

Importance of Forage Fish in the Delaware River

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Since 1980, New Jersey Department of Environmental Protection's Division of Fish and Wildlife's Bureau of Marine Fisheries has conducted a beach seine survey for striped bass on the Delaware River. Data collected during this survey provides biologists with information on the population status of many species, not just stripers. For more details on this survey, read *New Jersey's Priceless Resource—Studying the Delaware River* on our Web site www.NJFishandWildlife.com/artdelstudy08.htm.

Many species captured during the survey are forage fish, commonly considered as bait fish. Their schooling behavior, size and abundance make them a significant food source for predator species including striped bass, bluefish, weakfish and white perch. These predators are important species recreationally, commercially as well as economically.

As a major food source for predator species, forage fish provide the sustenance necessary for predators to reach reproductive

maturity. Forage species produce abundant offspring, enough to sustain both recreational and commercial fishermen and the natural predators that inhabit the ocean. Without healthy forage fish populations, the resulting predator-prey imbalance could become critical to a particular species.

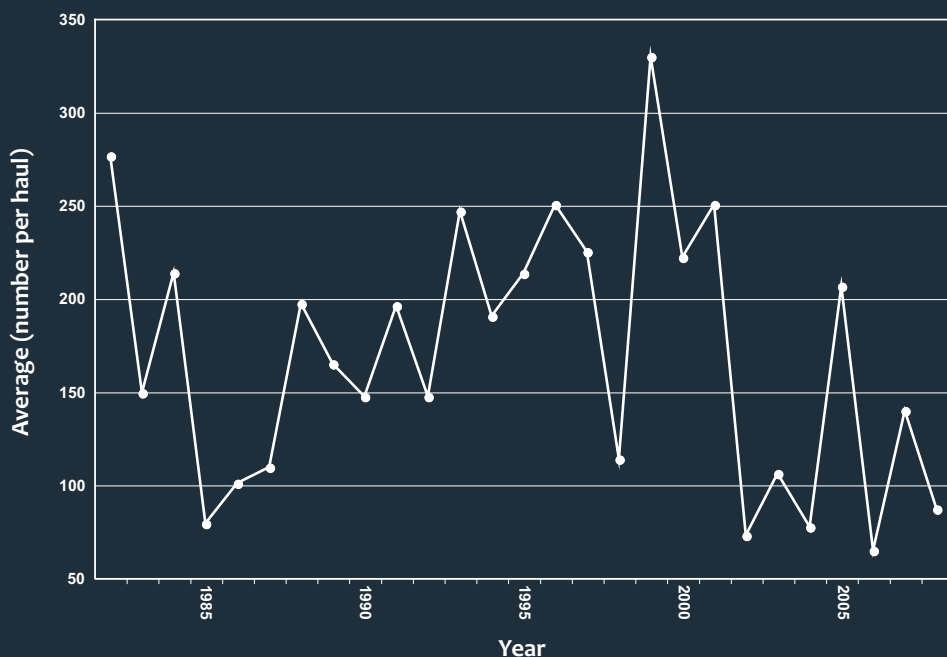
In contrast, predators have an impact on all forage species populations. Since every fish consumed by a predator reduces the population, collectively, predators can prevent a single forage fish species from becoming dominant by lowering both survival and reproductive rates of the prey. Predation assures a "survival of the fittest" scenario. Without predation, certain forage species could overrun other fish populations. The predator-prey relationship is vital to maintain a balance among species.

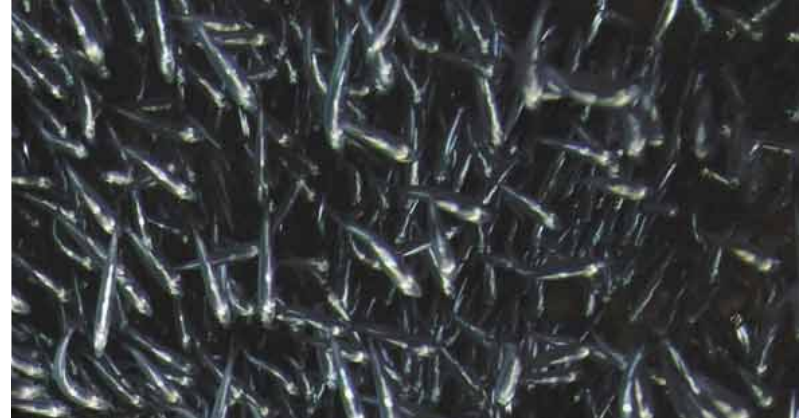
The Delaware River beach seine survey provides an inventory of fish while most are still juveniles. The methodology and equipment used are designed to catch smaller fish on their nursery grounds close to the shoreline. Individual fish

of each species are counted so biologists can assess the populations. Fish and Wildlife developed a forage fish index for the Delaware River which includes the following species: alewife, American shad, Atlantic silverside, Atlantic menhaden, banded killifish, bay anchovy, blueback herring, Eastern silvery minnow, gizzard shad, mummichog, spot and spottail shiners.

Over the years, past surveys showed that forage fish comprised more than 71 percent of the total catch. As with most surveys, the abundance of forage fish populations within the Delaware River can vary annually. Since 1985, the forage fish index increased steadily through 1999, peaking with an average of 330 fish per haul (see figure). Water quality improvements were most likely the driving force behind this increase, especially for anadromous

Delaware River Forage Fish — Averages by Year






species such as shad and river herring. Not all species increased however. For example, while the forage fish *index* increased through 1999, Atlantic silverside *catches* peaked in 1993 (25 fish per haul) and have been declining ever since.

During years of severe flooding (2006) and drought (1998, 2002), total catches were lower than normal. During a flood year, there is an influx of fresh water causing a drop both in salinity and water temperature. Species that prefer saltier water will move out of the sampling area which will lower the forage fish index. During drought years there is no fresh water influx; salinity and water temperature both rise. As salinity increases, fish retreat into streams and tributaries where salt concentrations are lower. Likewise, most fish caught during a beach seine survey for striped bass are avoiding areas where water is too warm. For these reasons, the forage fish index in 2006 was the lowest average ever—at only 71 fish per haul.

The index has declined in recent years; currently, forage fish numbers in the Delaware River are at a similar level to those of the mid to late 1980s. Biologists are concerned, because the lack of forage fish is a signal that something is out-of-balance in the Delaware River. Of particular concern in New Jersey is the decline of the bay anchovy.

Typically one of the most abundant species in the Delaware estuary, the bay anchovy is a primary food source for young weakfish, bluefish and striped bass. The average number of bay anchovy caught per seine haul has been declining since 1997. During that year, catches averaged 105 fish per haul. From 1998 to 2001, average bay anchovy catches ranged from 28 to 87 fish per haul. Since 2001, there have been no averages greater than 15 fish per haul. Future effects from this serious decrease are not yet fully understood, but the recent decline in some predatory species such as weakfish may be a result of this food chain imbalance.

The Delaware River seine survey demonstrates that forage species are the backbone of the survey's total catch. As an essential tool for biologists to monitor species trends, this survey provides vital information on which to base smart fisheries management decisions. 

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Throw Back That Short Fish—Unharmmed!

By Conservation Officer Dominick Fresco

**“Officer, that fish wasn’t going to live anyway.”
“The fish swallowed my \$5 lure. Darned thing died when I tried to get it back, so I just kept the fish.”**

All too common, these excuses are heard daily by New Jersey Conservation Officers from the Marine Enforcement Unit when inspecting anglers who possess illegal or “short” marine fish. But be advised that COs rely on sure-fire techniques when it comes to short fish: state-issued fish measuring board. Either the fish is of legal size, or it’s not.

To release sublegal fish, follow these tips for returning hooked fish back to the water unharmmed.

The main causes of hooking mortality in fish are stress and wounding. Fish fighting after they are hooked is a major stressor. More physiological stress results from the change in temperature or pressure as fish are reeled up from depths greater than 40 feet. An outward sign of the adverse effects of the rapidly decreasing water pressure surrounding the fish during retrieval is a distended air bladder protruding from the fishes’ mouth. Of course, there’s also wounding from the hook. The degree of wounding depends on the location of the hook; gill- or gut-hooked fish have a greater possibility of death.

Catch and Release Guidelines

Plan—in advance—your strategy for releasing hooked fish, especially species with season or size restrictions. On lures, replace treble hooks with single hooks and consider pinching barbs. Try using non-offset circle hooks when fishing with bait. Use properly-sized equipment for the targeted fish species to limit time and effort spent on fighting fish. Use a slower retrieve when fishing in depths greater than 40 feet, such as offshore wreck fishing.

Once the decision is made to release, attempt to keep the fish in the water while using needle-nose pliers or a de-hooking device to extract the hook. If the fish is gill- or gut-hooked, cut the line as close to the hook as possible. Studies show the hook will release within about 120 days. Avoid netting the fish. If a



net must be used, neoprene nets cause less damage to the protective slime layer covering the fish, a layer which guards against infection.

When leaving the fish in the water is not possible, keep your hands wet at all times (less damage to the slime layer) and minimize handling—particularly the gills and soft belly. Anglers often hold fish behind the gills while de-hooking. This can be problematic, especially for flounders whose internal organs (liver, heart and stomach) are located in this small region of the body and are particularly susceptible to injury. For these fish, pinch between your thumb and fingers on top and bottom sides just behind the eyes, flattening the dorsal fin to hold the body securely.

Avoid placing fish on hard surfaces. Use on an old piece of foam cushion and place a wet rag or gloved hand over the fish’s eye. This action can subdue even the most unruly bluefish or tuna.

Revive First

As quickly as possible return the fish to the water and gently rock it back and forth several times, making water flow through the gills. To assist reviving fish (saltwater ONLY) whose air bladder is distended and protruding from the mouth the best apparatus is a hypodermic syringe with the plunger removed.

(Or purchase the Florida SeaGrant-approved venting tool kit from major sporting goods retailers.) The instrument used must be hollow in order for gases to escape and is inserted at a 45 degree angle near the fourth or fifth spine at the base of the pectoral fin. If the bloated condition is severe, gentle pressure can be applied to the abdominal wall. The venting tool should be cleaned after each use (bleach or alcohol). As for all fish, be sure to release it—*always head-first*—into the water.

These catch-and-release techniques are the only resolve anglers have when sub-legal fish are caught. If you possess illegal fish and are inspected by a Conservation Officer, be truthful and cooperative. But don’t put yourself in that situation; the best approach is to immediately release hooked fish unharmmed.

PUBLICATIONS AVAILABLE ■

The following publications are available by writing:

Nacote Creek, Research Station Publications
P.O. Box 418
Port Republic, NJ 08241

Shellfish Growing Waters Classification Charts

This publication is available free at any shellfish license agent and online at <http://www.nj.gov/dep/bmw/waterclass.htm>.

New Jersey Boaters Guide

Send a self-addressed stamped, #10 envelope (2 oz. postage).

New Jersey Pumpout Directory (free waterproof map)

Write to the Nacote Creek address above.

The following publications are also available online at NJFishandWildlife.com:

- Guide to New Jersey Saltwater Fishing (available online only)
- NJ Reef News
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