NJ REEF NEWS

2004 Edition

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Twenty Years of Reef Building In New Jersey

A Message From The Commissioner

When the New Jersey Department of Environmental Protection initiated its ocean reef building program in 1984, no one could have predicted the program would become so successful.

During the past two decades, New Jersey established a network of 14 ocean reef sites from Sandy Hook to Cape May, encompassing a total of 25 square miles of sea floor. On these sites, we made more than 3,500 deployments of various reef materials - more than any other state in the country. We sank 120 ships and barges, built massive undersea ridges from six million tons of rock, created numerous drift-fishing areas from thousands of fabricated concrete reef units, and much more.

The ocean reef program exemplifies Governor James E. McGreevey's commitment to protecting and enhancing New Jersey's aquatic environments. Our reefs provide many benefits, the most important of which is the hard-substrate habitat that is now home to more than 150 species of fish and other marine life. Biological communities have encrusted reef structures so densely that these new habitats have 800 times more biomass per unit of area than the surrounding sandy sea floor.

Fishermen applaud the new fishing grounds that have developed around reefs. In fact, one out of every five fish reeled in by recreational anglers in

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NEW JERSEY DIVISION OF Fish and Wildlife

New Jersey Department of Environmental Protection

Division of Fish and Wildlife

SPORT FISH RESTORATION

Maureen Langevin with a tog speared on the Mako Mania Wreck, Shark River Reef Site.

New Jersey's saltwaters during 2000 was caught on a reef site. Divers, too, welcome the new wrecks and other underwater attractions provided on the reefs. Anglers and divers using reefs generate $50 million each year for coastal tourism and fishing industries.

What has enabled the program to accomplish so much? The reef program is a grassroots endeavor that has garnered wide public support. Fishing and diving groups provide many services, including the financial support that is vital to numerous reef-building efforts. The reef program also coordinates contributions of various reef materials from private industry and many federal, state and county agencies as well. Without so much help from so many, the DEP's reef program would have achieved only a fraction of the success it enjoys today.

Where do we go from here? We are now reviewing a comprehensive reef management plan that will guide New Jersey's reef development during the next 20 years. We also have convened an independent task force, comprising marine scientists and reef experts, to evaluate our reef program to ensure that it meets the highest environmental standards. These efforts will go a long way toward ensuring New Jersey's ocean reefs continue to be an asset to our marine environment and serve the needs of our citizens for generations to come.

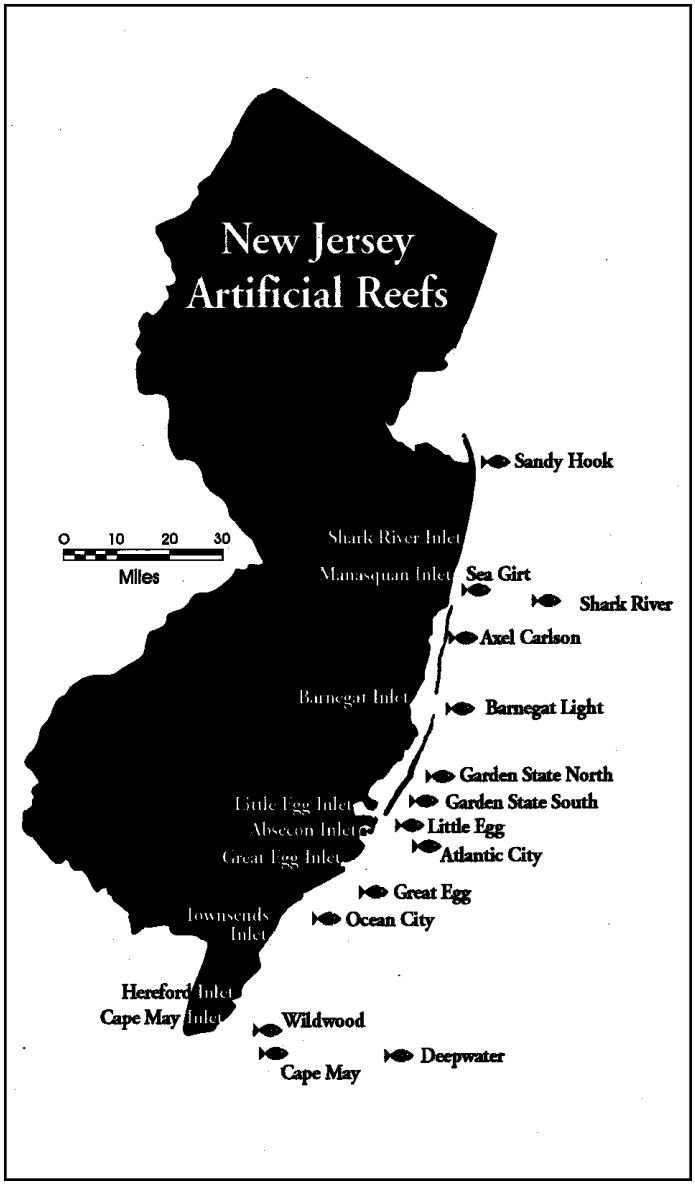
I hope you enjoy this great public resource and appreciate the time and effort it takes to create it.

Bradley Campbell

OBJECTIVES OF THE REEF PROGRAM

New Jersey's Reef program is administered by the Department of Environmental Protection's Division of Fish and Wildlife. It focuses on creating hard-substrate "reef" habitat in the ocean for certain species of fish and shellfish, new fishing grounds for anglers, underwater structures for scuba divers, and economic benefits for the fishing industry.

In constructing and managing reefs, the goal is to spread the benefits of reef resources to as many people as possible. The intent of the program is not to change New Jersey's marine environment, but rather to enhance a small portion, less than one percent of the sea floor, to benefit 150 species of marine life that prefer structured habitat.



A massive dredge loads a scow with bedrock blasted from the Kill Van Kull.

Undersea rock ridges can make fishing more fabulous

The undersea ridges on the Shark River Reef Site are a big deal. The ridges consist of 26 peaks that are 40 to 60 feet high and 25 valleys that stretch across the sea floor for a combined length of more than 13,000 feet.

The New Jersey Department of Environmental Protection (DEP) worked with the Port Authority of New York and New Jersey and the U.S. Army Corps of Engineers' New York District to create four undersea ridges on the Shark River Reef Site. The ridges were constructed from granite originating from the Kill Van Kull Harbor Deepening Project. The access channels to New York Harbor and Newark Bay required deepening to accommodate ever-larger transport ships. After all of the soft sediment was dredged from the channel bottom, the Port Authority still had to go even deeper, and that meant removing granite bedrock.

To remove solid bedrock, a marine contractor drilled and blasted; then, mammoth-sized dredges scooped up the cobble-to boulder-sized chunks of granite. During this project, about 2.1 million cubic yards, approximately 5 million tons, were dredged up and placed in 300-foot-long dump scows. To visualize the volume of material generated by this project, imagine two lanes of the Garden State Parkway covered with three feet of granite over its entire 172-mile length from Montvale to Cape May. That's a lot of rock.

Tugs towed the loaded barges 23 ocean miles to the Shark River Reef Site, located 16 miles offshore of Shark River Inlet. Once on the site, the barges opened up along their keels and dropped their 5,000- to 10,000-ton loads of granite at predetermined locations. The DEP's Division of Fish and Wildlife provided the coordinates for unloading. Placement of the dredge rock on the reef was very accurate. Global Positioning System technology guided each tug to the target site, and a computer system told the barge operator exactly when to drop the load.

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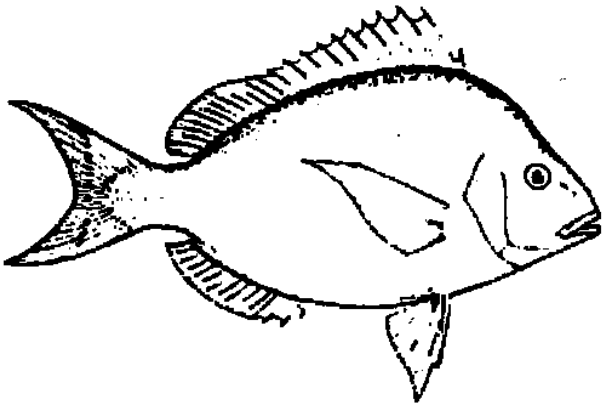
The Shark River Reef Site is 125 to 130 feet deep. The 40- to 60-foot-high undersea ridges deflect nutrient-rich bottom water currents toward the surface, nourishing clouds of plant plankton and schools of bait fish. These organisms form a base that will be consumed by larger pelagic fishes (ones that swim in the upper water column), such as bluefish, bonito, tuna, pollock and sharks.

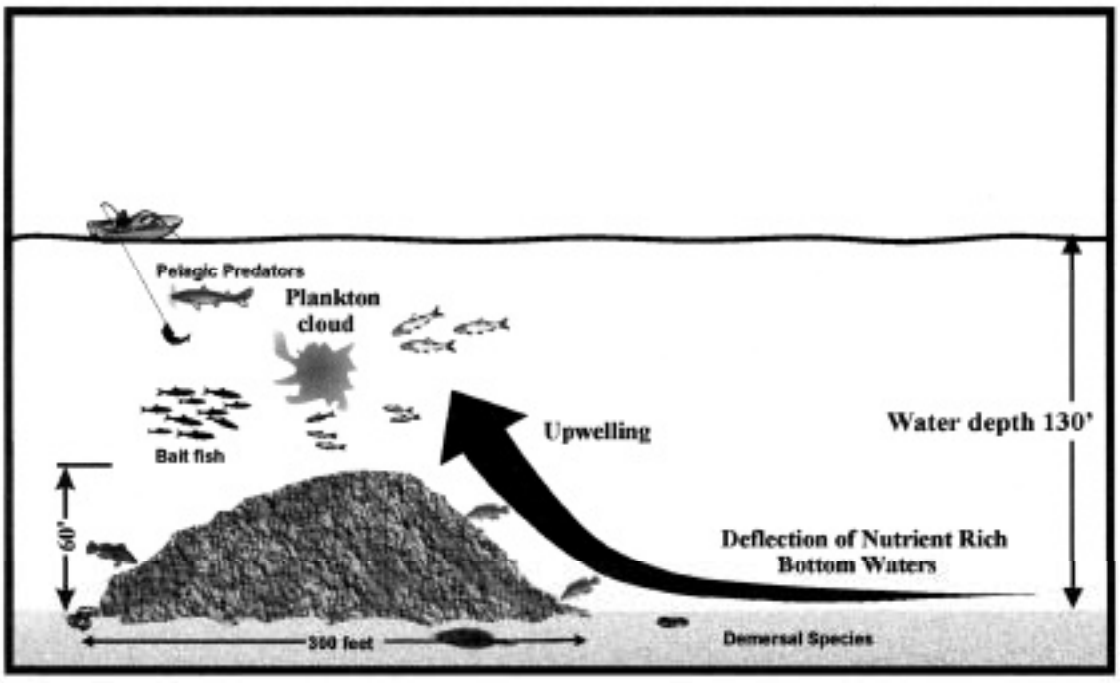
Due to their massive size, undersea ridges will provide habitat for pelagic fish. The rocky ridges also will function like typical, smaller reef structures by offering attachment surfaces for epibenthic marine life (invertebrate organisms that cling to bottom structures), such as mussels, barnacles, sponges and anemones, and hiding places for demersal (bottom) species such as sea bass, blackfish, cod, crab and lobster.

Fish and wildlife biologists expect the undersea ridges to affect the entire water column, enabling varied marine life communities to flourish from sea floor to surface. Fish and other marine life colonized the new ridges within months. A fully developed marine life community, comprising 150 species of fish and invertebrates, will take about five years.

Fishermen have long recognized that productive ocean fishing grounds occur on and around underwater sand ridges, such as Manasquan Ridge, Barnegat Ridge and 5 Fathom Bunk. The rock ridges created on the Shark River Reef Site protrude higher and more abruptly from the sea floor than natural sand formations and consequently, are expected to become fantastic fishing grounds.

A scow, loaded with 7,000 tons of dredge rock, is ready for reef deployment.





The cross-section of a rock mountain on Shark River Reef Site depicting how nutrient rich bottom currents are deflected toward the surface.

Reefs enrich marine environment, study shows

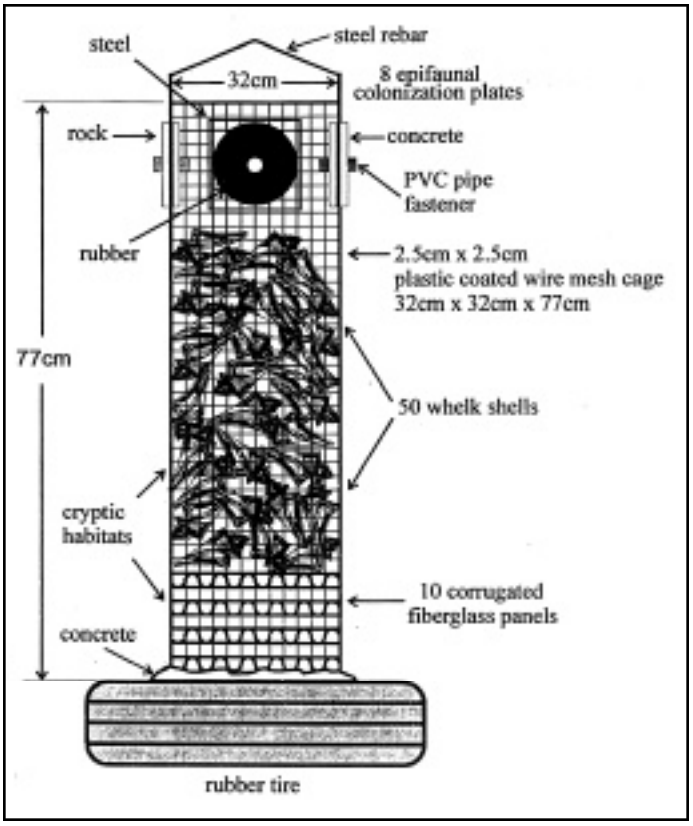
It's not rhetoric; it's reality: reefs enhance New Jersey's marine environment.

That's the upshot of a comprehensive study of reef colonization that also showed New Jersey reefs support more than 800 times more marine life than the sandy sea floor.

The New Jersey Department of Environmental Protection's Division of Fish and Wildlife launched the study in 1996 to determine the types and amounts of marine life that colonize ocean reefs and to compare those levels with what is typically found on the sandy bottom.

In the study, 30 experimental reef habitats were placed on the Barnegat Light Reef Site. Each habitat consisted of a 3-foot by 1-foot by 1-foot plastic-coated wire box embedded in a concrete base. The boxes were filled with various materials to imitate the hiding places found on reefs and to duplicate common reef-building materials. Each box contained 10 corrugated fiberglass panels, 50 whelk shells (large snails) and eight plates of four common reef-building materials: steel, concrete, rock and tire rubber.

During the past five years, scuba divers retrieved a total of 10 habitats from the ocean reef site. The divers encapsulated each habitat in a plastic drum to capture all of the marine life. After each year's collection, Fish and Wildlife biologists spent four months in the lab removing, sorting, counting, identifying and weighing the marine life living within the experimental habitats. What they found was impressive. More than 145 species of marine life, including fishes, crabs, shrimps, lobster, mussels, barnacles, starfish, urchins, snails, worms, sponges and anemones, had colonized the small, experimental habitats.



Experimental reef habitat.

After retrieval by divers, biologists remove barrel used to encapsulate experimental habitat.

Biologists estimate that a one-square-meter area of reef habitat is home to 432,022 individual marine organisms. In an area the size of a card table, the miniature reef provided homes for 118,651 mussels, 29,310 barnacles, 4,626 anemones, 16,626 worms, 2,349 urchins, 3,545 crabs, 22 lobsters and 133 young fish less than four inches long. Also colonizing the habitat were colonial encrusting organisms such as stone coral, bryozoans, hydroids and sponges that were not counted individually, but collectively accounted for hundreds of thousands of organisms. The biomass, which in this study refers to the weight of marine life inhabiting a square meter of sea floor, totaled 129 pounds.

Fish and Wildlife biologists also collected 60, one-foot-square samples of the sandy sea floor near the

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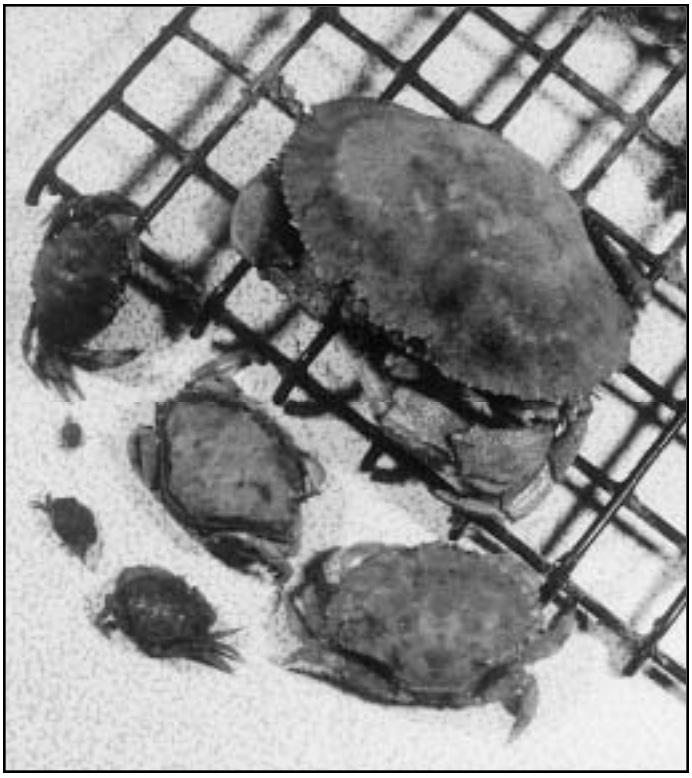

Crabs of all kinds and sizes live within the habitats.

Cape May reef. A similar area (one square meter) of sandy sea floor naturally has only about 2.5 ounces of marine life. On an equal area basis, reef habitats have 825 times more biomass than the sandy bottom. Reef structures are three-dimensional and consequently, offer more attachment surfaces for marine-life growth than the two-dimensional sea floor. Also, the reef structure's firm substrate enables encrusting organisms to withstand storms that stir the sandy sea floor. A reef's numerous crevices and holes offer fish, crabs and other mobile animals secure places to hide from predators.

Almost every form of marine life, from a sponge to a crab to a bluefin tuna, starts its life as an egg, which develops into a microscopic larva that will drift among plankton in ocean currents. After weeks of growth, the larva settles out of the plankton to begin its adult life stage. If the larva of a barnacle or a mussel, for example, happens to land on a reef structure, it attaches itself there and grows into an adult. However, if the larva lands on sand or mud on the ocean floor, it dies. Many marine species increase their chances of survival by filling the water column with countless spawn.

Though encrusting organisms are unable to travel around to find suitable places to live, tiny fish can—and do—actively search for the proper habitat. Young reef denizens, for example, seek structured reef habitat where they can hide from ocean predators and, with a little luck, survive to reproduce.

The reef habitat's bigger biomass also is significant because it represents a far greater food source for ocean predators. The study revealed that epibenthic (attached to surfaces) marine life populations on the habitats exposed to predation were reduced by more than 45 percent, consumed by fish, crabs, lobster and starfish.

Further, biologists learned that whether reef material is concrete, rock, steel or tire rubber, there are no significant differences in the colonization rate. Apparently, mussels, barnacles and other encrusting organisms are not discriminating; they just want something firm upon which to attach. Manmade materials are just as productive as natural rock.

New Jersey's reefs are colonized entirely by marine animals. The depths on reef sites, generally more than 60 feet, are too great to allow sufficient sunlight to penetrate to sustain plant growth. Instead of plants, the foundation of the reef food web consists of many species of filter-feeding animals that live attached to reef structures and feed by straining the plankton which drift past on ocean currents. Filter feeders, such as mussels, barnacles and tubeworms, are in turn eaten by fish, crabs and lobster. Stationary filter feeders serve another function on the reef by providing cover for small mobile invertebrates, such as shrimp, snails and worms. These animals also may become food for larger predators that make up this trophic web.

The inside of the habitat is densely packed with marine life.

Accomplishments, 1984-2003

Since the inception of the Division of Fish and Wildlife's Reef program in 1984, 2,829 patch reefs have been built on New Jersey's network of 14 ocean reef sites. A patch reef is a several-square-yard to several-acre reef created by sinking a ship or placing a barge load of other material on the sea floor. In 2003, 736 patch reefs were constructed, the most in any single year.

Reef Material	Patch Reefs Built in 2003	Total Patch Reefs Built 1984-2003
Rock	436	1,447
Concrete	7	223
Reef Balls	15	106
Concrete Castings	24	33
Vessels	4	123
Army Tanks	—	397
Other	250	500
Total	736	2,829

We have tagged more than 17,000 sea bass and tautog and need your help in determining where they went. Tagging study results will be summarized in the next edition of Reef News. Please call in your tag returns at (609) 748-2020.

Reef-Related Web and E-Mail Sites

njfishandwildlife.com
NJ Division of Fish and Wildlife, Reef program information

njscuba.net
Reef construction, reef studies, photos

gotosnapshot.com
Reef shipwrecks, reef structures, underwater photos.

pegdiver@monmouth.com
Scuba diving, current events, regulations

savefish.com
Recreational Fishing Alliance, fishing, current events, legislative

thebassbarn.com
Recreational fishing, reef fund

realfish-underwater.com
Diving, video, marine art

wreckvalle@aol.com
Diving, current events

scubanj.org
NJ Council of Dive Clubs

2003 Reef Adoptions

"Shawn's Lobster House"

The McDaniel Family sponsored a reef of concrete castings on the Ocean City Reef Site.

"Manasquan River Marlin and Tuna Club Reefs"

The Manasquan River Marlin and Tuna Club sponsored two reefs of concrete castings on the Axel Carlson Reef Site.

"Margaret Delanoy Reef"

The family and friends of Margaret Delanoy sponsored a reef of concrete castings on the Axel Carlson Reef Site.

"Visceglia Reef II"

John B. Visceglia sponsored a reef of concrete castings on the Axel Carlson Reef Site.

"JCSA-RBBC Reef"

The Jersey Coast Shark Anglers and Riviera Beach Boat Club sponsored a reef of concrete castings on the Axel Carlson Reef Site.

"Robert 'Bob' Koch Reef"

The North East Mako Owners Association sponsored a reef of concrete castings on the Axel Carlson Reef Site.

"Party Reef"

The Cape May Party and Charter Boat Association sponsored a reef of concrete castings on the Wildwood Reef Site.

"Bass Barn II"

The bassbarn.com sponsored a reef of concrete castings on the Wildwood Reef Site.

"Charles Boehm Middle School Reef"

The Charles Boehm Middle School sponsored a reef of concrete castings on the Wildwood Reef Site.

"John D. Fergone Reef"

Family and friends sponsored a reef of concrete castings on the Wildwood Reef Site.

"Fisherman's Reef"

The Atlantic County Fisherman's Association sponsored a reef of concrete castings on the Great Egg Reef Site.

"Jack Clements Reef"

The Strathmere Fishing and Environmental Club sponsored a reef of concrete castings on the Ocean City Reef Site.

"Bill Quenzer Fathead Reef"

Bill's fishing buddies, the Fatheads, sponsored a reef of concrete castings on the Great Egg Reef Site.

"Greater Point Pleasant Charter Boat Association Reefs"

The Greater Point Pleasant Charter Boat Association sponsored three reefs of concrete castings on the Axel Carlson Reef Site.

"Grady White Reef"

The New Jersey Grady White Marine Club sponsored a reef of concrete castings on the Axel Carlson Reef Site.

"Archie Faulkner Sr. Reef"

Pauline Faulkner and family of Archie Faulkner sponsored a reef of Reef Balls on the Cape May Reef Site.

"Lester's Mountain"

The Norma K and friends of Lester Van Pelt adopted a rock mountain on the Shark River Reef Site.

"Paul Ward Reef"

Family and friends of Paul Ward sponsored a reef of concrete castings on the Barnegat Light Reef Site.

"Walter Lamon Reef"

Family and friends of Walter Lamon sponsored a reef of concrete castings on the Barnegat Light Reef Site.

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Ken Gerecke displays big bass and little bass.

2003 Reef Adoptions–*(continued)*

"Sly Fox Reef"

Friends of Ed Folio sponsored a reef of concrete castings on the Barnegat Light Reef Site.

"Bill Schoick Reef"

Family and friends of Bill Schoick sponsored a reef of concrete castings on the Barnegat Light Reef Site.

"Fish Hawks Reef II"

The Fish Hawks Fishing Club sponsored a reef of concrete castings on the Barnegat Light Reef Site.

"Harry C. Michels Reef"

Family and friends of Harry Michels sponsored a reef of concrete castings on the Barnegat Light Reef Site.

"Lucille Kirkenir Reef"

John M. Kirkenir sponsored a reef of Reef Balls on Little Egg Reef Site.

"Kayleigh's Reef"

Joseph F. Duffy sponsored a reef of Reef Balls on the Little Egg Reef Site.

"Tom Russinelli Reef II"

The Manahawkin Elks sponsored a reef of Reef Balls on the Little Egg Reef Site.

"Beach Haven Moose Reef"

The Beach Haven Moose Lodge 1575 sponsored a reef of Reef Balls on the Little Egg Reef Site.

"Anna B. Crann Reef"

Daniel F. Crann sponsored a reef of Reef Balls on the Little Egg Reef Site.

"Kids Fishin' Hole"

Chase and Shane Rivera and Marley Hoffman sponsored a reef of Reef Balls on the Little Egg Reef site.

"The Bassbarn.com Reef"

The Bassbarn.com sponsored a reef of Reef Balls on the Little Egg Reef Site.

"Carole's Reef"

Carole M. Hoffman sponsored a reef of Reef Balls on the Little Egg Reef Site.

"Gus Picone Reef"

Friends of Gus Picone sponsored a reef of Reef Balls on the Atlantic City Reef Site.

"Jersey Fresh Reef"

The New Jersey Fresh Seafood Festival sponsored a Reef of Reef Balls on the Atlantic City Reef Site.

Sea bass don't roam too far from home, tagging study shows

Fisheries biologists know the big picture. Every April, as ocean waters warm, sea bass schools migrate from deep, offshore wintering grounds to shallow, inshore waters, where they remain from May to November. But knowledge is limited about the behavior of individual fish. Once inshore, do they find a wreck or reef to call home and stay there? Or, do they move from reef to reef like vagabonds?

To try to answer these questions, state fisheries biologists tagged 3,299 sea bass during 2002 on a one-square-mile area of the Atlantic City Reef Site. This small reef area has 20 individual reefs, some of which are only a few hundred feet apart. The average population of sea bass on each reef was estimated at 5,000; the total population in the 20-reef study site was about 100,000 sea bass.

During the six-month study period, biologists recaptured 87 tagged fish on the reef site. Of these, 78 percent were recaptured at the exact location of their original tagging, suggesting that once sea bass establish a home base, the majority do not wander, even though other potential homes are close by.

In addition to those recaptured by biologists, 82 tagged fish were also caught and reported by other anglers during the April to October study. Although the exact recapture locations of angler-reported fish are unknown, 40 percent were within one mile of the tagging site and 83 percent were caught within five miles of the tagging site. These data indicate that even if fish do move around, they do not travel very far.

The tagging study also shows that dense populations of sea bass on reef structures find plenty of food throughout the summer because they are not migrating in search of happier hunting grounds. This information strongly indicates that once numbers of sea bass at a reef or wreck are significantly reduced by fishing, it will take a long time for the fish to rebuild their population on those structures - something every angler might want to keep in mind.

2003 Reef Habitat Sponsors

The S.B.R.T. Murphy Family Foundation sponsored the "Safe Haven" Reef.

Louis and Barbara Meier sponsored "Meier's Reef."

Princeton High School Marine Explorers sponsored the "Princeton High School Marine Explorers Reef."

Charles D. Roseman sponsored "Roseman's Reef."

Patricia Pistone sponsored the "4-SQEEG" Reef.

Paul Hellmold, Brad Young and Jim Lee sponsored the Bob Stern Memorial Reef.

Catherine Seaman sponsored the Willliam "The Seaburger" Seaman Jr. Reef.

The Forked River Tuna Club sponsored a drift-fishing reef.

The Women's Auxiliary of the Forked River Tuna Club sponsored the Girl's Catch of the Day Reef.

Harry Yospin sponsored the Porgy and Bass Reef.

Peter J. Milelli sponsored Milelli's Reef.

Stephen Urbanik sponsored the Joseph DeMarie Reef.

Glenn Bley sponsored the Capt. Bley Reef.

The Rainbow Rod and Gun Club sponsored the Zigmund Brzezinski Reef.

John and Judy Gerkens sponsored the Marholto Reef.

Sal, Mary, Dennis, Bobby, Nancy, Chris and Cheryl Casale sponsored the Ralph M. Casale Reef.

Reef Supporters

Sue Kelly

Joe Galese

Barry and Susan Gabler

Joan and Bud Koons

New Wrecks in '03

Ann E. Clark—A 120 foot tugboat sunk on September 25 on the Deepwater Reef Site. Sponsored by the Ann E. Clark Foundation.

Diver's Abyss—A 104 foot tugboat sunk on September 25 on the Deepwater Reef Site. Sponsored by the Abyss Dive Club and the Cape May Party and Charter Boat Association.

Barbara Ann—A 75 foot deck barge sunk on August 14 on the Axel Carlson Reef Site. Sponsored by NJscuba.com and Les Swenson.

Patrick S. Murphy—A 50 foot deck barge sunk on August 14 on the Axel Carlson Reef Site. Sponsored by the CBS Friends of Patrick Murphy.

What Do Lobsters Eat?

It's awfully difficult to pass up a lobster dinner—even for, well, lobsters. A food-habits study of 98 adult lobsters collected on New Jersey reefs revealed these creatures are not only pugnacious, they're also cannibalistic. Indeed, the study found that 18 percent of a lobster's diet is other lobsters.

Mostly, lobsters love to dine on crabs, mussels, snails and starfish, all of which are easy to catch and unable to defend themselves against the lobsters' powerful, crushing claws.

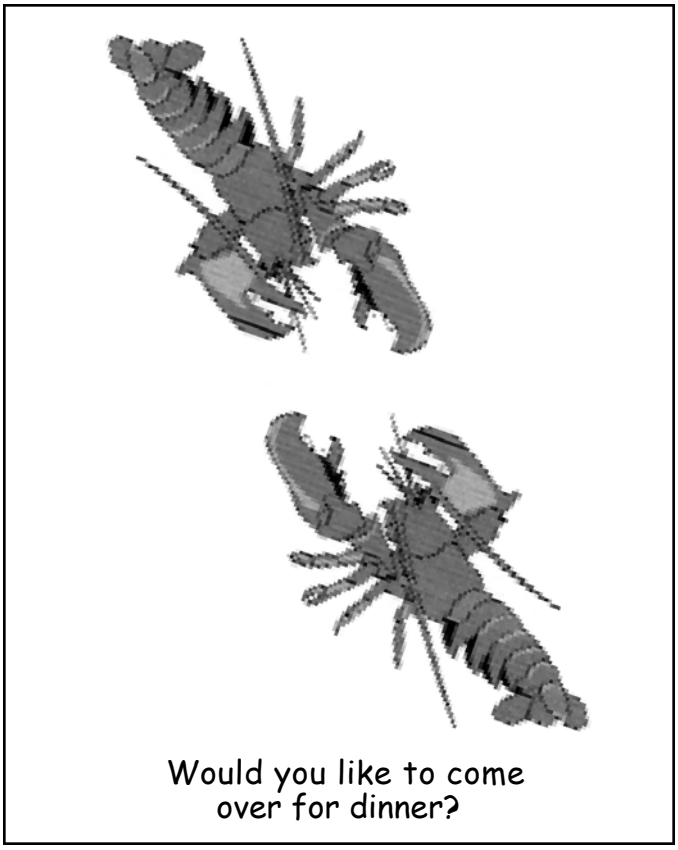

Photo by Herb Segars, Undersea Photo.

THE DIET OF LOBSTERS ON NEW JERSEY REEFS	
Food Group	Percent of Diet
Crustaceans (crabs, lobsters)	58.8
Bivalves (mussels, clams)	22.5
Fish (mostly skate egg cases)	12.0
Echinoderms (starfish)	3.6
Gastropods (snails)	2.3
Hydroids	0.7
Worms	0.1

REEF PROGRAM
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF FISH AND WILDLIFE
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