

# Pinelands Frogs and Toads



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## Surveys

### Life Cycle

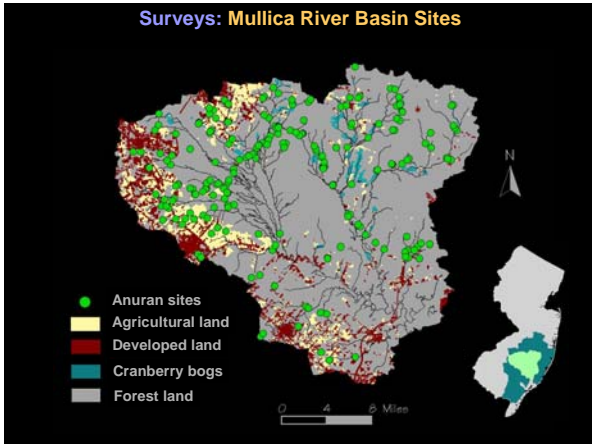
### Habitat Types

### Geographic Affinity

### 14 Frog and Toad Species

### Environmental Indicators

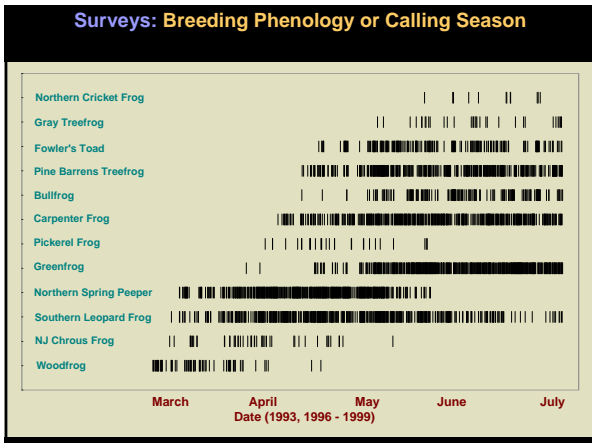
### Surveys: Mullica River Basin Sites



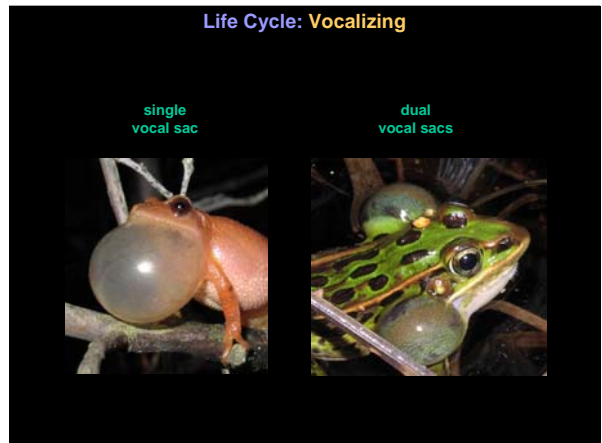
### Surveys: Methods



### Surveys: Breeding Phenology or Calling Season



### Life Cycle: Vocalizing



Life Cycle: Vocalizing



Life Cycle: Amplexus



Life Cycle: Amplexus



Life Cycle: Amplexus



Life Cycle: Egg Deposition



Life Cycle: Egg Deposition

Spring peeper eggs



Spadefoot eggs



Southern leopard frog eggs



### Life Cycle: Embryonic Development



### Life Cycle: Hatching and Larval Development

External Gills



Internal Gills



### Life Cycle: Tadpole Feeding



- algae
- detritus
- predatory



### Life Cycle: Metamorphosis



Tail Bud

### Life Cycle: Adult Feeding



- insects
- worms
- tadpoles
- other frogs
- salamanders
- snakes
- fish



### Life Cycle: Growth and Shedding



### Life Cycle: Death



### Life Cycle: Death



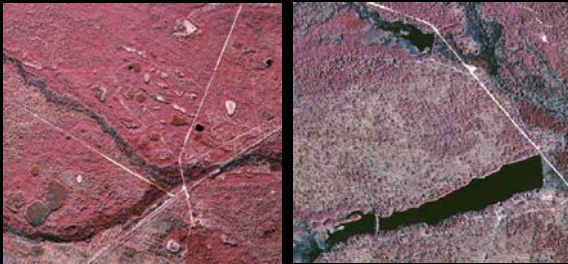
### Habitat Types

#### Temporary water

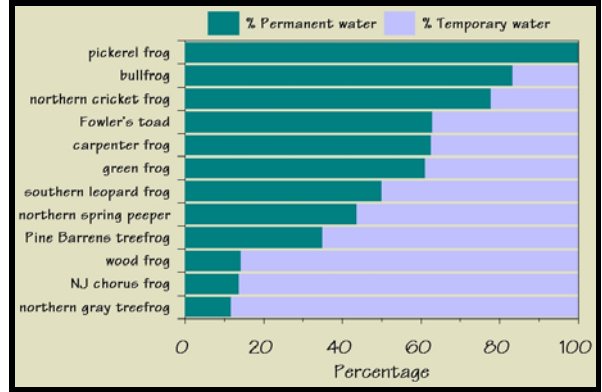
- periodically dries
- fewer predators
- short larval period
- more active tadpoles

#### Permanent water

- never dries
- more predators
- long larval period
- less active tadpoles



### Habitat Types: Hydrologic Affinity



### Habitat Types: Temporary Water Habitats



### Habitat Types: Temporary Water Habitats



Habitat Types: Temporary Water Habitats



Habitat Types: Temporary Water Habitats



Habitat Types: Permanent Water Habitats



Habitat Types: Permanent Water Habitats



Habitat Types: Permanent Water Habitats



Habitat Types: Permanent Water Habitats



## Geographic Affinity

### Native Pinelands Species

Pine Barrens Species

Wide-ranging Species

### Nonnative Species

Border-entrant Species



## Native Pinelands Anurans - 7 species

Pine Barrens and wide-ranging species



### Pine Barrens treefrog

*Hyla andersonii*

- temporary habitats
- May and June
- eggs single
- disjunct populations
- acid tolerant





**Carpenter frog**  
*Rana virgatipes*

- permanent habitats
- May and June
- egg mass
- acid tolerant






**Southern leopard frog**  
*Rana utricularia*

- both habitat types
- April and May
- egg mass
- fast jumpers
- variable color




**Northern spring peeper**  
*Pseudacris c. crucifer*

- both habitat types
- March and April
- single eggs or groups
- cold tolerant



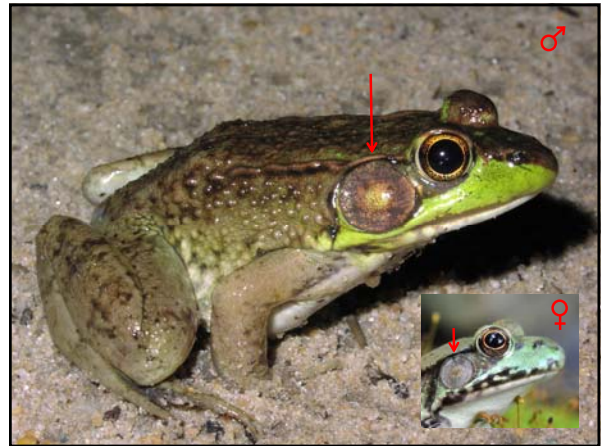







**Green frog**  
*Rana clamitans melanota*



- permanent habitats
- May and June
- eggs in surface film
- cat-like squeak
- most frequently found



**Fowler's toad**  
*Bufo woodhousii fowleri*

- both habitat types
- May and June
- eggs in strings
- skin secretions
- unpalatable to fish

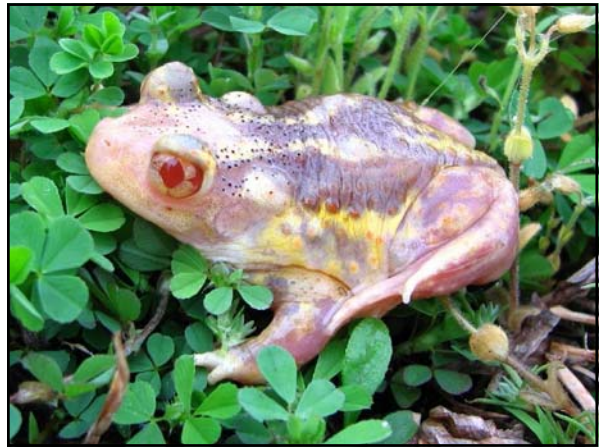






**Eastern spadefoot**  
*Scaphiopus h. holbrooki*

- after heavy rains
- very temporary habitats
- very short larval period
- egg mass
- vertical pupil
- spade on hind foot





Non-Pinelands Anurans - 6 species

Border-entrant species



New Jersey chorus frog

*Pseudacris triseriata kalmi*

- temporary habitats
- March and April
- cold tolerant
- egg mass
- forest dweller

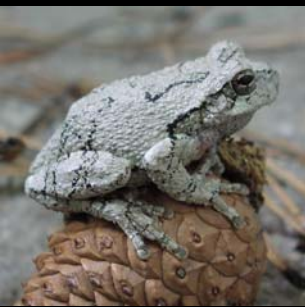




### Northern cricket frog

*Acris c. crepitans*

- permanent habitats
- May and June
- eggs single or groups
- warty skin



### Northern gray treefrog

*Hyla versicolor*

- temporary habitats
- May and June
- eggs in small groups
- variable color
- call from high in trees
- similar to southern gray





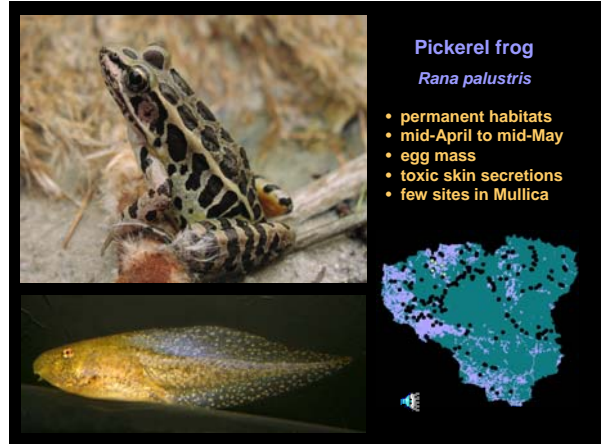
Northern gray treefrog

Southern gray treefrog



Northern gray treefrog metamorph

Pine Barrens treefrog metamorph



Pickerel frog  
*Rana palustris*

- permanent habitats
- mid-April to mid-May
- egg mass
- toxic skin secretions
- few sites in Mullica



Pickerel Frog



Southern leopard frog



Wood frog

*Rana sylvatica*

- temporary habitats
- late Feb. and March
- egg mass and rafts
- acid and cold tolerant
- forest dweller

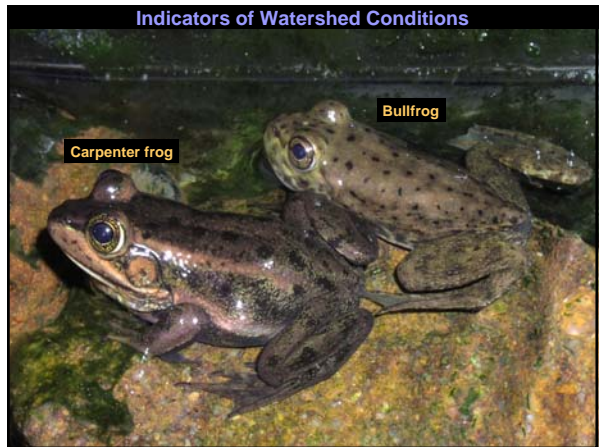
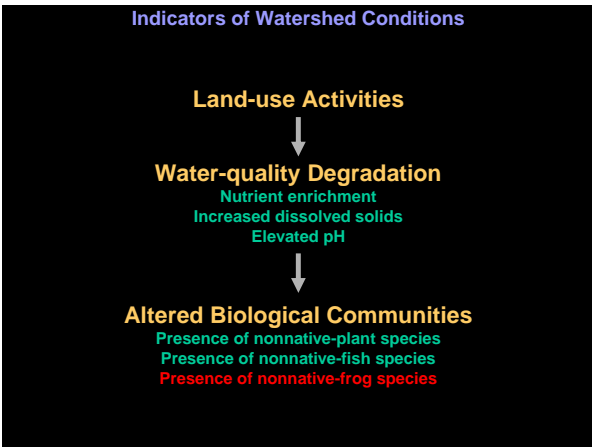


Bullfrog

*Rana catesbeiana*

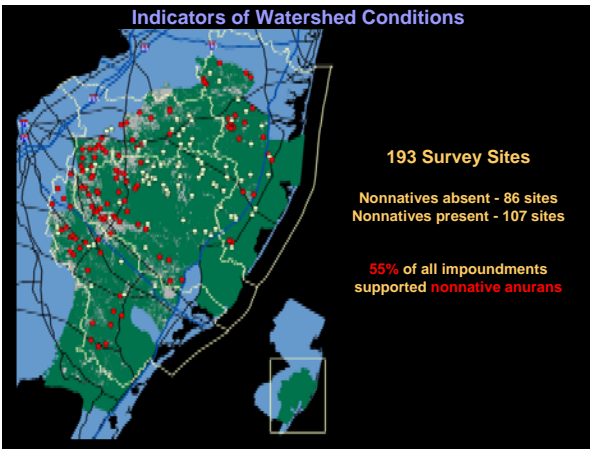
- permanent habitats
- May and June
- 12,000 eggs in film
- largest frog, predator
- indicator



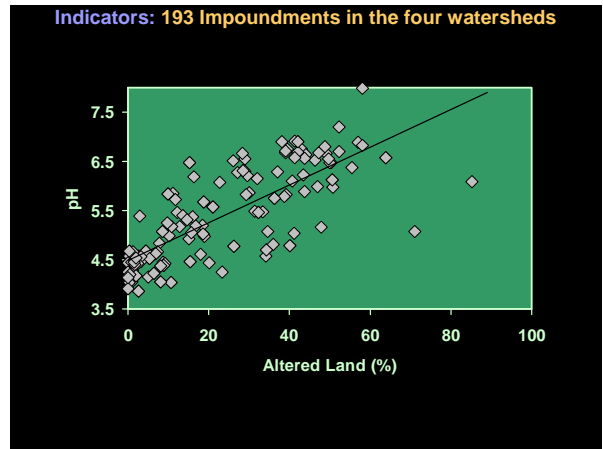




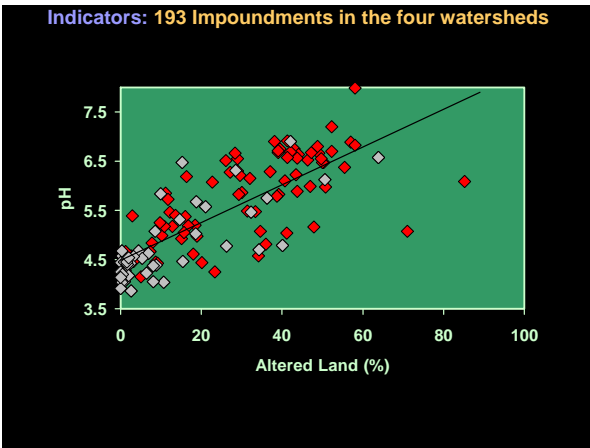
### Indicators of Watershed Conditions



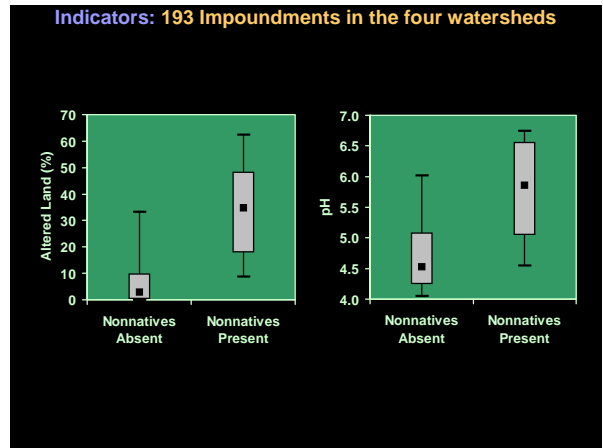
### Indicators: 193 Impoundments in the four watersheds



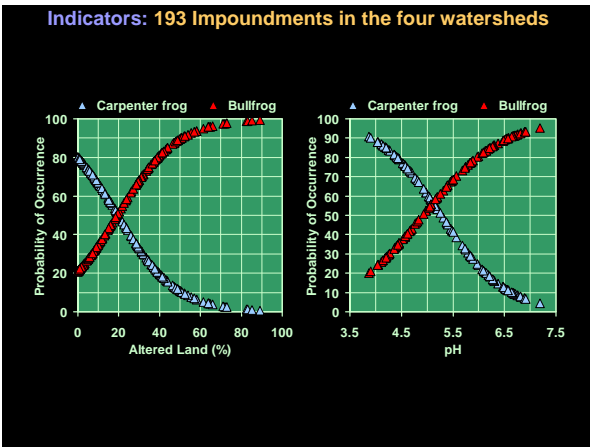
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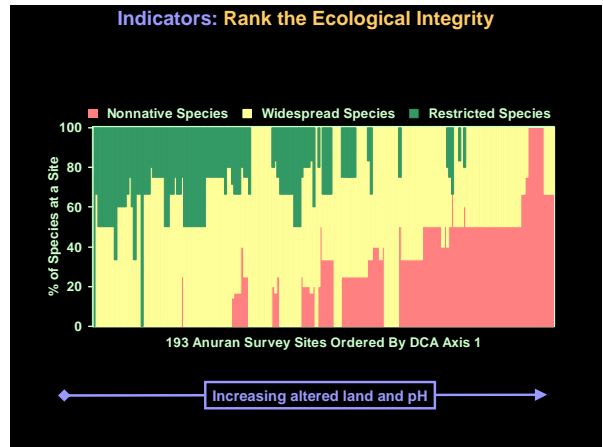
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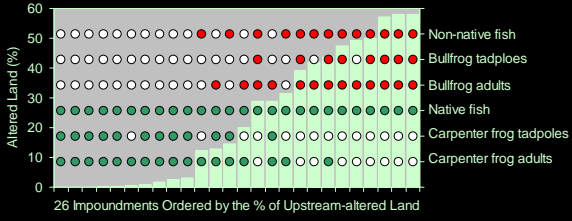
### Indicators: 193 Impoundments in the four watersheds



### Indicators: Rank the Ecological Integrity

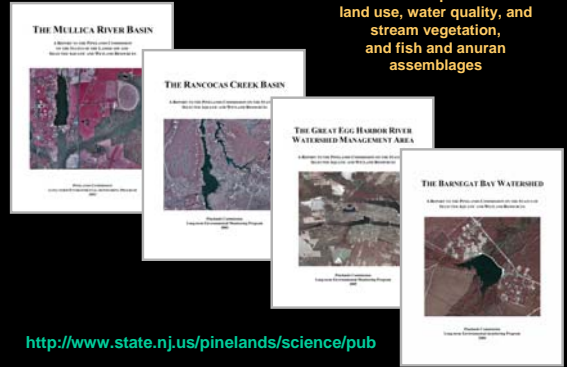


## Indicators: Biotic Homogenization



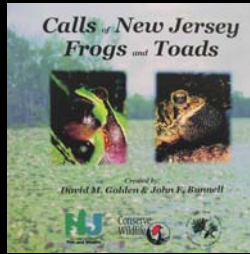
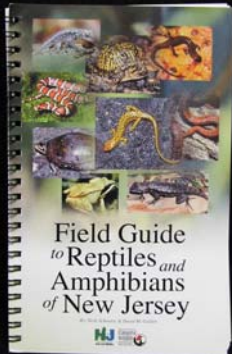
## Pinelands Watershed Studies

Relationship between land use, water quality, and stream vegetation, and fish and anuran assemblages



## Other Information

<http://www.conservewildlifenj.org/store/books/>



Warm, humid nights  
Find a lake or pond  
Breeding phenology figure on handout  
Vocalizations on internet and CD

THE END

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