Trawl-tech:

Chasing the Future of Fisheries Research

By Greg Hinks, Principal Biologist



Thyboron brand steel trawl doors provide the hydrodynamic lift required to expand the dimensions of a trawl net being pulled through the ocean.

The Tackle Box

New Jersey Division of Fish and Wildlife's Ocean Stock Assessment Survey samples fish in near-shore ocean waters from Sandy Hook to Cape May. Sampling is conducted with a 30-meter wide bottom otter-trawl, a net designed to drag along the seabed. An otter-trawl includes components referred to as doors.

Historically, an otter door was merely a slab of wood held in a steel frame. At nearly 1,200 pounds of dead weight per door, they were essential for the trawl net to function. Two otter doors maintain the trawl net opening by providing resistance against water as they are pulled by the vessel.

Today, this equipment has been transformed by applying the science of hydrodynamics—which utilizes the forces of fluids, like seawater—to achieve the same result as the old doors, but at half the weight.

The functioning of these advanced-style otter trawl doors resembles an airplane wing by using the redirection of water as it flows over the gear to provide lift. Not only do modern trawl doors weigh significantly less—making them more fuel-efficient because of the decreased mass—they are made entirely of steel resulting in sturdier equipment.

Like a fisherman's hook in the water, trawl nets are nearly invisible once deployed. In the past, knowledge of how a net was performing was based entirely on the experience of the captain behind the wheel. Deployment complications could result in an incomplete opening of the net or perhaps the weighted "footrope" intended to dredge the ocean floor might not be making contact.

Scientists now use wireless net-monitoring systems to reveal how a net is performing in the water. Special sensors attached to the fishing gear relay information back to the boat via a hydrophone, providing virtually any imaginable measurement one may desire to know about the net. Wingspan (the distance from one side of the net to the other) is constantly monitored, informing the captain if the net is fully open, while a bottom-contact sensor



Technological advances in the field of fisheries research continually enhance and improve the way data is collected, making it faster, easier and more efficient to count fish. While these advancements may come with a hefty price tag, the payoff is immense, often resulting in new data that was previously unobtainable.



indicates whether the footrope is on the ground as it should be. Additional data, such as temperature and depth, are constantly recorded—information that was previously difficult to monitor over the course of a 20-minute sampling tow.

The Thermometer

Since its first launch in 1989, the New Jersey Stock Assessment Survey has always monitored water quality parameters such as dissolved oxygen and salinity, but the measurement techniques have changed dramatically. Traditionally, fisheries scientists would collect water samples from various ocean depths and transport them back to their laboratory. Hours would be spent performing Winkler titrations—a chemically-based analysis to determine the amount of oxygen contained in a water sample. Although tried and true, the method required glass laboratory components, chemicals and a skilled scientist familiar with this method-

ology along with the ability to interpret the results. And this analysis only determines the water's dissolved oxygen level! Numerous additional complex tests would be required to obtain other water quality parameters important to evaluating the conditions from where the fish were sampled.

Fisheries scientists now use electronic devices to obtain this data. A "SONDE" device (Shipboard Oceanographic Networked Data Environment) now records everything scientists need to know in one convenient unit. Think of it as an environmental Swiss Army knife. Multiparameter SONDEs, such as those used for

the Stock Assessment Survey,
are lowered to the ocean
floor by a data cable
connected to a
hand-held
display

unit aboard the ship. Measurements of water depth, temperature, salinity, dissolved oxygen and pH are recorded every half-second during the device's voyage to the bottom of the sea and back. What used to take hours and resulted in one set of measurements each at the bottom and surface of the water column, now takes only minutes and provides a complete chemical profile of depths approaching 90 feet.

The Fishing Log

The bulk of the information gathered by the Ocean Stock Assessment Survey is biological data on the fish species sampled. Most of this data is length and weight collected from thousands of fish every year. Paper data-sheets used to be the only way to record the large amount of information obtained from each drag of the net. A biologist would record the weight of each basket loaded with a particular fish species, then measure the length of every fish in that basket. All this data could fill many double-sided data sheets. Once a survey was completed, each data sheet would be checked for errors, entered into a computer database and then verified to be error-free. Repeating this process for nearly 200 samples annually required several staff members numerous weeks to complete.

Miniaturization of electronic components has expanded and simplified fisheries data collection by means of hand-held computers, much like a smartphone. The former steps for data-recording, entry and error-checking are reduced to a single step of data-entry, followed by a quick check for erroneous or missing information. One person can handle updating the database in only a few days.

Advances in technology have proven invaluable to fisheries research scientists. It's difficult to imagine what might be the next big leap forward in marine fisheries research—but it is eagerly awaited.

With a YSI/Xylem brand SONDE instrument, surveyors measure water quality parameters important for monitoring environmental trends.





MARINE TRADES

Skillful Angler Recognition Program

RECOGNITION PROGRAMS =

The Skillful Angler Program is designed both to supplement the New Jersey Record Fish Program and to acknowledge that many anglers catch freshwater and marine fish that are not record size but are still worthy of recognition because the size and weight of the fish sufficiently tested the angler's skill. Open to resident and non-resident anglers. All fish must be caught in New Jersey waters using hook and line during legally open seasons.

Saltwater species taken from a boat must have been caught from a boat that left from, and returned to, a New Jersey port during the same trip.

Anglers can now submit their application and photo(s) electronically! Program rules and steps to enter are found here https://njfishandwild-life.com/skflang.htm. Anglers qualifying for a Skillful Angler award receive a certificate along with a Skillful Angler patch as a testament to their achievement. The Program has three main

divisions: Adult (for anglers age 16 and older), Junior (under age 16) and Catch and Release (based on length). A clear, side-view photo that allows accurate species identification must be included with each application. Additional good quality (and high resolution) photos with the angler are welcome and appreciated.

The Skillful Angler Program recognizes different levels of fishing expertise. An angler who submits five applications of qualifying size for the same species will receive a Specialist Certificate and patch. An angler who submits five applications of qualifying fish of different species will receive a Master Certificate and patch. Catch 10 or more qualifying species of fish within the year, and the angler will earn an Elite Angler Certificate and patch.

For new anglers, the Program also recognizes your first fish caught *no matter the age of the angler*. Qualified anglers will receive a First Fish certificate.

New!

Email your entry and photo from any device!

https://njfishandwildlife.com/skflang.htm

There are also four "Slam" categories — an Inshore Slam 1, Inshore Slam 2, Offshore Pelagics Slam and Marlin Slam. For the Inshore Slam 1, an angler must submit qualifying applications for a striped bass, bluefish and fluke. For the Inshore Slam 2, an angler must submit qualifying applications for black sea bass, tautog, and weakfish. The Offshore Pelagics Slam will be obtained if an angler submits qualifying applications for bluefin tuna, bigeye tuna, yellowfin tuna and dolphin. For the Marlin Slam, an angler must submit qualifying applications for a white marlin and a blue marlin.

Each month, the leaders of each category and species will be posted on our Skillful Angler Leader Board web page. At the end of the year, special recognition is given to anglers who catch the largest fish in each species category. The winner of each category is sent a special certificate recognizing his/her accomplishment along with a winner's patch as the best of New Jersey's Skillful Anglers.

Fish must be measured from the tip of the nose (with mouth closed) to the tip of the tail. For catch and release categories, the fish must be measured and photographed alongside a ruler. For Adult/Junior Division, fish must be weighed and measured by a fishing license agent, tackle shop or authorized Fish and Wildlife fisheries biologist.

Anglers must submit a photograph of the fish caught, alongside a ruler for clear identification and measurement verification. Be sure the rule markings are legible. All photos become the property of the NJDFW and may be used for promotional purposes.

To apply, go to:

NJFishandWildlife.com/pdf/skflangapp-salt.pdf.

Minimum Entry Requirements:

Species	Adult Weight (lbs., oz.)	Junior Weight (lbs., oz.)	Catch & Release (inches)	
Black Sea Bass	4	3	20	
Striped Bass	40	36	42	
Black Drum	70	63	46	
Bluefish	18	16	33	
Cod	30	27	42	
Dolphin	30	27	n/a	
Winter Flounder	2	1 lb., 8 oz.	16	
Fluke	8	7	27	
Kingfish	1	8 oz.	13	
Mako Shark	250	225	n/a	
Blue Marlin	400	360	n/a	
White Marlin	60	54	n/a	
Pollock	25	22 lbs., 8 oz.	41	
Tautog	8	7	22	
Albacore Tuna	50	45	n/a	
Big Eye Tuna	200	180	n/a	
Bluefin Tuna	500	450	n/a	
Yellowfin Tuna	120	108	n/a	
Tuna (other)	250	225	n/a	
Weakfish	10	9	30	

The New Jersey State Record Fish Program requires a separate application and is based on weight alone. Scale certification documentation and a weighmaster's signature are necessary. Other rules apply. Visit Fish and Wildlife's website at NJFishandWildlife.com for a complete list of current state records. See also page 28.

New Jersey State Federation of Sportsmen's Clubs

If you care about...

- Wise management of fish and wildlife populations
- Protection and enhancement of natural lands and waters
- Preservation of traditional outdoor sports



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- Stay informed on issues affecting NJ sportsmen and sportswomen
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- Meet others who share similar sporting interests
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State Record Marine Sport Fish

RECOGNITION PROGRAMS =



Brian Cassidy of Red Bank made his way onto the state record fish list recently by landing a gray triggerfish while spearfishing. Brian was free diving off the shore of Monmouth Beach when he landed the 3-pound, 13-ounce fish. The new record gray triggerfish/ spearfishing measured 16 1/8 inches in fork length.

New Jersey Division of Fish and Wildlife's Record Fish Program honors anglers who catch the largest of select species of freshwater and saltwater fish. Record size is based on weight alone; there are no line classes. Currently there are 76 marine species eligible for entry into the program which includes a new spearfishing category with 17 additional species.

Anglers are reminded that the objective of the Record Fish Program is to increase awareness of fishing opportunities for species that are regularly sought and routinely found on or off the coast of New Jersey. The original list of 72 species was pared down with that objective in mind.

Twelve species are now retired from the list of program-eligible fish, but remain on a separate list posted on Fish and Wildlife's website. One historical catch is also retired and posted on the list.

Anglers should be aware of the procedure in effect for entering the Record Fish Program. First, separate applications are required for freshwater and saltwater species. Second, for saltwater entries, it is now mandatory that a marine biologist inspect any potential record fish, as identification solely by photo is not always accurate. Anglers must call Fish and Wildlife's Nacote Creek Research Station at (609) 748-2020 to make arrangements for inspection. In most instances, the fish must be transported to this office in Port Republic. However, in the case of extremely large fish (i.e., shark and tuna), a biologist should be available to travel for dockside inspection. Note that all scale certification requirements still apply, including a valid Certificate of Inspection/Test Report and current Registration Certificate issued by the County Office of Weights and Measures.

The entry deadline is now no later than one month after the date of catch.

For a complete list of state record fish or to print an application with complete program rules, visit the Division of Fish and Wildlife's website at NJFishandWildlife.com/fishing.htm.

New Jersey State Record Marine Fish

Species	Lbs.	Oz.	Year	Angler	Where Caught	
Amberjack, greater	85	0	1993	Edwin Metzner	Off Cape May	
Bass, black sea	9	0	2015	Steve Singler	Atlantic Ocean	
Bluefish	27	1	1997	Roger Kastorsky	5 Fathom Bank	
Bonito, Atlantic	13	8	1945	Frank Lykes, Jr.	Off Sandy Hook	
Cobia	87	0	1999	John Shanchuk	Off Sea Bright	
Cod	81	0	1967	Joseph Chesla	Off Brielle	
Crab, blue	8¾" pt. to pt.		2008	Raymond Ponik	Bayonne	
Croaker, Atlantic	5	8	1981	Frederick Brown	Delaware Bay	
*Cunner	3	2.4	2015	Jorge Antonio Costa	Mud Hole	
Dogfish, smooth	19	11.2	2013	Michael J. LaTorre, Jr.	Sculls Bay	
Dogfish, spiny	15	12	1990	Jeff Pennick	Off Cape May	
Dolphin	63	3	1974	Scott Smith, Jr.	Baltimore Canyon	
Drum, black	109	0	2008	Nick Henry	Delaware Bay	
Drum, red	55	0	1985	Daniel Yanino	Great Bay	
Eel, American	9	13	1988	Warren Campbell	Atlantic City	
Fluke	19	12	1953	Walter Lubin	Off Cape May	
Flounder, winter	5	11	1993	Jimmy Swanson	Off Barnegat Light	
Hake, red (Ling)	12	13	2010	Billy Watson	Off Manasquan	
Hake, white	41	7	1989	Wayne Eble	Off Barnegat Light	
Kingfish, Northern	2	8	2004	Chester Urbanski	Barnegat Bay	
Mackerel, Atlantic	4	1	1983	Abe Elkin	Manasquan Ridge	
Mackerel, king	54	0	1998	Fernando Alfaiate	Off Cape May	
*Mackerel, Spanish	9	12	1990	Donald Kohler	Off Cape May	
Marlin, blue	1,046	0	1986	Phil Infantolino	Hudson Canyon	
Marlin, white	137	8	1980	Mike Marchell	Hudson Canyon	
Perch, white	2	12	1998	Michael King	Little Beach Creek	
*Pollock	46	7	1975	John Holton	Off Brielle	
Porgy	5	14	1976	Victor Rone	Delaware Bay	
Sailfish	43	4	2006	Dr. John Tallia Linden Kohl Can		
Seatrout, spotted	11	2	1974	Bert Harper Holgate Surf		
Shad, American	7	0	1967	Rodger West	Great Bay	
Shad, hickory	2	13	2011	Robert Macejka	Mantoloking	

Species	Lbs.	Oz.	Year	Angler	Where Caught	
Shark, blue	366	0	0 1996 William Young, Jr.		Mud Hole	
Shark, bull	Vacant (Minimum Weight 150 lbs.)					
Shark, dusky	530	0	1987	Brian Dunlevy	Off Great Egg Inlet	
Shark, hammerhead	365	0	1985	Walter Thackara	Mud Hole	
Shark, porbeagle	Vacant (Minimum Weight 100 lbs.)					
Shark, s-fin mako	856	0	1994	Christopher Palmer	Wilmington Canyon	
Shark, thresher	683	0	2009	Bennett Fogelberg	Fingers	
Shark, tiger	880	0	1988	Billy DeJohn	Off Cape May	
Sheepshead	19	3	2014	William Catino	Longport	
Spadefish	11	6	1998	Cliff Low	Delaware Bay	
Spearfish, longbill	42	0	1989	George Algard	Poor Man's Canyon	
	42	0	1997	Joseph Natoli	Hudson Canyon	
Spot	0	13	2003	Robert Belsky, Jr.	Little Sheepshead Creek	
*Striped bass	78	8	1982	Al McReynolds	Atlantic City	
Swordfish	530	0	1964	Edmund Levitt	Wilmington Canyon	
*Tautog	25	5.92	2015	Frank LaMorte	Atlantic Ocean	
Tilefish, golden	63	8	2009	Dennis Muhlenforth	Lindenkohl Canyon	
Tilefish, gray	23	4	2015	Mark Milici	Lindenkohl Canyon	
Triggerfish, gray	6	11	2016	James Massimino	Sea Girt Reef	
Tuna, albacore	77	15	1984	Dr. S. Scannapiego	Spencer Canyon	
Tuna, big-eye	364	14	1984	George Krenick	Hudson Canyon	
Tuna, bluefin	1,030	6	1981	Royal Parsons	Off Pt. Pleasant	
Tuna, skipjack	13	4	1999	Craig Eberbach	Wilmington Canyon	
Tuna, yellowfin	290	0	1980	Wayne Brinkerhoff	Hudson Canyon	
Tunny, little	24	15	1977	Mark Niemczyk	Off Sea Bright	
Wahoo	123	12	1992	Robert Carr	28-Mile Wreck	
Weakfish	18	8	1986	Karl Jones	Delaware Bay	
Whiting (silver hake)	Vacant (Minimum Weight 2.5 lbs.)					

^{*} Fish was previously certified by the IGFA as a world record. For information concerning the New Jersey State Record Fish or Skillful Angler programs, visit the New Jersey Division of Fish and Wildlife's website at NJFishandWildlife.com.

New Jersey State Record Marine Fish — Spearfishing Category

In 2014, the NJ Record Fish Program expanded with the addition of a Spearfishing category for saltwater. Seventeen (17) species commonly sought after by spearfishers are part of the Program. Spearfishers now have a unique opportunity to be recognized in New Jersey's Record Fish Program. Anglers are reminded that the objective of the Record Fish Program is to increase the awareness of fishing opportunities for species that are regularly sought and routinely found in or off the coast of New Jersey.

Species	Lbs.	Oz.	Year	Angler	Where Caught	
Amberjack, greater	Min. Wt. 60 pounds	VACANT				
Bass, black sea	Min. Wt. 5 pounds		VAC	ANT		
Bluefish	22	2	2017	Igor Kotov	Shark River Reef, USS Algol	
Cobia	60	0	2015	William Maier	Off Cape May	
Cod	Min. Wt. 50 pounds	VACANT				
Dolphin	Min. Wt. 40 pounds	VACANT				
*Fluke	15	5	2014	Robert A. Davis	Off Barnegat Lighthouse	
Flounder, winter	3 pounds	7	2018	Jim Oriscak	Shark River "back bay"	
Hake, red (ling)	Min. Wt. 9 pounds	VACANT				
Pollock	Min. Wt. 30 pounds	VACANT				
Porgy	Min. Wt. 4 pounds	VACANT				
Sheepshead	Min. Wt. 12 pounds	VACANT				
Spadefish	Min. Wt. 9 pounds	VACANT				
Striped bass	Min. Wt. 55 pounds	VACANT				
*Tautog	23	14	2007	Luke Dylan Hickey	Off Cape May	
Triggerfish, gray	3 pounds	13	2018	Brian Cassidy	Off Monmouth Beach	
Weakfish	11.8	n/a	2009	Tai Menz	Off Cape May	

^{*} Fish was recognized by the International Underwater Spearfishing Association as a world record.



Health Advisory

FISH SMART, EAT SMART =

Eating Fish And Crabs Caught In New Jersey Waters

Fishing provides enjoyable and relaxing recreation. Fish are an excellent source of protein and other nutrients and play a role in maintaining a healthy, well-balanced diet. Many anglers enjoy cooking and eating their own catch. However, elevated levels of potentially harmful chemical contaminants such as dioxin, polychlorinated biphenyls (PCBs), pesticides



and mercury have been found in certain fish and crabs in some New Jersey waters. Fish consumption advisories have been adopted to guide citizens on safe consumption practices.

To reduce exposure to harmful chemical contaminants when preparing and eating the fish species taken from the identified waters, it is essential to follow the guidelines provided. The DEP encourages you to consult the Fish Smart-Eat Smart Fish Advisory Guide or, for a complete list of state and federal marine fish consumption advisories visit www.FishSmartEatSmartNJ.org for making decisions about eating recreationally caught fish and crabs.

Try the Interactive Map!

One click on the waterbody where you fish takes you to any current health advisories.

www.FishSmartEatSmartNJ.org









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Special Management Zones for 13 Artificial Reef Sites off New Jersey

NOAA Fisheries has established 13 artificial reef sites as special management zones. Fishing is allowed year-round with handline, rod and reel, or spear (including the taking of fish by hand). **All other gears are prohibited.**



FAQs

As a recreational fisherman, can I continue fishing on these reefs with rod and reel gear?

Yes, anyone may fish on the reefs year-round using rod and reel gear.

Is commercial fishing allowed in these areas?

Yes, commercial fishing with handline, rod and reel, or spearfishing is allowed, if you have the proper state and federal permits. However, all other fixed and mobile gears are banned, including pots/traps and pelagic longlines.

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https://www.fisheries.noaa.gov/bulletin/ noaa-designates-13-artificial-reef-sitesspecial-management-zones



U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

Sedge Island Natural Resource Education Center Programs — Summer 2019

- Sedge Island Fishing Experience:
 A 4-day 3-night marine fishing intensive program. Open to students going into grades 8 and 9 in the fall of 2019.
- Barnegat Bay Field and Research Experience: A 6-day 5-night program focused on conducting field research. Open to high school students.
- Sedge Island Field Experience:
 A 4-day 3-night program that has students work alongside biologists in the salt marsh field. Open to students going into grades 7, 8 and 9 in the fall of 2019.
- Bay to Bowl: A 3-day 2-night program open to adults interested in harvesting food from the bay and learning how to prepare and cook it.

For more details, dates and cost visit **NJFishandWildlife.com/sedge.htm** or contact Karen Byrne at Karen.Byrne@dep.nj.gov.



Law Enforcement and Regulation Information

Contact a New Jersey Division of Fish & Wildlife Law Enforcement office that serves the county where you hunt or fish.

- Northern Region (908) 735-8240 (Bergen, Essex, Hudson, Hunterdon, Morris, Passaic, Somerset, Sussex, Union and Warren counties)
- Central Region (609) 259-2120 (Burlington, Mercer, Middlesex, Monmouth and Ocean counties)
- Southern Region (856) 629-0555
 (Atlantic, Camden, Cape May, Cumberland, Gloucester and Salem counties)
- Marine Region (609) 748-2050 (coastal and bay areas)
- To report violations anonymously call Operation Game Thief — (855) OGT-TIPS

Attention Boaters

Keep Our Water Clean— Use Pumpouts

Ready To Serve Boaters! Visit marina pumpout facilities or contact one of the pumpout boats. A complete listing of operational pumpout facilities at marinas and detailed information on the pumpout boats can be found at NJBoating.org.

Proper maintenance and operation of your on-board toilet and holding tank are critical to ensure they function properly.

- Always use sufficient water when flushing
- Use toilet paper designed for use in marine/RV systems
- Have your marina inspect your onboard toilet system to make sure it is operating properly



Operation Game Thief

Report Abuse of our Outdoor Heritage!

1-855-0GT-TIPS

24 Hours a Day, Seven Days a Week

The person who poaches, pollutes habitat and abuses public land tarnishes the image of sportsmen and robs us of our fish and wildlife as well as tax and license dollars. You can make a difference.

Call OGT to report:

- Negligent use of firearms
- Over the limits for game and fish
- Commercial exploitation of fish and wildlife
- Pollution of habitat, dumping on state land
- · Destruction of signs and state property
- · Illegal killing, taking or possession of any wildlife

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Designed to encourage sportsmen to report poaching and wildlife crimes.