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Climate and crustaceans: How ocean warming affects lobster and shrimp

The topic of climate change has been front and center in popular media in recent years. Stories about receding polar caps, sea level rise, and increased incidence of extreme weather – like Super Storm Sandy, or most recently Typhoon Haiyan – make people aware of global climate change and some of the effects related to it. However, few people are aware of how climate change is affecting their local environment because the impacts are often difficult to detect and characterize.

Marine Fisheries has been monitoring bottom water temperatures at a number of locations in our coastal waters since the late 1980s (Figure 1). Each location has a concrete mooring, fitted with an electronic temperature logger, on the sea-floor. These loggers record the bottom temperature every two hours for the entire year.

Marine Fisheries divers visit each location annually to retrieve data. In addition to our efforts, the National Oceanic and Atmospheric Administration (NOAA) maintains sea surface temperature time series in Boston Harbor and Woods Hole that go back to 1922 and 1945, respectively. These data are archived and provide us with an extraordinary opportunity to look at temperature trends over a broad period of time on both the surface and the bottom of our local waters.

The burning questions that many people ask are, “Is the ocean actually getting warmer?” and “Is global climate change real?” The resounding answer to both questions is YES. For example, in the last 90 years, the annual average sea surface temperature in Boston Harbor has increased by roughly 2 degrees

Celsius (roughly 3.5 degrees Fahrenheit) (Figure 2).

While at first glance this may seem insignificant, the severity of the change becomes more apparent when you look at sea surface temperature conditions within a year. From 1922 to 2012, there was an average of 195 days per year when sea surface temperatures were greater than 10° C (roughly 50° F). When you look at the annual deviations from this average (the number of days higher or lower than the average, Figure 3) over the entire time series, the extent of the temperature changes over time becomes apparent. The trend of more positive deviations in recent times indicates that water temperatures are, indeed, warming. For example, in 2001 (the largest deviation), the sea surface temperature exceeded 10° C for 230 days, whereas in 1924 it exceeded 10° C for 155 days. That is a difference of over two months!



DMF Staff Photo

American lobster, *Homo americanus*

How do sea surface temperatures relate to what is happening on the sea floor? Although we have a much shorter time period of observations, we still see substantial increases in bottom water temperatures over the last few decades. For example, in 70 feet of water at the mouth of Boston Harbor (a site called Martin's Ledge), the bottom temperature exceeded 10° C for 7 days in 1993. In 2012, there were 151 days in which the bottom temperature exceeded this temperature. We see similar, if not more dramatic, increases in water temperatures south of Cape Cod. In the northern end of Buzzards Bay in 35 feet of water (Cleveland Ledge), the number of days in which the bottom temperature exceeds 20° C (roughly 68° F) has more than doubled from 1986 to 2012.

It may seem like an annual rise of 2° C is a pretty small increase to get worked up about. However, it is important to remember that water is a natural insulator, which means that water temperatures vary much less than air temperatures. For example, in 70 feet of water, our Martin's Ledge temperature logger typically records an 11° C variation in temperature over the *entire year*. In contrast, average *daily* air temperatures in Boston vary around 7° to 9° C, depending on the time of year. Boston air temperatures can range from summertime highs in the upper 20s° C (mid 80s° F) to winter lows around -6° C (about 20° F), an annual variation of about 35° C. Marine animals that are used to being exposed to small annual variations in temperature are not well-adapted to these kinds of changes.

What does this all mean for marine animals living in Massachusetts coastal waters? The answer is complex and largely depends on what species you focus on and where in that species' geographic range you are looking. Changes in ocean temperature can create adverse habitat conditions for some species, while at the same time creating beneficial habitat conditions for others. Two species of particular interest in Massachusetts that

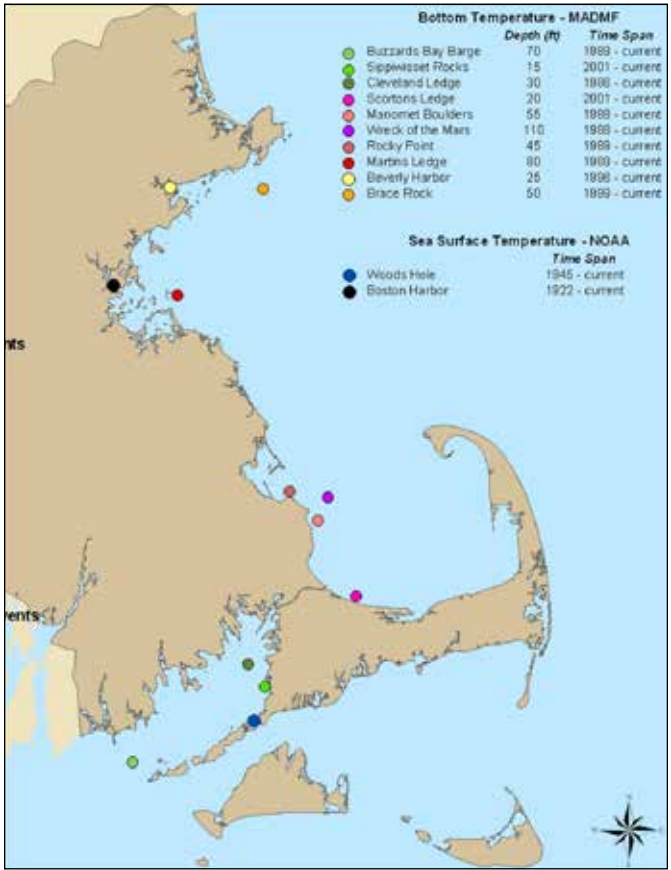
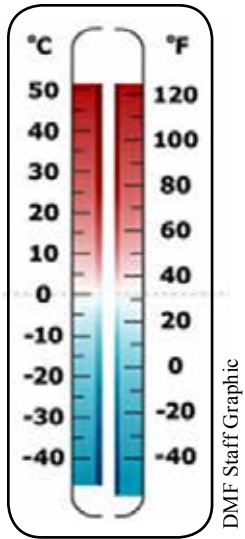


Figure 1. Locations of bottom temperature loggers in coastal Massachusetts waters.

are experiencing the effects of climate change are American lobster and northern shrimp.

Temperature governs nearly every aspect of life for lobsters, including growth rates, how long it takes to reach sexual maturity, activity levels, reproductive output, and ability to cope with other environmental variables. Adult lobsters can survive temperatures as low as -1° C to as high as 30.5° C for very brief time periods. However, these are the absolute limits; lobsters can't live more than a couple days in these extreme temperatures. Their typical temperature range is closer to roughly 5° C to 20° C. At the extremes of this range, lobsters start to experience physiological changes. At extremely low temperatures, respiration slows, they become lethargic, and growth stops. At very high temperatures, respiration becomes inefficient, environmental changes such as low oxygen or low salinity are not tolerated, and the immune system becomes compromised, leading to increased rates of a variety of diseases. Lobsters living at the extreme northern or extreme southern extent of their geographic range can tolerate adverse conditions for brief periods of time, but physiological stress will accumulate and take a toll if exposure is prolonged.

Luckily, lobsters are highly mobile animals, and are well-equipped to detect and respond to changes in their environment. Laboratory studies have shown that lobsters will move away from water temperature exceeding 19° C, and tend to prefer temperatures ranging from 12° to 18° C. When the seafloor temperatures exceed 19° C, lobsters will move out of those areas

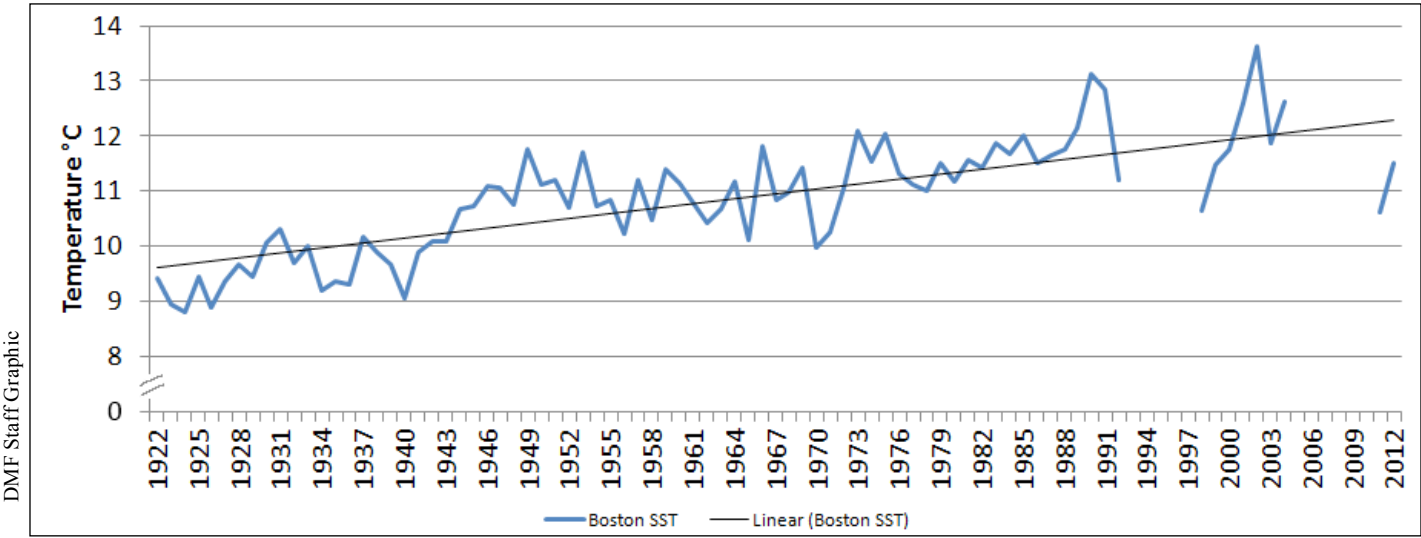


A comparison of Celsius to Fahrenheit temperatures

and seek refuge in deeper/cooler waters. Through our ventless lobster trap survey and our commercial sea-sampling program, *MarineFishes* has been able to document large portions of Buzzards Bay that are now almost completely devoid of lobsters in the summer when the temperature exceeds this threshold. These movements change the spatial distribution of lobsters in our coastal waters and can have substantial effects on both the fishery and important life history processes. For example, a once very productive lobster fishery in Buzzards Bay has now diminished substantially and shifted to the deeper waters south and west of Martha's Vineyard.

One of the ecological consequences is a shift in the location where female lobsters hatch their eggs. Historically, large numbers of egg-bearing female lobsters would migrate into the mouth of Buzzards Bay in late May and early June to hatch their eggs. Once hatched, the larvae would be retained within Buzzards Bay, develop, and be transported to shallow nursery habitats by the prevailing summertime southwest winds. In recent years

Figure 2: Sea surface temperatures (SST) in Boston Harbor, between 1922 and 2012.

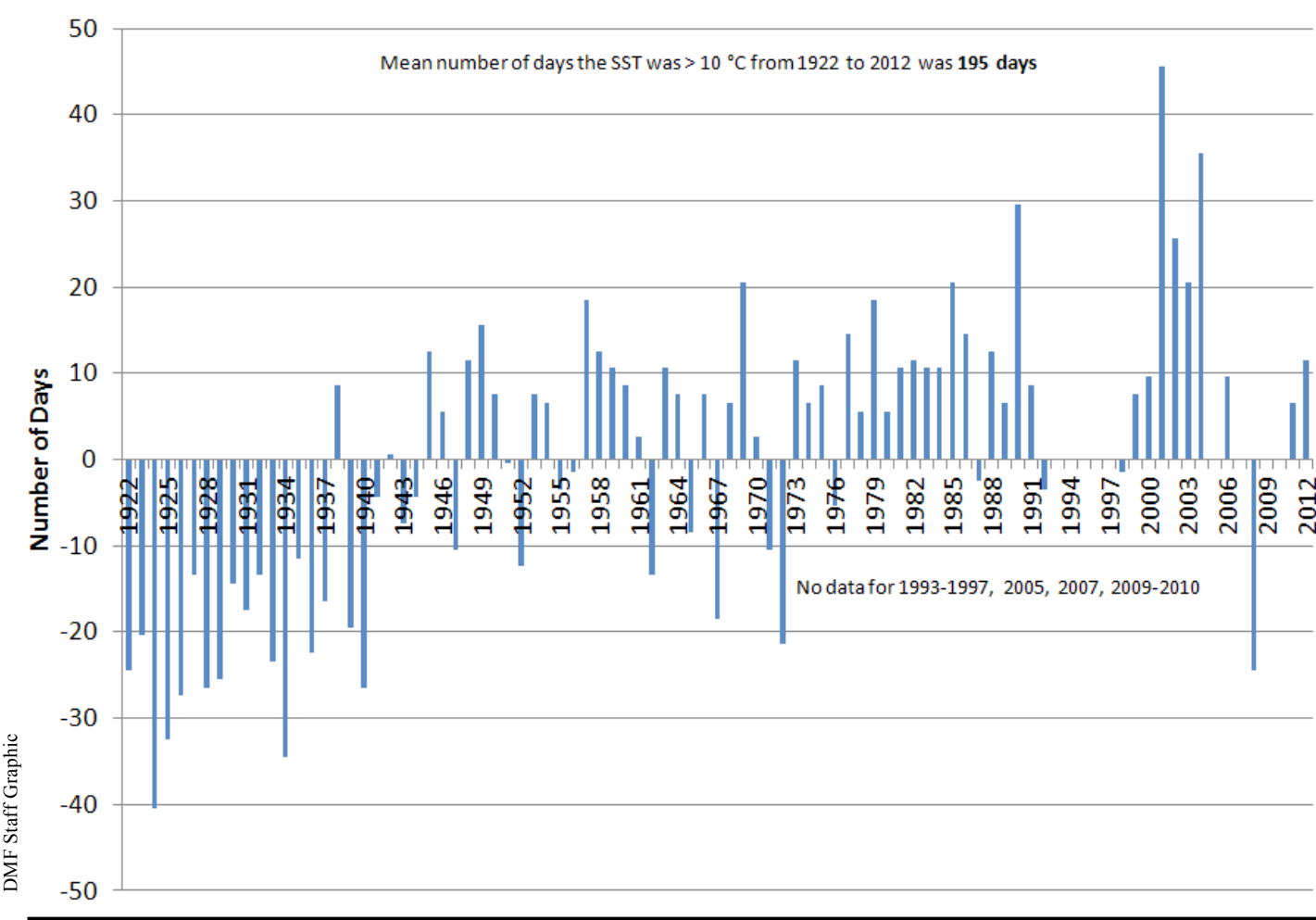


we have found the majority of egg-bearing lobsters at hatching time in June concentrated in the deeper waters west and south of Martha's Vineyard. Satellite drifter research conducted by *MarineFishes*, and new oceanographic current models indicate that the prevailing coastal current in the waters of Rhode Island Sound would rapidly transport larvae west toward Rhode Island and down the back side of Long Island. This research also indicated that there is an extremely low probability of a

larvae hatched outside of Buzzards Bay to make it into the bay, despite the prevailing southwest winds and the ability of late-stage larvae to actively swim toward shore. Therefore, what seems like a relatively minor change in where lobsters live can have substantial impacts on important life history processes, like reproduction.

Northern shrimp are also highly influenced by ocean conditions. This cold water species is thought to be particularly

Figure 3: Sea surface anomalies from mean number of days above 10 °C in Boston Harbor.





DMF Staff Photo

Recent warming trends have coincided with declines in northern shrimp abundance, suggesting that it has either become too warm for shrimp survival, or that something more subtle is behind the low abundance.

sensitive to climate change, as Massachusetts is the extreme southern limit of this species' boreal distribution. In the 1950s the northern shrimp population effectively disappeared from the Gulf of Maine during a period of warm waters documented by a long-term sea surface temperature time series near Boothbay, Maine. In recent years, temperatures have again reached these extreme highs and dramatic shrimp population declines have occurred. Consequently, the commercial season for 2014 has been canceled due to low stock level.

The relationship between temperature and northern shrimp abundance has been difficult to define, as it is not simply a direct effect on growth and mortality. Historically, shrimp landings have corresponded to periodic changes in sea surface temperatures, and periods of colder water temperatures were linked to increased fecundity (female egg production) and recruitment. However, laboratory studies have shown that larvae appear to develop faster and survive better in warmer temperatures common in the Gulf of Maine. Recent warming trends have coincided with declines in northern shrimp abundance, suggesting that either it has either become too warm for shrimp survival, or that something more subtle is behind the low abundance.

Recruitment variability (fluctuations in the numbers of new shrimp from year to year) has increased since the late 1990s. These larger fluctuations may be resulting from sub-lethal or indirect effects of temperature on the shrimp population or resources they depend on. For instance, shrimp larvae feed primarily on phytoplankton in the spring. Recent variations and declines in spring phytoplankton blooms may be altering the available food resource. The recent warming trend has caused a change in when female shrimp hatch their eggs, with hatch commencing more than a month earlier now than it did prior to 2000 and extending for a longer time period than in previous years. While the prolonged hatch period may improve the likelihood that larvae encounter the more variable spring phytoplankton bloom, this potential benefit has not materialized as recent year classes have been extremely low in number. This is one potential explanation behind decreased shrimp abundance in recent years, but certainly not the only one.

Here, we've discussed two local species for which relatively small changes in water temperatures have had some major impacts on important life history components, including spatial distributions and reproduction. The impacts of climate change on marine ecosystems are complex and it is often difficult to tease out the mechanisms behind many of the observed changes we are seeing in populations of crustaceans, shellfish, and finfish in

our coastal waters. Species living at the geographic extremes of their natural ranges are most likely to be affected by changing climate conditions, and a number of examples are available in scientific literature describing shifts or contractions in ranges resulting from changing conditions. Lobsters in southern New England and northern shrimp in the Gulf of Maine are two examples of marine animals that have been adversely affected by climate change.

Undoubtedly, there are other species in Massachusetts' waters which have been positively affected by climate change. Some examples of positive changes for certain species may include expanding available habitats, decreasing predation risks, or increasing food resources. *MarineFishes* will continue to monitor temperature trends in our coastal waters and to conduct research on how climate change is affecting both our living marine resources and the fisheries that rely on them.

*By Bob Glenn, Kelly Whitmore, and Tracy Pugh;
Biologists*

Striped Bass Outlook: New commercial regulations proposed for 2014 and coastwide harvest reductions slated for 2015

This past October, the Atlantic States Marine Fisheries Commission (ASMFC) approved a new striped bass stock assessment. The 2013 assessment concludes that striped bass are not overfished or experiencing overfishing (see graphs on page 7). However, the estimated fishing mortality rate (F) has been above its newly-recommended target for the past 10 consecutive years, which coupled with a recent string of poor year classes, has resulted in a decline in female spawning stock biomass (SSB). Since its peak in 2003, SSB has been below its target for the past seven consecutive years.

These results "fired" several of the management triggers that were written into the interstate fishery management plan to ensure the stock does not revert to its depleted status of the 1980s. Consequently, the Striped Bass Management Board initiated revisions to the plan that would reduce F to or below its target in 2015.

The assessment, which included data through 2012, was of the benchmark variety, meaning its authors could evaluate and incorporate new data sources and methods while dropping previously used but outmoded information and techniques, with the end result being peer reviewed by an independent panel of fisheries experts. Included in this process was a review of the management plan's biological reference points – the threshold and target levels for F and SSB – on which the determination of stock status hinges.

The assessment team recommended alternative definitions for the F reference points that link them to the SSB reference points (i.e., the F target is the rate estimated to produce the SSB target, and the F threshold is the rate estimated to produce the SSB threshold). The method for estimating the new F target and threshold features less scientific uncertainty, and results in lower values for the F reference points that are considered more reflective of the predominantly recreationally-harvested striped bass population. No change was recommended for the SSB reference points; they remain based on the assessment's estimates of SSB in 1995, the year ASMFC determined that the stock was rebuilt.

Continues, page 6

Michael Syslo: Marine Biologist, Teacher

This issue of DMF News is dedicated to the memory of longtime *MarineFishes* marine biologist Michael Syslo, who suffered a fatal heart attack last January 29th (2013) while working. On Mike's final day, he did what he liked to do best: he taught a lobster biology class to new shellfish constables at the Massachusetts Maritime Academy.

Mike served the Commonwealth as a lobster culturist and marine fisheries biologist for 35 years, and was a well known figure on Martha's Vineyard where he was stationed for most of his career. He was the assistant to the founder of the Lobster Hatchery, John Hughes, early in his career, and later assumed the role of hatchery chief from 1984 onward. Mike transitioned to become the Division's shellfish biologist on the island and worked closely with commercial fishermen and town officials. His forte was education and training, and he was best known for his lectures and hands-on instruction in marine science, especially lobster life history. He trained thousands of federal and state enforcement agents about lobsters and their biology and was often consulted on enforcement cases concerning "scrubbed eggers" – the illegal practice of forcibly removing eggs from the tails of mature lobsters.

Mike's passions were travel, fishing, and family. He is missed by all who knew him. His survivors include his wife Janis, daughter Allyson, and son Benjamin.

**Top, right: Mike Syslo and Lady Bird Johnson, lobstering.
Bottom, left: Mike with striped bass.
Bottom, right: Mike with a blue lobster.**



Images courtesy of Benny Syslo

Striped Bass Outlook: continued from pg. 4

While these reference points were approved for management use by the Board, an addendum to the management plan is necessary to formally adopt them. The draft addendum will also present any recommendations from the Striped Bass Technical Committee regarding discrete reference points for the Chesapeake Bay producer area and North Carolina’s Albemarle Sound/Roanoke River management area. These areas have had separate – and lower – F targets from the rest of the management unit due to the smaller size limits allowed there.

It was partly because updated F targets for these areas were not yet developed that management measures to reduce F were delayed until 2015. Based on the assessment’s projections for further stock decline in 2013, *MarineFisheries* Director Paul Diodati encouraged the Board to take action to reduce F along the coast beginning in 2014. However, the will of the Board was to synchronize the timing of new measures in all areas. Additionally, some of the Mid-Atlantic states, with fisheries that occur in winter months, would be hard-pressed to get measures in place prior to the commencement of their 2014 fishing seasons. It’s expected that public hearings up and down the coast will be held in the spring to vet the new biological reference points and options to reduce F to the target.

Upcoming Hearings on Commercial Rules for Massachusetts

Massachusetts will also be holding hearings this winter unrelated to the new stock assessment. These hearings will address two issues: requirements of the ASMFC to implement a commercial tagging program for striped bass prior to the 2014 fishing season; and consequences of recent trends in the stock’s distribution on performance and administration of the Commonwealth’s commercial fishery.

Commercial Tagging Program: As previously reported in DMF News (2012 Quarters 1 & 2 edition), an addendum to the interstate management plan requires all states with commercial striped bass fisheries to tag each striped bass sold into commerce. The objective is to increase accountability in the supply chain and thereby give law enforcement a greater ability to detect poaching. The addendum allows each state to implement either a point-of-harvest or point-of-sale tagging program. Following a review of other states’ tagging rules, consideration of the

Commonwealth’s fishery, and meetings with industry advisors, the Division developed a point-of-sale tagging program for public comment. Under proposed regulations, each dealer buying striped bass directly from harvesters would tag each of these fish with a *MarineFisheries*-supplied tag. Tags would remain affixed to whole striped bass or accompany processed or filleted striped bass while in the possession of any person for the purpose of re-sale. All unused tags would be returned to the Division and accounted for at the end of the season.

Slowing The Race to Fish: The dynamics of the Commonwealth’s commercial striped bass fishery have changed a great deal the past several years, due to the formation of dense aggregations of large stripers in an area east of Chatham during July and August. Likely caused by factors such as water temperature and forage species availability, these schools in a remarkably small area close to shore has increased accessibility and catchability so much that over 60% of the commercial quota is being harvested from this single area (Statistical Reporting Area 9) and the quota closure is coming earlier and earlier each year.

A race to fish in this area has given rise to unprecedented levels of boat congestion on the water and at boat ramps on open fishing days. Lack of legal parking spaces, long queues at boat ramps, and vessel collisions are increasingly common and are causing numerous problems for local officials, Massachusetts Environmental Police, and members of the (fishing and non-fishing) public. Fishery-specific problems include market gluts, shorter seasons, and lower ex-vessel prices. High catchability of fish and heavy participation makes compliance with daily catch limits difficult to enforce. Also of concern are possible ramifications of harvesting so many large (and older) fish from a single discrete area off our coast. Tagging data that document inter-annual site fidelity by striped bass give evidence for the vulnerability of portions of the stock to repeated, site-specific heavy fishing effort.

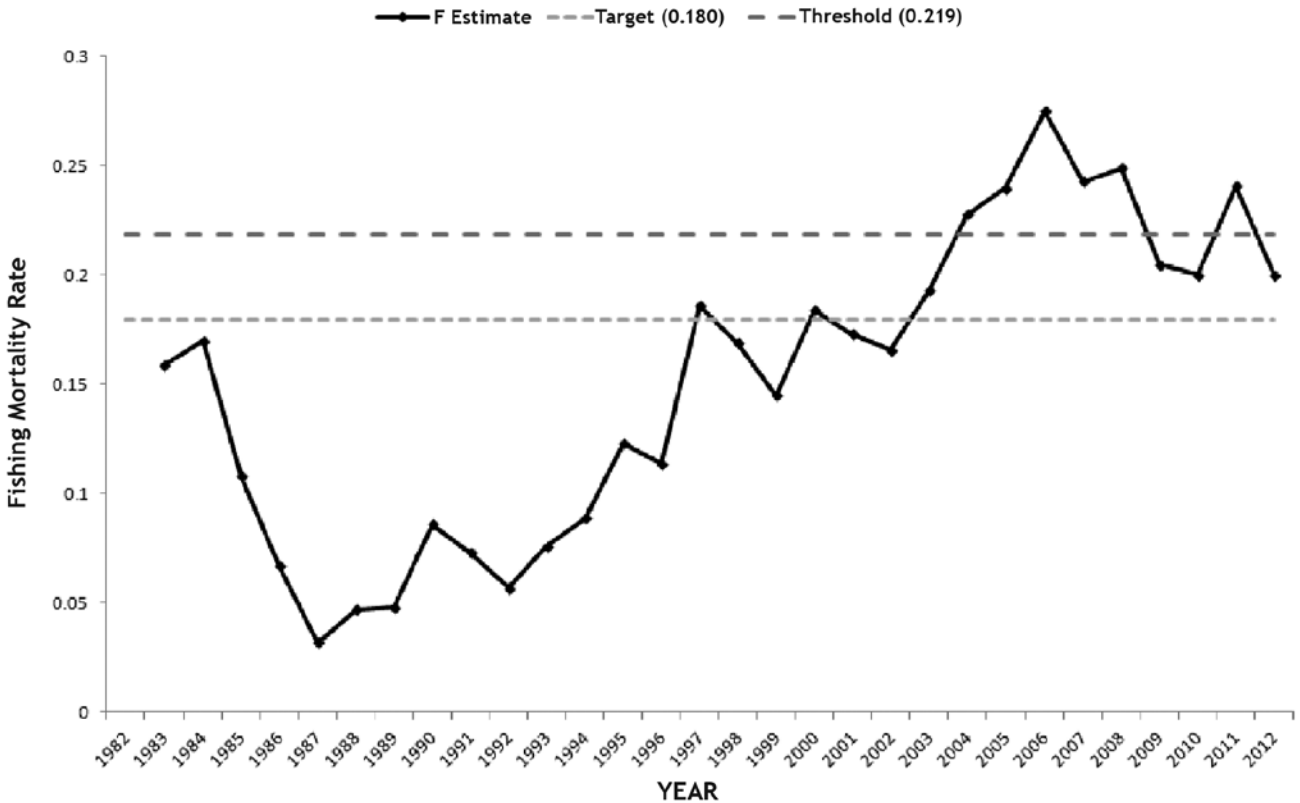
In response, the Division will be presenting management options for public comment aimed at diffusing this fishing effort, extending the season, and improving compliance with the possession limit. It’s worth stating upfront that some of these options represent a notable break from how the fishery has been practiced and managed, but when it’s hard to find anyone happy with the current state of the fishery, introduction of new approaches is necessary.

One such option concerns the assignment of daily possession limits based on the type of commercial fishing permit held;

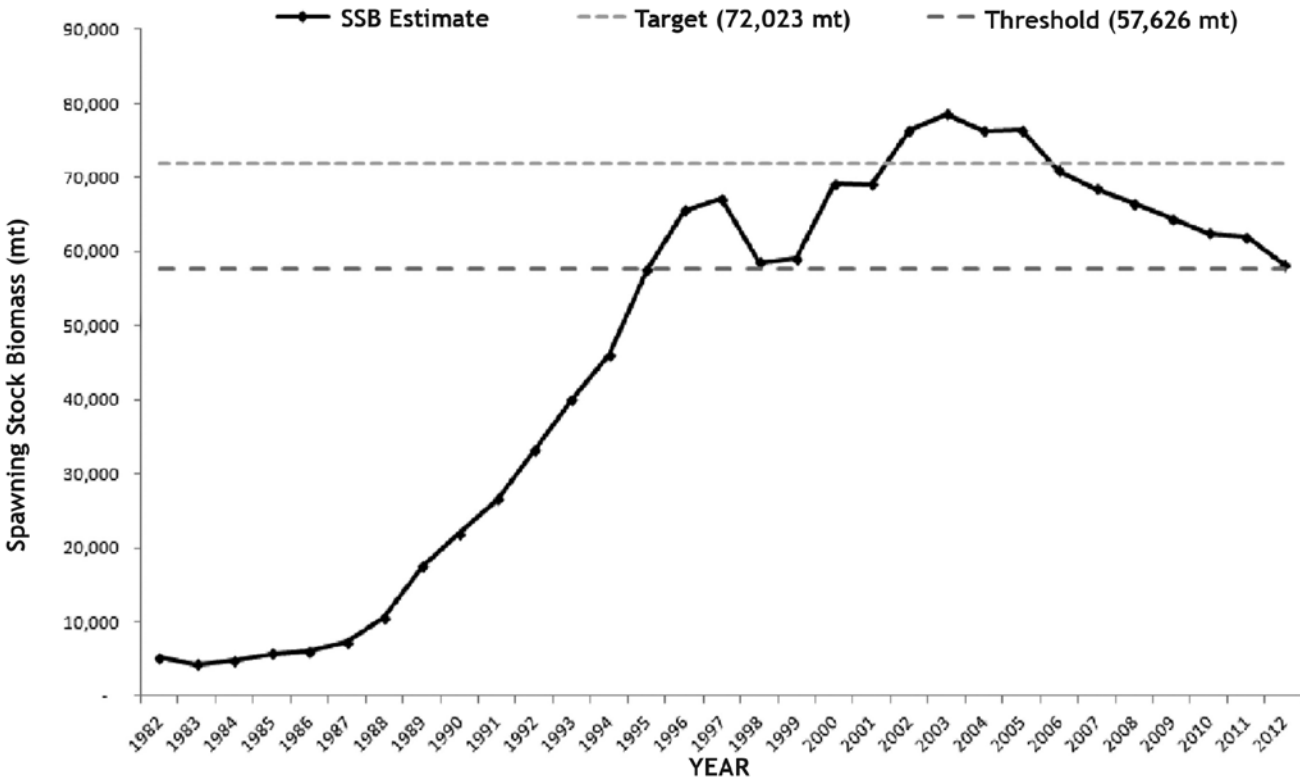


Aggregations of striped bass east of Chatham during July and August have given rise to unprecedented levels of boat congestion during the commercial season.

DMF Staff Graphic



DMF Staff Graphic



Graph 1 (top), estimates of fishing mortality rate (F) and Graph 2 (bottom), spawning stock biomass (SSB) from the ASMFC’s 2013 Striped Bass Stock Assessment. The 2012 value of F (0.200) is below the F threshold, meaning the stock is not considered to be experiencing overfishing; the 2012 value of SSB (58,238 metric tons) is above the SSB threshold, meaning the stock is not considered overfished.

Striped Bass Permit Endorsements attached to Boat Permits would have a considerably larger possession limit than Striped Bass Permit Endorsements attached to Individual or Rod & Reel Permits. While the striped bass fishery has provided an avenue for those interested in pursuing fishing as an occupation, the fact remains that anyone positioning himself or herself to earn a living from fishing should be expected to have a boat – and an accompanying Boat Permit. A lower possession limit for the non-boat permits would accommodate the occasional catch with intent to sell that occurs from shore, while also discouraging the illegal practice of fishermen selling an overage of the possession limit by attributing the overage to a second or multiple permits.

A complementary option to reduce the Boat Permit possession limit from 30 fish to somewhere between 10 and 20 fish would also discourage long-distance travel to the Chatham aggregation, alleviating vessel congestion and associated woes. Reducing the possession limits, as well as options to reduce the number of open days per week, would likely assist with market glut, ex-vessel value, and season length. A longer supply of striped bass to markets could encourage more local demand. Revisions to the season start date, specifically starting earlier than July 12, are also up for comment.

Cheating on trip limits would also be addressed through a clarification that the daily limit applies to an individual fisherman, regardless of the number of permits assigned him.

Furthermore, dealers would be prohibited from purchasing striped bass from a single fisherman in excess of the possession limit, regardless of the number of commercial fisherman permits in possession.

Two more options address the commercial sale of striped bass caught during for-hire trips and a control date. One proposal would override a long-standing policy exempting those who have been issued a for-hire permit and a commercial Striped Bass Permit Endorsement to land and sell striped bass caught by their for-hire customers during the commercial season, provided they are consistent with the commercial possession and size limits. This practice contradicts other policies about (not) mixing commercial and recreational activities on the same trip, is a source of error in harvest estimates, has been abused by some permit holders, and is difficult to enforce. Another proposal would put in place a control date by which participation in the fishery could be conditioned in the future.

Refer to Page 16 for information on the public hearings for these management options.

By Nichola Meserve, Fisheries Policy Analyst, with contributions from Paul Diodati, Director



Photo courtesy of: Jaymie Boyle

Dune grass restoration is underway and much of the decking is in place on the Oak Bluffs Pier (photo taken November 2013).

Pier to open Spring 2014

The much anticipated fishing pier in Oak Bluffs on Martha's Vineyard is nearing completion and will be ready in time for the arrival of many of the sport fish that we love to catch. The pier was originally scheduled to be finished in the spring of 2013 but a shortage of materials delayed construction. Hurricane Sandy's destruction of shore-side infrastructure left large sections of the Atlantic Coast of the United States in need of dock pilings. Quality wooden piles were simply not available and steel piles were bought as they became available. Steel pilings for the main portion of the pier arrived and were installed last spring. The remaining pilings for the "L" portion were delivered and installed this past fall. The cross members, decking, and railings were being affixed to the pier even as the cold of winter made its annual appearance.

During construction, *MarineFisheries* personnel performed assessments of what marine species were utilizing the area under the pier. Throughout the summer and fall, sand eels, scup, black sea bass, striped bass, and sea robins were observed using the structure provided by the pier. By the end of August, the pilings were host to many algae, barnacles, and other invertebrates. The assemblages of fish and colonization on the pilings so far are a reason to be optimistic that this fishing pier will be a great place to catch a few fish, share some laughs, and build memories.

Partial funding for the pier came from recreational saltwater fishing permit revenues. At-least one-third of these revenues are spent on public access projects. This pier is the largest project completed since the inception of the permit in 2011.

New Refinancing and Loan Assistance Opportunities Become Available to Commercial Groundfishermen

The Commonwealth of Massachusetts and federal government have recently mobilized a suite of financial assistance programs to assist commercial groundfishermen. A fishery disaster was declared in the groundfishery beginning May 1, 2013 but Massachusetts fishermen and communities have suffered for some time now as annual quotas for several key groundfish stocks have continued to decline despite fishermen's adherence to annual catch limits.

When the groundfish sector system was first adopted under Amendment 16 in 2010, *MarineFisheries* and NOAA Fisheries entered into a partnership to provide loan assistance to smaller fishing operations. These smaller-scale businesses were likely to face greater economic hurdles in financing the leasing of groundfish quota that has now become a key component to active participation in the fishery. That Commercial Fisheries Revolving Loan Fund (RLF) has now been expanded to allow eligible fishermen to finance not just quota leases, but vessel and gear purchases as well as to refinance existing fisheries-related debt. Further information on the RLF is available on our website (www.mass.gov/marinefisheries) by searching for "Commercial Fisheries Revolving Loan Fund".

In response to the federal disaster declaration, Governor Patrick applied for federal assistance through the Economic Injury Disaster Loan program at the Small Business Administration (SBA). The approved program enables SBA to offer working capital loans to help small businesses meet their ordinary and necessary financial obligations that cannot be met as a direct result of the disaster. Other non-disaster SBA and Department of Agriculture loan assistance programs are available as well. Further information on these federal programs is available on the NOAA Fisheries website: <http://www.nero.noaa.gov/stories/2013/sbausdaseminardec2.html>

While *MarineFisheries* continues to pursue these and other opportunities for Massachusetts fishermen, additional regulatory and scientific action will be necessary to assist the Commonwealth's commercial groundfishing fleet to persevere through the social and economic impacts caused by recent, severe catch limit reductions. *MarineFisheries* remains committed to stabilizing this fishery and historic fishing communities towards a sustainable future.

By Melanie Griffin, Fisheries Policy Analyst and RLF Program Manager

Eels and the black market: the changing status of American eel in Massachusetts

It is not hard to make a case that the American eel (*Anguilla rostrata*), well known as slimy and hard to handle, is a unique creature. Its many adaptations, while making it one of the most evolutionary successful fish in North America, also render it one of the most difficult to manage. The interstate management process for the American eel is currently being tested by a confluence of biological and socio-economic factors. Concerns about stock status have reached a tipping point, with the need for additional harvest restrictions well accepted, at the same time as a boom in the elver fishery. The primary driver for the



DMF Staff Photo

Age 1 American eels counted at the Saugus eel ramp.

increase in harvest is overseas demand. Those states in which elver harvest is prohibited, including Massachusetts, are not immune, but rather have seen a surge in poaching. The black market for eels has become a major feature in discussions of pending management revisions.

The uniqueness of the American eel begins with the great diversity of habitats it occupies. They are the only fish in North America that spawn in the ocean, with the young migrating to freshwater habitats to grow to maturity. Despite being a fish, juvenile eels can climb a vertical surface if rough and wet. They are panmictic, belonging to a single genetic stock throughout their distribution, which has an expansive range from South American to Greenland. After hatching in the Sargasso Sea, young eels make an epic migration as post-larvae that have a flattened body which helps them take advantage of ocean currents moving west towards the continent. Little is known about their ocean migrations and how the environment influences their survival. The larvae transform into a 2.5-inch transparent glass eel as they approach coastal rivers during the cool, higher flows of spring to avoid predation. They can migrate deep into watersheds, in many cases becoming the largest predator with the highest biomass among freshwater fish. They can live for over 20 years and when mature, migrate thousands of miles back to the Sargasso Sea, where they spawn and die. To survive cold winters and the long journey to the Sargasso Sea, American eels are well adapted to store fats in their tissues. This feature contributes to their reverence in many cultures as a premier fish to grill and smoke.

The Japanese discovered long ago that juvenile Japanese eels (*Anguilla japonica*) could be gathered easily as they ran up coastal rivers and then raised in captivity to a larger size to supply local appetite for grilled eel, or *kabayaki*. Today, eel holds a place of cultural and dietary importance in Japan that is rivaled by few fish. This demand eventually led to overharvest of the Japanese eel in the 1980s and 1990s. At that time, the Japanese market turned to the European eel (*Anguilla anguilla*) which, in a short period of high prices and illegal harvest, contributed to declining abundance for that species. The stage was then set for a repeat showing of this drama in the United States.

The Japanese market attracted experimental fisheries for glass eels in several East Coast states in the 1970s and 1980s. Most attempts fizzled as lower prices did not always cover the challenge of shipping a live product to Japan. However, the continued decline in abundance of *Anguilla* species world-wide and competition from other Asian countries in the eel culture business has sharply increased the price for glass eels offered to U.S. fishermen in the last few years.

American eel are managed by the Atlantic States Marine Fisheries Commission (ASMFC) because they migrate across jurisdictional boundaries on the East Coast. The first interstate American eel management plan debuted in 2000 and included a ban on glass eel fisheries with exceptions for the states of Maine and South Carolina. Other states found limited economic viability in experimental glass eel fisheries and their scientists expressed concerns over the potential impacts to future stock recruitment. In effect, ASMFC agreed to “grandfather” the activity of the two states and prohibit new glass eel fisheries from developing.

Maine’s glass eel fishery continued at a fairly low level of catch and effort during the 1990s with fluctuations driven by the price offered by the Japanese market. Because glass eels are easy to intercept as they enter coastal rivers, no boat is necessary and the cost of gear to catch eels is relatively minor. Small-mesh nets, waders, and holding tanks are the prime equipment needed.

Some illegal fishing occurred in Massachusetts during the 1990s and 2000s, mainly by a few poachers traveling from Maine during years that the price increased into the \$250-350/pound range. This all changed in 2011 when the declining supply of European and Japanese glass eels mingled with increasing competition and maturity of the Chinese, Taiwanese, and South Korean eel culture industry. These countries have large numbers of eel grow-out farms that buy glass eels, raise them to over a foot in length, and sell them to Japanese markets after 6 to 16 months. The glass eel traders from these countries bid the price for American glass eels to \$1,000/lb that spring, increasing illegal poaching and trade in the United States. Similar to a black market that developed in southern Europe over ten years ago, the high price was more than enough incentive to bring unprecedented levels of poaching to Massachusetts in 2011.

The topic of poaching glass eels in Massachusetts has generated concerns. Who is poaching and how much is happening? How will this impact Massachusetts? Biologists with the Division’s Diadromous Fish Biology and Management Project are active each spring working on river herring, shad, smelt, and eel monitoring projects. In the 1990s and 2000s, staff might observe, over the course of a season, an occasional illegal fyke net set up to poach glass eels. Jump to 2011 and our project staff found either fyke nets or related equipment in most of our monitored rivers. The Massachusetts Environmental Police were very active and had an unprecedented number of arrests. Increasing competition among buyers for glass eels in 2012 raised the price to over \$2,000/lb in Maine. The chance to make \$10,000 a night encouraged poachers to tune their craft, with some working directly with dealers and Massachusetts contacts. In 2013, the reported price for glass eels averaged slightly less than \$2,000/lb and the amount of poaching was similar to 2012.

The consequences of uncontrolled illegal harvest of glass eels in Massachusetts are wide ranging. Massachusetts does not allow glass eel harvest and is trying to restore eel abundance in all of our state’s river systems. A poacher’s well-placed fyke net can remove a majority of the annual recruitment of glass eels in a small coastal river. However, officers have found that poachers are not taking the risk of traveling from Maine to set

a single net in one river. A large effort of illegal fishing could jeopardize our goals to restore eel populations. The MA Environmental Police are forced to devote significant resources to combat the rise in poaching. There are real costs, risks, and lost opportunity to enforce other fisheries that did not exist prior to 2011. Possibly the most important impact is the loss of ecological benefits, as glass eels are food for a wide range of fish and wildlife. Many fish that support commercial and recreational fisheries feed on American eel.

It’s hard to think of a fisheries enforcement issue in Massachusetts that has generated as much disregard for the public trust in natural resources. How can the state combat the illegal harvest? *Marine Fisheries* has been working with the ASMFC American Eel Management Board and Technical Committee to find regulatory solutions. During a public hearing process for amending the Interstate American Eel Management Plan in 2012, the majority of comments from New England states other than Maine asked ASMFC to close the glass eel fishery. The ASMFC Law Enforcement Committee has stated that the only way to stop the current level of illegal activity is to shut the glass eel fishery down. This option and others were discussed at the ASMFC Eel Board meetings in both August and October, but to date no meaningful glass eel regulatory change has advanced. Maine is looking at internal corrections, like lowering the landings by 25 – 40% through a hard quota, increasing fines, and stepping-up reporting requirements, to protect the interests of their law-abiding fishermen.

Maybe the answer comes from successful hatchery rearing of glass eels. Once researchers develop the ability to efficiently spawn adult eels in captivity and keep the young alive, the demand for wild glass eels will diminish.

The 2012 ASMFC American Eel Stock Assessment found the eel stock to be depleted, U.S. harvest to be at historic low levels, and recommended reductions in mortality at all life stages. *Marine Fisheries’* objectives for American eel are to restore populations to a level that can provide widespread ecological benefits and support the seasonal fisheries for food and bait that were an important part of our coastal culture 50 years ago. This work is underway and includes eel passage and habitat restoration efforts and active participation in the interstate management arena. Most East Coast states and Canadian Provinces share these goals. However, the black market for glass eels is a significant obstacle to American eel restoration and we have no control over the demand from the Asian market for glass eels. Improved support for environmental law enforcement and higher fines are needed as we wait for ASMFC to consider regulatory change. In the meantime, the global dynamics of supply and demand will likely have the poachers coming down Route 95 again next spring.

By Brad Chase, Senior Marine Fisheries Biologist



American eel

Image prepared by Ellen Edmonson and Hugh Chrisp



DMF Staff Photo

Softshell clams can now be harvested at Joppa Flats by specially licensed harvesters.

Newburyport’s Joppa Flats reopens to clam harvest after an 80-year closure

Once considered among the top clam producing flats in Massachusetts, bacterial contamination shut down Joppa Flats nearly a century ago. This highly productive bed is now reopening as a result of improved water quality and a comprehensive management plan developed with the City of Newburyport. The area is opened only to Conditionally Restricted commercial harvest of softshell clams (*Mya arenaria*) for depuration, meaning harvesting for direct human consumption and recreational harvesting are still prohibited.

“Conditionally Restricted” means that only specially licensed individuals will be allowed to harvest the clams. Due to elevated levels of bacterial contamination – even during dry weather periods – all clams harvested must be “cleansed” (depurated) at the *Marine Fisheries* Shellfish Purification Plant on Plum Island, Newburyport. Softshell clams and other bivalve mollusks become contaminated by filtering both harmless and pathogenic (disease causing) bacteria and viruses from seawater when they are feeding and breathing. Contaminated shellfish can transmit these bacteria to people if they are eaten raw or under cooked. To become safe for human consumption, these shellfish must first be purged of the harmful organisms to a level suitable for food purposes.

Only softshell clams may be harvested by specially licensed Master and Subordinate diggers. Longstanding regulations limit harvest in Conditionally Restricted Areas to weekdays only for Master Diggers and their employees, known as Subordinate Diggers. The Master buys the clams from subordinates at the landing site. The clams are then placed in plastic boxes, loaded

onto the Master Diggers truck, and transported to the depuration plant on Plum Island via a prescribed route.

When clams arrive at the Shellfish Purification Plant, they are placed on pallets and lowered into one of nine 3,500 gallon tanks. The tank is filled with clean salt water from two 130’ deep wells. The clams then do all the work through a self-cleansing depuration process. The shellfish purge their digestive system of particulates as seawater is continuously re-circulated and sterilized by ultraviolet lamps. Clams and tank seawater are tested daily for bacteria at the in-house laboratory. Typically, after 2½ to 3 days, the shellfish are clean. The clams are then returned to the Master Diggers who sell them to Massachusetts wholesale shellfish dealers for processing and/or resale.

The Merrimack River was once considered one of the nation’s ten most polluted rivers. The reopening of Joppa Flats was accomplished through a concerted clean-up effort begun over twenty years ago by local, state, and federal programs, along with an aggressive re-sampling initiative by *Marine Fisheries*. The reopening encompasses over 251 acres of the southeastern portion of the Joppa Flat, while the northwest section remains closed and classified “Prohibited” as part of a closed safety zone around the Newburyport Wastewater Treatment Plant discharge. An additional 534 acres of Merrimack River estuary clam flats in Newburyport and Salisbury were reopened in 2006.

By Jeff Kennedy, Newburyport Shellfish Purification Plant Manager

New Approaches to Managing Black Sea Bass in 2013

This past year ushered in new management strategies for black sea bass in Massachusetts. The commercial fishery’s season shifted to later in the year while the recreational fishery experimented with a pilot program allowing patrons on for-hire vessels different rules than private anglers. The rationales for these revisions are independent of one another, but both have at their root the growing availability of black sea bass in the Commonwealth’s waters. While more black sea bass are ostensibly a good thing, this trend is not without implications for management, especially when commensurate increases to the annual catch limit have been hindered by scientific uncertainty.

On the commercial side, unprecedented catch rates in the spring have forced early closure of the spring (May) fishery, relegating little-to-no quota for the summer fishery intended to start on August 1. The high efficiency of the May fishery raises a number of concerns. First, it has meant that the majority of harvested fish are from pre-spawning aggregations – contributing to the high catch-per-unit effort at this time. Second, it created a *de facto* regional allocation favoring those who fish



DMF Staff Photo

Black sea bass



DMF Staff Photo

An angler catches a black sea bass at the Yarmouth Tire Reef

Buzzards Bay where fish first arrive in early spring, at the expense of those who fish elsewhere, such as Martha's Vineyard and Nantucket Sound. Third, many Massachusetts consumers have been largely shut out of the local black sea bass market because the majority of sea bass harvested in May are exported out of state. And fourth, non-compliance with possession limits has increased as a result of the high availability of black sea bass at this time and the low commercial trip limits needed to slow use of the quota.

To address these quota management issues, the spring fishery was eliminated in 2013 in favor of a season beginning on the first Tuesday in August. With three open days per week (Sunday, Tuesday, and Wednesday), the trip limits were raised from 200 lbs to 300 lbs for fish pots and from 80 lbs to 150 lbs for mobile gear and hook & line.

Under these rules in 2013, sexually mature black sea bass had an opportunity to spawn before being targeted by the commercial fishery. The number of open fishing days increased (although some of this can be attributed to an increase in quota) and the average daily price remained more stable throughout the season (see graphs). Locally-caught black sea bass were available in southern Massachusetts markets during the summer months – a time when demand is high, coinciding with peak tourist activity. As such, shifting the start of the commercial season met a number of objectives. We are hopeful the same will be true in 2014, when the Commonwealth's commercial black sea bass quota and regulations will remain unchanged from 2013.

A transitional year for the recreational fishery

Headed into 2013, *MarineFisheries* was faced with needing to cut Massachusetts' recreational black sea bass harvest by roughly a third from the 2012 level. Because the available data indicated that few anglers harvested the full bag limit in 2012 (10 fish from May 11 – June 24, and 20 fish from June 25 – October 31), decreasing harvest by a third would require a uniform bag limit of just 4 fish unless the size limit were also raised or the season reduced.

MarineFisheries has shied away from further increases to the size limit (14") because the reproductive effect of selectively harvesting males may be detrimental. (Black sea bass generally

mature first as females and later become male, so the size limit affects the proportion of males-to-females in the harvest). But whether the season should be reduced to preserve higher bag limits quickly became a topic of debate, primarily among for-hire vessel operators.

Highly problematic was the lateness in proposing such a severe cut to the bag limit. The black sea bass rule-setting process is customarily delayed until late winter by a need to wait for the November/December recreational harvest estimates, but late-breaking revisions to the annual catch limit and interstate management plan in 2013 further delayed the process into early spring. Consequently, many charter and head boat captains insisted that their businesses would be doomed with the 4-fish bag limit, as they had already been booking trips under the assumption of the same bag limits as those in 2012. Other for-hire operators, while also frustrated by the timing of the rules, preferred a longer season at the expense of the bag limit, a strategy that is generally better suited for the whole of private anglers as well.

With this break-down in the management process inadvertently harming some businesses, the Division recognized the need for flexibility in the management measures for 2013. The resulting innovative approach established baseline regulations expected to meet the required harvest reduction through a bag limit reduction (4 fish from May 11 – October 31), while also providing a mechanism for interested for-hire vessels to reduce season length rather than bag limit for an equivalent harvest reduction. Because for-hire captains target sea bass during different times of the season depending on location, part of each two-month "wave" was closed to the for-hire vessels opting into the special access program, resulting in a 10-fish bag limit from May 11 – June 14 and a 20-fish bag limit from July 1 – August 11 and September 1 – October 10. Participating vessels were prohibited from possessing black sea bass for recreational purposes outside of the open periods and were required to maintain a daily logbook of all black sea bass caught during for-hire trips. Seventy-six vessels were active in the program, taking over 1,500 for-hire trips under the alternative rules.

While final data for the entire recreational fishery are not yet available, projections of harvest suggest that Massachusetts achieved the required reduction in 2013, but the coast, as a whole, may not have done so. Assuming a continuation of the regional management approach for the recreational black sea bass fishery, some modest tightening of regulations may still be needed in 2014. What is unequivocal, is that a return to the liberal 2012 regulations is not in the cards. Other adjustments to Massachusetts rules can be made based on "conservation equivalency," meaning that a liberalization in any one element (bag limit, season, or size limit) would be balanced by a reduction in the others.

Another year of the special "closed season" for-hire fishery enjoyed by some vessels in 2013 is also in doubt. The primary reason for that program was because the for-hire industry was not notified early enough of the impending large bag limit reduction in 2013. The Division is broadcasting early in 2014 that the upcoming recreational black sea bass rules are likely to be across the board. Furthermore, a review of the 2013 recreational sampling data indicates that the survey is not capable of accurately measuring the catches of a small subset of vessels within the larger fleet of for-hire vessels, nor can this component be set aside from the remaining fishery during sampling to avoid biasing catch estimates.

Public hearings are expected in late winter or early spring before the 2014 recreational black sea bass rules are settled.

By Nichola Meserve, Fisheries Policy Analyst

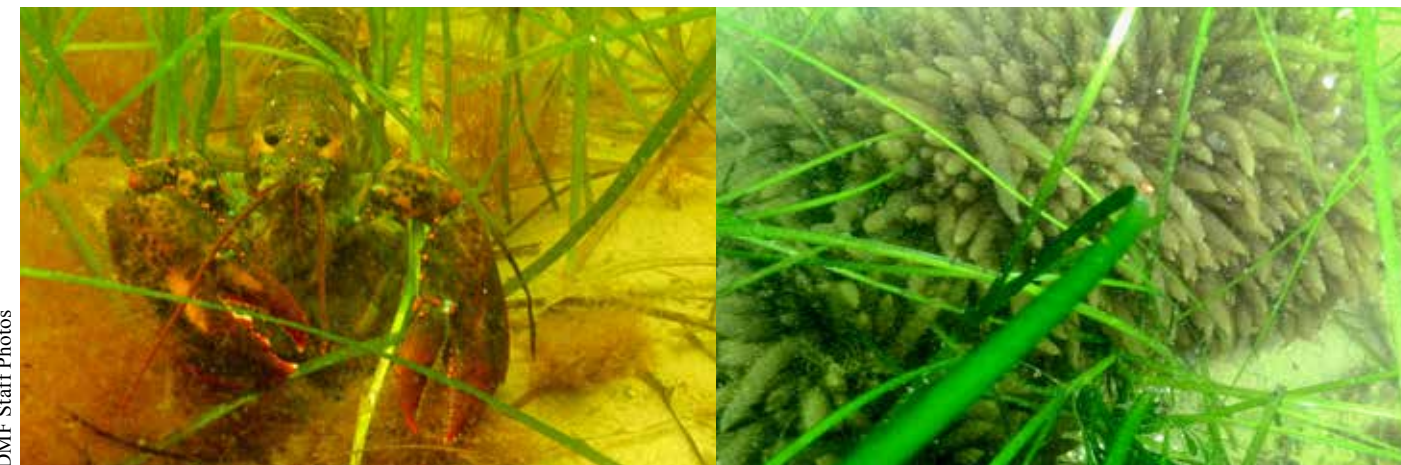
Eelgrass beds: Havens for marine species

Just as coral reefs are to tropical waters and rainforests are to the Amazon, seagrass meadows are important to the New England coastline. They provide habitat and foraging grounds for marine animals, buffer the shoreline from erosion, filter the water, and oxygenate the sediments. Eelgrass (*Zostera marina*), an underwater flowering perennial plant, is the predominant seagrass species in Massachusetts and can be found growing in many of our bays, harbors, and open-water shelves. Eelgrass beds can be dense meadows or patchy mosaics, both providing critical refuge and habitat for recreational and commercial fisheries species including flounders, scallops, lobsters, tautog, and black sea bass. Studies have found that fish abundance, biomass, and species richness rise with increasing eelgrass meadow complexity, so more eelgrass may mean stronger fisheries, making eelgrass a highly valuable resource. In fact, one study valued seagrass meadows, based on the ecosystem services they provide and their support of commercial and recreational fisheries species, at \$50,000 (in 1994 USD) per acre, per year, globally. (That's close to \$100,000 per acre, per year in today's dollars.)

Despite their ecological value, seagrasses are considered among the most threatened ecosystems on earth. Researchers estimate a 7% annual rate of decline globally since 1990. Massachusetts has had a long history of persistent eelgrass meadows, but in the past two decades we've seen significant declines coastwide. The Massachusetts Department of Environmental Protection has calculated an annual loss rate of 3% from 1996 to 2006; that's 1,866 acres of eelgrass lost from 30 Massachusetts embayments.

The main threat to eelgrass is poor water quality, which causes reduced light available to plants and in some cases results in a low oxygen, toxic environment in the sediments. Declining water quality in Massachusetts is mostly due to nitrogen loading via septic tanks and fertilizers, and stormwater runoff from impervious surfaces (i.e., buildings and pavement). Eelgrass damage and loss can also result from coastal construction projects, such as dredging and dock building, common boating and fishing practices, such as anchoring, mooring chain scour, propellers running in shallow water, and some bottom-tending fishing gears.

Due to its importance as a fisheries habitat, *MarineFisheries* has been working to restore, monitor, and reduce impacts to eelgrass throughout Massachusetts waters. Funding for our eelgrass restoration efforts comes in part as mitigation for coastal construction projects by Algonquin Gas Transmission LLC, and Massachusetts Port Authority.



DMF Staff Photos

Eelgrass is an important habitat for a variety of animals including (left) lobster, and squid (egg deposit, right).

Since 2004, *MarineFisheries* has successfully restored seven acres of eelgrass, through transplants from healthy donor beds into areas deemed suitable for restoration. Five acres planted around the Boston Harbor Islands from 2004 to 2007 have expanded to encompass greater than 10 acres in 2013. Because it takes 3 to 5 years for a successfully transplanted eelgrass bed to grow and become functionally equivalent to natural eelgrass meadows, we will continue monitoring our recently planted grass to ensure that the restoration sites are on a trajectory of development. Despite these highlighted successes, some attempts at planting fail, due mostly to poor site selection – if eelgrass isn't already growing somewhere due to site conditions, the site may not be amenable to transplant establishment.

Restoration is time-consuming and costly – ranging from \$250,000 to \$350,000 for site selection, planting, monitoring, and where necessary, re-planting – and not always effective at replacing lost habitat. For this reason, *MarineFisheries* is also focusing on ways to protect and reduce impacts to eelgrass. Conventional boat moorings scour eelgrass and leave large circular scars. Working with municipalities, *MarineFisheries* is helping to install and monitor moorings that have a flexible, floating chain that does not drag on the bottom.

We are also working to better understand how changes in eelgrass meadows relate to changes in our environment, including climate and storm influence, as well as human impacts, including fishing gear interactions. To answer these questions, we are studying a discrete site off Beverly where we are gathering high resolution transect data in a large eelgrass meadow. This monitoring program is part of a global seagrass monitoring network called SeagrassNet. SeagrassNet stations around the world are collecting comparable data which can be used to assess global trends. Overall, our data show a 56% decline in eelgrass biomass and 51% decline in density since 2008 at the Beverly SeagrassNet stations.

Today Massachusetts has approximately 38,000 acres of eelgrass remaining. This is a far cry from the estimated hundreds of thousands of acres present in pre-colonial times. It's up to us to be stewards of this valuable fisheries habitat and to work toward curbing its decline. For more information about eelgrass and what you can do to minimize your impacts, please visit our website at <http://www.mass.gov/eea/agencies/dfg/dmf/programs-and-projects/seagrass.html> and blog <http://seagrasssoundings.blogspot.com/>

By Tay Evans, Aquatic Biologist

Cap and Protect: Reducing River Herring Bycatch

River herring – alewives and blueback herring – continue to capture attention even in the fall and winter when the herring runs are over. Their unintended catch by offshore trawlers fishing for Atlantic (sea) herring causes much consternation to those concerned about these important forage fish, epitomizing communities’ devotion to coastal protection and enhancement. Recognizing these facts, *MarineFisheseries* has been aggressive with its approach to restrict and help fishermen avoid river herring bycatch. For example, over the last few years, *MarineFisheseries* has been involved in a sea herring fishery “move-along strategy,” enabling fishing vessels to avoid areas where river herring bycatch has been identified.

More recently, *MarineFisheseries* helped convince the New England Fishery Management Council to adopt restrictive river herring catch caps by fishing gear and area. These caps have the potential to stop mid-water trawling for sea herring in the Gulf of Maine, east of Cape Cod, and in southern New England waters. With past years’ catches as high as the caps, fishermen understand that avoiding river herring is now paramount for their continued fishing on quota-controlled sea herring.

To their credit, sea herring fishermen and processors have been highly supportive of the move-along strategy, helping to meet the objective of the fleet avoiding river herring “hot spots.” *MarineFisheseries* researchers, Bill Hoffman and Brad Schondelmeier, do the lion’s share of work associated with this program such as arranging sampling trips, calculating bycatch, and issuing advisories to the fishing fleet. David Bethoney, a graduate student at the School for Marine Science and Technology (SMST) at the University of Massachusetts Dartmouth, has also assisted with this program. Of special note, the Nature Conservancy continues to help with some financial support.

This initiative of the Massachusetts Marine Fisheries Institute (*MarineFisheseries* & SMST), with the collaboration of the sea herring industry, is now another management tool used by the Council to reduce river herring bycatch. With catch caps expected to be implemented in 2014, regional river herring protection will be vaulted to even greater prominence.

By David Pierce, Ph.D., Deputy Director



DMF Staff Photo

MarineFisheseries’ Nick Buchan samples a trawler’s harvest of river herring.

Your Catch Counts – the Marine Recreational Information Program (MRIP) in Massachusetts

Last year marked the first year that *MarineFisheseries* coordinated the Massachusetts portion of the federal marine recreational fisheries catch survey. The survey is designed to estimate the number of fish caught by recreational anglers in each state. This number is gathered by field interviewers who are hired and trained by *MarineFisheseries* biologists. They interview anglers at over 500 recreational fishing sites along the Massachusetts coast and on the islands. Sites include boat ramps, marinas, fishing piers, beaches, and jetties.

While on assignment, interviewers seek out anglers who have completed fishing and ask them a standardized set of survey questions, such as: what species were targeted and how often the angler(s) fished in the last two months and within the last year. Most importantly, they identify, count, weigh, and measure a sample of each angler’s catch. Interviewers are deployed almost every day throughout the fishing season from April to November, with more effort placed on weekends – when recreational fishing activity is highest. At the high point in the summer of 2013, there were 20 field interviewers collecting data on the Massachusetts coast, including five on the north shore from Salisbury to Boston, six from south of Boston to Westport, and nine on Cape Cod and the Islands.

Interviewers headed into the field are given one of four “modes” to sample – shore, private boat, charter boat, or head boat. Only one mode is sampled per assignment. *MarineFisheseries* worked in 2013 to significantly increase the number of survey assignments as compared to previous years. This increased effort means more interviews collected, and more fish counted, weighed, and measured. The result is an improvement to the precision and accuracy of catch estimates. A total of 6,670 anglers were interviewed in 2013: 3,500 private boat anglers, 1,500 shore anglers, 200 charter boat anglers, and 1,470 head boat anglers.

The catch estimates produced by MRIP are used by fishery scientists to assess the health of our recreational fisheries and understand fluctuations in fish populations. Managers use MRIP survey data to guide future actions – such as establishment of minimum size limits, angler bag limits, and yearly catch quotas. We cannot emphasize enough how important this survey is to the successful management and scientific understanding of our recreational fisheries.

It is important for anglers to understand that their participation in the survey is one of the most important contributions they can make to their fishery. Refusing to participate can lead to insufficient or biased data collection, resulting in poor catch estimates, which in turn can produce ineffective management measures. *MarineFisheseries* remains committed to dedicating the resources necessary to maintain sustainability of our marine resources, and we ask anglers to help in our efforts to produce the best data to manage our recreational fisheries.

By Dave Martins, MRIP Coordinator

Comings and Goings



2002. Cecil received his BS in Earth systems from UMass Amherst. Before *MarineFisheseries*, Cecil was a caretaker on Martha’s Vineyard.



late 2009. When not evaluating fisheries habitats, Kate enjoys sports, cooking, and fishing.



Cooperative Research Study Fleet Project. He is excited to work on innovative ways to streamline and enhance the permitting process. Outside of work, Story enjoys boating and fishing with his family and friends.

Cecil French is the new Clean Vessel Act and Boating Infrastructure Grant program coordinator for *MarineFisheseries*. Cecil assists marinas along the Massachusetts coastline with pumpout needs and in applying for federal Clean Vessel Act and Boating Infrastructure grants. Previously, Cecil was the licensing program coordinator where he specialized in dealer, commercial, and recreational permitting. He has worked with *MarineFisheseries* since

Recently, Kate Ostrick joined *MarineFisheseries* as a full time Fisheries Supervisor for the Habitat Project. In this position, Kate evaluates coastal alteration projects for their potential impacts to marine species and habitats. She also supports eelgrass restoration and monitoring projects in Boston Harbor and Salem Sound. Kate received her BS in biology (minor psychology) from UMass Amherst. Before coming to *MarineFisheseries*, Kate worked with the Whale Center of New England. She has worked for *MarineFisheseries* as a contract employee in habitat restoration since

Story Reed has recently been reassigned as Permit Program Administrator for the Division, working out of the Boston office. He has worked in the Division’s Statistics Project since 2005 based in Gloucester, most recently as Fisheries Statistics Coordinator. Story earned a BA in environmental studies with a minor in economics from Bates College and an MS in public affairs from UMASS Boston. Prior to coming to work for the Division, he worked on the

This past autumn, Paul Somerville left *MarineFisheseries* to pursue a career with a non-governmental organization in Maryland. He was an aquatic biologist within our shellfish program for 8 years. We wish him the best on all his future endeavors.



Tom Beaulieu has worked in public service for 30 years, having spent the last 20 as the Clean Vessel Act Grant coordinator for *MarineFisheseries*. He has been part of the CVA program since its beginning in Massachusetts and has had the opportunity to witness it grow not only in this state, but nationally. The program now boasts the largest number of pump out boats in the country and the largest amount of effluent removed from coastal waterways. We wish him a happy retirement.



MA RMV Graphic

Does Your License Plate Help Support the Environment?

The Massachusetts Environmental Trust (MET) provides funding to many river, wetland, and other water resource protection and restoration projects throughout the Commonwealth. A major source of MET’s funding comes from the sale of “Preserve the Trust” environmental license plates. These specialty plates include the “Right Whale and Roseate Tern” plate (above), the “Fish and Wildlife” plate (depicting a brook trout), and the “Blackstone Valley Mill” plate. These three are the *only* Massachusetts specialty license plates that exclusively fund environmental programs. Getting an environmental plate is easy and can be done on-line or in person at your local Registry of Motor Vehicles office. For more information, visit: <http://www.mass.gov/eea/grants-and-tech-assistance/grants-and-loans/mass-enviro-trust/>

Legal Notice of Public Hearings Scheduled for February 11 and 12, 2014 Commercial Striped Bass Tagging and Management

Under the provisions of M.G.L. c. 30A § 2 and pursuant to the authority found at M.G.L. c. 130 § 2, 17A, 21, 80 and 100A, the Division of Marine Fisheries (DMF) and the Marine Fisheries Advisory Commission have scheduled public hearings and a public comment period to accept comment on proposed regulations to amend 322 CMR 6.00 and 7.00 affecting the commercial striped bass fishery.

1. **Commercial Striped Bass Tagging (322 CMR 6.07).** To comply with the Atlantic States Marine Fisheries Commission's interstate management plan for striped bass, DMF is proposing to establish a point-of-sale striped bass tagging program.
2. **Commercial Striped Bass Management (322 CMR 6.07, 7.01, 7.04 and 7.07).** To improve market conditions, fish availability, regulatory compliance and fishing safety, DMF is proposing a number of changes to the commercial striped bass management and permitting regulations. The proposals include adjustments to the season start date, open fishing days, daily catch limits, dealer purchasing protocol, fishery access and permit application and renewal deadlines.

Public Hearing Schedule

February 11, 2014 - Plymouth Harbor Radisson, Plymouth, MA - 6:00 PM

February 12, 2014 - Gloucester High School Auditorium, Gloucester, MA - 6:30 PM.

Public comments will be accepted until 5:00 PM on Friday, February 21, 2014. Please e-mail all public comments to jared.silva@state.ma.us or send to the attention of Jared Silva at 251 Causeway Street, Suite 400, Boston, MA 02114. For further information or to obtain a copy of the full proposed regulations, please contact Jared Silva by phone (617-626-1534) or through e-mail. Visit our website (www.mass.gov/marinefisheries) to view the expanded public hearing notice.

Notice of Public Hearings Scheduled for February 18 and 19, 2014

Under the provisions of M.G.L. c. 30A § 2 and pursuant to the authority found at M.G.L. c. 130 § 2, 17A, 21, and 80 the Division of Marine Fisheries (DMF) and the Marine Fisheries Advisory Commission have scheduled public hearings and a public comment period to accept comment on proposed regulations to amend 322 CMR 6.00 and 7.00.

1. **Fish Pot Restrictions and Permitting (322 CMR 6.12, 6.15, 6.31, 7.03, 7.06 and 7.09).** To improve compliance with DMF regulations affecting fish pot fishing and improve the efficiency of fish pot permit transfers, DMF is making the following proposals:
 - a. Require that all regulated fish pot permit endorsements be owner-operator;
 - b. Liberalize the regulated fish pot permit endorsement transfer requirements to allow the transfer of a limited entry regulated fishery permit endorsement to any person that has 1-year of full time or the equivalent part-time fishing experience;
 - c. Prohibit fish pot permit holders from fishing more than one fish pot or conch pot trap limit on the same vessel without a Letter of Authorization from the Director;

- d. Authorize the use of black sea bass pots to catch tautog during the commercial tautog season;
- e. Require that annual fish pot and conch pot trap tags must be affixed to pot gear prior to being set; and
- f. Organize all fish pot specific fishing regulations at 322 CMR 6.12 and all fish pot permitting regulations at 322 CMR 7.06.

2. **Knobbed Whelk Minimum Size (322 CMR 6.21).** To limit further depletion of the knobbed whelk resource, DMF is proposing to increase spawning stock biomass by increasing the minimum size for knobbed whelk on the same schedule as channeled whelk. This proposal will:

- a. Increase the minimum size for knobbed whelk from 2 ¾ inches:
 - i. to 2 7/8 inches in 2014; and
 - ii. 3 inches in 2015.

3. **Fishing Limits and Permitting for Draggers in Nantucket Sound (322 CMR 6.21, 6.34 and 7.01).** To limit the further depletion of the knobbed whelk and horseshoe crab resources, DMF is proposing to:

- a. Reduce the current 600 crab horseshoe crab limit for draggers to 300 crab limit;
- b. Establish a mixed knobbed and channeled whelk trip limit of 500 pounds for draggers; and
- c. For 2015, establish a limited entry permit regulated fishery permit endorsement for Coastal Access Permit endorsement holders to take, possess and land knobbed and channeled whelk. This permit will be available only to those Coastal Access Permit holders with verifiable knobbed and mixed whelk landings during 2010, 2011, 2012 or 2013.

4. **Improving Recreational Fishing Compliance (322 CMR 6.03 and 6.41).** To improve compliance with recreational fishing minimum sizes and trip limits, DMF is proposing to:

- a. Hold for-hire operators and permit holders liable for violations of recreational fishing regulations that occur onboard the for-hire vessel;
- b. Allow the at-sea filleting of all recreationally caught species under the following conditions:
 - i. For the purpose of species identification, skin remains affixed to all fillets;
 - ii. For the purpose of compliance with bag limits, the number of fillets does not exceed:
 1. Two times the species specific bag limit; or
 2. In the case of flounder species that have been butterfly filleted, four times the species specific bag limit; and
 - iii. Filleting will remain prohibited for private recreational anglers catching striped bass.
- c. To determine compliance with bag limits or fillet limits, in instances where recreational anglers have comingled catch, the comingled catch will be divided by the number of active anglers.

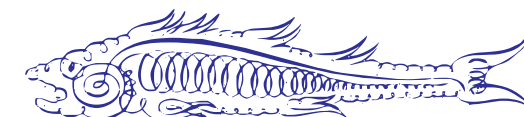
Public Hearing Schedule

February 18, 2014 - Plymouth Harbor Radisson Hotel 180 Water Street Plymouth, MA - 6:00 PM

February 19, 2014 - DMF's Annisquam River Station, 30 Emerson Avenue, Gloucester, MA - 6:00 PM

Public comments will be accepted until 5:00 PM on Friday, February 21, 2014. Please e-mail all public comments to jared.silva@state.ma.us or send the attention of Jared Silva at 251 Causeway Street, Suite 400, Boston, MA 02114.

For further information or to obtain a copy of the full proposed regulations please contact Jared Silva by phone (617-626-1534) or through e-mail (jared.silva@state.ma.us), or visit our website (www.mass.gov/marinefisheries).



During the period of July 15, 2013 through December 31, 2013 the following regulatory changes were enacted by the Division of Marine Fisheries (MarineFisheries) after public hearings and Marine Fishery Advisory Commission (MFC) approval. Annual specifications and emergency regulations promulgated during this period have also been listed.

Charter Boats

MarineFisheries is no longer requiring charter boats post recreational fishing limits on their vessel; operators are only required to announce all applicable recreational fishing limits to their patrons prior to fishing. This was done at the request of charter boat permit holders and operators who expressed concern about their ability to comply with the requirement to post rules due to size limitations on 20-30 foot center console vessels. This exemption to posting rules does not apply to head boats.

Gillnet Pingers

MarineFisheries is repealing the state's gillnet pinger regulations. This action does not eliminate the need to use gillnet pingers when fishing in state waters. Federal gillnet pinger regulations are filed pursuant to the Marine Mammal Protection Act and apply in both state and federal managed waters. Therefore, all gillnet fishermen must comply with the federal gillnet pinger regulations at 50 CFR. The reason for this action is to eliminate any confusion that may exist because state gillnet pinger regulations have fallen out of phase with and do not complement the over-arching federal regulations.

Sale of Lobster Tails

In July 2013, Governor Patrick signed into law an act that amended the state's lobster processing statute at Massachusetts General Law c. 130 § 44. This legislation legalized the in-state possession and sale of frozen shell-on lobster tails, provided said tails weigh more than 3 ounces. All Massachusetts seafood dealers and food establishments may now sell this product and all consumers within the state may possess it for personal use. Consequently, MarineFisheries modified its lobster processing regulations at 322 CMR 6.32 to complement the revised statute. Of note, the regulation requires that all processed shell-on lobster tails be accompanied by documentation that shows the processor, the product and the country of origin. This requirement will help Law Enforcement determine if the product was lawfully processed.

Menhaden

In December 2012, the Atlantic States Marine Fisheries Commission (ASMFC) approved Amendment 2 to the Atlantic Menhaden Fishery Management Plan (Plan). This plan established the first ever coastal commercial quota with state quota shares. Based on reported landings from 2009 to 2011, Massachusetts was allocated 0.84% of the quota. To ensure compliance with state quota shares, ASMFC mandated that individual states implement a quota managed system by July 2013.

To comply with this Plan, MarineFisheries implemented a quota management program by emergency regulation in early July 2013. Final regulations were promulgated during the fall of 2013. The final regulations established an open access and a limited access fishery, with fishery specific trip limits. Open access commercial menhaden fishery participants may fish for and land up to 6,000 pounds of menhaden per day without a menhaden regulated fishery permit endorsement. To land more than 6,000 pounds of menhaden a limited entry regulated menhaden fishing permit is required.

The limited entry regulated menhaden permit endorsement will only be issued in 2014 to commercial fishermen that: (1)

hold an inshore net regulated fishery permit; (2) hold a Coastal Access Permit; or (3) landed more than 6,000 lbs of menhaden during any trip in 2009, 2010 or 2011. This fishery will be subject to trip limits based on quota availability. Until 75% of the quota is projected to have been landed, commercial fishermen may land 125,000 pounds of menhaden per trip; after the 75% threshold, the trip limit will be reduced to 25,000 pounds until 95% of the quota is projected to be landed; and after the 95% threshold, the trip limit will be reduced to 6,000 pounds until the fishery is closed.

Once the menhaden fishery is closed, commercial fishermen from both the open access and limited access fishery may continue to land menhaden as bycatch. Menhaden bycatch will be limited to 1,000 pounds per trip and the weight of menhaden may not exceed 5% of the total weight of the catch landed.

Scup

The Director declared the Winter II Scup Limits. For the period of November 1 through December 31 the scup trip limit was set at 8,000 pounds per trip. This declaration complements the federal trip limit established by the National Marine Fisheries Service.

Surf Clams

In most years over the past decade, the National Marine Fisheries Service suspended the surf clam minimum size taken from federal waters. Accordingly, MarineFisheries has amended its surf clam minimum size regulations to allow federal surf clam permit holders to land surf clams below the state's 5 inch minimum size, provided said surf clams were legally harvested in federal waters. A similar action was not taken for surf clams caught in state waters due to concerns about maintaining broodstock.

Miscellaneous

MarineFisheries took a series of minor actions to update 322 CMR by codifying longstanding practices and eliminating outdated rules. The changes are as follows:

Anglers are no longer limited to using a certain number of hooks per line when fishing for shad on certain areas of the Palmer River or white perch on certain areas of the Agawam River;

During the 1970s and 1980s, Massachusetts attempted to introduce coho salmon into Massachusetts, this program was unsuccessful and coho salmon have not populated state waters. As a result, MarineFisheries has repealed its coho salmon regulations.

With the introduction of trip level reporting for commercial fishermen in 2010, MarineFisheries has phased out annual catch reports.



Applications Sought for New England Fishery Management Council

The Commonwealth of Massachusetts is seeking interested individuals for nomination to open seats on the **New England Fishery Management Council**. Candidates, by reason of their occupational or other experience, scientific expertise, or training, must be knowledgeable and experienced in ways related to fishery resources of New England. Qualified female and minority candidates are encouraged to apply.

The seats that will be open to nominations are four at-large seats, currently held by Mary Beth Nickell-Tooley of Maine (2nd term); Peter Kendall of New Hampshire (1st term); Laura Ramsden of Massachusetts (1st term); and Thomas Dempsey of Massachusetts (1st term). Each of these individuals is eligible for reappointment to another term.

Qualified individuals interested in being considered for nomination to the Council should contact Nichola Meserve (617-626-1531, nichola.meserve@state.ma.us)

state.ma.us) to request the nomination application kit. All applications will be due by the end of day on **Friday, February 14, 2014**. As part of the application process, the Commonwealth will also conduct an initial background review.

The New England Fishery Management Council is one of eight regional councils that manage our nation's marine fisheries seaward of state territorial waters. Responsibilities include the development of fishery management plans that are submitted to the National Marine Fisheries Service and the Secretary of Commerce for approval and implementation. A Council appointment is for a 3-year term; nominees must be willing and able, barring unforeseen circumstances, to make the commitment to fully participate in Council business and related activities for the duration of the term. For further information on the Council and the Council process, please visit www.nefmc.org.

MarineFisheries Show Calendar

February 1-2: Annual Southeastern Massachusetts Sportsman Show

Standish Sportsman's Association Club House
1 Burr Lane, East Bridgewater, MA 02333
Show website: <http://www.standishsportsmans.com/show.html>

February 6-9: New England Fishing and Outdoor Expo

DCU Center
50 Foster Street, Worcester, MA 01608
Expo website: <http://www.newenglandfishingexpo.com/>

February 20-23: The Springfield Sportsmen's Show

Eastern States Exposition
1305 Memorial Avenue, W. Springfield, MA 01089
Show website: <http://www.osegsportsmens.com/>

February 22- March 2: New England Boat Show

Boston Convention and Exhibition Center
415 Summer Street, Boston, MA 02210
Show website: <http://www.newenglandboatshow.com/>

March 8-9: Massachusetts Striped Bass Association Sport Fishing Expo

JunglePlex
8 Natalie Way, Plymouth, MA 02360

March 28-30: New England Saltwater Fishing Show

Rhode Island Convention Center
1 Sabin Street, Providence, RI 02903
Show website: <http://www.nesaltwatershow.com/>



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This Newsletter & Other Information
is available on our Web Site!

<http://www.mass.gov/marinefisheries>

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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Richard K. Sullivan, Jr., Secretary, EEA
Mary B. Griffin, Commissioner, DFG
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Comments and suggestions for the newsletter are welcome. Please contact the Editors at (617) 626-1520, or write to:

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