TRAWLING The Delaware Bay

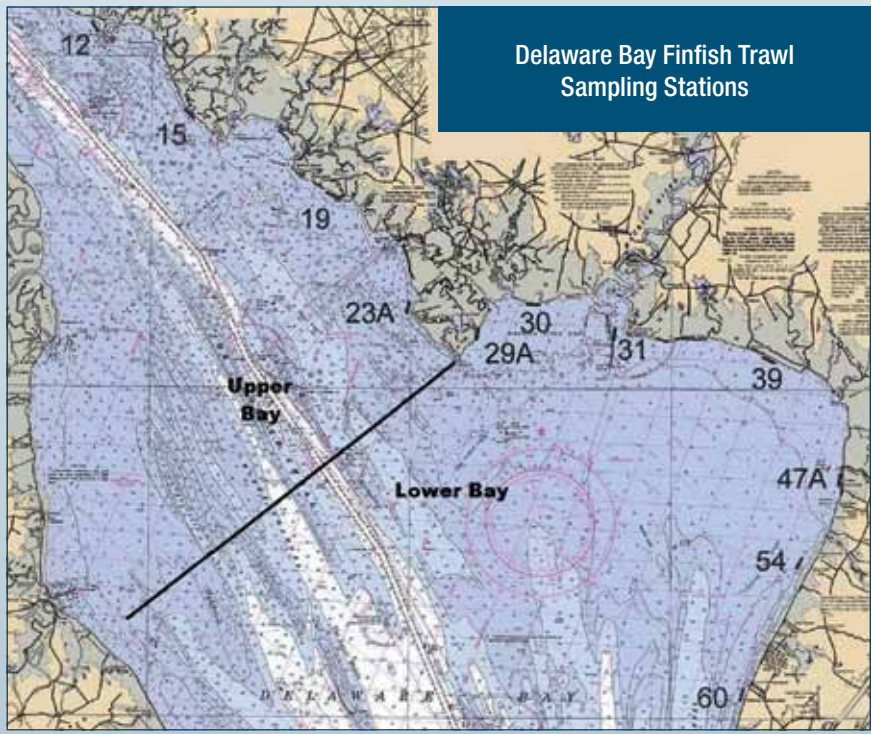
By Jennifer Pyle, Assistant Fisheries Biologist

The Delaware Estuary is New Jersey's largest estuary system. This semi-enclosed body of water mixes freshwater from the Delaware River with salt water from the Delaware Bay. It serves as a nursery area, spawning and feeding grounds and a migratory route for many recreational and commercial fish.

Each year New Jersey Division of Fish and Wildlife's Bureau of Shellfisheries biologists conduct several fisheries surveys to study the status of species populations within the estuary. One of these surveys is the Delaware Bay Juvenile Finfish Trawl Survey.

In 1991, Fish and Wildlife began a Delaware Bay trawl survey of juvenile finfish species to develop indices for comparing the relative annual abundance of selected stocks. The survey was designed to complement a similar effort being conducted on the western side of Delaware Bay by the State of Delaware's Division of Fish and Wildlife. Data collected allows biologists to develop relative abundance estimates and length frequencies of estuarine-dependent finfish, information necessary for predicting future fishery trends and harvest potential.

Survey sampling stations and their locations have varied over the years. Currently, there are 11 sampling stations located on shoals near the shoreline, extending from Villas in Cape May to the Cohansey River of Cumberland County. These near-shore stations have typically provided greater fish yields and more species diversity than sampling efforts in deeper waters.



Delaware Bay Finfish Trawl Sampling Stations

Sampling is conducted with a 42-foot research vessel, the R/V Zephyrus. The sampling months have also varied. Presently, samples are collected at each location once a month from April to October. Single, ten-minute tows are conducted against the tide at each station.

All species collected are identified, counted and measured. If counts are high, 50 individual lengths are randomly selected and recorded. For finfish, fork lengths (tip of nose to inside fork of tail) are recorded for all species with a forked tail. For species without a forked tail, such as Atlantic croaker, a total length is measured.

Water quality levels are recorded at each sampling station. These parameters include salinity, water temperature and dissolved oxygen. Measurements are taken at the bottom of the water column at each station.

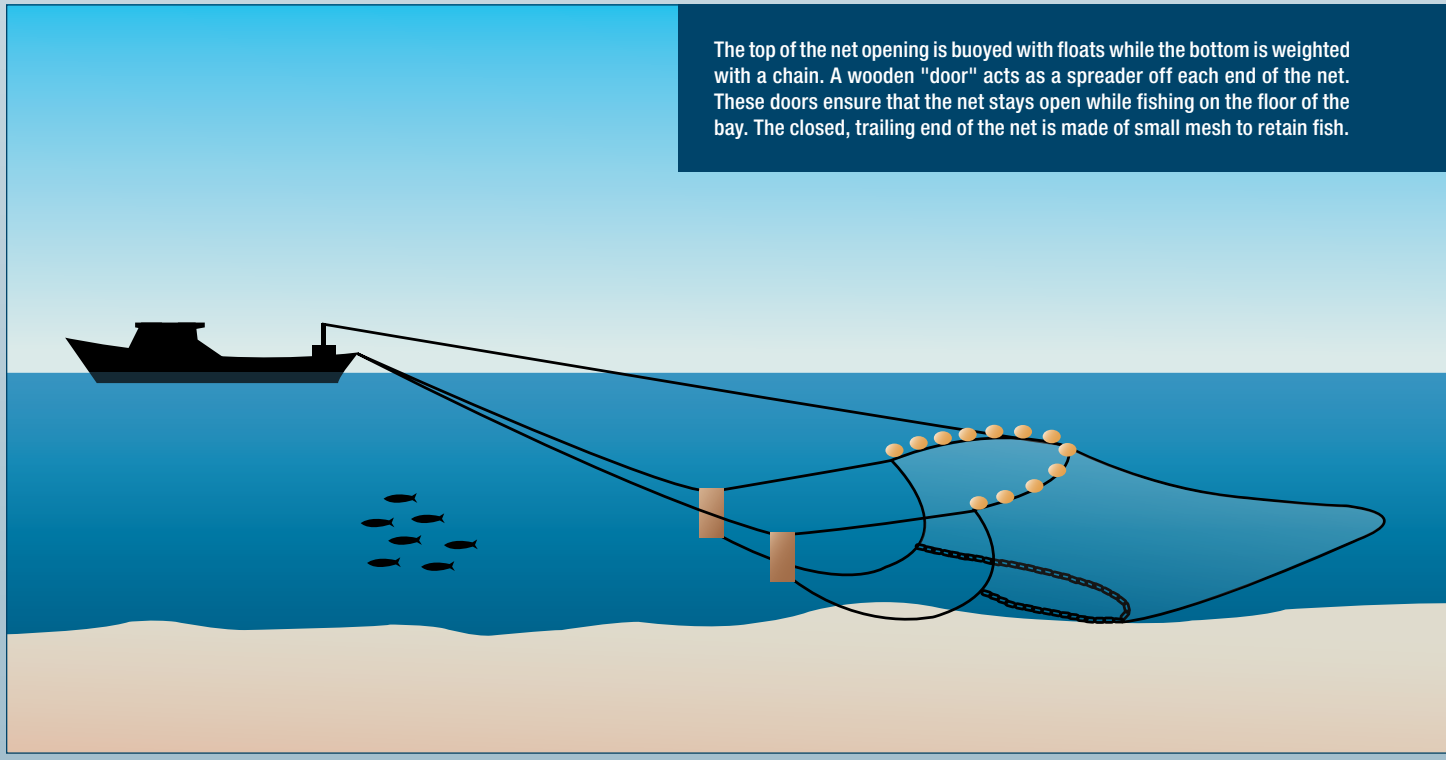
Since 1991, Fish and Wildlife has hauled 1,476 tows and caught 377,641 fish for an average of 255 fish per tow. A total of 83 species have been identified, the five most abundant being bay anchovy, Atlantic croaker, weakfish, blue crab and Atlantic herring.

Fish and Wildlife's Marine Fisheries staff deploy the 16-foot otter trawl net.

Common Name	Total Number Caught
Bay Anchovy	196,341
Atlantic Croaker	89,178
Weakfish	32,328
Blue Crab	23,067
Atlantic Herring	5,192

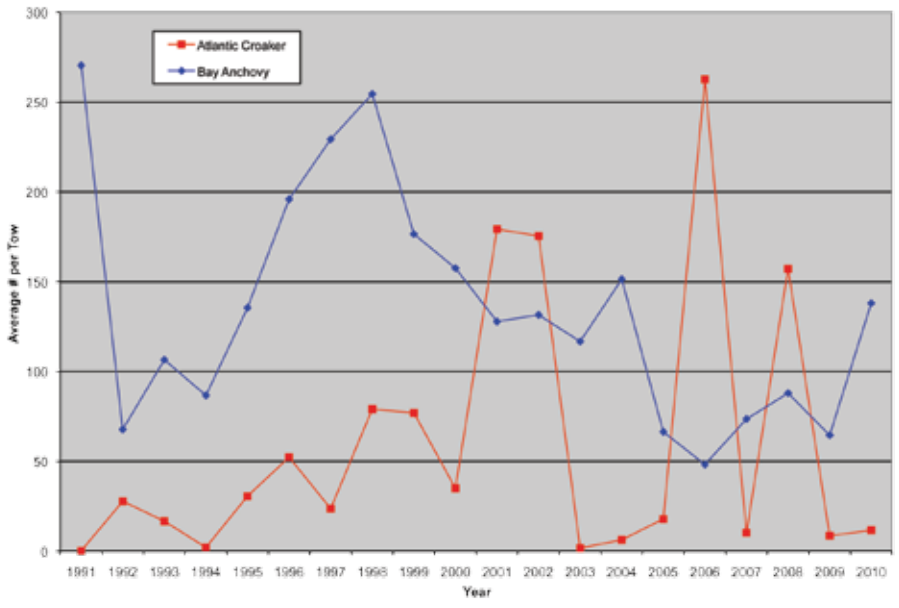
Bay anchovy numbers are decreasing at an alarming rate. Typically one of the most abundant species in the Delaware estuary, bay anchovy are a primary food source for many fish, including weakfish, bluefish and striped bass. The numbers caught in this survey peaked in 1998, with an average of 254 fish per tow. Anchovy numbers have been decreasing ever since. The lowest numbers were recorded in 2006, with catches averaging 48 fish per haul. The potential impact from this decrease has yet to be recognized, but a recent decline in the Delaware Bay's weakfish population may be an indication of a food chain imbalance within this estuary. The average number of weakfish per haul in 2010 was 138 fish, which is the largest average since 2004.

Atlantic croaker numbers increased until 2001, when averages reached 179 fish per tow. Since that time there have been many fluctuations within the croaker population. Averages bottomed out in 2003 with only one fish per tow. Croaker reached the survey's peak in 2006, with an average of 262 fish per tow, yet dropped again the next year to an average of 10 fish per tow in 2007. Similar fluctuations are also seen in data collected from Fish and Wildlife's Ocean Trawl Survey. >



The top of the net opening is buoyed with floats while the bottom is weighted with a chain. A wooden "door" acts as a spreader off each end of the net. These doors ensure that the net stays open while fishing on the floor of the bay. The closed, trailing end of the net is made of small mesh to retain fish.

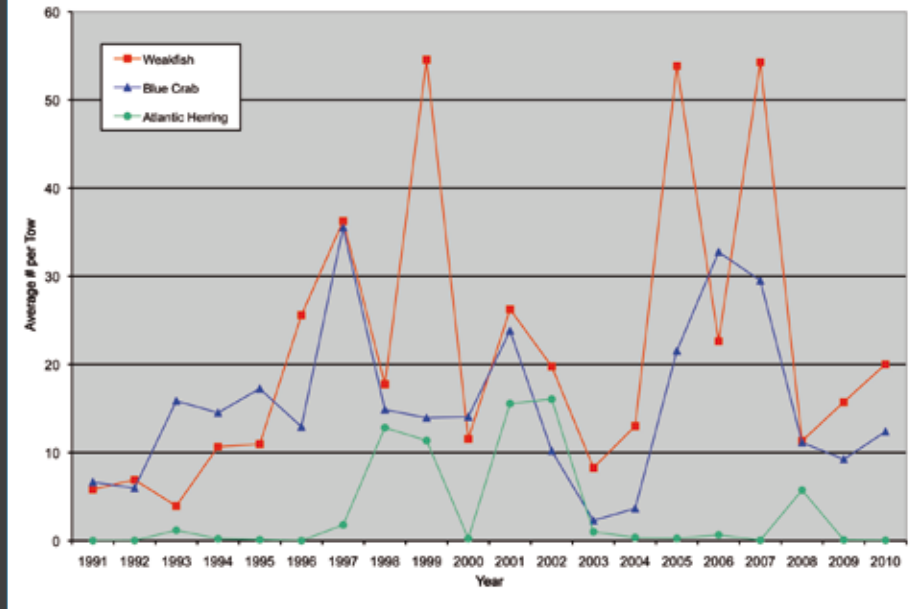
Population Trends for Atlantic Croaker and Bay Anchovy



The overall number of weakfish caught during the trawl survey has been decreasing since 1999, when the average number per tow was 54 fish. The lowest average was in 1993, with three fish per tow. The drop to an average of 22 fish per tow during 2006 could have been due to severe flooding that year. Because of an above-average influx of freshwater into the bay, the weakfish most likely moved into regions with higher salinities. Despite a decreasing long-term trend, the average number of weakfish caught per haul has been increasing for the past three years.

While the trawl survey primarily catches finfish, 6.11 percent of the total catch for all years has been blue crabs. Over the years, the average number of blue crabs caught increased until 1997, when the average peaked at 35 crabs per tow. Since then, the averages have fluctuated.

Population Trends for Weakfish, Blue Crab and Atlantic Herring



Surveys like this are just the beginning of the stock assessment process for many species. Data collected from this survey shows fluctuations among all species across the years. The size of fish populations changes constantly due to many environmental factors. Fish and Wildlife is planning future research to examine species population variations.

Fishery surveys such as the Delaware Bay Juvenile Finfish Trawl are important for ecosystem management. Surveys provide biologists with data on annual abundance and population trends of many species and are essential to predict future fishery management needs. Awareness of population fluctuations is crucial when creating recreational and commercial fishing regulations.

** Information for this article was provided by principal biologists Jeffrey Normant, lead investigator and Jason Heron, co-investigator of New Jersey Division of Fish and Wildlife's Delaware Bay Juvenile Finfish Trawl Survey program.*