

Published by the Massachusetts Division of Marine Fisheries (DMF) to inform and educate its constituents on matters relating to the conservation and sustainable use of the Commonwealth's marine resources.

DMF News

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Front entrance to the new SMAST East building.

DMF's South Coast Office is Making a Move!

Our New Bedford field station is relocating to the South End

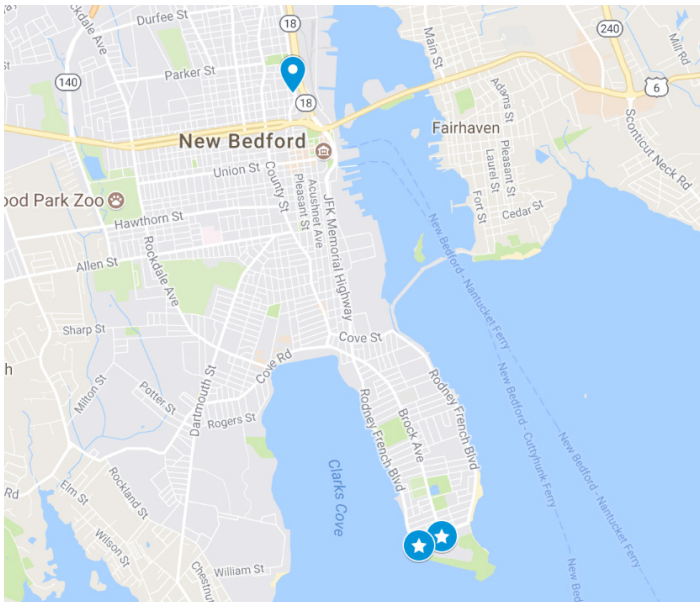
Starting this February, DMF South Coast's office will have a brand new location. Previously at the Quest Building on Purchase Street in downtown New Bedford, we are now in the newly constructed UMass Dartmouth building located in Clark's Cove. Sharing residency with UMass Dartmouth's School for Marine Science & Technology (SMAST) students and faculty, this 64,000-square foot facility will serve as a major marine science hub in New Bedford by enhancing scientific knowledge and promoting sustainable fisheries management.

The third floor of SMAST East will be the new home for our South Coast staff working on fisheries management and stock assessment, invertebrate species and shark research, habitat protection, recreational and diadromous fisheries and protected species. The Division's Shellfish Program will be headquartered at the adjacent SMAST West building allowing our shellfish area biologists and bacteriologist to have more fluid collaboration on water quality testing. The new location at SMAST East also provides an added benefit to constituents, with



Planning a trip to our New Bedford office?

Starting in early February, constituents can find us at 836 South Rodney French Boulevard, New Bedford, MA 02744. The entrance to the first floor walk-in permitting office is located on the right side of the building. You can still reach us by phone at (508) 990-2860.



South Coast Division staff will now be located at SMAST East and SMAST West in New Bedford's South End. We were previously located on Purchase Street in downtown New Bedford.

walk-in permitting on the first floor and dedicated customer parking near the DMF entrance.

The transition into this new state of the art facility has been a long uphill battle for the Division. Originally stationed in Pocasset, DMF staff moved to the temporary office space on Purchase Street back in 2006. With two other locations in Gloucester and Boston, the initial move to New Bedford completed the trifecta of office locations serving the Commonwealth's largest fishing ports. Our plans to build a permanent New Bedford office faced some major hurdles, as all construction projects do. In 2010, the Division began planning for a new facility to be constructed on a 3-acre parcel in the South End Terminal Extension on Blackmer Street. Plans halted in 2011, when the property was acquired by the city for the Wind Energy Terminal, forcing the Division to seek alternative sites. By 2015, DMF had partnered with UMass Dartmouth and broke ground on the SMAST East project.

Off and Running

On September 29, SMAST East had its ribbon-cutting ceremony and DMF staff was present along with many dignitaries celebrating the new facility and what it has to offer UMass Dartmouth, New Bed-

ford, and the Division. SMAST East and the existing SMAST West facilities will strengthen the Division's relationship with SMAST and improve collaboration through the Massachusetts Marine Fisheries Institute (MFI). Established in 2002, the MFI cemented a partnership between DMF and SMAST with a goal to promote sustainable fisheries through scientific research.

Through the collaboration of researchers, managers, and industry members, this facility will play a key role in hosting important fishery events. Already the MFI has sponsored a two day workshop on fishery management plan accountability measures. The MFI Advisory Council met at SMAST East to review and react to ongoing and planned MFI research.

Now that the ribbon has been cut and our boxes packed, we hope to realize even more benefits through collaborative research benefiting our fisheries and coastal economies.

By David E. Pierce, PhD, DMF Director & MFI Co-Chair



DMF staff out front of the new SMAST East building during the September 29 ribbon-cutting ceremony.

"The partnership between the Commonwealth's Division of Marine Fisheries and UMass Dartmouth's School for Marine Science and Technology educates the next generation of marine scientists and greatly improves our understanding of the marine environment through its collaboration with the fishing industry and research community. The Marine Fisheries Institute provides us invaluable information as our administration continues to protect the Commonwealth's coastal waters, ensure sustainable fisheries and promote the prosperity of our fishing industry and communities."

Governor Charlie Baker & Lt. Governor Karyn Polito

River Herring Bycatch Avoidance Program Success

The cooperative River Herring Bycatch Avoidance Program has met its goal of reducing the at-sea incidental catch of river herring and American shad in the Atlantic herring mid-water trawl fishery (MWT) by 50%. Atlantic herring, or sea herring, which are used as lobster bait or frozen for zoos and aquaria, have robust populations. However, this fishery can have substantial bycatch of river herring (alewife and blueback herring) and shad. Due to river herring population declines in the early 2000s, Massachusetts implemented a moratorium on their in-river harvest in 2006. Reducing the at-sea bycatch of river herring then became a management priority, prompting the Bycatch Avoidance Program's development in 2010 by DMF, the University of Massachusetts-Dartmouth School for Marine Science, and MWT industry members.

Modeled after the SMAST yellowtail flounder bycatch avoidance program in the sea scallop fishery, the ongoing river herring bycatch avoidance program (RHBA) uses increased data collection and real-time communication with fishermen to enable the fleet to dodge bycatch "hot spots." Laptops, pre-programmed with coded grids and installed in wheelhouses, allow captains to easily transmit tow location and bycatch data. Paired with information from DMF's comprehensive portside sampling program and NOAA Fisheries' sea sampling program, these data are aggregated into real-time bycatch alerts and maps that are sent back to the vessels. Maps are coded high, moderate or low bycatch in a stoplight fashion. If a high bycatch tow or trip is sampled, an immediate alert is sent to the entire fleet, along with their shoreside personnel. While vessels are not banned from entering high bycatch areas, they are encouraged to fish elsewhere for seven days. DMF and SMAST also conduct analysis before a fishing season to provide fishermen with insight into where and when river herring interactions have been highest in the past.

In late 2015, the regional fishery management councils created river herring bycatch caps for the Atlantic herring fishery. These caps, which shut down large areas when river herring bycatch amounts are exceeded, create an additional incentive to avoid bycatch and have increased the importance of the program's work. Buy-in from the fishing industry has been excellent, with all active vessels enrolled in the program.

DMF and SMAST recently concluded a comprehensive program evaluation that was published in the September 2017 issue of the scientific journal, *Marine Policy*. (The full study can be found on our publications webpage under Contribution 88). Bycatch levels and fishery effort distribution during the first four full years of the program (2011–2014) were compared to the previous four year period (2007–2010), for three specific fishing areas. Overall, river herring and shad bycatch decreased by approximately 60%, and the over-



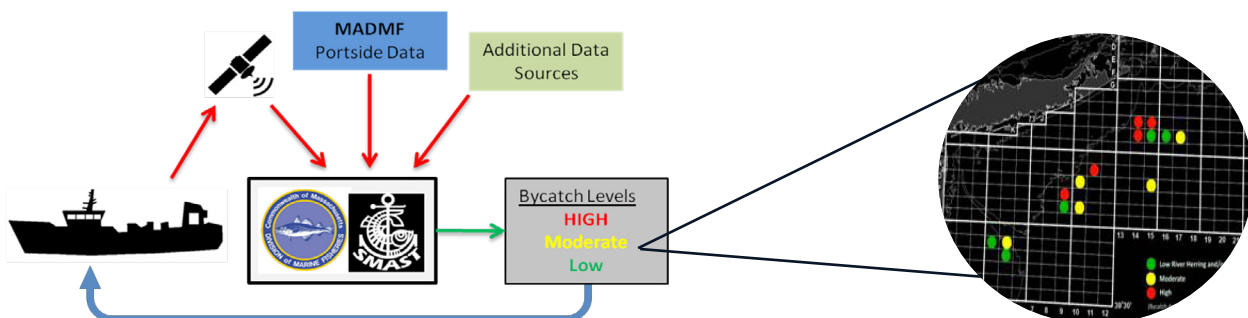
DMF biologist, Nicole Ward, sampling sea herring catch at one of the portside stations.

all bycatch rate decreased by 20%. Fishing effort in the area with historically the highest bycatch rates (southern New England in the winter) decreased by 20% during the program. Additionally, trip re-entries into moderate bycatch areas decreased by 19%, while re-entries into high bycatch areas decreased by 52% during the program. At-sea abundance of river herring and shad, as detected by NOAA Fisheries' spring bottom trawl survey, actually increased during this period. These results indicate that constant communication, port sampling and outreach by DMF and SMAST positively influenced fishing behavior and played a role in decreasing bycatch.

Initiated with National Fish and Wildlife Foundation grant funds in 2010, the RHBA has since been supported by The Nature Conservancy and other state and federal grants. In 2014, DMF and SMAST were awarded the Atlantic Herring Research Set-Aside (RSA). This cooperative research grant award allocates 3% of the annual sea herring quota to DMF and SMAST to distribute, with a portion of the proceeds returned to SMAST to fund ongoing research. Now in its fourth year, the RSA splits roughly 900 metric tons of herring quota among qualifying vessels to fund portside sampling, continued bycatch avoidance work, and the evaluation of a habitat forecasting model which could add a predictive element to the program. This productive industry-academia-management partnership has spawned additional research opportunities, such as those that seek to reveal further links between oceanographic conditions and river herring bycatch. Viewed by fishermen and biologists as a wholesale success and leading example of collaborative research, the RSA has created a mechanism where fishermen can fund the research and programs from which they can directly benefit, while ensuring the conservation of river herring and shad populations.

For more information about the river herring bycatch avoidance program or the herring RSA, please contact Brad Schondelmeier at brad.schondelmeier@state.ma.us or (978) 282-0308 x123.

By Brad Schondelmeier, Fisheries Biologist



Information from multiple sources is aggregated into real-time bycatch alert maps that are color coded red for high, yellow for moderate and green for low. An immediate alert for the area is sent out to the fleet.

Trawl Survey Goes Over the Hill!

DMF has completed its 40th year of the state inshore bottom trawl survey. Since 1978, the Resource Assessment Project has conducted a biannual bottom trawl survey to monitor the abundance, distribution, and size composition of commercially and recreationally important marine resources in state waters. Because the timing and methods have been so consistent, this 40-year survey provides reliable indicators of species changes across the state.

Through consistency in survey gear and biological sampling protocols, fishery-independent survey indices are developed which routinely contribute to stock assessments of Mid-Atlantic and Gulf of Maine fish stocks. Survey data are also used in ocean planning and assessing impacts from proposed coastal alteration projects. This is one of the longest running inshore trawl surveys in the United States which continues to grow in value with each additional year completed.

The daytime survey utilizes a stratified random sampling design with 23 strata based on six depth zones (<30, 31-60, 61-90, 91-120, 121-180, and >180 feet) and five bio-geographic regions (Massachusetts Bay north to the Merrimack River, Cape Cod Bay, south and east of Cape Cod and Nantucket, Nantucket Sound, and Buzzards Bay/Vineyard Sound). One hundred and three randomly

selected stations are allocated to strata in proportion to each stratum's estimated area. Randomly chosen stations in locations known to be untowable due to hard bottom are reassigned. Sampling intensity is approximately one station per 19 square nautical miles. A minimum of two stations are assigned to each stratum.

Upon arriving at a survey station, the vessel steams through the area to scan for fixed gear and to ensure there is towable bottom on the depth sounder. If all looks good, the trawl gear is deployed to complete a 20-minute tow at a speed of 2.5 knots. When the net is hauled back, the catch is dumped on a sorting table and sorted by species into baskets and buckets for processing. Standard bottom trawl survey techniques are used when processing the catch. Generally, the total weight and length-frequency are recorded electronically for each species using special software developed by NOAA Fisheries. Additional information on survey gear and sampling protocol can be found on our Publications webpage as Technical Report 38.

The F/V Frances Elizabeth provided the platform for the first eight surveys through fall 1981. The 72-foot R/V Gloria Michelle has consistently been the survey vessel since spring 1982. The R/V Gloria Michelle is operated and maintained by NOAA Corps officers. The vessel's main duties include the spring and fall Massachusetts trawl surveys and the NEFSC Gulf of Maine northern shrimp survey. The Resource Assessment Project is currently staffed with three

Species	Total Abundance (#)
Scup	5,482,262
Longfin Squid	1,432,689
Butterfish	1,403,914
Spiny Dogfish	675,107
Northern Sand Lance	645,177
Bay Anchovy	548,028
Blue Mussel	417,306
Winter Flounder	349,661
Atlantic Cod	323,395
American Plaice	265,788

Species	Total Biomass (lb)
Spiny Dogfish	3,029,227
Winter Skate	234,581
Little Skate	233,944
Scup	185,275
Winter Flounder	157,823
Ocean Pout	115,534
Northern Searobin	69,747
Longhorn Sculpin	67,231
Yellowtail Flounder	60,550
Atlantic Cod	51,777

The top ten species caught throughout the trawl survey's history, by abundance and biomass.



The Gloria Michelle, a NOAA Fisheries research vessel, has been used as the platform for every survey since 1982. Photo courtesy of Jacob Snyder.



Our Resource Assessment team includes (from left) Project Leader Matt Camisa, Jeremy King (retired), Mark Szymanski, and Vin Manfredi.

By the Numbers

40: Number of years the Division has conducted our trawl survey

14,289,226: Total number of individual organisms captured on all surveys

4,796,554: Total weight (lb) of all tows on all surveys

275: Average tow weight (lb) in the spring

981: Average tow weight (lb) in the fall

794: Average number of individual organisms in a spring tow

2,970: Average number of individual organisms in a fall tow

144,347: Heaviest tow (lb) recorded (98% of tow weight was from spiny dogfish)

127,496: Greatest number of individual organisms in a single tow (99.5% of individuals were bay anchovies)

254: Largest single animal (lb) captured to date; a roughtail stingray with a disk measurement of 60 inches

full time fisheries biologists. There have been 18 project members since 1978 with a combined 150 years of trawl survey experience. Hundreds of state and federal biologists, researchers, students, fishermen and state officials have volunteered their time and effort on the surveys. The scientific crew aboard the Gloria Michelle is staffed with DMF biologists and volunteers while the vessel crew consists of NOAA Corps officers, contracted fishermen, and volunteer federal employees.

Over the past 40 years, the inshore bottom trawl survey has deployed the net 8,298 times and towed over 5,750 nautical miles. Spring surveys have produced 3,897 successful tows. Fall surveys have produced 3,770 successful tows. Tow completion rates are typically lower for fall surveys due to increased fixed gear issues and large spiny dogfish catches.

To date, 195 unique species have been documented on spring and fall surveys.

Several notable catches have been observed over the last decade. Bay anchovy were first recorded on our fall surveys in 2009 and a record 127,000 fish were taken in fall of 2012. Several record lows were observed in 2013 including GOM ocean pout, windowpane flounder, cod, and winter skate as well as SNE windowpane flounder, winter flounder, little skate, and winter skate. In the spring of 2015, we saw two record tows of sand lance (107,083 and 75,855).

That fall, our team captured a record number of 15,631 young-of-the-year black sea bass at a single station. In the spring of 2016, we saw two record high tows by weight of haddock (2,756 lb and 1,082 lb) and in our most recent survey, one station produced 714 pounds of lobsters, 90% of which were large mature females with eggs.

Many additional catch components besides finfish and shellfish resources have been encountered over the years including algae, sponge, coral, rock, mud, clay, shells, bones, jellyfish, worm tubes, fossilized marine organisms, leaves, brush, trees and timbers. Non-biological catch components include derelict fishing gear, a large ship anchor, household debris, acoustic whale hydrophone, miscellaneous shipwreck debris, and a WWII hedgehog mine. If you're thinking this survey has caught everything but the kitchen sink, think again. Remnants of a stainless steel kitchen sink were taken in outer Mass Bay this past fall!

By Matt Camisa, Resource Assessment Project Leader

2017 Striped Bass Season Recap: One for the Books!

Talks about the 2017 striped bass season in early spring of this year was just about the only hot thing around. With temperatures hanging in the 40s through early June, it seemed the only people out "enjoying" the weather were coastal anglers eager to test the waters and greet the returning class of 2011 stripers. At six years old, this migrating school held the anticipation of having grown out to 28" or greater, which meets the legal keeper size for the state of Massachusetts. Additionally, the equally as successful 2015 cohort would be migrating for the first time, and at 12" to 14" would be a lively catch and release group for the early part of the season.

Even with this anticipation of a fruitful season, a surprising catch was taken the weekend before Memorial Day. Very few people could have predicted such a large fish so early in the season, but on May 16 a monster 64.6 lb striper was taken after a 13-minute battle, securing the 2017 Massachusetts Saltwater Derby winning entry. From there the season continued to provide countless hours of entertainment and strategy. Whether trolling, fly fishing, or canal side jigging, everyone agreed that 2017 was a year for the books. Angler reports from the Cape Cod Canal revealed some of the best fishing in decades.

Because of the abundant return of these iconic fish this year, it's never been more important to understand and follow Massachusetts' recreational fishing regulations. The legal size limit of 28" and a possession limit of 1 fish per day play a crucial role in protecting



DMF's 2017 Weigh-In Derby winner, Jeff Fortin (left) of Walpole with his 64.6 lb striped bass. Photo courtesy of Jeff Fortin.

and maintaining the striped bass stock for years to come. This year, several individuals made the unfortunate decision to violate regulations, and the Massachusetts Environmental Police cited many poachers with criminal and non-criminal fines, especially anglers on the banks of the canal. As we look forward to all the 2018 season can bring to fans of striped bass fishing, we encourage not only the legal collection of these fish, but also cooperative reporting from anglers all across the coastline. Should you see illegal activity in the future, you can report directly to the Massachusetts Environmental Police by calling (800) 632-8075.

By Christine Cassidy, Information and Education Coordinator

The Dish on Fish: Skate Wings with Roasted Tomatoes & Spinach

Bringing locally caught sustainable seafood to a table near you!



The final product from this delicious skate wing recipe. Photo courtesy of the Cape Cod Commercial Fishermen's Alliance.

Skate is a bottom dwelling fish that is abundant right off the shores of Cape Cod. This white meat fish is an excellent source of low fat protein with a mild sweet flavor and delicate texture. Skate is a versatile fish to cook with and available year-round.

Ingredients:

- 10-12 cherry tomatoes
- 1/2 tsp. crushed red peppers
- 1 tbsp. olive oil
- 2 skate wing fillets
- 2 large handfuls of baby spinach
- 1 lemon, quartered, for serving
- Salt and pepper

For the dressing:

- 2 tbsp. olive oil
- 1 tbsp. lemon juice
- 2 tsp. mustard
- Salt and Pepper

Directions:

Heat oven to 400 degrees. Toss the cherry tomatoes and crushed red pepper in the olive oil and roast in a large roasting pan for 10 minutes. Season skate wings with salt and pepper and then transfer to the roasting pan, moving the tomatoes to one side. Roast for an additional 15 minutes.

Make the dressing by stirring together the olive oil, lemon juice, mustard, and salt and pepper, to taste. Pour over the fish and tomatoes. Return to the oven for 2-3 minutes. Serve hot over a bed of baby spinach with the lemon, tomatoes, and pan juices.

This recipe is brought to you by the Cape Cod Commercial Fishermen's Alliance's Pier to Plate initiative, which was funded by a Saltonstall-Kennedy grant from NOAA Fisheries. The recipe development was sponsored by the Massachusetts Seafood Marketing Program and Buy Fresh Buy Local Cape Cod. You can find more delicious and local recipes like this on the Fishermen's Alliance's YouTube channel.



Small Boats. Big Ideas.



2018 Commercial Quota Outlook

Atlantic menhaden: 6,065,015 pounds (MA quota)

The 2018 coastwide commercial quota was established at a special meeting of the Atlantic States Marine Fisheries Commission (ASMFC) in November 2017. This action was paired with the Management Board's approval of Amendment 3 to the interstate fishery management plan, which changes the state-by-state allocation formula. The 2017 coastwide quota was 440.8 million pounds, of which Massachusetts received 0.84% or roughly 3.7 million pounds. The 2018 coastwide quota is up 8% to 476.2 million pounds, of which MA now receives 1.27%. The quota reported above was also nominally increased by three other states relinquishing quota they don't intend to use. See page 8 for more information.

Black sea bass: 457,600 pounds (MA quota)

The 2018 coastwide commercial quota of 3.52 million pounds represents a roughly 15% reduction from 2017, but recall that the 2017 quota was increased 52% from 2016 based on a new benchmark stock assessment. The decrease for 2018 reflects a decline in sea bass abundance as the strong 2011 year class exits the fishery. Massachusetts' share is 13%. The 2015 year class is looking to be above average and will be available to the commercial fishery in 2018. This, and the expected release of revised recreational harvest estimates in 2018, has led the Mid-Atlantic Fishery Management Council (MAFMC) and ASMFC to request a stock assessment update in late 2018 which could be used to set specifications for 2019. The assessment schedule is pending.

Bluefish: To be determined (MA quota)

The 2018 coastwide commercial landing limit is up over 5% from 2017; however, the coastwide commercial quota will depend on the amount of the recreational harvest limit that is transferred to the commercial fishery. The recreational fishery is allocated 83% of the total catch limit, but some of this can be transferred to the commercial fishery when the recreational fishery is projected to have an underage. In 2017, a transfer of over 5 million pounds from the recreational fishery resulted in a coastwide commercial quota of 8.5 million pounds, and a Massachusetts quota of 573,755 pounds (our share is 6.7%). Our fishery landed about 360,000 pounds in 2017, down from 500,000 pounds in 2016. These 2017 landings were roughly two-thirds of the MA quota, marking the first year in several that DMF has not acquired a quota transfer from another state(s) to prevent a premature closure of the fishery. We await the preliminary 2017 recreational harvest estimate to project the 2018 recreational landings and determine the commercial quotas.

Horseshoe crab: 165,000 crabs (MA quota)

Massachusetts' 2018 commercial quota for horseshoe crabs harvested for bait purposes is unchanged from 2017. Horseshoe crabs harvested for other purposes (i.e., biomedical use, research, display) are not counted against this quota.

Northern Shrimp: 0 pounds (MA quota)

The northern shrimp fishery will remain closed for the 5th year in response to the depleted condition of the resource. The stock has limited prospects for the near future due to an increasingly inhospitable environment, i.e., warming ocean temperatures in western Gulf of Maine shrimp habitat. Should the moratorium be lifted, Massachusetts will receive 10% of the total allowable catch per the recently approved Amendment 3 to the interstate fishery management plan.

Scup: 2,016,112 pounds (MA Summer Period quota)

At 23.98 million pounds, the 2018 coastwide commercial quota is up 30% from 2017 due to a favorable stock assessment showing strong recruitment events in 2014 and 2015. The quota is divided among three seasons, with a change in the designation of October from Summer to Winter II beginning in 2018. The Winter I Period (January–April) and Winter II Period (October–December) receive 45.11% and 15.94% of the coastwide quota, respectively; this equates to 10.82 million pounds and 3.82 million pounds for 2018. Quota during these periods is open to all states. Of the 38.95% (or 9.34 million pounds for 2018) allocated to the Summer Period fishery (May–September), Massachusetts receives roughly 21.6%. Harvest in 2017 was roughly 1.19 million pounds.

Spiny Dogfish: 22,153,577 (ME–CT regional quota)

The coastwide commercial quota is decreasing by just over 2% to roughly 38.2 million pounds for the May 1, 2018 through April 30, 2019 fishing year. The Northern Region of Maine through Connecticut receives 58% of the coastwide quota, of which Massachusetts generally takes the largest portion. The small decrease to the quota is inconsequential to our fishery given recent landings trends, with marketability having more to do with how much is landed than the quota or dogfish availability. Harvesters landing dogfish in the Northern Region will be restricted to 6,000 pounds per trip.

Striped Bass: 847,585 pounds (MA quota)

Massachusetts' base quota is unchanged (869,813 pounds), but our 2018 quota will reflect a payback for a small quota overage in 2017. The overage amount is not yet finalized (currently reported as 22,228 pounds), so the quota listed above may change slightly. Our 2017 quota was reduced by a larger 2016 overage, so the final quota for 2018 is expected to be an effective 5% increase.

Summer flounder (fluke): 404,742 pounds (MA quota)

The coastwide commercial quota was initially increased 17% for 2018. This followed two years of roughly 30% cuts in 2016 and 2017 to end overfishing on the resource, resulting in all-time low quotas for 2017 (5.66 million pounds coastwide and 385,988 pounds for Massachusetts). Our summertime directed fishery consequently had its earliest closure in 2017: July 19. The initial 6.63 million pound coastwide quota for 2018 was reduced by 191,218 pounds to account for a 2% overage of the Annual Catch Limit in 2016 due to higher than expected discards. Massachusetts' state share (6.82%) of the resulting 6.44 million pound coastwide quota is 438,973 pounds. However, we have prior year quota overages totaling 34,231 pounds that need to be accounted for. Our resulting quota for 2018 is an effective 5% increase from 2017.

Tautog: 63,886 pounds (MA quota)

Massachusetts' 2018 tautog quota is nearly status quo with 2017. Our 2017 quota was set equal to our base quota (64,753 pounds) due to no overage in 2016. Our 2018 quota will be reduced by a very small (1%) overage in 2017. The quota reported above may change slightly as 2017 landings data are finalized. A harvester tagging program is due to be implemented for the 2019 commercial season, as a result of Amendment 1 to the Interstate Fishery Management Plan for Tautog.

By Nichola Meserve, Fisheries Policy Analyst

New Interstate Plan for Atlantic Menhaden: Revised Quotas, Same Reference Points

After an intense two-day meeting, the Atlantic States Marine Fisheries Commission has approved a new interstate fishery management plan for Atlantic menhaden. The Commission approved Amendment 3 to take effect in 2018, after struggling with the contentious issues of the scale of the overall coastwide quota, the shares allocated to each state, and the theoretical question of whether to manage menhaden individually—or in the larger context of its role in the ecosystem. The ASMFC received a record-setting number of public comments on these issues.

Relative to the potential range of options, the reforms in Amendment 3 are arguably modest. For instance, the amendment maintains the existing single-species biological reference points for determining menhaden's stock status, as well as state-by-state quota management of the coastwide commercial total allowable catch (TAC). The most substantial change is how the amendment allocates the TAC among the states.

The original quota allocation formula resulted in the lion's share of the quota (85%) going to a single state, Virginia, with New Jersey coming in a distant second (11%). No other state received more than 1.37%, and Massachusetts received 0.84%. These allocations were established based on the proportion of each state's landings during the years 2009–2011. (Virginia has the sole remaining "reduction" fishery along the Atlantic coast, in which menhaden are produced into fish meal and fish oil. All other landings are sold as bait for both commercial and recreational fisheries.)

While the use of these years captured recent fishery performance unbiased by catch limits, it ignored the fluctuating abundance of menhaden and the capacity seen in a number of states' fisheries in prior years. During the past few years, with the addition of older year classes in the population, menhaden are more abundant in New England waters, the northern end of the range. The result was a quota management system that underserved some states, leaving them little opportunity to rebuild their fisheries to former levels. This was recognized during the adoption of Amendment 2, and led to the plan's inclusion of the episodic event set-aside and incidental catch limit (more on these later), as well as a 3-year allocation revisit provision.

Draft Amendment 3 offered up various reallocation options. Several would have adopted gear-based, regional, or disposition-based quotas (the latter meaning a split between the bait and reduction



Commercial vessel seining for menhaden in Ipswich Bay, MA.

fisheries); however, these were seen as too drastic a departure from the existing approach that allows each state the flexibility to manage its quota to best meet local needs. Other options maintained the state-by-state approach but changed the allocation timeframe, such as to include landings from older and/or more recent years. However, no single timeframe option could address all of the "problem" states' allocations because of wide swings in the availability of menhaden and the effect on a state's landings.

The fixed minimum approach provided the mechanism to move away from the total reliance on a particular period in history for determining allocation. Amendment 3 provides each Atlantic coast jurisdiction, of which there are 16, with a base allocation of 0.5% of the TAC, before allocating the remainder to states based on their proportion of the coastwide landings during 2009–2011. At the 0.5% level, it reallocates 8% of the TAC equally to all jurisdictions, and maintains the status quo allocation approach for 92% of the TAC. The reallocation takes quota away from Virginia primarily, and from New Jersey to a much lesser degree. Meanwhile, every other jurisdiction sees an increased share.

The potential economic impact of reduced allocations for Virginia and New Jersey was a serious matter for the ASMFC, and factored into several other decisions. First, attempts to adopt a higher fixed minimum, including 0.75% and 1.0%, were rejected. Second, a provision was established whereby states can opt to relinquish some or all of their quota for redistribution to the other states on an annual basis. This provision recognizes that the fixed minimum approach provides more quota to some states than needed, including some without a commercial menhaden fishery or any intent to develop one. Third, the ability to transfer quota between states remains in the plan, such that a state with a projected underage as its fishery winds down could donate unused quota to a quota-hungry state. Fourth, the TAC will increase by 8% from 200,000 metric tons (mts) for 2017 to 216,000 mts for 2018 and 2019. The combined result is that every state's quota (by weight) is up in 2018.

DMF supported the fixed minimum approach for quota allocation but favored the 1% level. We reasoned this would have provided enough quota to all states to eliminate the need to leave a quantity of quota as an "episodic event" set-aside. This provision has allowed Northeast states who experience an unexpected abundance off their coast to reach into extra quota when their allocation is filled. DMF advocated to simplify the plan by removing the episodic events set-aside, as well as the incidental catch limit allowance to ensure all harvest is counted against the TAC. With the 0.5% fixed minimum winning the day, these two stipulations remained in the plan with some modification to the incidental catch allowance.



Menhaden collected by DMF biologists during a sampling trip.

The incidental limit continues to be 6,000 pounds per trip per day after a state meets its quota, but Amendment 3 clarifies and expands the eligible gears to include all “small-scale” and “non-directed” gears. These are effectively everything (e.g., cast nets, gill nets, fyke nets, weirs, trawls, pots) except purse seines greater than 900 feet in length and 42 feet in depth. Amendment 2’s bycatch limit was specified for “non-directed fisheries” but this wasn’t defined, resulting in inconsistencies between states. Amendment 3 also defines the “stationary multi-species gears” that are allowed 12,000 pounds incidental harvest when two permitted individuals are fishing the gear from the same vessel.

DMF’s preference was to end the incidental catch allowance thereby making each state live within its quota (so long as Amendment 3 allocated enough quota to each state). Under both Amendment 2 and 3, landings from the incidental catch allowance are monitored but do not count against the TAC. While incidental catch landings have been minor (less than 2% of coastwide landings) and should decrease given reallocation and the TAC increase, they still undermine the TAC as managed. At least unused quota will not be rolled over to the subsequent year, per another Amendment 3 decision, which otherwise would have further undermined a year’s TAC.

The episodic event set-aside remains at 1% of the TAC (4.76 million pounds for 2018–2019), with states from Maine to New York eligible to participate in its harvest when they have exhausted their state quota prior to September 1. New York was not included in Amendment 2’s episodic event set-aside program but was allowed in beginning in 2016 based largely on fish kill concerns. The rules for participating states remain unchanged, including a 120,000-pound limit for harvest in a state’s waters only; daily trip level harvester reporting; and redistribution of unused set-aside.

These decisions—for the 0.5% fixed minimum allocation, incidental catch allowance, 1% episodic event set-aside, quota transfer allowance, and quota rollover prohibition—were part of a single motion representing an attempt at a grand bargain to get most states’ support and ward off disadvantaged states’ interest in possibly going out of compliance with the plan. While DMF did not support the motion because of concerns with the incidental catch allowance, we are agreeable to this outcome over other reallocation options supported by a few other states that would have done little to change the Amendment 2 math. DMF also supported the 8% TAC increase as a means to encourage meaningful quota reallocation, made acceptable by the positive stock status of menhaden.

That stock status will continue to be determined based on single-species biological reference points for menhaden while menhaden-specific ecological reference points that account for the needs of menhaden’s predators (e.g., striped bass) are developed by the ASMFC over the next two years. In selecting this option, the ASMFC declined to apply currently available ecological reference points (ERPs) developed for forage fish in general. DMF preferred one of these “rules of thumb” that was widely supported at public hearings and in comment letters as an acceptable stepping stone to adopting menhaden-specific ERPs in the future and as a means off warding off significant increases to the TAC in the interim. While the single-species reference points remain in place, the TAC that was implemented for the next two years has less than a 15% risk of exceeding the fishing mortality target and 0% risk of exceeding the threshold. This indicates that the fishery will be leaving many more menhaden in the water than would be allowed under more customary use of the reference points to set catch limits, boosting the forage base.

Menhaden predators in the Chesapeake Bay will also benefit from a more stringent limit on the amount of menhaden the purse seine reduction fishery can harvest from those waters. The Chesapeake Bay Reduction Fishery Cap was reduced from 87,216 mts to 51,000 mts, roughly the average harvest the last five years. In addition, the ability to rollover part of the cap if unused was discontinued. The bay serves as an important nursery ground for menhaden.

	Amendment 2 Allocation	Amendment 3 Allocation	2017 Quota (lb.) 200,000 mt TAC	2018 Quota (lb.)* 216,000 mt TAC
ME	0.04%	0.52%	171,882	2,439,114
NH	0.00%	0.50%	131	2,357,315
MA	0.84%	1.27%	3,660,454	6,065,015
RI	0.02%	0.52%	78,195	2,441,831
CT	0.02%	0.52%	76,152	2,432,640
NY	0.06%	0.69%	242,032	3,270,675
NJ	11.19%	10.87%	48,853,880	52,013,736
PA	0.00%	0.50%	0	2,357,183
DE	0.01%	0.51%	57,646	416,467
MD	1.37%	1.89%	5,991,662	9,002,733
PRFC	0.62%	1.07%	2,709,809	5,102,086
VA	85.32%	78.66%	372,443,990	376,543,327
NC	0.49%	0.96%	2,150,995	4,540,560
SC	0.00%	0.50%	0	10,000
GA	0.00%	0.50%	0	0
FL	0.02%	0.52%	78,449	2,443,819

Atlantic menhaden commercial allocation. * The 2018 quotas reflect a total of 6,704,365 pounds being relinquished by the states of DE, SC, and GA and redistributed to the other states. They do not yet account for any quota overages that may have occurred in 2017.

Massachusetts is not required to make any significant changes to its rules for menhaden to implement Amendment 3. The principal impact is to our allocation, which goes from 0.84% to 1.27%. Our quota will increase from about 3.6 million pounds in 2017 to over 6 million pounds for the next two years. DMF intends to meet with industry participants and other interested stakeholders this winter to consider whether any discretionary changes to our regulations are warranted to make better use of the quota. It seems unlikely, although not impossible, that our commercial fishery can scale up that amount in one year without additional purse seine participation and/or a relaxation of the trip limits. Of course, the fish have to be here too.

Purse seines are responsible for about 95% of menhaden landings in Massachusetts on average. The remaining 5% of state landings are attributed to cast nets, gill nets, and weirs generally. Midwater trawls also landed menhaden in Massachusetts in 2016 for the first time. The vessels that contribute significantly to the Massachusetts fishery are few in number. Only 12 harvesters are authorized to fish purse seines in the state’s inshore harbors and estuaries, where menhaden are most catchable, and only a handful tend to be active in a given year. These participants adhere to trip limits that decline as the quota is consumed, a daily reporting requirement, and closures in certain harbors (e.g., Boston Harbor). Cast nets and small bait nets (<250 ft²) can be used to take bait for personal use from within the inshore restricted waters without a special permit. There is a mix of purse seine, trawl, gill net, and weir harvesters (61 in 2016) that have a “limited entry” permit endorsement to take menhaden at higher limits. There are many more “open entry” participants in any given year, but their contribution to the total annual landings is minimal. Many in this group take menhaden for personal bait use; whether sold or not, menhaden catch must be reported by commercial fishermen.

Massachusetts' season opens January 1 although the fish don't generally arrive in local waters until May. Menhaden depart Massachusetts by the end of October. State regulations allow anyone with a commercial fishing permit to take 6,000 pounds per trip or day (whichever is longer) until the quota is harvested. Those with a menhaden permit endorsement have a 125,000-pound trip limit until 85% of the quota is taken, then a 25,000-pound trip limit until 95% of the quota is taken, after which they have the same 6,000-pound trip limit as the open entry fishery. The intent of these trip limits is to stretch out the season and provide for small-scale access throughout it. Should a quota closure occur, up to 1,000 pounds menhaden can be harvested, provided 95% of the harvest is of other species. We'll need to exclude large purse seines from this bycatch tolerance

for compliance with Amendment 3. Our fishery has avoided a quota closure in all years under this system of trip limits. In so doing, we've also removed the possibility of participating in the episodic event set-aside.

DMF received largely positive feedback on its management of the menhaden fishery in Massachusetts during the public hearings for Amendment 3. We'll keep this in mind as we consider any refinements based on the recent changes to the interstate management plan.

By Nichola Meserve, Fisheries Policy Analyst

Mystic River Fish Restoration Efforts are Working

Record number of river herring return to the Mystic Lakes in 2017



School of river herring. Photo courtesy of Matt Devine.

The river herring run in the Mystic River showed continued improvement this year in response to fish passage restoration work that began in 2011. The replacement of the Upper Mystic Lakes Dam by the MA Department of Conservation and Recreation (DCR) provided an opportunity to create fish passage into Upper Mystic Lake beginning in 2012, granting consistent access to 200 acres of spawning and nursery habitat for alewives, blueback herring, and American eel. A volunteer visual count led by the Mystic River Watershed Association (MyRWA) has documented a threefold increase in the herring population which has risen from just under 200,000 fish in 2012 to approximately 630,000 in 2017, making it the largest herring run recorded in the state this year.

Another exciting development in 2017 was the collaborative implementation of an online counting and education project at the site. A video monitoring system was installed at the exit of the fishway and recorded fish as they passed into Upper Mystic Lake. This footage was uploaded to the internet where counts could be crowdsourced, increasing the available resources to count fish, spreading awareness of the run, and informing us about migration patterns at this site. This material and other resources were also brought into local school districts to build awareness and improve environmental education options in the greater Boston school system. DMF designed and installed the video system and provided in-season technical advice, and field assistance to help MyRWA execute this project, which can be found online at www.mysticherring.org.

The future for this run appears even more promising thanks to ongoing restoration work within the Mystic and Aberjona watersheds. Last fall, as part of a US EPA Superfund settlement, the Town of Winchester installed a steepass fishway on the Aberjona River at Center Falls Dam in Winchester, the first impediment to fish migration upstream of the Mystic Lakes Dam. In 2017, the Center Falls Dam gates were opened and the head pond drawn down for work on buildings in downtown Winchester, meaning that 2018 will be the first season for migratory fish passage through the ladder. This will provide annual passage to Wedge Pond and further upstream through Horn Pond Brook to Horn Pond itself.

The rebuilding of the Scalley Dam at Horn Pond this past spring allowed an opportunity for DMF to work with the Towns of Winchester and Woburn to improve the rock ramp auxiliary spillway for the pond to make it more fish friendly. In past years, DMF biologists and local volunteers have documented herring passing up this spillway, but many more fish appeared unable to swim up the steep spillway. Before the construction site was demobilized, several yards of rocks were added to the toe of the slope to soften the grade of the ramp and improve passage into the 102-acre pond.

Collectively, the restoration work conducted in this urban watershed has provided new access for migratory fish to three water bodies totaling 288 acres. This diadromous fish restoration effort is one of our most successful, in terms of providing migratory fish access to obstructed waterways at multiple sites with highly positive results in a very short time frame.

By Ben Gahagan, Diadromous Fisheries Biologist



Rebuilding efforts at the Scalley Dam at Horn Pond this past spring.

Diadromous Fish Stock Assessment Updates

Three stock assessment updates were conducted on diadromous fish species in 2017 by the Atlantic States Marine Fisheries Commission (ASMFC). Stock assessments are the basis for sound resource management decisions.

River herring include both alewife and blueback herring which are anadromous fish that live most of their life at sea before returning to natal streams for spawning. Data series that were prepared for the last benchmark stock assessment in 2012 were updated with 2011–2015 data and analyzed with the same methods. Fifty-four rivers on the East Coast with river herring data were considered in the update. Most of the data series were derived from spawning run counts. Over half of the datasets had no discernable trend or insufficient data to assess the status. Of the remainder, 16 were found to be increasing in abundance, two were decreasing, and eight had stable abundance. The status of the stock was concluded to be depleted based on trend analysis of the abundance indices. This was unchanged from the 2012 benchmark assessment; however, the outlook on the update is more positive due to the growing number of increasing abundance trends and declining number of decreasing trends. This improvement was particularly evident from the Mid-Atlantic to New England regions. Concern remains for the overall status of river herring on the East Coast due to low abundance relative to historic levels, and the uncertain role of various marine and freshwater-based stressors on the different river herring populations.

American eel are catadromous, meaning they are born at sea and migrate to freshwater to spend most of their life. They are the only catadromous species found in North America. American eel are very much a data-poor species with insufficient information available to conduct traditional stock assessment models. The first benchmark stock assessment for American eel was completed in 2012. The 2017 update evaluated 22 young-of-year (or glass eel) and 15 yellow eel (adults) abundance surveys from East Coast states. There are no silver eel (mature adults) indices on the East Coast and no yellow eel indices in New England. DMF maintains the one glass eel index station in New England at the Jones River in Kingston. The surveys were standardized to generate abundance indices and

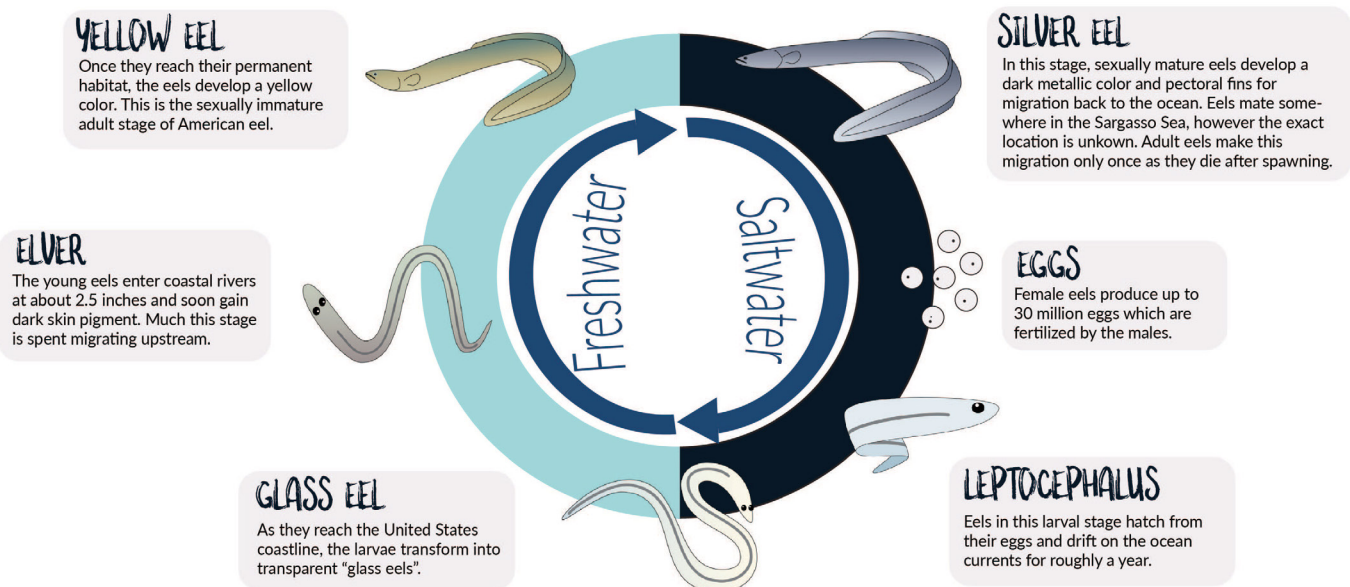
then combined to create regional and coastwide indices. The available indices were tested using several trend analysis methods. In addition to the survey data, available length, weight, and age data and commercial harvest data were summarized and evaluated for trends. Overall, few indices were trending upward in the assessment and several significant downward trends were detected. The past 20 years shows an overall stable trend for abundance indices and commercial harvest data. Despite this stability, the available information indicates that harvest remains at or near historic low levels. Consistent with the 2012 benchmark assessment, the status of the stock was concluded to be depleted based on the trend analyses and commercial landings status. The available information did not allow an overfishing determination to be made.

Atlantic sturgeon share an anadromous reproductive life history with river herring but are otherwise from a starkly different evolutionary lineage. Atlantic sturgeon can exceed 10 ft in length and live for over 50 years. Their huge size and unusual body form with large ganoid scales can give them the appearance of a fossil fish that came to life. Their value for caviar and smoked fish in the 19th century led to severe overfishing and extremely low abundance in recent decades. In 2012, NOAA Fisheries listed all five distinct population segments (DPS) on the East Coast as either threatened or endangered. A benchmark assessment was conducted for Atlantic sturgeon in 2017; the first assessment since 1998 when the results led to a coastwide moratorium on harvest. The stock assessment assembled available fishery-independent and fishery-dependent (bycatch) data series to evaluate trends in abundance and mortality estimates. The conclusion, both coastwide and for all DPSs, is that Atlantic sturgeon are depleted relative to historic levels. However, evidence does point towards a modest recovery underway with a high probability that the coastwide index had increased from the last assessment.

More details on these three assessments can be found on the ASMFC's website, www.asmfc.org.

Brad Chase, Diadromous Fisheries Project Leader

THE CURIOUS LIFE OF AN AMERICAN EEL



Eel images courtesy of Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/symbols/).

Declining Right Whale Population Suffers Huge Losses in 2017

It has not been a good year for the beleaguered North Atlantic right whale. A total of 17 right whale carcasses were discovered in 2017, which is approximately 3% of the known population. Most of these carcasses were found in the Gulf of St. Lawrence, an area of heavy shipping traffic and fishing effort. Necropsy results indicate the deaths were due to vessel collision and entanglement in fishing gear.

The extraordinary number of deaths this year coincides with the release of a new study showing that the right whale population has been in decline since 2010. Data show that female right whales are dying at a faster rate than males and the calving rate is half of what it has been historically. A recent study conducted by New England Aquarium suggests that the decline in female right whale health is related to sub-lethal effects of entanglement in fishing gear. In addition, scientists suspect that a reduction in the quality and/or availability of food (copepods) may also be playing a role in the declining right whale population. If mortality and calving rates continue at the levels seen this year, experts believe the population could go extinct in our lifetime.

The downturn in the right whale population has also coincided with a shift in their distribution. Since 2010, right whales have abandoned many of their traditional habitats, spending more time traveling and exploring habitats further north, like the Gulf of St. Lawrence. The increase in deaths could be correlated with the shift in distribution, as right whales move around more and explore areas of high gear density or heavy shipping activity where protective measures are not in place. However the risk posed to right whales from human activities is not solely in Canada. While most of the recent deaths occurred in Canadian waters, four of the dead right whales were documented near Massachusetts, including a death from small vessel collision that occurred in Cape Cod Bay in April. The deaths of the three other right whales are unknown.

Despite the overall change in habitat use, Cape Cod Bay continues to be an incredibly important habitat, hosting large aggregations of right whales each spring. In 2017, approximately 55% of the known

right whale population was observed in Cape Cod Bay, including over 200 individuals in a single day (see *DMF News* 1st and 2nd Quarters 2017.) To eliminate the risk of entanglement during the right whale season, a fixed fishing gear closure takes place in Cape Cod Bay and surrounding waters from February 1–April 30. With the population in decline and over half the known individuals visiting Cape Cod Bay each year, it's critical to ensure their protection while in Massachusetts waters. Entanglement is still a significant problem in other areas and at other times and there does not seem to be an easy solution to the entanglement problem.

In response to the recent deaths and downturn in the right whale population, the National Marine Fisheries Service (NMFS) has initiated several actions, including completing a 5-year review of the Right Whale Recovery Plan and designation of an Unusual Mortality Event (UME) for right whales in 2017, which frees up additional funds to investigate the cause of the mortalities. NMFS has also begun a re-consultation of the lobster fishery under Section 7 of the Endangered Species Act. Under the current Biological Opinion, the lobster fishery was found not likely to jeopardize the continued existence of any ESA-listed species, including the right whale. That determination could change under the new consultation given the trend in the right whale population and the increase in severe entanglements observed in recent years. Canadian officials are also examining possible strategies to reduce the risk of vessel collision and entanglement in the Gulf of St. Lawrence. International working groups have been established between US and Canadian officials to jointly work on reversing the downward trend in the right whale population.

In the meantime, the 2018 Cape Cod Bay right whale season is about to begin, with sporadic right whale sightings and acoustic detections already starting around the Cape. DMF will work closely with the Environmental Police and the Massachusetts Lobstermen's Association to ensure compliance with the fixed gear closure, in addition to continuing our partnership with NMFS and the Center for Coastal Studies on the aerial surveillance program for right whales in Cape Cod Bay.

By Erin Burke, Protected Species Biologist



Researchers respond to a dead right whale carcass in the Gulf of St. Lawrence. Photo courtesy of the Canadian Press and the Department of Fisheries and Oceans.

Large Whale Seasonal Trap Gear Closure Area

The northern right whale is an endangered species. During the late winter and early spring, a large proportion of the known population migrates through the waters east of Cape Cod into Cape Cod Bay. They aggregate in the bay to feed on high densities of zooplankton before continuing their annual migration northward.

Several years back, a large area east of Cape Cod, on Stellwagen Bank and within Cape Cod Bay (map) was closed to trap gear during the period of February 1 – April 30. This closure was designed to protect endangered right whales from injury and mortality associated with becoming entangled in fixed gear (e.g., vertical buoy lines) when they migrate through and aggregate in our waters. The closure remains on the books and recreational and commercial lobstermen are reminded to remove their trap gear from these waters during the closure period.

Throughout January, the Massachusetts Environmental Police, with assistance from the Division of Marine Fisheries, are conducting surveys of the closure area to identify any trap gear that remains in the water. Fishermen will be notified of their location of the gear and asked to move it from the closure area before the closure goes into effect on February 1. Given the current weather conditions and the fact that many smaller harbors have frozen over, DMF is encouraging fishermen to work cooperatively to ensure



this gear is removed. Once the closure goes into effect, any trap gear found in the closed area may be removed and it may result in the fisherman facing fines or permit sanctions.

Tautog Management Update

Of all the recreationally and commercially important fish in the Northeast, tautog is one of least migratory. Consequently, local conservation efforts will have local benefits to the stock. In the months ahead, DMF will be enacting new seasonal bag limits for the recreational fishery, creating a commercial fish tagging program, and possibly limiting entry for commercial harvesters.

Amendment 1 to the interstate management plan was approved this past October and allows for management at regional levels. Massachusetts and Rhode Island will be co-managing the MA-RI region. The other three regions are Long Island Sound, New Jersey-New York Bight, and DelMarVa (Delaware, Maryland and Virginia). The management plan strongly encourages uniform measures within each region, and DMF worked with Rhode Island officials to develop more uniform rules.

To comply with the requirements of the interstate plan, DMF will be completing final rulemaking for state fisheries in the months ahead. Recreational fishermen will see seasonal changes to the bag limits. Instead of a season long 3-fish limit, we will see four different season/bag limit combinations. The per-angler daily limit will be lowered from 3fish to 1fish in June and July (when tautog fishing is slow) and increased to 5 fish in the late fall (when tautog fishing is at its best). January through March will be no retention. Rhode Island will have nearly identical rules; the only difference being a 0-fish limit during June–July.

On the commercial side, the quota (63,886 lb) will remain unchanged with the season opening on September 1. However, there is a new permit endorsement required for the retention of tautog for commercial purposes. This endorsement was introduced in anticipation of the new interstate plan requirement for a commercial tagging program in 2019, which will necessitate DMF having an accurate count on the number of commercial tautog harvesters and possibly restricting that number.

The program will require tagging of tautog by all harvesters affixing state issued tags to the fish before landing them. The issuance of the tags will be overseen by the Atlantic States Marine Fisheries Commission with the purpose of establishing improved tracking of fish in commerce, especially interstate commerce. The ASMFC Law Enforcement Committee has identified tautog poaching and illicit sales as one of the biggest challenges in the northeast. The ASMFC addressed analogous poaching problems in the striped bass fishery by requiring state-issued tags to be affixed to all striped bass in commerce.

DMF will be challenged to effectively administer a tagging program for commercially caught tautog given the small overall commercial harvest. Region-wide, only about 10% of the landings are sold with the remaining 90% taken by recreational anglers. In Massachusetts there is an estimated 20,000 tautog sold by commercial fishermen to Massachusetts dealers each year. Because the interstate plan

mandates all commercial harvesters tag each tautog at-sea, we will be looking at the feasibility of keeping the fishery open access—with unlimited participants—or alternatively limiting the fishery to a smaller number of participants with historical landings.

DMF enacted a control date of August 28, 2017 that the agency could use as a potential cut-off date to limit participation in the tautog fishery. Each year, only about 250 commercial fishermen sell tautog and given the relatively small overall value of the fishery (about \$250,000), it may be appropriate to limit the fishery to a small number of participants. The administrative challenge will be for the agency to have all unused tags returned by the permitted commercial fisherman back to the agency each year.

The interstate plan amendment can be viewed at the ASMFC website (www.asmfc.org).

By Dan McKiernan, Deputy Director and Chairman, ASMFC Tautog Management Board

Testing Electronic Reporting in the Massachusetts For-Hire Fleet

Recently, there has been increasing concerns from the for-hire industry regarding the collection of recreational catch data used by fishery managers in stock assessments. Currently, catch data for the for-hire charter sector are gathered through the Marine Recreational Information Program (MRIP) by dockside interviewers who randomly intercept charter vessel anglers at the end of a trip and record best recollection of their catch for both retained and released fish by species. Many captains have expressed concern about the accuracy of angler reported catch, and believe that the data that they can provide will be more accurate. One of the major hurdles to this idea is that unless the data from captains are submitted in close to real-time, the accuracy and recall bias, or the issue with submitting the data days or weeks later and actually recalling the correct numbers for all catch, will make the data unusable.

During the winter of 2017, researchers at DMF and the Gulf of Maine Research Institute began recruiting for-hire charter captains to participate in a study examining the use of a tablet-based application to report trip catch. For this study, both state and federally permitted vessels were recruited to cover multiple fisheries from around the state. The motivation to participate was to generate catch estimates for the recreational fisheries in Massachusetts with better accuracy than those resulting from MRIP.

All participating captains were provided an iPad mini tablet in a waterproof case and hardware to mount the tablet on their vessel. Captains were encouraged to mount the tablet in a location that would allow for easy accessibility of data entry during charter trips. This allowed for data to be entered in close to real-time as each trip progressed. If captains were not comfortable entering data throughout the trip, due to time constraints or unsafe conditions, they could also enter trip catch data once they had returned to the dock at the end of each trip. Trip data could then be uploaded to a database once the tablet was brought into an area with wifi. Training sessions were made available to captains and were spread out along the coast to ensure all participants would be comfortable with the application and the data entry activity.



An iPad mini tablet used by for-hire captains to report near real-time catch.

To examine the accuracy of both the captain and angler reported data, we will have samplers aboard 75 trips over the course of the project. The samplers will collect data including time spent fishing and the catch for all anglers on the trip. The anglers on each trip will also be intercepted by the sampler when the vessel returns to the dock. Each trip with a ride-along will have three data streams with the control being the sampler data. Comparisons of catch data from captain reported and angler reported will be made to see which most closely matches that of the control.

During the 2017 fishing season, approximately half of the 75 at-sea ride-along trips were completed and the roughly 30 participating captains to date have filed the catch data from over 900 charter trips. These data are beginning to be analyzed, with additional data still to come from early in 2018.

By Matt Ayer, Recreational Fisheries Biologist

Reminder...

Beginning in March of 2018, all charter/party vessels that have a federal permit for Mid-Atlantic managed species (Atlantic mackerel, squid, butterfish, summer flounder, scup, black sea bass, bluefish, and tilefish) will be required to submit their vessel trip reports (VTRs) electronically. Initially many thought that this change would only affect vessels South of Cape Cod; however, most if not all vessels are permitted for Atlantic mackerel and bluefish all the way up to the Canadian border. Any vessel that has a federal endorsement for these species is required to begin the mandated electronic reporting by March 12, 2018. Reporting must be completed using a NOAA approved software application and VTRs must be submitted within 48 hours following the completion of each trip.



Bushel of softshell clams collected by DMF biologists.

Creature Feature: Softshell clam (*Mya arenaria*)

Warm summer days at the beach pair nicely with a plate of briny, whole-belly, crispy, fried clams. As the weather turns colder, hold onto your summer memories and get to know the bivalve involved in this tasty treat!

The softshell clam can be found burrowed into the sand or mud from the high intertidal to shallow subtidal zones along the north-west Atlantic coast, ranging from Labrador down to South Carolina. While most common in New England and the Chesapeake, they have also been introduced to Alaska, California, and Western Europe. When disturbed at low tide they sometimes give away their presence by squirting a stream of water out of their burrows, which appear as small circular holes in the sand. Locate these siphon holes and you may find a soft shell clam anywhere from 3 inches to a foot below the surface.

Softshell clams earn their name from their fragile calcium carbonate shell, which can break easily. Clam shells can be destroyed during harvest if care is not taken, and sometimes the clams may even break their own shells by contracting while being washed and prepared for dinner. *Mya arenaria* has many other nicknames as well, including steamer clam for the popular cooking method, long-neck clam after its extendable siphon, and Ipswich clam for the town with a long history of harvest. Their thin, elliptically-shaped shell has openings at each end. The siphon or “neck” protrudes slightly from one end, while a gap at the opposite end allows the clam’s foot to dig into the substrate. This clam is incapable of completely retracting its neck and closing its shell, making it vulnerable to predators. The outside of the shell is most often pale gray or chalky white but may contain tan, black or brown depending on the substrate. Softshell clams that live in rocky substrate may have bumps or divots due to being pushed up against rocks while growing. Clams may even have a double layer. This can occur when the mantle tissue responsible for new

shell growth becomes detached from the outermost shell margin but then subsequently re-attaches further inside the old shell.

Growth rates in softshell clams vary by location but on average in Massachusetts it takes two to three years to reach the minimum harvest size of two inches long. Adult clams grow to an average of four inches in shell length but are sometimes found as long as six inches. In general, soft shell clams achieve the most growth in the late spring and early summer, coinciding with an increase in water temperature and available phytoplankton. Clams feed on plankton by pulling water down through their siphon to a pair of gills which filter the algae and guide it to the stomach. A neat and possibly unique feature in bivalves like the clam is a rotating gelatinous rod within the stomach called the crystalline style. This spinning rod aids in the mixing and digesting of food particles, and is perhaps the only rotating body part in the animal kingdom.

Reproduction is determined by size not age and clams are able to reproduce at around $\frac{3}{4}$ of an inch in size, but as with growth rates, this varies by location. When environmental conditions are just right, clams will release their eggs and sperm during a spawning event. Female clams are capable of producing up to three million eggs annually, although the average is 120,000 eggs. The eggs and sperm will fertilize in the water column and transform through a few larval stages before setting down on appropriate substrate after about two or three weeks. Unfortunately, larval clams have a high mortality rate with less than one-tenth of one percent of all larvae survives the mercy of the tides, winds, and predators to grow to legal size.

Softshell clams face many threats. Predators abound and consist of arthropods like green crabs and horseshoe crabs; other invertebrates like moon snails, sea stars, and milky ribbon worms; finfish including flounder, striped bass, and tautog; even birds like the eider and gulls; but most importantly, humans. The softshell clam fishery

Rank	Port	Pounds	Value
1	Chatham	3,343,354	\$6,082,907
2	Ipswich	2,754,807	\$4,589,028
3	Newbury	2,589,187	\$4,512,316
4	Essex	2,114,459	\$3,560,678
5	Gloucester	1,911,021	\$3,241,930

Top 5 Massachusetts ports with softshell clam landings in pounds and value from 2012-2016.

produces one of the highest valued seafood products in Massachusetts. Annual landings can reach over 5 million pounds with a value over \$7 million. This is an astounding number given that all softshell clams are harvested by hand at low tide with nothing more than a bent-tined fork.

This clam's sedentary intertidal lifestyle introduces other problems. Living burrowed in the mudflats exposes clams to a wide array of

different and inescapable environmental parameters. These clams must survive through possible desiccation at low tide, large swings in salinity with freshwater runoff, and highly variable water temperatures.

Being unable to move from the coastal mudflats while filtering the surrounding water puts clams at risk of being contaminated by sewage and other pollutants. With the construction of sewage treatment plants, environmental pollution levels have decreased and previously polluted closed areas have been able to be reopened for harvest. However, the sanitary quality of the waters above shellfish beds still needs to be monitored and evaluated to protect public health.

DMF is responsible for classifying the waters of the Commonwealth as to whether or not shellfish in the area can be harvested for human consumption. Growing area classifications are assigned based on the results of sanitary surveys. In Massachusetts, there are five classifications.

The taking of shellfish is subject to the control of the cities and towns. Coastal towns protect shellfish stock through catch limits, permits, and other regulations. However, DMF has authority to regulate shellfish taken from Restricted and Conditionally Restricted areas.

Softshell clams harvested from Restricted or Conditionally Restricted areas must be brought to the agency's Shellfish Purification Plant in Newburyport for depuration. The depuration process occurs for a minimum of three days and upon completion, the clams are returned to the harvesters. The purified clams are then sold in commerce. Clams harvested in Massachusetts waters are most commonly served two ways: steamed whole in the shell then shucked and dipped in butter, or shucked and breaded for deep frying. Any way you serve them, softshell clams have been among the top three most valuable bivalve shellfish harvested in Massachusetts by value for the past 12 years. In 2010 they were surpassed by oysters and have since taken the number three spot. Even so, no one will argue that fried clams are a delicious and quintessential part of Massachusetts.

By Melissa Campbell, Shellfish Biologist

Shellfish Classification Areas

APPROVED: Open to shellfish harvesting for direct human consumption subject to local rules and regulations. Closed only during major coast-wide events (e.g., hurricane, oil spill, red tide event).

CONDITIONALLY APPROVED: Closed some of the time due to rainfall or seasonally poor water quality or other predictable events. When open, it is treated as an Approved area.

RESTRICTED: Contains a limited degree of contamination at all times. When open, shellfish can be relayed to a less contaminated area or harvested for depuration.

CONDITIONALLY RESTRICTED: Contains a limited degree of contamination at all times. Subject to intermittent pollution events and may close due to poor water quality from rainfall events or season. When open, only commercial harvesting of soft shell clams for depuration is allowed.

PROHIBITED: Closed to the harvest of shellfish under all conditions, except the gathering of seeds for municipal propagation programs under a DMF permit.

Comings and Goings



Ron Amidon was appointed as the new Commissioner of the Department of Fish and Game this summer. Ron comes to the Department following a successful career in large-scale construction management. Ron also has an extensive background in the Commonwealth's sportsmen community and has dedicated many years to ensuring the preservation of wildlife and natural resources. Our new Commissioner is "looking forward to working with the Division of Marine Fisheries and their

constituents as we continue to improve our scientific analysis of data collected by our marine biologists that inform local species stock assessments. The recreational and commercial fishermen depend upon our expert research and management decisions to guide them and to ensure healthy fisheries for many generations to come." We are appreciative of Ron's support of the Division's work and welcome him aboard!



Alex Boeri joined DMF in June as a Seagrass Restoration and Habitat Technician in Gloucester. His responsibilities include assisting biologists in the field, processing seagrass samples, as well as data entry and management. Alex holds a Bachelor's degree in Marine and Freshwater Biology from the University of New Hampshire and comes to DMF with an array of diverse experiences. He was one of the co-founders of the Fat Dog Shellfish Company, spending 4 years establishing and

operating a successful oyster farm in Great Bay, New Hampshire. Alex also interned for the Massachusetts Office of Coastal Zone Management and participated in seafloor mapping research conducted by the US Environmental Protection Agency.



Christine Cassidy joined DMF in July as the Information and Education Coordinator for the Recreational and Diadromous Fisheries Program. Her responsibilities include the creation of media production, web and social content, public outreach, and educational supports. Christine has her Masters in Conservation Education Management from George Mason University and comes to the Division from the New England Aquarium where she was the Teacher Resources Coordinator.

Originally from Chicago, she has been involved in Zoological educational programming for the past 13 years at Shedd Aquarium and the Chicago Academy of the Sciences. Christine is looking forward to collaborating with Division professionals to extend the scope of understanding of our programs and projects with the greater Massachusetts audience.

Gus Sanfilippo has stepped down from the Marine Fisheries Advisory Commission (MFAC). Gus is a commercial fisherman from Gloucester. He owned an 80-foot trawler and remains active in his family's commercial fishing business. He has also worked as a sales representative selling tug boats and barges. Gus has served on the Commission since May 2016. The MFAC serves the recreational and commercial fishermen across the Commonwealth by working with the Division of Marine Fisheries to ensure sustainable resources for all.

Bill Smith has resigned his post on the Division's Marine Recreational Fisheries Development Panel. Bill is a USCG captain and owner of Draggin' Fly Charters. April through October, he could be found fishing Boston Harbor to Cape Cod Bay. Bill also writes on fly fishing and light tackle angling adventures. He has been an educator for over forty years, including public school administration and private consulting. He received the Raytheon's Math Hero award for his work to improve educational opportunities for all students. Bill and his wife are relocating out of state; we wish them the best!

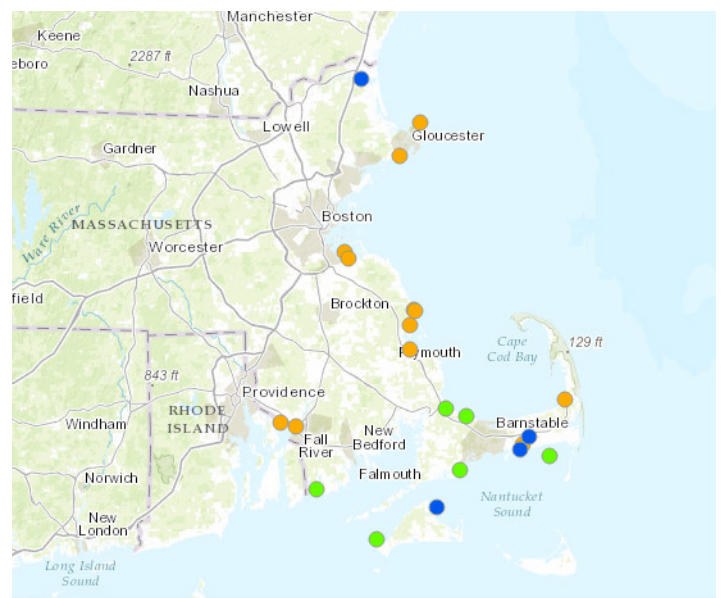
Public Access Update

DMF's Public Access Project awarded funds in late 2017 to two municipalities through its small grant initiative. The projects are expected to enhance public access to saltwater fishing opportunities beginning in 2018. The projects receiving funding are:

Marblehead - \$10,796 - The Town of Marblehead will use the funding to improve access to shoreline fishing areas at four locations: Village Street, Pattison Landing, Parkers Landing, and Tuckers Landing. Improvements include safety ladders, fish cleaning and filleting stations, and sign kiosks at each location.

Sandwich - \$6,920 - The Town of Sandwich will use the funding to repair the heavily used boat ramp and to install lighting at the same boat ramp to improve safety at that location during low light conditions.

These grants are funded from revenues in the Marine Recreational Fisheries Development Fund, and are the fifth round of grant funding since the state saltwater fishing permit was established in 2011. The saltwater fishing permit program provides funds for marine recreational fishing programs including fisheries research, management, and public access for anglers.



Location of all completed public access projects funded by recreational saltwater permit sales. Orange dots designate small grants, blue are large grants, and green are considered general items.

Applications Sought for the New England Fishery Management Council

The Commonwealth of Massachusetts is seeking interested individuals for nomination to upcoming 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 open for nominations include one obligatory seat currently held by Dr. John Quinn of New Bedford (2nd term) and one at-large seat currently held by Mr. Vincent Balzano of Saco, ME (2nd term). Members are ineligible for reappointment after their 3rd term.

Qualified individuals interested in being considered for nomination by the Governor to the Council should contact Samantha Andrews (617-626-1564, samantha.n.andrews@state.ma.us). Nomination application kits will be made available upon request. All applications are due to DMF (c/o Samantha Andrews, 251 Causeway St, Suite 400, Boston, MA 02114) by the end of day on Monday, February

12, 2018. As part of the application process, the Commonwealth will 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.



Accolades

Nick Buchan, Bill Hoffman, Brad Schondelmeir, and Nicole Ward recently received the Department of Fish and Game's Pride and Performance award for their work on the Division's Fisheries Dependent Investigations (FDI) project. This project collects data from sampling commercial fisheries to document fishery performance, characterize the fishery in support of stock assessments and research, and address specific fisheries management questions. Their sampling often involves long hours, work on weekends and overnight, and extreme environmental conditions. FDI's recent work includes the administration of two innovative projects. The first is the bycatch avoidance program, which provides real-time communication about areas with high levels of river herring bycatch. This allows Atlantic herring fishermen to make more informed decisions about where to fish. The second is a three-year industry-based survey for Gulf of Maine cod, which will help inform groundfish stock assessments. Without the FDI project, our agency could not accomplish the goals of effective management and conservation of marine resources in Massachusetts.



(From left) Nicole Ward, Nick Buchan, Bill Hoffman and Brad Schondelmeir of the Division Fisheries Dependent Investigation team.

Former DMF Director, **Paul Diodati**, was awarded the prestigious Captain David H. Hart Award from the Atlantic States Marine Fisheries Commission (ASMFC) this past fall. This annual award recognizes individuals who have made outstanding efforts to improve Atlantic coast marine fisheries. Paul's career at DMF began in 1975 as a contracted sea sampler for northern shrimp and concluded in 2015 with his final 15 years served as Director. Over his career, Paul has been a prominent figure in the fisheries management community not only in Massachusetts but throughout the Atlantic coast. During his time as Director, Paul championed key management issues including the development of the Massachusetts Ocean Plan, the requirements for comprehensive dealer and commercial harvester reporting, and the establishment of the state's saltwater recreational fishing permits. Paul also had an active role as Massachusetts's Administrative Commissioner on ASMFC, serving as both the Vice-chair and Chair. Not only did Paul oversee the development and implementation of interstate management plans for ASMFC, he also helped improve the coordination and sharing of information between the states and federal agencies.



Captain David H. Hart award winner Paul Diodati.

Recent Publications

Greg DeCelles was on a team of researchers from the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) to improve information on the distribution and abundance of groundfish. Federal surveys sample randomly but are restricted to short tow lengths and minimal area covered at high daily expenses. This team collaborated with fishermen to develop a video system that can be deployed in a commercial trawl net. Rather than tows being hauled to the surface, fish are counted as they pass through the net. This new approach allows for an increased area of sea floor to be sampled without killing more fish. → In addition to existing survey designs, this technology can be used to estimate abundance and provide a clearer picture of the resource. More on this work can be found on our Publications webpage as Contribution 89. Stokesbury, K. D. E., S. X. Cadrin, N. Calabrese, E. Keiley, T. M. Lowery, B. J. Rothschild and G. R. DeCelles. 2017. **Towards an Improved System for Sampling New England Groundfish Using Video Technology.** *Fisheries* 42(8): 432-439.

Dr. Greg Skomal and **John Chisholm** conducted a study with the Woods Hole Oceanographic Institution using satellite-based tags to investigate broad-scale movements of white sharks in the North Atlantic. Based on tracking data, they found that white sharks are more broadly distributed than previously understood. White sharks exhibit shifts from near-coastal waters to further offshore and deeper waters throughout different life stages. These findings extend the known habitat range for white sharks and have implications for future conservation. The full study can be found on our Publications webpage as Contribution 90. Skomal, G. B., C. D. Braun, J. H. Chisholm, and S. R. Thorrold. 2017. **Movements of the white shark (*Carcharodon carcharias*) in the North Atlantic Ocean.** *Marine Ecology Progress Series*.

Ben Gahagan, **Dr. Michael Armstrong**, and **John Sheppard** recently published a collaborative study investigating the timing and duration of river herring spawning. In this study, they captured juvenile river herring and extracted otoliths to determine the age and back-calculate spawn dates. Spawning dates were compared with fishway counts of migrating adults to assess the difference in migration timing and the timing and duration of spawning. General patterns of spawn timing and duration can be incorporated into population models and used to estimate temporal changes in productivity associated with variable timing and density of spawning river herring in lakes. This study can be found on our Publications webpage as Contribution 91. Rosset, J., A. H. Roy, B. I. Gahagan, A. R. Whiteley, M. P. Armstrong, J. J. Sheppard, and A. Jordaan. 2017. **Temporal patterns of migration and spawning of river herring in coastal Massachusetts.** *Transactions of the American Fisheries Society* 146: 1101-1114.

Greg DeCelles was on a team of researchers to characterize trends in the bycatch of three flatfish in the sea scallop fishery. In this study, a fishery-independent scallop dredge survey was conducted in two sea scallop access areas on Georges Bank. Results from the survey were used to model seasonal bycatch hotspots of yellowtail, winter, and windowpane flounder. Model catch rates for the three flatfish species suggested localized catches at discrete times of the year. These results suggest consistent seasonal trends that may help managers identify the best times to open the access area to the scallop fleet in order to reduce bycatch. More on this study can be found on our Publications webpage as Contribution 93. Winton, M., C. Huntsberger, D. Rudders, G. DeCelles, K. Thompson, K. Goetting, and R. Somolowitz. 2017. **Spatiotemporal patterns of flatfish bycatch in two scallop access areas on Georges Bank.** *Journal of Northwest Atlantic Fisheries Science* 49: 23-37.

Marine Fisheries Updates

Public hearings, regulations, and legislation

During the period of July 1, 2017 through December 31, 2017 the following regulatory changes were enacted by the Division of Marine Fisheries after public hearings and Marine Fishery Advisory Commission approval or by the Director under his declaratory and emergency authorities.

Commercial Tautog Permit Endorsement and Control Date

Beginning in 2018, DMF will require fishermen who participate in the commercial tautog fishery to hold a regulated fishery permit endorsement for tautog. At present, this permit endorsement is open entry and any commercial fisherman may apply for it. Anticipating the 2019 implementation of a point-of-harvest tagging program for this commercial fishery, DMF also established a control date of August 28, 2017. DMF expects that this control date may be utilized, subject to future rule-making, to reduce participation in this fishery in order for the tagging program to be administered.

Ellisville Surf Clam Dredge Closure

On August 27, 2017, DMF established by declaration a temporary closure of a nearshore area between Ellisville Beach and the Cape Cod Canal to surf clam dredge fishing. This closure remained in effect through October 31, 2017. The closure was implemented to ameliorate ongoing gear conflicts between lobstermen and surf clam dredge boats fishing in the area and to address concerns raised by lobstermen regarding the impact the dredge gear may be having on recently molted lobsters. DMF will propose the closure be enacted as a permanent rule at upcoming hearings.

Recreational Gulf of Maine Cod Limits

DMF closed the recreational cod fishery in the Gulf of Maine Management Area to for-hire fishing operations. The fishery remained open within the state-waters portion of the area to private anglers with a 1-fish per angler bag limit and 19" minimum size. These rules will remain in effect through at least April 30, 2018.

Recreational Gulf of Maine Haddock Limits

For anglers aboard for-hire vessels, DMF established a 12-haddock bag limit and retained the 19" minimum size within the Gulf of Maine Management Area. Additionally, spring and fall closed seasons were implemented for March 1–April 15 and September 16–October 31, respectively. Private anglers are subject to the same bag limit and minimum size, but are not subject to the closed seasons. These rules will remain in effect through at least April 30, 2018.

Commercial Scup Limits for Winter II (2017) and Winter I (2018)

By declaration, DMF set the commercial scup possession and landing limit at 18,000 pounds for November–December, 2017 and 50,000 pounds for January–April, 2018. These state possession and landing limits match the federal limits for these periods. This allows offshore vessels catching scup during the winter to lawfully transit our waters and land their catch in Massachusetts.



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Inside . . .



New Bedford Office Moves



2018 Quota Outlook



New Interstate Menhaden Plan



Right Whale Deaths in 2017



DMF Regulations



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