Appendix V. Land Use/Land Cover Selections and Patch Type Justifications.

ENSP staff chose LULC classes from the NJDEP 2012 Modified Anderson System for each species-feature label combination in the formation of species-based patches of habitat. Also, in the delineation of species-based habitat, each species-feature label combination is grouped into a "Patch Type," or category that describes the method employed to form the valued habitat area from the Landscape base layer. In addition, for each LULC class selected for a particular species-feature label combination, a "LULC Treatment," or rule, is applied that determines how polygons of a LULC class will interact with a SOA and/or with polygons of other LULC classes in order to construct patches of habitat. The four general patch types are described below along with the LULC Treatments. For those species-feature label combinations that utilize variations, or subtypes, of the four general patch types, an explanation of the subtype is included within the corresponding patch type justification.

BIOPID – a unique ID that represents a species and a set of its feature labels.

Patch Type – a category that describes the method employed to form the valued habitat area from the Landscape base layer for each species-feature label combination. Each species-feature label combination is grouped into one of the following patch type categories.

- **Limited Extent** – polygons from a select set of LULC classes are valued upon intersection with a SOA. Once the valued habitat area is identified, any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.

- **Contiguous Area** – polygons from a select set of LULC classes are dissolved/combined into contiguous areas and valued upon intersection with a SOA.

- **Cardinal-Proximate** – polygons from an initial, or cardinal, set of LULC classes are valued upon intersection with a SOA and then polygons from a second, proximate set of LULC classes are valued based on a spatial relationship (e.g., adjacency) with polygons from the cardinal set of LULC classes and/or a SOA. Once the valued habitat area is identified, any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.

- **Stream Centerline** – stream centerlines are valued upon intersection with a SOA.

LULC Treatment – a specific rule applied to an individual LULC class that determines how polygons of the LULC class will interact with a SOA and/or with polygons of other LULC classes in order to construct patches of habitat for each species-feature label combination. For each species-feature label combination, each LULC class selected is assigned one or more of the following LULC treatments.

- **Undissolved** – polygons are not dissolved and are used as they are mapped in the Landscape base layer.

- **Dissolved** – polygons are dissolved to form contiguous patches.

- **Riparian Undissolved** – polygons coded as riparian are not dissolved and are used as they are mapped in the Landscape base layer.

- **Riparian Dissolved** – polygons coded as riparian are dissolved to form contiguous patches.

- **Adjacent Undissolved** – polygons are not dissolved and are selected based on adjacency with polygons of other LULC classes; or polygons are not dissolved and are selected based on adjacency with polygons of other LULC classes and a spatial connection with a SOA.

- **Gap Elimination** – polygons are used to fill in any internal holes or gaps that are completely enclosed by and contiguous with identified habitat areas.

The following table contains all of the Species-Feature Label Combinations sorted alphabetically by class. Click on any BIOPID number to be taken to the Land Use Land Cover Selections and Patch Type Justifications for that BIOPID.

Species-Feature Label Combinations (BIOPID)

Class Amphibia

Common Name ***Blue-spotted Salamander**** ***BIOPID*** *207*

Feature Label	*NJ Status*	*Patch Type*
Non-breeding Sighting	State Endangered	Cardinal-Proximate *
Occupied Habitat	State Endangered	Cardinal-Proximate *
On Road	State Endangered	Cardinal-Proximate *
Vernal Pool Breeding	State Endangered	Cardinal-Proximate *
Vernal Pool Non-breeding	State Endangered	Cardinal-Proximate *

Common Name ***Carpenter Frog*** ***BIOPID*** *255*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Cardinal-Proximate *
Non-breeding Sighting	Special Concern	Cardinal-Proximate *
Occupied Habitat	Special Concern	Cardinal-Proximate *
On Road	Special Concern	Cardinal-Proximate *
Vernal Pool Breeding	Special Concern	Cardinal-Proximate *
Vernal Pool Non-breeding	Special Concern	Cardinal-Proximate *

Common Name ***Cope's Gray Treefrog*** ***BIOPID*** *230*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	State Endangered	Cardinal-Proximate *
Non-breeding Sighting	State Endangered	Cardinal-Proximate *
Occupied Habitat	State Endangered	Cardinal-Proximate *
On Road	State Endangered	Cardinal-Proximate *
Vernal Pool Breeding	State Endangered	Cardinal-Proximate *
Vernal Pool Non-breeding	State Endangered	Cardinal-Proximate *

Common Name ***Eastern Tiger Salamander**** ***BIOPID*** *220*

Feature Label	*NJ Status*	*Patch Type*
Non-breeding Sighting	State Endangered	Contiguous Area
Occupied Habitat	State Endangered	Contiguous Area
On Road	State Endangered	Contiguous Area
Vernal Pool Breeding	State Endangered	Contiguous Area
Vernal Pool Non-breeding	State Endangered	Contiguous Area

Common Name Fowler's Toad **BIOPID** 285

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate *
Non-breeding Sighting	Special Concern	Cardinal-Proximate *
Occupied Habitat	Special Concern	Cardinal-Proximate *
On Road	Special Concern	Cardinal-Proximate *
Vernal Pool Breeding	Special Concern	Cardinal-Proximate *
Vernal Pool Non-breeding	Special Concern	Cardinal-Proximate *

Common Name Jefferson Salamander **BIOPID** 208

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Cardinal-Proximate *
Occupied Habitat	Special Concern	Cardinal-Proximate *
On Road	Special Concern	Cardinal-Proximate *
Vernal Pool Breeding	Special Concern	Cardinal-Proximate *
Vernal Pool Non-breeding	Special Concern	Cardinal-Proximate *

Common Name Longtail Salamander **BIOPID** 210

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Contiguous Area *
Non-breeding Sighting	State Threatened	Contiguous Area *
Occupied Habitat	State Threatened	Contiguous Area *
On Road	State Threatened	Contiguous Area *
Vernal Pool Breeding	State Threatened	Contiguous Area *
Vernal Pool Non-breeding	State Threatened	Contiguous Area *

Common Name Marbled Salamander **BIOPID** 209

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Cardinal-Proximate *
Occupied Habitat	Special Concern	Cardinal-Proximate *
On Road	Special Concern	Cardinal-Proximate *
Vernal Pool Breeding	Special Concern	Cardinal-Proximate *
Vernal Pool Non-breeding	Special Concern	Cardinal-Proximate *

Common Name Northern Spring Salamander **BIOPID** 279

Feature Label	NJ Status	Patch Type
Occupied Habitat	Special Concern	Limited Extent

On Road	Special Concern	Limited Extent

Common Name ***Pine Barrens Treefrog*** ***BIOPID*** *231*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	State Threatened	Cardinal-Proximate *
Non-breeding Sighting	State Threatened	Cardinal-Proximate *
Occupied Habitat	State Threatened	Cardinal-Proximate *
On Road	State Threatened	Cardinal-Proximate *
Vernal Pool Breeding	State Threatened	Cardinal-Proximate *
Vernal Pool Non-breeding	State Threatened	Cardinal-Proximate *

Class Aves

Common Name ***American Bittern*** ***BIOPID*** *160*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting-Confirmed	State Endangered	Contiguous Area
Nest	State Endangered	Contiguous Area
Roosting Area	State Endangered	Contiguous Area

Common Name ***American Kestrel*** ***BIOPID*** *274*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	State Threatened	Contiguous Area
Nest	State Threatened	Contiguous Area
Non-breeding Sighting	State Threatened	Contiguous Area

Common Name ***American Oystercatcher*** ***BIOPID*** *161*

Feature Label	*NJ Status*	*Patch Type*
Nest	Special Concern	Contiguous Area
Nesting Area	Special Concern	Contiguous Area
Non-breeding Concentration	Special Concern	Contiguous Area

Common Name ***Bald Eagle*** ***BIOPID*** *221*

Feature Label	*NJ Status*	*Patch Type*
Nest	State Endangered	Limited Extent

Common Name ***Bald Eagle*** ***BIOPID*** *236*

Feature Label	*NJ Status*	*Patch Type*
Foraging	State Endangered	Limited Extent

Common Name ***Bald Eagle*** ***BIOPID*** *238*

Feature Label	*NJ Status*	*Patch Type*

Roosting Area	State Threatened	Limited Extent

Common Name Bald Eagle **BIOPID** 286

Feature Label	NJ Status	Patch Type
Wintering	State Threatened	Limited Extent

Common Name Barn Owl **BIOPID** 225

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate
Non-breeding Sighting	Special Concern	Cardinal-Proximate

Common Name Barred Owl **BIOPID** 38

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Contiguous Area
Nest	State Threatened	Contiguous Area
Non-breeding Sighting	State Threatened	Contiguous Area
Roosting Area	State Threatened	Contiguous Area

Common Name Black Rail **BIOPID** 162

Feature Label	NJ Status	Patch Type
Breeding Sighting-Confirmed	State Endangered	Contiguous Area
Nest	State Endangered	Contiguous Area
Roosting Area	State Endangered	Contiguous Area

Common Name Black Skimmer **BIOPID** 163

Feature Label	NJ Status	Patch Type
Nesting Colony	State Endangered	Limited Extent
Non-breeding Concentration	State Endangered	Limited Extent

Common Name Black Skimmer **BIOPID** 164

Feature Label	NJ Status	Patch Type
Foraging	State Endangered	Limited Extent

Common Name Black-billed Cuckoo **BIOPID** 47

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate *
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate *

Common Name Blackburnian Warbler **BIOPID** 48

Feature Label	NJ Status	Patch Type

Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name ***Black-crowned Night-heron*** ***BIOPID*** *166*

Feature Label	*NJ Status*	*Patch Type*
Nesting Colony	State Threatened	Limited Extent
Roosting Area	State Threatened	Limited Extent

Common Name ***Black-crowned Night-heron*** ***BIOPID*** *167*

Feature Label	*NJ Status*	*Patch Type*
Foraging	State Threatened	Limited Extent

Common Name ***Black-throated Blue Warbler*** ***BIOPID*** *49*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name ***Black-throated Green Warbler*** ***BIOPID*** *35*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name ***Blue-headed Vireo (Solitary Vireo)*** ***BIOPID*** *50*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name ***Bobolink*** ***BIOPID*** *34*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	State Threatened	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Threatened	Cardinal-Proximate *

Common Name ***Bobolink*** ***BIOPID*** *54*

Feature Label	*NJ Status*	*Patch Type*
Non-breeding Sighting	Special Concern	Limited Extent

Common Name ***Broad-winged Hawk*** ***BIOPID*** *226*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Limited Extent
Nest	Special Concern	Limited Extent

Common Name	Brown Thrasher	BIOPID	51

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate *
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate *

Common Name	Canada Warbler	BIOPID	52

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name	Caspian Tern	BIOPID	168

Feature Label	NJ Status	Patch Type
Nesting Colony	Special Concern	Limited Extent

Common Name	Caspian Tern	BIOPID	169

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent

Common Name	Cattle Egret	BIOPID	200

Feature Label	NJ Status	Patch Type
Nesting Colony	State Threatened	Limited Extent
Roosting Area	State Threatened	Limited Extent

Common Name	Cattle Egret	BIOPID	201

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent

Common Name	Cerulean Warbler	BIOPID	53

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Contiguous Area *
Breeding Sighting-Confirmed	Special Concern	Contiguous Area *

Common Name	Cerulean Warbler	BIOPID	55

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Contiguous Area

Common Name	Cliff Swallow	BIOPID	218

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name	Common Nighthawk	BIOPID	56

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Limited Extent
Breeding Sighting-Confirmed	Special Concern	Limited Extent
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Common Tern	BIOPID	170

Feature Label	NJ Status	Patch Type
Nesting Colony	Special Concern	Limited Extent

Common Name	Common Tern	BIOPID	171

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent

Common Name	Cooper's Hawk	BIOPID	40

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Limited Extent
Nest	Special Concern	Limited Extent
Non-breeding Sighting	Stable	Limited Extent

Common Name	Eastern Meadowlark	BIOPID	58

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate *
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate *

Common Name	Glossy Ibis	BIOPID	198

Feature Label	NJ Status	Patch Type
Nesting Colony	Special Concern	Limited Extent
Roosting Area	Special Concern	Limited Extent

Common Name	Glossy Ibis	BIOPID	199

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent

Common Name	Golden-winged Warbler	BIOPID	60

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Limited Extent
Breeding Sighting-Confirmed	State Endangered	Limited Extent
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Grasshopper Sparrow	BIOPID	61

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Threatened	Cardinal-Proximate *
Non-breeding Sighting	Special Concern	Cardinal-Proximate *

Common Name	Gray-cheeked Thrush	BIOPID	62

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Great Blue Heron	BIOPID	172

Feature Label	NJ Status	Patch Type
Nesting Colony	Special Concern	Limited Extent
Roosting Area	Special Concern	Limited Extent

Common Name	Great Blue Heron	BIOPID	173

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent

Common Name	Gull-billed Tern	BIOPID	178

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Contiguous Area
Nesting Colony	Special Concern	Contiguous Area

Common Name	Henslow's Sparrow	BIOPID	63

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Endangered	Cardinal-Proximate *

Common Name	Henslow's Sparrow	BIOPID	64

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	State Endangered	Limited Extent

Common Name	Hooded Warbler	BIOPID	65

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name	Horned Lark	BIOPID	66

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Cardinal-Proximate *

Breeding Sighting-Confirmed	State Threatened	Cardinal-Proximate *
Non-breeding Sighting	Special Concern	Cardinal-Proximate *

Common Name ***Kentucky Warbler*** ***BIOPID*** *67*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name ***Kentucky Warbler*** ***BIOPID*** *68*

Feature Label	*NJ Status*	*Patch Type*
Non-breeding Sighting	Special Concern	Contiguous Area

Common Name ***Least Bittern*** ***BIOPID*** *181*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting-Confirmed	Special Concern	Contiguous Area
Nest	Special Concern	Contiguous Area
Roosting Area	Special Concern	Contiguous Area

Common Name ***Least Flycatcher*** ***BIOPID*** *69*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Limited Extent
Breeding Sighting-Confirmed	Special Concern	Limited Extent

Common Name ***Least Tern*** ***BIOPID*** *182*

Feature Label	*NJ Status*	*Patch Type*
Nesting Colony	State Endangered	Limited Extent

Common Name ***Least Tern*** ***BIOPID*** *183*

Feature Label	*NJ Status*	*Patch Type*
Foraging	State Endangered	Limited Extent

Common Name ***Little Blue Heron*** ***BIOPID*** *184*

Feature Label	*NJ Status*	*Patch Type*
Nesting Colony	Special Concern	Limited Extent
Roosting Area	Special Concern	Limited Extent

Common Name ***Little Blue Heron*** ***BIOPID*** *185*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent

Common Name ***Loggerhead Shrike*** ***BIOPID*** *70*

Feature Label	*NJ Status*	*Patch Type*

Non-breeding Sighting	State Endangered	Limited Extent

Common Name Long-eared Owl **BIOPID** 222

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Cardinal-Proximate
Nest	State Threatened	Cardinal-Proximate
Non-breeding Sighting	State Threatened	Cardinal-Proximate

Common Name Long-eared Owl **BIOPID** 223

Feature Label	NJ Status	Patch Type
Roosting Area	State Threatened	Contiguous Area

Common Name Migratory Raptor Concentration Site **BIOPID** 241

Feature Label	NJ Status	Patch Type
Non-breeding Concentration	NA	Limited Extent

Common Name Migratory Shorebird Concentration Site **BIOPID** 213

Feature Label	NJ Status	Patch Type
Non-breeding Concentration	State Endangered	Limited Extent
Non-breeding Concentration-Major	State Endangered	Limited Extent

Common Name Nashville Warbler **BIOPID** 71

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate

Common Name Northern Goshawk **BIOPID** 41

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Contiguous Area
Nest	State Endangered	Contiguous Area
Non-breeding Sighting	Special Concern	Contiguous Area

Common Name Northern Harrier **BIOPID** 224

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Cardinal-Proximate
Nest	State Endangered	Cardinal-Proximate
Non-breeding Sighting	Special Concern	Cardinal-Proximate

Common Name	Northern Parula	BIOPID	72

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate

Common Name	Osprey	BIOPID	227

Feature Label	NJ Status	Patch Type
Nest	State Threatened	Cardinal-Proximate

Common Name	Osprey	BIOPID	287

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent

Common Name	Peregrine Falcon	BIOPID	239

Feature Label	NJ Status	Patch Type
Nest	State Endangered	Limited Extent
Urban Nest	State Endangered	Limited Extent

Common Name	Pied-billed Grebe	BIOPID	186

Feature Label	NJ Status	Patch Type
Breeding Sighting-Confirmed	State Endangered	Contiguous Area
Nest	State Endangered	Contiguous Area

Common Name	Piping Plover	BIOPID	187

Feature Label	NJ Status	Patch Type
Nest	State Endangered	Limited Extent
Nesting Area	State Endangered	Limited Extent
Non-breeding Concentration	State Endangered	Limited Extent

Common Name	Red Knot	BIOPID	214

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	State Endangered	Limited Extent

Common Name	Red-headed Woodpecker	BIOPID	73

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Threatened	Cardinal-Proximate *

Common Name	Red-headed Woodpecker	BIOPID	74

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	State Threatened	Cardinal-Proximate *

Common Name	Red-shouldered Hawk	BIOPID	204

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Limited Extent
Nest	State Endangered	Limited Extent
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Roseate Tern	BIOPID	188

Feature Label	NJ Status	Patch Type
Nesting Colony	State Endangered	Limited Extent

Common Name	Roseate Tern	BIOPID	189

Feature Label	NJ Status	Patch Type
Foraging	State Endangered	Limited Extent

Common Name	Saltmarsh Sparrow	BIOPID	75

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate
Nest	Special Concern	Cardinal-Proximate
Urban Nest	Special Concern	Cardinal-Proximate

Common Name	Sanderling	BIOPID	215

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Savannah Sparrow	BIOPID	76

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Threatened	Cardinal-Proximate *

Common Name	Sedge Wren	BIOPID	87

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Cardinal-Proximate *
Nest	State Endangered	Cardinal-Proximate *
Non-breeding Sighting	State Endangered	Cardinal-Proximate *

Common Name	Semipalmated Sandpiper	BIOPID	216

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Sharp-shinned Hawk	BIOPID	240

Feature Label	NJ Status	Patch Type

Breeding Sighting	Special Concern	Limited Extent
Nest	Special Concern	Limited Extent

Common Name ***Short-eared Owl*** ***BIOPID*** *273*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	State Endangered	Contiguous Area
Nest	State Endangered	Contiguous Area
Non-breeding Sighting	Special Concern	Contiguous Area

Common Name ***Snowy Egret*** ***BIOPID*** *202*

Feature Label	*NJ Status*	*Patch Type*
Nesting Colony	Special Concern	Limited Extent
Roosting Area	Special Concern	Limited Extent

Common Name ***Snowy Egret*** ***BIOPID*** *203*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent

Common Name ***Tricolored Heron*** ***BIOPID*** *192*

Feature Label	*NJ Status*	*Patch Type*
Nesting Colony	Special Concern	Limited Extent
Roosting Area	Special Concern	Limited Extent

Common Name ***Tricolored Heron*** ***BIOPID*** *193*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent

Common Name ***Upland Sandpiper*** ***BIOPID*** *77*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	State Endangered	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Endangered	Cardinal-Proximate *

Common Name ***Upland Sandpiper*** ***BIOPID*** *78*

Feature Label	*NJ Status*	*Patch Type*
Non-breeding Sighting	State Endangered	Limited Extent

Common Name ***Veery*** ***BIOPID*** *79*

Feature Label	*NJ Status*	*Patch Type*
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name	Vesper Sparrow	BIOPID	80

Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	Cardinal-Proximate *
Breeding Sighting-Confirmed	State Endangered	Cardinal-Proximate *

Common Name	Vesper Sparrow	BIOPID	81

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Whimbrel	BIOPID	217

Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	Limited Extent

Common Name	Whip-poor-will	BIOPID	82

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate

Common Name	Winter Wren	BIOPID	83

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name	Wood Thrush	BIOPID	84

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Limited Extent
Breeding Sighting-Confirmed	Special Concern	Limited Extent

Common Name	Worm-eating Warbler	BIOPID	85

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Contiguous Area
Breeding Sighting-Confirmed	Special Concern	Contiguous Area

Common Name	Yellow-breasted Chat	BIOPID	86

Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	Cardinal-Proximate *
Breeding Sighting-Confirmed	Special Concern	Cardinal-Proximate *

Common Name	Yellow-crowned Night-heron	BIOPID	10

Feature Label	NJ Status	Patch Type
Nesting Colony	State Threatened	Cardinal-Proximate *

Roosting Area	State Threatened	Cardinal-Proximate *

Common Name ***Yellow-crowned Night-heron*** ***BIOPID*** *197*

Feature Label	*NJ Status*	*Patch Type*
Foraging	State Threatened	Limited Extent

Class Bivalvia

Common Name ***Brook Floater**** ***BIOPID*** *245*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Endangered	Stream Centerline
Fresh Shell Sighting	State Endangered	Stream Centerline
Live Individual Sighting	State Endangered	Stream Centerline

Common Name ***Creeper**** ***BIOPID*** *246*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	Special Concern	Stream Centerline
Fresh Shell Sighting	Special Concern	Stream Centerline
Live Individual Sighting	Special Concern	Stream Centerline

Common Name ***Dwarf Wedgemussel**** ***BIOPID*** *247*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Endangered	Stream Centerline
Fresh Shell Sighting	State Endangered	Stream Centerline
Live Individual Sighting	State Endangered	Stream Centerline

Common Name ***Eastern Lampmussel**** ***BIOPID*** *248*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Threatened	Stream Centerline
Fresh Shell Sighting	State Threatened	Stream Centerline
Live Individual Sighting	State Threatened	Stream Centerline

Common Name ***Eastern Pondmussel**** ***BIOPID*** *249*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Threatened	Stream Centerline
Fresh Shell Sighting	State Threatened	Stream Centerline
Live Individual Sighting	State Threatened	Stream Centerline

Common Name ***Green Floater**** ***BIOPID*** *250*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Endangered	Stream Centerline

Fresh Shell Sighting	State Endangered	Stream Centerline
Live Individual Sighting	State Endangered	Stream Centerline

Common Name ***Tidewater Mucket**** ***BIOPID*** *251*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Threatened	Stream Centerline
Fresh Shell Sighting	State Threatened	Stream Centerline
Live Individual Sighting	State Threatened	Stream Centerline

Common Name ***Triangle Floater**** ***BIOPID*** *252*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Threatened	Stream Centerline
Fresh Shell Sighting	State Threatened	Stream Centerline
Live Individual Sighting	State Threatened	Stream Centerline

Common Name ***Yellow Lampmussel**** ***BIOPID*** *253*

Feature Label	*NJ Status*	*Patch Type*
Fresh Dead Individual	State Threatened	Stream Centerline
Fresh Shell Sighting	State Threatened	Stream Centerline
Live Individual Sighting	State Threatened	Stream Centerline

Class Insecta

Common Name ***Allegheny River Cruiser*** ***BIOPID*** *136*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Allegheny River Cruiser*** ***BIOPID*** *137*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Arogos Skipper*** ***BIOPID*** *11*

Feature Label	*NJ Status*	*Patch Type*
Casual Flyby	State Endangered	Limited Extent
Nectaring	State Endangered	Limited Extent

Common Name Arogos Skipper **BIOPID** 95

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Endangered	Cardinal-Proximate
Larvae Sighting	State Endangered	Cardinal-Proximate
Pupae Sighting	State Endangered	Cardinal-Proximate

Common Name Arrowhead Spiketail **BIOPID** 98

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Arrowhead Spiketail **BIOPID** 99

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Banner Clubtail **BIOPID** 134

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Threatened	Cardinal-Proximate *
Exuviae Sighting	State Threatened	Cardinal-Proximate *
Larvae Sighting	State Threatened	Cardinal-Proximate *
Territorial Display	State Threatened	Cardinal-Proximate *

Common Name Banner Clubtail **BIOPID** 135

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent
Occupied Habitat	State Threatened	Limited Extent

Common Name Bronze Copper **BIOPID** 30

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Endangered	Cardinal-Proximate
Larvae Sighting	State Endangered	Cardinal-Proximate
Pupae Sighting	State Endangered	Cardinal-Proximate

Common Name Bronze Copper **BIOPID** 31

Feature Label	NJ Status	Patch Type
Casual Flyby	State Endangered	Limited Extent

Nectaring	State Endangered	Limited Extent

Common Name Brook Snaketail **BIOPID** 122

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Threatened	Cardinal-Proximate *
Exuviae Sighting	State Threatened	Cardinal-Proximate *
Larvae Sighting	State Threatened	Cardinal-Proximate *
Territorial Display	State Threatened	Cardinal-Proximate *

Common Name Brook Snaketail **BIOPID** 123

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent
Occupied Habitat	State Threatened	Limited Extent

Common Name Brush-tipped Emerald **BIOPID** 146

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Brush-tipped Emerald **BIOPID** 147

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Checkered White **BIOPID** 28

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Threatened	Cardinal-Proximate
Larvae Sighting	State Threatened	Cardinal-Proximate
Pupae Sighting	State Threatened	Cardinal-Proximate

Common Name Checkered White **BIOPID** 29

Feature Label	NJ Status	Patch Type
Casual Flyby	State Threatened	Limited Extent
Nectaring	State Threatened	Limited Extent

Common Name Cobra Clubtail **BIOPID** 114

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *

Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Cobra Clubtail*** ***BIOPID*** *115*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Coppery Emerald*** ***BIOPID*** *133*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Crimson-ringed Whiteface*** ***BIOPID*** *156*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Crimson-ringed Whiteface*** ***BIOPID*** *157*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Dotted Skipper*** ***BIOPID*** *17*

Feature Label	*NJ Status*	*Patch Type*
Casual Flyby	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent

Common Name ***Forcipate Emerald*** ***BIOPID*** *153*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Frosted Elfin*** ***BIOPID*** *22*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	State Threatened	Cardinal-Proximate
Larvae Sighting	State Threatened	Cardinal-Proximate

Pupae Sighting	State Threatened	Cardinal-Proximate

Common Name Frosted Elfin **BIOPID** 23

Feature Label	NJ Status	Patch Type
Casual Flyby	State Threatened	Limited Extent
Nectaring	State Threatened	Limited Extent

Common Name Georgia Satyr **BIOPID** 12

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate
Larvae Sighting	Special Concern	Cardinal-Proximate
Pupae Sighting	Special Concern	Cardinal-Proximate

Common Name Georgia Satyr **BIOPID** 13

Feature Label	NJ Status	Patch Type
Casual Flyby	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent

Common Name Golden-winged Skimmer **BIOPID** 104

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate
Exuviae Sighting	Special Concern	Cardinal-Proximate
Larvae Sighting	Special Concern	Cardinal-Proximate
Territorial Display	Special Concern	Cardinal-Proximate

Common Name Golden-winged Skimmer **BIOPID** 105

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Gray Petaltail **BIOPID** 92

Feature Label	NJ Status	Patch Type
Foraging	State Endangered	Limited Extent
Occupied Habitat	State Endangered	Limited Extent

Common Name Green-faced Clubtail **BIOPID** 112

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *

Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Green-faced Clubtail **BIOPID** 113

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Harpoon Clubtail **BIOPID** 126

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Threatened	Cardinal-Proximate *
Exuviae Sighting	State Threatened	Cardinal-Proximate *
Larvae Sighting	State Threatened	Cardinal-Proximate *
Territorial Display	State Threatened	Cardinal-Proximate *

Common Name Harpoon Clubtail **BIOPID** 127

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent
Occupied Habitat	State Threatened	Limited Extent

Common Name Harris Checkerspot **BIOPID** 20

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Limited Extent
Casual Flyby	Special Concern	Limited Extent
Larvae Sighting	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent
Pupae Sighting	Special Concern	Limited Extent

Common Name Hessel's Hairstreak **BIOPID** 176

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate
Larvae Sighting	Special Concern	Cardinal-Proximate
Pupae Sighting	Special Concern	Cardinal-Proximate

Common Name Hessel's Hairstreak **BIOPID** 177

Feature Label	NJ Status	Patch Type
Casual Flyby	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent

Common Name Hoary Elfin **BIOPID** 24

Feature Label	NJ Status	Patch Type

Breeding/Courtship	Special Concern	Cardinal-Proximate
Larvae Sighting	Special Concern	Cardinal-Proximate
Pupae Sighting	Special Concern	Cardinal-Proximate

Common Name ***Hudsonian Whiteface*** ***BIOPID*** *154*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Hudsonian Whiteface*** ***BIOPID*** *155*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Kennedy's Emerald*** ***BIOPID*** *158*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	State Threatened	Cardinal-Proximate *
Exuviae Sighting	State Threatened	Cardinal-Proximate *
Larvae Sighting	State Threatened	Cardinal-Proximate *
Territorial Display	State Threatened	Cardinal-Proximate *

Common Name ***Leonard's Skipper*** ***BIOPID*** *89*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate
Larvae Sighting	Special Concern	Cardinal-Proximate
Pupae Sighting	Special Concern	Cardinal-Proximate

Common Name ***Leonard's Skipper*** ***BIOPID*** *90*

Feature Label	*NJ Status*	*Patch Type*
Casual Flyby	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent

Common Name ***Maine Snaketail*** ***BIOPID*** *128*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *

Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Maine Snaketail **BIOPID** 129

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Midland Clubtail **BIOPID** 116

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Mitchell's Satyr **BIOPID** 19

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Endangered	Limited Extent
Casual Flyby	State Endangered	Limited Extent
Larvae Sighting	State Endangered	Limited Extent
Nectaring	State Endangered	Limited Extent
Pupae Sighting	State Endangered	Limited Extent

Common Name New England Bluet **BIOPID** 108

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name New England Bluet **BIOPID** 109

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Northeastern Beach Tiger Beetle **BIOPID** 244

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Endangered	Limited Extent
Larvae Sighting	State Endangered	Limited Extent

Occupied Habitat	State Endangered	Limited Extent

Common Name ***Northern Metalmark*** ***BIOPID*** *26*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Limited Extent
Casual Flyby	Special Concern	Limited Extent
Larvae Sighting	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent
Pupae Sighting	Special Concern	Limited Extent

Common Name ***Pine Barrens Bluet*** ***BIOPID*** *102*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Pine Barrens Bluet*** ***BIOPID*** *103*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Rapids Clubtail*** ***BIOPID*** *120*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Rapids Clubtail*** ***BIOPID*** *121*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Robust Baskettail*** ***BIOPID*** *138*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	State Threatened	Cardinal-Proximate *
Exuviae Sighting	State Threatened	Cardinal-Proximate *
Larvae Sighting	State Threatened	Cardinal-Proximate *

Territorial Display	State Threatened	Cardinal-Proximate *

Common Name Robust Baskettail **BIOPID** 139

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent
Occupied Habitat	State Threatened	Limited Extent

Common Name Sable Clubtail **BIOPID** 100

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Sable Clubtail **BIOPID** 101

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Scarlet Bluet **BIOPID** 106

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Scarlet Bluet **BIOPID** 107

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Septima's Clubtail **BIOPID** 110

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Septima's Clubtail **BIOPID** 111

Feature Label	NJ Status	Patch Type

Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Silver-bordered Fritillary*** ***BIOPID*** *18*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	State Threatened	Cardinal-Proximate
Larvae Sighting	State Threatened	Cardinal-Proximate
Pupae Sighting	State Threatened	Cardinal-Proximate

Common Name ***Silver-bordered Fritillary*** ***BIOPID*** *88*

Feature Label	*NJ Status*	*Patch Type*
Casual Flyby	State Threatened	Limited Extent
Nectaring	State Threatened	Limited Extent

Common Name ***Ski-tailed Emerald*** ***BIOPID*** *150*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Spatterdock Darner*** ***BIOPID*** *140*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Spatterdock Darner*** ***BIOPID*** *141*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Subarctic Darner*** ***BIOPID*** *144*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Superb Jewelwing **BIOPID** 124

Feature Label	NJ Status	Patch Type
Breeding/Courtship	State Threatened	Cardinal-Proximate *
Exuviae Sighting	State Threatened	Cardinal-Proximate *
Larvae Sighting	State Threatened	Cardinal-Proximate *
Territorial Display	State Threatened	Cardinal-Proximate *

Common Name Superb Jewelwing **BIOPID** 125

Feature Label	NJ Status	Patch Type
Foraging	State Threatened	Limited Extent
Occupied Habitat	State Threatened	Limited Extent

Common Name Tiger Spiketail **BIOPID** 96

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name Tiger Spiketail **BIOPID** 97

Feature Label	NJ Status	Patch Type
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name Two-spotted Skipper **BIOPID** 14

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate
Larvae Sighting	Special Concern	Cardinal-Proximate
Pupae Sighting	Special Concern	Cardinal-Proximate

Common Name Two-spotted Skipper **BIOPID** 15

Feature Label	NJ Status	Patch Type
Casual Flyby	Special Concern	Limited Extent
Nectaring	Special Concern	Limited Extent

Common Name Williamson's Emerald **BIOPID** 148

Feature Label	NJ Status	Patch Type
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *

Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Common Name ***Williamson's Emerald*** ***BIOPID*** *149*

Feature Label	*NJ Status*	*Patch Type*
Foraging	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent

Common Name ***Zebra Clubtail*** ***BIOPID*** *130*

Feature Label	*NJ Status*	*Patch Type*
Breeding/Courtship	Special Concern	Cardinal-Proximate *
Exuviae Sighting	Special Concern	Cardinal-Proximate *
Larvae Sighting	Special Concern	Cardinal-Proximate *
Territorial Display	Special Concern	Cardinal-Proximate *

Class Mammalia

Common Name ***Allegheny Woodrat*** ***BIOPID*** *219*

Feature Label	*NJ Status*	*Patch Type*
Capture Location	State Endangered	Contiguous Area
Live Individual Sighting	State Endangered	Contiguous Area
On Road	State Endangered	Contiguous Area
Physical evidence	State Endangered	Contiguous Area

Common Name ***Bobcat*** ***BIOPID*** *46*

Feature Label	*NJ Status*	*Patch Type*
Capture Location	State Endangered	Contiguous Area *
Live Individual Sighting	State Endangered	Contiguous Area *
On Road	State Endangered	Contiguous Area *
Physical evidence	State Endangered	Contiguous Area *
Telemetry: Home Range	State Endangered	Contiguous Area *

Common Name ***Fin Whale*** ***BIOPID*** *256*

Feature Label	*NJ Status*	*Patch Type*
Foraging Area	State Endangered	Limited Extent
Live Individual Sighting	State Endangered	Limited Extent

Common Name ***Humpback Whale*** ***BIOPID*** *257*

Feature Label	*NJ Status*	*Patch Type*
Foraging Area	State Endangered	Limited Extent

Live Individual Sighting	State Endangered	Limited Extent

Common Name ***Indiana Bat*** ***BIOPID*** *229*

Feature Label	*NJ Status*	*Patch Type*
Active Season Sighting	State Endangered	Contiguous Area
Hibernaculum	State Endangered	Contiguous Area
Inactive Season Sighting	State Endangered	Contiguous Area
Maternity Colony	State Endangered	Contiguous Area

Common Name ***North Atlantic Right Whale*** ***BIOPID*** *258*

Feature Label	*NJ Status*	*Patch Type*
Foraging Area	State Endangered	Limited Extent
Live Individual Sighting	State Endangered	Limited Extent

Common Name ***Northern Myotis*** ***BIOPID*** *290*

Feature Label	*NJ Status*	*Patch Type*
Active Season Sighting	NA	Contiguous Area
Hibernaculum	NA	Contiguous Area
Inactive Season Sighting	NA	Contiguous Area
Maternity Colony	NA	Contiguous Area
Roost Site	NA	Contiguous Area

Class Osteichthyes

Common Name ***Atlantic Sturgeon*** ***BIOPID*** *264*

Feature Label	*NJ Status*	*Patch Type*
Migration Corridor - Adult Sighting	State Endangered	Limited Extent
Migration Corridor - Juvenile Sighting	State Endangered	Limited Extent
Nursery Area - Larvae Sighting	State Endangered	Limited Extent
Nursery Area - Young-of-year Sighting	State Endangered	Limited Extent
Spawning Area - Adult Sighting	State Endangered	Limited Extent
Spawning Area - Egg Sighting	State Endangered	Limited Extent
Summering Area - Adult Sighting	State Endangered	Limited Extent
Summering Area - Juvenile Sighting	State Endangered	Limited Extent

Common Name ***Shortnose Sturgeon*** ***BIOPID*** *263*

Feature Label	*NJ Status*	*Patch Type*

Migration Corridor - Adult Sighting	State Endangered	Limited Extent
Migration Corridor - Juvenile Sighting	State Endangered	Limited Extent
Nursery Area - Larvae Sighting	State Endangered	Limited Extent
Nursery Area - Young-of-year Sighting	State Endangered	Limited Extent
Overwintering Area - Adult Sighting	State Endangered	Limited Extent
Overwintering Area - Juvenile Sighting	State Endangered	Limited Extent
Spawning Area - Adult Sighting	State Endangered	Limited Extent
Spawning Area - Egg Sighting	State Endangered	Limited Extent
Summering Area - Adult Sighting	State Endangered	Limited Extent
Summering Area - Juvenile Sighting	State Endangered	Limited Extent

Class Reptilia

Common Name ***Atlantic Green Turtle*** ***BIOPID*** *259*

Feature Label	*NJ Status*	*Patch Type*
Marine Telemetry: Partial Activity Range	State Threatened	Limited Extent
Occupied Habitat	State Threatened	Limited Extent

Common Name ***Atlantic Leatherback*** ***BIOPID*** *262*

Feature Label	*NJ Status*	*Patch Type*
Marine Telemetry: Partial Activity Range	State Endangered	Limited Extent
Occupied Habitat	State Endangered	Limited Extent

Common Name ***Atlantic Loggerhead*** ***BIOPID*** *260*

Feature Label	*NJ Status*	*Patch Type*
Marine Telemetry: Partial Activity Range	State Endangered	Limited Extent
Occupied Habitat	State Endangered	Limited Extent

Common Name ***Atlantic Ridley*** ***BIOPID*** *261*

Feature Label	*NJ Status*	*Patch Type*
Marine Telemetry: Partial Activity Range	State Endangered	Limited Extent
Occupied Habitat	State Endangered	Limited Extent

Common Name ***Bog Turtle**** ***BIOPID*** *206*

Feature Label	*NJ Status*	*Patch Type*

Hibernaculum	State Endangered	Contiguous Area *
Occupied Habitat	State Endangered	Contiguous Area *
On Road	State Endangered	Contiguous Area *

Common Name ***Corn Snake**** ***BIOPID*** *254*

Feature Label	NJ Status	Patch Type
Gestation Site	State Endangered	Contiguous Area
Hibernaculum	State Endangered	Contiguous Area
Nesting Area	State Endangered	Contiguous Area
Occupied Habitat	State Endangered	Contiguous Area
Occurrence by Den	State Endangered	Contiguous Area
On Road	State Endangered	Contiguous Area
Telemetry: Home Range	State Endangered	Contiguous Area
Telemetry: Partial Activity Range	State Endangered	Contiguous Area

Common Name ***Eastern Box Turtle**** ***BIOPID*** *233*

Feature Label	NJ Status	Patch Type
Hibernaculum	Special Concern	Limited Extent
Nesting Area	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent
On Road	Special Concern	Limited Extent
Vernal Pool Non-breeding	Special Concern	Limited Extent

Common Name ***Eastern Kingsnake**** ***BIOPID*** *281*

Feature Label	NJ Status	Patch Type
Gestation Site	Special Concern	Limited Extent
Hibernaculum	Special Concern	Limited Extent
Nesting Area	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent
Occurrence by Den	Special Concern	Limited Extent
On Road	Special Concern	Limited Extent
Telemetry: Home Range	Special Concern	Limited Extent
Telemetry: Partial Activity Range	Special Concern	Limited Extent

Common Name ***Northern Copperhead Snake**** ***BIOPID*** *44*

Feature Label	NJ Status	Patch Type

Gestation Site	Special Concern	Contiguous Area
Hibernaculum	Special Concern	Contiguous Area
Occupied Habitat	Special Concern	Contiguous Area
Occurrence by Den	Special Concern	Contiguous Area
On Road	Special Concern	Contiguous Area
Telemetry: Home Range	Special Concern	Contiguous Area
Telemetry: Partial Activity Range	Special Concern	Contiguous Area

Common Name ***Northern Pine Snake**** ***BIOPID*** *232*

Feature Label	*NJ Status*	*Patch Type*
Gestation Site	State Threatened	Contiguous Area
Hibernaculum	State Threatened	Contiguous Area
Nesting Area	State Threatened	Contiguous Area
Occupied Habitat	State Threatened	Contiguous Area
Occurrence by Den	State Threatened	Contiguous Area
On Road	State Threatened	Contiguous Area
Telemetry: Home Range	State Threatened	Contiguous Area
Telemetry: Partial Activity Range	State Threatened	Contiguous Area

Common Name ***Spotted Turtle**** ***BIOPID*** *282*

Feature Label	*NJ Status*	*Patch Type*
Hibernaculum	Special Concern	Limited Extent
Nesting Area	Special Concern	Limited Extent
Occupied Habitat	Special Concern	Limited Extent
On Road	Special Concern	Limited Extent
Vernal Pool	Special Concern	Limited Extent

Common Name ***Timber Rattlesnake**** ***BIOPID*** *45* ***Skylands***

Feature Label	*NJ Status*	*Patch Type*
Gestation Site	State Endangered	Contiguous Area
Hibernaculum	State Endangered	Contiguous Area
Occupied Habitat	State Endangered	Contiguous Area
Occurrence by Den	State Endangered	Contiguous Area
On Road	State Endangered	Contiguous Area
Telemetry: Home Range	State Endangered	Contiguous Area

	Telemetry: Partial Activity Range	State Endangered	Contiguous Area

Common Name	Timber Rattlesnake*	BIOPID	284	Atlantic Coastal, Delaware Bay, Piedmont Plains and Pinelands

	Feature Label	NJ Status	Patch Type
	Gestation Site	State Endangered	Contiguous Area
	Hibernaculum	State Endangered	Contiguous Area
	Occupied Habitat	State Endangered	Contiguous Area
	Occurrence by Den	State Endangered	Contiguous Area
	On Road	State Endangered	Contiguous Area
	Telemetry: Home Range	State Endangered	Contiguous Area
	Telemetry: Partial Activity Range	State Endangered	Contiguous Area

Common Name	Wood Turtle*	BIOPID	196

	Feature Label	NJ Status	Patch Type
	Hibernaculum	State Threatened	Limited Extent
	Nesting Area	State Threatened	Limited Extent
	Occupied Habitat	State Threatened	Limited Extent
	On Road	State Threatened	Limited Extent
	Vernal Pool	State Threatened	Limited Extent

*Generalized Feature Label Justification Class Amphibia and Reptilia

The collection of wildlife for commercial purposes and the disturbance of critical wildlife areas is a recognized threat to individual reptile and amphibian species (Gibbons et al. 2000, Garber and Burger 1995, Goode et al. 2004). Because ectotherms are often dormant or sedentary for parts of the year, and because they often exhibit fidelity to unique features within their respective home ranges (e.g., den, nesting area, breeding pool) information specific to the locations of these areas are considered sensitive. To minimize existing threats to imperiled species prone to collection and disturbance, feature labels are depicted solely as “Occupied Habitat” and will not explicitly state more descriptive labeling as with other listed species in this report.

Garber, S.D., and Burger, J. 1995. A 20-yr study documenting the relationship between turtle decline and human recreation. Ecological Applications. 5: 1151-1162.

Gibbons JW, et al. 2000. The global decline of reptiles, déjà vu amphibians. BioScience 50: 653 -666.

Goode MJ, Swann DE, Schwalbe CR. 2004. Effects of destructive collecting practices on reptiles: A field experiment. Journal of Wildlife Management 68: 429 -434.

**Generalized Feature Label Justification Class Bivalvia

Freshwater mussels, especially those with unique or attractive shell characteristics, are often sought by shell collectors and hobbyists. Anecdotal information suggests an active “black market” in the shell trade, where people collect endangered and threatened species because of their rarity. Shells of rare species, which are most attractive when the animal is found live and then sacrificed, have also been advertised for sale on E-Bay (J. Bowers-Altman, pers. obs). Collection of dwarf wedgemussels, a federally endangered species, is considered a serious threat by the US Fish and Wildlife Service to the few remaining populations (Dept. of Interior 1990). Dwarf wedgemussels are sought by collectors because of their rarity and unusual shell anatomy. Populations of this species are considered vulnerable because of their small size. Also, an entire population may occur in a few hundred yards of stream length, making it especially susceptible to extirpation if a collector is aware of an exact location. Other species, such as green floater or brook floater, may be represented in small stream segments by populations of one or two individuals and could therefore not withstand any collection activity. For these reasons, location information for all freshwater mussel species should be protected. To minimize existing threats to imperiled species prone to collection and disturbance, feature labels are depicted solely as “Occupied Habitat” and will not explicitly state more descriptive labeling as with other listed species in the report.

Department of Interior, Fish and Wildlife Service. 1990. Federal Register Vol. 55, No. 50. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Dwarf Wedge Mussel.

Land Use Land Cover Selections and Patch Type Justifications

Blue-spotted Salamander **BIOPID** 207 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	2-5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	2-5
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	2-5
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	2-5
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	2-5
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2-5
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	2-5
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2-5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	2-5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2-5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	2-5
4230	PLANTATION	Undissolved	2-5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	2-5

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	2-5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2-5
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	2-5
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	2-5
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	2-5
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	2-5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	2-5

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	2-5
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	2-5
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2-5

Land Use - Land Cover Selection and Patch Type Rationale

Blue-spotted salamanders (*Ambystoma laterale*) breed in fish-free ponds, often defined as vernal pools, in New Jersey (Anderson and Giacosie 1967). Much of each species' distribution is within 300-meters of a breeding habitat, although individuals will disperse outside of this range (Regosin et al. 2005). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of this salamander. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as the non-breeding habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for marbled salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

1. Anderson, J.D. and R.V. Giacosie. 1967. Ambystoma laterale in New Jersey. Herpetologica 23 (2): 108-111

2. Faccio, S.D. 2003. Postbreeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. Journal of Herpetology 37:479-489.

3. Madison, D. M. 1997. The emigration of radio-implanted spotted salamanders, Ambystoma maculatum. Journal of Herpetology 31:542-551.

4. Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington D.C., USA.

5. Regosin, J.V., B.S. Windmiller, R.N. Homan, and J.M. Reed. 2005. Variation in Terrestrial Habitat Use By Four Pool-Breeding Amphibian Species. Journal of Wildlife Management 69 (4): 1481-1493.

Land Use Land Cover Selections and Patch Type Justifications

Carpenter Frog

BIOPID *255* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-3*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
5200	NATURAL LAKES	Undissolved	*1-3*
5300	ARTIFICIAL LAKES	Undissolved	*1-3*

6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

From Conant and Collins: Sometimes called the “sphagnum frog” because of a close association with sphagnum bogs. It may also be found in stands of emergent grasslike vegetation. This species is found in the Atlantic Coastal Plain ranging from the New Jersey Pine Barrens to southern Georgia. They prefer tea colored, still water with an abundance of aquatic vegetation (NatureServe 2015). Additionally, they have adapted to high acidic levels in water.

Because of their limited dispersal ability patch type Cardinal-Proximate is the best model to capture the species’ critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of carpenter frogs from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for carpenter frogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

1. Bunnell J. F., & Zampella, R. A. 2008. Native Fish and Anuran Assemblages Differ between Impoundments with and without Non-Native Centrarchids and Bullfrogs. Copeia, 2008(4), 931–939.

2. Conant, R., and J. T. Collins. 1998. A Field Guide to Reptiles & Amphibians. Eastern and Central North America. Third Edition, Expanded. Houghton Mifflin Company, Boston. 616 pp.

3. NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: July 13, 2016).

Land Use Land Cover Selections and Patch Type Justifications

Cope's Gray Treefrog

BIOPID *230* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	*1-4*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-4*
1499	STORMWATER BASIN	Undissolved	*1-4*
2100	CROPLAND AND PASTURELAND	Undissolved	*1-4*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*1-4*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-4*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-4*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-4*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-4*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-4*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-4*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-4*

4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-4*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-4*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-4*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-4*
5200	NATURAL LAKES	Undissolved	*1-4*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*

7300	EXTRACTIVE MINING	Undissolved	*1-4*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*1-4*

Land Use - Land Cover Selection and Patch Type Rationale

Cope's gray treefrogs utilize vernal pools for breeding during the late spring and summer. Year round this species will also make use of upland habitats for resting, feeding, and overwintering. During the breeding season, this species will occasionally make daily movements into vernal pools at night and then retreat to adjacent wetland or upland forested habitats during the day (Golden 2005). As with many amphibians that breed in vernal pools, the dispersal abilities of the Cope's gray treefrog are limited; most literature on this topic suggests that this species remains within 200 m of its breeding pool during both the breeding and non-breeding season (Johnson and Semlitsch 2003, Golden 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Cope's gray treefrogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

1. Golden, D. M. 2005. Eastern Tiger Salamander and Southern (Cope's) Gray Treefrog. State Wildlife Grants, Progress Report, T-1-5, Project 3, Job 2A. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program, Trenton, NJ.

2. Johnson, J.R. and R.D. Semlitsch. 2003. Defining core habitat of local populations of the gray treefrog (*Hyla versicolor*) based on Choice of oviposition site. Oecologia 137: 205-210.

3. Liguori, S. 2003. Southern Gray Treefrog (*Hyla chrysoscelis*). *In* Endangered and Threatened Wildlife of New Jersey (B. Beans and L. Niles, eds.). Rutgers University Press, New Brunswick, New Jersey. Pp 228-231.

4. Schwartz, V. and D.M. Golden. 2002. Field Guide to Reptiles and Amphibians of New Jersey. New Jersey Division of Fish and Wildlife, Trenton, New Jersey.

Land Use Land Cover Selections and Patch Type Justifications

Eastern Tiger Salamander

BIOPID 220 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-4
1499	STORMWATER BASIN	Undissolved	1-4
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-4
2100	CROPLAND AND PASTURELAND	Dissolved	1-4
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-4
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-4
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-4
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-4
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-4
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-4
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1-4
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-4
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1-4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-4

4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	*1-4*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-4*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-4*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-4*
5300	ARTIFICIAL LAKES	Dissolved	*1-4*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-4*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-4*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-4*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1,2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-4*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-4*
6240	HERBACEOUS WETLANDS	Dissolved	*1-4*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-4*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-4*
7300	EXTRACTIVE MINING	Dissolved	*1-4*
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	*1-4*
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	*1-4*

Land Use - Land Cover Selection and Patch Type Rationale

Ambystomid salamanders are all obligate vernal pool breeders in New Jersey. Much of each species' distribution is within 300 meters of a breeding habitat, although individuals will disperse outside of this range. Vernal pools, a type of ephemeral wetland, are identified in the LULC GIS coverage as various wetland and forest classes and are a critical component to the persistence of the eastern tiger salamander (*Ambystoma tigrinum tigrinum*). Many types of non-urban LULC classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as the non-breeding habitat for this species (Smith 2003).

Tiger salamanders do show fidelity to vernal pools as breeding habitats (Semlitsch 1998), but work by Madison and Farrand (1998) suggests that when leaving the breeding ponds ambystomid salamanders move in all directions within forested habitats. Therefore, patch type Contiguous Area is used to capture this species' critical habitat requirements and to account for the dispersal of salamanders into adjacent suitable habitats and breeding ponds.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Fowler's Toad

BIOPID *285* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-3*
1499	STORMWATER BASIN	Undissolved	*1-3*
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	*1-3*
2100	CROPLAND AND PASTURELAND	Undissolved	*1-3*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*1-3*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*1-3*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-3*
2300	CONFINED FEEDING OPERATIONS	Undissolved	*1-3*
2400	OTHER AGRICULTURE	Undissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4230	PLANTATION	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-3*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-3*
5200	NATURAL LAKES	Undissolved	*1-3*
5300	ARTIFICIAL LAKES	Undissolved	*1-3*
6130	VEGETATED DUNE COMMUNITIES	Undissolved and Adjacent Undissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	*1-3*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-3*
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	*1-3*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

From COSEWIC: Fowler's toads occur in areas with loose, well-drained gravelly or sandy soils, including sand dunes, sandy deciduous woodland, and rocky, poorly vegetated areas (Hubbs 1918; Smith 1961; Minton 1972; Brown 1974; Green 1989; Klemens 1993). Wright and Wright (1949) noted that in the eastern United States, Fowler's toads were common along roadsides, near homes, and in fields, pastures, gardens, and sand dunes. They are a typical species of the New Jersey Pine Barrens (Zampella and Bunnell 2000). From NatureServ: Fowler's toads inhabit wooded areas, river valleys, and floodplains, including agricultural and residential areas, usually in areas with deep friable soils, up to at least several hundred meters from breeding sites.

Because of their limited dispersal ability patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of Fowler's toads from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Fowler's toad. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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3. NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 3, 2012).

Land Use Land Cover Selections and Patch Type Justifications

Jefferson Salamander

BIOPID *208* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	*2-5*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*2-5*
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	*2*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	*2*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	*2*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*2*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*2*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*2-5*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*2-5*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*2-5*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*2-5*
4230	PLANTATION	Undissolved	*2-5*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*2-5*

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	2-5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2-5
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	2-5
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	2-5
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	2-5
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	2-5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	2-5

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	2-5
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	2-5
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2-5

Land Use - Land Cover Selection and Patch Type Rationale

Jefferson salamanders (*Ambystoma jeffersonianum*) are primarily vernal pool breeders (Douglas and Monroe 1981). Much of each species' distribution is within 300-meters of a breeding habitat (Douglas and Monroe 1981). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of the species. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as important upland, non-breeding habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Jefferson salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

1. Douglas, M.E. and B.L. Monroe. 1981. A comparative study of topographical orientation in Ambystoma (Amphibia: Caudata). Copeia 1981(2): 460-463.

2. Faccio, S. D. 2003. Postbreeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. Journal of Herpetology 37:479-489.

3. Madison, D. M. 1997. The emigration of radio-implanted spotted salamanders, *Ambystoma maculatum*. Journal of Herpetology 31:542-551.

4. Petranka, J.W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press, Washington D.C., USA.

5. Regosin, J.V., B.S. Windmiller, R.N. Homan, and J.M. Reed. 2005. Variation in Terrestrial Habitat Use By Four Pool-Breeding Amphibian Species. Journal of Wildlife Management 69 (4): 1481-1493.

Land Use Land Cover Selections and Patch Type Justifications

Longtail Salamander

BIOPID *210* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-3,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Riparian Dissolved	*1-3,**
1711	CEMETERY ON WETLAND	Riparian Dissolved	*1-3,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Riparian Dissolved	*1-3,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Riparian Dissolved	*1-3,**
2100	CROPLAND AND PASTURELAND	Riparian Dissolved	*1-3,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-3,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-3,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Riparian Dissolved	*1-3,**
2300	CONFINED FEEDING OPERATIONS	Riparian Dissolved	*1-3,**
2400	OTHER AGRICULTURE	Riparian Dissolved	*1-3,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	*1-3,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	*1-3,**
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	*1-3,**

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Dissolved	Riparian	***1-3,****
4230	PLANTATION	Riparian	Dissolved	***1-3,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Dissolved	Riparian	***1-3,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Dissolved	Riparian	***1-3,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Dissolved	Riparian	***1-3,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Dissolved	Riparian	***1-3,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Riparian	Dissolved	***1-3,****
4411	PHRAGMITES DOMINATE OLD FIELD	Riparian	Dissolved	***1-3,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Dissolved	Riparian	***1-3,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Dissolved	Riparian	***1-3,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Dissolved	Riparian	***1-3,****
4500	SEVERE BURNED UPLAND VEGETATION	Riparian	Dissolved	***1-3,****
6111	SALINE MARSHES (LOW MARSH)	Riparian	Dissolved	***1-3,****
6112	SALINE MARSHES (HIGH MARSH)	Riparian	Dissolved	***1-3,****
6120	FRESHWATER TIDAL MARSHES	Riparian	Dissolved	***1-3,****
6130	VEGETATED DUNE COMMUNITIES	Riparian	Dissolved	***1-3,****
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Riparian	Dissolved	***1-3,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-3,**
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Riparian Dissolved	*1-3,**
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Riparian Dissolved	*1-3,**
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Riparian Dissolved	*1-3,**
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Riparian Dissolved	*1-3,**
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Riparian Dissolved	*1-3,**
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Riparian Dissolved	*1-3,**
6240	HERBACEOUS WETLANDS	Undissolved	*1-3,**
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Dissolved	*1-3,**
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Riparian Dissolved	*1-3,**
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Riparian Dissolved	*1-3,**
6500	SEVERE BURNED WETLANDS	Riparian Dissolved	*1-3,**
7100	BEACHES	Riparian Dissolved	*1-3,**
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Riparian Dissolved	*1-3,**
7300	EXTRACTIVE MINING	Riparian Dissolved	*1-3,**
7400	ALTERED LANDS	Riparian Dissolved	*1-3,**

7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Riparian Dissolved	***1-3,****
7500	TRANSITIONAL AREAS	Riparian Dissolved	***1-3,****
7600	UNDIFFERENTIATED BARREN LANDS	Riparian Dissolved	***1-3,****

Land Use - Land Cover Selection and Patch Type Rationale

Longtail salamanders (*Eurycea longicauda longicauda*) primarily occur in the northern to north-central part of the state along bands of limestone bedrock and are most often associated with riparian corridors and vernal habitats (Anderson and Martino 1966, Zarate et al. 2005). Deciduous forest and wetland land use types provide habitat for this salamander (ENSP 2010). Shaded rock outcrop seepages and springs within close proximity to streams or vernal pools are the critical micro-habitat features used by longtails (Petranka 1998, Zarate expert opinion). LULC classes were selected to reflect these preferences.

Many of the occurrences for longtail salamanders are from either breeding habitats or overwintering sites. Patch type Contiguous Area values contiguous riparian habitat upon intersection with the SOA. This riparian component reflects the species' prevalence in adjacent non-urban patches and association with streams or vernal habitats and therefore is the best patch type for this salamander. Additionally, polygons of a selected set of LULC classes are also valued if they intersect the SOA. These additional, important areas capture critical habitat within and immediately surrounding the SOA not initially captured by the patch type Contiguous Area model.

Literature Citations

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4. Zarate, B., G. Fowles, and K. Pollack. 2005. Poster presentation at Association of Fish and Wildlife Agencies meeting, Washington, DC. Unpublished report by NJ Division of Fish and Wildlife, Clinton, NJ.

* ENSP biologist expert opinion - B. Zarate

Land Use Land Cover Selections and Patch Type Justifications

Marbled Salamander

BIOPID *209* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	*1,3-5*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1,3-5*
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	*1,3-5*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	*1,3-5*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	*1,3-5*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*1,3-5*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*1,3-5*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1,3-5*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1,3-5*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1,3-5*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1,3-5*
4230	PLANTATION	Undissolved	*1,3-5*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1,3-5*

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1,3-5*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1,3-5*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1,3-5*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1,3-5*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1,3-5*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1,3-5*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1,3-5*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1,3-5*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1,3-5*
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1,3-5*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1,3-5*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	*1,3-5*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1,3-5*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1,3-5*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1,3-5*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1,3-5*
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	*1,3-5*

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	***1,3-5***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	***1,3-5***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	***1,3-5***
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	***1,3-5***
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	***1,3-5***

Land Use - Land Cover Selection and Patch Type Rationale

Marbled salamanders (*Ambystoma opacum*) deposit their eggs in dry vernal pools (Petranka 1998). Much of each species' distribution is within 300-meters of a breeding habitat, although individuals will disperse outside of this range (Gamble et al. 2006). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of this salamander. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as important upland habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for marbled salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Northern Spring Salamander **BIOPID** 279 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2,*
1711	CEMETERY ON WETLAND	Undissolved	1,2,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1,2,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1,2,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,2,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1,2,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,*
4230	PLANTATION	Undissolved	1,2,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2,*

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1,2,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1,2,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1,2,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1,2,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,2,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,2,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1,2,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1,2,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1,2,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1,2,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1,2,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,2,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,2,****
6240	HERBACEOUS WETLANDS	Undissolved	***1,2,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1,2,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,2,****
6500	SEVERE BURNED WETLANDS	Undissolved	***1,2,****

7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1,2,**

Land Use - Land Cover Selection and Patch Type Rationale

Northern spring salamanders (*Gyrinophilus porphyriticus*) occur only in the northern part of the state. Typically within deciduous forest and wetland types, this salamander will live in and adjacent to springs, headwater seeps, wet rock outcrops, and small headwater tributaries (Bruce 1972, Petranka 1998, Zarate expert opinion).

Because of their limited dispersal ability, small home range, and preference for wooded headwater streams and seeps, patch type Limited Extent is the best model to capture this species' critical habitat requirements. This patch type places the most emphasis on critical habitats closest to the original observations.

Literature Citations

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* ENSP biologist expert opinion - B. Zarate

Land Use Land Cover Selections and Patch Type Justifications

Pine Barrens Treefrog

BIOPID *231* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	*1-4*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-4*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*1-4*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-4*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-4*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-4*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-4*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-4*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-4*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-4*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-4*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-4*

5200	NATURAL LAKES	Undissolved	*1-4*
5300	ARTIFICIAL LAKES	Undissolved	*1-4*
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	*1-4*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1-4*
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	*1-4*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*1-4*

Land Use - Land Cover Selection and Patch Type Rationale

Pine Barrens treefrogs utilize vernal pools for breeding during the late spring and summer. Year round this species will also make use of upland forested and scrub-shrub habitats and radio-isotope tracking on this species suggests most individuals remain within 70-m of there breeding pool during the breeding season (Freda 1986), but movements away from breeding ponds of greater distances are likely outside of the breeding season (Semlitsch and Brodie 2003).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Pine Barrens treefrogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

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Land Use Land Cover Selections and Patch Type Justifications

American Bittern

BIOPID *160* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*
2100	CROPLAND AND PASTURELAND	Riparian Dissolved	*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*
4410	OLD FIELD (< 25% BRUSH COVERED)	Riparian Dissolved	*
4411	PHRAGMITES DOMINATE OLD FIELD	Riparian Dissolved	*
4420	DECIDUOUS BRUSH/SHRUBLAND	Riparian Dissolved	*
4430	CONIFEROUS BRUSH/SHRUBLAND	Riparian Dissolved	*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Riparian Dissolved	*
5100	STREAMS AND CANALS	Dissolved	*3,5*
5200	NATURAL LAKES	Dissolved	*2,3,5*
5300	ARTIFICIAL LAKES	Dissolved	*2,3,5*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	*3,5*
5412	TIDAL MUD FLAT	Dissolved	*1,2,4*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	*3-5*

6120	FRESHWATER TIDAL MARSHES	Dissolved	*3-5*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*1,3-7*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1,3-7*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1,3-7*
6240	HERBACEOUS WETLANDS	Dissolved	*1,3-7*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*1,3-7*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1,3-7*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*1,2,4*

Land Use - Land Cover Selection and Patch Type Rationale

American bitterns utilize freshwater marsh habitat in New Jersey, occasionally venturing into more brackish and salt water systems. They nest in tall, emergent vegetation and prefer to forage at the interface of this vegetation and the shorelines of lakes, rivers, bays and other water systems (Bent 1926, Desgranges and Houde 1989, Duebbert and Lokemoen 1077, Gibbs et al. 1991, Gibbs and Melvin 1992, Middleton 1949, Mousley 1939). They can be found in agriculture and forested areas, but only when they are associated with or adjacent to water (Davis expert opinion). Although secretive and not often observed in the open, they do use the edges of mudflats adjacent to marsh for foraging and this habitat type also connects the vegetated marsh patches they use and acts as something of a corridor (Davis expert opinion).

Patch type Contiguous Area is selected because it dissolves the LULC cover types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. The habitat used within the home range primarily consists of wetlands dominated by tall, emergent herbaceous vegetation so it is difficult to delineate (i.e. observers do not often see the extent to which they use an area). Moreover, many records consist of vocal observations. The Contiguous Area patch type, therefore, is appropriate as it ensures that all the suitable habitat in and around the likely home range will be valued. Some of the LULC types (generally the upland classes) are used by this species only when associated with water, which made the dissolve type of “Riparian Dependent” appropriate.

Literature Citations

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

American Kestrel

BIOPID 274 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-3
1800	RECREATIONAL LAND	Dissolved	1-3
1804	ATHLETIC FIELDS (SCHOOLS)	Undissolved	1-3
2100	CROPLAND AND PASTURELAND	Dissolved	1-3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-3
2300	CONFINED FEEDING OPERATIONS	Dissolved	1-3
2400	OTHER AGRICULTURE	Dissolved	1-3
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-3
6130	VEGETATED DUNE COMMUNITIES	Dissolved	1-3
6240	HERBACEOUS WETLANDS	Dissolved	1-3

Land Use - Land Cover Selection and Patch Type Rationale

From Smallwood et al 2002: American kestrel prefers large (>25ha) open habitats with short ground vegetation. These habitats include grasslands, meadows, agricultural areas and open parkland.

Patch type Contiguous Area is selected to represent habitat to be valued by American kestrel species occurrence areas because this patch type dissolves adjacent polygons of the selected land use land cover types and creates patches of contiguous habitat. Large patches of habitat are preferred by breeding kestrels and are more likely to be occupied than smaller. (Smallwood 2009)

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

American Oystercatcher

BIOPID 161 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Dissolved	5
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2-5,7,9,10
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2-5,7,9,10
6130	VEGETATED DUNE COMMUNITIES	Dissolved	2-5,7,9,10
6240	HERBACEOUS WETLANDS	Dissolved	2-5,7,9,10
7100	BEACHES	Dissolved	1,3-11
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	2-5,7,9,10
7440	DISTURBED TIDAL WETLANDS	Dissolved	5

Land Use - Land Cover Selection and Patch Type Rationale

American oystercatchers utilize both salt marsh and beach habitats in New Jersey. They nest on either wrack that has washed up along the marsh or directly on the sand and raise their young in whichever habitat the nest was located in. They feed primarily on bivalves which they hunt for in a marsh environment (Bent 1929, Frohling 1965, Humphrey 1990, Lauro & Burger 1989, Nol & Humphrey 1994, Rappole 1981, Shields & Parnell 1990, Virzi, et. al 2009, Wilke 2008, Zaradusky 1985).

Patch type Contiguous Area is selected for oystercatchers since it best captures the habitat use of this species. Oystercatchers that nest in the marsh can be particularly hard to follow and the dissolve feature of this patch type ensures that all of the habitat that the species will use in a given area is captured. The same is true for their foraging behaviors – the dissolve feature allows the extent of their foraging habitat to be captured for the individuals represented by each SOA.

Literature Citations

1. Bent, A. C. 1929. Life histories of North American shore birds, Part 2. U.S. National Museum Bulletin No. 146.

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Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID *221* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1,3***
2100	CROPLAND AND PASTURELAND	Undissolved	***1,3***
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1,3***
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1,3***
2400	OTHER AGRICULTURE	Undissolved	***1,3***
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1,3***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1,3***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1,3***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1,3***
4230	PLANTATION	Undissolved	***1,3***
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1,3***
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1,3***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1,3***
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1,3***
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1,3***

4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1,3***
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1,3***
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,3***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,3***
5100	STREAMS AND CANALS	Undissolved	***1,3***
5200	NATURAL LAKES	Undissolved	***1,3***
5300	ARTIFICIAL LAKES	Undissolved	***1,3***
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	***1,3***
5411	OPEN TIDAL BAYS	Undissolved	***1,3***
5412	TIDAL MUD FLAT	Undissolved	***1***
6111	SALINE MARSHES (LOW MARSH)	Undissolved	***1,3***
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	***1,3***
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1,3***
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	***1,3***
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1,3***
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1,3***
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1,3***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1,3***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,3***

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***
6240	HERBACEOUS WETLANDS	Undissolved	***1,3***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1,3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1,3***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***1***
7500	TRANSITIONAL AREAS	Undissolved	***1,3***

Land Use - Land Cover Selection and Patch Type Rationale

Most non-urban habitat types that fall within 1 km of a nest are designated as critical habitat for nesting bald eagles. Habitat requirements vary from predominant forest to a nest tree surrounded by open field habitat, with nests usually located within 1.6 km of open water. Nest trees are usually super-canopy in height, but lone trees may also offer the clear view and aerial approach sought by eagles for nesting; both forested and open habitats are occupied in NJ (Paturzo and Clark 2003). Home range size for nesting bald eagles is variable depending on the habitat resources of the area such as food abundance, distance to adequate foraging habitat, etc. (Stalmaster 1987, Therres, et al. 1993, Buehler 2000, Harmata and Montopoli 2001). Successful and continued occupancy of a nest site by eagles is also influenced by distance to human disturbance often associated with residential housing, roads, extractive industries (mining, timber) and others. The 1 km radius for nest site habitat protection equals approximately 3 km^2 of area. This is one-third larger than what may be the mean territory size (summarized in Buehler 2000), though data specific to NJ are lacking.

A summary of territory sizes from Birds of North America (Buehler 2000) presents the following: Estimates of territory size (defended part of home range) vary widely based on nesting density, food supply, and method of measurement. Most reliable estimates based on radio-telemetry are limited. Stalmaster (1987) suggested 1–2 km^2 as typical territory size. Average territory radius (n = 10) was 590 m in Minnesota, as measured by presentation of decoy bird to elicit defensive reactions (Mahaffy and Frenzel 1987). Assuming circular territories, average territory size was about 1 km^2. Minimum territory size was 4 km^2 for radio-tagged pair in Saskatchewan (Gerrard et al. 1992b). Spacing between nests was observed about 1 nest/1.6 km of shoreline reported historically on Chesapeake Bay (Kirkwood 1895).

The patch type Limited Extent is selected to maximize the identification of habitats (generally, most non-urban habitats) within the critical 1 km of an active nest, the nesting territory. However, habitat patches that extend beyond the 1 km radius by virtue of being contiguous patches may be important habitat elements to the eagles' choice of that nesting site. Regional differences may exist between eagle nest sites among areas with larger versus smaller habitat patch sizes, because eagles are selecting based on food availability as well as local habitat structure and extent. This model does not represent all of eagle home range associated with a particular nesting pair; it is supplemented in that regard by the bald eagle foraging model.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID *236* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1,3***
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4230	PLANTATION	Riparian Undissolved	***1,3***
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Riparian Undissolved	***1,3***
5100	STREAMS AND CANALS	Undissolved	***1,3***
5200	NATURAL LAKES	Undissolved	***1,3***
5300	ARTIFICIAL LAKES	Undissolved	***1,3***
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	***1,3***
5411	OPEN TIDAL BAYS	Undissolved	***1,3***

5412	TIDAL MUD FLAT	Undissolved	***1***
6111	SALINE MARSHES (LOW MARSH)	Undissolved	***1,3***
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	***1,3***
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1,3***
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	***1,3***
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	***1,3***
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	***1,3***
6221	ATLANTIC WHITE CEDAR SWAMP	Riparian Undissolved	***1,3***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1,3***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,3***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***
6240	HERBACEOUS WETLANDS	Undissolved	***1,3***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1,3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	***1,3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***1,3***
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1,3***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***1***

Land Use - Land Cover Selection and Patch Type Rationale

Bald eagle foraging habitat is defined as the amount of foraging habitat required to support a nesting pair of eagles throughout the year, as breeding bald eagles are year-round residents in NJ. Bald eagles hunt in open water for fish, waterfowl, turtles, eels and other aquatic species, but usually do so from perches along the water's edge (Stalmaster 1987, Buehler 2000).

Based on the clear association of bald eagles with rivers, streams and other water bodies, patch type Limited Extent is applied to value forest land use types coded as riparian (maximum distance of 100 meters from a water body) and intersecting the bald eagle foraging species occurrence area model (ENSP 2011) associated with an active nest. This habitat model is different from, and in addition to, the bald eagle nest habitat valuation.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID 238 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1

7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Bald eagle roosting habitats were identified using recorded sightings of more than two eagles located in single sites at times approaching dusk and shortly after dawn. These sightings generally included more than ten individual eagles using a site for overnight roosting and were not associated with a nest. Polygons of suitable habitat (forest, forested wetlands, fields and open waters) that intersected with each winter occurrence were designated as habitat.

From the Birds of North America (Buehler 2000): For bald eagles, winter habitat suitability is defined by food availability, presence of roost sites that provide protection from inclement weather, and absence of human disturbance. Roost sites are mature forest habitat usually located within a few miles of foraging areas, and are characterized by large trees (often conifers) that provide some protection from wind, rain and snow, and are free of human disturbance.

Patch type Limited Extent is used to value suitable habitats that intersect with bald eagle occurrence records characterized and delineated as roosts. This patch type limited the extent of suitable habitat valued to those intersected by a recorded occurrence; larger areas may be identified as additional records of wintering eagles are documented in a particular area.

Literature Citations

1. Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). *In* The Birds of North America, No. 506 (A. Poole, ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/506 doi:10.2173/bna.506

Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID 286 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
5100	STREAMS AND CANALS	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1

6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*1*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1*
6240	HERBACEOUS WETLANDS	Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Wintering bald eagle habitats were identified using eagle sightings recorded during the annual Eagle Midwinter Survey, as well as recorded sightings of eagles during the winter period of November 1-January 31 and not associated with a known nest. Polygons of suitable habitat (forest, forested wetlands, fields and open waters) that intersected with each winter occurrence were designated as habitat.

From the Birds of North America (Buehler 2000): In winter eagles are typically associated with aquatic habitats with some open water for foraging. Often concentrate in large numbers (100s–1,000s) on wintering grounds. Winter habitat suitability is defined by food availability, presence of roost sites that provide protection from inclement weather, and absence of human disturbance. Food type (avian, mammalian, or fish) and means of availability (live prey or as carrion) vary greatly across wintering range. Some wintering areas feature absence of human activity associated with site, although eagles will tolerate some human activity in areas of high prey availability (e.g., below hydroelectric facilities on Missouri and Mississippi Rivers. Perching habitat is characterized by presence of tall trees located adjacent (<50 m) to foraging areas, similar to other times of the year.

Patch type Limited Extent is used to value suitable habitats that intersect with bald eagle occurrence records in the winter period (and not directly associated with a known nest). This patch type limited the extent of suitable habitat valued to those intersected by a recorded occurrence; larger areas may be identified as additional records of wintering eagles are documented in a particular area.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Barn Owl

BIOPID *225* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
2100	CROPLAND AND PASTURELAND	Dissolved	*1,2*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1,2*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1,2*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent Undissolved	*2*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*2*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	*2*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	*2*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*2*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*2*
6240	HERBACEOUS WETLANDS	Dissolved	*2*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Adjacent Undissolved	*2*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*2*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands which are characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agriculture, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (i.e. field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC shapefiles are not frequent enough to capture the changes to a given site.

Barn owls are considered open field raptors using grasslands, pastures, marshes and other agricultural areas (Marti et al. 2005). In New Jersey, barn owls primarily occur along the coast. Phragmites adds to the overall mosaic of the grassland for both wintering and breeding birds (Marti et al. 2005).

Patch Type Cardinal-Proximate is selected for barn owls since they are mobile species, reflecting the dynamic nature of their preferred habitats and the need to follow prey supplies (Marti et al. 2005). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable habitat for breeding and non-breeding barn owls. Proximate LULC polygons are only valued if they are adjacent to cardinal habitat because while important to the local population, that LULC class would not be used by the species if not associated with the cardinal classes. This approach limits the habitat valued to that which the population uses but accommodates its need for breeding, wintering and foraging habitat.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Barred Owl

BIOPID 38 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3-6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3-6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3-6
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	3-6
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3-6
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	3-6
4230	PLANTATION	Dissolved	3-6
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	3-6
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	3-6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	3-6
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	3-6
6210	DECIDUOUS WOODED WETLANDS	Dissolved	3-6
6220	CONIFEROUS WOODED WETLANDS	Dissolved	3-6
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	3-6
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	3,*

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***3,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***3,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***3,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***3,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***3-6***

Land Use - Land Cover Selection and Patch Type Rationale

Mazur and James (2000) stated that barred owls are restricted to forested areas, ranging from swamps and riparian areas to upland regions. While large, unfragmented blocks of forests are usually preferred, recent literature describes barred owls using mature forest patches within suburban areas as well (Harrold 2003). Throughout its range, it is found in association with mature and old-growth forests, typically of mixed deciduous-coniferous composition. In New Jersey, found in old-growth hardwood, cedar swamps, and upland oak-pine forests (Laidig and Dobkin 1995, Liguori 2003). In New Hampshire and Connecticut, mixed hardwood-conifers; avoids marshes and agricultural lands. Old-growth hemlock, maple, and hemlock-maple forests used in Michigan (Elody and Sloan 1985). In Minnesota, mixed hardwood-conifer and oak woods selected (Fuller 1979). As presented in Mazur and James (2000), barred owls in Ontario were strongly associated with tall, unfragmented, mixed wood forests; avoids young forests. Thought to prefer old forests owing to greater availability of potential nest trees, lower stem densities that facilitate easier hunting, and closed canopy for thermoregulation and protection from mobbing. The structural complexity of old forests thought to provide diversity of prey (Mazur and James 2000). At nest sites, mature and old forest is typical nest habitat, including a wide range of forest types, both conifer and hardwood; nest sites may be found in areas with well-developed understory (Mazur and James 2000). Some studies indicate association with water, yet others found no such evidence. Adults forage near nest site during breeding period, suggesting that prey availability may be important in nest-site selection as well (Mazur and James 2000).

Barred owl home ranges are highly variable geographically and are generally larger during the non-breeding season (Mazur and James 2000). Home range results identified within the literature illustrate this variability (Nichols and Warner 1972, Fuller 1979, and Elody and Sloan 1985). As year-round residents to NJ, barred owl habitat represents breeding and non-breeding use.

Barred owl habitat was identified using the LULC classes listed above and applying patch type Contiguous Area to identify entire patches of suitable habitat before segregation by roads or unsuitable habitat types. This approach is appropriate for barred owls because they tend to reside within larger forest patches, which this patch type is designed to create.

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* ENSP biologist expert opinion – M. Valent and K. Clark

Land Use Land Cover Selections and Patch Type Justifications

Black Rail

BIOPID 162 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Dissolved	*
5200	NATURAL LAKES	Dissolved	*
5300	ARTIFICIAL LAKES	Dissolved	*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	*
5411	OPEN TIDAL BAYS	Undissolved	*
5412	TIDAL MUD FLAT	Dissolved	*1*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	*2,4,6*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	*2-4,6*
6120	FRESHWATER TIDAL MARSHES	Dissolved	*1,2*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*
6240	HERBACEOUS WETLANDS	Dissolved	*1-5*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Black rails are found in both freshwater and saltwater tidal marshes where they breed and forage. They can occur in both the Atlantic coast and Delaware Bay marshes (Eddleman et al. 1994, Eddleman 1988, Flores and Eddleman 1995, Kerlinger and Sutton 1989, Todd 1977, Weske 1969). Although they do not utilize open water for foraging, preferring to feed within and along the edges of the marsh, this habitat does connect the marsh patches they use and acts as something of a corridor as they fly from one area to another. To fully capture the habitat they are likely using, it was important to value open water.

Patch type Contiguous Area is selected because it dissolves the LULC types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. The habitat used within the home range primarily consists of wetlands dominated by dense herbaceous vegetation so it is difficult to delineate (i.e. observers do not often see the extent to which they use an area). Moreover, many records consist of vocal observations. The Contiguous Area patch type, therefore, is appropriate as it ensures that all the suitable habitat in and around the likely home range will be valued.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black Skimmer

BIOPID 163 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	5
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3-5
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-5
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1-6
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-5
6240	HERBACEOUS WETLANDS	Undissolved	1,3,4
7100	BEACHES	Undissolved	1-6
7440	DISTURBED TIDAL WETLANDS	Undissolved	5

Land Use - Land Cover Selection and Patch Type Rationale

Black skimmers nest in both the salt marsh and on the beach. When they nest in the marsh their nests are located on either wrack mats or sandy patches of marsh islands. On the beach, they use sparsely vegetated beaches, often near inlets, laying their eggs right on the sand (Burger and Gochfeld 1990, Clapp, et. al 1983, Erwin 1979, Erwin 1980, Gochfeld and Burger 1994, Gore 1991). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Gochfeld and Burger 1994, C. Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. This is possible because black skimmers are well surveyed in the state and nest in easily delineated, discrete colonies. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option since it won't value habitats not being used by this species.

Literature Citations

1. Burger, J. and M. Gochfeld. 1990. The Black Skimmer: social dynamics of a colonial species. Columbia University Press, New York.

2. Clapp, R. B., D. Morgan-Jacobs, and R. C. Banks. 1983. Marine birds of the Southeastern United States. U.S. Fish & Wildlife Service, FWS/OBS 83/30, Washington, DC.

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6. Gore, J. A. 1991. Distribution and abundance of nesting Least Terns and Black Skimmers in northwest Florida. Florida Field Naturalist. 19:65-72.

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black Skimmer

BIOPID 164 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5200	NATURAL LAKES	Undissolved	2,3
5300	ARTIFICIAL LAKES	Undissolved	2,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3
5411	OPEN TIDAL BAYS	Undissolved	1-3
5412	TIDAL MUD FLAT	Undissolved	2
5420	DREDGED LAGOON	Undissolved	2,3
5430	ATLANTIC OCEAN	Undissolved	2
6111	SALINE MARSHES (LOW MARSH)	Riparian Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Riparian Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Riparian Undissolved	*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Riparian Undissolved	2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2
6240	HERBACEOUS WETLANDS	Riparian Undissolved	*
7100	BEACHES	Undissolved	*
7440	DISTURBED TIDAL WETLANDS	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Black skimmers will use many types of water bodies to forage for fish – the ocean, bays, inlets, ponds, lakes or rivers (Erwin 1977, Gochfeld and Burger 1994, Valiela 1984). The land-based habitat (including mudflats) that is valued is important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches (Gochfeld and Burger 1994). It is also where the adults will feed the young.

Patch type Limited Extent is selected because black skimmers are a highly surveyed species in the state and their distribution is well understood. The nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. The Limited Extent patch type values the habitat that is most likely used by the associated colony (which is based on an understanding of foraging commutes) without extending it to areas that are less likely to be used. The LULC polygons that are land-based were coded "Riparian Undissolved" because they are areas that are only important to black skimmers for foraging when they are located adjacent to water.

Literature Citations

1. Erwin, R. M. 1977. Foraging and breeding adaptations to different food regimes in three seabirds: the Common Tern (*Sterna hirundo*), Royal Tern (*Sterna maxima*), and Black Skimmer (*Rynchops niger*). Ecology 58:389-397.

2. Gochfeld, M. and J. Burger. 1994. Black Skimmer (*Rynchops niger*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/108 doi:10.2173/bna.108

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black-billed Cuckoo

BIOPID 47 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved and Adjacent Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	1

2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4230	PLANTATION	Undissolved and Adjacent Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*1*
6120	FRESHWATER TIDAL MARSHES	Undissolved and Adjacent Undissolved	*1*

6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1*
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	*1*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Hughes 2001: Black-billed cuckoo breeding habitat includes groves of trees, forest edges and thickets, young deciduous and mixed deciduous-coniferous woods, abandoned farmland and other shrubby areas, pastures, roadsides, and fencerows, orchards and berry patches, and hawthorn thickets. Also includes edges of bogs, marshes, lake and river shores and urban areas (parks, ravines, golf courses, residential gardens). They may be susceptible to habitat fragmentation and modification.

Patch type Cardinal-Proximate is applied because 1) black-billed cuckoos are not interior forest birds and can breed in urban areas, so polygons did not need to be dissolved to represent the area needed for breeding individuals, and 2) patch type Limited Extent failed to value patches of suitable habitat adjacent to valued habitat (< 100m away) that would likely be used by the documented species occurrence, let alone the local population. Patch type Cardinal-Proximate better represents suitable breeding habitat used by the local breeding population by including suitable habitat adjacent to cardinal habitat valued by the SOA, but none of the polygons are dissolved, whether cardinal or proximate, thus limiting the extent of valued habitat to the areas likely to be used by the local breeding population. Because this species can use forest/field edges, large contiguous patches of forest and agriculture will be valued by the model, however, the most suitable portions of closed-canopy forest and agriculture used by black-billed cuckoos are likely to be found within 75 meters of the forest edge.

Literature Citations

1. Hughes, Janice M. 2001. Black-billed Cuckoo (*Coccyzus erythropthalmus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/587 doi:10.2173/bna.587

Land Use Land Cover Selections and Patch Type Justifications

Blackburnian Warbler *BIOPID* 48 *REGION* Statewide *PATCH TYPE* Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4230	PLANTATION	Dissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*

6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Breeding individuals occur in coniferous and mixed coniferous-deciduous forests, but also inhabits deciduous forest at the southern end of the range, which includes NJ and the southern Appalachian Mountains. In NY, found mostly in forest with hemlocks (even in forests with few hemlocks), almost invariably associated with these isolated trees (Morse 2004). They nest mostly in conifers but will also use deciduous second growth (Morse 2004).

Blackburnian warblers breed in forest interiors and are sensitive to forest fragmentation (Morse 2004). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. Morse, D. H. (2004). Blackburnian Warbler (*Dendroica fusca*). The Birds of North America Online. (A. Poole, Ed.) Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/bna/species/102 doi:10.2173/bna.102

Land Use Land Cover Selections and Patch Type Justifications

Black-crowned Night-heron

BIOPID 166 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1,2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1,2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1,2*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1,2*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1,2*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1,2*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1,2*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1,2*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Black-crowned night-herons use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marshelder, *Iva frutescens*) and trees (such as black cherry, *Prunus serotina*) in the Atlantic coastal marsh islands. They have also been documented using Phragmites (*Phragmites australis*) for nesting (Davis 1993, Palmer 1962). In some cases, the night-herons will nest in areas that are further inland than the marsh islands, though they generally stay near open water when possible. These nests are typically located in trees (Davis 1993, Palmer 1962, Davis expert opinion). Although they will not nest in open mudflat areas and primarily use them for foraging, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The birds can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Davis 1993).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. This is possible because black-crowned night-herons are well surveyed in the state and nest in easily delineated, discrete colonies. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option since it won't value habitats not being used by this species.

Literature Citations

1. Davis, Jr., William E. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/074 doi:10.2173/bna.74

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black-crowned Night-heron

BIOPID 167 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1,2
5200	NATURAL LAKES	Undissolved	1,2
5300	ARTIFICIAL LAKES	Undissolved	1,2
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,2
5411	OPEN TIDAL BAYS	Undissolved	*
5412	TIDAL MUD FLAT	Undissolved	1,2,3
5420	DREDGED LAGOON	Undissolved	1,2
6111	SALINE MARSHES (LOW MARSH)	Riparian Undissolved	1-3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1-3
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	1-3
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	1-3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*
6240	HERBACEOUS WETLANDS	Undissolved	*1-3*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	*1-3*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1,2,3*

Land Use - Land Cover Selection and Patch Type Rationale

Black-crowned night-herons are generalist hunters, meaning they will eat a wide variety of prey items including fish, mollusks, bivalves, insects, frogs, birds, and small mammals. They will use open water to stalk aquatic prey and will hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Davis 1993, Gross 1923, Hoefler 1979).

Patch type Limited Extent is selected because black-crowned night-herons are a highly surveyed species in the state and their distribution is well understood. The nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Using Limited Extent patch type values the habitat that is most likely used by the associated colony (which is based on an understanding of foraging commutes) without extending it to areas that are less likely to be used.

Literature Citations

1. Davis, Jr., William E. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/074 doi:10.2173/bna.74

2. Gross, A. O. 1923. The Black-crowned Night Heron (*Nycticorax nycticorax naevius*) of Sandy Neck. Auk 40:1-30.

3. Hoefler, J. E. 1979. Status and distribution of Black-crowned Night Herons in Wisconsin. Proceedings of Colonial Waterbird Group 3:75-84.

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black-throated Blue Warbler

BIOPID 49 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4230	PLANTATION	Dissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1

6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Black-throated blue warblers breed mainly in large, continuous tracts of undisturbed deciduous or mixed deciduous/ coniferous forests usually dominated by maples, birches, beech, and other northern hardwoods, with varying amounts of eastern hemlock, spruce, and fir (Holmes et. al 2005). They use dense patches of regenerating aspen and spruce or in red pine plantations with a dense, deciduous sapling understory in the post-fledging season (Holmes et. al 2005). Forests most suitable as breeding habitat contain a relatively thick undergrowth of dense, usually deciduous or broad-leaved evergreen shrubs. The species occurs where there is a thick undergrowth of mountain laurel, rhododendron, creeping yew, deciduous bushes, small saplings, or tiny conifers suitable for nesting (Holmes et. al 2005).

Patch type Contiguous Area is applied because the black-throated blue warblers are area-sensitive forest-interior birds (Holmes et al 2005). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. Holmes, R.T., N. L. Rodenhouse and T. S. Sillett. (2005). Black-throated Blue Warbler (*Dendroica caerulescens*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/bna/species/087 doi:10.2173/bna.87

Land Use Land Cover Selections and Patch Type Justifications

Black-throated Green Warbler

BIOPID 35 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4230	PLANTATION	Dissolved	1,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1

6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1***
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1***

Land Use - Land Cover Selection and Patch Type Rationale

Black-throated green warbler breeding habitat consists of coniferous forests, mixed and deciduous forests, often associated with hemlock forests. In more southern areas they will inhabit Atlantic white cedar wetlands (Morse and Poole 2005). Nests are typically located in shrubs or saplings (Morse and Poole 2005), and breeding individuals have been seen in utility rights-of-way and other shrubby habitats adjacent to forests, as well as pine plantations surrounded by forest (Petzinger expert opinion).

Black-throated green warblers inhabit interior forests, are area-sensitive, and require large tracts of forest to breed (Morse and Poole 2005). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

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* ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Blue-headed Vireo (Solitary Vireo)

BIOPID 50 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1

6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From James (1998): Blue-headed vireos typically breed in evergreen forests with spruce, fir, hemlock, and pine, in conifers with associated deciduous growth consisting of shrubs such as alder and willow, poplar, birch, and/or maple trees. In the highlands of the eastern U.S., this species of vireo will use a variety of forest types ranging from pure hardwood forests of beech, maple, oak, hickory, etc. to mixed mesophytic forests, pure pine or hemlock stands, and fir and spruce dominate forests on mountaintops. Presence correlates closely with areas where extensive forest predominates, but given that requirement, they may be found almost anywhere with trees that are middle-aged to mature, with high percent canopy closure (usually >75%), and where there is some (but not a dense) understory of shrubs and saplings, often near small openings or edges of wetlands and lakes.

Blue-headed vireos inhabit interior forests and require large tracts of forest to breed (James 1998). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. James, Ross D. 1998. Blue-headed Vireo (*Vireo solitarius*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/379 doi:10.2173/bna.379

Land Use Land Cover Selections and Patch Type Justifications

Bobolink

BIOPID *34* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Dissolved	*4*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*1,3,4*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*1,3,4*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*4,8*
1800	RECREATIONAL LAND	Adjacent Undissolved	*4*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-8*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*3-5,8*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*2,4*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*4*
2400	OTHER AGRICULTURE	Undissolved	*3,4*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2-4*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1,3,4*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1,3,4*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1,3,4*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*3*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*9*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*3*
6240	HERBACEOUS WETLANDS	Dissolved	*2-4*
7400	ALTERED LANDS	Undissolved	*1,3,4*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*4,8*
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	*4,8*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall relative size of the grassland. This increase of size is important to most grassland bird species because they require large patches of habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008).

Bobolinks are area sensitive and use large patches of early successional habitat including hayfields, airports, grazed pasture lands, and fallow fields to nest, forage and raise their young (Vickery et al. 1994; Martin and Gavin 2005; Norment et al. 2010; Shustack et al. 2010;). Bobolinks prefer dense grassland habitat with thick layers and low to moderate amounts of forbs (Dechant et al. 2001; Martin and Gavin 1995). Bobolinks nest on the ground, typically at the wetter margins of fields at the base of a sturdy herbaceous plant (Martin and Gavin 1995). The vegetative structure of the grassland appears to be more important than the actual type of vegetation (Norment et al. 2010) which can be manipulated to provide preferred habitat for bobolinks (Nocera et al. 2007).

Morgan and Burger (2005) developed a predictive model for potential grassland bird habitat in New York using land cover classes that captured land use that maintained early successional habitat including airports, developed open space, barren land, scrub/shrub, grassland/herbaceous, pasture/hay, cultivated crops and emergent herbaceous wetlands. The results of this model were used to justify many of the LULC choices for bobolinks.

Patch type Cardinal-Proximate is selected for bobolinks due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for bobolinks. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates bobolinks breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Bobolink

BIOPID *54* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1,3,4*
1440	AIRPORT FACILITIES	Undissolved	*4,6,7,8*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1,3,4*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1,3,4*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*4,8*
1800	RECREATIONAL LAND	Undissolved	*4*
2100	CROPLAND AND PASTURELAND	Undissolved	*1-8*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*3-5,8*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*2,4*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*4*
2400	OTHER AGRICULTURE	Undissolved	*3,4*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-4*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1,3,4*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1,3,4*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1,3,4*

6111	SALINE MARSHES (LOW MARSH)	Undissolved	*3*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*3*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
6240	HERBACEOUS WETLANDS	Undissolved	*3*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*3*
7400	ALTERED LANDS	Undissolved	*1,3,4*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*4,8*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*4,8*

Land Use - Land Cover Selection and Patch Type Rationale

Bobolinks are one of the few obligate grassland bird species that are long-distance Neotropical migrants and make one of the longest annual migration of any passerine (Martin and Gavin 1995). Bobolinks use the same habitat as their breeding habitat (agricultural and early successional lands) but will congregate in large flocks in freshwater and coastal marshes prior to beginning fall migration (Martin and Gavin 1995). Migrant bobolinks rely on shrubland habitat for food and cover (Askins 2002)

Patch type Limited Extent is selected for bobolink observations during migration because bobolinks will congregate in small areas for short periods of time before they move southward. Therefore, the selected LULC polygons did not need to be dissolved. The resulting polygons value the habitat important to migrating bobolinks while limiting the extension into areas that are less likely to be used during migration.

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Land Use Land Cover Selections and Patch Type Justifications

Broad-winged Hawk

BIOPID *226* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4230	PLANTATION	Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Goodrich et al. (1996): The broad-winged hawk nests predominantly in the humid temperate ecoregion domain. Forests at mid-latitudes consist of broad-leaf and coniferous trees. This bird nests in continuous deciduous or mixed-deciduous forests, with openings and water nearby. Forages near small openings in the canopy. In New York, nests on slopes more than on level sites. In Minnesota and Wisconsin, uses managed forests, oak-aspen stands 35–50 yr old; nest stands dominated by northern red oak with 204 trees/ha, on average. In Ontario, uses young, deciduous-dominated forests with a mean canopy height of 21 m and mean elevation of 350.4 ± 48.8 (SD) m. Conifer plantations used rarely.

Although it generally nests away from human dwellings, it is sometimes indifferent. It is detected more frequently in undisturbed, mixed conifer-deciduous forests of Maine than in areas used for agriculture or forestry. Compared to nesting red-shouldered hawks, broad-wings use younger forests with more openings.

Patch type Limited Extent is selected to value forest habitats within and adjacent to the species' occurrence location and its approximate home range area as represented by the SOA, without valuing additional, adjacent habitats.

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Land Use Land Cover Selections and Patch Type Justifications

Brown Thrasher

BIOPID 51 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved and Adjacent Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1
1710	CEMETERY	Undissolved and Adjacent Undissolved	1
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	1
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1

2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	*1*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	*1*
2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4230	PLANTATION	Undissolved and Adjacent Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*1*

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*1*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved and Adjacent Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Cavitt and Haas (2000): Brown thrashers breed in dry, open country, especially in thickets and scrubby fields and brushy hillsides covered with hawthorn. In New Jersey pine barrens habitat, thrashers breed at high densities in regularly burned habitat dominated by pitch pine, scrub oak and black jack oak but are absent or rare in areas where fire suppression allows oaks to grow to canopy. Brown thrashers have not been found breeding in New Jersey woodlots <0.8 ha in size and are rare in woodlots of <4 ha. They only occasionally breed in urban settings, such as yards, gardens, and fencerows. Although this species uses a wide variety of habitats, highest densities are obtained in shrub or mid-successional stages of forests. Habitat suitability peaks when density of woody stems =1.0 m tall are 10,000-30,000/ha, percentage of canopy cover of trees is 10-30%, and percentage of ground surface covered by litter =1 cm deep is >80%.

Patch type Cardinal-Proximate is applied because brown thrashers are not interior forest birds and can breed in urban areas, so patches do not need to be dissolved to represent the area needed for breeding individuals. However, because some areas valued by just using patch type Limited Extent were too small to sustain a breeding pair, let alone a local population, patch type Cardinal-Proximate was chosen to expand the area of habitat depicted by including suitable habitat adjacent to cardinal habitat valued by the SOA, but none of the polygons are dissolved, whether cardinal or proximate, thus limiting the extent of valued habitat to the areas likely to be used by the local breeding population. Because this species can use forest/field edges, large contiguous patches of forest and agriculture will be valued by the model, however, the most suitable portions of closed-canopy forest and agriculture used by brown thrashers are likely to be found within 200 meters of the forest edge.

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Land Use Land Cover Selections and Patch Type Justifications

Canada Warbler

BIOPID *52* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-3*

6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1,2***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-3***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-3***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-3***

Land Use - Land Cover Selection and Patch Type Rationale

Canada warblers inhabit lowland and upland habitats, including swamps, streamside thickets, brushy ravines, moist forests, and regenerating timber cuts with a well-developed shrub layer and structurally complex forest floor (Lambert and Faccio 2005). They use a wide range of deciduous and coniferous forests and are most abundant in moist, mixed coniferous-deciduous forests with a well-developed understory (Reitsma et al. 2010, USFWS 2001). At lower elevations this species is often restricted to cool, wet, low-lying areas such as cedar forests, swampy forests, sphagnum bogs, moist forest clearings and woodland edges, spruce tamarack bogs, aspen and moist spruce-birch forests, and alder and willow stands along stream banks (Reitsma et al. 2010).

Canada warblers are area sensitive in regions dominated with more urban/residential areas than forested areas (Lambert and Faccio 2005). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. Lambert, D. J. and S. D. Faccio. 2005. Canada warbler population status, habitat use, and stewardship guidelines for northeastern forests. VINS Technical Report 05-4.

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Land Use Land Cover Selections and Patch Type Justifications

Caspian Tern

BIOPID 168 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
7100	BEACHES	Undissolved	1,2
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Caspian terns often nest in Atlantic coastal marsh islands on mats of wrack. They can also occur on beaches. Their nests are small divots in the wrack or on the sand. They nest colonially and can nest with other tern species as well (Cuthbert & Wires 1999, Ludwig 1991). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Cuthbert & Wires 1999, Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Although caspian terns are infrequent nesters in the state, the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

1. Cuthbert, Francesca J. and Linda R. Wires. 1999. Caspian Tern (*Sterna caspia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/403 doi:10.2173/bna.403

2. Ludwig, J. P. 1991. Caspian Tern. *in* The atlas of breeding birds of Michigan. (Brewer, R., G. A. McPeek, and R. J. Adams, Jr., Eds.) Michigan State Univ. Press, East Lansing.
   * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Caspian Tern

BIOPID 169 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
7100	BEACHES	Undissolved	1
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Caspian terns forage almost exclusively on fish, which they capture by dive bombing into open waters. The land based habitat, as well as mudflats, that are valued are important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young (Cuthbert & Wires 1999).

Caspian terns are very infrequent nesters in this state. However, the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used.

Literature Citations

1. Cuthbert, Francesca J. and Linda R. Wires. 1999. Caspian Tern (*Sterna caspia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/403 doi:10.2173/bna.403

Land Use Land Cover Selections and Patch Type Justifications

Cattle Egret

BIOPID *200* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5412	TIDAL MUD FLAT	Undissolved	***3***
6111	SALINE MARSHES (LOW MARSH)	Undissolved	***1-3***
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	***1-3***
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	***1-3***
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-3***
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-3***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-3***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-3***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-3***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***3***

Land Use - Land Cover Selection and Patch Type Rationale

Cattle egrets use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as black cherry, *Prunus serotina*), and in the Atlantic costal marsh islands (Burger 1978, Mora & Miller 1998, Telfair 2006). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Telfair 2006, Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Cattle egrets have become infrequent nesters in the state but the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

1. Burger , J. 1978. The pattern and mechanism of nesting in mixed-species heronries. Pages 45-58 *in* Wading birds. (Sprunt IV, A., J. C. Ogden, and S. Winckler, Eds.) National Audubon Society. Research Report No. 7, New York.

2. Mora, M. A. and J. M. Miller. 1998. Foraging flights, reproductive success and organochlorine contaminants in Cattle Egrets nesting in a residential area in Bryan, Texas. Texas Journal of Science 50:205-214.

3. Telfair II, Raymond C. 2006. Cattle Egret (*Bubulcus ibis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 12 April 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/113 doi:10.2173/bna.113

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Cattle Egret

BIOPID 201 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
2100	CROPLAND AND PASTURELAND	Undissolved	2,3
2400	OTHER AGRICULTURE	Undissolved	2,3
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	3
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Cattle egrets consume a variety of prey items including insects (such as grasshoppers, crickets and moths), spiders, frogs and fish. Unlike many of the other long-legged wading birds, this species uses both aquatic and terrestrial habitats for foraging on a regular basis. Terrestrial habitats include agricultural areas such as fields, where they are frequently observed hunting (Cunningham 1965, Singh et. al 1988, Telfair 2006).

Cattle Egrets have become infrequent nesters in this state. However, the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used.

Literature Citations

1. Cunningham, R. L. 1965. Predation on birds by the Cattle Egret. Auk 82:502-503.

2. Singh, N., N. Sodhi, and S. Khera. 1988. Biology of the Cattle Egret *Bubulcus ibis cormandus* (Boddaert). Records of the Zoological Survey of India 104:1-143.

3. Telfair II, Raymond C. 2006. Cattle Egret (*Bubulcus ibis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 12 April 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/113 doi:10.2173/bna.113

Land Use Land Cover Selections and Patch Type Justifications

Cerulean Warbler

BIOPID *53* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Cerulean warblers breed in mature forests with large, tall, broad-leaved, deciduous trees and an open understory, in wet bottomlands, in upland forests (including mesic slopes and mountains), and in second-growth forest (Hamel 2000). In the Piedmont Plains and Delaware Bay regions, cerulean warblers prefer areas at least 70% forested (deciduous or mixed) and suitability increases with proximity to larger, contiguous forest patches. In the Highlands region, they prefer areas that are at least 50% forest, deciduous, and mixed and occasionally coniferous. Suitability also increases with proximity to larger, contiguous forest patches in this region (Rosenberg et al. 1999).

Cerulean warblers are area sensitive forest-interior birds and require a minimum 10 hectares of forest to breed (Hamel 2000). Because of the negative edge effects on breeding ceruleans, patch type Contiguous Area is applied because cerulean warblers need large tracts of forest to breed, but only patches with at least 10 ha of core forest will be included in the model. This reflects the minimum patch size needed for suitable breeding habitat for cerulean warblers.

Literature Citations

1. Hamel, Paul B. 2000. Cerulean Warbler (*Dendroica cerulea*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/511 doi:10.2173/bna.511

2. Rosenberg, K. V., R. W. Rohrbaugh, Jr., S. E. Barker, J. D. Lowe, R. S. Hames, and A. A. Dhondt. 1999. A land manager's guide to improving habitat for scarlet tanagers and other forest-interior birds. The Cornell Lab of Ornithology.

Land Use Land Cover Selections and Patch Type Justifications

Cerulean Warbler

BIOPID 55 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Riparian Undissolved	*
1800	RECREATIONAL LAND	Riparian Dissolved	*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Little information is known about migratory stopover habitat for cerulean warblers (Hamel 2000), so the habitats were chosen based upon known foraging habitat (forests) and other potentially wooded riparian areas surrounded by urban classes where migrating ceruleans have been observed (Petzinger expert opinion).

Patch type Contiguous Area is applied because cerulean warblers are known to use large tracts of forest, and larger tracts of forest are more likely to be suitable stopover habitat for this species than smaller tracts (Petzinger expert opinion). Furthermore, small riparian wooded areas are known to be stopover habitat for cerulean warblers. Therefore, forest LULC polygons are dissolved to create large forest patches and recreational land LULC polygons are also dissolved but only when in riparian zones. Rural residential LULC polygons are undissolved when in riparian zones.

Literature Citations

1. Hamel, Paul B. 2000. Cerulean Warbler (*Dendroica cerulea*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/511 doi:10.2173/bna.511

* ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Cliff Swallow

BIOPID 218 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Dissolved	1
2400	OTHER AGRICULTURE	Dissolved	1
5100	STREAMS AND CANALS	Dissolved	1
5200	NATURAL LAKES	Dissolved	1
5300	ARTIFICIAL LAKES	Dissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Historically, cliff swallows nested on cliff faces that had horizontal overhanging rocks that provided protection to the nest. More recently cliff swallows have adapted to using man-made structures for nesting. They currently use buildings and bridges and therefore have been able to exploit many more habitat types including grasslands, agricultural fields, towns, riparian edges and areas of fragmented forests (Brown and Brown 1995).

In New Jersey, the majority of cliff swallow colonies are located on bridges over rivers and other water bodies. The largest colonies are located on bridges over the upper Delaware River (Valent expert opinion). Proximity to a mud source for nest building appears to be an important factor in colony location.

Most cliff swallow locations in the Biotics database are associated with a nesting colony and therefore the Contiguous Area patch type is appropriate as it values suitable nesting habitat using the LULC classes listed above within the species occurrence area. Since cliff swallows will use a wide variety of habitat types for foraging and will travel a considerable distance from their nesting colony only nesting habitat is valued for this species as it is assumed that suitable foraging habitat will be located near the colony site.

Literature Citations

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* ENSP biologist expert opinion – M. Valent

Land Use Land Cover Selections and Patch Type Justifications

Common Nighthawk

BIOPID 56 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	1
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1
1150	MIXED RESIDENTIAL	Undissolved	1
1300	INDUSTRIAL	Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1
1440	AIRPORT FACILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1
1800	RECREATIONAL LAND	Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1

2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1*
2400	OTHER AGRICULTURE	Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4230	PLANTATION	Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1*
5200	NATURAL LAKES	Undissolved	*1*
5300	ARTIFICIAL LAKES	Undissolved	*1*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
6240	HERBACEOUS WETLANDS	Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
7100	BEACHES	Undissolved	*1*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	*1*
7300	EXTRACTIVE MINING	Undissolved	*1*
7400	ALTERED LANDS	Undissolved	*1*
7500	TRANSITIONAL AREAS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Brigham et al. 2011: Common nighthawk nesting habitat includes coastal sand dunes and beaches, logged or slashburned areas of forest, woodland clearings, prairies and plains, grassland habitat, farm fields, open forests, rock outcrops, and flat gravel rooftops of city buildings. Nighthawks may also use forest that has been selectively cut or thinned. In urban areas, the density of flat roofs is a primary factor in the selection of urban home ranges. Nesting areas are chosen secondarily in association with large trees for roosting and vegetation for the production of flying insects for food. Common nighthawks forage while in flight, between 1 m above water and ≥80 m at forest canopy height.

Because of the large breeding SOA and the multitude of habitat types used for nesting and/or foraging common nighthawks, including residential areas, patch type Limited Extent is applied so the habitat types would not be dissolved. In doing so, the extent of habitat valued by a breeding individual would be limited to the breeding territory.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Common Tern

BIOPID 170 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-4
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1,3,5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-4
6240	HERBACEOUS WETLANDS	Undissolved	2,3,4
7100	BEACHES	Undissolved	1,3,5
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Common terns nest in Atlantic coastal marsh islands on mats of wracks. They can also occur on beaches, often near inlets, but are more commonly found in the marsh. Their nests are small divots in the wrack or on the sand. They nest colonially and quite often share nesting areas with Black Skimmers (Andrews 1990, Burger & Gochfeld 1990, Nisbet 2002, Storey 1987, Trull et. al 1999). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Nisbet 2002, Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Common terns are regularly surveyed in NJ and their distribution is well understood. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Common Tern

BIOPID 171 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Undissolved	*
5200	NATURAL LAKES	Undissolved	1,3
5300	ARTIFICIAL LAKES	Undissolved	1,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,3,4
5411	OPEN TIDAL BAYS	Undissolved	1,3
5412	TIDAL MUD FLAT	Undissolved	4
5420	DREDGED LAGOON	Undissolved	4
5430	ATLANTIC OCEAN	Undissolved	*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	*
6240	HERBACEOUS WETLANDS	Undissolved	*
7100	BEACHES	Undissolved	2

7440	DISTURBED TIDAL WETLANDS	Undissolved	*4*

Land Use - Land Cover Selection and Patch Type Rationale

Common terns forage almost exclusively on fish, which they obtain by dive bombing into open bodies of water, including the ocean, bays, inlets, lakes and rivers (Duffy 1986, Nisbet 1983, Safina et. al 1988, Trull et. al 1999). The land based habitat, as well as mudflats, are valued as important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young.

This is a well-surveyed, and the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used. One LULC type was selected as “Riparian Undissolved” since it is not a habitat they will utilize unless it is adjacent to water.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Cooper's Hawk

BIOPID *40* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4230	PLANTATION	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

Cooper's hawk nesting habitat in southern New Jersey has been described as deciduous, coniferous and mixed riparian or wetland forests, red maple or black gum swamps, and Atlantic white cedar (Liguori 2003). In northern NJ, habitat tends to be mixed riparian woodlands, eastern hemlock/white pine forests and conifer plantations (Liguori 2003). Nesting habitat in the NY/NJ region was found to be similar for Cooper's hawks and Northern goshawks, except that Cooper's hawk nest sites had more shrub cover, were generally on flatter terrain, and closer to roads, forest openings and human habitation than goshawks (Bosakowski et al. 1992). Curtis et al. (2006) reported nesting habitat as deciduous, mixed and evergreen forests and deciduous stands of riparian habitat.

The Limited Extent patch type is applied to value forest types within and proximate to a known species' occurrence and its approximate home range.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Meadowlark

BIOPID 58 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	3,5
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	3,4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	3,4
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	3,5
1800	RECREATIONAL LAND	Adjacent Undissolved	3
2100	CROPLAND AND PASTURELAND	Dissolved	1-6
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	3,4
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	3,4
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	4
2400	OTHER AGRICULTURE	Undissolved	3,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	2
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	2
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	2

6240	HERBACEOUS WETLANDS	Dissolved	*3,4*
7400	ALTERED LANDS	Undissolved	*3*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*3*
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	*3*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

Eastern meadowlarks are most commonly found breeding in "grasslands, pastures, and savannas, but also in hay and alfalfa fields, weedy borders of croplands, roadsides, orchards, golf courses, reclaimed strip mines, airports, shrubby overgrown fields, or other open areas" (Hull 2002). They prefer larger areas with few shrubs and trees but will use tall trees in fields for singing (Lanyon 1995; Hull 2002). This species shows preference for habitats with good grass and litter cover (Lanyon 1995). In New Jersey, eastern meadowlarks are found using shrubland habitat types at a rate that indicates active selection of that habitat type. Therefore some shrubland LULC classes have been included as a secondary LULC habitat type (ENSP 2010).

Patch type Cardinal-Proximate is selected for Eastern meadowlarks due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for Eastern meadowlarks. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates Eastern meadowlarks breeding, foraging and rearing young requirements.

A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Glossy Ibis

BIOPID 198 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2-4,6,7
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2-4,6,7
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2-4,7
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-5,7,8
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1-5,7
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-5,7,8
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1-5,7
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1-5,7
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1-5,7
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1-5,7,8
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1-5,7
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Glossy ibis use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as black cherry, *Prunus serotina*), and in the Atlantic costal marsh islands (Beaver et. al 1980, Cramp & Simmons 1977, Hancock et. al 1992, Palmer 1962, Post et. al 1970, Spendalow & Patton 1988, Stevenson & Anderson 1994, Wiese 1979). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis expert opinion). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Beaver et. al 1980, Davis expert opinion).

Patch type Limited Extent is selected for this species. They are a well surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only highlight habitats being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Glossy Ibis

BIOPID 199 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1-3,6
5200	NATURAL LAKES	Undissolved	1-3,6
5300	ARTIFICIAL LAKES	Undissolved	1-3,6
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3,6
5411	OPEN TIDAL BAYS	Undissolved	1-3,6
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1-3,6
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,4
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2,4
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	5-8
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	7,8
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	5-8
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	7,8
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	5-8

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***7,8***
6240	HERBACEOUS WETLANDS	Riparian Undissolved	*****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	***5-8***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***7,8***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***1***

Land Use - Land Cover Selection and Patch Type Rationale

Glossy ibis forage on invertebrates, including aquatic beetles and insect larvae, and small mollusks, such as mussels and clams. They will use open water to stalk aquatic prey in and will hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Davis & Kricher 2000, Erwin 1983, Hancock et. al 1992, Master 1992, Palmer 1962, Stevenson & Anderson 1994, Wiese 1979, Williams 1975).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. This patch type allows for the habitat that is most likely used to be valued without extending it to areas that are less likely to be used. In an additional effort to avoid valuing habitat that is not used by this species, some LULC polygons are coded “Riparian Undissolved” so that they are only valued when adjacent to water, and therefore more attractive to this species.

Literature Citations

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Warbler

BIOPID *60* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-6*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-6*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-6*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-6*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-6*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-6*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-6*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-6*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-6*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-6*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-6*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-6*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-6*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-6*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-6*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-6*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-6*
6240	HERBACEOUS WETLANDS	Undissolved	*1-6*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-6*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-6*

Land Use - Land Cover Selection and Patch Type Rationale

Golden-winged warblers predominately breed in scrub-shrub habitat but will use the forest edges up to 30 meters into the forest (Reed 2001, Confer et al. 1992). Territories are most often in wetlands, including the edge of tamarack bogs, alder swamps, wetlands with willows, and sometimes swamp forests. In southern New York and adjacent New Jersey, golden-winged warblers nest in swamp forests that are dominated by red maple in the canopy and tussock sedge in the herb layer with a dry, forested edge (Confer et al. 2011, Confer and Pascoe unpublished, Confer et al. 2003, Hunter et al. 2001). The majority of golden-winged warblers breeding in New Jersey are in utility rights-of-way, but can also be found in shrub swamps and the upland forest edge of wetlands, wetland successional forests, abandoned homesteads, and other upland shrubby fields (Petzinger expert opinion). Stopover habitat for golden-winged warblers is poorly documented but they have been observed using forest edge and tall second growth forest (Confer et al. 2011).

Patch type Limited Extent is applied to limit the amount of forested habitat valued by breeding occurrences. Because population dynamics are better understood for golden-winged warblers in New Jersey, the SOA size for golden-winged warblers will adequately depict the area likely used by the local population. Therefore, LULC polygons did not need to be dissolved. Because this species will use wetlands, open-canopy forest, or shrubby areas when these habitats are adjacent to forest, large contiguous patches of forest will be valued by the model, however, the most suitable portions of closed-canopy forest used by golden-winged warblers are likely to be found within 30 meters of the forest edge.

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* ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Grasshopper Sparrow

BIOPID *61* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Dissolved	*4,6*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*6*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent Undissolved	*6*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*6*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*4,6*
1800	RECREATIONAL LAND	Adjacent Undissolved	*4,6*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-6*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-6*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*6*
2400	OTHER AGRICULTURE	Undissolved	*4,6*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1-6*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	*3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*3*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*3*
6240	HERBACEOUS WETLANDS	Undissolved	*6*
7400	ALTERED LANDS	Undissolved	*6*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*6*
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	*6*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall relative size of the grassland. This increase of size is important to most grassland bird species because they require large patches of habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

Grasshopper sparrows utilize native and cultivated grasslands, weedy fallow fields, and alfalfa fields. They avoid significant shrub cover (Vickery 1996; Denchant et al. 2002) and occupy intermediate grassland habitat, preferring drier sparse sites with open or bare ground for feeding (Vickery 1996). In Maine, grasshopper sparrows also occur in blueberry barrens, airfields, and hayfields (Vickery 1996). In New Jersey, grasshopper sparrows are found using shrubland habitat types at a rate that indicates active selection of that habitat type. Therefore, some shrubland LULC classes have been included as a secondary LULC habitat type (ENSP 2010). Breeding and non-breeding habitat is similar for grasshopper sparrow (Vickery 1996).

Patch type Cardinal-Proximate is selected for grasshopper sparrows due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for grasshopper sparrows. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates grasshopper sparrows breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Gray-cheeked Thrush

BIOPID 62 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1
1800	RECREATIONAL LAND	Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

There is little known information about migratory stopover habitat of gray-cheeked thrushes. They may be observed in any treed or shrubby area, including city parks and suburban gardens but appear to favor well-wooded sites with thick understory or shrub layer similar to breeding habitat. Additionally, gray-cheeked thrushes may be observed stopping over in more open woodlands or possibly in areas with sparse or no canopy (Lowther et al. 2001).

Patch type Limited Extent is applied to encompass migratory stopover habitat of gray-cheeked thrushes while minimizing the extent of habitat valued because migrant thrushes use stopover habitats on a limited and local basis.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Great Blue Heron

BIOPID 172 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,2***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,2***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,2***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***1***

Land Use - Land Cover Selection and Patch Type Rationale

Great blue herons utilize a wide variety of forested habitats for nesting. They will nest in lowland swamp, wetland and upland forests (Butler 1992, Spendalow & Patton 1988). They will use many species of trees for substrate and although they can nest near the ground, in New Jersey they often nest higher in the canopy. They almost always nest in colonies, though there are exceptions of one pair "colonies". The colonies in New Jersey only consist of other great blue herons. Their colonies are often some distance away from human disturbance and nestled within a forested patch, though again, there are exceptions (Davis personal observation). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Butler 1992, Davis expert opinion).

Great blue herons are a fairly well surveyed species in the state and their distribution is variable throughout the state. Colonies can abandon and then reform in a nearby area or be active at the same location for many years. Due to these reasons, Patch type Limited Extent is selected for this species. The colonies are easily delineated and this patch type allows the habitat being utilized by the individuals in the SOA to be valued without overvaluing areas that are not critical to that nesting site. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only value habitats used by this species for nesting colonies.

Literature Citations

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Great Blue Heron

BIOPID 173 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1
6120	FRESHWATER TIDAL MARSHES	Undissolved	1
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	1
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	1

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
6240	HERBACEOUS WETLANDS	Undissolved	*1*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Great blue herons are generalist predators that will forage on a wide variety of prey items, including fish, amphibians, and small reptile, mammals and other birds. They hunt for some of these items in and around aquatic environments such as lakes, rivers, ponds, streams and bays. More terrestrial based prey is acquired on hunting bouts in both shrubby and forested wetlands, and salt and freshwater habitats (Butler 1992).

Patch type Limited Extent is selected for this species. It is a reasonably well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. Great blue herons are capable of long foraging commutes, and patch type Limited Extent allows for the suitable habitat that is most often used to be valued (i.e. that nearest to the colony) without extending it to areas that are used less often. The LULC polygons that were "Riparian Undissolved" was applied denote those wooded wetlands areas that will likely only be used when adjacent to water.

Literature Citations

1. Butler, Robert W. 1992. Great Blue Heron (*Ardea herodias*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 7 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/025 doi:10.2173/bna.25

Land Use Land Cover Selections and Patch Type Justifications

Gull-billed Tern

BIOPID 178 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	2,3
2100	CROPLAND AND PASTURELAND	Dissolved	1,3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	2,3
5200	NATURAL LAKES	Dissolved	3
5300	ARTIFICIAL LAKES	Dissolved	3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	3
5411	OPEN TIDAL BAYS	Undissolved	3
5412	TIDAL MUD FLAT	Dissolved	3
5420	DREDGED LAGOON	Dissolved	3
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,3
6120	FRESHWATER TIDAL MARSHES	Dissolved	2,3
6130	VEGETATED DUNE COMMUNITIES	Dissolved	3,4
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	2,3
6240	HERBACEOUS WETLANDS	Dissolved	2,3

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*2,3*
7100	BEACHES	Dissolved	*3*
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	*2,3*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*3*

Land Use - Land Cover Selection and Patch Type Rationale

Gull-billed terns are colonially nesting terns that breed primarily in the marshes of New Jersey (Buckley & McCaffrey 1978, Molina et. al 2009, Davis expert opinion). Some birds choose to nest on beaches, usually amongst common tern and black skimmer colonies (Rohwer & Woolfeden 1968). Nests are laid on wrack mats in the marsh or directly on the sand on the beach. Unlike most other terns in New Jersey, gull-billed terns do not forage primarily on fish. Although they will take fish, they also hunt for prey items including insects, lizards, amphibians and occasionally other birds. Therefore, foraging areas include mudflats, salt marshes and the like in addition to open water (Molina et. al 2009). They have also been known to forage in agricultural fields (Bogiliani et. al 1990).

Patch type Contiguous Area is applied for this species. Gull-billed terns do not nest in large numbers in the state, leading to a moderate number of records, and only their Atlantic coastal marsh habitat is surveyed on a regular basis. Since their distribution is not fully understood and because their nesting and foraging habitat is so similar (though they use different areas for each) this patch type ensures that the habitat they are using for both behaviors (nesting and foraging) is properly valued.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Henslow's Sparrow

BIOPID 63 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	3,5
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	4
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	3,5
1800	RECREATIONAL LAND	Adjacent Undissolved	4
2100	CROPLAND AND PASTURELAND	Dissolved	1-7
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	2-7
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2-7
6111	SALINE MARSHES (LOW MARSH)	Undissolved	4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	4
6120	FRESHWATER TIDAL MARSHES	Undissolved	4
6240	HERBACEOUS WETLANDS	Dissolved	3,6
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	4
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	4

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall relative size of the grassland. This increase of size is important to most grassland bird species because they require large patches of habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

Henslow's sparrows are considered a mature grassland species because their preferred breeding habitat is tall, dense vegetation with a thick litter layer and no bare ground that is typical of older grasslands (3-5 years without disturbance) (Bollinger 1995; Pruitt 1996; Peterjohn 2006). They are also frequently found using moist areas (Pruitt 1996, Herkert et al. 2002, Peterjohn 2006). In the eastern part of its range, preferred habitats include coastal marshes, swamps, dry fields, salt marshes, low wet meadows and upland weedy hayfields or pastures (Pruitt 1996, Herkert et al. 2002). In the Northeast, airports provide large areas of grassland habitat for grassland birds, including Henslow's sparrow (Morgan and Burger 2008).

Patch type Cardinal-Proximate is selected for Henslow's sparrows due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for Henslow's sparrows. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates Henslow's sparrows breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Henslow's Sparrow

BIOPID 64 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Undissolved	4
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	6
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	4
1800	RECREATIONAL LAND	Undissolved	3
2100	CROPLAND AND PASTURELAND	Undissolved	1-6
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	2,3,5,6
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	3
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2-6
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	6
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	6
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	6
6111	SALINE MARSHES (LOW MARSH)	Undissolved	3,6
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	3,6
6120	FRESHWATER TIDAL MARSHES	Undissolved	3,6

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*6*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*6*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*6*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*6*
6240	HERBACEOUS WETLANDS	Undissolved	*3,5,6*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*3,6*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*3,6*

Land Use - Land Cover Selection and Patch Type Rationale

Breeding and non-breeding habitat is similar for Henslow's sparrows. They are considered a mature grassland species as their preferred breeding habitat is tall, dense vegetation with a thick litter layer and no bare ground that is typical of older grasslands (3-5 years without disturbance) (Bollinger 1995; Pruitt 1996; Peterjohn 2006). Henslow's sparrows are also frequently found using moist areas (Pruitt 1996; Herkert et al. 2002; Peterjohn 2006) and may select those habitat types during non-breeding season (Pruitt 1996). In the eastern part of its range, preferred habitats include coastal marshes, swamps, dry fields, salt marshes, low wet meadows and upland weedy hayfields or pastures (Pruitt 1996; Herkert et al. 2002). In the Northeast, airports provide large areas of grassland habitat for grassland birds, including Henslow's sparrows (Morgan and Burger 2008). Although the migration habitat requirements for Henslow's sparrows have not been thoroughly researched, there is evidence that they also use shrub habitat (Pruitt 1996).

Patch type Limited Extent is selected for Henslow's sparrow observations during migration because during migration birds utilize small areas for short periods of time before they move southward. Therefore, the selected LULCs did not need to be dissolved. The resulting polygons value the habitat important to migrating Henslow's sparrows while limiting the extension into areas that are less likely to be used during migration.

Literature Citations

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2. Herkert, J. R. 1998 (revised 2002). Effects of management practice on grassland birds: Henslow's Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. 17 pages.

3. Herkert, James R., Peter D. Vickery and Donald E. Kroodsma. 2002. Henslow's Sparrow (*Ammodramus henslowii*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/672 doi:10.2173/bna.672

4. Morgan, M. and M. Burger. 2008. A Plan for Conserving Grassland Birds in New York: Final Report to the New York State Department of Environmental Conservation under contract #C005137. New York Audubon. 140 pp.

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Land Use Land Cover Selections and Patch Type Justifications

Hooded Warbler

BIOPID *65* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*

6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Chiver et al. 2011: Hooded warblers breed in a variety of forested habitats. Their territories usually include small clearings where shrub understory is available for nesting. Typical breeding habitat for hooded warblers include mature forests where trees are large enough to create significant tree fall gaps, selectively logged deciduous forests, as well as pine plantations, 1–5 yr after harvesting, and remains as long as there are suitable understory shrubs for nesting. Hooded warblers are also often associated with moist woodlands and ravines, forested wetlands, and bottomland hardwood forest. This species tends to breed in large forests but can also be found in small (2.5 ha) isolated fragments.

Hooded warblers breed in forested habitat and may be sensitive to forest fragmentation. Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. Chiver, Ioana, L. J. Ogden and B. J. Stutchbury. 2011. Hooded Warbler (*Wilsonia citrina*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/110 doi:10.2173/bna.110

Land Use Land Cover Selections and Patch Type Justifications

Horned Lark

BIOPID *66* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Dissolved	*2,4*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*2*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*2*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*2-4,6*
1710	CEMETERY	Adjacent Undissolved	*2*
1800	RECREATIONAL LAND	Undissolved	*2-4,6*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-7*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Adjacent Undissolved	*2*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*2*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*2*
2300	CONFINED FEEDING OPERATIONS	Undissolved	*2*
2400	OTHER AGRICULTURE	Undissolved	*2-4,6*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*2,3*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*2*

6240	HERBACEOUS WETLANDS	Undissolved	*2*
7100	BEACHES	Undissolved	*2*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	*2,3,6*
7300	EXTRACTIVE MINING	Dissolved	*2,3,6*
7400	ALTERED LANDS	Dissolved	*2,3*
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	*2,6*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*2,6*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands which are characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agriculture, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (i.e. field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULCs are not frequent enough to capture the changes to a given site (Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

In New Jersey, Horned larks are year round residents and are considered disturbance-tolerant species (Peterjohn 2006). Breeding and non-breeding habitat are similar but during the winter months Horned larks increase the use of beaches and sand dunes and mowed areas such as airfields. In winter, horned larks will also make use of livestock feed lots and heavily grazed areas (Beason 1995).

Horned larks are typically the first breeding bird species to colonize bare ground by reclamation of surface mines, strip mines and newly seeded agricultural lands (Beason 1995; Peterjohn 2006). This species prefers to breed in barren ground, areas with little vegetation and fields of row crop stubble (Beason 1995; Dinkins et al. 2003).

Patch Type Cardinal-Proximate is selected for horned lark due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). To compensate for the changing nature of the agricultural lands they rely on, horned larks may change breeding locations once habitats become unsuitable (Peterjohn 2006; Askins, 2000; Shustack et al. 2010). Some areas that are suitable for nesting in early spring often become unsuitable by late spring or early summer because vegetation grows too tall (Beason 1995; Peterjohn 2006). When the habitat becomes unsuitable, "the birds generally abandon the area or forego further nesting" (Beason 1995). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates horned lark breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Kentucky Warbler

BIOPID *67* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*

6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Kentucky warblers breed in bottomland hardwoods and woods near streams with dense understory, often at low elevations. Studies of forest fragmentation in Missouri indicate that blocks of suitable habitat (at least 500 ha) are necessary for successful breeding while an analysis of floristic, structural, isolation and area variables of forest fragments on coastal plain of Maryland found that forest area, independent of its covariates, strongly affected presence/absence of Kentucky warblers (McDonald 1998). Because this species is area-sensitive, any type of forest surrounding breeding habitat contributes towards making that breeding habitat more suitable. Therefore, coniferous forest types were included in the LULC selection (Petzinger expert opinion).

Kentucky warblers inhabit interior forests, are area-sensitive, and require large tracts of forest to breed (McDonald 1998). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. Mcdonald, Mary Victoria. 1998. Kentucky Warbler (*Oporornis formosus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/324 doi:10.2173/bna.324

* ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Kentucky Warbler

BIOPID *68* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Riparian Undissolved	*1*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1*
1800	RECREATIONAL LAND	Dissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Little is known about migratory stopover habitat of Kentucky warblers. They have been observed in coastal areas as well as suburban gardens and city parks and prefer to forage in the lower levels of trees and in dense foliage near the ground (McDonald 1998).

Because so little is known about migratory stopover habitat and area needed for foraging during migration, patch type Contiguous Area is applied because Kentucky warblers are known to use large tracts of forest, and larger tracts of forest are more likely to be suitable stopover habitat for this species than smaller tracts (Petzinger expert opinion). Therefore, forest, scrub-shrub, and recreational land LULC polygons are dissolved to create large patches and rural residential LULC polygons are undissolved in riparian zones to minimize the residential habitat valued.

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1. Mcdonald, Mary Victoria. 1998. Kentucky Warbler (*Oporornis formosus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/324 doi:10.2173/bna.324

* ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Least Bittern

BIOPID 181 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Dissolved	2
5200	NATURAL LAKES	Dissolved	1,2
5300	ARTIFICIAL LAKES	Dissolved	1,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	2
5412	TIDAL MUD FLAT	Dissolved	2
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,4
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,4
6120	FRESHWATER TIDAL MARSHES	Dissolved	2-4
6240	HERBACEOUS WETLANDS	Dissolved	2
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	2
7440	DISTURBED TIDAL WETLANDS	Dissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Least bitterns are a highly secretive species that nest in freshwater and brackish marshes (Gibbs et. al 2009, Stewart & Robbins 1958, Swift 1989). They lay their eggs in emergent wetland substrate and spend the majority of their time hidden among the grass of the marshes they inhabit. They hunt a wide variety of prey items, including fish, herptiles, small mammals and insects, which they obtain in the same marsh habitats they nest in (Gibbs & Melvin 1990, Gibbs et. al 2009). Although secretive and not often observed in the open, they do use the edges of mudflats adjacent to marsh for foraging and this habitat type also connects the vegetated marsh patches they use and acts as something of a corridor (Gibbs et al 2009, Davis expert opinion).

Least bitterns are extremely difficult to census and their distribution and population are not well documented. Patch type Contiguous Area is selected for this species because it is able to reasonably value the habitat that is likely used by the individuals represented by the SOA.

Literature Citations

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2. Gibbs, J. P., F. A. Reid, S. M. Melvin, Alan F. Poole and Peter Lowther. 2009. Least Bittern (*Ixobrychus exilis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 7 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/017 doi:10.2173/bna.17

3. Stewart, R. E. and C. S. Robbins. 1958. Birds of Maryland and the District of Columbia. U.S. Fish and Wildlife Service. North American Fauna 62.

4. Swift, B. L. 1989. Avian breeding habitats in Hudson River tidal marshes. Unpubl. rept., New York Department of Environmental Conservation Division of Fish and Wildlife, Delmar, NY.

Land Use Land Cover Selections and Patch Type Justifications

Least Flycatcher

BIOPID *69* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1*
1800	RECREATIONAL LAND	Undissolved	*1*
2100	CROPLAND AND PASTURELAND	Undissolved	*1*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1*
2400	OTHER AGRICULTURE	Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*

4230	PLANTATION	Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
6240	HERBACEOUS WETLANDS	Undissolved	*1*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1*

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Tarof and Briskie, 2008: Least flycatchers breed in semi-open, second-growth, mid-successional and mature deciduous and mixed woods. They occasionally breed in conifer groves, post-burned areas, swamp and bog edges, orchards, and shrubby fields. While this species is often considered to be a forest-interior bird, it can be common in large, contiguous, mixed deciduous forests with moderate understory and well-developed canopy as well as in small (~1 ha) forest patches and country residential/camping areas (e.g., backyards with forest patches <1 ha). Least flycatchers are often found near open spaces (e.g., forest clearings, edges, yards), water (e.g., swamp, lake) and roads.

Because least flycatchers do not appear to be area sensitive and can occur in interior forest, forest edges, and shrubby habitat, patch type Limited Extent is applied to limit the extent of habitat valued to increase the likelihood that the valued patches actually support the documented local breeding population. Even so, large contiguous patches of forest and agriculture will be valued by the model but the most suitable portions of these habitat types used by least flycatchers are likely to be found within 100 meters of the forest edge.

Literature Citations

1. Tarof, S.and J. Briskie. 2008. Least Flycatcher (*Empidonax minimus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/099 doi:10.2173/bna.99

Land Use Land Cover Selections and Patch Type Justifications

Least Tern

BIOPID 182 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Undissolved	4,*
5412	TIDAL MUD FLAT	Undissolved	4
6111	SALINE MARSHES (LOW MARSH)	Undissolved	4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	4
6130	VEGETATED DUNE COMMUNITIES	Undissolved	2,4
7100	BEACHES	Undissolved	1-4
7300	EXTRACTIVE MINING	Undissolved	*
7400	ALTERED LANDS	Undissolved	4
7440	DISTURBED TIDAL WETLANDS	Undissolved	4
7500	TRANSITIONAL AREAS	Undissolved	4

Land Use - Land Cover Selection and Patch Type Rationale

Least terns are a colonial nesting species that nest primarily on barrier island beaches in New Jersey (Gochfeld 1983, Maclean et. al 1991, Savereno & Murphy 1995, Thompson et. al 1997). They will also nest on dredge spoil islands, occasionally on marsh islands and rarely (though consistently at active locations) at airports (Maclean et al. 1991, Thompson et al. 1997, Davis personal observation.). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Thompson et al. 1997, Davis expert opinion). They will also nest in habitats that have been converted to operations for sand mining where sandy substrate they desire for nesting becomes available (Thompson et al. 1997). Their nests are small divots in the sand, wrack in the marsh or on gravel/vegetation in more urban areas.

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. This is possible because least terns are well surveyed in the state and nest in easily delineated, discrete colonies. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option since it won't value habitats not being used by this species.

Literature Citations

1. Gochfeld, M. 1983. Colony site selection by Least Terns: physical attributes of sites. Colonial Waterbirds 6:205-213.

2. Maclean, D. C., T. S. Litwin, A. M. Ducey-Ortiz, and R. A. Lent. 1991. Nesting biology, habitat use, and inter-colony movements of the Least Tern (*Sterna antillarum*) on Long Island, N.Y. New York Department of Environmental Conservation Albany.

3. Savereno, L. A. and T. M. Murphy. 1995. A review of nesting sites used by Least Terns in South Carolina. Chat 59:41-46.

4. Thompson, Bruce C., Jerome A. Jackson, Joannna Burger, Laura A. Hill, Eileen M. Kirsch and Jonathan L. Atwood. 1997. Least Tern (*Sternula antillarum*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 10 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/290 doi:10.2173/bna.290

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Least Tern

BIOPID 183 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Undissolved	1
1419	BRIDGE OVER WATER	Undissolved	1
5100	STREAMS AND CANALS	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	1
7100	BEACHES	Undissolved	1
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Least terns forage almost exclusively on fish, which they obtain by diving into open bodies of water, including the ocean, bays, inlets, lakes and rivers (Thompson et al. 1997). The land based habitat, as well as mudflats, are valued as important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young. Although not an immediately obvious choice, the military installation classification (LULC 1211) is included because there are installations along the coast where least terns are documented nesting and foraging

Patch type Limited Extent is selected because least terns are a highly surveyed species in the state and their distribution is well understood, so a type that only values patches which intersect with the SOA is the best fit. The nesting colonies on which the foraging models are based are discrete, delineated polygons, which make it fairly easy to identify and map the areas likely to be used for foraging (given our understanding of foraging commutes). Using this patch type values the habitat that is most likely used by the associated colony without extending it to areas that are less likely to be used. One LULC was selected as “Riparian Undissolved” since it is not a habitat they will utilize unless it is adjacent to water.

Literature Citations

1. Thompson, Bruce C., Jerome A. Jackson, Joannna Burger, Laura A. Hill, Eileen M. Kirsch and Jonathan L. Atwood. 1997. Least Tern (*Sternula antillarum*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 10 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/290 doi:10.2173/bna.290

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Little Blue Heron

BIOPID 184 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	2
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
7440	DISTURBED TIDAL WETLANDS	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Little blue herons use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in the shrubs (such as marshelder, *Iva frutescens*) and trees (such as black cherry, *Prunus serotina*) in the Atlantic coastal marsh islands (Mccrimmon 1978, Rodgers & Smith 1995). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis personal observation). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Rogers & Smith 1995).

Patch type Limited Extent is selected for this species. It is a well-surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best type for this since it will not value habitats not being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

Literature Citations

1. Mccrimmon, Jr., D. A. 1978. Nest site characteristics among five species of herons on the North Carolina coast. Auk 95:267-280.

2. Rodgers, Jr., J.A. and H. T. Smith. 1995. Little Blue Heron (*Egretta caerulea*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 10 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/145 doi:10.2173/bna.145

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Little Blue Heron

BIOPID 185 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	3,4
5200	NATURAL LAKES	Undissolved	3,4
5300	ARTIFICIAL LAKES	Undissolved	3,4
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3
5411	OPEN TIDAL BAYS	Undissolved	3
5412	TIDAL MUD FLAT	Undissolved	3
5420	DREDGED LAGOON	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	3,*
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	3
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	3

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	*3*
6240	HERBACEOUS WETLANDS	Riparian Undissolved	*3*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	*3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	*3*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*3*

Land Use - Land Cover Selection and Patch Type Rationale

Little blue herons forage on fish and will also take small amphibians and invertebrates. They will use open water to stalk aquatic prey in and will hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Custer & Osborn 1978, Erwin 1983, Rodgers & Smith 1995, Willard 1977).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging model which makes it fairly easy to identify and map the areas most likely to be used for foraging around any given colony. Patch type Limited Extent allows for the habitat that is most likely used to be valued without extending to areas that are less likely to be used. There are several LULC habitat types that are only used by this species if adjacent to water. Therefore, those LULC polygons are coded "Riparian Undissolved" which will only value those habitat/classes adjacent to water thereby avoiding over valuing of habitat.

Literature Citations

1. Custer, T. W. and R. G. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95:733-743.

2. Erwin, R. M. 1983. Feeding habits of nesting wading birds: spatial use and social influences. Auk 100:960-970.

3. Rodgers, Jr., J.A. and H. T. Smith. 1995. Little Blue Heron (*Egretta caerulea*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 10 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/145 doi:10.2173/bna.145

4. Willard, D. E. 1977. The feeding ecology and behavior of five species of herons in southeastern New Jersey. Condor 79:462-470.

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Loggerhead Shrike

BIOPID 70 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	3
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	3
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*
1710	CEMETERY	Undissolved	3
1711	CEMETERY ON WETLAND	Undissolved	3
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	3
1800	RECREATIONAL LAND	Undissolved	3
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	3
2100	CROPLAND AND PASTURELAND	Undissolved	1-3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-3
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	3
2400	OTHER AGRICULTURE	Undissolved	3

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4230	PLANTATION	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*3*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*3*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*
6240	HERBACEOUS WETLANDS	Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
7400	ALTERED LANDS	Undissolved	*1*

7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

No empirical data exists on the migratory habitat of loggerhead shrikes, but it is considered to be similar to breeding habitat since breeding and winter habitat are very similar (Yosef 1996). Therefore, potential migratory stopover habitat includes open country with short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, open woodlands, and abandoned railroad rights-of-way (Yosef 1996, Dechant et al. 1998). Winter habitat is also similar to breeding habitat but hay fields and idle pastures are used in addition to scrub-shrub and open forest habitat (Yosef 1996).

Loggerhead shrikes have not been documented breeding in New Jersey since the early 1900s. However, New Jersey does provide stopover habitat for migrating loggerhead shrikes, and it may differ between spring and fall (Petzinger expert opinion). Individuals may move from pastures and cropland to more shrub-forest habitat in winter, particularly when fields are snow-covered (Pruitt 2000).

Patch type Limited Extent is applied to encompass migratory stopover habitat of loggerhead shrikes while minimizing the extent of habitat valued because migrant loggerhead shrikes use stopover habitats on a limited and local basis and the stopover habitat they use is also ephemeral.

Literature Citations

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2. Pruitt, L. 2000. Loggerhead Shrike Status Assessment. USFWS, Bloomington, IN.

3. Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). *In* The Birds of North America, No. 231 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

* ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Long-eared Owl

BIOPID *222* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4230	PLANTATION	Dissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1*

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

As summarized by Marks et al. (1994): The long-eared owl inhabits dense vegetation adjacent to grasslands or shrublands; also open forests. The reports of forests as the main habitat are misleading in that long-eared owls normally use these habitats for nesting and roosting only. In Idaho, large numbers nest in willows (*Salix* spp.), cottonwoods (*Populus* spp.), and junipers (*Juniperus* spp.) adjacent to shrubsteppe desert. Nesting in dense or brushy vegetation amidst open habitats also occurs in western states from California to Nevada to South Dakota. This owl inhabits coniferous or deciduous forest near open meadows in Michigan and western Oregon. In northeastern Oregon, breeds in extensive stands of grand fir (*Abies grandis*) mixed with other conifers, but forages primarily in open forests and forest edges.

Patch type Cardinal Proximate is used to identify cardinal (i.e., all forest types) that intersect the SOA, plus adjacent agricultural and shrubby types that long-eared owls use for foraging. This patch type most closely represents the way this species seems to select habitats in the landscape.

Literature Citations

1. Marks, J. S., D. L. Evans and D. W. Holt. 1994. Long-eared Owl (Asio otus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/133 doi:10.2173/bna.133

Land Use Land Cover Selections and Patch Type Justifications

Long-eared Owl

BIOPID *223* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4230	PLANTATION	Dissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

The long-eared owl uses conifer stands for roosting in eastern U.S.; the important attribute of winter roosts seems to be dense vegetation for concealment and perhaps thermal cover (Marks et al. 1994). Roost groves are adjacent to open habitats used for foraging (Marks et al. 1994). However, only forest habitat types were selected for valuation for roosts.

Patch type Contiguous Area is applied to dissolve all the suitable LULC polygons into patches, then value those patches that intersect a long-eared owl species occurrence area (SOA). In this way, suitable habitats (only forest types) were linked before being segregated by roads or unsuitable habitat types. This patch type served to identify the whole forest patch associated with a roosting SOA.

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Land Use Land Cover Selections and Patch Type Justifications

Migratory Raptor Concentration Site

BIOPID 241 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2
1710	CEMETERY	Undissolved	1,2
1711	CEMETERY ON WETLAND	Undissolved	1,2
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	2
1800	RECREATIONAL LAND	Undissolved	2
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	2
2100	CROPLAND AND PASTURELAND	Undissolved	2
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	2
2400	OTHER AGRICULTURE	Undissolved	2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1,2*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1,2*
4230	PLANTATION	Undissolved	*1,2*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1,2*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1,2*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1,2*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1,2*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1,2*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1,2*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1,2*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1,2*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1,2*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1,2*
5412	TIDAL MUD FLAT	Undissolved	*1,2*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*1,2*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*1,2*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1,2*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*1,2*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*1,2*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1,2*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1,2*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1,2*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1,2*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1,2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1,2*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1,2*
6240	HERBACEOUS WETLANDS	Undissolved	*1,2*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1,2*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1,2*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1,2*
6500	SEVERE BURNED WETLANDS	Undissolved	*1,2*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	*1,2*
7300	EXTRACTIVE MINING	Undissolved	*1,2*
7400	ALTERED LANDS	Undissolved	*1,2*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1,2*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1,2*
7500	TRANSITIONAL AREAS	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

All LULC types that provide some sort of vegetative habitat in the lower 10 kilometers of the Cape May peninsula were valued for migrating birds, because studies have shown that southbound migrating birds use all types of terrestrial habitats available before the approach to the Delaware Bay water crossing (McCann et al. 1993; Niles et al. 1996).

Patch type Limited Extent is used to value all vegetated habitats in the area identified as terrestrial migratory bird habitat, the lower 10 km of the southern point of Cape May peninsula.

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Land Use Land Cover Selections and Patch Type Justifications

Migratory Shorebird Concentration Site

BIOPID 213 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5300	ARTIFICIAL LAKES	Undissolved	5,7,9,*
5412	TIDAL MUD FLAT	Undissolved	1,4,8
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-3,6,9-11
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3,6,9-11
6130	VEGETATED DUNE COMMUNITIES	Undissolved	3,*
7100	BEACHES	Undissolved	1-3,5-7,9-11

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration (late-April to early June), migratory shorebirds forage on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on bivalves and polychaetes on Atlantic coast beaches, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010, Macwhirter et al. 2002, Skeel and Mallory 1996). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). During fall migration (mid-July through November), shorebird suitable foraging habitats include Atlantic coast beach, tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010, Macwhirter et al. 2002, Skeel and Mallory 1996). Shorebird movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008, Watts and Truitt 2000). As shorebirds spend more than half of the year on migratory stopovers along the US East Coast and wintering areas in the US, Central and South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

Literature Citations

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* ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Nashville Warbler

BIOPID *71* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1,2*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1,2*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1,2*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1,2*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1,2*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1,2*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1,2*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1,2*
4230	PLANTATION	Adjacent Undissolved	*1,2*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1,2*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	*1,2*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1,2*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	*1,2*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1,2*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1,2*

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1,2*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1,2*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1,2*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1,2*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1,2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1,2*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1,2*
6240	HERBACEOUS WETLANDS	Adjacent Undissolved	*1,2*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1,2*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

Nashville warblers breed in second growth, open deciduous or mixed forests with high levels of light penetration, preferably with shrubby undergrowth, forest edges, and regenerating fields (Williams 1996, Lowther & Williams 2011). In New York they nest in mixed forests, forest edges, and fields, along streams or at edge of a pond, marsh, swamp, or bog, and on mountain slopes (Williams 1996, Lowther & Williams 2011). Nashville warblers will also nest in tamarack and spruce-bordered bogs with sphagnum and Labrador tea. The area immediately around the nest is usually open rather than heavily wooded areas with herbaceous ground cover (Lowther & Williams 2011). In the East this species can inhabit steep mountain slopes as high as 1,400 m, but not above timberline (Williams 1996).

Patch type Cardinal-Proximate is applied because Nashville warblers breed in open forest, forest edge, and scrub-shrub. The cardinal habitats are dissolved and most likely to be breeding habitat for Nashville warblers either by themselves or as a conglomerate: open forests, shrubby habitats, and wetland forests. Proximate habitats are only likely be used only when adjacent to cardinal habitat and are undissolved: upland forest with >50% cover and herbaceous wetlands.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Northern Goshawk

BIOPID *41* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4230	PLANTATION	Dissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Squires and Reynolds (1997): In eastern deciduous forests, Northern goshawks prefer nesting in mature, mixed hardwood–hemlock stands of birch (*Betula* sp.), beech (Fagus sp.), maple (Acer sp.), and eastern hemlock (*Tsuga canadensis*). Forest stands containing nests are often small, approximately 10–100 ha, and territories may contain 1– 5 alternative nest areas. Depending on the continuity of forest cover, nests of adjacent pairs occur at regular intervals. Descriptions of nest habitat may be biased because not all studies equally sample all habitats and forest successional stages for nesting hawks; the data are equivocal regarding mature forest preferences. Although goshawks are considered habitat generalists at large spatial scales, they tend to nest in a relatively narrow range of vegetation structural conditions. Nests are typically in mature to old-growth forests composed primarily of large trees, with high (60–90%) canopy closure, near the bottom of moderate hill slopes, with sparse ground cover. Closed stands may reduce predation and, along with north slopes, provide relatively cool environments. Nest habitat is single to multistoried, depending on the forest type. In eastern deciduous forests, goshawks prefer to nest in large forested areas containing more mature timber than is generally present in the landscape while smaller forest tracts are seldom used.

In the non-breeding season, mature forests may provide sufficient cover to attain undetected hunting perches, yet are open enough for hawks to maneuver when hunting prey. Agricultural lands, wetlands, and clear-cuts are used in proportion to their availability. Although mature forests were preferred by goshawks wintering in Swedish boreal forests, edge habitats were used extensively by birds wintering in agricultural lands (Squires and Reynolds 1997).

The Contiguous Area patch type is applied to represent suitable and contiguous forest areas used by this species, recognizing it has a large territory size relative to other forest hawks.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Northern Harrier

BIOPID *224* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-5*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*2-5*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*2-4*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2-5*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent Undissolved	*3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*2-5*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Adjacent Undissolved	*2,3*
5412	TIDAL MUD FLAT	Dissolved	*2,4*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	*2,4*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	*2,4*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*3,4*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*3,4*
6240	HERBACEOUS WETLANDS	Dissolved	*2-4*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*3*

7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	*2-5*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*2,4*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Northern harriers are considered open field raptors and are associated with agricultural lands, marshes, scrub-shrub, pastures and wetlands with tall dense vegetation (Denchant et al. 2002). Northern harriers are ground nesters and they typically place their nests in grasslands or wetlands in dense vegetation (Macwhirter et al. 1996, Denchant et al. 2001, Blake et al. 2008). These birds prefer to place their nests in the wetter margins of their breeding habitat, probably to reduce the risk of predation (Denchant et al. 2002, Macwhirter et al. 1996). In the coastal states such as New Jersey, Northern harriers are found breeding in fresh and tidal marshes as well as upland meadows and grasslands (Macwhirter et al. 1996, Blake et al. 2008). Non-breeding habitat is the same as breeding (Macwhirter et al. 1996).

Patch Type Cardinal-Proximate is selected for Northern harriers since they are relatively mobile, reflecting the ephemeral nature of their preferred breeding habitats and the need to follow prey sources and habitat changes (Macwhirter et al. 1996, Denchant et al. 2002, Blake et al. 2008). Patch Type Cardinal-Proximate dissolves the cardinal polygons and values adjacent (proximate) LULC classes to form large, contiguous patches of suitable habitat for breeding and non-breeding Northern harriers (Macwhirter et al. 1996, Denchant et al. 2002). Adjacent (proximate) habitat is only valued if adjacent to primary habitat. This approach limits the habitat valued to that which the population uses but accommodates its need for breeding and foraging habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Northern Parula

BIOPID *72* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1*
4230	PLANTATION	Adjacent Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*

6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Adjacent Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Adjacent Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Moldenhauer and Regelski 1996: Northern parulas are primarily a riparian species associated with mature forest with epiphytic growth. They prefer to breed in tall, mature coniferous forests with spruce, hemlock, and fir in moist bog and swamp habitat where beard moss is abundant. They can also breed in hardwood stands of sugar maple, red maple, paper birch, and yellow birch. Northern parulas are most abundant in 40-yr-old stands of trees and their density is positively correlated with tree density, basal area, percent canopy cover, and canopy height. In the Mid-Atlantic, forest area was a significant predictor of this species' relative abundance and they are rarely encountered in forests of <100 ha.

Patch type Cardinal-Proximate is applied because, while northern parulas are predominately a forest interior species that is also area sensitive, they also need forest gaps to allow for shrubby growth, especially in areas where mature forest is not available (Petzinger expert opinion). Therefore, forested habitat was chosen as cardinal habitat and dissolved, and shrubby habitat was chosen as proximate habitat and undissolved.

Literature Citations

1. Moldenhauer, Ralph R. and Daniel J. Regelski. 1996. Northern Parula (*Parula americana*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/215 doi:10.2173/bna.215

Land Use Land Cover Selections and Patch Type Justifications

Osprey

BIOPID 227 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1,*
5200	NATURAL LAKES	Dissolved	1,*
5300	ARTIFICIAL LAKES	Dissolved	1,*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,*
5411	OPEN TIDAL BAYS	Undissolved	1,*
5412	TIDAL MUD FLAT	Dissolved	1,*
5420	DREDGED LAGOON	Dissolved	1,*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	1,*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	1,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1,*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	1,*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,*

6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1,**
6240	HERBACEOUS WETLANDS	Adjacent/Riparian Undissolved	*1,**
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	*1,**
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1,**
7100	BEACHES	Dissolved	*1,**
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*1,**
7440	DISTURBED TIDAL WETLANDS	Dissolved	*1,**

Land Use - Land Cover Selection and Patch Type Rationale

From Poole (2002): Across the osprey's range, habitat common denominators are: (1) adequate supply of accessible fish within commuting distance (10–20 km) of nest; shallow waters (0.5–2 m deep), which generally provide most accessible fish; (2) open nest sites free from predators (especially mammalian); such sites generally elevated (e.g., trees, large rocks [especially over water], or bluffs); predator-free islands; and, increasingly, artificial structures such as towers supporting electrical lines or cell-phone relays and channel markers; (3) ice-free season sufficiently long to allow fledging of young.

In NJ, most ospreys nest on artificial structures (designed nest platforms, channel markers, power and cell towers, etc.) that are within 1.6 km of open water (Clark expert opinion). The habitats typically occupied by nesting ospreys were included for valuation (i.e., marshes, wooded and herbaceous wetlands). Not all potential habitats were included, however, because to do so would tend to value large forested parcels due to occupancy of an artificial structure like a cell tower surrounded by forest.

In NJ colonies, some nests are as close as 120 meters, but most are more than 500 meters apart (Clark expert opinion). While ospreys generally tolerate and nest in proximity to people, human activity of certain types and at certain times of the season will disrupt nesting and can cause injury or mortality to young (Clark expert opinion).

Patch type Cardinal Proximate is selected because it dissolves suitable habitats to represent them together, then values adjacent undissolved habitats that are contiguous with those. Adjacent undissolved habitats (like utility corridors and forest-marsh interfaces) are suitable mainly when proximate to larger, primary habitat types (generally speaking, marshes). The habitats closest to nests are valued, even though ospreys forage many miles away, because osprey foraging habitat is valued in a separate osprey foraging model.

Literature Citations

1. Poole, Alan F., Rob O. Bierregaard and Mark S. Martell. 2002. Osprey (*Pandion haliaetus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/683 doi:10.2173/bna.683

* ENSP biologist expert opinion – K. Clark

Land Use Land Cover Selections and Patch Type Justifications

Osprey

BIOPID *287* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5200	NATURAL LAKES	Undissolved	***1***
5300	ARTIFICIAL LAKES	Undissolved	***1***
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	***1***
5411	OPEN TIDAL BAYS	Undissolved	***1***
5412	TIDAL MUD FLAT	Undissolved	***1,****
5420	DREDGED LAGOON	Undissolved	***1***
5430	ATLANTIC OCEAN	Undissolved	***1***

Land Use - Land Cover Selection and Patch Type Rationale

From Poole (2002): Across the osprey's range, habitat common denominators are: (1) adequate supply of accessible fish within commuting distance (10–20 km) of nest; shallow waters (0.5–2 m deep), which generally provide most accessible fish; (2) open nest sites free from predators (especially mammalian); such sites generally elevated (e.g., trees, large rocks [especially over water], or bluffs); predator-free islands; and, increasingly, artificial structures such as towers supporting electrical lines or cell-phone relays and channel markers; (3) ice-free season sufficiently long to allow fledging of young.

All water LULC types were selected for foraging except 5100 (streams and canals), which may be used for foraging under conditions of proximity to nest and accessibility of fish to ospreys. For all other open waters, Patch Type Limited Extent emphasizes the open waters in closest proximity to nests, although we recognize that ospreys forage distances up to 20 km.

Literature Citations

1. Poole, Alan F., Rob O. Bierregaard and Mark S. Martell. 2002. Osprey (*Pandion haliaetus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/683 doi:10.2173/bna.683

Land Use Land Cover Selections and Patch Type Justifications

Peregrine Falcon

BIOPID *239* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Riparian Undissolved	*3,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Riparian Undissolved	*3,**
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	*3,**
5411	OPEN TIDAL BAYS	Undissolved	*3,**
5412	TIDAL MUD FLAT	Undissolved	*3,**
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*3,**
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*3,**
6120	FRESHWATER TIDAL MARSHES	Undissolved	*3,**
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*3,**
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*3,**
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*3,**
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*3,**
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*3,**
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*3,**
6240	HERBACEOUS WETLANDS	Undissolved	*3,**

7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***3,****
7440	DISTURBED TIDAL WETLANDS	Undissolved	***3,****

Land Use - Land Cover Selection and Patch Type Rationale

All emergent and scrub-shrub wetland habitats within 1 km of a nest were designated as critical habitat. Home range size is much larger than 1 km, as peregrines forage on birds found in open habitats within 5 km of the nest (White et al. 2002). Peregrines will defend an area that is approximately 1.6 km in radius, based on the closest nesting pairs observed in NJ (Clark expert opinion). Prey species are mainly passerines, shorebirds and doves found in open habitats, usually within 1-5 km of the nest, and typical hunting habitats are emergent marsh, scrub-shrub, wooded edges, beach, dunes and intertidal flats (White et al. 2002). In urban areas, any of those habitat types are used, in addition to the urban setting itself, where peregrines hunt rock pigeons (*Columba livia*). In urban areas, *Columba* species may comprise 31% of the peregrine diet, and resident bird species (including *Columba* species) more than 90% (by occurrence; Nadareski 2001). In contrast, Steidl et al. (1997) found that nearly 70% of the diet of NJ coastal peregrines consisted of migratory birds, predominantly shorebirds. These diet figures point to the habitat differences between coastal/marsh nesting peregrines and urban-nesting peregrines.

Patch type Limited Extent was selected to emphasize the valuation of suitable habitat types closest to the nest site proper, but contiguous patches of suitable habitat would typically be used beyond the 1 km SOA radius due to the birds' territory size and foraging habits. Urban habitats were not selected to be valued unless they were riparian, but ENSP recognizes that urban peregrines make use of a wide range of habitats available to them.

Literature Citations

1. Nadareski, C. A. 2001. Analysis of prey of the peregrine falcon (*Falco peregrinus*) for the Port of New York/New Jersey. Unpublished report to U.S. Fish and Wildlife Service. May 2001.

2. Steidl, R. J., C. R. Griffin, T. P. Augspurger, D. W. Sparks, L. J. Niles. 1997. Prey of peregrine falcons from the New Jersey coast and associated contaminant levels. Northeast Wildlife 52:11-19.

3. White, C. M., N. J. Clum, T. J. Cade, and W. G. Hunt. (2002). Peregrine Falcon (*Falco peregrinus*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/bna/species/660 doi:10.2173/bna.660

* ENSP biologist expert opinion – K. Clark

Land Use Land Cover Selections and Patch Type Justifications

Pied-billed Grebe

BIOPID 186 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1
5100	STREAMS AND CANALS	Dissolved	1
5200	NATURAL LAKES	Dissolved	1
5300	ARTIFICIAL LAKES	Dissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Dissolved	1
6111	SALINE MARSHES (LOW MARSH)	Dissolved	1
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	1
6120	FRESHWATER TIDAL MARSHES	Dissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Dissolved	*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Dissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Dissolved	*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Dissolved	*
6240	HERBACEOUS WETLANDS	Dissolved	1

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Dissolved	*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Pied-billed grebes use open water habitat in lakes, bays and rivers for foraging, where they will dive into the water to consume prey items such as fish, aquatic insects and crustaceans. They will also use the areas close to shore for cover and to hunt other prey items. They will nest in the herbaceous wetlands around and near the bodies of water they hunt in, raising a brood of precocious chicks. Once the chicks are old enough, they will follow the adults onto the open water and utilize these habitats as well (Muller and Storer 1999). Although they do not directly use mudflats, this habitat type connects the vegetated marsh patches and open water they do use and acts as something of a corridor (Muller & Storer 1999, C. Davis expert opinion).

Patch type Contiguous Area was selected because it dissolves the LULC types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. Pied-billed grebes are not a well documented species in the state, due both to their secretive nature and presumed small numbers. Database records are generally not comprehensive enough to fully map their home ranges so this patch type ensures that all the suitable habitat in and around the SOA will be valued. Upland LULC types are typically used only when associated with water, hence their dissolve type of “Riparian Dependent.”

Literature Citations

1. Muller, M. J. and R.W. Storer. 1999. Pied-billed Grebe (*Podilymbus podiceps*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 18 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/410 doi:10.2173/bna.410

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Piping Plover

BIOPID 187 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	2
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-4
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1,2
6240	HERBACEOUS WETLANDS	Undissolved	1-4
7100	BEACHES	Undissolved	1-4
7440	DISTURBED TIDAL WETLANDS	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Piping plovers are small shorebirds that have firm habitat requirements. In New Jersey, they are almost exclusively found on Atlantic coast beaches and mudflats, with few known exceptions. Each breeding pair will delineate a territory in the area between the dune and high tide line and use the sandy substrate to nest (Elliott-Smith and Haig 2004). Piping plovers primarily forage for various invertebrates in the wrack line (the line of debris deposited by the ocean as the tide rises), dune line and in the intertidal zone. However they will also use wetland edges, marsh island edges and mudflats to forage. Their precocial chicks will join the adults to forage almost from the time they are hatched. Chicks will remain in these habitats until they fledge and migrate (Loegering and Fraser 1995, Regosin 1998).

Patch type Limited Extent is selected for this species. Due to their status as a federal and state listed species, piping plovers are the recipients of the highest level of survey effort and their distribution in the state is very well understood. Their proclivity for nesting in open areas makes it relatively easy to determine and map their home ranges. Patch type Limited Extent assures that only the habitat that the individuals represented by the SOA are valued without including areas that are not used by those individuals since it only values habitat that intersect with the SOA.

Literature Citations

1. Elias, S. P., J. D. Fraser, and P. A. Buckley. 2000. Piping Plover brood foraging ecology on New York barrier islands. Journal of Wildlife Management 64:346-354

2. Elliott-Smith, Elise and Susan M. Haig. 2004. Piping Plover (*Charadrius melodus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 18 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/002 doi:10.2173/bna.2

3. Loegering, J. P. and J. D. Fraser. 1995. Factors affecting Piping Plover Chick survival in different brood-rearing habitats. Journal of Wildlife Management 59:646-655.

4. Regosin, J. V. 1998. Chick behavior, habitat use, and reproductive success of Piping Plovers at Goosewing Beach, Rhode Island. Journal of Field Ornithology 69:228-234.

Land Use Land Cover Selections and Patch Type Justifications

Red Knot

BIOPID 214 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5300	ARTIFICIAL LAKES	Undissolved	3,*
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-3,5,7
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3,5,7
6130	VEGETATED DUNE COMMUNITIES	Undissolved	3,*
7100	BEACHES	Undissolved	1-3,5,7

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration, red knots forage on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on bivalves and polychaetes on Atlantic coast beaches, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). During fall migration, red knot suitable foraging habitats include Atlantic coast beach, tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). Red knot movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). As red knots spend more than half of the year on migratory stopovers along the US East Coast and wintering areas in the US, Central and South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

Literature Citations

1. Burger, J., L. Niles, and K. E. Clark. 1997. Importance of beach, mudflat, and marsh habitats to migrant shorebirds on Delaware Bay. Biological Conservation 79:283-292.

2. Clark, K. E., L. J. Niles, and J. Burger. 1993. Abundance and distribution of migratory shorebirds in Delaware Bay, NJ. Condor 95:694-705.

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6. Niles, L.J., H.P. Sitters, A.D. Dey, P.W. Atkinson, A.J. Baker, K.A. Bennett, R. Carmona, K.E. Clark, N.A. Clark, and C. Espoz. 2008. Status of the red knot (Calidris canutus rufa) in the Western Hemisphere. Studies in Avian Biology 36:1-185.

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Pitts, R. A. Robinson, and I. L. Serrano. 2008. Status of the Red Knot (*Calidris canutus rufa*) in the Western Hemisphere. Studies in Avian Biology, No. 36. Cooper Ornithological Society.

* ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Red-headed Woodpecker

BIOPID 73 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	1
1710	CEMETERY	Undissolved	1
1711	CEMETERY ON WETLAND	Undissolved	1
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	1
1800	RECREATIONAL LAND	Undissolved	1
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1

2400	OTHER AGRICULTURE	Adjacent Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	*1*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1*
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*

6240	HERBACEOUS WETLANDS	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
7400	ALTERED LANDS	Adjacent Undissolved	*1*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Smith et al. 2000: Red-headed woodpeckers commonly breed in deciduous woodlands, lowland and upland habitats, river bottoms, open woods, groves of dead and dying trees, orchards, parks, open agricultural country, savanna-like grasslands with scattered trees, forest edge and along roadsides. In the southeastern part of the U.S., this species uses pine scrub, mixed pines and hardwood forests, urban environments, pine-oak savanna, and sandhills with open understories or sparse shrub layers. Red-headed woodpeckers prefer xeric woodlands and areas containing tall trees with large circumferences, high basal area, and low density of stems in the understory, but they also breed in open country and are attracted to burns and recent clearings. This species can be found in open, upland meadow or short-grass areas, such as pastures, or residential zones such as golf courses, and isolated woodlots and forest islands as long as a few snags or large dead limbs are present. Red-headed woodpeckers are also attracted to American beaver ponds, open wooded swamps where dead trees and stumps are plentiful, fringes of bottomland forest with numerous snags near or over water, margins of reclaimed strip mines and reservoirs, and areas of timber with little or no leaf canopy, such as those sprayed with herbicides, killed by flooding or severe ice storms. Red-headed woodpeckers were formerly common breeders in urban areas with trees. They were common in cities and towns during late 1800s, but now breed in reduced numbers in urban areas, adversely affected by practice of pruning dead tree branches and removing dead trees.

Patch type Cardinal-Proximate is used for red-headed woodpeckers. This approach was used because, while red-headed woodpeckers can breed in a variety of different habitats (Smith et al. 2000), we sought to limit how the different habitat types are dissolved and valued to increase the likelihood that the valued patches are suitable for breeding red-headed woodpeckers and actually support the documented local population. Because these woodpeckers primarily breed in open forest and wetland forests, those LULC types are the most likely to be used by breeding individuals and so are cardinal habitat types that are dissolved. Red-headed woodpeckers can also use forest edges, cemeteries, golf courses, and shrub wetlands, so those LULC types are treated as cardinal habitat but are undissolved to limit the amount of closed-canopy forest valued. The open habitats associated with forest edge were chosen as proximate undissolved habitat so they would only be valued when they are the most likely to be part of the local habitat, which is when adjacent to cardinal habitats. Finally, red-headed woodpeckers also breed in residential areas. This habitat class, in addition to rights-of-way, were undissolved and will only be valued when they intersect the SOA to limit the amount of residential habitat valued.

Literature Citations

1. Smith, Kimberly G., James H. Withgott and Paul G. Rodewald. 2000. Red-headed Woodpecker (*Melanerpes erythrocephalus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/518 doi:10.2173/bna.518

Land Use Land Cover Selections and Patch Type Justifications

Red-headed Woodpecker **BIOPID** 74 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	1
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	1
1710	CEMETERY	Dissolved	1
1711	CEMETERY ON WETLAND	Dissolved	1
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	1
1800	RECREATIONAL LAND	Dissolved	1
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Adjacent Undissolved	1

2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Adjacent Undissolved	*1*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1*
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	*1*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1*
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1*

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*
6240	HERBACEOUS WETLANDS	Dissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
7400	ALTERED LANDS	Adjacent Undissolved	*1*
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	*1*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

From Smith et al. 2000: There is little information on red-headed woodpecker habitat use during migration. They forage on oak, maple, and hickory trees and dead trees during spring in Illinois and use shelterbelts in spring migration on Great Plains. They can also form loose flocks in the fall that seek mast or fruit-bearing trees in orchards, oak hammocks, and urban areas where mature oaks or fruit trees are plentiful, and my use forest edges more in the fall. Red-headed woodpecker wintering habitat consists of mature stands of forest, particularly oak, oak-hickory, maple, ash, beech, and pine or pine-oak. This species favors areas with numerous standing snags such as beaver ponds, marshes, and swamps as well as forested areas that had succumbed to disease or pests. The presence of mast as a winter food has long been recognized as an important factor in determining winter distribution of red-headed woodpeckers, especially in the northern part of their range.

Patch type Cardinal-Proximate is used for red-headed woodpeckers. This approach was used because, while red-headed woodpeckers can use a variety of different habitats during the non-breeding season (Smith et al. 2000), we sought to limit how the different habitat types are dissolved and valued to increase the likelihood that the valued patches are suitable for non-breeding red-headed woodpeckers. Because these woodpeckers primarily use open forest and wetland forests for migration and wintering, those LULC types are the most likely to be used by non-breeding individuals and so are cardinal habitat types that are dissolved. Red-headed woodpeckers are also known to use forest edges and golf courses, so those LULC types are treated as cardinal habitat but are undissolved to limit the amount of closed-canopy forest valued. The open habitats associated with forest edge were chosen as proximate undissolved habitat so they would only be valued when they are the most likely to be part of the local habitat, which is when adjacent to cardinal habitats. Finally, non-breeding red-headed woodpeckers will use residential areas more often than in the breeding season. Even so, these habitat classes, in addition to rights-of-way, were undissolved and will only be valued when they intersect the SOA to limit the amount of residential habitat valued.

Literature Citations

1. Smith, Kimberly G., James H. Withgott and Paul G. Rodewald. 2000. Red-headed Woodpecker (*Melanerpes erythrocephalus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/518 doi:10.2173/bna.518

Land Use Land Cover Selections and Patch Type Justifications

Red-shouldered Hawk

BIOPID 204 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3
4230	PLANTATION	Undissolved	1,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,3
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,3

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,3***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***

Land Use - Land Cover Selection and Patch Type Rationale

For eastern populations of red-shouldered hawks, habitat varies from bottomland hardwood, riparian areas, and flooded deciduous swamps to upland mixed deciduous-coniferous forest. Generally, habitat is extensive forest stands consisting of mature to old-growth canopy trees with variable amounts of understory (Dykstra et al. 2008). This is consistent with Liguori's (2003) characterization for NJ of mature wet woods.

From Dykstra et al. 2008: This species is fairly common in suburban areas adjacent to forested habitat in the northern half of eastern North America and common in suburban areas with the appropriate habitat in southeastern United States. In Ontario, this species favors mature, open, deciduous forest with low ground cover. Red-shouldered hawks in Georgia nested in areas containing more mature bottomland hardwood and less agricultural habitat than red-tailed hawks, and nests were closer to water and farther from edges and openings than those of red-tailed hawks. In Indiana, red-shouldered hawk nest sites were more associated with wetlands and forested areas and were farther from human development than those of red-tailed hawks. Habitat selection is not fixed across the red-shouldered hawk's range; there is documentation of them adapting their habitat usage to what is available. In NJ however, red-shouldered hawks are clearly associated with forests and forested wetlands (ENSP 2011).

The Limited Extent patch type is selected to value only the forest habitat classes, and the wetland shrub habitats adjacent to the valued forest parcels, within and proximate to known species' occurrences.

Literature Citations

1. Dykstra, Cheryl R., Jeffrey L. Hays and Scott T. Crocoll. 2008. Red-shouldered Hawk (*Buteo lineatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/107 doi:10.2173/bna.107

2. ENSP. 2011. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.

3. Liguori, S. 2003. Red-shouldered Hawk (*Buteo lineatus*). *In* Endangered and Threatened Wildlife of New Jersey (B. Beans and L. Niles, eds.). Rutgers University Press, New Brunswick, New Jersey. Pp 61-67.

Land Use Land Cover Selections and Patch Type Justifications

Roseate Tern

BIOPID 188 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
7100	BEACHES	Undissolved	1
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Roseate terns are a colonial species that utilizes coastal habitats for nesting. In New Jersey, they can nest on sandy substrates of beaches and on wrack in marsh wetlands (though they will use additional habitats, such as rocky shores, which are not available to them in NJ) and will use mudflats for roosting (Gochfeld et al. 1998, Nisbet 1981).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Although roseate terns are infrequent nesters in the state, the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

1. Gochfeld, M., J.Burger and I.C. Nisbet. 1998. Roseate Tern (*Sterna dougallii*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 24 May 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/370 doi:10.2173/bna.370

2. Nisbet, I. C. T. 1981. Biological characteristics of the Roseate Tern (*Sterna dougallii*). Report 50181-084-9. U.S. Fish Wildlife Service, Newton Corner, MA.

Land Use Land Cover Selections and Patch Type Justifications

Roseate Tern

BIOPID *189* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5100	STREAMS AND CANALS	Undissolved	*
5200	NATURAL LAKES	Undissolved	*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	*1-4*
5411	OPEN TIDAL BAYS	Undissolved	*1-4*
5420	DREDGED LAGOON	Undissolved	*
5430	ATLANTIC OCEAN	Undissolved	*1*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	*
6240	HERBACEOUS WETLANDS	Undissolved	*

Land Use - Land Cover Selection and Patch Type Rationale

Roseate terns primarily forage on marine fish. They forage over open bodies of water such as tidal bays, inlets, lakes, rivers and the ocean (Heinemann 1992, Safina 1990, Safina 1990, Shealer & Burger 1993). The land based habitat that is valued is important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young.

Roseate terns are very infrequent nesters in this state. However, the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used.

Literature Citations

1. Heinemann, D. 1992. Foraging ecology of Roseate Terns on Bird Island, Buzzards Bay, Massachusetts. Unpublished Report to U.S. Fish and Wildlife Service, Newton Corner, MA.

2. Safina, C. 1990. Bluefish mediation of foraging competition between Roseate and Common Terns. Ecology 71:1804-1809.

3. Safina, C. 1990. Foraging habitat partitioning in Roseate and Common Terns. Auk 107:351-358.

4. Shealer, D. A. and J. Burger. 1993. Effects of interference competition on the foraging activity of tropical Roseate Terns. Condor 95:322-329.

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Saltmarsh Sparrow

BIOPID *75* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*1*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Adjacent Undissolved	*1*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Adjacent Undissolved	*1*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	*1,2*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	*1,2*
6120	FRESHWATER TIDAL MARSHES	Dissolved	*1,2*
6130	VEGETATED DUNE COMMUNITIES	Adjacent Undissolved	*1*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Adjacent Undissolved	*1,2*
6240	HERBACEOUS WETLANDS	Dissolved	*1*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Adjacent Undissolved	*1*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Saltmarsh sharp-tailed sparrows breed in salt marshes where smooth cordgrass, saltmeadow grass, and blackgrass are bordered by cattail, reed (*Phragmites* sp.), and marsh elder (Greenlaw and Rising 1994, Shriver and Vickery 2001). This species forages on the ground in dense grasses of marshes or wet meadows, ditch margins, edges of shallow pools and mud pannes, patches of wrack, and tidal bays (Greenlaw and Rising 1994).

Patch type Cardinal-Proximate is applied to account for habitat that would be used for cover when adjacent to nesting and foraging habitat (Greenlaw and Rising 1994). Marshes and other herbaceous wetlands are cardinal, because they are considered nesting and foraging habitat, and are dissolved, while other wetland habitat (shrub wetlands, *Phragmites*, vegetated dunes) are considered proximate habitat and are not dissolved, but are valuable when adjacent to the cardinal habitats.

Literature Citations

1. Greenlaw, J. S. and J. D. Rising. 1994. Sharp-tailed Sparrow (*Ammodramus caudacutus*). In The Birds of North America, No. 112 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

2. Shriver, W. G. and P. D. Vickery. 2001. Anthropogenic effects on the distribution and abundance of breeding salt marsh birds in Long Island Sound and New England, Center for Biological Conservation, Massachusetts Audubon Society.

Land Use Land Cover Selections and Patch Type Justifications

Sanderling

BIOPID 215 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5300	ARTIFICIAL LAKES	Undissolved	4,*
5412	TIDAL MUD FLAT	Undissolved	1,3,5
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*
7100	BEACHES	Undissolved	1,2,4

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration (late-April to early June), sanderling forage primarily on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on crustaceans, bivalves and polychaetes on Atlantic coast beaches, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). During fall migration (mid-July through November), sanderling suitable foraging habitats are primarily the hard-packed sandy beaches of the Atlantic coast, but also include tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). Sanderling movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). As Sanderlings spend more than half of the year on migratory stopovers and wintering sites in New Jersey, and along the US East Coast, Central and northern South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

Literature Citations

1. Burger, J., L. Niles, and K. E. Clark. 1997. Importance of beach, mudflat, and marsh habitats to migrant shorebirds on Delaware Bay. Biological Conservation 79:283-292.

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5. Niles, L.J., H.P. Sitters, A.D. Dey, P.W. Atkinson, A.J. Baker, K.A. Bennett, R. Carmona, K.E. Clark, N.A. Clark, and C. Espoz. 2008. Status of the red knot (Calidris canutus rufa) in the Western Hemisphere. Studies in Avian Biology 36:1-185.

* ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Savannah Sparrow

BIOPID *76* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Dissolved	*4,6,10*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*10*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*10*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*6,9,10*
1800	RECREATIONAL LAND	Adjacent Undissolved	*5*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-10*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1,3,4,8,10*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-10*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*10*
2400	OTHER AGRICULTURE	Dissolved	*4,10*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2-10*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	*10*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*10*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*10*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*10*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	***10***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	***10***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Adjacent Undissolved	***10***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Adjacent Undissolved	***10***
6240	HERBACEOUS WETLANDS	Undissolved	***10***
7400	ALTERED LANDS	Undissolved	***4,5,10***
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	***4,5,10***
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	***4,5,10***

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall relative size of the grassland. This increase of size is important to most grassland bird species because they require large patches of habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

Savannah sparrows are "frequently found in disturbed pastures and hayfields with relatively short vegetation and a few small bushes, saplings, or other low song perches. They also occupy cultivated alfalfa fields" (Peterjohn 2006). Swanson et al. (2002) reported that although total woody cover in habitats used by savannah sparrows for nesting was low throughout its range, a study found that birds often used small trees and shrubs as song perches. Nest location is often at the base of a woody shrub and fledglings will often move toward the wooded edges of their nest location (Wheelwright and Rising 2008). Airports and other large, managed grassland areas in this region provide breeding habitat for savannah sparrows (Vickery et al. 1994; Shriver et al. 2005; Wheelwright and Rising 2008).

In the Northeastern US, savannah sparrows are found in hayfields dominated by tall, dense vegetation (Bollinger 1995), in short, sparse grass dominated fields (Bollinger 1995; Shustack et al. 2010) and were one of the most common species found in a New York breeding grassland bird survey that included airports, hayfields and fallow fields (Shriver et al. 2005). Wheelwright and Rising (2008) states that savannah sparrows "inhabit grassy meadows, cultivated fields (especially alfalfa), lightly grazed pastures, roadsides, coastal grasslands, sedge bogs, and edge of salt marshes."

Patch type Cardinal-Proximate is selected for savannah sparrows due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for savannah sparrows. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates savannah sparrows breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Sedge Wren

BIOPID *87* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*1,2*
1800	RECREATIONAL LAND	Adjacent Undissolved	*2*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	*1,2*
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	*1-3*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1,2*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-4*
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1,2*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1-4*
6111	SALINE MARSHES (LOW MARSH)	Adjacent Undissolved	*2,4,5*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	*2,4,5*
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	*2,4,5*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1,2*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1,2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1,2*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1,2*
6240	HERBACEOUS WETLANDS	Dissolved	*1-4*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*1,2*
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

According to Herkert et al. (2001): “Owing to its erratic movements, generally low site fidelity, and secretive habits, there have been relatively few field studies of this species (sedge wren), and thus many aspects of its natural history remain poorly known.”

Sedge wrens use a variety of habitats for breeding in both upland and wetland areas with tall dense vegetation and moderate forb cover including pasture, dry and wet grasslands (Herkert et al. 2001; Denchant et al. 2002); and marsh areas (Herkert et al. 2001). However, sedge wrens prefer to breed in damp habitats dominated by grasses and sedges frequently at the margins of marshes and avoid areas with persistent standing water (Herkert et al. 2001, Denchant et al. 2001, Torok 2004, Peterjohn 2006). Sedge wrens will abandon a breeding site if it becomes too wet or dry (Herkert et al. 2001, Denchant et al. 2001, Torok 2004). They are found more often in areas with medium shrub densities (Herkert et al. 2001). Sedge wren breeding range in New Jersey has been suggested as the coastal strip from Burlington County through Cape May and north to the Hackensack Meadowlands (Walsh et al. 1999). However, most records come from the along the Delaware bayshore in Cumberland and Cape May Counties and the large marsh complexes of northeastern Jersey (Walsh et al. 1999).

There is little information on habitat use during non-breeding season. Herkert et al. (2001) found sedge wrens using a variety of habitats during winter including brackish and freshwater sedge meadows and marshes, pine savannas, old fields with dense, matted grass or weeds; grassy edges of marshes, and sometimes dry, grassy places, as long as cover is at least 60–90 cm tall. Sedge wrens are also found to frequent grassy marshes in coastal areas and dry grass fields.

Patch type Cardinal-Proximate is selected for sedge wrens since they are habitat specialists and are adapted to exploiting patchy, short-lived habitats within the landscape and will change locations once habitats become unsuitable (Herkert et al. 2001). In response to the changing nature of the temporary habitats they breed in, sedge wrens have low site fidelity and will change breeding locations to take advantage of current conditions (Herkert et al. 2001, Denchant et al. 2001, Torok 2004). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for sedge wrens. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates breeding, foraging and rearing young requirements. This approach limits the habitat valued to that which the population uses but accommodates its need for larger habitat areas.

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Land Use Land Cover Selections and Patch Type Justifications

Semipalmated Sandpiper

BIOPID 216 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5300	ARTIFICIAL LAKES	Undissolved	4,*
5412	TIDAL MUD FLAT	Undissolved	1,3,5
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2,4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*
7100	BEACHES	Undissolved	1,2,4

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration (late-April to early June), semipalmated sandpipers forage on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on polychaete and oligochaete worms on Atlantic coast beaches and marshes, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). During fall migration (mid-July through November), semipalmated sandpipers suitable foraging habitats include Atlantic coast beach, tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). Semipalmated sandpiper movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). As Semipalmated sandpipers spend more than half of the year on migratory stopovers along the US East Coast and wintering areas in northern South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

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* ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Sharp-shinned Hawk

BIOPID *240* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1*
4230	PLANTATION	Undissolved	*1*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Sharp-shinned hawks nest in most forest types across their range (Bildstein and Meyer 2000). This species is reported as being dependent on contiguous forests (as summarized in Bildstein and Meyer 2000).

Patch type Limited Extent is selected to value forest habitats within and associated with the species' occurrence location and its approximate home range as represented by the SOA.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Short-eared Owl

BIOPID *273* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-7*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*2,4,6,7*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-7*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2,4,6,7*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*4,6,7*
5412	TIDAL MUD FLAT	Dissolved	*2,4,6,7*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	*2,4,6,7*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	*2,4,6,7*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*4*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*2,4,6,7*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*2,4,6,7*
6240	HERBACEOUS WETLANDS	Dissolved	*2,4,6,7*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*4*
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	*2,4,6,7*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*2,4,6,7*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands which are characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agriculture, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULCs are not frequent enough to capture the changes to a given site.

The short-eared owl is a raptor of open fields, marshes and grasslands and is active during both day and evening (Dechant et al. 2003; Wiggins 2004; Wiggins et al. 2006). These owls require large blocks of contiguous grassland for nesting, ideally a mosaic of grassland and associated wetlands, and they also prefer such areas for foraging (Dechant et al. 2003, Wiggins 2004, Wiggins et al. 2006). Short-eared owls prey on small mammals that also use grassland habitats (Holt 1993) and they will change both breeding and wintering locations depending on the abundance of food supplies and habitat conditions. Their nomadic nature also indicates a need for large, contiguous habitat areas (Holt 1993, Dechant et al. 2003, Wiggins 2004, Wiggins et al. 2006). In New Jersey, breeding short-eared owls are found along the coast in tidal and brackish marshes and inland grasslands (Liguori 2003). Phragmites dominated wetlands add to the field/grassland mosaic short-eared owls depend on (Liguori 2003).

Patch type Contiguous Area is selected for short-eared owls because this species relies on dynamic habitat types and requires large, contiguous habitat areas for both breeding and non-breeding. Patch type Contiguous Area dissolves the selected LULC classes into contiguous patches of habitat that best represent the species need to follow food supplies and provide nesting habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Snowy Egret

BIOPID 202 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	2
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
7440	DISTURBED TIDAL WETLANDS	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Snowy egrets use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as Atlantic white cedar, *Juniperus virginiana*), and in the Atlantic costal marsh islands (Burger 1978, Parsons & Master 2000). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis per. obs.). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Parsons & Master 2000, Davis expert opinion).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only highlight habitats being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Snowy Egret

BIOPID *203* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5100	STREAMS AND CANALS	Undissolved	***1,3***
5200	NATURAL LAKES	Undissolved	***1,3***
5300	ARTIFICIAL LAKES	Undissolved	***1,3***
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	***1,3***
5411	OPEN TIDAL BAYS	Undissolved	***1,3***
5412	TIDAL MUD FLAT	Undissolved	***2***
5420	DREDGED LAGOON	Undissolved	***1,3***
6111	SALINE MARSHES (LOW MARSH)	Undissolved	***1,3***
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	***1,3***
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	***2***
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	***2***
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	***2***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	***2***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	***2***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	***2***

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***2***
6240	HERBACEOUS WETLANDS	Undissolved	***1-3***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	***2***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	***2***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***2***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***2***

Land Use - Land Cover Selection and Patch Type Rationale

Snowy Egrets forage on a variety of prey items including fish, insects, worms, crabs, shrimp, frogs and snakes. They use open water to stalk aquatic prey, and they hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Custer & Osborn 1978, Parsons & Master 2000, Willard 1977).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models, and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. This patch type allows for the habitat that is most likely used to be valued without extending it to areas that are less likely to be used. In an additional effort to avoid valuing habitat that is not used by this species, some LULC polygons are coded “Riparian Undissolved” so that they are only valued when adjacent to water, and therefore attractive to this species.

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Land Use Land Cover Selections and Patch Type Justifications

Tricolored Heron

BIOPID 192 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1-3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-4
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1-4
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1-4
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1-4
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1-3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1-3
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Tricolored herons use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as black cherry, *Prunus serotina*), and in the Atlantic costal marsh islands (Frederick 1997, Kushlan 1978). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis personal observation). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Frederick 1997, Davis expert opinion).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only highlight habitats being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

Literature Citations

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Tricolored Heron

BIOPID 193 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	2
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	2

6240	HERBACEOUS WETLANDS	Undissolved	*2*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	*2*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	*2*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	*2*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Tricolored herons forage almost exclusively on fish. They use open water to stalk aquatic prey, and they hunt in marshes, on mudflats and forest edges associated with wetlands for many of the items they occasionally eat (insects, crustaceans and frogs) (Bancroft et. al 1994, Belser & Post 1994, Frederick 1997, Rodgers 1978).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models, and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. This patch type allows for the habitat that is most likely used to be valued without extending it to areas that are less likely to be used. In an additional effort to avoid valuing habitat that is not used by this species, some LULC polygons are coded “Riparian Undissolved” so that they are only valued when adjacent to water, and therefore attractive to this species.

Literature Citations

1. Frederick, Peter C. 1997. Tricolored Heron (*Egretta tricolor*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 21 July 2010 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/306 doi:10.2173/bna.306

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Land Use Land Cover Selections and Patch Type Justifications

Upland Sandpiper

BIOPID *77* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Dissolved	*1,3-8*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*3,4*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*3,4*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*3-8*
1800	RECREATIONAL LAND	Adjacent Undissolved	*1-7*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-8*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1,3,4*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*3,4*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*3-7*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*3,4*
6240	HERBACEOUS WETLANDS	Undissolved	*3,4*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*1-7*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1-7*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall effective size of the grassland. This increase in overall size is important to upland sandpipers because they are area sensitive and require large, contiguous habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

The upland sandpiper is an area-sensitive, grassland obligate species requiring large areas with different vegetation components to successfully breed (Houston and Bowen 2001). Large, contiguous areas of suitable habitat (as small as 26 ha to greater than 200 ha reported) are required for upland sandpipers (Houston and Bowen 2001, Dechant et al. 2002) to breed successfully; as patches of suitable habitat become smaller and more fragmented, upland sandpipers cease to use the site for breeding (Shriver et al. 2005). The minimum patch size of 25 ha was chosen for breeding populations based on studies located closest to New Jersey (Mitchell et al. 2000). In general, upland sandpipers forage within short vegetation and nest and rear broods within taller vegetation (Houston and Bowen 2001, Dechant et al. 2002) and use dry grasslands "with low to moderate forb cover, low woody cover, moderate grass cover, moderate to high litter cover, and little bare ground" (Dechant et al. 2002). Upland sandpipers nest on the ground and require grasslands of various heights for rearing broods (Houston and Bowen 2001). Chicks are precocial (i.e., they leave the nest immediately) and require taller vegetation including shrubs in which to hide and forage (Houston and Bowen 2001). In New Jersey and New England, the largest populations of upland sandpipers are found on air force bases and airports (Houston and Bowen 2001, Dechant et al. 2002, Shriver et al. 2005).

From Bolster (1990): To secure populations of upland sandpipers, managers must "provide a mosaic of habitat types, such as grassland of various heights and densities as well as cropland, to provide for the needs of upland sandpiper throughout the breeding season."

Patch type Cardinal-Proximate is selected for upland sandpipers due to the dynamic nature of grassland bird preferred habitat and their requirement for large, contiguous habitat. Upland sandpipers are relatively mobile, reflecting the dynamic nature of their preferred habitats and the need to change breeding locations once habitats become unsuitable (Dechant et al. 1999, Askins 2002, Shustack et al. 2010). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for upland sandpipers. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates upland sandpipers breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This

approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

A minimum patch size was selected for upland sandpipers because large, contiguous areas of suitable habitat (as small as 26 ha to greater than 200 ha reported) are required for upland sandpipers (Vickery et al. 2010, Houston and Bowen 2001, Dechant et al. 2002) to breed successfully; as suitable habitat become smaller and more fragmented, upland sandpipers cease to use the site for breeding (Shriver et al. 2005). Minimum suitable grassland sizes varied greatly from 26 to 50 ha (Mitchell et al. 2000; Vickery et al. 2010) and breeding territories differ between males and females and average 8 ha for males and 85.6 ha for females (Houston and Bowen 2001; Denchant et al. 2002). The minimum patch size of 26 ha was reported closest to New Jersey (Mitchell et al. 2000). Due to this area sensitivity, only patches 25 ha or greater are valued for breeding upland sandpipers.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Upland Sandpiper

BIOPID 78 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Undissolved	1,2
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1,2
1800	RECREATIONAL LAND	Undissolved	1,2
2100	CROPLAND AND PASTURELAND	Undissolved	1,2
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1,2
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,2
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2

6240	HERBACEOUS WETLANDS	Undissolved	*1,2*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1,2*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

Upland sandpipers are one of the few obligate grassland bird species that are long-distance migrants (Houston and Bowen 2001) and protecting migratory stopovers is important. During migration, upland sandpipers generally use large plowed fields, mowed hayfields, and pastures for staging and stopover feeding sites. They also occur in dry salt-hay marshes (Vickery et al. 2010). As the migratory habitats of upland sandpipers are not well known (see Vickery et al. 2010), brush/shrubland was selected when it is associated within the agricultural landscape.

Patch type Limited Extent is selected for upland sandpiper for migratory observations, because during migration birds utilize small areas of habitat for short periods of time before they move southward. Therefore, the selected LULC polygons did not need to be dissolved. The resulting polygons value the habitat important to migrating upland sandpipers while limiting the extension into areas that are less likely to be used during migration.

Literature Citations

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2. Vickery, P. D., D. E. Blanco, and B. López-Lanús. 2010. Conservation Plan for the Upland Sandpiper (*Bartramia longicauda*). Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Land Use Land Cover Selections and Patch Type Justifications

Veery ***BIOPID*** *79* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-3*

6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

Veeries primarily breed in deciduous or mixed forest, but can also use coniferous and hemlock forests (USFWS 2001, Rosenberg et al. 2003). They are area sensitive and intolerant of forest fragmentation even though they use dense understory within forest gaps and disturbed forest (Rosenberg et al 2003, Bevier et al. 2004). Moisture and shrub cover are primary factors in habitat selection (Bevier et al. 2004). In the Middle Atlantic veeries require forests of 20 ha for 50% probability of occurrence but they can breed in red maple swamps as small as 1 hectare as long as there is a large amount of forested habitat in the area (Bevier et al. 2004). The amount of area needed for suitable breeding habitat is related to the amount of fragmentation in the area but they can tolerate smaller fragments of 1 - 8 ha (Rosenberg et al 2003).

Patch type Contiguous Area is applied because veeries breed in non-residential forest openings within large tracts of forest (Rosenberg et al. 2003, Bevier et al. 2004). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Vesper Sparrow

BIOPID *80* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Dissolved	*5*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*2*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent Undissolved	*2*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*2*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*5*
1800	RECREATIONAL LAND	Undissolved	*2,7*
2100	CROPLAND AND PASTURELAND	Dissolved	*1-9*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*2*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*2,4*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*2-4*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*2,4-9*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	*2,3,6,7*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*2,3,6,7*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*2-4,8,9*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*3*

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*3*
7400	ALTERED LANDS	Undissolved	*2,4-9*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	*2,4*
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	*2,4*

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall relative size of the grassland. This increase of size is important to most grassland bird species because they require large areas of suitable habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

Vesper sparrows are considered a moderate habitat generalist as they breed in dry, open habitats with short, sparse and patchy vegetation and low to moderate shrub or forb cover, avoiding wet areas (Jones and Cornely 2002, Denchant et al. 2003, Peterjohn 2006). Breeding habitat includes airports (Morgan and Burger 2008), wooded field edges, cultivated crop fields, hayfields, and fencerows (Jones and Cornely 2002, Denchant et al. 2003, Shriver et al. 2005, Peterjohn 2006). In Maine, vesper sparrows breed in blueberry barrens (Vickery et al. 1994). Breeding males will use the wooded edge of their breeding territory to sing from trees (Denchant et al. 2003). Moreover, in New Jersey, vesper sparrows are found using shrub habitat types at a rate that indicates active selection of that habitat type. Therefore, some shrub LULC classes have been included as a secondary LULC habitat type (ENSP 2010).

Patch type Cardinal-Proximate is selected for vesper sparrow due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for vesper sparrows. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates vesper sparrows breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

A minimum patch size was selected for this species as their breeding territories range from 0.29 – 8.19 ha in patches 5+ ha in size (Jones and Cornely 2002; Denchant et al. 2003). In Maine, abundance was positively correlated with increasing area; reached 50% incidence at 20 ha in grassland barrens (Vickery et al. 1994). As patches of suitable habitat become smaller and more fragmented, vesper sparrows are less likely to use the site for breeding (Shriver et al. 2005). The minimum patch size of 5 ha was based upon the Michigan upper limit breeding territory size (Jones and Cornely 2002) therefore only polygons containing 5 ha or greater of primary habitat are valued for breeding vesper sparrow.

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Land Use Land Cover Selections and Patch Type Justifications

Vesper Sparrow

BIOPID *81* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1440	AIRPORT FACILITIES	Undissolved	***4***
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1***
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1***
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***4***
1800	RECREATIONAL LAND	Undissolved	***1,5***
2100	CROPLAND AND PASTURELAND	Undissolved	***1,3-5***
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***3***
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1,3***
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1,3***
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1,3-5***
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1,3***
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,3***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-3***
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1,3***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***2***

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*2*
7400	ALTERED LANDS	Undissolved	*1,3,5*

Land Use - Land Cover Selection and Patch Type Rationale

Vesper sparrows are a migratory grassland bird species in New Jersey and use similar habitat types during non-breeding as in breeding. However during non-breeding they are not area sensitive. Vesper sparrows are considered a moderate habitat generalist using open habitats with short, sparse and patchy vegetation and low to moderate shrub or forb cover while avoiding wet areas (Jones and Cornely 2002; Denchant et al. 2003; Peterjohn 2006). Breeding and non-breeding habitat includes airports (Morgan and Burger 2008), wooded field edges, cultivated crop fields, hayfields, and fencerows (Jones and Cornely 2002; Denchant et al. 2003; Shriver et al. 2005; Peterjohn 2006). Based on accepted sightings, non-breeding vesper sparrows are found using some shrubland habitat types at a frequency that indicates birds are actively selecting that habitat type, so it has been included as a suitable LULC class (ENSP 2010).

Patch Type Limited Extent - LULC classes are not dissolved/combined into patches. Instead, species occurrence areas are overlaid and value any suitable LULC polygons with which they intersect. Therefore, the selected LULCs did not need to be dissolved. The resulting polygons value the habitat important to migrating vesper sparrows while limiting the extension into areas that are less likely to be used by during migration.

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Land Use Land Cover Selections and Patch Type Justifications

Whimbrel

BIOPID 217 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
2100	CROPLAND AND PASTURELAND	Undissolved	5,7
5300	ARTIFICIAL LAKES	Undissolved	6
5412	TIDAL MUD FLAT	Undissolved	1,3,4
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2,4-7
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,2,6
6130	VEGETATED DUNE COMMUNITIES	Undissolved	5,6
6240	HERBACEOUS WETLANDS	Undissolved	6
7100	BEACHES	Undissolved	1,2,4-7

Land Use - Land Cover Selection and Patch Type Rationale

During migration (mid-April through mid-May and mid-July through November) whimbrels feed on marine invertebrates in varied costal habitats: mud flats, sandy and rocky beaches, and salt marshes (Skeel and Mallory 1996). Other upland habitats used include dunes, wet meadows, pastures, and fields (Rottenborn 1996, Skeel and Mallory 1996, Watts and Truitt 2000). Main foods include brachyuran crabs and other crustaceans, marine worms, and mollusks (Skeel and Mallory 1996). Whimbrel movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993). As whimbrels spend more than half of the year on migratory stopovers along the US East Coast and wintering areas in the US, Central and South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

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Land Use Land Cover Selections and Patch Type Justifications

Whip-poor-will

BIOPID *82* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	*1*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	*1*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent Undissolved	*1*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*1*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	*1*
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	*1,2*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Adjacent Undissolved	*1,2*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Adjacent Undissolved	*1,2*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	*1*
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1,2*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1,2*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1,2*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1,2*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1,2*
4230	PLANTATION	Dissolved	*1*

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1,2*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1,2*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1,2*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1,2*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	*1,2*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1,2*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1,2*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	*1,2*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	*1*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	*1*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*1,2*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Adjacent Undissolved	*1,2*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Adjacent Undissolved	*1,2*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Adjacent Undissolved	*1,2*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent Undissolved	*1*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent Undissolved	*1*

Land Use - Land Cover Selection and Patch Type Rationale

Whip-poor-wills breed in dry deciduous or mixed forests with little or no underbrush throughout most of its range (USFWS 2002), but the degree of openness in the forest understory appears to be more important than forest composition (Cink 2002). In New York State, this species is widespread in northern hardwood forests and white pine and oak-northern hardwoods or aspen-gray birch-paper birch forests, but it is also found breeding in forested wetlands and along marsh edges (Cink 2002). In the Coastal Plains, whip-poor-wills prefer dry woodlands such as pitch pine-scrub oak barrens. Whip-poor-wills can also be found in a variety of semi-open habitats, including farmlands, power-line and roadway corridors, clearcut and selectively logged forest, old fields, and reclaimed surface mines (Cink 2002).

Shade, proximity to open areas for foraging, and fairly sparse ground cover are key elements of habitat preference for whip-poor-wills. This species is absent from areas where the forest canopy is extensive and closed (Cink 2002).

Patch type Cardinal-Proximate is applied because this species will predominately use forested habitat but will also use forest edges. Therefore, forest habitats were chosen as the cardinal habitats that are dissolved and early-successional habitats were chosen as the proximate habitats and are undissolved. Because this species can use forest/field edges, large contiguous patches of early successional habitat will be valued by the model, however, the most suitable portions of early successional habitat used by whip-poor-wills are likely to be found within 175 meters of the forest edge.

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Land Use Land Cover Selections and Patch Type Justifications

Winter Wren

BIOPID *83* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1,2*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1,2*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1,2*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1,2*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1,2*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1,2*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1,2*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1,2*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1,2*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1,2*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1,2*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1,2*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1,2*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1,2*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1,2*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1,2***
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1,2***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1,2***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1,2***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1,2***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1,2***
6240	HERBACEOUS WETLANDS	Dissolved	***1,2***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1,2***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1,2***

Land Use - Land Cover Selection and Patch Type Rationale

Winter wrens use all types of forest near water, including deciduous riparian forests, hardwood forests, and mixed conifer-hardwood forests, especially old-growth structures (snags, downed logs, and large trees) for nesting, foraging, and roosting, and frequently nest and forage near water, particularly streams, but also near bogs, swamps, and lakes (Gould et al. 1999, Hejl et al. 2002). Other important aspects of breeding habitat include dead wood (fallen logs and coarse woody debris), standing dead trees, stumps, slash piles, and very large trees found in old-growth and mature conifer forests (Hejl et al. 2002). In some areas, winter wrens are associated with greater shrub development, often where natural disturbance has created small openings or edges in forest, and occasionally in slash following logging operations (Hejl et al. 2002). Winter wrens have been observed feeding along banks of streams, frequently pecking at water and sometimes immersing head, apparently foraging on water insects (Hejl et al. 2002).

Patch type Contiguous Area is applied because the winter wrens are forest birds with large territories and patchy distributions (Hejl et al 2002). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it represents the contiguous forest and scrub-shrub needed by the local breeding population based on documented occurrences.

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Land Use Land Cover Selections and Patch Type Justifications

Wood Thrush

BIOPID *84* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	*1-3*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-3*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-3*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-3*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-3*
1710	CEMETERY	Undissolved	*1-3*
1800	RECREATIONAL LAND	Undissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3*

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

Wood thrushes breed in interior and edges of deciduous and mixed forests in cool, moist sites near water and require moderate to dense understory with a lot of shade, moist soil, and decaying leaf litter (Roth et al. 1996, USFWS 2001, Rosenberg et al. 2003). They are more likely to occur in larger forests but may nest in 1-ha fragments and semi-wooded residential areas and parks (Roth et al. 1996). High suitability is in forest patches at least 81 ha (200 acres) with suitability declining in patches less than 40.5 ha (100 acres), but they can breed in smaller patches with lower reproductive success (Rosenberg et al. 2003). Important factors for reproductive success for wood thrush is forest size, amount of core area, amount of edge, and vegetation structure (Rosenberg et al. 2003)

Patch type Limited Extent is applied for wood thrush because, while they prefer larger forests, they will use small forest fragments, including rural residential areas. Patch type Limited Extent will minimize the area of residential habitat valued by wood thrushes breeding in these areas.

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Land Use Land Cover Selections and Patch Type Justifications

Worm-eating Warbler

BIOPID 85 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1,2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1,2
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1,2
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Dissolved	2
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	2

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1,2***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1,2***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1,2***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1,2***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1,2***

Land Use - Land Cover Selection and Patch Type Rationale

Worm-eating warblers are area sensitive and breed in a variety of forest communities, including eastern hemlock, beech-maple, and oak-hickory, where large tracts of mature deciduous or mixed deciduous-coniferous forest overlap with hillsides and smaller patches of shrubs such as mountain laurel and rhododendron (Hanners and Patton 1998). In the Piedmont Plains and Delaware Bay regions, worm-eating warblers prefer forested areas with at least 70% forest cover, deciduous or mixed, and the suitability increases with proximity of forest patches to larger, contiguous forest patches (Rosenberg et al. 1999). In the Highlands, they prefer forested areas with at least 50% forest cover, deciduous, mixed and occasionally coniferous, and the suitability also increases with proximity of forest patches to larger, contiguous forest patches (Rosenberg et al. 1999). Plant composition of the forest community appears less important to this species than forest age and size, presence of hillsides, and occurrence of dense patches of shrub cover (Hanners and Patton 1998).

Patch type Contiguous Area is applied because the worm-eating warblers are area-sensitive forest-interior birds (Hanners and Patton 1998). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

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Land Use Land Cover Selections and Patch Type Justifications

Yellow-breasted Chat *BIOPID* 86 *REGION* Statewide *PATCH TYPE* Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-4*
1440	AIRPORT FACILITIES	Adjacent Undissolved	*1,2*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-4*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-4*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1,2*
1800	RECREATIONAL LAND	Adjacent Undissolved	*1*
2100	CROPLAND AND PASTURELAND	Undissolved	*1,2,4*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1,2,4*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1,2,4*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent Undissolved	*1-4*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent Undissolved	*1-4*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent Undissolved	*1-4*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent Undissolved	*1-4*

4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-4*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-4*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-4*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1*
6240	HERBACEOUS WETLANDS	Adjacent Undissolved	*1*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent Undissolved	*1-4*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent Undissolved	*1-4*

Land Use - Land Cover Selection and Patch Type Rationale

Yellow-breasted chats are considered a disturbance-dependent species. In the eastern United States, they breed in early second-growth forests, shrubby areas in abandoned agricultural fields, clear cuts, power-line right of ways, forest edges and openings of sufficient size (minimum of 0.5 ha) (Eckerle and Thompson 2001; Rittenhouse et al. 2007; Environment Canada 2011). They can be found in "low, dense vegetation without a closed tree canopy, including shrubby habitat along stream, swamp, and pond margins; forest edges, regenerating burned-over forest, and logged areas; and fencerows and upland thickets of recently abandoned farmland" (Eckerle and Thompson 2001). A habitat quality model developed by USGS found that the amount of maturing forest in the landscape surrounding yellow-breasted chat breeding habitat had a positive impact on those breeding populations (USGS online).

Patch type Cardinal-Proximate was selected because yellow-breasted chats are habitat specialists and are adapted to exploiting patchy, short-lived habitats within the landscape and will change locations once habitats become unsuitable (Eckerle and Thompson 2001; Rittenhouse et al. 2007; Environment Canada 2011). In response to the changing nature of the temporary habitats they breed in, yellow-breasted chats have low site fidelity and will change breeding locations to take advantage of current conditions (Eckerle and Thompson 2001). Patch type Cardinal-Proximate adequately identifies the habitat required by yellow-breasted chats by dissolving the primary (cardinal) polygons and valuing adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates yellow-breasted chats breeding, foraging and rearing young requirements. Disturbance-dependent birds will predominately use early successional habitat but will also use forest and agricultural edges. Therefore, early-successional habitats were selected as cardinal and the forested and agricultural classes were chosen as proximate. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 2100 (cropland and pasture land).

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Land Use Land Cover Selections and Patch Type Justifications

Yellow-crowned Night-heron **BIOPID** 10 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	3
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	3
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	2,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	2,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	2,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	2,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	2,3
5412	TIDAL MUD FLAT	Dissolved	4
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,3
6120	FRESHWATER TIDAL MARSHES	Dissolved	2,3

6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*2,3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*
7440	DISTURBED TIDAL WETLANDS	Dissolved	*4*

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey, yellow-crowned night-herons nest primarily in coastal marshes, utilizing vegetation as nesting substrate, including marsh elder (*Iva frutescens*), Eastern red cedar (*Juniperus virginiana*) and phragmites (*Phragmites australis*) (Bagley and Grau 1979, Bentley 1994, Watts 1989). Increasingly, this species has been noted using residential areas throughout the state to nest, often where tall deciduous trees or clusters of cedars are interspersed among homes, parks and businesses (Watts 1989). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Watts 2011).

Patch type Cardinal-Proximate is applied for this species to account for its proclivity to nest in both natural and more suburban/urban locations (Watts 1989). Since the colonies in the marsh islands are well-surveyed and discrete, overlapping the SOA with only the intersecting patches (versus creating contiguous patches) is satisfactory to capture the breeding birds' habitat. Additionally, when the night-herons nest in more developed areas, this patch type will prevent overvaluing areas that are not typically considered habitat (such as residential neighborhoods in coastal barrier islands) but that is nonetheless utilized by this species and must be accounted for. These are represented by the 1000 level (urban) LULC selections, which are not dissolved so as to minimize overvaluing these areas. The adjacent undissolved LULC polygons were selected since they will likely only be used when adjacent to primary selections. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Yellow-crowned Night-heron

BIOPID 197 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	2,3
5200	NATURAL LAKES	Undissolved	2,3
5300	ARTIFICIAL LAKES	Undissolved	2,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	2,3
5411	OPEN TIDAL BAYS	Undissolved	2,3
5412	TIDAL MUD FLAT	Undissolved	1,2,3
5420	DREDGED LAGOON	Undissolved	2,3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,3
6120	FRESHWATER TIDAL MARSHES	Undissolved	2,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2,3
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	2,3
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	2,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2,3

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	***2,3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***2,3***
6240	HERBACEOUS WETLANDS	Undissolved	***2,3***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	***2,3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	***2,3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	***2,3***
7440	DISTURBED TIDAL WETLANDS	Undissolved	***1,2,3***

Land Use - Land Cover Selection and Patch Type Rationale

Yellow-crowned night-herons forage almost exclusively on salt- and freshwater crustaceans, which they will stalk and capture along the edges of bodies of water such as lakes, rivers, tidal bays, inlets, and mudflats associated with marsh and wetland habitats (Bentley 1994, Mumford & Keller 1984, Watts 1995).

Patch type Limited Extent is selected because yellow-crowned night-herons are a highly surveyed species in the state and their distribution is well understood. The nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Using Limited Extent patch type values the habitat that is most likely used by the associated colony (which is based on an understanding of foraging commutes) without extending it to areas that are less likely to be used. This is especially critical in valuing foraging areas associated with more urban colonies as this is an area where overvaluing is liable to be of most concern. The LULC polygons that are land-based were coded “Riparian Undissolved” because they are areas that are only important to yellow-crowned night-herons for foraging when they are located adjacent to water.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Brook Floater

BIOPID *245* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

Stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2011), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 2 km of each other (assuming unsuitable habitat between), these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species. Examples of habitat considered unsuitable include artificial canals, stream/river bottoms comprised primarily of bedrock or having no available sand/gravel/cobble or preferred substrate types, natural barriers such as upland habitat, and impoundments where conditions would not allow particular species to thrive. In addition, in most instances, dams were considered barriers and therefore the extent of stream valued was limited. Using dams as barriers when designating freshwater mussel occurrences is based on scientific literature (NatureServe 2011).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and waterbodies did not always intersect the centerline of the water feature. In these cases, it was therefore necessary to select segments manually and designate them as habitat. There are some species that were handled differently based on their habitat preferences. For example, we only valued the main channel of the Delaware River for the yellow lampmussel, since this species prefers larger river habitat and is not known to occur in NJ tributaries.

Literature Citations

1. Johnson, R.I. 1970. The systematics and zoogeography of the Unionidae (Mollusca: Bivaliva) of the southern Atlantic slope region. Bulletin of the Museum of Comparative Zoology, Harvard University, 140(6):263-449.

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5. Strayer, D.L., and K.J. Jirka. 1997. The pearly mussels of New York state. New York State Museum Memoir 26. The University of the State of New York. 113 pp. + figures

Land Use Land Cover Selections and Patch Type Justifications

Creeper ***BIOPID*** *246* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

Stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2011), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 2 km of each other (assuming unsuitable habitat between), these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species. Examples of habitat considered unsuitable include artificial canals, stream/river bottoms comprised primarily of bedrock or having no available sand/gravel/cobble or preferred substrate types, natural barriers such as upland habitat, and impoundments where conditions would not allow particular species to thrive. In addition, in most instances, dams were considered barriers and therefore the extent of stream valued was limited. Using dams as barriers when designating freshwater mussel occurrences is based on scientific literature (NatureServe 2011).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and waterbodies did not always intersect the centerline of the water feature. In these cases, it was therefore necessary to select segments manually and designate them as habitat. There are some species that were handled differently based on their habitat preferences. For example, we only valued the main channel of the Delaware River for the yellow lampmussel, since this species prefers larger river habitat and is not known to occur in NJ tributaries.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Dwarf Wedgemussel

BIOPID *247* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

Stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2011), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 2 km of each other (assuming unsuitable habitat between), these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species. Examples of habitat considered unsuitable include artificial canals, stream/river bottoms comprised primarily of bedrock or having no available sand/gravel/cobble or preferred substrate types, natural barriers such as upland habitat, and impoundments where conditions would not allow particular species to thrive. In addition, in most instances, dams were considered barriers and therefore the extent of stream valued was limited. Using dams as barriers when designating freshwater mussel occurrences is based on scientific literature (NatureServe 2011).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and waterbodies did not always intersect the centerline of the water feature. In these cases, it was therefore necessary to select segments manually and designate them as habitat. There are some species that were handled differently based on their habitat preferences. For example, we only valued the main channel of the Delaware River for the yellow lampmussel, since this species prefers larger river habitat and is not known to occur in NJ tributaries.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Lampmussel

BIOPID *248* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

Stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2011), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 2 km of each other (assuming unsuitable habitat between), these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species. Examples of habitat considered unsuitable include artificial canals, stream/river bottoms comprised primarily of bedrock or having no available sand/gravel/cobble or preferred substrate types, natural barriers such as upland habitat, and impoundments where conditions would not allow particular species to thrive. In addition, in most instances, dams were considered barriers and therefore the extent of stream valued was limited. Using dams as barriers when designating freshwater mussel occurrences is based on scientific literature (NatureServe 2011).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and waterbodies did not always intersect the centerline of the water feature. In these cases, it was therefore necessary to select segments manually and designate them as habitat. There are some species that were handled differently based on their habitat preferences. For example, we only valued the main channel of the Delaware River for the yellow lampmussel, since this species prefers larger river habitat and is not known to occur in NJ tributaries.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Pondmussel

BIOPID *249* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

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Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and waterbodies did not always intersect the centerline of the water feature. In these cases, it was therefore necessary to select segments manually and designate them as habitat. There are some species that were handled differently based on their habitat preferences. For example, we only valued the main channel of the Delaware River for the yellow lampmussel, since this species prefers larger river habitat and is not known to occur in NJ tributaries.

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Land Use Land Cover Selections and Patch Type Justifications

Green Floater

BIOPID *250* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

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Land Use Land Cover Selections and Patch Type Justifications

Tidewater Mucket

BIOPID *251* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

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Land Use Land Cover Selections and Patch Type Justifications

Triangle Floater

BIOPID *252* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

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Land Use Land Cover Selections and Patch Type Justifications

Yellow Lampmussel

BIOPID *253* ***REGION*** Statewide ***PATCH TYPE*** Stream Centerline

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
8888	STREAM CENTERLINE	Undissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes (Lindenmayer et al. 2009). Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams (Johnson 1970), whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas (Ortmann 1919, Strayer and Jirka 1997). Species such as the creeper are considered habitat generalists (NatureServe 2011), thriving in streams, rivers, lakes and ponds. All of the abovementioned aquatic habitats are reflected in the Landscape Project stream layer.

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Land Use Land Cover Selections and Patch Type Justifications

Allegheny River Cruiser

BIOPID *136* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Allegheny River Cruiser

BIOPID *137* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Arogos Skipper

BIOPID 11 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-8,*
1711	CEMETERY ON WETLAND	Undissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-8,*
2400	OTHER AGRICULTURE	Undissolved	1-8,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-8,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-8,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-8,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Undissolved	***1-8,****
7400	ALTERED LANDS	Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

In northern New Jersey, this species occurs mostly in grassy patches and successional dry fields while, in southern New Jersey, this species occurs mostly on reedgrass savannas and meadows. The northern New Jersey populations are known to use little bluestem (*Schizachyrium scoparius*) as a primary foodplant and southern New Jersey populations are known to use Pinebarrens Reedgrass (*Calamovilfa brevipilis*) as a primary foodplant (NatureServe 2010).

Arogos Skipper utilizes open habitats for breeding and nectaring but also depends on forest edges for shelter during inclement or hot weather and nectaring (NatureServe 2010). This species is known to feed on a variety of grass species throughout its range and presumably could use other foodplants in New Jersey. The classes selected represent habitats suitable for use by this species for both breeding and nonbreeding activities in relation to the occurrence. Many species of lepidoptera will use a wide variety of habitat types for nectaring, shelter and dispersal purposes that would not be suitable for breeding habitat.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Arogos Skipper

BIOPID 95 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-8,*
1711	CEMETERY ON WETLAND	Dissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-8,*
2400	OTHER AGRICULTURE	Dissolved	1-8,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-8,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-8,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-8,****
4230	PLANTATION	Dissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-8,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-8,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-8,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-8,****
7100	BEACHES	Dissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-8,****
7300	EXTRACTIVE MINING	Dissolved	***1-8,****
7400	ALTERED LANDS	Dissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-8,****
7500	TRANSITIONAL AREAS	Dissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

In northern New Jersey, this species occurs mostly in grassy patches and successional dry fields. In southern New Jersey, this species occurs mostly on reedgrass savannas and meadows. This species will often travel hundreds of meters to several kilometers in order to reach nectar sources or colonize new locations. The northern New Jersey populations are known to use little bluestem (*Schizachyrium scoparius*) as a primary foodplant. The southern New Jersey populations are known to use Pinebarrens Reedgrass (*Calamovilfa brevipilis*) as a primary foodplant (NatureServe 2010).

Arogos Skipper utilizes open grassy habitats for breeding and nectaring but also depends on forest edges for shelter during inclement or hot weather and for additional nectaring sources (NatureServe 2010). This species is known to feed on a variety of grass species throughout its range and presumably could use other foodplants in New Jersey. Many species of lepidoptera will use a wide variety of habitat types for nectaring, shelter and dispersal purposes that would not be suitable for breeding habitat.

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Arrowhead Spiketail

BIOPID *98* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	*1-8,**
1419	BRIDGE OVER WATER	Undissolved	*1-8,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-8,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-8,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-8,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	*1-8,**
1711	CEMETERY ON WETLAND	Adjacent Undissolved	*1-8,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	*1-8,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	*1-8,**
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	*1-8,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-8,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-8,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	*1-8,**
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	*1-8,**
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1-8,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Adjacent Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Adjacent Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Adjacent Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Adjacent Undissolved	***1-8,****
7400	ALTERED LANDS	Adjacent Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Adjacent Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and pupae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Arrowhead Spiketail

BIOPID *99* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-8,**
1419	BRIDGE OVER WATER	Undissolved	*1-8,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-8,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-8,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-8,**
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-8,**
1711	CEMETERY ON WETLAND	Undissolved	*1-8,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	*1-8,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	*1-8,**
2100	CROPLAND AND PASTURELAND	Undissolved	*1-8,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-8,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-8,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-8,**
2300	CONFINED FEEDING OPERATIONS	Undissolved	*1-8,**
2400	OTHER AGRICULTURE	Undissolved	*1-8,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Undissolved	***1-8,****
7400	ALTERED LANDS	Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Banner Clubtail

BIOPID *134* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Banner Clubtail

BIOPID *135* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.

3. Biber, E. 2002. Habitat Analysis of a Rare Dragonfly (*Williamsonia lintneri*) in Rhode Island. Northern Naturalist, 9(3):341-352.

4. Bried, J. T. and G. N. Ervin. 2006. Abundance Patterns of Dragonflies Along a Wetland Buffer. Wetlands, 26(3): 878-883.

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7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Bronze Copper **BIOPID** 30 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7440	DISTURBED TIDAL WETLANDS	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in fields, marshes, meadows, fens, and along the edges of ponds and streams. It will often travel to adjacent uplands for nectar (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Bronze Copper

BIOPID *31* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-6,**
1711	CEMETERY ON WETLAND	Undissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Undissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-6,**
2400	OTHER AGRICULTURE	Undissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7440	DISTURBED TIDAL WETLANDS	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in fields, marshes, meadows, fens, and along the edges of ponds and streams. It will often travel to adjacent uplands for nectar (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.

2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.

3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brook Snaketail

BIOPID *122* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brook Snaketail

BIOPID *123* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.

3. Biber, E. 2002. Habitat Analysis of a Rare Dragonfly (*Williamsonia lintneri*) in Rhode Island. Northern Naturalist, 9(3):341-352.

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5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.

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7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.

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11. Nikula, B., Ryan, J.L., and M.R. Burne. 2007. A Field Guide to the Dragonflies and Damselflies of Massachusetts 2nd ed. Westborough, MA: Massachusetts Division of Fisheries and Wildlife-Natural Heritage & Endangered Species Program.

12. NJOdes. 2006. NJOdes-The Dragonflies and Damselflies of New Jersey. Accessed June 30, 2011. Available www.njodes.com.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brush-tipped Emerald

BIOPID *146* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brush-tipped Emerald

BIOPID *147* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Checkered White

BIOPID *28* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	*1-6,**
1711	CEMETERY ON WETLAND	Dissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Dissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-6,**
2400	OTHER AGRICULTURE	Dissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in disturbed open areas, grasslands, savannas, successional fields, and open/grassy woodlands and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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5. Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. http://www.butterfliesandmoths.org/ (Version 06302011).

6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Checkered White

BIOPID *29* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-6,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-6,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-6,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-6,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-6,****
1711	CEMETERY ON WETLAND	Undissolved	***1-6,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-6,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-6,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-6,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-6,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-6,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-6,****
2400	OTHER AGRICULTURE	Undissolved	***1-6,****
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****

6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in disturbed open areas, grasslands, savannas, successional fields, and open/grassy woodlands and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.

4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1 NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

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6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Cobra Clubtail

BIOPID *114* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at http://www.odonatacentral.org. (Accessed: July 07, 2011).

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5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.

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7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.

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13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Cobra Clubtail

BIOPID *115* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Coppery Emerald

BIOPID *133* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Crimson-ringed Whiteface **BIOPID** 156 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate *

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Crimson-ringed Whiteface **BIOPID** 157 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-4,6-10*
1419	BRIDGE OVER WATER	Undissolved	1-4,6-10*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-4,6-10*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-4,6-10*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-4,6-10*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-4,6-10*
1711	CEMETERY ON WETLAND	Undissolved	1-4,6-10*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-4,6-10*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-4,6-10*
2100	CROPLAND AND PASTURELAND	Undissolved	1-4,6-10*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-4,6-10*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-4,6-10*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-4,6-10*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-4,6-10*
2400	OTHER AGRICULTURE	Undissolved	1-4,6-10*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4230	PLANTATION	Undissolved	*1-4,6-10**
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-4,6-10**
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-4,6-10**
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-4,6-10**
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-4,6-10**
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-4,6-10**
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-4,6-10**
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-4,6-10**
5100	STREAMS AND CANALS	Undissolved	*1-4,6-10**
5200	NATURAL LAKES	Undissolved	*1-4,6-10**
5300	ARTIFICIAL LAKES	Undissolved	*1-4,6-10**
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1-4,6-10**

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-4,6-10****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-4,6-10****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-4,6-10****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-4,6-10****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-4,6-10****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-4,6-10****
6240	HERBACEOUS WETLANDS	Undissolved	***1-4,6-10****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-4,6-10****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-4,6-10****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-4,6-10****
7100	BEACHES	Undissolved	***1-4,6-10****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-4,6-10****
7300	EXTRACTIVE MINING	Undissolved	***1-4,6-10****
7400	ALTERED LANDS	Undissolved	***1-4,6-10****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-4,6-10****
7500	TRANSITIONAL AREAS	Undissolved	***1-4,6-10****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-4,6-10****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Limited Extent is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Dotted Skipper

BIOPID *17* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-6,**
1711	CEMETERY ON WETLAND	Undissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Undissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-6,**
2400	OTHER AGRICULTURE	Undissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in dry, shortgrass praires, successional fields, pine barrens, meadows, reedgrass savannahs, woodlands, and scrub/shrub land. Dotted skipper utilizes open habitats for breeding and nectaring but also depends on forests for shelter during inclement or hot weather, dispersal, and nectaring (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and non-breeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Forcipate Emerald

BIOPID *153* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Frosted Elfin

BIOPID *22* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-7,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-7,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1-7,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-7,**
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	*1-7,**
1711	CEMETERY ON WETLAND	Dissolved	*1-7,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-7,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-7,**
2100	CROPLAND AND PASTURELAND	Dissolved	*1-7,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-7,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-7,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-7,**
2400	OTHER AGRICULTURE	Dissolved	*1-7,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-7,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-7,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-7,**
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-7,**
4230	PLANTATION	Dissolved	*1-7,**
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-7,**
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	*1-7,**
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-7,**
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	*1-7,**
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1-7,**
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	*1-7,**
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-7,**
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-7,**
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-7,**
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1-7,**
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	*1-7,**
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	*1-7,**
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	*1-7,**
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-7,**
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-7,**
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-7,**

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-7,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-7,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-7,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-7,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-7,****
7100	BEACHES	Dissolved	***1-7,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-7,****
7300	EXTRACTIVE MINING	Dissolved	***1-7,****
7400	ALTERED LANDS	Dissolved	***1-7,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-7,****
7500	TRANSITIONAL AREAS	Dissolved	***1-7,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-7,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in open/barren habitat, grasslands, savannahs, successional fields, scrub/shrub lands and open woodlands and forest edges (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Frosted Elfin

BIOPID 23 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-7,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-7,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-7,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-7,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-7,*
1711	CEMETERY ON WETLAND	Undissolved	1-7,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-7,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-7,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-7,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-7,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-7,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-7,*
2400	OTHER AGRICULTURE	Undissolved	1-7,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-7,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-7,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-7,**
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-7,**
4230	PLANTATION	Undissolved	*1-7,**
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-7,**
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-7,**
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-7,**
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-7,**
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-7,**
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-7,**
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-7,**
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-7,**
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-7,**
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-7,**
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-7,**
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-7,**
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-7,**
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-7,**
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-7,**
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-7,**

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-7,**
6240	HERBACEOUS WETLANDS	Undissolved	*1-7,**
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1-7,**
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-7,**
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-7,**
7100	BEACHES	Undissolved	*1-7,**
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	*1-7,**
7300	EXTRACTIVE MINING	Undissolved	*1-7,**
7400	ALTERED LANDS	Undissolved	*1-7,**
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1-7,**
7500	TRANSITIONAL AREAS	Undissolved	*1-7,**
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	*1-7,**

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in open/barren habitat, grasslands, savannahs, successional fields, scrub/shrub lands and open woodlands and edges (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Albanese, G., P. D. Vickery, P. R. Sievert. 2008. Microhabitat use by larvae and females of a rare barrens butterfly, frosted elfin (*Callophrys irus*). Journal Insect Conservation, 12:603-615.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Georgia Satyr

BIOPID *12* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	*1-6,**
1711	CEMETERY ON WETLAND	Dissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Dissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-6,**
2400	OTHER AGRICULTURE	Dissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in marshes, meadows, fens, and along the edges of pond and streams. It will often travel to adjacent uplands for shelter and dispersal (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Georgia Satyr

BIOPID *13* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-6,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-6,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-6,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-6,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-6,****
1711	CEMETERY ON WETLAND	Undissolved	***1-6,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-6,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-6,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-6,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-6,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-6,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-6,****
2400	OTHER AGRICULTURE	Undissolved	***1-6,****
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in marshes, meadows, fens, and along the edges of ponds and streams. It will often travel to adjacent uplands for shelter and dispersal (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.

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4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

5. Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. http://www.butterfliesandmoths.org/ (Version 06302011).

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Skimmer ***BIOPID*** *104* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-10,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Skimmer

BIOPID *105* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4230	PLANTATION	Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Undissolved	***1-10,****
7400	ALTERED LANDS	Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at http://www.odonatacentral.org. (Accessed: July 07, 2011).

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10. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Gray Petaltail

BIOPID *92* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-8,**
1419	BRIDGE OVER WATER	Undissolved	*1-8,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-8,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-8,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-8,**
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-8,**
1711	CEMETERY ON WETLAND	Undissolved	*1-8,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	*1-8,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	*1-8,**
2100	CROPLAND AND PASTURELAND	Undissolved	*1-8,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-8,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-8,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-8,**
2300	CONFINED FEEDING OPERATIONS	Undissolved	*1-8,**
2400	OTHER AGRICULTURE	Undissolved	*1-8,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Undissolved	***1-8,****
7400	ALTERED LANDS	Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Green-faced Clubtail

BIOPID *112* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Green-faced Clubtail

BIOPID *113* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Harpoon Clubtail

BIOPID *126* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Harpoon Clubtail

BIOPID *127* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Harris Checkerspot

BIOPID *20* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-6,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-6,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-6,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-6,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-6,****
1711	CEMETERY ON WETLAND	Undissolved	***1-6,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-6,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-6,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-6,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-6,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-6,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-6,****
2400	OTHER AGRICULTURE	Undissolved	***1-6,****
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in a wide variety of open habitats. It is found in scrub/shrub lands and forest edge areas, grasslands, bogs, marshes, and meadows (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for all records relating to this species and values any habitat suitable for this species to complete its life history, including areas suitable for breeding, nectaring, resting, and dispersal.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hessel's Hairstreak

BIOPID *176* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	*1-6,**
1419	BRIDGE OVER WATER	Adjacent Undissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent Undissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	*1-6,**
1711	CEMETERY ON WETLAND	Adjacent Undissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	*1-6,**
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent Undissolved	*1-6,**

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Adjacent Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	***1-6,****
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Adjacent Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Adjacent Undissolved	***1-6,****
7400	ALTERED LANDS	Adjacent Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Adjacent Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in Atlantic White Cedar wetlands and swamps as well as adjacent wetland and upland areas containing nectar sources (NatureServe 2010). Landuse-Landcover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hessel's Hairstreak

BIOPID *177* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-6,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-6,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-6,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-6,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-6,****
1711	CEMETERY ON WETLAND	Undissolved	***1-6,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-6,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-6,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-6,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-6,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-6,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-6,****
2400	OTHER AGRICULTURE	Undissolved	***1-6,****
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in Atlantic White Cedar wetlands and swamps as well as adjacent wetland and upland areas containing nectar sources (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hoary Elfin

BIOPID *24* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	*1-6,**
1711	CEMETERY ON WETLAND	Dissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Dissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-6,**
2400	OTHER AGRICULTURE	Dissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in open/barren habitat, grasslands, savannahs, successional fields, scrub/shrub lands and open woodlands and forest edges (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hudsonian Whiteface

BIOPID *154* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hudsonian Whiteface

BIOPID *155* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Kennedy's Emerald

BIOPID *158* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

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13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

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Land Use Land Cover Selections and Patch Type Justifications

Leonard's Skipper

BIOPID 89 **REGION** Statewide **PATCH TYPE** Cardinal-Proximate

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in grasslands, savannas, successional fields, and open/grassy wood and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Leonard's Skipper

BIOPID 90 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-6,*
1711	CEMETERY ON WETLAND	Undissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-6,*
2400	OTHER AGRICULTURE	Undissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in grasslands, savannas, successional fields, and open/grassy wood and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.

4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

5. Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. http://www.butterfliesandmoths.org/ (Version 06302011).

6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Maine Snaketail

BIOPID *128* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Maine Snaketail

BIOPID *129* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Midland Clubtail

BIOPID *116* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Mitchell's Satyr

BIOPID *19* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Undissolved	***1-10,****
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4230	PLANTATION	Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-10,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Undissolved	***1-10,****
7400	ALTERED LANDS	Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in fen and sedge meadow complexes and wooded/scrub/shrub wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for all records relating to this species and values any habitat suitable for this species to complete its life history, including areas suitable for breeding, nectaring, resting, and dispersal.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

New England Bluet

BIOPID *108* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-10,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

New England Bluet

BIOPID *109* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4230	PLANTATION	Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Undissolved	***1-10,****
7400	ALTERED LANDS	Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Northeastern Beach Tiger Beetle **BIOPID** 244 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-3,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-3,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-3,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-3,*
1711	CEMETERY ON WETLAND	Undissolved	1-3,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-3,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-3,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-3,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-3,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-3,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-3,*
2400	OTHER AGRICULTURE	Undissolved	1-3,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-3,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-3,*

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3,**
4230	PLANTATION	Undissolved	*1-3,**
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3,**
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3,**
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3,**
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3,**
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-3,**
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-3,**
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3,**
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3,**
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3,**
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-3,**
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-3,**
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-3,**
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3,**
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3,**
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3,**
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3,**
6240	HERBACEOUS WETLANDS	Undissolved	*1-3,**

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-3,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-3,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-3,****
7100	BEACHES	Undissolved	***1-3,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-3,****
7300	EXTRACTIVE MINING	Undissolved	***1-3,****
7400	ALTERED LANDS	Undissolved	***1-3,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-3,****
7500	TRANSITIONAL AREAS	Undissolved	***1-3,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-3,****

Land Use - Land Cover Selection and Patch Type Rationale

This species of tiger beetle is restricted to sandy beach and dune habitat along ocean and bay shorelines. The larvae inhabit burrows between the high tide line and the dune line. Adults forage widely over the beach areas but are found primarily close to the water's edge. They will often disperse over several kilometers to colonize new habitat (Pearson, D.L., Knisley, C.B., and C.J. Kazilek. 2006). Land Use/Land Cover patches were selected to represent areas that would be suitable for larvae to inhabit and for the adults to forage and disperse.

Patch type Limited Extent was used to value habitat limited to the immediate area surrounding known occurrences of this species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Northern Metalmark

BIOPID *26* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-7,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-7,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-7,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-7,**
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-7,**
2100	CROPLAND AND PASTURELAND	Undissolved	*1-7,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-7,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-7,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-7,**
2400	OTHER AGRICULTURE	Undissolved	*1-7,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-7,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-7,**
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-7,**
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-7,**
4230	PLANTATION	Undissolved	*1-7,**

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-7,**
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-7,**
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-7,**
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-7,**
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-7,**
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-7,**
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-7,**
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-7,**
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-7,**
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-7,**
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-7,**
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-7,**
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-7,**
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-7,**
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-7,**
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-7,**
6240	HERBACEOUS WETLANDS	Undissolved	*1-7,**
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1-7,**
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-7,**

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-7,****
7100	BEACHES	Undissolved	***1-7,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-7,****
7300	EXTRACTIVE MINING	Undissolved	***1-7,****
7400	ALTERED LANDS	Undissolved	***1-7,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-7,****
7500	TRANSITIONAL AREAS	Undissolved	***1-7,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-7,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey, Northern Metalmark occurs in forest and woodland openings and edges predominantly in areas characterized as glades within Red Cedar stands. It is also found in scrub/shrub land, successional fields, fens/meadows, habitat edges, and other suitable habitat types (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for all records relating to this species and values any habitat suitable for this species to complete its life history, including areas suitable for breeding, nectaring, resting, and dispersal.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Pine Barrens Bluet

BIOPID *102* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-10,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Pine Barrens Bluet

BIOPID *103* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Undissolved	***1-10,,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4230	PLANTATION	Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Undissolved	***1-10,****
7400	ALTERED LANDS	Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Rapids Clubtail

BIOPID *120* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Rapids Clubtail

BIOPID *121* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at http://www.odonatacentral.org. (Accessed: July 07, 2011).

2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.

3. Biber, E. 2002. Habitat Analysis of a Rare Dragonfly (*Williamsonia lintneri*) in Rhode Island. Northern Naturalist, 9(3):341-352.

4. Bried, J. T. and G. N. Ervin. 2006. Abundance Patterns of Dragonflies Along a Wetland Buffer. Wetlands, 26(3): 878-883.

5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.

6. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.

7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.

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13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Robust Basketail

BIOPID *138* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at http://www.odonatacentral.org. (Accessed: July 07, 2011).

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Land Use Land Cover Selections and Patch Type Justifications

Robust Basketail

BIOPID *139* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Sable Clubtail

BIOPID *100* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	*1-8,**
1419	BRIDGE OVER WATER	Undissolved	*1-8,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-8,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-8,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-8,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	*1-8,**
1711	CEMETERY ON WETLAND	Adjacent Undissolved	*1-8,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	*1-8,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	*1-8,**
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	*1-8,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-8,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-8,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	*1-8,**
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	*1-8,**
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1-8,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Adjacent Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Adjacent Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Adjacent Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Adjacent Undissolved	***1-8,****
7400	ALTERED LANDS	Adjacent Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Adjacent Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

Patch Type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and pupae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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4. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Sable Clubtail

BIOPID *101* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-8,****
1419	BRIDGE OVER WATER	Undissolved	***1-8,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-8,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-8,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-8,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-8,****
1711	CEMETERY ON WETLAND	Undissolved	***1-8,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-8,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-8,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-8,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-8,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-8,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-8,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-8,****
2400	OTHER AGRICULTURE	Undissolved	***1-8,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Undissolved	***1-8,****
7400	ALTERED LANDS	Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Scarlet Bluet

BIOPID *106* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-10,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-10,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Scarlet Bluet

BIOPID *107* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-10,****
1419	BRIDGE OVER WATER	Undissolved	***1-10,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-10,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-10,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-10,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-10,****
1711	CEMETERY ON WETLAND	Undissolved	***1-10,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-10,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-10,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-10,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-10,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-10,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-10,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-10,****
2400	OTHER AGRICULTURE	Undissolved	***1-10,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-10,****
4230	PLANTATION	Undissolved	***1-10,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-10,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-10,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-10,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-10,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-10,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-10,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-10,****
5100	STREAMS AND CANALS	Undissolved	***1-10,****
5200	NATURAL LAKES	Undissolved	***1-10,****
5300	ARTIFICIAL LAKES	Undissolved	***1-10,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-10,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-10,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-10,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-10,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-10,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-10,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-10,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-10,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-10,****
7100	BEACHES	Undissolved	***1-10,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-10,****
7300	EXTRACTIVE MINING	Undissolved	***1-10,****
7400	ALTERED LANDS	Undissolved	***1-10,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-10,****
7500	TRANSITIONAL AREAS	Undissolved	***1-10,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-10,****

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This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Septima's Clubtail

BIOPID *110* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Septima's Clubtail

BIOPID *111* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Silver-bordered Fritillary

BIOPID *18* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	*1-6,**
1711	CEMETERY ON WETLAND	Dissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Dissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-6,**
2400	OTHER AGRICULTURE	Dissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in wet meadows/savannahs, marshes, bogs, and scrub/shrub and wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Silver-bordered Fritillary

BIOPID *88* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-6,**
1711	CEMETERY ON WETLAND	Undissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Undissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-6,**
2400	OTHER AGRICULTURE	Undissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in wet meadows/savannahs, marshes, bogs, and scrub/shrub and wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Ski-tailed Emerald

BIOPID *150* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Spatterdock Darner

BIOPID *140* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Spatterdock Darner

BIOPID *141* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
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6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
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6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Subarctic Darner

BIOPID *144* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Superb Jewelwing

BIOPID *124* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

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This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Superb Jewelwing

BIOPID *125* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
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4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
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4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
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5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
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6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
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6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

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This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Tiger Spiketail

BIOPID *96* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	*1-8,**
1419	BRIDGE OVER WATER	Undissolved	*1-8,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-8,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-8,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-8,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	*1-8,**
1711	CEMETERY ON WETLAND	Adjacent Undissolved	*1-8,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	*1-8,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	*1-8,**
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	*1-8,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-8,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-8,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	*1-8,**
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	*1-8,**
2400	OTHER AGRICULTURE	Adjacent Undissolved	*1-8,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Adjacent Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Adjacent Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Adjacent Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Adjacent Undissolved	***1-8,****
7400	ALTERED LANDS	Adjacent Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Adjacent Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and pupae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Tiger Spiketail

BIOPID *97* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-8,****
1419	BRIDGE OVER WATER	Undissolved	***1-8,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-8,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-8,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-8,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-8,****
1711	CEMETERY ON WETLAND	Undissolved	***1-8,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-8,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-8,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-8,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-8,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-8,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-8,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-8,****
2400	OTHER AGRICULTURE	Undissolved	***1-8,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-8,****
4230	PLANTATION	Undissolved	***1-8,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-8,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-8,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-8,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-8,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-8,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-8,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-8,****
5100	STREAMS AND CANALS	Undissolved	***1-8,****
5200	NATURAL LAKES	Undissolved	***1-8,****
5300	ARTIFICIAL LAKES	Undissolved	***1-8,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-8,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-8,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-8,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-8,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-8,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-8,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-8,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-8,****
7100	BEACHES	Undissolved	***1-8,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-8,****
7300	EXTRACTIVE MINING	Undissolved	***1-8,****
7400	ALTERED LANDS	Undissolved	***1-8,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-8,****
7500	TRANSITIONAL AREAS	Undissolved	***1-8,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-8,****

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Two-spotted Skipper

BIOPID *14* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	*1-6,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-6,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	*1-6,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-6,**
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	*1-6,**
1711	CEMETERY ON WETLAND	Dissolved	*1-6,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-6,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-6,**
2100	CROPLAND AND PASTURELAND	Dissolved	*1-6,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-6,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-6,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-6,**
2400	OTHER AGRICULTURE	Dissolved	*1-6,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-6,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	*1-6,**

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4230	PLANTATION	Dissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-6,****
7100	BEACHES	Dissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1-6,****
7300	EXTRACTIVE MINING	Dissolved	***1-6,****
7400	ALTERED LANDS	Dissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-6,****
7500	TRANSITIONAL AREAS	Dissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in wet meadows/savannahs, bogs, sedge meadows, stream/seepage sedge marshes, and gaps in swamps/wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Two-spotted Skipper

BIOPID *15* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-6,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-6,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-6,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-6,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-6,****
1711	CEMETERY ON WETLAND	Undissolved	***1-6,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-6,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-6,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-6,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-6,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-6,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-6,****
2400	OTHER AGRICULTURE	Undissolved	***1-6,****
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-6,****
4230	PLANTATION	Undissolved	***1-6,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-6,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-6,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-6,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-6,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-6,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-6,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-6,****
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-6,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-6,****
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1-6,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-6,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-6,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-6,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-6,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-6,****
7100	BEACHES	Undissolved	***1-6,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-6,****
7300	EXTRACTIVE MINING	Undissolved	***1-6,****
7400	ALTERED LANDS	Undissolved	***1-6,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-6,****
7500	TRANSITIONAL AREAS	Undissolved	***1-6,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-6,****

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in wet meadows/savannahs, bogs, sedge meadows, stream/seepage sedge marshes, and gaps in swamps/wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Williamson's Emerald

BIOPID *148* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	*1-13,**
1419	BRIDGE OVER WATER	Dissolved	*1-13,**
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-13,**
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	*1-13,**
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	*1-13,**
1711	CEMETERY ON WETLAND	Dissolved	*1-13,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	*1-13,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	*1-13,**
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	*1-13,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*1-13,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-13,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	*1-13,**
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	*1-13,**
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	*1-13,**

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Williamson's Emerald

BIOPID *149* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Undissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Undissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-13,****
4230	PLANTATION	Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Undissolved	***1-13,****
5300	ARTIFICIAL LAKES	Undissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Undissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-13,****
7100	BEACHES	Undissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Undissolved	***1-13,****
7400	ALTERED LANDS	Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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11. Nikula, B., Ryan, J.L., and M.R. Burne. 2007. A Field Guide to the Dragonflies and Damselflies of Massachusetts 2nd ed. Westborough, MA: Massachusetts Division of Fisheries and Wildlife-Natural Heritage & Endangered Species Program.

12. NJOdes. 2006. NJOdes-The Dragonflies and Damselflies of New Jersey. Accessed June 30, 2011. Available www.njodes.com.

13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Zebra Clubtail

BIOPID *130* ***REGION*** Statewide ***PATCH TYPE*** Cardinal-Proximate *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	***1-13,****
1419	BRIDGE OVER WATER	Dissolved	***1-13,****
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***1-13,****
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	***1-13,****
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	***1-13,****
1711	CEMETERY ON WETLAND	Dissolved	***1-13,****
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	***1-13,****
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	***1-13,****
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	***1-13,****
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	***1-13,****
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	***1-13,****
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	***1-13,****
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	***1-13,****
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	***1-13,****

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4230	PLANTATION	Adjacent/Riparian Undissolved	***1-13,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	***1-13,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	***1-13,****
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	***1-13,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	***1-13,****
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	***1-13,****
5100	STREAMS AND CANALS	Undissolved	***1-13,****
5200	NATURAL LAKES	Dissolved	***1-13,****
5300	ARTIFICIAL LAKES	Dissolved	***1-13,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-13,****

6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-13,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-13,****
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-13,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-13,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-13,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-13,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-13,****
7100	BEACHES	Dissolved	***1-13,****
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	***1-13,****
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	***1-13,****
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	***1-13,****
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	***1-13,****
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	***1-13,****
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	***1-13,****

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undisolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Allegheny Woodrat

BIOPID *219* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***1,4,10***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	***1,4,10***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***4***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	***4***
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***4***
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	***4***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***4***
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	***4***
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***4***
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***4***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***4***
6210	DECIDUOUS WOODED WETLANDS	Dissolved	***4,9***
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***4,9***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***9***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***9***

7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	*1,4,7-10*

Land Use - Land Cover Selection and Patch Type Rationale

The Allegheny woodrat is closely associated with cliffs and talus slopes, rock outcrops and caves and abandoned mines within forested regions of the central and southern Appalachian Mountains from New York to Tennessee (Wiley 1980). Balcom and Yahner (1996) found that Allegheny woodrats in the northeast appear to prefer sites with a high percentage of rock cover, greater slope and less overstory basal area for building their nests. In New Jersey, woodrats construct their nests, or middens, in the voids between boulders in talus slopes and rock outcrops within forested habitats generally near the edge of talus fields where some overstory tree cover exists (Valent expert opinion).

Castleberry (2000) found that Allegheny woodrats use habitats adjacent to the talus habitat where their middens are located. Their diets are varied and it has been documented to consist of various parts of most of the plant species found in its domain (Poole 1940). In addition, other researchers have reported the woodrats' food as various fruits and berries, including mountain ash, blackberry, dogwood, sumac fruit, poison ivy, wild grape, wild cherry, shadberry, ferns, hard mast and fungi (Newcombe 1930). In areas where forested and clear-cut habitats are adjacent to talus, woodrats use both habitats in proportion to their availability (Castleberry 2000). A dense understory growth of hardwood stump sprouts, blackberry, and greenbrier, along with logging debris, was present on clear-cut sites. The dense understory provided security from avian predators and allowed woodrats to utilize the increased food resources found on clear-cut sites. Most research on woodrat habitat concludes that they will make use of any vegetated habitat type found within close proximity of their midden as long as it provides protective cover from predators (Balcom and Yahner 1996; Castleberry 2000).

Castleberry (2000) estimated mean topographic home ranges for 34 Allegheny woodrats in West Virginia at 4.4 ha. However, resource availability likely has a significant influence on home range size and has been well documented in other rodent species (Boutin 1990; Jones 1990; Bowers et al. 1990; Lacher and Mares 1996). Therefore, the Contiguous Area patch type is applied because it values suitable habitat based on the LULC classes listed above within and beyond the species occurrence area, which is nearly always located in nesting habitat, and in all cases values both foraging and midden habitat associated with an SOA.

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* ENSP biologist expert opinion – M. Valent

Land Use Land Cover Selections and Patch Type Justifications

Bobcat

BIOPID *46* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved and Riparian Dissolved	***8,11***
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved and Riparian Dissolved	***8,11***
2100	CROPLAND AND PASTURELAND	Dissolved and Riparian Dissolved	***7,11***
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved and Riparian Dissolved	***11***
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved and Riparian Dissolved	***2,11***
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
4230	PLANTATION	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6-12***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6-12***
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	***1,3,4,6-12***
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved and Riparian Dissolved	***7,11***
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved and Riparian Dissolved	*****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved and Riparian Dissolved	***1,7,11***
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved and Riparian Dissolved	***1,7,11***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved and Riparian Dissolved	***1,7,11***
6120	FRESHWATER TIDAL MARSHES	Dissolved and Riparian Dissolved	***2,6***
6210	DECIDUOUS WOODED WETLANDS	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
6220	CONIFEROUS WOODED WETLANDS	Dissolved and Riparian Dissolved	***1,3,4,6,7,9-12***
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved and Riparian Dissolved	***10***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved and Riparian Dissolved	***1,7,11***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved and Riparian Dissolved	***1,7,11***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved and Riparian Dissolved	***1,7,11***

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved and Dissolved	Riparian	***1,7,11***
6240	HERBACEOUS WETLANDS	Dissolved and Dissolved	Riparian	***1,7,11***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved and Dissolved	Riparian	*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved and Dissolved	Riparian	***1,3,4,6,7,9-12***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved and Dissolved	Riparian	***1,3,4,6,7,9-12***

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels tracked in the Biotics Database as habitat use does not vary significantly between sexes, breeding season and non-breeding season.

Bobcats are highly adaptable animals that can survive in a wide variety of habitats as long as there is abundant prey available. Bobcats prefer habitats that contain a mix of seral stages containing emergent, scrub/shrub and forested wetlands, upland and lowland deciduous, coniferous and mixed forests, old fields, scrub/shrub, rocky outcrops and sparse agriculture (Lariviere and 1997). Bobcats require areas of dense cover for resting, reproduction and protection from weather and predators. Rocky outcrops are often used for resting, cover and rearing of young (Schantz and Valent 2003). Where rock outcrops are not available as dens, bobcats will use hollow logs, brush thickets, cavities in the base of trees, brush piles, abandoned beaver lodges and occasionally old abandoned buildings or foundations (Hatler et al. 2003).

Bobcat home range sizes are highly variable, both geographically and intrasexually in the same geographic area, particularly if suitable habitat components have a patchy distribution (Lovallo 1999). The home range size of males is generally larger than that of females. In New Jersey, the annual home range of a male in 2002 was 121 km2 with a core of 19 km2 and the home range of a female in 2003 was 90 km2 with a core of 11.7 km2, as estimated by kernel home range method (ENSP 2011). The Contiguous Area patch type is applied to value suitable bobcat habitat based on occurrence records in the Biotics database for all feature label types. Although bobcats are considered habitat generalists, they do not occur in areas that are highly altered by agriculture or development. Bobcat habitat is identified using the LULC classes listed and applying a modified Contiguous Area patch type. To avoid valuing large, contiguous areas of agriculture, which bobcats typically avoid, only LULC class 2100 (cropland and pastureland) polygons less than 3 hectares in size are included with the other LULC classes to form the bobcat habitat patches that are available to be valued by bobcat occurrence data. Since bobcats have large home ranges, and therefore require large areas of suitable habitat, a minimum core size of 10 hectares is required for habitat patches to be valued by bobcat occurrence area data. Telemetry data in NJ has shown that riparian corridors are important for bobcats as travel routes between suitable habitat patches. Therefore, a second set of patches are created to be valued. The same set of LULC classes as listed above are dissolved together but only if they are coded as riparian, regardless of core area size. These riparian patches of habitat are valued if they intersect a bobcat SOA. However, suitable habitat patches less than 0.25 acre have been excluded from being valued within the riparian zone due to their small size.

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* ENSP biologist expert opinion – M. Valent

Land Use Land Cover Selections and Patch Type Justifications

Fin Whale

BIOPID *256* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5411	OPEN TIDAL BAYS	Undissolved	*1*
5430	ATLANTIC OCEAN	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

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Land Use Land Cover Selections and Patch Type Justifications

Humpback Whale

BIOPID *257* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5411	OPEN TIDAL BAYS	Undissolved	*1*
5430	ATLANTIC OCEAN	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Literature Citations

1. NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 15, 2007).

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Land Use Land Cover Selections and Patch Type Justifications

Indiana Bat

BIOPID 229 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	8,10,14,24,25,25,31
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	8,10,14,24,25,25,31
2100	CROPLAND AND PASTURELAND	Dissolved	1,3,14,15,26,36
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,3,14,15,26,36
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,17,20,26,29
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,17,20,26,29
4230	PLANTATION	Dissolved	7,9,13,14,16,20,26,29
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,14,16,32,33
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	34

4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***34***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***9,10,21***
5100	STREAMS AND CANALS	Dissolved	***9,10,21***
5200	NATURAL LAKES	Dissolved	***9,10,21***
5300	ARTIFICIAL LAKES	Dissolved	***9,10,21***
6210	DECIDUOUS WOODED WETLANDS	Dissolved	***7,9,13,14,16,33,29***
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***7,9,13,14,16,22,23,26,29***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***34***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***34***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***34***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***34***
6240	HERBACEOUS WETLANDS	Dissolved	***34***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***7,9,13,14,16,26,29***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***7,9,13,14,16,23,26,29***
7300	EXTRACTIVE MINING	Dissolved	***7,13,14,17,23***

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels related to Indiana bat tracked in the Biotics Database, because habitat use during the active season does not vary significantly between sexes, breeding season and non-breeding season.

Murray and Kurta (2004) documented that linear distances between roosts and foraging areas for females range from 0.5 to 8.4 km (0.3 to 5.2 mi). However, most distances were less than half the maximum distance. In an Indiana study, one individual at a colony moved 8.4 km (5.2 mi) between roosts and foraging area (Brack 1983). However, the mean distance of 41 bats from the same colony was 3.0 km (1.9 mi). In a study conducted at Canoe Creek State Park in Pennsylvania, an area with significant changes in elevation, reported distances between roost and foraging areas ranged from 2.4 to 4.5 km (1.5 to 2.8 mi) with an average distance of 3.4 km (2.1 mi) (Butchkoski and Hassinger 2002).

During the summer months female Indiana bats typically roost under the exfoliating bark of dead or nearly dead trees that receive a significant amount of solar radiation throughout the day (Callahan 1993, Kurta et al. 2002, Carter 2003, Britzke et al. 2006). Over 30 species of trees have been documented as being used by Indiana bats during the summer. Most primary roost trees used by maternity colonies are large diameter (Kurta and Rice 2002, Whitaker and Brack 2002) deciduous species, with the exception of a few coniferous trees recently discovered in the Great Smoky Mountains (Britzke et al. 2003) and in New England (Palm 2003). Maternity roost trees are typically located in “open” situations such as a natural or man-made gap in the forest, along the edge of a woodlot, a copse of dead trees and grazed woodlands or pastures with scattered trees (USFWS 2007). In dense forest conditions maternity roosts often occur above the surrounding canopy where they receive greater exposure to sunlight (Callahan et al. 1997) or in suitable trees in, or adjacent to, natural or man-made gaps in the forest canopy. Several researchers have found no significant difference between primary and alternate roost trees and have noted that males may select smaller trees that receive less solar radiation than those typically selected by females. (Callahan et al. 1997, Kurta et al. 2002).

Indiana bats consistently use forested corridors for commuting from roosts to foraging areas and back as opposed to crossing large open areas (Gardner et al. 1991b, Verboom and Huitema 1997, Carter 2003, Chenger 2003, Murray and Kurta 2004, Winhold et al. 2005). Therefore, suitable patches of forest within acceptable travel distances of a roost may not be available to individuals unless they are connected by wooded corridors for travel (USFWS 2007).

Maternity colonies have been documented as occurring in riparian zones (Humphrey et al. 1977), bottomland and floodplain habitats (Carter 2003), upland communities (Gardener et al. 1991b, Palm 2003), and a mix of riparian and upland habitats (Callahan 1993). Kurta et al. (2002) reported maternity colonies from wooded wetland habitats. Most studies that looked at landscape level habitat features found that the areas surrounding known roosts contain primarily agricultural habitats with lesser amounts of forests and wetlands (Gardner et al. 1991b, Kurta et al. 2002). Carter et al. (2002) found that areas around roosts had fewer and smaller urban patches, larger patches of closed-canopy forests but occurred in highly fragmented forests with more patches of bottomland forest and agriculture than randomly chosen sites.

Foraging habitat usually occurs in closed to semi-open forested habitats and forest edges (Humphrey et al. 1977, LaVal et al. 1977, Brack 1983). Indiana bats have been documented to forage in floodplain, riparian, lowland and upland forests (Garner and Gardner 1992, Hobson and Holland 1995, Sparks 2003, Murray and Kurta 2004). They generally hunt around, not within, the canopy of trees. In Indiana, Brack (1983) found that Indiana bats frequently foraged in habitats with large foliage surfaces, including woodland edges and crowns of lone trees. Other documented habitats used for foraging include ponds, old fields, row crops and pastures (Garner and Gardner 1992, Gardner et al. 1991b).

The Contiguous Area patch type is applied to value suitable Indiana bat habitat from the LULC classes above within and beyond each documented species occurrence area. Indiana bat species occurrence areas include primarily trapping locations, known roost trees and telemetry locations, The Contiguous Area patch type does a good job in valuing both foraging and roosting habitats associated with the documented SOA as foraging areas can occur at a considerable distance from the roost location.

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Land Use Land Cover Selections and Patch Type Justifications

North Atlantic Right Whale

BIOPID *258* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5411	OPEN TIDAL BAYS	Undissolved	*1*
5430	ATLANTIC OCEAN	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

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Land Use Land Cover Selections and Patch Type Justifications

Northern Myotis

BIOPID 290 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	4,40,44
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	4,40,44
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	31
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	31
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	4,7,9,11,18,21,25,31,32,34,35,40,41a,42,43,44
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,4,7,9,11,16,20,21,22,25,26,27,28,31,32,34,35,40,41a,42,43,44,46
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	13,18,20,22,26,35,38,39,41b
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,7,13,20,22,26,35,37,39,41b
4230	PLANTATION	Dissolved	13,37,38,39
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	5,7,8,13,20,26,30,35,38,39,41a,41b
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	2,5,7,8,13,20,26,30,35,39,41a,41b
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	4,6,7,8,11,21,30,31,35,40,44
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	2,4,6,7,8,11,20,21,26,27,30,35,36,40,44
5100	STREAMS AND CANALS	Dissolved	3,8,9,11,20,21,25,28,31,34,37,39,40,41a,41b,43
6210	DECIDUOUS WOODED WETLANDS	Dissolved	3,4,8,11,16,17,20,24,25,27,28,31,34,41b,42,43,44

6220	CONIFEROUS WOODED WETLANDS	Dissolved	***8,20,41b***
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***20,41a,41b***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***4,6,11,16,20,41a,44***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***20,41a***
7300	EXTRACTIVE MINING	Dissolved	***1,9,27,31,40,44,45***

Northern Myotis - Land Use/Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Northern Myotis (also known as the northern long-eared bat) tracked in the Biotics Database, because habitat use by this species does not vary significantly between the active and inactive seasons or between sexes or age classes. Northern Myotis inhabit deciduous (4, 9, 11, 17, 18, 21, 22, 25), coniferous (13, 18, 20, 21, 22, 26, 35), and mixed forests (2, 8, 13, 25, 30, 35, 40), including industrial timberlands and plantations, such as those of loblolly pine (37, 39), and natural areas on military reservations (40, 44). They roost in a variety of tree species and tree sizes, sheltering mainly in cavities, crevices and beneath loose bark (11, 13, 20, 26, 28, 30, 32, 39, 43). While roost trees are generally selected relative to their abundance on the landscape (4), some radio-telemetry studies have found Northern Myotis using certain species more than expected (such as green ash and pin oak snags (11, 16), sassafras (4, 42), balsam fir (5), black locust snags (25, 32)) or less than expected (such as sugar maple (4), sweetgum snags (11), American elm (16)) based on availability. Some studies have found Northern Myotis roosting more commonly in bottomland/floodplain forests (11, 43) or in wetlands where the bases of roost trees were submerged in water, favoring snag creation (16). Others have found these bats to choose roost trees at higher elevations more often (29). Risley (41a, 41b) has observed as association between Northern Myotis and Atlantic white cedar swamps.

Reproductive (lactating) females tend to choose larger trees in more open canopies and in later stages of decay (4, 5, 9, 18, 25, 26, 38) than non-reproductive females or males, but still tolerate higher canopy covers and more obstructed environments compared to Indiana bats (11, 16). Lactating females also tend to roost high up in those large trees (18, 25). In the Black Hills of South Dakota, Cryan et al. (13) found that, on average, roost tree plots contained more snags than random plots and that roost trees were of significantly greater diameter than random snags. Johnson et al. (25) found that maternity colonies in the Central Appalachians responded favorably to prescribed fire due to the creation of large-diameter snags and canopy gaps; Perry et al. (38) saw a similar preference for roosting in mature forest stands that had been thinned by forestry. Northern Myotis may form smaller colonies in order to utilize smaller trees (11). The roosting areas of females have been found to be about six times larger than those of males (6). Females have been found to change roost sites every two days or so (2, 9, 11, 16, 26), with six to 2,000 meters or more between roosts (2, 9, 43). Furthermore, members of a colony may roost in multiple trees on a given day in a fission-fusion social dynamic (19). For these reasons, maintaining a network of roost trees is important to the species (18, 19, 21, 22).

While tree roosts are preferred, Northern Myotis will occasionally use buildings and other man-made structures within close proximity to natural habitat (2, 3, 9, 14, 20, 21, 33, 43). However, with respect to the statewide habitat mapping for this species, we have decided to *exclude* structural Land Use/Land Cover patch types (i.e. Residential LULCs and bridges) because their use by bats is so incidental relative to the broad coverage of these patch types across the state. A special provision (4(d) rule) of the Endangered Species Act listing for Northern Myotis aims to avoid undue burden on citizens by allowing, among other things, for the removal of bats from human structures; this rule further marginalizes the need for structural “habitats” to be mapped for Northern Myotis. Homeowners and managers should still follow State guidelines when conducting bat exclusion work, regardless of the bat species present.

Northern Myotis are agile fliers and often forage for insects in the cluttered, closed-canopied forest interior (7, 10, 11, 21, 35, 42, 46), especially over small woodland pools and forest streams (4, 8, 9, 17, 20, 21, 25, 27, 34, 37, 39, 42) and along paths and forest edges (9, 20, 23, 25, 34, 39) and rights-of-way (31). Huie (24) found that Northern Myotis was the most abundant bat species foraging over constructed woodland pools within large, forested landscapes in Kentucky. (By contrast, Jung et al. (26) found that Northern Myotis in their central Ontario, Canada study rarely foraged over water but preferred to forage in

old-growth white pine stands.) Northern Myotis also forage along hillsides and ridges (34, 41b). They do not appear to forage over open areas such as agricultural lands (21) or the centers of clearcuts (23, 35). They are known for gleaning, or capturing prey from foliage (9). In West Virginia, Carter et al. (12) found that Coleoptera (42.3%) and Lepidoptera (31.1%) dominated their diet. In the Greater Fundy Ecosystem, New Brunswick, Canada, researchers found that Northern Myotis foraged in forest types proportionate to their availability, and that the females' foraging areas were 3.4 times larger than the males' (6). Roost sites have been found to average 600 meters (9) to >1,000 meters (5, 21, 43) from foraging/capture sites.

Northern Myotis hibernate in caves and abandoned mines (1, 9, 27, 44, 45), generally within 56 km of their summer habitats (9). Males and females begin arriving at hibernacula in late July or August, where they engage in swarming, mating, and feeding before settling in for hibernation by October or early November (9). In the central Appalachians, Northern Myotis have been found to use caves and mines as night roosts during the summer and fall, and to remain active later into October than other bat species (1). Northern Myotis typically return to the same hibernacula each year, though not always in sequential years, and they may move between sites during the winter (9). They prefer to cluster in deep crevices within hibernation sites (9). The bats emerge from hibernation around April, depending on environmental factors, and return to their summer ranges in May.

The Contiguous Area patch type is used to value suitable Northern Myotis habitat from the LULC classes above, within and beyond each documented Species Occurrence Area (SOA). Northern Myotis SOAs primarily include netting/trapping locations, sightings during hibernation surveys, and roost locations discovered through radio-telemetry. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from a colony's network of roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Atlantic Sturgeon

BIOPID 264 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1,2
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,2
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

This species occurs in both freshwater and marine environments. However, its range within New Jersey is restricted to the Delaware River, Hudson River, Raritan Bay, and Delaware Bay (NatureServe 2015). There is no documentation that shows Atlantic sturgeon utilize NJ tributaries, therefore, for those LULC level 3 classes listed above, only those which correspond to that restricted range may be valued. For marine level 3 classes, Raritan and Delaware bays, as well as the tidal portions of the Delaware and Hudson rivers may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For species which inhabit marine waters, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are not dissolved/combined into patches these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Shortnose Sturgeon

BIOPID 263 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	2,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	2,3
5411	OPEN TIDAL BAYS	Undissolved	2,3
5412	TIDAL MUD FLAT	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

This species occurs in both freshwater and marine environments. However, its range within New Jersey is restricted to the Delaware River, Hudson River and Delaware Bay (Dadswell et al. 1984, NatureServe 2015). Although there is anecdotal information that suggests shortnose sturgeon once utilized portions of several Delaware River tributaries, recent evidence confirming species' occurrences in these areas is lacking. To date, there is only one confirmed observation of a shortnose sturgeon at the mouth of one Delaware River tributary (Boriek pers. comm. 2005). Therefore, for those LULC level 3 classes listed above, only those which correspond to that restricted range may be valued. For marine level 3 classes, Delaware Bay as well as the tidal portions and associated tidal flats of the Delaware and Hudson Rivers may be valued for this species as well as upstream freshwater portions of the Delaware River.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For species which inhabit marine waters, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are not dissolved/combined into patches these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

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Land Use Land Cover Selections and Patch Type Justifications

Atlantic Green Turtle

BIOPID 259 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,2
5411	OPEN TIDAL BAYS	Undissolved	1,2
5412	TIDAL MUD FLAT	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean, nearshore, and within some semi-enclosed tidal waters and tidal mudflats. The Atlantic Ocean, Delaware and Raritan Bays, as well as New Jersey's inland bays and other marine waters may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Several manual edits to those marine areas coded as "Tidal Rivers, Inland Bays and Other Tidal Waters" were necessary in order to exclude marine water bodies which were either landlocked based on either aerial imagery or on the LULC dataset or were connected to larger marine areas by a passage which is unsuitable for the species to travel through.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Atlantic Leatherback

BIOPID *262* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5411	OPEN TIDAL BAYS	Undissolved	*1*
5430	ATLANTIC OCEAN	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Literature Citations

1. NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 20, 2007).

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Land Use Land Cover Selections and Patch Type Justifications

Atlantic Loggerhead

BIOPID 260 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,2
5411	OPEN TIDAL BAYS	Undissolved	1,2
5412	TIDAL MUD FLAT	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean, nearshore, and within some semi-enclosed tidal waters and associated tidal mudflats. The Atlantic Ocean, Delaware and Raritan Bays, as well as New Jersey's inland bays and other marine waters may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Several manual edits to those marine areas coded as "Tidal Rivers, Inland Bays and Other Tidal Waters" were necessary in order to exclude marine water bodies which were either landlocked based on either aerial imagery or on the LULC dataset or were connected to larger marine areas by a passage which is unsuitable for the species to travel through.

Literature Citations

1. NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: April 21, 2016).

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Land Use Land Cover Selections and Patch Type Justifications

Atlantic Ridley

BIOPID 261 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3
5411	OPEN TIDAL BAYS	Undissolved	1-3
5412	TIDAL MUD FLAT	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1-3

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean, nearshore, and within some semi-enclosed tidal waters and associated tidal mudflats. The Atlantic Ocean, Delaware and Raritan Bays, as well as New Jersey's inland bays and other marine waters may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Several manual edits to those marine areas coded as "Tidal Rivers, Inland Bays and Other Tidal Waters" were necessary in order to exclude marine water bodies which were either landlocked based on either aerial imagery or on the LULC dataset or were connected to larger marine areas by a passage which is unsuitable for the species to travel through.

Literature Citations

1. NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 20, 2007).

2. Spotila, James R. 2004. Sea Turtles – A Complete Guide to Their Biology, Behavior, and Conservation. The John Hopkins University Press, Baltimore and London.

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Land Use Land Cover Selections and Patch Type Justifications

Bog Turtle

BIOPID *206* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area *

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-4,**
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-4,**
1711	CEMETERY ON WETLAND	Dissolved	*1-4,**
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	*1-4,**
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	*1-4,**
2100	CROPLAND AND PASTURELAND	Undissolved	*4,**
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*4,**
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*4,**
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*4,**
2300	CONFINED FEEDING OPERATIONS	Undissolved	*4,**
2400	OTHER AGRICULTURE	Undissolved	*4,**
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1,2,4,**
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Gap Elimination	*1,2,4,**
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1,2,4,**
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1,2,4,**

4230	PLANTATION	Undissolved	***1,2,4,****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1,2,4,****
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1,2,4,****
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1,2,4,****
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1,2,4,****
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1,2,4,****
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1,2,4,****
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1,2,4,****
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,2,4,****
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,2,4,****
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1,2,4,****
6111	SALINE MARSHES (LOW MARSH)	Dissolved	***1-4,****
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	***1-4,****
6120	FRESHWATER TIDAL MARSHES	Dissolved	***1-4,****
6130	VEGETATED DUNE COMMUNITIES	Dissolved	***1-4,****
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	***1-4,****
6210	DECIDUOUS WOODED WETLANDS	Dissolved	***1-4,****
6220	CONIFEROUS WOODED WETLANDS	Dissolved	***1-4,****
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	***1-4,****

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***1-4,****
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	***1-4,****
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-4,****
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-4,****
6240	HERBACEOUS WETLANDS	Dissolved	***1-4,****
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	***1-4,****
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	***1-4,****
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	***1-4,****
6500	SEVERE BURNED WETLANDS	Dissolved	***1-4,****
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	***1-4,****

Land Use - Land Cover Selection and Patch Type Rationale

The bog turtle (*Glyptemys muhlenbergii)* is a habitat specialist that occupies wetlands with certain vegetative, soil, and hydrological characteristics, as well as adjacent uplands (Chase et al. 1989, Ernst and Lovich 2009). The life history of the bog turtle is somewhat unique in that it spends the majority of the year within the wetland complex and often does not venture for long periods of time into the adjacent uplands. Therefore, identifying wetlands that support bog turtles is critical in maintaining the integrity of the populations in the state.

Due to the discreet nature and small size of some bog turtle wetlands within the larger landscape context, an analysis of this preliminary mapping methodology revealed that habitat associated with entire bog turtle colonies was not being valued. Known wetlands where bog turtles occur were mapped as non-wetland land cover types at times. In other cases, bog turtle colonies exist in non-contiguous wetlands and are therefore isolated (e.g., a small "island" wetland surrounded by uplands) to a point where all the remaining wetlands comprise the entirety of the bog turtle colony. Because illegal collection is still a major threat to this species, ENSP and the USFWS were concerned that such mapping would reveal exact location information that could be mis-used by collectors.

To address the issue of habitat not being identified correctly by the LULC, cases where core bog turtle colonies were the only wetlands identified in the surrounding landscape (and thus dangerously revealing precise location information), and to capture associated uplands bog turtles are now known to frequent, a patch type Contiguous Area model is used to value critical habitat. Upland LULC types are dissolved only when they intersect the SOA to ensure these critical habitats are captured adjacent to documented occurrences.

The initial result of the patch type Contiguous Area model revealed gaps left in the mapping of upland LULC classes because they were located outside of the SOA. We added back into the model any of the uplands initially selected to fill these discrepancies. Upland class 4120 was also added only to fill gaps in the model when it was discovered that some significant portions of occupied bog turtle habitat would not have been mapped without this inclusion.

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* ENSP biologist expert opinion - B. Zarate

Land Use Land Cover Selections and Patch Type Justifications

Corn Snake

BIOPID *254* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1211	MILITARY RESERVATIONS	Dissolved	*1-3*
1440	AIRPORT FACILITIES	Dissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4230	PLANTATION	Dissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*
6500	SEVERE BURNED WETLANDS	Dissolved	*1-3*
7300	EXTRACTIVE MINING	Dissolved	*1-3*
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

Corn snakes (*Elaphe guttata guttata*) prefer upland habitats with sandy soils and pine-dominated forests (Beans and Niles 2003, ENSP 2010). Corn snake are a fossorial species and, based on published accounts, activity range estimates for this species in the New Jersey Pine Barrens range from 11.3 - 24.8 acres (Zappalorti and Gianluca 1990). However, published activity ranges for this species in the Pine Barrens are often based on an incomplete season of data and therefore a patch type Contiguous Area approach was chosen to best represent the corn snake's habitat needs.

Patch type Contiguous Area captures larger areas of habitat then some of the other patch type models. This is important for a fossorial species like the corn snake, which may be underrepresented by the species occurrence data, because the model values enough habitat around each species occurrence area to capture the critical nesting, denning, and foraging habitat for corn snakes even if occurrence data is lacking.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Box Turtle

BIOPID 233 **REGION** Statewide **PATCH TYPE** Limited Extent

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-3
1711	CEMETERY ON WETLAND	Undissolved	1-3
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-3
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-3
2100	CROPLAND AND PASTURELAND	Undissolved	1-3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-3
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-3
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-3
2400	OTHER AGRICULTURE	Undissolved	1-3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2,4
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	2,4
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3

4230	PLANTATION	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-3*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*2,4*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-3*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*1-3*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*1-3*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1-3*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*1-3*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1,2*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-3*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1,2***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1-3***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-3***
6240	HERBACEOUS WETLANDS	Undissolved	***1,2***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1-3***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1-3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1-3***
6500	SEVERE BURNED WETLANDS	Undissolved	***1-3***
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1-3***

Land Use - Land Cover Selection and Patch Type Rationale

The eastern box turtle (*Terrapene carolina carolina*) is New Jersey's most terrestrial turtle (Ernst and Lovich 2009). As such, it relies on a variety of habitat types to successfully complete its life cycle. There is a preference for ecotone areas and valued LULC types attempt to reflect the diverse habitats the species is known to occur in and those the literature suggests are valuable (Delia et al. 2001, Ernst and Lovich 2009, ENSP 2010).

Analyzing the state's current distribution of occurrences for box turtle determined large percentages are from wetland areas, although woodlands are well recognized as being a preferred habitat type, as well (ENSP 2010). In order to capture the state's existing records and include the upland cover types the species routinely occupies, various wetland types tangent to scrub/shrub and hardwood forests were chosen as the species' critical habitats, supported in the literature by Reagan (1974) and Delia et al. (2001).

The relatively small home range sizes and local population limits based on Stickel's work (1950) are captured using a patch type Limited Extent model to value critical habitat for eastern box turtles. Patch type Limited Extent depicts the turtle's limited dispersal ability from the home range and does not value habitat beyond the size of the local population.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Kingsnake

BIOPID *281* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-3*
2100	CROPLAND AND PASTURELAND	Undissolved	*1-3*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-3*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-3*
4230	PLANTATION	Undissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-3*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-3*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-3*

4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-3*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*
6240	HERBACEOUS WETLANDS	Undissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

Eastern kingsnakes (*Lampropeltis getula getula*) are found in a wider variety of habitats including early successional fields, old fields, and coniferous and deciduous forests (Conant and Collins 1998; Schwartz and Golden 2002). Similar to other snake species, kingsnakes overwinter in underground dens and will nest in decaying logs and debris piles (MacGowan et al. 2009).

Because none of the LULC patches are dissolved together in the patch type Limited Extent approach, it provides a conservative estimate of the habitat occupied by a particular species. There is little research available on kingsnakes in New Jersey and therefore we adopted the conservative approach of valuing habitat for this species by selected patch type Limited Extent to best represent habitat for the eastern kingsnake.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Northern Copperhead Snake **BIOPID** 44 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	5,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,4,5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	5,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,4,5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	5,*
4230	PLANTATION	Dissolved	*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	3,4,5
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	5,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	3,4,5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	5,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	5
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	5
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*

4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	2,5
6220	CONIFEROUS WOODED WETLANDS	Dissolved	2,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	2,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	2,5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	2,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	2,*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	2
6240	HERBACEOUS WETLANDS	Dissolved	2,5,*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	2,5
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	2,*
6500	SEVERE BURNED WETLANDS	Dissolved	*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	3,4,5

Land Use - Land Cover Selection and Patch Type Rationale

There is a paucity of literature regarding northern copperhead habitat use. The Land Use-Land Cover (LULC) selections apply to the northern copperheads (Agkistrodon contortrix mokasen) across life history stages (hibernation, foraging, gestation, basking, shedding, etc.) with the understanding that the local populations (represented through the identification of a critical site, either a hibernaculum and/or a gestation site/birthing rookery) would use suitable habitat within [approximately] 995 meters (ENSP 2011) of a hibernaculum. The [combined] land use classes valued for northern copperhead provide critical habitat for the population's success.

Copperheads' hibernacula, gestation sites, birthing rookeries and basking habitats are commonly associated with open (or partially open) rocky areas (talus, ridge, boulder fields) (Reinert 1984, Schantz expert opinion, Smith 2007). Northern copperheads use upland forests for foraging and travel, preferring more open canopies (i.e., <50% canopy closure) (Reinert 1984, Smith 2007, Smith pers. comm. 2011) with gravid females relying upon sparsely forested, "very rocky sites" with "very sparse canopy" closure (Reinert 1984). Forests with limited sunlight infiltration (e.g., greater than 50% canopy closure or containing dense ground cover; a feature not currently distinguishable in GIS data layers) are considered less optimal (or not as preferable) but are likely used as corridors between optimal habitats (Smith pers. comm. 2011). "Plantations" were selected because they resemble natural forested habitat in northern New Jersey and provide a similar microclimate, food source for prey species, travel corridors, and/or shelter/cover from predators and/or the sun (Schantz expert opinion). Additional open habitats such as old field habitats (<25% brush covered) and more open upland deciduous scrub/shrub habitats are used for thermoregulation, cover/shelter and foraging (Schantz expert opinion, Smith pers. comm. 2011). Dense coniferous habitats may be used as corridors between optimal habitats (Schantz expert opinion). Wetland LULCs were selected because these habitats are not avoided (Mitchell 1994, Schantz expert opinion, Smith pers. comm. 2011) and copperheads are commonly reported foraging/hunting along wetland edges (Schantz expert opinion).

The Contiguous Area patch type is most appropriate for this species as the northern copperhead requires a mosaic of habitat types to sustain the population. In addition, individuals from a local population may travel beyond the boundary from the identified critical site (den) either as part of their personal home range or as males disperse in search of females from other populations. This patch type will value suitable habitat within and extending just beyond the specified range from a critical site and/or random observation, more accurately representing the habitat used by any local population and/or individual, respectively.

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* ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Northern Pine Snake

BIOPID 232 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	1-5
1440	AIRPORT FACILITIES	Dissolved	1-5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-5
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-5
4230	PLANTATION	Dissolved	1-5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-5
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1-5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1-5
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-5
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-5
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-5

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-5*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1-5*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-5*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-5*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-5*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-5*
6500	SEVERE BURNED WETLANDS	Dissolved	*1-5*
7300	EXTRACTIVE MINING	Dissolved	*1-5*
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	*1-5*

Land Use - Land Cover Selection and Patch Type Rationale

Northern pine snakes (Pituophis m. melanoleucus) have fairly narrow habitat requirements, and, as their name suggests, prefer well-drained, sandy, upland pine and pine-oak forests throughout their range (Smith and Bien, 2005; Zappalorti et al., 2008; Zappalorti et al., 2009; Golden et al. 2009). These sandy habitats make the burrowing behavior of this species possible, and pine snake nests are found almost exclusively in open areas with loose sandy soils and little vegetation (Burger and Zappalorti 1986). Pine snake dens can be found in both forested and open upland habitats (Smith and Bien 2005).

In order to capture the required nesting and denning locations, along with the associated foraging habitat, for this species a patch type Contiguous Area approach is chosen to best represent the pine snake's habitat needs. Patch type Contiguous Area is the best option for this species because this patch type captures large contiguous patches of habitat and therefore accounts for the large home range requirements of northern pine snakes and identifies the additional habitat needed for individuals to disperse and interact with other local populations.

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Land Use Land Cover Selections and Patch Type Justifications

Spotted Turtle

BIOPID *282* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1-3***
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1,2***
1711	CEMETERY ON WETLAND	Undissolved	***1,2***
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1,2***
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1,2***
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1-3***
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1-3***
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-3***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-3***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1-3***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1-3***
4230	PLANTATION	Undissolved	***1-3***
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1-3***
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1-3***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1-3***

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1-3***
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1-3***
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1-3***
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1-3***
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-3***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1-3***
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1-3***
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1,2***
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1,2***
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1,2***
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1,2***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,2***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,2***
6240	HERBACEOUS WETLANDS	Undissolved	***1,2***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1,2***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,2***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,2***
6500	SEVERE BURNED WETLANDS	Undissolved	***1,2***

7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1,2*

Land Use - Land Cover Selection and Patch Type Rationale

The spotted turtle (*Clemmys guttata*) frequents a variety of wetland habitat types throughout its range, although terrestrial habitat use is documented (Milem and Melvin 2001, Ernst and Lovich 2009). The type of wetland that the species uses may shift seasonally causing the animal to travel regularly across fields, through forests, or employ wetlands as a corridor between preferred habitats (Joyal et.al 2001, Milam and Melvin 2001). LULC selections reflect the diverse habitat types used by this turtle.

Patch type Limited Extent was selected for the spotted turtle to concentrate valued habitats around known occurrences. Spotted turtles have small home ranges (Ernst and Lovich 2009) and this patch type accurately captures the local populations that the occurrences represent.

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Land Use Land Cover Selections and Patch Type Justifications

Timber Rattlesnake

BIOPID *45* ***REGION*** Skylands ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	***4***
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	***3,9***
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***2,7,9***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	***1,2,7,9***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	***2,7,9***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	***1,2,9***
4230	PLANTATION	Dissolved	*****
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	***2,7***
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	***1,2,9***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	***2,7,9***
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	***1,2,9***
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*****
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	***1,2,5,6,9***
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1,2,5,6***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	***1,2,5,6,9***

4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	***8***
6210	DECIDUOUS WOODED WETLANDS	Dissolved	***9***
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	***9***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*
6500	SEVERE BURNED WETLANDS	Dissolved	*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	***1,2,3,9***

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use-Land Cover selections apply to the timber rattlesnakes of northern New Jersey across life history stages (hibernation, foraging, gestation, basking, shedding, etc.) with the understanding that the majority of the local population (represented through the identification of a critical site, either a hibernaculum and/or a gestation site/birthing rookery) uses suitable habitat within 1.5 miles of a hibernaculum. To minimize alteration of and/or impacts to the core habitat and protect the species' habitat requirements, an additional one-mile buffer is included (2.5 miles or 4 km total) (Brown 1993). As such, the [combined] land use classes valued for timber rattlesnake provide critical habitat for the population's success.

Hibernacula are commonly associated with open (or partially open) rocky areas (talus, ridge, boulder fields) (Brown 1992 and 1993, Martin 1992, ENSP 2010) but have also been documented in small, forested rock outcrops (Schantz 2009). While rattlesnakes prefer forested habitats when they are not basking (Brown 1992 and 1993, Reinert 1984, ENSP 2011b, Schantz 2009), gravid females rely upon sparsely forested sites with sparse canopy closure (Brown 1992, Reinert 1984). "Plantations" were selected because they may resemble natural forested habitat in northern New Jersey and provide a similar microclimate, food source for prey species, travel corridors, and/or shelter/cover from predators and/or the sun (Schantz expert opinion).

While the literature (Brown 1992 and 1993, Martin 1992) does not differentiate between upland and wetland shrub habitats, upland shrub habitats are commonly associated with hibernacula, gestation areas, birthing rookeries and basking sites for thermoregulation and additional cover in an otherwise exposed area (Michell pers. communication, Schantz expert opinion). Shrub habitats (in general) are also used for cover/shelter and foraging (Martin 1992). Schantz, 2009, documented rattlesnakes using both deciduous forest and scrub/shrub wetlands and herbaceous wetlands. Although little research exists regarding the importance of wetland habitats throughout the species' range in mountainous regions, research in northern New Jersey (ENSP 2011b, Schantz 2009, Schantz expert opinion) suggests these habitats appear to be neither preferred nor avoided by the snakes during their active season. For this reason, wetland forest and scrub-shrub habitats were selected as suitable rattlesnake habitat. In addition, old field (<25% brush covered) habitats were selected given the snakes' use of various open and edge habitats for basking, shedding and foraging (Schantz expert opinion).

The Contiguous Area patch type is most appropriate for this species as the timber rattlesnake is a wide ranging species requiring a mosaic of habitat types to sustain the population. In addition, individuals from a local population may travel beyond the specified range from the identified critical site (den) either as part of their personal home range or as males disperse in search of females from other populations. This patch type will value suitable habitat within and extending just beyond the specified range from a critical site and/or random observation, more accurately representing the habitat used by any local population and/or individual, respectively.

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* ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Timber Rattlesnake

BIOPID *284* ***REGION*** Atlantic Coastal, Delaware Bay, Piedmont Plains and Pinelands ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*1-3*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-3*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4230	PLANTATION	Dissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*
6240	HERBACEOUS WETLANDS	Dissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

Timber rattlesnakes (*Crotalus horridus*) have large home ranges (Brown 1993) and occupy forested habitats within the Pine Barrens (Reinert and Zappalorti 1988, Laidig and Golden 2004). Hibernacula of timber rattlesnakes in this region tend occur in wooded wetlands and are often associated with streams (Reinert and Zappalorti 1988).

Because timber rattlesnakes have large home ranges it is important to value large contiguous habitat patches in order to capture the required gestation sites, denning locations, and foraging habitat for this species. For this reason, patch type Contiguous Area approach is the method that was applied to identify the suitable habitats for timber rattlesnakes. This method also accounts for the additional habitat needed for individuals to disperse and interact with other local populations.

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Land Use Land Cover Selections and Patch Type Justifications

Wood Turtle

BIOPID *196* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	***1,3***
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	***1***
1711	CEMETERY ON WETLAND	Undissolved	***1,4-6***
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	***1,4-6***
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	***1,4-6***
2100	CROPLAND AND PASTURELAND	Undissolved	***1,4-6***
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	***1,3***
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	***1,3***
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Riparian Undissolved	***1,4-6***
2300	CONFINED FEEDING OPERATIONS	Riparian Undissolved	***1,4-6***
2400	OTHER AGRICULTURE	Riparian Undissolved	***1,4-6***
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1,3***
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1,3,4***
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	***1,4-6***
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	***1,4-6***

4230	PLANTATION	Undissolved	***1,4-6***
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	***1,4-6***
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	***1,4-6***
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	***1,4-6***
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	***1,4-6***
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	***1,4-6***
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	***1,4-6***
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	***1,4-6***
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,4-6***
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	***1,3***
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	***1,4-6***
6111	SALINE MARSHES (LOW MARSH)	Undissolved	***1,3***
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	***1,3***
6120	FRESHWATER TIDAL MARSHES	Undissolved	***1,4-6***
6130	VEGETATED DUNE COMMUNITIES	Undissolved	***1,3***
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	***1,3***
6210	DECIDUOUS WOODED WETLANDS	Undissolved	***1,3***
6220	CONIFEROUS WOODED WETLANDS	Undissolved	***1,3***
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	***1,3***

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	***1,3***
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	***1,4-6***
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***
6240	HERBACEOUS WETLANDS	Undissolved	***1,3***
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	***1,4-6***
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	***1,3***
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	***1,3***
6500	SEVERE BURNED WETLANDS	Undissolved	***1,3***
7100	BEACHES	Riparian Undissolved	***1,4-6***
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Riparian Undissolved	***1,4-6***
7300	EXTRACTIVE MINING	Riparian Undissolved	***1,4-6***
7400	ALTERED LANDS	Riparian Undissolved	***1,4-6***
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	***1,4-6***
7500	TRANSITIONAL AREAS	Riparian Undissolved	***1,4-6***
7600	UNDIFFERENTIATED BARREN LANDS	Riparian Undissolved	***1,4-6***

Land Use - Land Cover Selection and Patch Type Rationale

Aside from the eastern box turtle, the wood turtle (*Glyptemys insculpta*) is New Jersey's most terrestrial turtle, and also a stream-dependent, habitat generalist (Harding and Bloomer 1979, Kaufmann 1995). After the spring breeding period, females disperse to forage and nesting areas and both sexes frequently move great distances away from the streams during the summer months (Harding and Bloomer 1979, Kaufmann 1992).

The LULC choices made for wood turtle represent the habitat types most described in the literature along with areas of documented occurrence in New Jersey (ENSP 2010). With many of the in-state occurrences in wetlands, these areas were considered of paramount importance, while uplands offer critical nesting and foraging opportunities (Kaufman 1992). Kaufmann (1992) and Compton et al. (2002) found wood turtles to use a variety of wetland and upland land-use types adjacent and distant to stream corridors.

Because wood turtles have relatively small home ranges and are fidelic to home streams (Kaufmann 1995), habitat surrounding known occurrences (often associated with streams) are captured using patch type Limited Extent modeling. This patch type limits the amount of habitat valued distant from the original observations and takes into account the turtle's limited mobility.

As a stream-dependent species, wood turtles also value riparian habitats provided they intersect with the SOA. These riparian habitats include all non-urban LULC types. This habitat is critical as basking and resting areas, and also as a dispersal corridor to other preferred habitat types (Harding and Bloomer 1979, Compton et al. 2002). The riparian LULC selections are undissolved so only the most critical adjacent habitats are captured in the model.

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Land Use Land Cover Selections and Patch Type Justifications

10 Hectare Core Forest

BIOPID *1005* ***REGION*** Statewide ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-23*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-23*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-23*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-23*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-23*
4230	PLANTATION	Dissolved	*1-23*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-23*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-23*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-23*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-23*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-23*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-23*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-23*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1-23*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-23*

6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-23*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-23*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-23*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-23*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-23*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-23*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-23*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-23*

Land Use - Land Cover Selection and Patch Type Rationale

Many endangered and threatened species in New Jersey only inhabit large tracts of forest (> 10Ha). Barred owls are restricted to forested areas, ranging from swamps and riparian areas to upland regions. They prefer large, unfragmented tracts of mature and old-growth forests, typically of mixed deciduous-coniferous composition. In New Jersey, barred owls are found in old-growth hardwood, cedar swamps, and upland oak-pine forest (Mazur and James 2000) and have a mean home range of 339.47 ha (Nichols and Warner 1972, Fuller 1979, Elody and Sloan 1985). Red-shouldered hawk habitat varies from bottomland hardwood, riparian areas, and flooded deciduous swamps to upland mixed deciduous-coniferous forests. They prefer extensive forest stands (mean home range 224 ha) consisting of mature to old-growth canopy trees with variable amounts of understory (Crocoll 1994). Northern goshawks prefer large, contiguous tracts of mature forests and forested wetlands to breed (Squires and Reynolds 1997, Bosakowski and Speiser 1994), while non-breeding habitats may also include young forests, scrub-shrub habitats and ecotones between forest and open fields and agricultural lands (Squires and Reynolds 1997, Bosakowski and Speiser 1994). Bobcat home range sizes are highly variable, both geographically and intrasexually in the same geographic area particularly if suitable habitat components have a patchy distribution (Lovallo 1999). The home range size of males is generally larger than that of females, but ranger from 6.40-33 km^2, for females and 15.34-326 km^2 for males (Connor et al.1999, Litvaitis et al, 1986, Lovallo and Anderson 1996, Lovallo 2000). In New Jersey, the annual home range of a male in 2002 was 121 km^2 with a core of 19 km^2 and the home range of a female in 2003 was 90 km^2 with a core of 11.7 km^2, as estimated by the kernel home range method. Timber rattlesnakes have variable sizes in home ranges, between 16-207 ha (Brown 1993a, Brown 1993b).

The minimum 10 ha for suitable habitat was chosen because many of the bird species of a special or regional concern are forest-interior birds, that is birds that nest within the interior core of a forest patch (area of forest > 90 m from an edge) (Faaborg et al. 1995,). The minimum core required to provide suitable breeding habitat for area-sensitive species are 10 ha of forest core (Franklin 1993, Faaborg et al. 1995, Dawson et al. 1993, Collinge 1996, Dawson et al, 1998, Hamel 2000). Area-sensitive birds tend not to occur in forests that lack core habitat (McCollin 1998).

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Land Use Land Cover Selections and Patch Type Justifications

18 Hectare Grassland

BIOPID 1004 **REGION** Statewide **PATCH TYPE** Contiguous Area

LU12	LABEL 12	LULC TREATMENT	CITATIONS
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-10
2100	CROPLAND AND PASTURELAND	Dissolved	1-10
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-10
2300	CONFINED FEEDING OPERATIONS	Dissolved	1-10
2400	OTHER AGRICULTURE	Dissolved	1-10
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-10

Land Use - Land Cover Selection and Patch Type Rationale

Endangered and rare species tend to have specific habitat requirements for foraging, nesting and cover (i.e. habitat "specialists"), making them more vulnerable to changes in the landscape. As it is, loss of habitat is the primary cause of the decline in species, affecting 85% of the species of plants, mammals, birds, herptiles, fish, and invertebrates, followed by the increase of non-native species (Wilcove et al. 1998). When their habitats are lost or degraded because of fragmentation, individuals of the species are also lost because they cannot utilize habitats other than that which they are specialized for (With and Crist 1995, Collinge 1996).

The minimum core required to provide suitable breeding habitat for area-sensitive grassland species is 18 Ha. of grassland core (Franklin 1993, Faabord et al, 1995, Vickery et al. 1994, Collinge 1996, Mitchell et al. 2000, Dechant et al. 2002, Smallwood and Bird 2002). Area-sensitive birds tend not to occur in grasslands that lack core habitat (Forman et al. 2002)).

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Land Use Land Cover Selections and Patch Type Justifications

Beach

BIOPID *1001* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
7100	BEACHES	Undissolved	*1-6*

Land Use - Land Cover Selection and Patch Type Rationale

These landscapes are the dynamic interface between the marine and the terrestrial environment and support an abundance of fauna, both seasonally and throughout the year. Beaches are crucial staging grounds for migratory shorebirds (Botton et al. 1994; Burger et al. 1997). It is on sandy beaches, particularly in the Delaware Bay region where horseshoe crabs spawn, leaving behind legions of high energy eggs unparalleled for satiating migrating birds. Abundance and availability of this food source is paramount for successful migration of threatened and endangered shorebirds in the Western hemisphere (Botton et al. 1994). Red knots, semipalmated sandpipers, sanderlings, and ruddy turnstones make up a majority of foraging migratory shorebirds on beaches in the Delaware Bay region (Botton, et al. 1994). Due to the tumultuous nature of tidal areas, a mosaic of habitat types are crucial to providing a stable and predictable food source for foraging birds. One study indicated that shorebirds forage on sandy beach up to 34% of the time (Burger et al. 1997), indicating the importance of sandy beaches for providing habitat heterogeneity. Piping Plovers choose beaches for foraging based in part on the presence of people and feed more continuously when there are few people in close proximity (Burger 1994).

Beach nesting birds such as common terns, least terns and piping plovers are in decline due to a reduction in optimal (undisturbed) beach nesting sites- resulting in fewer successful breedings (Burger 1987, Erwin and Smith 1985). Sandy inlets are preferred by piping plovers to oceanfront beaches due to greater expanses of suitable nesting and foraging areas (Davis 2008).

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Land Use Land Cover Selections and Patch Type Justifications

Coastal Forest

BIOPID *1006* ***REGION*** Atlantic Coastal ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-9*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-9*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-9*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-9*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-9*
4230	PLANTATION	Dissolved	*1-9*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-9*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-9*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-9*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-9*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-9*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-9*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-9*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1-9*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-9*

6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-9*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-9*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-9*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-9*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-9*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-9*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-9*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-9*

Land Use - Land Cover Selection and Patch Type Rationale

Coastal forests are essential stopover habitat for neotropical migrating songbirds (Rodewald and Brittingham 2004; Somershoe and Chandler 2004). While forest breeding birds utilize and prefer forests of particular successional stages, species composition, and core area during the breeding season, migratory songbirds appear to lose fidelity to these specifics during fall migration. Both shrubland and forest interior birds are found in a range of forest types including early successional and mature forest edge (Rodewald and Brittingham 2004). The pinelands are a largely contiguous area of early to mid- successional forest (due to fire) and valuable stopover habitat to songbirds as they migrate through the state (Kirchman et al. 2011). It is due to this broad use of coastal forest by migrating birds that the habitat is broadly valued for the landscape project.

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Land Use Land Cover Selections and Patch Type Justifications

Lower 10K Forest

BIOPID *1007* ***REGION*** Atlantic Coastal & Delaware Bay ***PATCH TYPE*** Contiguous Area

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*1-3*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	*1-3*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	*1-3*
4230	PLANTATION	Dissolved	*1-3*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	*1-3*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	*1-3*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	*1-3*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	*1-3*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*1-3*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	*1-3*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	*1-3*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	*1-3*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*1-3*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	*1-3*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	*1-3*

Land Use - Land Cover Selection and Patch Type Rationale

The forest habitat in the lower 10 kilometers on the Cape May peninsula is a critical area in New Jersey that serves as a migratory raptor concentration site as well as a wintering area for some species. Documented species include: American kestrels, Broad-winged hawks, Cooper's hawks, Osprey, Sharp-shinned hawks, and Bald eagles, among others (Niles et al. 1996, Sutton and Kerlinger 1997, Frank 2007). It is hypothesized that some of these raptors utilize this habitat much like migratory shorebirds, to rest and refuel. According to Niles et al (1996), specific habitat preferences for resting within the lower 10K forest closely mirrored habitat preferences during breeding or wintering by the majority of species highlighted. Additionally, when flying over the Cape May Point area, species again demonstrated preference of habitat typically used to forage by flying lowest and in the higher densities above such areas (Niles et al. 1996). As Cape May and surrounding areas continue to develop, these raptors find less suitable wintering/staging grounds and are forced to search out other areas in an effort to survive. Individuals spend more time foraging and/or forced prematurely to cross the Delaware Bay as a result (Sutton and Kerlinger 1997, Frank 2007). The decline in migratory raptor numbers in recent years coupled with increasing aggregations in areas north of the lower 10K, may point to implications that less suitable habitat for survival is being used (Frank 2007).

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Land Use Land Cover Selections and Patch Type Justifications

Riparian Corridor

BIOPID *1008* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1110	RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING	Undissolved	*1-6*
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	*1-6*
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	*1-6*
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	*1-6*
1150	MIXED RESIDENTIAL	Undissolved	*1-6*
1200	COMMERCIAL/SERVICES	Undissolved	*1-6*
1211	MILITARY RESERVATIONS	Undissolved	*1-6*
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Undissolved	*1-6*
1300	INDUSTRIAL	Undissolved	*1-6*
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	*1-6*
1410	MAJOR ROADWAY	Undissolved	*1-6*
1411	MIXED TRANSPORTATION CORRIDOR OVERFLAP AREA	Undissolved	*1-6*
1419	BRIDGE OVER WATER	Undissolved	*1-6*
1420	RAILROADS	Undissolved	*1-6*
1440	AIRPORT FACILITIES	Undissolved	*1-6*

1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-6*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	*1-6*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	*1-6*
1499	STORMWATER BASIN	Undissolved	*1-6*
1500	INDUSTRIAL/COMMERCIAL COMPLEXES	Undissolved	*1-6*
1600	MIXED URBAN OR BUILT-UP LAND	Undissolved	*1-6*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	*1-6*
1710	CEMETERY	Undissolved	*1-6*
1711	CEMETERY ON WETLAND	Undissolved	*1-6*
1741	PHRAGMITES DOMINATE URBAN AREAS	Undissolved	*1-6*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	*1-6*
1800	RECREATIONAL LAND	Undissolved	*1-6*
1804	ATHLETIC FIELDS (SCHOOLS)	Undissolved	*1-6*
1810	STADIUM THEATERS CULTURAL CENTERS AND ZOOS	Undissolved	*1-6*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	*1-6*
2100	CROPLAND AND PASTURELAND	Undissolved	*1-6*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-6*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-6*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	*1-6*

2300	CONFINED FEEDING OPERATIONS	Undissolved	*1-6*
2400	OTHER AGRICULTURE	Undissolved	*1-6*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	*1-6*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	*1-6*
4230	PLANTATION	Undissolved	*1-6*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	*1-6*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	*1-6*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	*1-6*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	*1-6*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	*1-6*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-6*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	*1-6*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-6*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	*1-6*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	*1-6*
5100	STREAMS AND CANALS	Undissolved	*1-6*
5190	EXPOSED FLATS	Undissolved	*1-6*

5200	NATURAL LAKES	Undissolved	*1-6*
5300	ARTIFICIAL LAKES	Undissolved	*1-6*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	*1-6*
5411	OPEN TIDAL BAYS	Undissolved	*1-6*
5412	TIDAL MUD FLAT	Undissolved	*1-6*
5420	DREDGED LAGOON	Undissolved	*1-6*
5430	ATLANTIC OCEAN	Undissolved	*1-6*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*1-6*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*1-6*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1-6*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*1-6*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*1-6*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-6*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-6*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-6*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-6*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-6*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-6*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-6*

6240	HERBACEOUS WETLANDS	Undissolved	*1-6*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1-6*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-6*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-6*
6290	UNVEGETATED FLATS	Undissolved	*1-6*
6500	SEVERE BURNED WETLANDS	Undissolved	*1-6*
7100	BEACHES	Undissolved	*1-6*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	*1-6*
7300	EXTRACTIVE MINING	Undissolved	*1-6*
7400	ALTERED LANDS	Undissolved	*1-6*
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	*1-6*
7440	DISTURBED TIDAL WETLANDS	Undissolved	*1-6*
7500	TRANSITIONAL AREAS	Undissolved	*1-6*
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	*1-6*

Land Use - Land Cover Selection and Patch Type Rationale

Corridors are landscape features that may facilitate travel and gene flow by connecting fragmented patches of habitat. Riparian corridors are important for both aquatic and terrestrial species as they form the transitional area between the two systems and may provide foraging and nesting opportunities less available in interior/upland forest (Inman et al. 2002, Smith et al. 2008).

Riparian corridor use by Indiana bats is documented and presumed to facilitate favorable travel between roosting and foraging sites. Researchers believe that these areas are conducive for more efficient flight (less structural complexity) while providing orientation information and higher insect abundance due to a linear shape (Menzel et al. 2005).

A breeding bird study in Michigan indicated northern parula, blackburnian, Canada and Nashville warblers and blue-headed vireo were far more abundant in riparian-forested areas versus upland forests. Veery and black-throated green warblers were also detected in high numbers in riparian forest (Bub et al. 2004). A study in Pennsylvania found that disturbed riparian corridors (agricultural and residential) contained only migrating neotropical birds whereas undisturbed corridors (>25 m of natural vegetation) were essential to supporting sensitive species (Croonquist and Brooks 1993). Species richness and evenness were higher in surveys of breeding birds in riparian versus upland forest (Inman et al. 2002, Bub et al. 2004) and negatively correlated with distance from streams in disturbed watersheds (Croonquist and Brooks 1993).

Wood Turtles spend the majority of the year in or adjacent to permanent streams and typically within forest edge habitat. In New Jersey during summer months, adult wood turtles are known for extensive travel over terrestrial areas though juveniles and hatchlings remain close to water (NatureServe 2011).

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Land Use Land Cover Selections and Patch Type Justifications

Water

BIOPID *1002* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
5100	STREAMS AND CANALS	Undissolved	***1-4***
5200	NATURAL LAKES	Undissolved	***1,3,4***
5300	ARTIFICIAL LAKES	Undissolved	***1,3,4***
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	***1-4***
5411	OPEN TIDAL BAYS	Undissolved	***1-4***
5430	ATLANTIC OCEAN	Undissolved	***1-4***

Land Use - Land Cover Selection and Patch Type Rationale

Water is essential for all species in some capacity. Beyond the obvious need for conservation of water resources in aquatic and marine dwelling species, is the partial need by organisms during some period of their life history. Sea turtles and cetaceans require marine waters for the very substrate they live in. Atlantic sturgeon use a spectrum of aquatic habitats from fresh to marine for varying stages of their life cycles; spawning in rivers with juveniles gradually moving towards estuaries and eventually marine environments as they age. (Hatin et al 2007). Bald eagles, osprey and pied-billed grebes require open water for foraging (Buehler 2000, Sibley 2003). Odonates are aquatic insects requiring freshwater such as streams and lakes for egg laying, growth and development, spending the majority of their lives underwater- emerging only as adults (NatureServe 2011). Habitat suitability for many terrestrial species is in part determined by varying proximity to water resources.

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Land Use Land Cover Selections and Patch Type Justifications

Wetlands

BIOPID *1003* ***REGION*** Statewide ***PATCH TYPE*** Limited Extent

LU12	*LABEL 12*	*LULC TREATMENT*	*CITATIONS*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	*1-13*
1741	PHRAGMITES DOMINATE URBAN AREAS	Undissolved	*1-13*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	*1-13*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	*1-13*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	*1-13*
5190	EXPOSED FLATS	Undissolved	*1-13*
5412	TIDAL MUD FLAT	Undissolved	*1-13*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*1-13*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*1-13*
6120	FRESHWATER TIDAL MARSHES	Undissolved	*1-13*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*1-13*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*1-13*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*1-13*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	*1-13*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	*1-13*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	*1-13*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	*1-13*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-13*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-13*
6240	HERBACEOUS WETLANDS	Undissolved	*1-13*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	*1-13*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*1-13*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*1-13*
6290	UNVEGETATED FLATS	Undissolved	*1-13*
6500	SEVERE BURNED WETLANDS	Undissolved	*1-13*

Land Use - Land Cover Selection and Patch Type Rationale

Emergent wetland types play a critical role in any ecosystem. Aside from the beneficial functions they provide for people, this unique habitat type is crucial to the existence of several wetland dependent species. Sizes ranging from less than 1 acre to several acres are of equal importance because of their role as habitat for wetland dependent species that vary in their mobility. Species like the American bittern and black rails occupy habitat up to 4 hectares while salamanders, such as the blue spotted salamander can occupy small isolated wetlands and frequently do not travel more than 300 meters from their breeding sites (Eddleman et al. 1994, Gibbs et al. 1992, Semlitsch and Bodie 2003).

For species that are habitat specialists and/or with limited dispersal capabilities, the presence of corridors can provide an effective means to enhance dispersal, thus reducing the effects of isolation and fragmentation on a population (Chase et al. 1989, Collinge 1996, Beier and Noss 1998 Simberloff and Cox 1987, Haddad 1999). Bog turtles almost exclusively inhabit emergent wetland types and value wetland connectivity to support gene flow and travel corridor as individual sites degrade or improve in condition in time. A several hundred-acre wetland can sustain multiple viable colonies and occurrences of the species that value them (Chase et al. 1989).

Forested wetlands are core habitat types for ambystomid breeding salamanders and core and travel corridor for wood turtle.

Some forest song birds, such as Canada warblers use a wide range of deciduous, coniferous and mixed wetland forests with a well-developed understory (Conway 1999). They inhabit lowland and upland habitats, including swamps, streamside thickets, brushy ravines, moist forests, and regenerating timber cuts with well-developed scrubs layers and structurally complex forest floor. They are area sensitive in "settled" areas but not in forest-dominated regions (Lambert and Faccio 2005). Barred owls inhabit forested wetland areas and have been used as an "umbrella" species for modeling of this habitat type (Rubino et al. 2003).

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