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The Gulf of Maine Cod Chronicles

Gulf of Maine (GOM) cod abundance seems to ebb and flow like the tides in Boston Harbor, except over time the highs have gotten lower and lower. Stock recovery from low levels, such as witnessed in the late 1990s, does occur with one and sometimes two year-classes boosting catch and encouraging commercial and recreational fishermen that their bread-and-butter species always will bounce back. Yet, now we have entered a new stage and one that is quite discouraging and disheartening.

This new stage is a decline in GOM cod, due largely to factors beyond our control as fisheries managers, according to those who provide the scientific advice. We now appear to be at 3-4% of our target abundance of mature fish (spawning stock biomass), and fishing mortality appears to be near all-time highs. But how can mortality be so high when fishery-recorded catches are at their lowest levels in the assessment time series (since 1982)?

Reduced fishing effort, caused by fewer fishermen and more regulations, when applied to a low stock, still results in a large percent removal of the little that is left. By definition, overfishing still occurs. Fishermen—commercial and recreational—find themselves in a can't-win, frustrating situation.

Having to prevent overfishing—and rebuild to target biomass levels by set deadlines—drives catch limits down and obliges more restrictions, such as seasonally closed areas, much to fishermen's chagrin and outrage.

In recent years, managers have not ignored scientific recommendations for GOM cod catch limits. In fact, since 2008, the New England Fishery Management Council (NEFMC), including the National Marine Fisheries Service, has been obligated by law to set limits no higher than those provided by scientists, i.e., the Council's Scientific and Statistical Committee (SSC) relying on peer-reviewed assessments.

Subsequent stock assessments have shown that even those SSC-provided limits were too high to rebuild GOM cod. Scientists overestimated current stock size and how many young fish (recruits) would be produced, but underestimated how many cod fishermen would catch.

These mistakes were due to many factors, not the least of which is that the GOM cod stock has proven to be very difficult to assess. This is perhaps due in part to the fact that the stock isn't properly defined—a conclusion made by a June 2012 GOM Cod Stock Structure Workshop. It's a problem that should, but cannot, be corrected unless all commercial fishermen's shares of GOM cod—based on their historical catches of this stock—are re-calculated. This would be an onerous outcome for most commercial fishermen who have lived with their valuable shares every year since 2010.

So, where are the cod? Some might say many of the young produced by the remaining GOM spawning aggregations are eaten before they have a chance to recruit to the fishery, or even appear in bottom trawl surveys.

For years, Northeast Fisheries Science Center (NEFSC) scientists have warned that groundfish rebuilding could be prevented by the presence and great abundance of spiny dogfish that now roam the Gulf in large schools for most of the year. In 2002, NEFSC scientists estimated that in one year of their study (1998), an average of 2.15 million age 1 (pre-recruit) cod were eaten by dogfish (range of 490,000 to 4.66 million fish).

They cited an estimate of age-1 abundance at 5.77 million fish (Link, Garrison, and Almeida 2002). Those numbers were for 1998, when dogfish abundance was relatively low. Now, we're far above the biomass target and dogfish are much larger in size. Being prodigious fish-eaters, the dogfish diet is comprised primarily of sea herring, sand lance, and cod of similar size, i.e., small-bodied individuals.

Perhaps this predation is one reason scientists now assume natural mortality has increased dramatically with cod abundance dipping to very low levels in recent years (2009 to present). This corresponds to the years with an "explosion" of large dogfish, especially found inshore including state waters. We have to wonder, "Is there a connection?"

Some might say cod (including juveniles) have moved to deeper waters in the Gulf of Maine, or even left the Gulf due to warming waters associated with assumed climatic change. There is no convincing evidence this has occurred, even though many fishermen claim it is the case.

During its meeting in October, NEFMC requested that the Regional Administrator of the National Marine Fisheries Service take emergency action to respond to the assessment update. Timely rebuilding will be very difficult, perhaps impossible, with our relatively high rebuilding target.

MarineFisheries continues to urge adoption of seasonal area closures to protect spawning cod. Known for our bellwether research on spawning cod and their distribution, done in cooperation with the Nature Conservancy, UMass at Dartmouth SMAST, and NOAA, *MarineFisheries* proposed and continues to urge a November through January closure of Massachusetts and Cape Cod Bays (Statistical Area 125 and a portion of Area 124) where cod return to reproduce. This is when cod aggregate and where they are easily found and caught. Understandably, this approach is resisted by many fishermen.

MarineFisheries does not take closures lightly. However, there is the future to consider and our obligation to groundfish conservation and rebuilding. That is the foundation for the Commonwealth's groundfish fisheries. At this time, that foundation is cracked, and we cannot afford to let it crumble.

We can only hope other forces, such as climate and predators (including our burgeoning populations of seals along our coast), don't thwart GOM cod rebuilding efforts. Many depend on this fishery – a fishery that will see its SSC-determined acceptable biological catch (ABC) cut from the anticipated 1,550 metric tons scheduled for May 1, 2015 to a bit less than 400 metric tons making it a fishery that can no longer be "directed," but one just of bycatch. This is an outcome few ever imagined our groundfish fishery would ever face.

By David Pierce, Ph.D., Deputy Director

Referenced work: Link, J.S., L.P. Garrison, and F.P. Almeida. 2002. Ecological interactions between elasmobranchs and groundfish species on the northeastern US continental shelf. I. Evaluation predation. *North American Journal of Fisheries Management* 22, 2: 550-562.

Using advanced tagging technology to elucidate the post-release mortality of Atlantic cod

There is no fish more essential to New England's history, culture, economy, and marine ecosystem than the Atlantic cod (*Gadus morhua*). After centuries of fishing, however, the once vast cod population in the Gulf of Maine is currently struggling to recover from historic lows. While each year over the last decade the commercial fishery has caught the most cod, the recreational fishing industry (which is composed of private, charter, and head boat anglers) has been responsible for 20–30% of the total cod catch.

In an effort to rebuild cod stocks, fishery managers regulate the amount of cod to be harvested annually, and limit the quantity and size of cod that can be kept daily. These harvest restrictions reduce the number of cod removed from the stock. Size restrictions provide smaller fish a chance to reach maturity when they can reproduce and support stock rebuilding.

Within the recreational fishery, as a result of the regulations, nearly twice as many cod by number are discarded as are kept. In fact, NOAA's Northeast Fisheries Science Center estimated that in 2010 alone, the recreational cod fishery discarded over 5 million pounds in the Gulf of Maine!

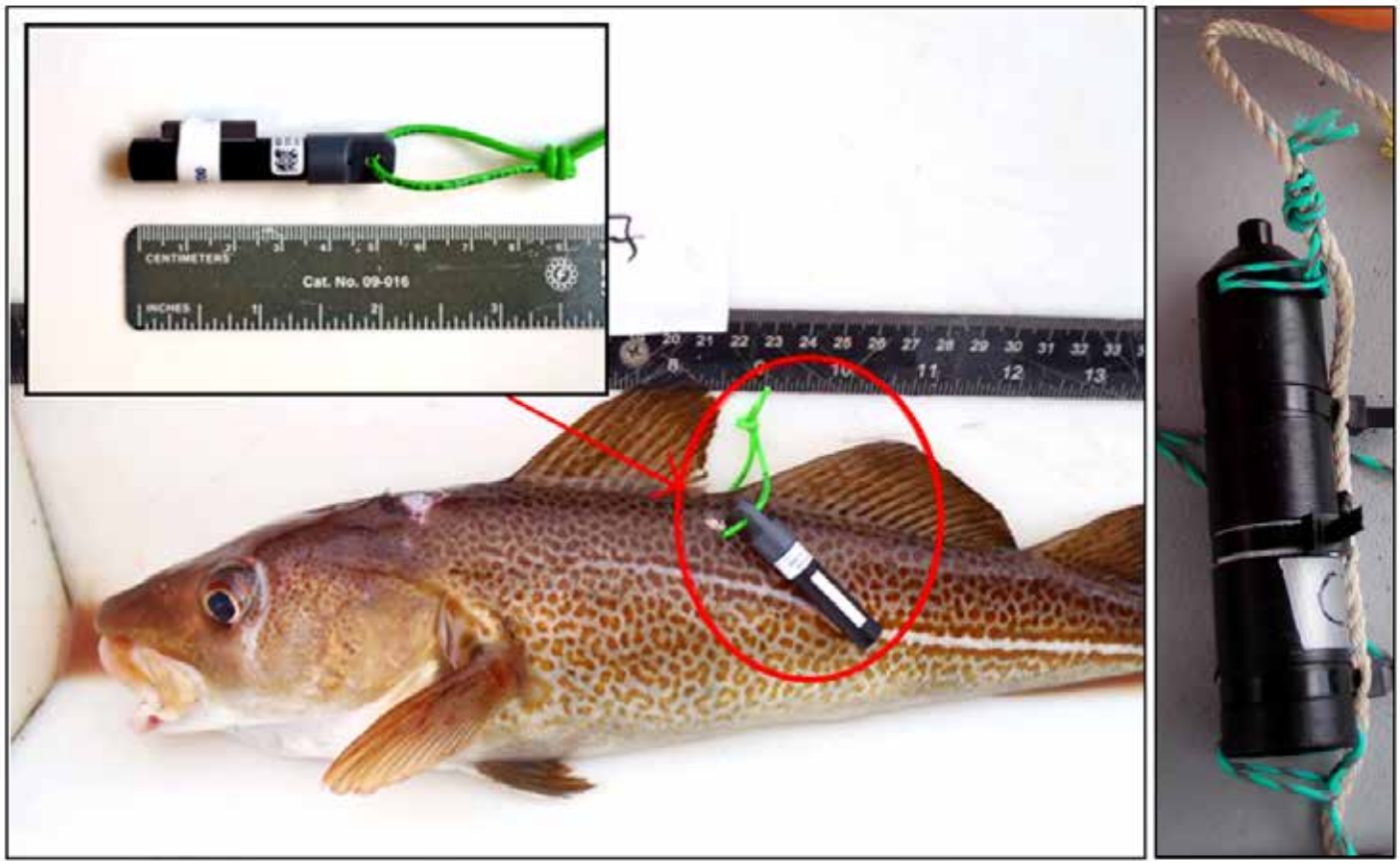
Being captured and handled by a person can induce significant stress on a fish, such as physical injury due to hooks, rough handling, air exposure, variations in temperature, and changes in pressure as the fish is brought to the surface. These stressors also reduce a fish's strength and response time, making it more vulnerable to predation after being released back into the ocean. All of these stressors negatively impact its chance of survival, sometimes resulting in death after release (known as "post-release mortality"). Currently, the post-release mortality rate for recreationally caught cod is unknown and estimates used by managers and biologists are purely guess work.

Having an estimate of cod post-release mortality is very important because it informs management decisions, stock assessments, and best fishing practices (to help reduce the number of fish that die in the future). Due to its importance, *MarineFisheries* has teamed up with the New England Aquarium, University of New England, and an active hook fisherman based out of New Hampshire, to study the health effects and the mortality rates of sub-legally sized cod that are recreationally caught and released in the Gulf of Maine.

Determining the exact percentage of fish that die after being released back into the open water is a difficult challenge. Past studies have used tanks and cages to hold the fish after being caught, but these methods had many limitations and introduced biases, which confounded results. To truly understand what happens to a cod after it is released, the fish needs to be monitored in-situ and over large periods of time.

To meet the needs of the study, our team deployed a high-tech acoustic telemetry tagging system manufactured by the Canadian-based company Vemco. The system uses transmitters (tags) and receivers to generate data. The transmitters are about the size of a AAA battery and are attached to the back of the fish using a loose-fitting, soft plastic-coated line. Once activated, the tag transmits data that includes a unique identification and sensor data, such as depth. These transmissions are picked up by an array of strategically placed receivers. The tags that we used had a detection range of approximately a third of a mile and the receivers had enough memory to hold 1.6 million detections.

When designing the study, careful consideration was given to the fishing techniques used to catch the cod. It was important that we used gear and practices most commonly used in the



Photos © by C. Capizzano

Acoustic tags were attached to cod between the first and second dorsal fin. These tags transmit an acoustic signal that is detected by receivers, such as the one on the right. Before putting these expensive transmitters on fish in the field, we did a preliminary laboratory study to make sure that the tags affixed in this manner did not detach, compromise health, or impede swimming ability.

recreational hook-and-line fishery. In order to determine what these were, we collected information from anglers through a pre-study questionnaire on their chosen practice, including bait type, gear, and techniques used when fishing for cod. Based on the survey results, we standardized our gear and deployed two tackle setups, an artificial lure (Norwegian 14 oz. stainless steel jig with hair teaser) and a high-low j-hook rig that was baited with surf clams.

We used tags that transmitted depth at the point of detection to provide us with evidence of the fish's movement within the water column. The unique identification detections gave us movement between receivers. Using these two criteria, we were able to determine whether a tagged cod was dead or still alive in the aftermath of release.

Now that the data has been collected, we are working on our ultimate goal of the study, which is to correlate various factors of the fish's capture—such as what tackle setup was used, how long the fish was on the hook, and how much time it spent on deck—with its health and survival. This will help us determine which aspects of capture are the most stressful for a fish reducing its chance for survival. In turn, this will allow us to advise recreational anglers on the capture and handling methods that offer the highest likelihood for survival of these released (sublegal) cod.

Currently NOAA Fisheries has imposed an Emergency Action that will have profound effects on how, when, and where anglers will be able to fish for cod in 2015. Due to near record-low stock abundance, daily catch limits will be further reduced and seasons shortened. Typically when in the absence of data, NOAA Fisheries has no choice but to be conservative. Fortunately, they are aware of this study and although final notes are still being incorporated into the report, we have begun to provide cod fishery managers and biologists with actual numbers of post-release mortality. So rather than applying guess work estimates of recreational fishery induced mortality, they are now using an informed estimate.

The timetable to a rebuilt Atlantic cod stock is still unknown, but through applying advanced technology, we are getting a clearer picture of what is really occurring when a cod is released back into the ocean after being caught with a rod and reel. By advising anglers on science-proven improved handling techniques, and providing biologists and fishery managers with accurate estimates of post-release mortality, more cod are being conserved. And hopefully with a little luck, more will be available to catch another day.

Contributions for this article were from Dr. John Mandelman (*NEAq*), Emily Jones (*NEAq*), Lauren Giglio (*NEAq*), and Connor Capizzano (*UNE*).

By Bill Hoffman, Senior Fisheries Biologist

Groundfish disaster aid payments underway

Groundfishermen impacted by the recent groundfishery disaster have begun to receive aid payments—and none too soon as the fishery faces further bad news for the 2015 fishing year. Bin 1, which is nearly complete, allocated $6.3 million to pre-identified federal limited access multispecies permit holders qualified by the National Marine Fisheries Service (NOAA Fisheries). In Bin 2, the Commonwealth has developed a state specific plan for the distribution of an additional $8.2 million in disaster funds to permit holders, crew, and groundfishing communities.

In May of 2014, stemming from a 2012 disaster declaration, NOAA Fisheries and state fishery directors from Maine to New York announced a three-part framework for the disbursement of $32.8 million in federal disaster relief: (1) direct aid to federal groundfish permit holders, (2) individual state specific spending programs, and (3) development of a potential buyout/buyback program. As part of this program, the Commonwealth will administer the distribution of roughly $14.5 million in funds to mitigate impacts from severe catch limit reductions on the Commonwealth's groundfish fishery.

Bin 1: Payments Wrapping Up for Federal Groundfish Permit Holders

The first round of federal relief was directed at federal groundfishermen active during the disaster period of May 1, 2010 through April 30, 2014. Permit holders who had landed at least 5,000 pounds of groundfish in any one of the 2010 through 2013 fishing years were pre-qualified by NOAA Fisheries to receive a $32,500 flat payment. With 201 of the 345 qualified permit holders homeported in Massachusetts, *MarineFisheries* has been responsible for administering nearly 60% of the disaster relief in Bin 1. As of mid-October, *MarineFisheries* has processed payment for all but 20 eligible individuals.

Although the Commonwealth is receiving the majority of the disaster relief funds allocated to the Northeast states, this amount is still not enough to make financially whole all of the potentially eligible Massachusetts groundfishermen and communities impacted by the fisheries disaster.

As was the case with the federal disaster aid program administered by the Commonwealth in 2008, *MarineFisheries* implemented a cap on the total funding received by a single entity to ensure that the limited funds allocated to the Commonwealth are distributed to the greatest number of eligible fishermen, crew, and communities affected by the groundfish disaster. As implemented, the cap limits Phase 1 disaster aid payment to a single entity at $354,198 – the average annual groundfish revenue earned by a vessel during the disaster period.

State	Number of Eligible Individuals Pre-qualified for Bin 1 Payment
CT	3
MA	201
ME	52
NH	28
NY	18
RI	43
Total	345

Bin 2: Spending Strategies Approved by NOAA Fisheries

As Bin 1 payments wrap up, *MarineFisheries* is gearing up for distribution of Bin 2 funds. On October 24, 2014 *MarineFisheries* submitted a final grant proposal for Bin 2 to NOAA Fisheries, which was subsequently approved February 5, 2015. In this state specific program, the Commonwealth will disburse an additional $8.2 million in federal disaster aid to additional components of the Commonwealth's groundfishery not addressed in Bin 1.

The majority of the $8.2 million will be directed towards federal and state groundfish permit holders impacted by the 2012 disaster declaration in the commercial and for-hire groundfish fisheries as well as crew on qualified commercial and for-hire vessels. Available funds will also supplement sector administration costs, mitigate impacted shoreside businesses, and subsidize crew safety training.

Qualifying criteria for commercial permit holders have been kept generally consistent with Bin 1 by defining those active in the fishery during the disaster period. However, the Division has expanded the reach of the aid by both considering an additional year (FY2009) in certain cases as well as a lower poundage rate (3,000 lb.) for those permit categories, like Handgear A, that operate under trip limit regulations and thus may not see their landings rise to the 5,000-lb. criterion. Payments have been tiered based on the poundage filter met.

Similarly, for-hire fishermen will receive a higher or lower flat rate payment based upon having landed groundfish on a higher or lower minimum number of trips in any one year during FY 2010-FY2013. In general, tiering payments enables *MarineFisheries* to recognize the varying impacts to components of the groundfishery while being as inclusive as possible:

Higher Flat Rate

Federal limited access multispecies permit holders who landed 5,000 lb. or more of groundfish in FY2009

State groundfish endorsement permit holders who landed 5,000 lb. or more of groundfish in any one year, FY2009-FY2013.

For-hire permit holders with at least 50 for-hire trips in GOM with at least 1 cod, pollock, or haddock per trip in any one year, FY2009-FY2013

Lower Flat Rate

Federal limited access multispecies permit holders who landed 3,000 lb. or more of groundfish in any one year, FY2010-FY2013

For-hire permit holders with at least 30 for-hire trips in GOM with at least 1 cod, pollock, or haddock per trip in any one year, FY2010-FY2013

While exact rates will depend on final eligibility numbers, higher flat rate payments may be as high as, but won't exceed $32,500; the rate paid to qualified Bin 1 permit holders. Lower flat rates will be 60% of the higher rate, based on the relative poundage or trips required in the qualification criteria (e.g., 3,000 lb. vs. 5,000 lb. or 30 trips vs. 50 trips). Permitted vessels that qualified for a Bin 1 payment are disqualified from receiving any additional funds in Bin 2.

Payments to crew will be scaled depending on the number of years active in the groundfishery to both mitigate impacts to

active crew members, and also to help promote a strong crew base for the future. Crew members, including owner/operators and lumpers, will be eligible for a flat-rate payment provided they meet minimum income criteria, including (1) 50% of their total income is from for-hire or commercial fishing; and (2) a minimum of $5,000 in revenue is from for-hire or commercial fishing.

Now that the state plan has been approved by NOAA Fisheries, *MarineFisheries* is reaching out to permit holders and crew members to provide further detail. Therefore, *MarineFisheries* is seeking contact information for all crew members employed on qualified vessels to ensure they are kept informed about the application process. Crew members that believe they may be eligible for Bin 2 Disaster Aid should provide their contact information to Samantha Andrews, *MarineFisheries* Program Coordinator, by phone at 617-626-1564 or by email at *samantha.n.andrews@state.ma.us*.

Further information and updates on the Groundfish Disaster Aid Program can be found on the *MarineFisheries* spotlight page *http://www.mass.gov/dmf/groundfishassistance*.

By Melanie Griffin,Fisheries Policy Analyst, and Samantha Andrews, Program Coordinator

Gulf of Maine northern shrimp closed for another year

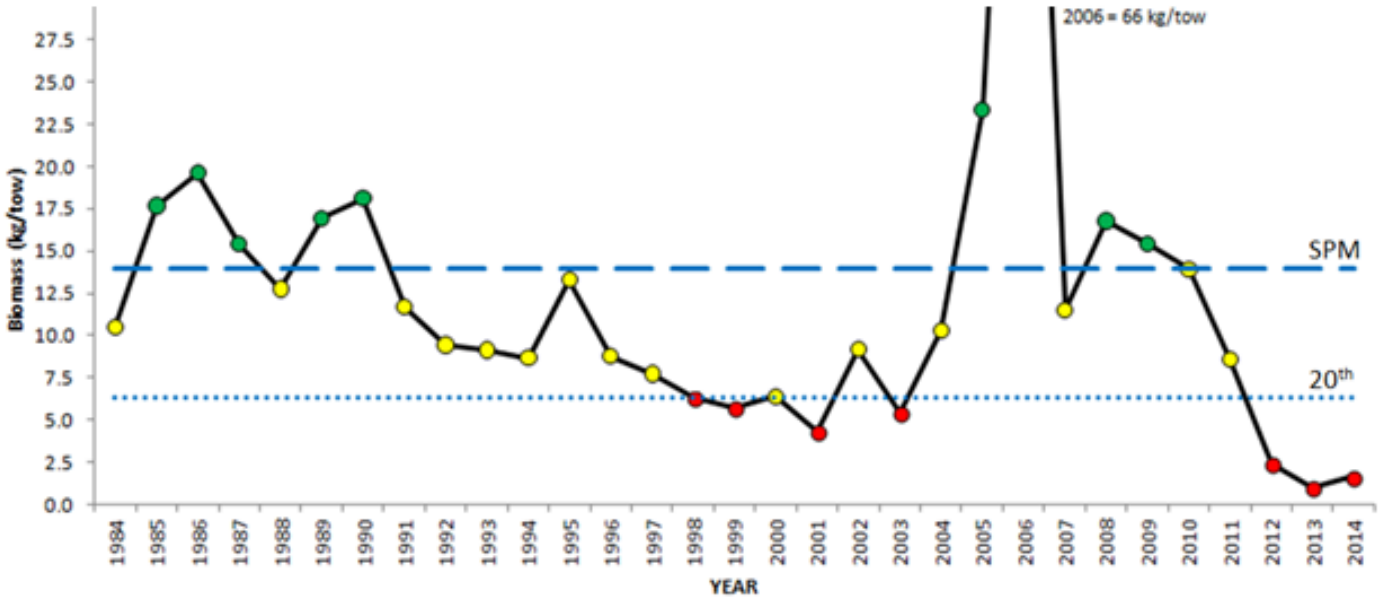
On November 5, 2014 the ASMFC Northern Shrimp Section met in Portland, Maine, to establish rules for the 2015 Northern shrimp (*Pandalus borealis*) commercial fishery. In response to findings from the ASMFC's 2014 Stock Status Report, the Section, chaired by Dr. Michael Armstrong of *MarineFisheries*, implemented a moratorium for the 2015 commercial fishing season, with a 25 mt (55,000 lb.) research set-aside. This is the second season of no fishing for this small, but valuable Gulf of Maine winter fishery, which was last closed in 1978. Northern shrimp are typically caught off the coast of Maine, with some activity off of New Hampshire and the north shore of Massachusetts.

The 2014 Stock Status Report, includes a suite of indicators demonstrating the currently depleted condition of the Gulf of Maine northern shrimp stock. Abundance and biomass indices from 2012 to 2014 fishery-independent surveys were at all-time lows. The 2014 biomass index from the dedicated ASMFC Summer Shrimp Survey was 1.7 kg/tow, well below both the stable period average (1985-1994) of 13.9 kg/tow and the 10th percentile (4.3 kg/tow) of the 31-year time series. This was also reflected in the Maine-New Hampshire inshore spring trawl survey, where northern shrimp biomass sank to unprecedented levels in 2013 (1.7 kg/tow) and 2014 (2.1 kg/tow), compared to a 12-year average of 8.9 kg/tow.

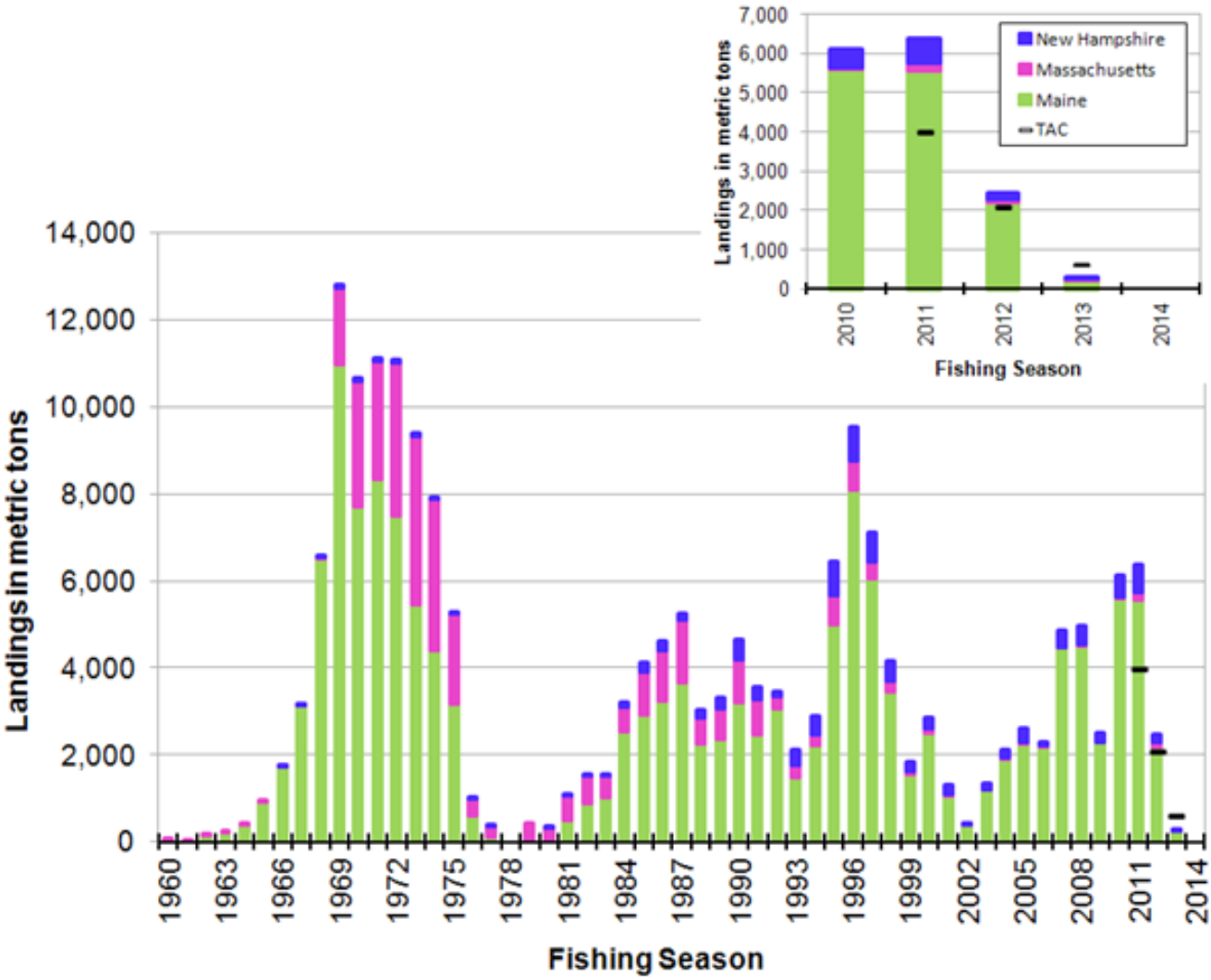
Gulf of Maine northern shrimp are thought to live for roughly five years, and the fishery prefers larger (thus, older) shrimp. In 2010, 2011, and 2012 the abundance of new shrimp produced (as seen in the following year's survey as 1.5 year-olds) was extremely low. For this short-lived species, the three-year run of recruitment failure has had significant consequences. First, there is very little fishable biomass now, as a 2015 fishery would have targeted shrimp from the weak 2010 and 2011 year classes (4-5 year old female shrimp). Secondly, the prospects for a 2016 fishery are also poor, given that the 2011 and 2012 year classes were the smallest ever observed at less than 5% of the average recruit abundance during the stable period. There were some recruits detected from the 2013 year class, but their abundance was still the ninth lowest in the time series. These shrimp are not expected to reach fishable size until 2017.

Factors that have likely contributed to the collapse of this stock include adverse ocean temperatures, increased predator biomass, and elevated fishing effort in recent years. Spring water temperatures were exceedingly warm from 2010-2013, which negatively impacts survival of young shrimp (see DMF News 2013, 3rd and 4th Quarters). Predation by finfish has doubled since the stable period due to growth of the spiny dogfish and Acadian redfish populations, which has affected natural mortality. Finally, the fishery landed relatively large amounts of shrimp from 2010-2012, averaging over 5,000 mt (11 million lb). In these three years, the fishing seasons were closed early due to landings in excess of the total allowable catch (TAC). Specifically, in 2012 the 4,000 mt TAC (8.8 million lb.) was exceeded by nearly 2,400 mt (5.3 million lb.). Landings then

DMF Staff Image



Index of total biomass (all stages of shrimp) of Gulf of Maine northern shrimp from the ASMFC Summer Shrimp survey from 1984-2014. Dashed line is the stable period (1985-1994) mean (SPM); dotted line is the 20th percentile of the time series (1984-2014).



DMF Staff Image

Commercial landings of Gulf of Maine northern shrimp by state (Maine, Massachusetts, and New Hampshire) from 1960-2014. A fishing moratorium was in place in 2014. The last five years (2010-2014) are expanded above, with the total allowable catch (TAC) established for each season noted by a black bar.

declined precipitously in 2013, when a TAC of 625 mt (1.4 million lb) was established but the fishery only harvested about 335 mt (737,000 lb.) While the price per pound for shrimp was high in 2013 ($1.81/lb.), the total value of the 2013 landings was relatively low at $1.36 million, compared to $11.2 million in 2011.

The closures in 2014 and 2015 were enacted to protect the critically low remaining spawning stock with hopes that the stock will demonstrate resiliency through improved recruitment and survival of upcoming year classes. However, this is also dependent on environment, and we optimistically report that water temperatures in the Gulf of Maine were markedly cooler in 2014. Perhaps the reduced fishing pressure and improved environmental conditions will provide at least short-term respite for this stock to rebuild.

By Kelly Whitmore, Marine Fisheries Biologist, ASMFC Northern Shrimp Technical Committee Chair

Bluefin tuna management changes: Amendment 7

On December 1, 2014, the National Marine Fisheries Service (NOAA Fisheries) announced the final rule to implement Amendment 7 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan. The primary purpose of Amendment 7 was to reduce and account for bluefin tuna dead discards in all categories, to optimize fishing opportunities, and to enhance reporting and monitoring. Although the Amendment also implements a quota for North Atlantic albacore, most of the measures will impact commercial and recreational fishermen who catch bluefin tuna, as well as dealers.

In short, the following measures will be implemented:

- Codified quota reallocation: To account for longline category bycatch, 68 metric tons (MT) of quota will be deducted annually, based on historical allocation percentages, from the general, harpoon, angling, purse seine, and reserve categories.
- Annual quota reallocation: Based on the previous year's catch, NOAA Fisheries will annually adjust the purse seine category quota and transfer unused quota to the reserve category, where it will be available to other categories as needed.

- Pelagic longline category measures: The amendment established Individual Bluefin Quotas (IBQs), two new Gear Restricted Areas (Cape Hatteras, North Carolina and Gulf of Mexico), closure of the fishery when the annual bluefin tuna quota is reached, elimination of target catch requirements associated with retention of incidental bluefin tuna, mandatory retention of legal-sized bluefin tuna caught as bycatch, and expanded monitoring requirements, which include electronic monitoring with cameras and catch reporting through a Vessel Monitoring System (VMS).
- Purse seine category measures: New measures require VMS use and reporting, and change the fishery start date from July 15 to a date within a range of June 1 to August 15, to be established by an annual action.
- General, harpoon, and charter/headboat categories: Requires the use of an online catch reporting system for all bluefin tuna retained or discarded dead.
- General and harpoon categories: Allows NOAA Fisheries to make in-season adjustments of retention limits and sub-quotas.
- Angling category: Establishes a Trophy subquota for the Gulf of Mexico.

Most of these management measures will take effect January 1, 2015, with two exceptions: electronic monitoring (June 1, 2015) and minimum IBQ allocation (January 1, 2016) requirements for pelagic longline vessels.

Amendment 7 implements a number of complex measures. *MarineFisheries* encourages those fishermen and dealers that target bluefin tuna to visit the NOAA Fisheries Highly Migratory Species website (*http://www.nmfs.noaa.gov/sfa/hms/*) for more detailed information.

By Dr. Greg Skomal, Senior Marine Fisheries Biologist

Seafood marketing legislation signed into law

On August 13, 2014, Governor Deval Patrick signed into law "An Act Promoting Economic Growth Across the Commonwealth," which, in part, establishes a Seafood Marketing Program within the Division of Marine Fisheries. The establishment of the Seafood Marketing Program is a direct result of the recommendation made by a special commission on seafood marketing, tasked by the legislature to investigate the merits of developing a Massachusetts seafood marketing program, as well as Senate Bill 1979, "An Act Establishing a Massachusetts Seafood Marketing Program," filed by Senator Bruce Tarr in 2013.

The legislation lays out initial objectives for the program including: increasing the public's knowledge about the health benefits of consuming seafood, educating the public on fisheries management, creating name recognition for the Commonwealth's seafood products, stabilizing market prices, and developing a coordinated marketing strategy.

Additionally, the legislation requires that a permanent, 19-member steering committee be appointed to guide *MarineFisheries* in the administration of the marketing program. The steering committee will be comprised of a combination of industry and government representatives.

The Seafood Marketing Program will be funded by up to $250,000 per fiscal year from commercial harvester and dealer permit revenue. Additional funding may be obtained from grants or other sources to fund the program's objectives.

Initial funding for the program will likely become available in early 2015. *MarineFisheries* is working on the structure of the program, including hiring a coordinator. Membership of the steering committee will take shape over the next several months, followed by an inaugural meeting. Stay tuned to DMF News for future updates.

By Story Reed, Fisheries Policy Analyst

DMF Staff Photo

Anglers aged 7 to 15 enjoyed a day on the pier at Let's Go Fishing!

MarineFisheries' inaugural fishing clinic a huge success

In August, *MarineFisheries* hosted its inaugural youth fishing clinic. Let's Go Fishing! was held at the Bass River Fishing Pier in South Yarmouth, in cooperation with Yarmouth Parks and Recreation. The clear sky and warm temperatures drew a mighty crowd to this event on the Cape.

After a quick introduction in rod and reel safety, participants and their families wandered through several educational stations. To encourage responsible fishing, participants measured life-size drawings of fish and checked the regulations to see if they were "keepers" or should be released. A must at every fishing clinic, knot tying was demonstrated and practiced. For those who had never fished before, a "land angler" area allowed the participating youths to get a feel for casting — with no hooks! — on land before venturing onto the pier to fish. There was also a craft tent where everyone was invited to create gyotaku — a fish print — with model fish.

Of course, what fishing clinic is complete without fishing? Equipped with their new skills, participants were invited to fish off the Bass River Pier. Registered youth, between the ages of seven and 15, borrowed rods and dropped baited lines down into the Atlantic. Although it took a little bit of patience from our young anglers, their efforts didn't go to waste. Cunner, scup, bluefish, and even a crab all made it over the railing and into pictures. The kids were excited for their catches and eager to release them back in the water, as this was a catch and release event.

Aside from photographs and memories, registered clinic participants also left the clinic with a starter tackle box. Inside the boxes were circle hooks donated by MustadUSA and Eagle Claw, rigs, a measuring tape, and sun block. In the afternoon directly following the event, many parents emailed saying they went straight to a local tackle shop to buy a fishing rod and reel combo for their angler, and then went fishing again the same day.

With the success of this first fishing clinic event hosted by *MarineFisheries*, plans are already in the works for fishing clinics to continue in the 2015 fishing season. While no locations or dates are set as of yet, plans include hosting clinics in different areas along the Massachusetts coastline. These future clinics will be for kids and families. Clinic information for the 2015 season will be posted on the *MarineFisheries* website starting in spring of 2015.

By Elaine Brewer, Information & Education Coordinator

Proposed amendments to the Large Whale Plan discussed at TRT meeting

On June 27, 2014, after years in development, the National Marine Fisheries Service (NOAA Fisheries) published the much-anticipated Vertical Line amendment to the Atlantic Large Whale Take Reduction Plan. The new rules are meant to address the entanglement risk associated with vertical lines in trap and pot fisheries on the East Coast. Massachusetts inshore waters will be particularly impacted by the new regulations, which include a seasonal closure in the Cape Cod Bay area and a ban on single traps in Massachusetts state waters. The ban on single traps will have significant consequences for small-boat fishermen and those who rely on single pots, due to fishing efficiency and low trap allocations.

In response to the Final Rule, *MarineFisheries* met with industry members to develop an exemption request, which would alleviate some of the hardship on Massachusetts pot fishermen while still providing conservation benefits to large whales. These proposed changes included a shift in the spatial and temporal extent of the Cape Cod Bay seasonal closure, an exemption from the ban on single traps in state waters, and a special gear marking scheme for single traps.

Given the time-sensitive nature of the proposed change in the seasonal closure, which would have gone into effect January 1, 2015 if unchanged, NOAA Fisheries held a conference call in October with the Atlantic Large Whale Take Reduction Team (TRT) to discuss that specific part of the Division's proposal. *MarineFisheries* had proposed to change the closure from January-April to February-April (allowing lobstermen to fish during the lucrative holiday season before having to pull their traps), and to expand the area of the closure to include all of the Outer Cape Cod Lobster Management Area (OCCLMA). An analysis of the proposed change was conducted by Industrial Economics to determine the impact; it was found that the proposed change would provide an equal or slightly greater reduction in vertical lines and co-occurrence as compared to the Final Rule. The Take Reduction Team was able to reach consensus in favor of an amendment to the Plan, which would allow the change in the closure. On December 12, NOAA Fisheries formally adopted the amendment.

The remainder of the Division's proposal regarding an exemption from the ban on single pots was discussed at the in-person TRT meeting January 12-14, 2015 in Providence, Rhode Island. At that meeting, the TRT gave consensus support to the Division's proposal to allow single pots to be fished in all state-waters portions of LMA 2 (Southern New England) and in the 0-3 mile range of LMA 1 (Gulf of Maine) and the OCCLMA. An additional wedge of southeastern Cape Cod Bay from Billingsgate Shoal to Barnstable was also included in the 0-3 mile range area. The caveat being that all vertical lines associated with single trap/pots fished in those exempt areas must be marked with a secondary and unique colored marking for LMA 1, LMA 2, and OCCLMA. It should also be noted that the allowance to fish singles in LMA 1 and OCCLMA is NOT in place February 1 – April 30 during the Mass Bay Restricted Closure Area season.

More information is available on the TRT meeting, including the states' proposals, at: *http://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/2015meeting.html*.

By Erin Burke, Aquatic Biologist

MarineFisheries biologist earns doctorate studying lobsters

MarineFisheries staff biologist, Tracy Pugh recently completed her PhD in Zoology at the University of New Hampshire. Tracy's research focused on mating behavior in American lobster (*Homarus americanus*), where she addressed several outstanding questions about lobster reproduction. How many females can a single male mate with? What happens if a female can only mate with smaller males? Is one male lobster just as good as any other male lobster? Are those females that should be mating really able to find mates? Tracy has been with *MarineFisheries'* Invertebrate Fisheries Program since 2002. Her primary focus is on lobster research and she administers our commercial lobster sea-sampling program and ventless lobster trap survey; read on to learn more about Dr. Pugh's research. Please join *MarineFisheries* in congratulating Dr. Pugh on her recent accomplishment!

Lobster mating success: it's all in the details

The American lobster generally leads a territorial and solitary lifestyle, unlike the more genial spiny lobsters found in the tropics. However, even the solitary American lobster must brush up on its social skills when it comes time to mate because, like for most animal species, it takes two to tango.

Lobster reproduction is not necessarily a simple process. Males must establish mating dens, defending against competitors while enticing persnickety females to visit. The actual mating process coincides with the female's molt; she sheds her shell in the safety of her partner's den and mates shortly thereafter. She'll then stick around for a week or so while her new shell hardens, before heading off on her own again leaving the male to try to attract the attention of another female. During mating, the male delivers sperm to the female's seminal receptacle, a specialized pouch in the underside of her shell, in a package called a spermatophore that protects the sperm until the female is ready to spawn, sometimes a year or more later.

Lobster management strategies typically focus on protecting females, banking on the concept that removing more males than females from the population isn't a problem since one male can mate with many females each year. However, no one knows exactly how many females a single male can successfully inseminate. Additionally, protecting females might mean that females not only outnumber, but out-grow the males, since protection from harvest means females survive longer. Females prefer to mate with big males, but what happens if there aren't any big males for a female to choose from?

DMF Staff Photo

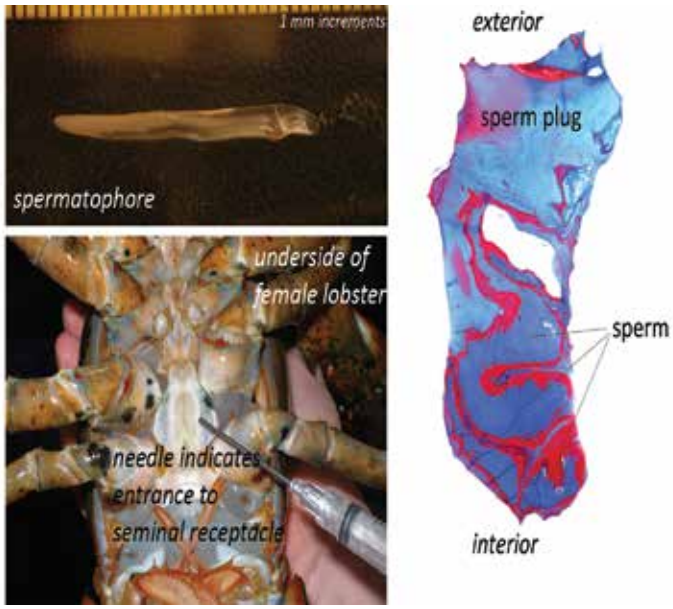
A lobster is measured during the survey.

Too much of a good thing

If a single man walks into a bar and finds himself outnumbered by available women, he's likely to be pretty pleased. But, at what point does this become a little overwhelming? For lobsters, it seems to depend partly on how close together all the available females are going to be ready for copulation. If the females all molt individually over the course of several weeks, one male may be able to keep up with the demand, providing each female with enough sperm. In lab experiments housing six females molting roughly six days apart and a single male, the male was able to provide a spermatophore to many of those females. However, if the six females molted around two days apart, many of them were not able to cohabit with the male in his shelter and did not receive a spermatophore. When a male had two females in his den, the time interval between those females' molts was not important and mating success was higher in general than in the experiments with six females.

Size does matter

When female lobsters were paired in laboratory mating experiments with males that were either similar in size or smaller, it became apparent that the size of the male relative to the female was important in determining mating success. When males were much smaller (> 40% smaller) than their female partner, most were not able to mate; those very few that did mate passed a spermatophore that was small relative to the size of the female's receptacle. Surprisingly, many males that were 25%-30% smaller than their female partner were able to mate. However, more than 30% of these males passed a spermatophore that did not fill the female's receptacle. If the female's receptacle isn't full, she might be able to mate again with another male, thus "topping off" the stored sperm. Or, if she doesn't mate again, those relatively small spermatophores might not be enough to fertilize all of the eggs she can produce. These results suggest that a female needs a mate of similar size, if not larger, to ensure all of her eggs are fertilized.



DMF Staff Photo

Counter-clockwise from top left: A freshly extruded spermatophore from a male lobster; underside of a female lobster, showing the seminal receptacle entrance; histological section of a spermatophore from within the female's seminal receptacle.

All males are not the same

Larger male lobsters tended to produce larger spermatophores, which is also true for many other crustacean species. However, there was a lot of variation in the size of spermatophores produced, as well as the contents of those spermatophores, by individual males that were of comparable size. For example, males that were about 1.3 lb. (legal-sized, around 3.5 inches carapace-length) produced spermatophores that ranged in weight from 6 mg to 30 mg. A 30 mg spermatophore might be composed of anywhere from 5% to 30% sperm. Therefore, mating with a male of a certain size is certainly no guarantee to a female that she will be receiving a predictable amount of sperm. This variability between individual males might make it even more important that female lobsters make good choices when selecting a mate, using information beyond just the size of the male.

Lonely Southern New England females?

Field studies show that most female lobsters examined from Boston waters north into Maine had mated (they had spermatophores in their receptacles), and that a surprisingly large number of these females were sublegal-sized. However, some females sampled from Buzzards Bay and portions of Rhode Island Sound did not appear to have mated. These were larger females (averaging roughly 1.5 lb.) that should have been reproductively active, but did not have a spermatophore in their seminal receptacles. This difference in mating success between lobsters from the Gulf of Maine stock, which is in good condition with high abundance, compared to females from Southern New England waters, where abundance is very low, raises some concerns about how females find mates when population levels are low.

The results of this research have shed some light on situations in which female lobsters might be limited in their reproductive success. There is still much to be done to understand how the

mating success of individual lobsters translates to population-level effects. However, it appears there may be a point at which population levels and the sizes of available males in relation to females may start to influence the reproductive success of those females. One of the goals of lobster management is to avoid recruitment failure, thus understanding lobster reproduction is a critical component to responsible management. Details on the nuances of lobster mating behavior give scientists and managers a better perspective on how larval production happens.

By Dr. Tracy Pugh, Marine Fisheries Biologist

Lobster permit fee increased to fund critical survey

This year's lobster permit fees were increased for the first time in 25 years and the new funds will be dedicated exclusively to lobster research and improved stock assessments. The increases will be an additional $15 for recreational and student commercial lobster permits, and $50 for all other commercial lobster permits. This increase, and the creation of a dedicated lobster research fund, was approved by the Legislature and the Governor as part of the FY2015 budget.

The fee increase received strong industry and stakeholder support, because the generated revenue will be dedicated specifically for lobster related research. The Massachusetts Lobstermen's Association supported this initiative specifically to continue the Ventless Trap Survey. For the past decade, *MarineFisheries* has worked with other states in the region and our federal partners to develop and refine this survey, which is a systematic approach to monitoring lobster stocks.

The survey was designed a decade ago using input from commercial lobstermen. It uses contracted lobstermen to deploy and haul lobster traps without escape vents, allowing *MarineFisheries* biologists aboard to collect data on all sizes of lobster and in all habitats. This survey accurately detects changes in lobster abundance and habitat preferences, a critical tool in this time of ocean changes, and is a vital component in monitoring and forecasting the abundance of lobster and bycatch species such as crabs and some finfish.

It's well known that a lobster trap is the ideal device to catch a lobster because the gear has negligible habitat impacts, animals can be released alive, and undersized lobsters are free to breakout by way of mandated escape vents. A functioning lobster trap is so effective at releasing undersized lobsters, that it's impossible for biologists to study the contents of routine commercial catch from vented traps to know much about the population of young lobsters. However, unvented lobster traps retain an order of magnitude more lobsters, especially juvenile lobsters that would grow in 1-3 years to become legal-sized. The survey is also designed to fish across all habitat types and depth strata. Therefore, if environmental conditions change, causing lobsters to decline or become more abundant in certain areas, these changes will be detected. For instance, the survey successfully forecasted the rise in the Gulf of Maine landings as well as the decline in southern New England.

Funding for this program has been challenging. In 2013, after 10 years of operation, *MarineFisheries* was unable to secure funding and therefore suspended the survey. This past summer, the survey was resumed, thanks to legislative funding in a supplemental budget. For 2015, the survey will be fully funded owing to the dedicated funding and fee increases.

We are especially proud of the excellent work of our Invertebrate Fisheries Program, and the cooperation our biologists enjoy with the industry. Surveys like these are developed to help managers ensure the sustainability of fishery resources well into the future, as well as give the industry confidence that stock assessments are based on the best science available.

By Bob Glenn, Invertebrate Biologist

Improved performance in the 2014 commercial striped bass fishery: the season was twice as long and 50% more valuable

Substantial changes to commercial striped bass regulations in 2014 were meant to improve fishery performance in several ways. The regulatory changes included: moving the start date from July 12th to June 23rd; reducing the number of open fishing days from four to two per week; and reducing the daily possession limit from 30 fish to 15 fish for Commercial Lobster or Boat Permits endorsed for striped bass and from 30 fish to 2 fish for Commercial Individual or Rod & Reel Permits endorsed for striped bass. These revised regulations were implemented, in part, to lengthen the season, in terms of both the number of fishing days and total duration, as well as to increase and stabilize the prices paid to fishermen.

The 2014 commercial season consisted of 21 open fishing days. This is the highest number of open fishing days since the 2010 season, which had eighteen 30-fish days and six 5-fish days. The total 70 day duration of the season, from the June 23rd opening to the September 1st closure, was more than twice as long as seasons in recent years. This allowed seafood dealers to provide a steady supply of Massachusetts striped bass to their customers for the bulk of the summer tourist season.

At certain times in recent years, very high daily catch rates approaching 160,000 lb. per day caused the average daily price per pound paid to fishermen to dip to or below $2.00 per pound. Reducing the number of fishing days per week and the daily possession limit had the desired effect of dramatically improving and stabilizing the average daily ex-vessel price per pound. The average price per pound paid to fishermen for the season rose from $3.10 per pound in 2013 to $4.26 per pound in 2014. Consequently, the total ex-vessel value of the commercial striped bass fishery rose over 50% from $3,107,809 in 2013 to $4,806,716 in 2014.

Lower daily harvest rates—generally between 30,000 and 60,000 lb. per day—and the reduced number of open fishing days per week enabled *MarineFisheries* staff to more precisely track use of the annual quota, and more accurately forecast the closure date, which led to no overage on the 2014 quota. This is a positive change from the past several years where overages up to 15% have been common, due to the difficulty in accurately forecasting closure dates given the high daily catch rates. If quota overages occur in a given year, the following year's quota is reduced equivalently, reducing fishing opportunities for that year.

Distribution in commercial harvest across the state was vastly different this season when compared to previous seasons. In recent years, the commercial harvest coming from statistical reporting area 9 (east of Cape Cod) peaked at over 60% of the total landings. Preliminary harvester reports show that roughly 18% of this year's commercial landings were harvested in area 9. A significantly higher percentage of landings in 2014 came from areas 7, 8, 10, 13, and 14. These areas cover Cape Cod Bay, Nantucket Sound, Vineyard Sound, and Buzzards Bay. In general, the landings by statistical area were much more spread out across the state than in recent years.

Photo © Wayne Davis

***Prepping to tag a white shark from aboard the M/V* Aleutian Dream.**

Feedback on the 2014 commercial striped bass season from fishermen and seafood dealers has been largely positive with the benefits including a longer duration season with a steady supply of fish, a higher ex-vessel price per pound, and harvest more spread out across the coast.

By Story Reed, Fisheries Policy Analyst

White shark research: how many are out there?

While sightings from shore and private boats over the past decade anecdotally attest that the white shark is rebounding from overexploitation in the Western North Atlantic Ocean, actual population estimates are lacking. Such information would be helpful for conservation and resource management, as well as public safety. The now predictable access to white sharks off the coast of Massachusetts, accompanying the region's growing seal population, provides an opportunity to collect data to qualify relative abundance and population size. With financial and technical assistance from the Atlantic White Shark Conservancy (AWSC; *www.atlanticwhiteshark.org*), *MarineFisheries* initiated a study in 2014 to do just this.

The methodological basis for the study is a traditional mark-recapture approach, during which a proportion of the population is identified (i.e., marked) each summer and the population is estimated based on the proportion of re-sightings. To intensively "mark" the population, bi-weekly aerial and vessel surveys were conducted off the east coast of Cape Cod from mid-June to the end of October in 2014. Working with spotter pilot Wayne Davis (www.oceanaerials.com), *MarineFisheries* and AWSC personnel used a small vessel, the M/V *Aleutian Dream*, to identify, videotape, and sex each shark spotted.

Using fin shapes, scars, and coloration patterns, 68 individual white sharks were identified off the coast of Cape Cod, primarily from Orleans to the southern tip of Monomoy. Of these fish, 43 were males and 25 were females; 17 of these sharks were tagged with pop-up satellite tags and/or acoustic transmitters. Now that 68 sharks have effectively been video "fingerprinted," efforts will be repeated next summer to re-sample the population. Based on the assumption that the number of marked individuals within next year's sample is proportional to the number of marked individuals in the whole population, a total population size can then be estimated. Of course, given that this is an open population, other factors – like immigration/emigration rates and population demographics – need to be taken into consideration. Prior tagging efforts (38 white sharks tagged from 2009-2013) provide such information. In the end, this research will offer the first baseline estimates of white shark population size that can be used for future conservation and public safety initiatives.

To read more about the evidence for an increasing white shark population in the western North Atlantic Ocean, see the June 2014 article by Curtis *et al.* in the journal PLOS ONE, entitled: Seasonal Distribution and Historic Trends in Abundance of White Sharks, *Carcharodon carcharias*, in the Western North Atlantic Ocean, available at: *www.mass.gov/eea/docs/dfg/dmf/publications/curtis-et-al-2014.pdf*.

By Dr. Greg Skomal, Senior Fisheries Biologist

MarineFisheries supports shellfish aquaculture on Martha's Vineyard

Infrastructure investments in *MarineFisheries*' John T. Hughes Hatchery and Research Station are paying off in the form of enhanced public shellfish beds through its partnership with the Martha's Vineyard Shellfish Group (MVSG). The MVSG, a consortium of the Shellfish Departments of the six towns of Martha's Vineyard, has used portions of this state-owned property since 2012 to spawn and culture shellfish for eventual transplant to harvestable shellfish beds throughout the waters of the member towns. Access to the hatchery greatly expanded MVSG's hatchery and nursery capacity. This activity supports several of the Division's strategic goals, including improving fisheries sustainability, supporting the Commonwealth's commercial and recreational fisheries, and providing technical support to Martha's Vineyard Town Shellfish Departments.

In order to support MVSG's operations, some overdue maintenance and additional upgrades were required for the building's structure and equipment. Production of shellfish in

the hatchery's main building and greenhouses utilizes fresh seawater from Lagoon Pond, aeration, and electrical systems for its many tanks, silos, and tables. These renovations were required to bring the facility back online, as the hatchery has served mainly to provide office support for several *MarineFisheries*' projects and a base of operation for the Massachusetts Office of Environmental Law enforcement for the past ten years.

Prior to that, however, the Oak Bluffs-based facility supported lobster aquaculture and research, as its original name—the State Lobster Hatchery—suggests. In 2012, it was renamed after renowned lobster culturist, John Hughes, who supervised its construction in 1949. Hughes, who at age 92 still resides on the island, directed the agency's development and operation of the facility through 1978. During this time, Hughes pioneered successful techniques to raise lobsters, bringing preeminent mariculture status to the island facility, and many of his innovations were used to develop similar facilities in other parts of the world. Lobster aquaculture activities ceased in 2002 when *MarineFisheries* decided that it could not combat the challenges of waterborne disease and limited resources that diminished the Division's ability to accomplish its benchmark lobster stock enhancement goals.

MVSG began shellfish culture operations at Hughes Hatchery in May 2012. Staff spent the season familiarizing themselves with the new facility and seawater systems, and developing optimal culture strategies for nursery production of bay scallops, quahogs, and oysters. A productive first season yielded more than three million juvenile quahogs and 188,000 seed scallops. Two million eyed oyster larvae were also introduced into tanks filled with cultch that successfully resulted in the production of tens of thousands of oyster spat that were planted out in Edgartown Great Pond. Eyed larvae, also termed pediveliger larvae, are the last stage of the oyster's free swimming larval stage when they settle to the bottom of the water column to seek a hard substrate (typically oyster shell or cultch).

In 2013, MVSG fine-tuned their operations and increased production. Roughly 5.7 million juvenile quahogs and 139,000 seed scallops were successfully cultured in the hatchery. Nearly 20,000 single oysters were also nursery-cultured in the hatchery prior to being moved to field nurseries in Edgartown Great Pond.

Estimated 2014 shellfish production at Hughes Hatchery.

Shellfish	Number
Quahog seed	6.5 million
Single oyster seed	23,000
Blue mussel seed	50,000
Bay scallop larvae	5.5 million
Oyster larvae	7.0 million
Eyed oyster larvae	5.1 million

In a cooperative project with The Nature Conservancy, MVSG produced about 146,000 oyster spat-on-shell that were planted in Tisbury Great Pond, in an effort to improve water quality and increase marine habitat for biodiversity. At the end of the year and with these successes, *MarineFisheries* renewed its initial two-year agreement with MVSG for an additional three years, through 2016.

MVSG continued to expand shellfish production at Hughes Hatchery in 2014, as well as develop larval rearing capabilities. Many promising results were achieved for the first time at the hatchery: oyster and scallop larvae were produced; phytoplankton tanks provided additional food for setting quahogs, scallops, and spat-on-shell oysters; quahog and scallop larvae were set in re-circulated and flow-through systems; and blue mussel seed was cultured.

The reopening and re-tasking of the Hughes Hatchery, and resulting increased shellfish production, provides additional educational and economic opportunities for the residents and visitors of Martha's Vineyard. There is an increased understanding of the role that shellfish play in maintaining and improving water quality and marine habitats. Shellfish production will likely have increasing application in bioremediation projects to restore and protect the water quality and marine ecology of the island's water bodies.

By Tom Shields, Senior Shellfish Biologist, Acting Manager of the John T. Hughes Hatchery

DMF Staff Photo

The newly renamed John T. Hughes Hatchery and Research Station.

DMF Staff Photo

Project partners received the award at the International Conference on Engineering and Ecohydrology for Fish Passage, held at the University of Wisconsin in June 2014: (from left to right) H. Lee Becker (EA Engineering, Science and Technology), James Turek (NOAA Restoration Center), Dr. Alex Haro (US Geological Survey), and John Sheppard (DMF).

Fish passage project in Acushnet River receives award

The Acushnet River Restoration Project is the 2014 recipient of the Distinguished Project in Fisheries Engineering and Ecohydrology Award, as presented by the American Fisheries Society Bioengineering Section in conjunction with the American Society of Civil Engineers – Environmental and Water Resource Institute. Awarded annually since 2013, this honor recognizes a project for a multidisciplinary approach to collaboration, innovation, education, and improved ecological value for passage of aquatic and diadromous species.

This multi-year project sought to improve diadromous fish passage on the Acushnet River from the head-of-tide to more than 200 acres of prime freshwater spawning habitat 3.8 miles upstream. The project partners – *MarineFisheries,* NOAA Restoration Center, U.S. Fish & Wildlife Service, New Bedford Harbor Trustees Council, and the Buzzards Bay Coalition – achieved this goal through a combination of fish passage improvements at three dams along the river and biological monitoring prior to and after fishway installations.

Restoration efforts began in 2002 with the construction of a state-of-the-art denil fishway at the New Bedford Reservoir dam. These efforts continued in 2007 with improvements to fish passage at two downstream obstructions – the Acushnet Sawmill dam and the Hamlin Street dam – in which both sites were fitted with innovative nature-like fishways, including a stone flow-constrictor/step pool system at the former and a stone step-weir system at the latter. These fishways are relatively unique designs which serve to improve passage for diadromous species as well as to improve aquatic habitat by restoring the river to a free-flowing riverine environment. The $1.8M project was funded with natural resource damages settlement funds from the New Bedford Harbor Trustees Council.

Prior to the second phase of fishway installation, biological monitoring indicated the numbers of adult river herring (*Alosa pseudoharengus* and *A. aestivalis*) returning to the reservoir from 2005 through 2007 were low, averaging less than 400 per year. Biological monitoring conducted after improvements to passage, from 2008 to 2014, indicated the project was successful in achieving short-term passage goals. In 2014, more than 10,000 river herring were recorded entering the New Bedford Reservoir (representing an increase of greater than 3100% over pre-construction conditions).

MarineFisheries has played a crucial role in this restoration effort including technical assistance in fishway design and planning, environmental review for construction permitting, as well as leading the biological monitoring program. In addition, *MarineFisheries* plans to continue monitoring in the hopes that the river herring population in the Acushnet River maintains an upward trajectory and to further document the success of these restoration efforts. The project and the monitoring results have been presented at numerous conferences as well as two publications which are available on the MarineFisheries website: *http://www.mass.gov/eea/agencies/dfg/dmf/publications/.*

By John Sheppard, Diadromous Fisheries Biologist

George Peterson named Commissioner of Fish and Game

George N. Peterson, Jr. of Grafton has been appointed to serve as the Commissioner of the Department of Fish and Game; Mary-Lee King of Hudson will serve as Deputy Commissioner. "As an avid outdoorsman and former commercial fisherman, George will bring a wealth of knowledge and experience, as well as a unique understanding of the issues most important to sportsmen and commercial fishermen across the Commonwealth," said Matthew Beaton, Secretary of Energy and Environmental Affairs.

Peterson served for 20 years in the Massachusetts House of Representatives representing the Ninth Worcester District. Prior to his time on Beacon Hill, George served in municipal government for 10 years in the town of Grafton. In the private sector, George worked as a commercial fisherman based out of Gloucester, MA, and also owned a wholesale and retail seafood

business. He is a graduate of the University of Massachusetts – Stockbridge School in Amherst where he earned a degree in Park Management and Arboriculture. Mary-Lee King was previously the Legislative Director for the Department.

Comings and Goings

Erich Druskat is a recently hired Marine Fisheries Data Analyst in the Gloucester office. Erich not only manages and analyzes data coming in, but also distributes results to the Division and other state and federal agency scientists and managers, as well as to the fishing industry, media, and general public. A native of Massachusetts, Erich graduated from the University of Massachusetts Amherst and has a Master of Science in Fish and Wildlife Science from New Mexico State University, while also carrying a graduate certificate in GIS from Cape Cod Community College. Welcome to the team, Erich!

Kim Trull has been with *MarineFisheries* age and growth lab since 2010, aging recreationally important finfish species. This past summer, Kim is also the SADCT (Sportfish Angler Data Collection Team) coordinator. She works with volunteer recreational anglers to collect scale samples from May through October on important fish species, including striped bass, black sea bass, fluke, and scup along the coast of Massachusetts. These coordinated efforts assist in stock assessment and management of these valuable recreational species. Kim graduated from the University of New Hampshire with a degree in Marine and Freshwater Biology. Before starting at the Division, she worked with New Hampshire Fish and Game as a biology aide, collecting river herring and rainbow smelt samples, seining, managing fish ladders, and participating in MRIP sampling.

Mike Bednarski has recently been promoted to the position of Stock Assessment Specialist, working out of the New Bedford office. Mike joined *MarineFisheries* in 2012 as a member of the diadromous fish program, where he worked as a Diadromous Fish Biologist. While in this position, Mike was responsible for monitoring populations of diadromous species throughout southeastern Massachusetts. In his new position, Mike will be concentrating his efforts on assessing recreational sportfish including black sea bass, fluke, scup, tautog, bluefish, and weakfish. As part of this responsibility, Mike will also be serving as *MarineFisheries'* representative to many committees of the Atlantic States Marine Fisheries Commission and of the Mid-Atlantic Fishery Management Council. He is excited to tackle the challenges associated with the new position and looks forward to working with his interstate collaborators to apply the novel techniques needed to more effectively manage saltwater fish species.

Elise Koob recently joined the age and growth lab in the Gloucester office. She determines the ages of a variety of species by using otoliths, scales, opercula, and fin spines in order to assist fisheries management. Elise completed her undergraduate degree in Marine Biology at the University of New Hampshire, interning shortly thereafter for the US Food and Drug Administration, researching Ciguatera Fish Poisoning on a variety of species on Dauphin Island in Alabama. She then returned north and worked as a laboratory and field technician at the Gulf of Maine Research Institute on age and growth and otolith microchemistry projects for bluefin tuna and swordfish before joining *MarineFisheries*. When not working in the lab, Elise enjoys many outdoor activities and any opportunity to travel the world!

Recently, **Kelly Kleister** was hired as a shellfish area biologist for the towns of Plymouth, Duxbury, Kingston, Scituate, Marshfield, Cohasset, and Barnstable. She monitors the shellfish growing areas in these towns to ensure they are properly classified and that all product going to market is safe for consumption. Previously, Kelly was a seasonal technician for both the Anadromous Fish and Shellfish groups. Before her time with *MarineFisheries*, Kelly was a marine mammal observer for Whale and Dolphin Conservation Society. She graduated from Massachusetts Maritime Academy, majoring in marine safety and environmental protection with a concentration in marine biology.

After 27 years with the Division, **Paul Caruso** has retired to focus more on his personal projects. Paul was the species biologist for many coastal finfish species including scup, black sea bass, bluefish, fluke, weakfish, and tautog. He served on technical committees of the Mid-Atlantic Fishery Management Council and the Atlantic States Marine Fisheries Commission, assisting in the management of these species. From anatomy to stock assessments—and the best locations to catch them—Paul was a plethora of information on those species he worked on. *MarineFisheries* wishes him well on his retirement!

Brian Kelly served 31 years in the Division. He worked tirelessly as a field sampler and observer for a variety of state fisheries including lobster, squid, fluke, black sea bass, whiting, spiny dogfish, and horseshoe crab, as well as weir and longline fisheries. Brian managed the Fisheries Dependent Investigations sea-sampling database and served as the contact for any marine waterfront issues. We wish Brian a happy retirement!

DMF *Rules UPDATE*

Public Hearings • Regulations • Legislation

During the period of July 1, 2014 through December 31, 2014 the following regulatory changes were enacted by the Division of Marine Fisheries after public hearings and Marine Fishery Advisory Commission approval. Annual specifications and emergency regulations promulgated during this period have also been listed.

Bluefish Management

MarineFisheries liberalized its commercial bluefish trip limit from 5,000 pounds of bluefish per day to 5,000 pounds of bluefish per trip. This rule change allows fishermen to target bluefish when they are abundant in our waters and land multiple limits in a single day.

Atlantic Sea Herring

MarineFisheries filed final regulations to establish a procedure for the Director to set fishery limits for all Atlantic sea herring management areas, to close specific management areas when 95% of the quota allocation for that management area is reached and the general fishery when 92% of the overall quota is reached, and to update management area boundaries.

Compliance with Recreational Fishing Regulations Onboard For-Hire Vessels

If a patron on board or disembarking from a for-hire vessel is found in possession of fish in violation of the state's recreational fishing regulations, the patron, the for-hire permit holder, and the for-hire operator may now be held jointly responsible for this violation. This action was taken to improve compliance with recreational fishing regulations on for-hire vessels.

Electronic Display of Recreational Fishing Permit

If a recreational angler is asked by a an Environmental Police Officer to display their recreational fishing permit, they may now do so by displaying it on a mobile electronic device. Previously, anglers were required to carry a paper copy of the permit.

Filleting of Recreational Catch

Recreational anglers may now fillet black sea bass and scup at sea provided the skin remains affixed to the fillet for the purpose of species identification and fillets are not possessed in a quantity that exceeds two times the number of fillets than the recreational bag limit. If recreational catch is co-mingled onboard a vessel, the catch will be divided by the number of anglers involved to determine compliance with recreational limits.

Northern Shrimp

Effective January 1, 2015 commercial fishermen may not possess, retain, or land northern shrimp in Massachusetts. This moratorium will remain in effect until further notice.

Shellfish Handling and Vibrio Management

MarineFisheries promulgated final regulations that codify provisions of the 2014 Massachusetts Vibrio (Vp) Control Plan and the National Shellfish Sanitation Program's (NSSP) Model Ordinance. These final regulations—previously established on an emergency basis—implement: (1) shellfish tagging requirements applicable to all commercial shellfish fishermen; (2) time to temperature, icing and shading standards for all oyster aquaculturists and wild commercial oyster harvesters; (3) logbook reporting requirements for all oyster aquaculturists and wild commercial oyster harvesters; and (4) stringent guidelines for oyster handling activities including wet storage, off site culling, anti-fouling, and the re-submergence of recalled or non-complaint product. The final regulations differ from the emergency regulations in that they allow aquaculturists to handle and process oysters at barges and floating structures off the licensed aquaculture site without being subject to the strict off-site culling requirement, provided the oysters were not out of the water for more than two-hours and they were adequately iced.

Small Mesh Squid Allowance

Beginning during the summer of 2014, all permitted commercial draggers were allowed to fish with small mesh trawls for squid in that band of state waters south of Martha's Vineyard and Nantucket bounded by Squibnocket to the west and the 70th meridian to the east during the period of June 10 through the close of the commercial fluke fishery or December 31, whichever date occurs first. Previously, small mesh trawl fishing for squid was prohibited in this area after June 9 without a letter of authorization from the Director.

Spiny Dogfish Trip Limits

On September 8, 2014, *MarineFisheries* increased the commercial spiny dogfish trip limits from 4,000 to 5,000 pounds in accordance with the Atlantic States Marine Fisheries Advisory Commission specification.

Scup Trip Limits

On October 2, 2014 the summertime (May 1—October 31) commercial scup trip limits were increased to 2,000 pounds per day or per trip, whichever is longer, and the no fishing days during this period were eliminated. These actions were taken to provide commercial fishermen with better access to the state's remaining summertime scup quota. Also, effective November 1, 2013, the Winter II (November 1—December 31) scup trip limits were temporarily increased to 18,000 pounds per trip. This was done to complement the federal trip limit for this period and thereby allows vessels with a Massachusetts scup landing permit to possess and land legally this caught fish in Massachusetts.

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INSIDE...

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DMF NEWS

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MarineFisheries receives state and federal funds to conduct research, management and development of the Commonwealth's marine fishery resources. Information in this publication is available in alternative formats.
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