Draft for Board Review

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR AMERICAN LOBSTER
(*Homarus americanus*)

2019 FISHING YEAR

Prepared by the Plan Review Team

October 2020

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

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This document covers fishery activities in 2019 as well as trap reductions which took place ahead of the 2020 fishing year.

1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption:	Amendment 3 (1997)
Plan Addenda:	
Addendum II (2001)	Addendum XIV (2009)
Addendum III (2002)	Addendum XV (2009)
Addendum IV (2003)	Addendum XVI (2010)
Addendum V (2004)	Addendum XVII (2012)
Addendum VI (2005)	Addendum XVIII (2012)
Addendum VII (2005)	Addendum XIX (2013)
Addendum VIII (2006)	Addendum XX (2013)
Addendum IX (2006)	Addendum XXI (2013)
Addendum X (2007)	Addendum XXII (2013)
Addendum XI (2007)	Addendum XXIII (2014)
Addendum XII (2008)	Addendum XXIV (2015)
Addendum XIII (2008)	Addendum XXVI (2018)
Management Unit:	Maine through North Carolina
States with a Declared Interest:	Maine through Virginia (Excluding Pennsylvania and DC)
Active Committees:	American Lobster Management Board, Technical Committee, Lobster Conservation Management Teams, Plan Development Team, Plan Review Team, Advisory Panel, Electronic Reporting Subcommittee, Electronic Tracking Subcommittee, Stock Assessment Subcommittee

2.0 Status of the Fishery

2.1 Commercial Fishery

The lobster fishery has seen incredible expansion in landings over the last 40 years. Between 1950 and 1975, landings were fairly stable around 30 million pounds; however, from 1976 – 2008 the average coastwide landings tripled, exceeding 98 million pounds in 2006. Landings have continued to increase over the last decade, reaching a high of 159 million pounds in 2016 (Table 1). In 2019, coastwide commercial landings were approximately 125.8 million pounds, a 15% decrease from 2018 landings of 147.9 million pounds. The largest contributors to the 2019 fishery were Maine and Massachusetts with 80% and 13% of landings, respectively. Landings, in descending order, also occurred in New Hampshire, Rhode Island, New Jersey, New York, Connecticut, Delaware, Maryland, and Virginia. The ex-vessel value for all lobster landings in 2019 was approximately $630 million.

Table 2 shows the break-down of commercial landings by Lobster Conservation Management Area (LCMA). Area 1 has historically had the highest landings and accounted for 80% of total harvest between 1981 and 2012. This is followed by LCMA 3 which accounted for 9% of total landings between 1981 and 2012. Yearly trends in Table 2 show that while landings have generally increased in LCMA 1, they have decreased in LCMA's 2, 4, and 6. Landings by LCMA are updated through each benchmark stock assessment.

Landings trends between the two biological stocks have also changed, as a greater percentage of lobster are harvested from the Gulf of Maine/Georges Bank (GOM/GBK) stock. In 1997, 26.3% of coastwide landings came from the Southern New England (SNE) stock. However, as the southern stock declined and abundance in the Gulf of Maine increased, this percentage has significantly changed. In 2000, only 15.6% of landings came from the SNE stock and by 2006, this declined to 7%. In 2018, approximately 1.8% of coastwide landings came from the SNE stock. The proportion of landings by stock for 2019 could not be calculated due to unreported data from Massachusetts.

2.2 Recreational Fishery

Lobster is also taken recreationally with pots, and in some states, by hand while SCUBA diving. While not all states collect recreational harvest data, some do report the number of pounds landed recreationally and/or the number of recreational permits issued. In 2018, New York reported 2,242 pounds of lobster harvested recreationally, representing 1.9% of state landings. New Hampshire reported 5,659 pounds of lobster harvested recreationally, representing 0.09% of total landings in the state. Maine, Rhode Island, and Connecticut do not collect information on the number of pounds recreationally harvested but did issue 2,112, 490, and 250 recreational lobster licenses, respectively. Massachusetts did not provide recreational landings data for 2019, but for the past five years that data were available (2011-2015) recreational lobster landings represented an average of 1.4% of the total state landings.

3.0 Status of the Stock

The 2015 peer-reviewed stock assessment report indicated a mixed picture of the American lobster resource, with record high stock abundance throughout most of the GOM/GBK and record low abundance and recruitment in SNE (Table 3).

The assessment found the GOM/GBK stock is not overfished and not experiencing overfishing. GOM and GBK were previously assessed as separate stock units; however, due to evidence of seasonal migrations by egg-bearing females between the two stocks, the areas were combined into one biological unit. While model results show a dramatic overall increase in stock abundance in the GOM/GBK, recent young-of-year estimates have been below average. This could indicate a potential decline in recruitment and landings in the coming years.

Conversely, the assessment found the SNE stock is severely depleted and in need of protection. Recruitment indices show the stock has continued to decline and is in recruitment failure. The inshore portion of the SNE stock is in particularly poor condition with surveys showing a

contraction of the population. This decline is expected to impact the offshore portion of the stock, which is likely dependent on recruitment from inshore.

Both the Technical Committee and the Peer Review Panel highlighted the need for management action in SNE. Specifically, the Panel recommended close monitoring of the stock status along with implementing measures to protect the remaining lobster resource in order to promote stock rebuilding.

A benchmark stock assessment for lobster was peer reviewed in August 2020. It will be presented for Board consideration and approval in October 2020.

4.0 Status of Management Measures

4.1 Implemented Regulations

Amendment 3 established regulations which require coastwide and area specific measures applicable to commercial fishing (Table 4). The coastwide requirements from Amendment 3 are summarized below; additional requirements were established through subsequent Addenda.

Coastwide Requirements and Prohibited Actions

- Prohibition on possession of berried or scrubbed lobsters
- Prohibition on possession of lobster meats, detached tails, claws, or other parts of lobsters by fishermen
- Prohibition on spearing lobsters
- Prohibition on possession of v-notched female lobsters
- Requirement for biodegradable "ghost" panel for traps
- Minimum gauge size of 3-1/4"
- Limits on landings by fishermen using gear or methods other than traps to 100 lobsters per day or 500 lobsters per trip for trips 5 days or longer
- Requirements for permits and licensing
- All lobster traps must contain at least one escape vent with a minimum size of 1-15/16" by 5-3/4"
- Maximum trap size of 22,950 cubic inches in all areas except area 3, where traps may not exceed a volume of 30,100 cubic inches.

<u>Amendment 3 to the Interstate Fishery Management Plan for American Lobster (December 1997)</u>

American lobster is managed under Amendment 3 to the Interstate FMP for American Lobster. Amendment 3 establishes seven lobster management areas. These areas include the: Inshore Gulf of Maine (Area 1), Inshore Southern New England (Area 2), Offshore Waters (Area 3), Inshore Northern Mid-Atlantic (Area 4), Inshore Southern Mid-Atlantic (Area 5), New York and Connecticut State Waters (Area 6), and Outer Cape Cod (OCC). Lobster Conservation Management Teams (LCMTs) comprised of industry representatives were formed for each management area. The LCMTs are charged with advising the Lobster Board and recommending changes to the management plan within their areas.

Amendment 3 also provides the flexibility to respond to current conditions of the resource and fishery by making changes to the management program through addenda. The commercial fishery is primarily controlled through minimum/maximum size limits, trap limits, and v-notching of egg-bearing females.

Addendum I (August 1999)
Establishes trap limits in the seven lobster conservation management areas (LCMAs).

Addendum II (February 2001)
Establishes regulations for increasing egg production through a variety of LCMT proposed management measures including, but not limited to, increased minimum gauge sizes in Areas 2, 3, 4, 5, and the Outer Cape.

Addendum III (February 2002)
Revises management measures for all seven LCMAs in order to meet the revised egg-rebuilding schedule.

Technical Addendum 1 (August 2002)
Eradicates the vessel upgrade provision for Area 5.

Addendum IV (January 2004)
Changes vent size requirements; applies the most restrictive rule on an area trap cap basis without regard to the individual's allocation; establishes Area 3 sliding scale trap reduction plan and transferable trap program to increase active trap reductions by 10%; and establishes an effort control program and gauge increases for Area 2; and a desire to change the interpretation of the most restrictive rule.

Addendum V (March 2004)
Amends Addendum IV transferability program for LCMA 3. It establishes a trap cap of 2200 with a conservation tax of 50% when the purchaser owns 1800 to 2200 traps and 10% for all others.

Addendum VI (February 2005)
Replaces two effort control measures for Area 2 – permits an eligibility period.

Addendum VII (November 2005)
Revises Area 2 effort control plan to include capping traps fished at recent levels and maintaining 3 3/8" minimum size limit.

Addendum VIII (May 2006)
Establishes new biological reference points to determine the stock status of the American lobster resource (fishing mortality and abundance targets and thresholds for the three stock assessment areas) and enhances data collection requirements.

Addendum IX (October 2006)

Establishes a 10% conservation tax under the Area 2 trap transfer program.

Addendum X (February 2007)
Establishes a coastwide reporting and data collection program that includes dealer and harvester reporting, at-sea sampling, port sampling, and fishery-independent data collection replacing the requirements in Addendum VIII.

Addendum XI (May 2007)
Establishes measures to rebuild the SNE stock, including a 15-year rebuilding timeline (ending in 2022) with a provision to end overfishing immediately. The Addendum also establishes measures to discourage delayed implementation of required management measures.

Addendum XII (February 2009)
Addresses issues which arise when fishing privileges are transferred, either when whole businesses are transferred, when dual state/federal permits are split, or when individual trap allocations are transferred as part of a trap transferability program. In order to ensure the various LCMA-specific effort control plans remain cohesive and viable, this addendum does three things. First, it clarifies certain foundational principles present in the Commission's overall history-based trap allocation effort control plan. Second, it redefines the most restrictive rule. Third, it establishes management measures to ensure history-based trap allocation effort control plans in the various LCMAs are implemented without undermining resource conservation efforts of neighboring jurisdictions or LCMAs.

Addendum XIII (May 2008)
Solidifies the transfer program for OCC and stops the current trap reductions.

Addendum XIV (May 2009)
Alters two aspects of the LCMA 3 trap transfer program. It lowers the maximum trap cap to 2000 for an individual that transfers traps. It changes the conservation tax on full business sales to 10% and for partial trap transfers to 20%.

Addendum XV (November 2009)
Establishes a limited entry program and criteria for Federal waters of LCMA 1.

Addendum XVI: Reference Points (May 2010)
Establishes new biological reference points to determine the stock status of the American lobster resource (fishing mortality and abundance targets and thresholds for the three stock assessment areas). The addendum also modifies the procedures for adopting reference points to allow the Board to take action on advice following a peer reviewed assessment.

Addendum XVII (February 2012)
Institutes a 10% reduction in exploitation for LCMAs within Southern New England (2, 3, 4, 5, and 6). Regulations are LCMA specific but include v-notch programs, closed seasons, and size limit changes.

Addendum XVIII (August 2012)
Reduces traps allocations by 50% for LCMA 2 and 25% for LCMA 3.

Addendum XIX (February 2013)
Modifies the conservation tax for LCMA 3 to a single transfer tax of 10% for full or partial business sales.

Addendum XX (May 2013)
Prohibits lobstermen from setting or storing lobster traps in Closed Area II from November 1 to June 15 annually. Any gear set in this area during this time will be considered derelict gear. This addendum represents an agreement between the lobster industry and the groundfish sector.

Addendum XXI (August 2013)
Addresses changes in the transferability program for Areas 2 and 3. Specific measures include the transfer of multi-LCMA trap allocations and trap caps.

Addendum XXII (November 2013)
Implements Single Ownership and Aggregate Ownership caps in LCMA 3. Specifically, it allows LCMA 3 permit holders to purchase lobster traps above the cap of 2000 traps; however, these traps cannot be fished until approved by the permit holder's regulating agency or once trap reductions commence. The Aggregate Ownership Cap limits LCMA fishermen or companies from owning more traps than five times the Single Ownership Cap.

Addendum XXIII (August 2014)
Updates Amendment 3's habitat section to include information on the habitat requirements and tolerances of American lobster by life stage.

Addendum XXIV (May 2015)
Aligns state and federal measure for trap transfer in LCMA's 2, 3, and the Outer Cape Cod regarding the conservation tax when whole businesses are transferred, trap transfer increments, and restrictions on trap transfers among dual permit holders.

Addendum XXVI
Advances the collection of harvester and biological data in the lobster fishery by improving the spatial resolution of data collection, requiring harvesters to report additional data elements, and establishing a deadline that within five years, states are required to implement 100% harvester reporting. The Addendum also improves the biological sampling requirements by establishing a baseline of ten sampling trips per year, and encourages states with more than 10% of coastwide landings to conduct additional sampling trips.

4.2 On-Going Management Actions

In response to signs of reduced settlement in the GOM/GBK, the Board initiated Draft Addendum XXVII in August 2017 to increase resiliency through considering the standardization

of management measures in the GOM/GBK stock. Due to the prioritization of actions in response to the Atlantic Large Whale Take Reduction Team recommendations, development of this addendum stalled, but in October 2019 the Board agreed to continue development of the addendum once the ongoing 2020 benchmark stock assessment is completed.

As a result of final action on Addendum XXVI, the Board established an Electronic Tracking Subcommittee and an Electronic Reporting Subcommittee. Membership on the two Committees is comprised of state representatives, technical committee members, federal partners, industry members, ACCSP staff, and ASMFC staff. The purpose of the Electronic Tracking Subcommittee is to design and implement a one-year tracking pilot program in the fishery. In 2019, funding was provided to Maine and Massachusetts to implement a pilot program to test tracking devices which could be used in the lobster fishery. A report on this pilot program should be available in October 2020. The Electronic Reporting Subcommittee was established to guide the development of electronic harvester reporting in the lobster fishery. This includes identifying data needs for an electronic harvester reporting form, evaluating various electronic reporting software, and recommending simple and logical solutions. To date, the Reporting Subcommittee has guided the specifications for data collection to ensure all required data elements from Addendum XXVI can be reported electronically beginning in 2021.

5.0 Ongoing Trap Reductions

Addendum XVIII established a series of trap reductions in LCMAs 2 and 3, with the intent of scaling the size of the SNE fishery to the size of the resource. Specifically, a 25% reduction in year 1 followed by a series of 5% reductions for five years was established in LCMA 2; a series of 5% reductions over five years was established in LCMA 3. The fifth year of reductions took place at the end of the 2019 fishing year and affect trap allocations in the 2020 fishery. Per Addendum XVIII, states with fishermen in Areas 2 and 3 are required to report on the degree of consolidation that has taken place. Trap reductions by jurisdiction ahead of the 2020 fishing year can be found in Table 5. It is important to note that trap reductions also occur as the result of trap transfers as, per Addendum XIX, there is a 10% conservation tax on trap allocation transfers between owners.

6.0 Fishery Dependent Monitoring

The following provisions of Addendum XXVI went into effect January 1, 2019:

- Required reporting of additional data elements
- Requirement to implement 100% harvester reporting within five years
- Baseline biological sampling requirement of ten sea and/or port sampling trips per year

The Addendum XXVI requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square will not be implemented until 2021. Table 6 describes the level of reporting and monitoring programs by each state. *De minimis* states are not required to conduct biological sampling of their lobster fishery.

In 2019, all states except New Jersey and Connecticut completed the required fishery dependent monitoring through sea and/or port sampling trips in 2019. New Jersey only

completed 3 sea sampling trips, noting that there has been a decrease in recent years of compliance and willingness from vessel captains to accommodate onboard observers. Connecticut noted budget constraints and the collapse of the fishery in Long Island Sound as reasons for not conducting sea sampling. Across the management unit, a total of 255 sea sampling trips, 23 port sampling trips, and 20 market sampling trips were performed, sampling a total of 256,282 lobsters. The number of trips and lobsters sampled by individual states are summarized in Table 7.

7.0 Status of Fishery Independent Monitoring

Addendum XXVI also requires fishery independent data collection by requiring statistical areas be sampled through one of the following methods: annual trawl survey, ventless trap survey, or young-of-year survey.

7.1 Trawl Surveys

Maine and New Hampshire: The Maine-New Hampshire Inshore Trawl survey began in 2000 and covers approximately two-thirds of the inshore portion of Gulf of Maine. The spring portion of the survey completed all 120 scheduled tows, and sampled 22,623 lobsters (11,346 females and 11,277 males). Spring survey abundance indices increased from 2018 and are well above the time series mean. The fall survey completed 98 out of 120 scheduled tows, resulting in an 82% completion. A total of 20,823 lobsters were caught and sampled (10,511 females and 10,312 males). Fall survey abundance indices decreased from 2018 (Figure 2).

Massachusetts: The Division of Marine Fisheries conducts spring and autumn bottom trawl surveys in the territorial waters of Massachusetts. Only data collected from the autumn portion of the inshore trawl survey is used to calculate lobster relative abundance indices. After low levels observed in the GOM during the early to mid-2000s, relative abundance indices have increased over the last decade. In SNE, relative abundance from the spring and fall surveys remains low, although the most recent value for legal-sized lobsters was above the time series median value in both seasons (Figure 3).

Rhode Island: The RIDFW Trawl Survey program conducted seasonal surveys in the spring and fall, as well as a monthly survey. In 2019, 44 trawls were conducted in both the spring and fall. 143 trawls were performed as part of the monthly program. Spring 2019 mean CPUEs were 0.11 and 1.16 for legal and sub-legal lobsters, respectively. Fall 2019 CPUE decreased slightly from 2018 to 0.07 for legal lobsters and 1.18 for sub-legal lobsters. The 2019 mean monthly trawl CPUEs were slightly lower than 2017 at 0.07 and 1.17 per tow for legal and sublegal lobsters, respectively. All abundances were low for the time series (Figure 4).

Connecticut and New York: Juvenile and adult abundance are monitored through the Long Island Sound Trawl Survey during the spring (April, May, June) and the fall (September, October) cruises. The spring 2019 lobster abundance index (geometric mean = 0.1 lobsters/tow) was the third lowest in the time series and is similar to the 2017-2018 indices (Figure 5). Spring abundance in the last nine years has been less than 1.0. All indices from 2004-2019 are below the time series median (3.16). The fall 2019 survey sadly marked the first time

since the survey began in 1984 that no lobsters were caught in September and October. The fall time series median (3.54) has not been exceeded since 2004 (Figure 5). Both legal and sublegal size lobster abundance has declined with a similar trajectory.

New York: In 2018, New York initiated a stratified random trawl survey in the near shore ocean waters off the south shore of Long Island from the Rockaways to Montauk Point and the New York waters of Block Island Sound. Sampling was conducted five times a year during the winter (February), spring (May, June), summer (August), and fall (December). Twenty-five to 30 stations were sampled each trip. Ten lobsters were caught during the 2019 survey.

New Jersey: An independent Ocean Trawl Survey is conducted from Sandy Hook, NJ to Cape May, NJ each year. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE, which is calculated as the sum of the mean number of lobsters per size class collected in each sampling area weighted by the stratum area, increased from 2017 to 2018 for all size classes grouped and legal sizes, but decreased for sublegal sizes (Figure 6).

7.2 Young of Year Index

Several states conduct young-of-year (YOY) surveys to detect trends in abundance of newly-settled and juvenile lobster populations. These surveys attempt to provide an accurate picture of the spatial pattern of lobster settlement. States hope to track juvenile populations and generate predictive models of future landings.

Maine: There are currently 40 fixed stations along the Maine coast. Of these 40 stations 38 have been sampled consistently since 2001 with two additional sites added to zone D in 2005. YOY survey indices in 2019 increased from 2018 in all areas. The 2019 indices in areas 511 and 512 are near the time series averages, while the indices for 513 east and west remain below the series averages (Figure 7).

New Hampshire: New Hampshire Fish and Game conducted a portion of the coastwide American Lobster Settlement Index (ALSI). In 2019, a total of 21 juvenile lobsters were sampled from three sites, 13 of which were deemed older juveniles 5 of which were YOY, and 3 one-year-olds (Y+) were observed. Figure 8 depicts the CPUE of lobsters for all NH sites combined, from 2008 through 2019. For each of these four indices, CPUE shows a general upward trend to a time series high in 2011, with sustained low levels from 2012 through 2019.

Massachusetts: Annual sampling for early benthic phase/juvenile (EBP) lobsters was conducted during August and September, 2019. Sampling was completed at 21 sites spanning 7 regions in Massachusetts coastal waters. Changes to the survey were made in 2019: in SNE two locations were discontinued in Buzzards Bay and both Vineyard Sound sites were discontinued due to lack of productivity and logistical constraints, in GOM two South Shore locations and all three Cape Cod Bay locations were discontinued due the risks associated with increasing white shark presence. Data for all sites were used to generate annual density estimates of EBP lobster and other decapod crustaceans. In 2019 densities of YOY lobsters remained low compared to the

time series average in all sampling locations except the South Shore (Figure 9). In GOM there were no YOY lobsters found in the Boston sampling regions. In SNE there were no YOY lobsters found in the Buzzards Bay sampling locations.

Rhode Island: For 2019, the YOY Settlement Survey was conducted using suction sampling at a total of six fixed stations with twelve randomly selected 0.5 m^2 quadrats sampled at each survey station. Average site abundance of lobster at sampling sites has generally declined since the mid-1990's (Figure 10). The 2019 YOY settlement survey index showed no change from the 2018 level of 0.03 YOY lobster/m^2.

Connecticut: The CT DEEP Larval Lobster Survey in western Long Island Sound was discontinued after 2012. Alternative monitoring data are available for the eastern Sound from the Millstone Power Station entrainment estimates of all stages of lobster larvae. Both programs show a protracted decline in recruitment following the 1999 die-off (correlation between programs: R=0.35, p=0.066) (Figure 11).

7.3 Ventless Trap Survey

To address a need for a reliable index of lobster recruitment, a cooperative random stratified ventless trap survey was designed to generate accurate estimates of the spatial distribution of lobster length frequency and relative abundance while attempting to limit the biases identified in conventional fishery dependent surveys.

Maine: The Maine Ventless Trap Survey changed strategies in 2015 to cover more area by eliminating the vented traps at each site. This change allowed the survey to double the number of sites with ventless traps and increase the sampling coverage spatially to 276 sites. Traps were set during the months of June, July, and August. The stratified mean was calculated for each area using depth and statistical area. Compared to the previous year, in 2019 there were decreases in the number of sublegal (< 83 mm CL) and legal-sized (≥ 83 mm CL) lobsters caught in all three areas (511, 512, and 513) (Figure 12).

New Hampshire: Since 2009, NHF&G has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (statistical area 513). A total of three sites were surveyed on a monthly basis from January through December in 2019. Catch per unit effort (stratified mean catch per trap haul) from 2009 through 2019 is presented in Figure 13. The highest catch value of the time series was recorded in 2019.

Massachusetts: The coast-wide ventless trap survey was initiated in 2006 and expanded in 2007 with the intention of establishing a standardized fishery-independent survey designed specifically to monitor lobster relative abundance and distribution. The survey was not conducted in 2013 due to a lack of funding; however, starting in 2014 the survey has been funded with lobster license revenues and will continue as a long-term survey. Relative abundance of sub-legal (< 83 mm CL) and legal-sized (≥ 83 mm CL) lobsters for Area 514 (part of LCMA 1) is shown in Figure 14 as the stratified mean CPUE. The average catch of sublegal lobsters is much higher than the catch of legal-sized lobsters, generally increased from 2006

through 2016 but has been declining since, with the 2019 value below the time series average of 4.84 lobsters/trap. The stratified mean catch per trap of legal-sized lobsters in 2019 was 0.52 (± 0.01), and was below the time series average of 0.57.

Figure 15 shows the time series of relative abundance (stratified mean CPUE) for sub-legal (<86 mm CL) and legal-sized (≥ 86 mm CL) lobsters in the southern MA region (Area 538; part of LCMA 2). Due to increasing expense, difficulty getting participating captains, and logistical issues, MA DMF ceased sampling the expanded survey area of SNE (expanded into Federal waters and northern Area 537) in 2018. Survey results reported for the MA SNE survey include only data generated within the original survey area (state waters portion of Area 538) for the entire time series. In 2019, mean CPUEs of the sublegal sized lobsters in the original area were below the time series averages. The mean sublegal CPUE in 2019 was 0.71 (± 0.06), below the time series average of 1.29 lobsters/trap haul. The CPUE of legal-sized lobsters in 2019 was 0.27 (±0.02), above the time series average of 0.22 lobsters/trap haul (Figure 15).

Rhode Island: In 2019, the Ventless Trap Survey was conducted during the months of June-August over 24 sampling sites. A total of 2,560 lobsters were collected from 851 traps over 18 trips. All sampling was conducted in LCMA 2, NMFS Statistical Area 539. The stratified abundance index of sublegal lobsters in the 2019 survey, 4.57 lobsters per ventless trap, remains below the time series mean of 6.23. The abundance index for legal-sized lobsters was almost equal to the time series mean of 0.34 lobsters per ventless trap (Figure 16).

Delaware: A pilot study was initiated in 2018 to assess the population structure of structure-oriented fish in the lower Delaware Bay and nearshore Atlantic Ocean. Sampling was conducted with commercial sized ventless fish pots, from January to December. In 2019, the survey encountered 7 American Lobsters in lower Delaware Bay and 658 American Lobsters in the nearshore Atlantic Ocean with a ratio of 58% males, 36% female and 6% egg laden. The sampled Atlantic Ocean American Lobsters ranged in length from 50 mm to 140 mm.

8.0 State Compliance

States are currently in compliance with all required biological management measures under Amendment 3 and Addendum I-XXIV; however, the PRT notes that New Jersey and Connecticut did not conduct the required amount of sea/port sampling in 2019, as specified in Addendum XXVI. The states' rationales for not meeting the requirement are provided in Section 6.0.

9.0 De Minimis Requests

The states of Virginia, Maryland, and Delaware have requested *de minimis* status. According to Addendum I, states may qualify for *de minimis* status if their commercial landings in the two most recent years for which data are available do not exceed an average of 40,000 pounds. Delaware, Maryland, and Virginia meet the *de minimis* requirement.

10.0 Regulatory Changes

Maine:

- In October 2018, a new lobster trawl limit area was established at the request of the Lobster Zone B Council. DMR was aware that there was potential to refine the area described by the new trawl limit to better meet the needs of Zone B and Zone C fishermen fishing there. The Department held meetings with fishermen from Zone B and Zone C to determine what changes to the area were advisable. At their January 2019 meeting, the Zone B Council supported the Department's proposal to amend this area in accordance with the changes proposed through the meetings that were held. DMR adopted this regulation which amended a five-trap trawl maximum for a specific area, within Zone B, off Hancock County and eliminated the December 31, 2019 sunset on the original area.
- There was an existing regulatory requirement for persons fishing lobster gear and trap/pot gear to mark their buoy lines with specific red marks in the sliver area and in federal waters. Through rulemaking, DMR amended the regulation removing the requirement for the red marks and instead required persons fishing lobster gear and trap/pot gear in all Maine coastal waters to mark their buoy line with purple marks. Inside the Exemption Area, fishermen are required to have three purple marks: a 36-inch mark in the top two fathom of their endline, and a 12-inch mark in the middle and at the bottom of their endline. Outside the Exemption Area, fishermen are required to have 4 purple marks: a 36-inch mark in the top two fathom of endline, and 3 12-inch marks at the top, middle, and bottom of their endline. Finally, all lobster gear and trap/pot gear fished outside the Exemption Area is required to have an additional green mark of a minimum of 6-inches in the top two fathom of buoy line. Lobster gear fished inside the Exemption Area is prohibited from having a green mark. The new marking requirements are required to be in place by September 1, 2020.
- DMR adopted a regulation which defines the area in the Bay of Fundy referred to as the "gray zone" that encompasses approximately 210 square miles around Machias Seal Island where there are overlapping claims of sovereignty by the United States and Canada. In a 2019 Resolve, the Legislature directed the Commissioner of Marine Resources to adopt regulations to define this area to ensure the boundaries of this area are clearly delineated.
- Emergency statutory changes done as a pilot in 2019 required the Commissioner of Marine Resources to allow a person who holds a lobster and crab fishing license to raise and haul lobster traps during any time of the day from September 1, 2019, through October 31, 2019, in an area in the Bay of Fundy referred to as the "gray zone". The gray zone encompasses approximately 210 square miles around Machias Seal Island where there are overlapping claims of sovereignty by the United States and Canada. It also directs the Commissioner to define this area in rule to ensure the boundaries of this area are clearly delineated, which is described above.
    - Emergency statutory changes allowed a person with a student lobster and crab fishing license to fish for or take lobster during the closed season in the Monhegan Lobster Conservation Area if that closed season occurs during an interim between school years, and the student license holder has been issued trap tags to fish only in

the Monhegan Lobster Conservation Area. This law changed the number of Monhegan Lobster Conservation Area trap tags that may be issued by the Commissioner to a student license holder from 15 tags to:

- 10 tags for a student license holder if that person is eight years of age or older and under 11 years of age;
- 25 tags for a student license holder if that person is 11 years of age or older and under 14 years of age; and
- 50 tags for a student license holder if that person is 14 years of age or older and under 23 years of age.

- Statutory changes clarified that a lobster and crab fishing license holder who has a substantial illness or medical condition and has been granted a temporary medical allowance may continue to fish under the license, as long as the license holder does not fish concurrently with the individual authorized to fish under the authority of that license holder through the temporary medical allowance. It added domestic partners to the list of individuals authorized to fish under this provision. It also clarified that the license holder is liable for the activities of the individual fishing under the temporary medical allowance whether or not the license holder is present on the vessel.
- Statutory changes allowed a Class III lobster and crab fishing license holder to engage more crew. The limit increased from two to four the number of unlicensed crew members a Class III lobster and crab fishing license holder may engage to assist in licensed activities.
    - There were three lobster and crab related technical changes put into law.
        - The number of days in a calendar year that constitutes a substantial portion of a vessel's business or trade activities for the purposes of establishing the vessel's base of operations under the commercial fishing laws was changed from 60 to 30.
        - It was clarified that an individual who has had that individual's lobster fishing license or right to obtain a lobster fishing license suspended in this State or in another state is not eligible for a nonresident lobster and crab landing permit.
        - It was clarified that a person who holds a current lobster and crab fishing license does not need to obtain a commercial green crab only license to fish for or take green crabs or possess, ship, transport or sell green crabs.
    - Maine's Joint Standing Committee on Marine Resources carried the following bill over to the next legislative session.
        - LD 28 - An Act Regarding Access to Lobster Licenses. This bill directs the Commissioner of Marine Resources to authorize new zone entrants for a limited-entry lobster zone who have been on a waiting list for 10 or more years and have met certain eligibility requirements. A person authorized as a new zone entrant under this bill must adhere to specific trap tag limits.

Massachusetts

- 3/22/19 – Amended 322 CMR 12.00 to provide regulatory language that allows the Director to extend by declaration the seasonal fixed trap gear closure north and east of Cape Cod to protect right whales.
- 10/18/19 – Establish new lobster processing regulations consistent with changes to state law at G.L. c. 130 s. 44. In their totality, these new rules allow for permitted seafood dealers to process whole live legal sized lobster into shell-on lobster parts for distribution in state and out-of-state. All tails must weight at least 3oz. Previously, whole live legal sized lobster could only be processed into frozen shell-on tails weighing 3 oz.

Delaware

- Delaware updated its lobster regulation in 2019 to keep the state in compliance with the American Lobster FMP.

Virginia

- In February 2020, VMRC passed regulatory language to establish minimum size of escape vents in lobster traps to comply with Addenda II and IV to the Interstate Fishery Management Plan for American Lobster.

11.0 Enforcement Concerns

Maine

- MMP Officers documented violations for illegal lobsters, gear violations, and license violations in 2019. One fisherman was charged for exceeding the boat trap limit and is currently facing a lengthy license suspension. Two fishermen in Southern Maine were also charged with trap tag violations and are facing license suspensions. Patrol officers spent thousands of hours conducting complaint investigations, educational outreach; as well as, routine and targeted enforcement patrols. The Bureau of MP considers the Maine lobster fishery as one that operates with a high degree of regulatory compliance.

Massachusetts

- There were two cases of potential scrubbed eggers and other violations in the fall of 2019, but final outcomes of these cases are still pending.

Rhode Island

- A remaining difficulty enforcement faces with lobster regulations is determining whether lobsters caught truly came from a lobster trap with an associated lobster trap allocation (LTA), or a trap targeting a different fishery (e.g. Rock crab, Black sea bass) without an LTA but operated by an individual or company with LTAs. In 2016, RIDEM DMF proposed that rock crab (*Cancer irroratus*) be included under the new management to help enforce lobster harvesting by removing gear that could catch lobsters outside the LTA program, while also reducing the number of lines in the water for marine mammal protection. Given public comment, industry did not support this because much of the rock crab fishery does not hold a LTA and could not prove history records for qualification.

New York

- No major enforcement issues in New York during 2019. There were minor gear issues with improper vent and escape panels. Due to vessel mechanical problems, limited lobster gear was hauled for inspection.

New Jersey

- During the 2019 calendar year, ten summonses were issued within New Jersey state waters. Of those ten, four were issued due to possession of undersized lobster, two for possession of mutilated parts of lobster, and four were issued for commercially fishing outside of the full access artificial reef zones, as described in State regulations.

12.0 Research Recommendations

The following research recommendations are from the 2015 Stock Assessment and were compiled by the Lobster TC and Stock Assessment Subcommittee.

- ***Ventless Trap Survey***- Calibration work is needed to determine how catch in ventless trap surveys relates to catch in the bottom trawl surveys. It is likely that at low densities, when trawl survey indices have dropped to near zero, ventless trap surveys will still catch lobsters due to the attractive nature of the gear and the ability to fish the gear over all habitat types. Conversely, it is possible that trawl surveys may be able to detect very high levels of lobster abundance, if trap saturation limits the capacity of the ventless traps. Ventless traps may be limited in their ability to differentiate between moderately high and extremely high abundance, and calibration with bottom trawl surveys may help to clarify how catchability might change with changes in lobster density.
- ***Maturation and Growth*** **-** Increases in water temperatures over the past several decades have likely resulted in changes to size at maturity and growth patterns. Maturity data currently used are more than 20 years old. Changes in size at maturity will subsequently affect growth, since female molting frequency decreases after reaching sexual maturity. It is critical to collect updated information on maturity and growth in order to appropriately assign molt probabilities to lobsters.
- ***Stock Connectivity*** **-** There is need for a comprehensive large scale tagging study to examine stock connectivity between the GOM and GBK. Historical tagging studies demonstrate movement from the inshore GOM to locations east of Cape Cod in the inshore portions of GBK, and from inshore areas east of Cape Cod to inshore GOM. What is lacking is a tagging study of lobsters in the fall/winter on GBK proper, prior to seasonal migrations which occur in the spring. This information would be extremely valuable to help complement other data used to justify the combination of the GOM and GBK stock and to confirm the connectivity of the GOM and GBK.
- ***Temperature –*** Given the importance of temperature in the life history of lobster, techniques should be developed to incorporate environmental data into population modeling.
- ***Post-Larval Settlement –*** There is a need to examine post-larval settlement dynamics in relation to the movement and re-distribution of spawning stock. Habitat suitability models for spawning stock and settling post-larvae should be developed.

- ***Natural Mortality –*** Methods should be explored to determine age or length-varying natural mortality, as well as looking at more rigorous ways of determining time-varying natural mortality for lobster. These may be driven by climactic shifts and changing predator fields.
- ***Shell Disease*** **-** With the high prevalence of shell disease in the SNE stock, particularly in ovigerous females, some exploration of the potential sub-lethal effects of disease should be examined. These effects could include negative impacts to larval quality, fecundity issues in females who need to re-direct physiological resources to dealing with the disease, and male sperm quality

13.0 Plan Review Team Recommendations

During their review of the state compliance reports, the PRT noted the following issues:

- Massachusetts and Connecticut were unable to provide compliance reports by the August 1 deadline. This has been a recurring issue over the last few years due to delays in data availability and limited staff resources.
- New Jersey only completed three sea/port sampling trips in 2019, and therefore did not meet the minimum requirement of ten trips under Addendum XXVI. The compliance report explains that NJ has seen a decrease in directed vessels within the lobster fleet over the course of recent years, which has resulted in a decrease of observable vessels. Because of this, observers have targeting the remaining vessels more often, much to their dismay, which has led to a decrease of compliance and willingness from Captains to accommodate observers aboard.

The PRT Recommends the Board approve the *de minimis* requests of DE, MD, and VA. Other than the issues noted above, all states appear to be in compliance with the requirements of the FMP.

The following are general recommendations the Plan Review Team would like to raise to the Board:

- The PRT recommends the Board consider reviewing the monitoring requirements in SNE given the status of the stock and the difficulty obtaining sea sampling trips in a fishery with reduced effort. The TC has discussed the need for additional sampling trips in federal waters as the fishery has shifted offshore.
- The PRT recommends the Board continue to make strides to improve the quantification of effort in the lobster fishery. Through Amendment 3 and subsequent addenda, the Board has largely managed effort in the lobster fishery through trap allocations. However, the effectiveness of trap allocations to reduce effort is confounded by their ambiguous relationship to trap hauls and the expansion of the Jonah crab fishery. Monitoring the true level of effort in the lobster fishery through trip-level reporting, number of permits, trap allocations, and trap hauls will provide the Board with much needed information regarding fishery trends, particularly as stock conditions change in the GOM/GBK and SNE.
- The PRT recommends research continue on lobster growth, maturity, and connectivity. Given the increase in water temperature over the last several decades, the TC believes it is

likely that there have been changes to size at maturity and growth patterns which are not captured in the current data.

- The PRT recommends continued research to understand settlement and larval dynamics.
- The PRT recommends coastwide consideration be given to the transfer of tags between traps to eliminate the issuance of exchange tags (similar to current Maine regulations).
- The PRT recommends the TC discuss the best way to present state index information in the annual compliance reports to provide more detailed resolution in size composition of the stock.
- The PRT recommends the Board engage with the Committee on Economic and Social Sciences (CESS) to consider available socioeconomic data to develop metrics that could be used to characterize changes in the fishery.

14.0 Tables

Table 1. Landings (in pounds) of American Lobster by the states of Maine through Virginia. Source: ACCSP Data Warehouse for 1981-2018 landings; state compliance reports for 2019 landings (except Massachusetts and Connecticut). *C= confidential data.*

	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
1981	22,631,614	793,400	11,420,638	1,871,067	807,911	890,218	593,801	55,700	63,108	2,173	**39,129,630**
1982	22,730,253	807,400	11,265,840	3,173,650	880,636	1,121,644	846,215	90,700	64,788	4,713	**40,985,839**
1983	21,976,555	1,310,560	12,867,378	5,114,486	1,654,163	1,207,442	769,913	56,700	76,192	20,619	**45,054,008**
1984	19,545,682	1,570,724	12,446,198	5,259,821	1,796,794	1,308,023	927,474	103,800	98,876	37,479	**43,094,871**
1985	20,125,177	1,193,881	13,702,702	5,140,131	1,381,029	1,240,928	1,079,723	118,500	82,295	42,881	**44,107,247**
1986	19,704,317	941,100	12,496,125	5,667,940	1,253,687	1,416,929	1,123,008	109,000	57,593	93,105	**42,862,804**
1987	19,747,766	1,256,170	12,856,301	5,317,302	1,571,811	1,146,613	1,397,138	84,100	49,820	60,241	**43,487,262**
1988	21,739,067	1,118,900	12,977,313	4,758,990	1,923,283	1,779,908	1,557,222	66,200	22,966	53,696	**45,997,545**
1989	23,368,719	1,430,347	15,645,964	5,786,810	2,076,851	2,344,932	2,059,800	76,500	17,502	45,107	**52,852,532**
1990	28,068,238	1,658,200	16,572,172	7,258,175	2,645,951	3,431,111	2,198,867	68,300	24,941	58,260	**61,984,215**
1991	30,788,646	1,802,035	15,998,463	7,445,172	2,673,674	3,128,246	1,673,031	54,700	26,445	7,914	**63,598,326**
1992	26,830,448	1,529,292	14,969,350	6,763,087	2,534,161	2,651,067	1,213,255	21,000	27,279	753	**56,539,692**
1993	29,926,464	1,693,347	14,350,595	6,228,470	2,177,022	2,667,107	906,498	24,000	46,650	2,940	**58,023,093**
1994	38,948,867	1,650,751	16,176,551	6,474,399	2,146,339	3,954,634	581,396	8,400	7,992	460	**69,949,789**
1995	37,208,324	1,834,794	15,903,241	5,362,084	2,541,140	6,653,780	606,011	25,100	26,955	5,210	**70,166,639**
1996	36,083,443	1,632,829	15,312,826	5,295,797	2,888,683	9,408,519	640,198	20,496	C	C	**71,282,791**
1997	47,023,271	1,414,133	15,010,532	5,798,529	3,468,051	8,878,395	858,426	C	C	C	**82,451,337**
1998	47,036,836	1,194,653	13,167,803	5,617,873	3,715,310	7,896,803	721,811	1,359	19,266	1,306	**79,373,020**
1999	53,494,418	1,380,360	15,875,031	8,155,947	2,595,764	6,452,472	931,064	C	C	C	**88,885,056**
2000	57,215,406	1,709,746	14,988,031	6,907,504	1,393,565	2,883,468	891,183	C	C	C	**85,988,903**
2001	48,617,693	2,027,725	11,976,487	4,452,358	1,329,707	2,052,741	579,753	C	C	C	**71,036,464**
2002	63,625,745	2,029,887	13,437,109	3,835,050	1,067,121	1,440,483	264,425	C	C	C	**85,699,820**
2003	54,970,948	1,958,817	11,321,324	3,561,391	C	946,449	209,956	C	22,778	C	**72,991,663**
2004	71,574,344	2,851,262	11,675,852	3,059,319	646,994	996,109	370,536	13,322	14,931	27,039	**91,229,708**
2005	68,729,623	C	11,291,145	3,174,852	713,901	1,154,470	369,003	C	39,173	C	**85,472,167**
2006	75,419,802	2,364,495	12,077,140	4,918,500	1,599,029	2,207,953	294,906	C	C	C	**98,881,825**
2007	63,987,073	2,468,811	10,046,120	2,299,744	568,696	911,761	334,097	C	C	C	**80,616,302**
2008	69,908,847	2,568,088	10,606,534	2,782,000	427,168	712,075	304,479	C	C	C	**87,309,191**
2009	81,124,201	2,986,981	11,789,536	2,842,088	412,468	731,811	C	C	30,988	C	**99,918,074**
2010	96,244,299	3,648,004	12,772,159	2,928,688	441,622	813,513	692,869	C	C	C	**117,541,155**
2011	104,957,224	3,919,195	13,385,393	2,754,067	198,928	344,232	697,883	8,879	41,077	12,879	**126,319,757**
2012	127,464,332	4,229,227	14,486,344	2,706,384	247,857	550,441	919,351	C	C	C	**150,603,937**
2013	128,015,530	3,817,707	15,158,509	2,155,762	127,420	496,535	660,367	C	C	C	**150,431,830**
2014	124,941,217	4,374,656	15,312,852	2,412,875	127,409	222,843	526,368	26,330	57,414	11,099	**148,013,063**
2015	122,685,803	4,721,826	16,450,414	2,315,708	205,099	147,414	445,060	22,894	29,284	9,474	**147,032,976**
2016	132,750,484	5,782,056	17,784,921	2,260,335	254,346	218,846	349,880	C	C	C	**159,400,867**
2017	112,170,593	5,513,999	16,493,125	2,031,143	130,015	150,317	409,062	32,364	29,136	1,630	**136,961,382**
2018	121,653,778	6,082,881	17,697,083	1,905,689	110,580	112,685	344,547	C	C	C	**147,907,244**
2019	100,891,654	5,983,075	16,674,961	1,787,435	81,807	113,775	292,707	C	C	C	**125,825,414**

Table 2. Estimated lobster landings (in pounds) by lobster conservation management area (LCMA)*. Source: ASMFC Lobster Data Warehouse. This table is only updated in years when stock assessment reports are conducted.

Coastwide Estimated Lobster Landings (lbs) by Lobster Conservation Management Area (LCMA)*								
Year	LCMA 1	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 6	LCMA OCC	Grand Total
1981	32,369,320	527,284	4,321,500	441,478	115,653	1,220,159	134,327	39,129,721
1982	32,123,750	1,656,479	4,961,680	622,674	99,093	1,359,058	163,105	40,985,839
1983	32,826,685	2,958,366	5,645,179	633,254	71,804	2,428,633	198,448	44,762,369
1984	29,862,411	2,978,985	6,409,741	795,180	135,652	2,704,070	208,832	43,094,871
1985	31,590,759	2,992,330	5,853,851	964,043	170,998	2,273,337	261,929	44,107,247
1986	30,080,507	3,081,903	5,829,275	1,084,282	125,969	2,362,128	298,747	42,862,811
1987	30,682,754	3,219,900	5,357,273	1,473,841	98,486	2,378,765	276,250	43,487,269
1988	32,362,492	3,259,336	5,132,943	1,666,439	85,142	3,195,208	295,985	45,997,545
1989	36,800,166	4,175,114	5,450,786	2,232,935	106,126	3,735,250	352,155	52,852,532
1990	41,720,481	4,374,062	8,783,629	2,431,198	237,410	4,250,654	581,447	62,378,881
1991	43,648,773	4,140,145	8,537,053	2,096,138	115,020	4,393,986	740,267	63,671,382
1992	39,055,380	3,795,367	7,124,248	1,448,866	77,854	4,362,551	738,026	56,602,292
1993	40,962,969	3,772,494	6,773,992	1,597,447	89,495	3,968,663	938,486	58,103,546
1994	51,597,880	5,602,507	5,684,252	554,367	26,013	5,738,398	848,181	70,051,598
1995	49,771,715	4,960,453	5,008,551	962,077	45,054	8,564,325	1,000,609	70,312,784
1996	47,992,628	4,880,328	4,896,782	978,376	52,758	11,705,439	852,532	71,358,843
1997	58,016,197	5,324,775	5,549,295	1,162,862	36,623	11,650,701	849,126	82,589,579
1998	56,187,841	5,273,463	5,043,939	1,534,067	41,963	10,575,143	797,019	79,453,435
1999	65,375,535	6,938,658	6,166,601	1,346,509	77,621	8,331,142	739,904	88,975,970
2000	69,265,611	5,651,160	5,436,618	1,123,486	53,364	3,802,880	765,801	86,098,920
2001	57,531,942	3,862,054	5,525,209	762,408	55,537	3,013,551	611,242	71,361,943
2002	73,607,600	3,445,004	5,483,983	442,425	14,838	2,230,869	786,137	86,010,856
2003	63,005,041	1,110,534	6,978,808	423,583	17,394	1,448,011	804,355	73,787,725
2004	80,448,651	1,184,942	6,722,671	480,203	93,270	1,534,130	993,689	91,457,556
2005	76,240,627	1,464,433	7,442,771	457,275	54,181	1,673,396	966,787	88,299,470
2006	80,846,400	1,853,505	7,588,539	516,130	59,928	1,840,308	1,048,051	93,752,862
2007	70,862,089	1,430,836	6,375,646	617,978	56,866	1,263,648	1,132,991	81,740,055
2008	78,914,865	1,168,921	6,124,979	440,108	322,916	920,951	1,127,422	89,020,163
2009	91,133,844	1,051,241	6,960,119	488,792	308,212	896,594	1,256,201	102,095,002
2010	106,458,701	1,022,528	7,955,472	522,037	184,409	966,505	1,209,482	118,319,134
2011	116,042,515	730,889	7,890,340	488,977	148,587	306,079	1,244,299	126,851,685
2012	138,762,843	627,051	8,111,396	782,684	154,455	286,215	1,223,279	149,947,922
Grand Total	1,886,148,973	98,515,048	201,127,121	31,572,119	3,332,690	115,380,746	23,445,109	2,359,521,806

*Landings data are not collected by LCMA in all states. To separate landings by LCMA, NMFS statistical areas are placed into a single LCMA. For a complete description of how estimates are completed contact Caitlin Starks, at cstarks@asmfc.org.

Table 3. Threshold reference points with stock status variables for lobsters in each stock area. (Source: 2015 Benchmark Stock Assessment).

Variable	GOM	GBK	GOM/GBK	SNE
Effective Exploitation				
Effective exploitation threshold	0.54	1.83	0.5	0.41
Recent effective exploitation (2011-2013)	0.48	1.54	0.48	0.27
Effective exploitation below threshold?	YES	YES	YES	YES
Reference Abundance (millions)				
Abundance threshold	52	0.8	66	24
Recent abundance (2011-2013)	247	1.57	248	10
Abundance above threshold?	YES	YES	YES	NO

Table 4. 2019 LCMA specific management measures

Management Measure	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	OCC
Min Gauge Size	3 1/4"	3 3/8"	3 17/32"	3 3/8"	3 3/8"	3 3/8"	3 3/8"
Vent Rect.	1 15/16 x 5 3/4"	2 x 5 3/4"	2 1/16 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"
Vent Cir.	2 7/16"	2 5/8"	2 11/16"	2 5/8"	2 5/8"	2 5/8"	2 5/8"
V-notch requirement	Mandatory for all eggers	Mandatory for all legal size eggers	Mandatory for all eggers above 42°30'	Mandatory for all eggers in federal waters. No v-notching in state waters.	Mandatory for all eggers	None	None
V-Notch Definition[1] (possession)	Zero Tolerance	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	State Permitted fisherman in state waters 1/4" without setal hairs Federal Permit holders 1/8" with or w/out setal hairs[1]
Max. Gauge (male & female)	5"	5 ¼"	6 3/4"	5 ¼"	5 ¼"	5 ¼"	State Waters none Federal Waters 6 3/4"
Season Closure				April 30-May 31[2]	February 1-March 31[3]	Sept 8-Nov 28[4]	February 1-April 30

[1] A v-notched lobster is defined as any female lobster that bears a notch or indentation in the base of the flipper that is at least as deep as 1/8", with or without setal hairs. It also means any female which is mutilated in a manner that could hide, obscure, or obliterate such a mark.

[2] Pots must be removed from the water by April 30 and un-baited lobster traps may be set one week prior to the season reopening.

[3] During the February 1 – March 31 closure, trap fishermen will have a two week period to remove lobster traps from the water and may set lobster traps one week prior to the end of the closed season.

[4] Two week gear removal and a 2 week grace period for gear removal at beginning of closure. No lobster traps may be baited more than 1 week prior to season reopening.

Table 5: Trap allocation reductions as required by Addendum XVIII for LCMA 2 and 3 fishermen. This table only represents trap allocation reductions reported ahead of the 2020 fishing year and does not represent aggregate trap reductions over multiple years. Traps can also be retired due to the 10% conservation tax on trap transfers. Sources of the trap allocations come from state compliance reports and GARFO 2020 trap allocations published for the trap transfer program.

	Jurisdiction	# of Trap Allocated (For 2020 Fishing Year)	# of Traps Retired (from 2019 to 2020 Fishing Year)	Comments on Trap Transfers
LCMA 2	MA	Not available	Not available	
	RI	62,611	3,516	1,255 traps transferred
	CT	2,544	108	
	NOAA (ME, NH, NY, NJ)	67,158	369	3,694 traps transferred out
LCMA 3	NOAA	105,645	406	4,060 traps transferred out

Table 6. 2019 sampling requirements and state implementation. All states have 100% active harvester reporting except for Maine which has 10% harvester reporting. Sufficient sea sampling can replace port sampling. *De minimis* states (denoted by *) are not required to conduct biological sampling of their lobster fishery.

State	100% Dealer Reporting	10% Harvester Reporting	Sea Sampling	Port Sampling	Ventless Trap Survey	Settlement Survey	Trawl Survey
ME	✓	✓ (10%)	✓	✓	✓	✓	✓
NH	✓	✓	✓	✓	✓	✓	✓
MA	✓	✓	✓	✓	✓	✓	✓
RI	✓	✓	✓	✓	✓	✓	✓
CT	✓	✓				*	✓
NY	✓	✓	✓	✓			✓
NJ	✓	✓	✓				✓
DE*	✓	✓			✓		✓
MD*	✓	✓	✓				✓
VA*	✓	✓					

*Larval data are available for the eastern Long Island Sound from the Millstone Power Station entrainment estimates of all stages of lobster larvae.

Table 7. 2019 sea and port sampling trips and samples by state. *De minimis* states (denoted by *) are not required to conduct biological sampling of their lobster fishery.

State	Sea Sampling			Port Sampling		Market Sampling		State Totals	
	Trips	Samples	Traps	Trips	Samples	Trips	Samples	Trips	Samples
ME	162	202,939	37,423	0	0	0	0	162	202,939
NH	17	10,285	NA	12	1,200	0	0	29	11,485
MA	60	31,185	12,373	0	0	0	0	60	31,185
RI	9	5,364	2,075	11	2,741	0	0	20	8,105
CT	0	0	0	0	0	0	0	0	0
NY	3	77	NA	0	0	20	1,017	23	1,094
NJ	3	1,270	1,309	0	0	0	0	3	1,270
DE*	0	0	0	0	0	0	0	0	0
MD*	1	204	309	0	0	0	0	1	204
VA*	0	0	0	0	0	0	0	0	0
Total	**255**	**251,324**	**53,489**	**23**	**3,941**	**20**	**1,017**	**298**	**256,282**

15.0 Figures

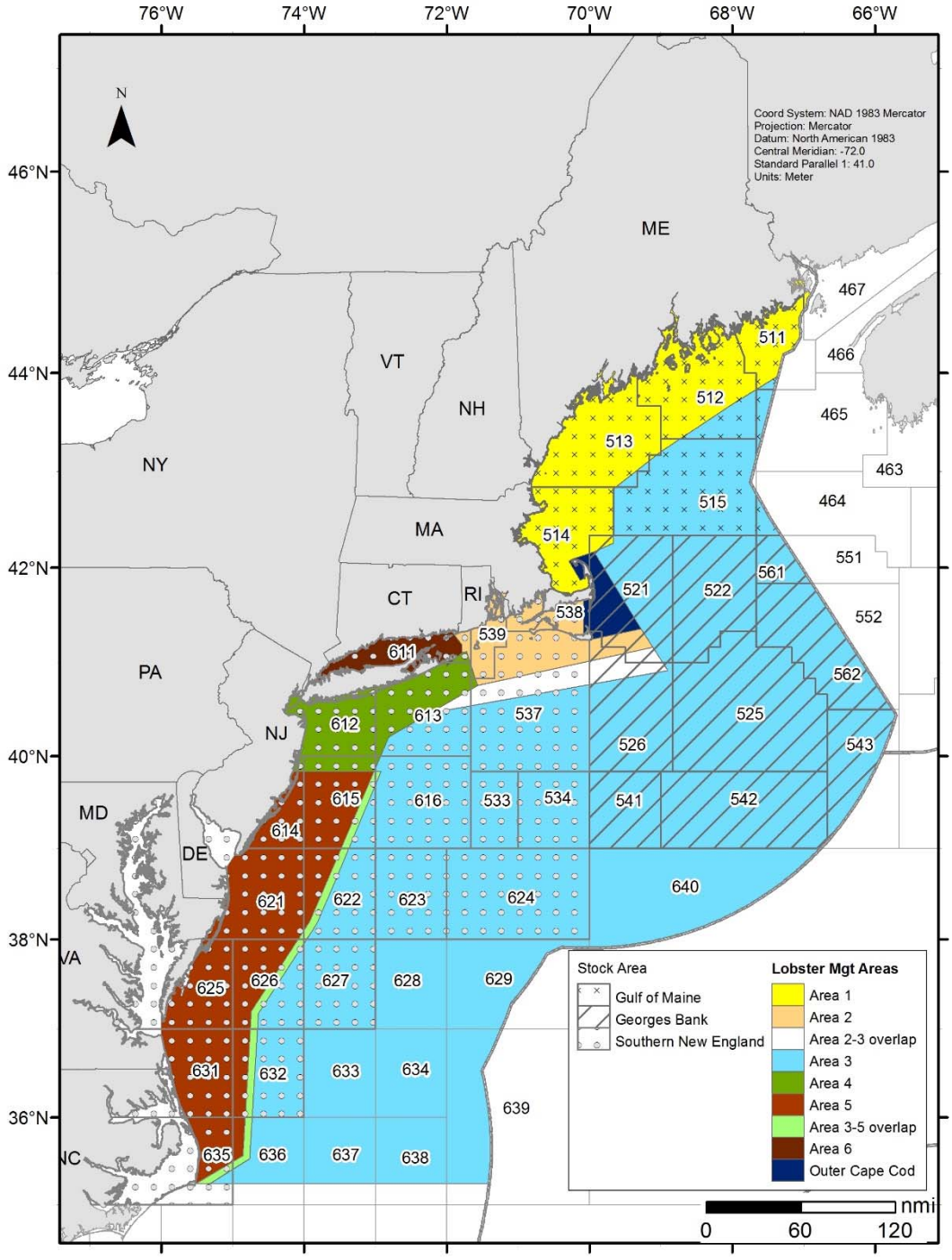

Figure 1: Lobster Conservation Management Areas (LCMAs) and stock boundaries for American lobster.

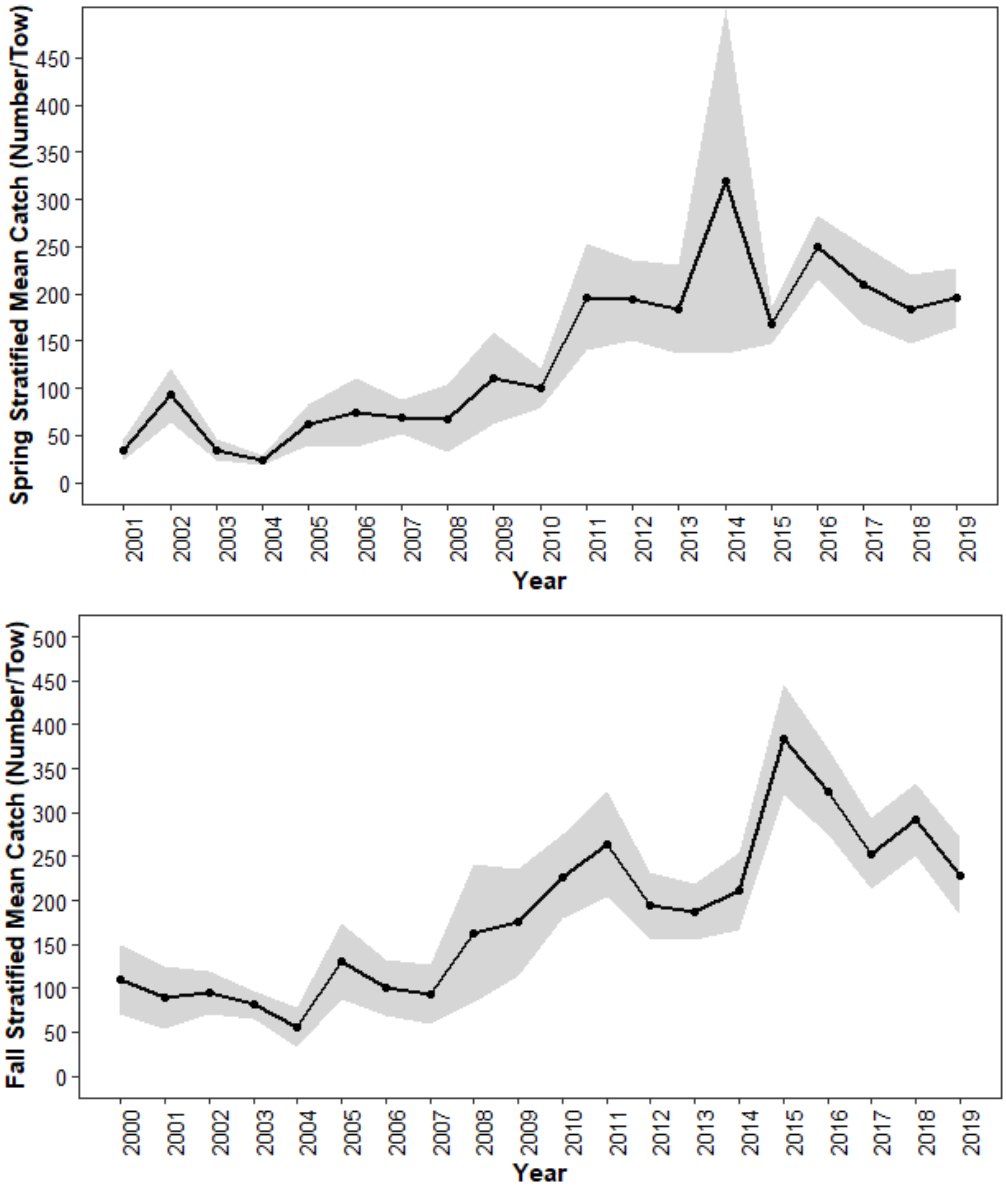

Figure 2: Maine-New Hampshire survey stratified mean abundance indices for lobster, 2000-2019. Results of the spring survey are on the top and results from the fall survey are on the bottom.

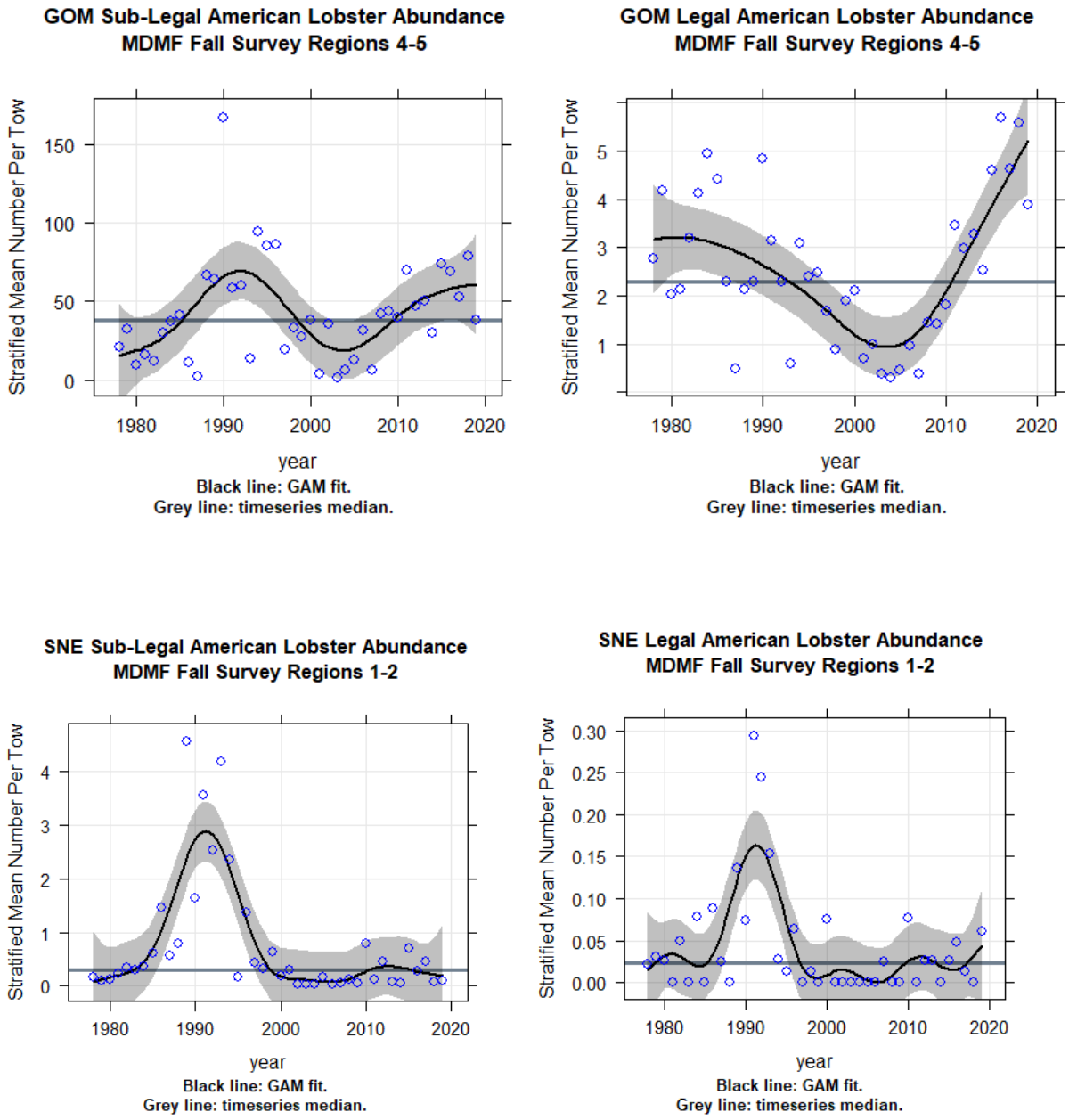

Figure 3: MADMF Fall Trawl Survey sublegal (left) and legal (right) indices from 1978-2019 sexes combined. The top charts are from Gulf of Maine and the bottom charts are from Southern New England.

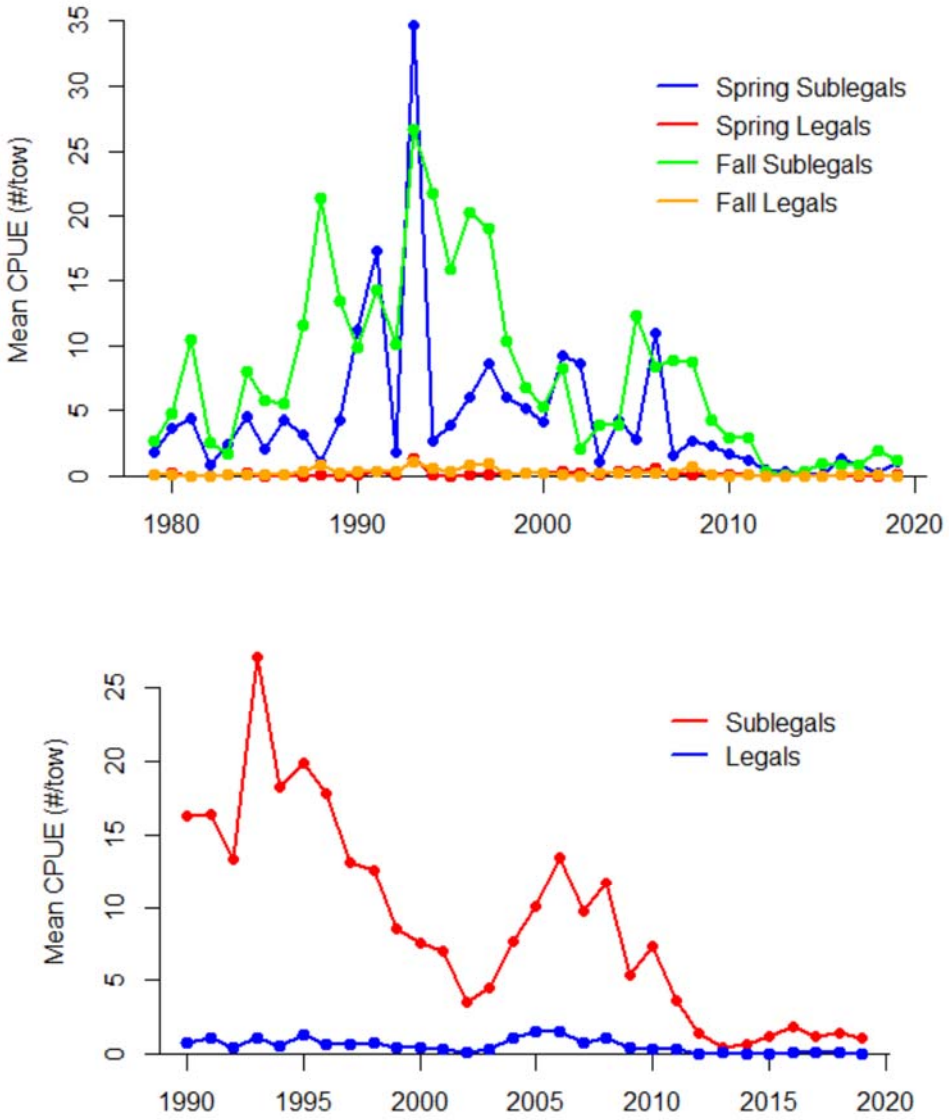

Figure 4: RIDFW Seasonal (spring and fall) Trawl lobster abundances (top) and Monthly Trawl lobster abundances (bottom). CPUE is expressed as the annual mean number per tow for sub-legal (<85.725mm CL) and legal sized (>=85.725mm CL) lobsters.

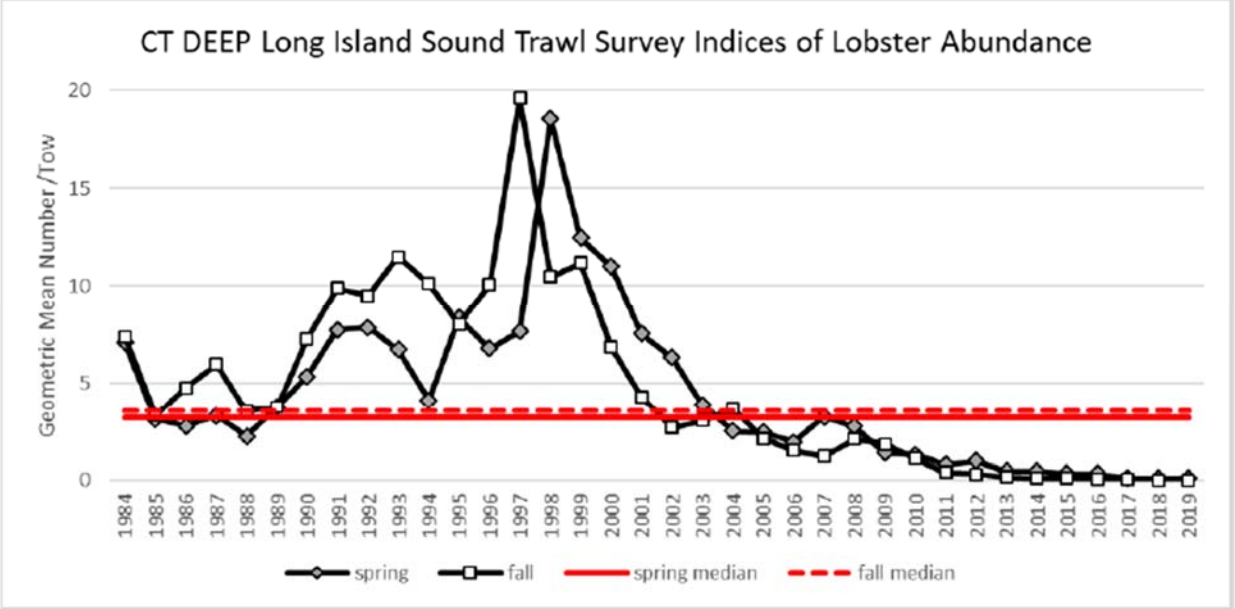

Figure 5: Results of the Long Island Sound Trawl Survey during spring (April-June) and fall (September-October) within NMFS statistical area 611.

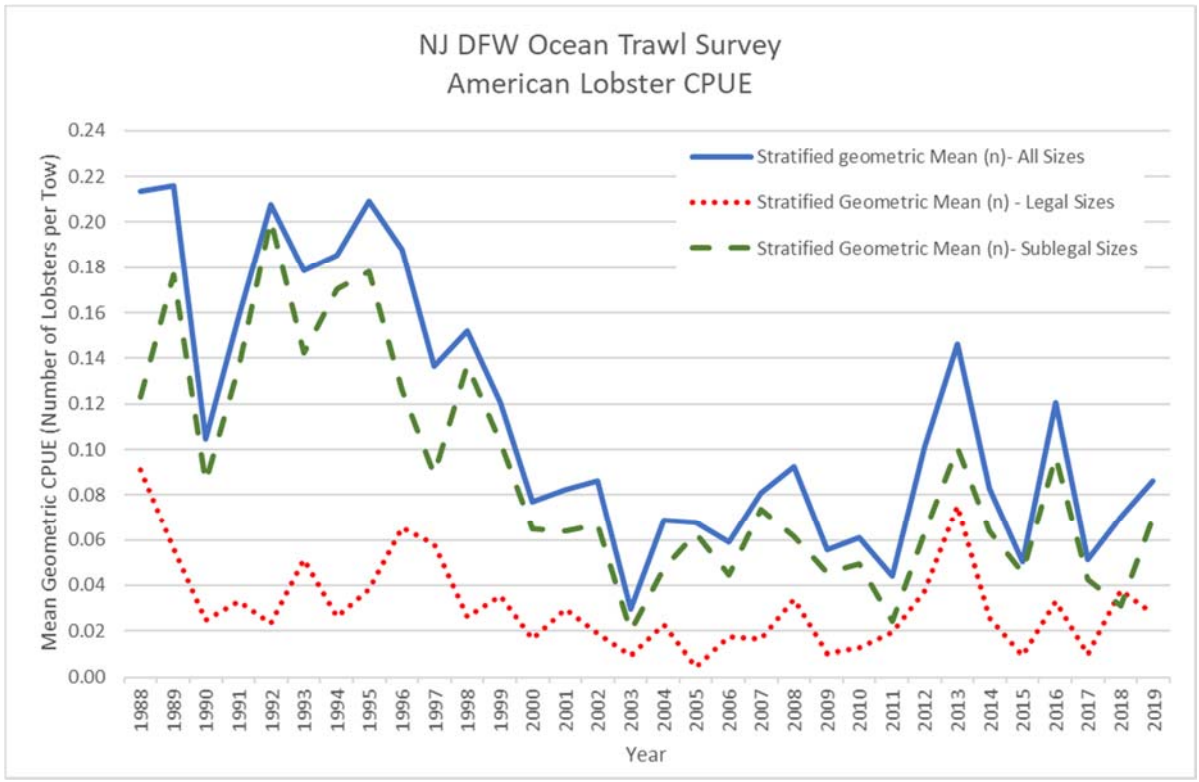

Figure 6: Stratified mean CPUE of all lobsters collected aboard the NJDFW Ocean Trawl Survey. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE was calculated as the sum of the mean number of lobsters per size class collected in each sampling area weighted by the stratum area.

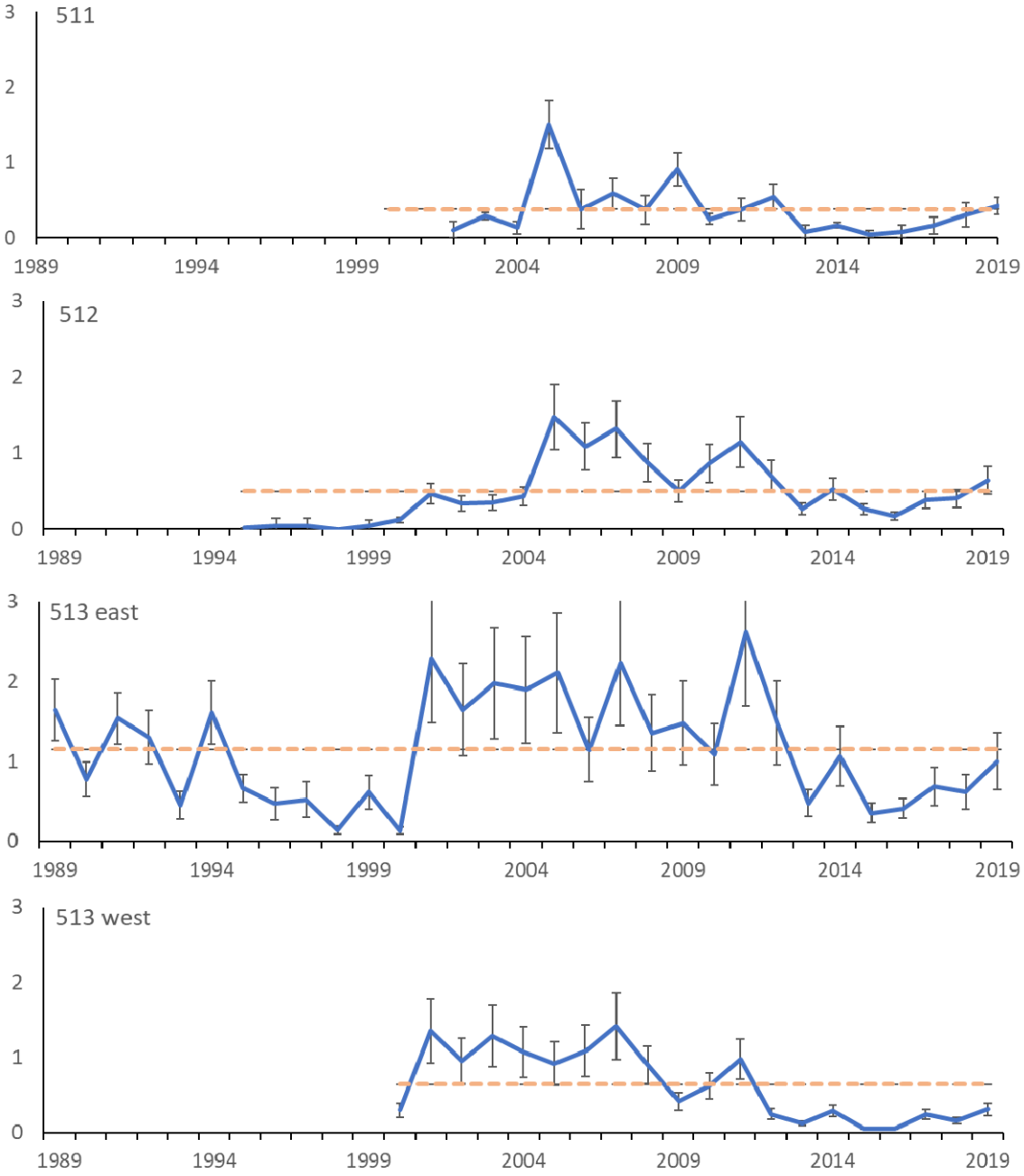

Figure 7: Settlement survey index (average number of YOY per meter squared; blue line) for each statistical area in Maine (1989-2019). The series average for each region is represented by the red dashed line.

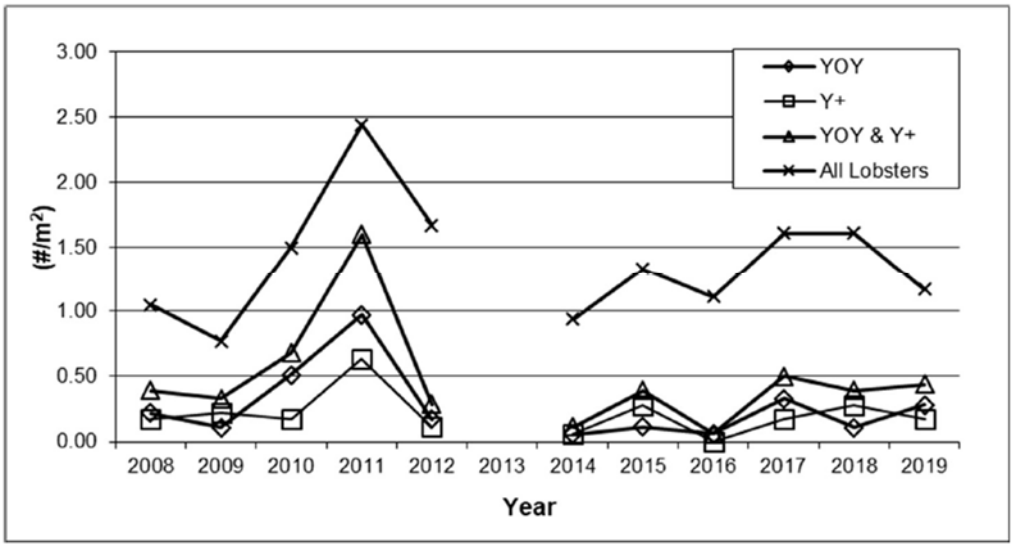

Figure 8: Catch per unit effort (#/m2) of young-of-year (YOY), one-year-olds (Y+), YOY and Y+ combined, and all lobsters during the American Lobster Settlement Index, by location, in New Hampshire, from 2008 through 2019. There were no settlement survey samples collected in NH in 2013.

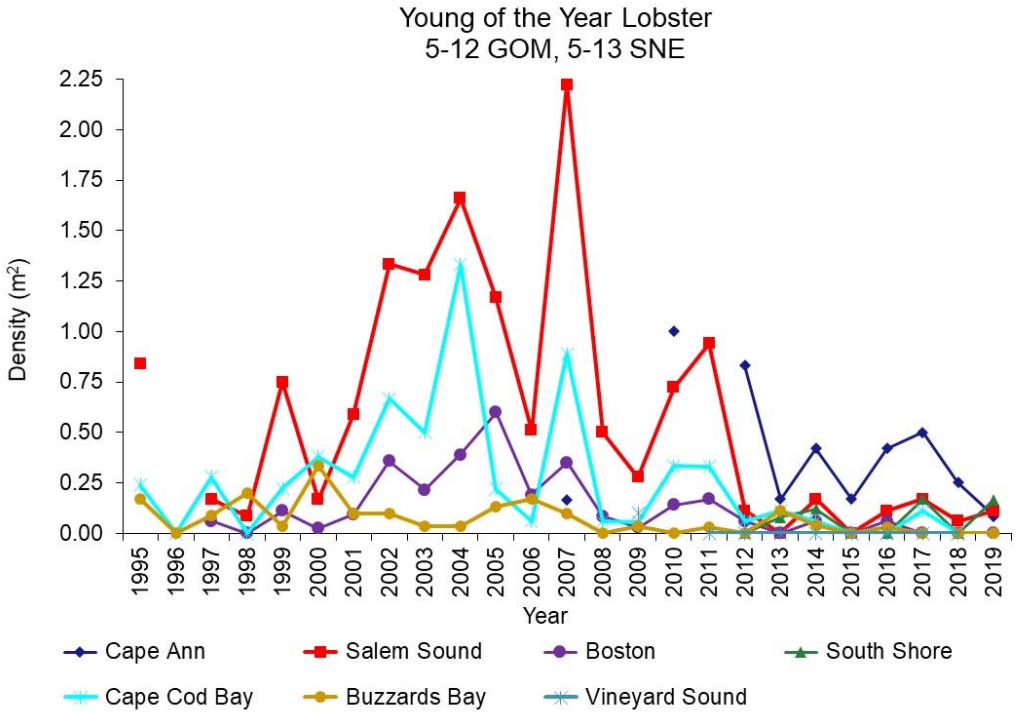

Figure 9: Young-of-year lobster density in seven Massachusetts regions; LCMA 1 – Cape Ann, Salem Sound, Boston, South Shore, Cape Cod Bay, LCMA 2 - Buzzards Bay, Vineyard Sound.

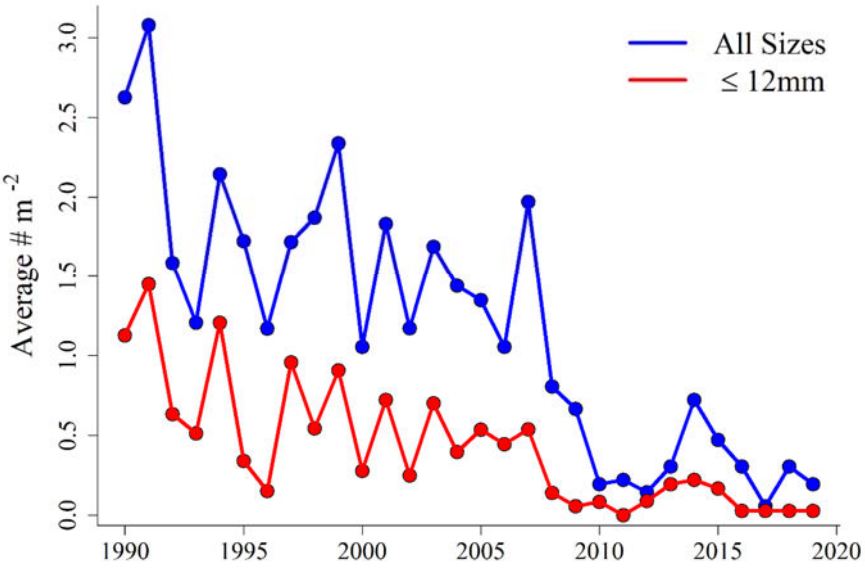

Figure 10: Average abundance of American lobster in Rhode Island suction sampling sites. Abundances are presented for lobsters 12mm and smaller (red line) and all sizes (blue line).

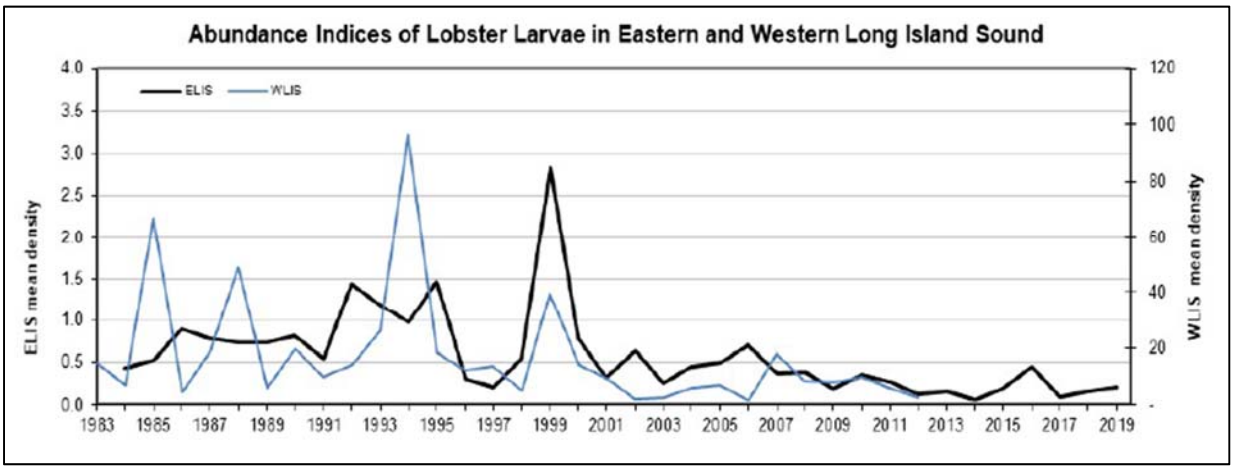

Figure 11: Abundance indices of lobster larvae from the Connecticut DEEP Larval Lobster Survey in western Long Island Sound and from the Millstone Power Station entrainment estimates in eastern Long Island Sound. The Connecticut DEEP survey was discontinued in 2013.

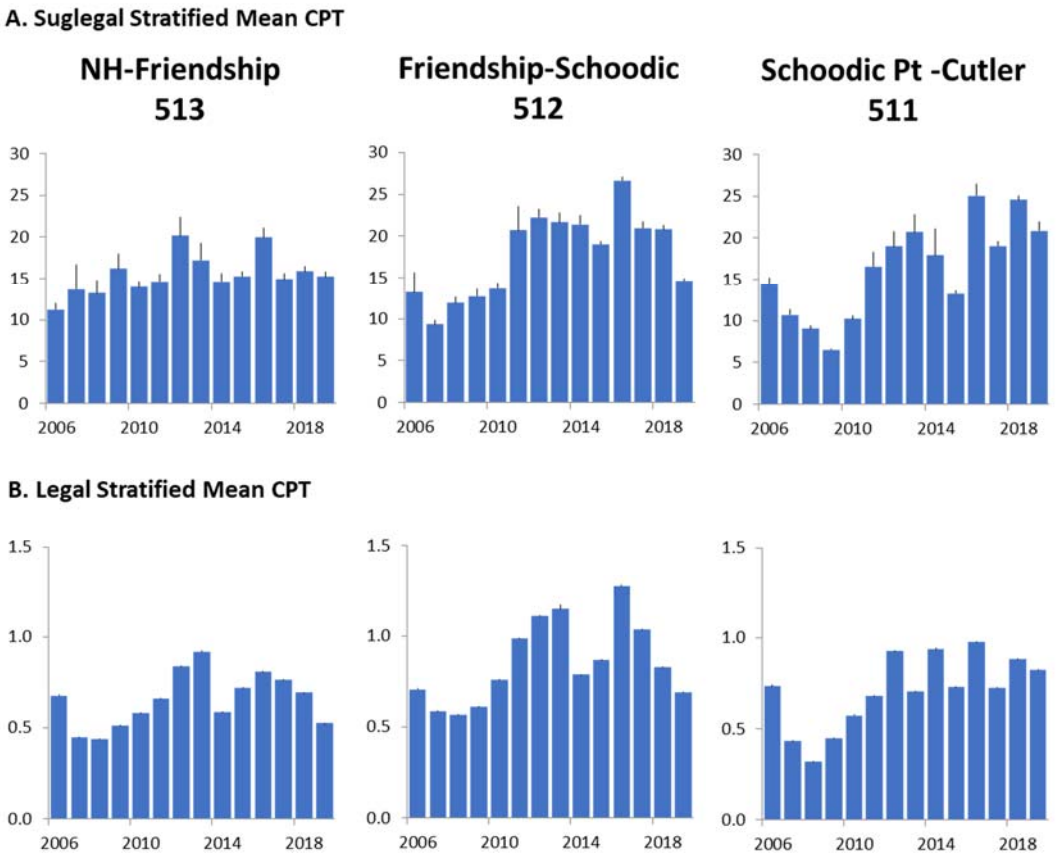

Figure 12: CPUE stratified mean for both sublegal and legal lobsters from Maine's Ventless Trap survey, 2006-2018, by statistical area. Only ventless traps were included in the analysis.

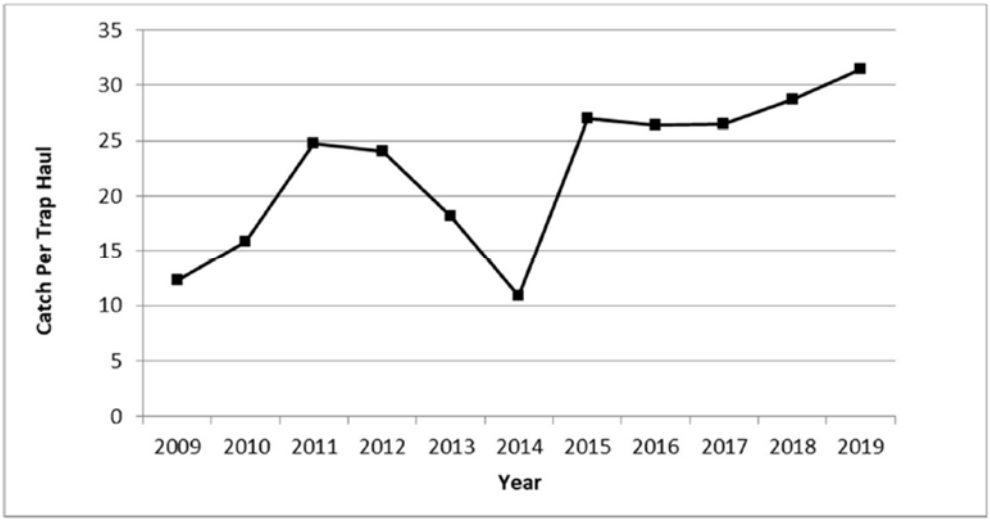

Figure 13: Stratified mean catch per trap haul, for all lobsters captured during the coast-wide random stratified Ventless Trap Survey in New Hampshire state waters from 2009 through 2019.

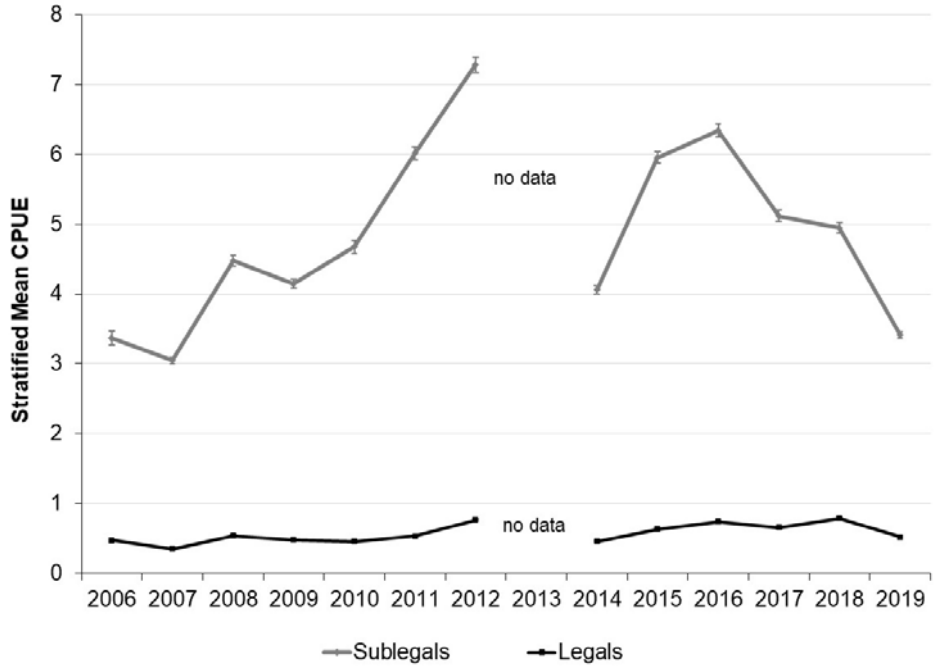

Figure 14: Stratified mean catch per trap haul (±S.E.) of sublegal (< 83 mm, grey line) and legal (≥ 83 mm, black line) lobsters in NMFS Area 514 from MADMF ventless trap survey from 2006-2019.

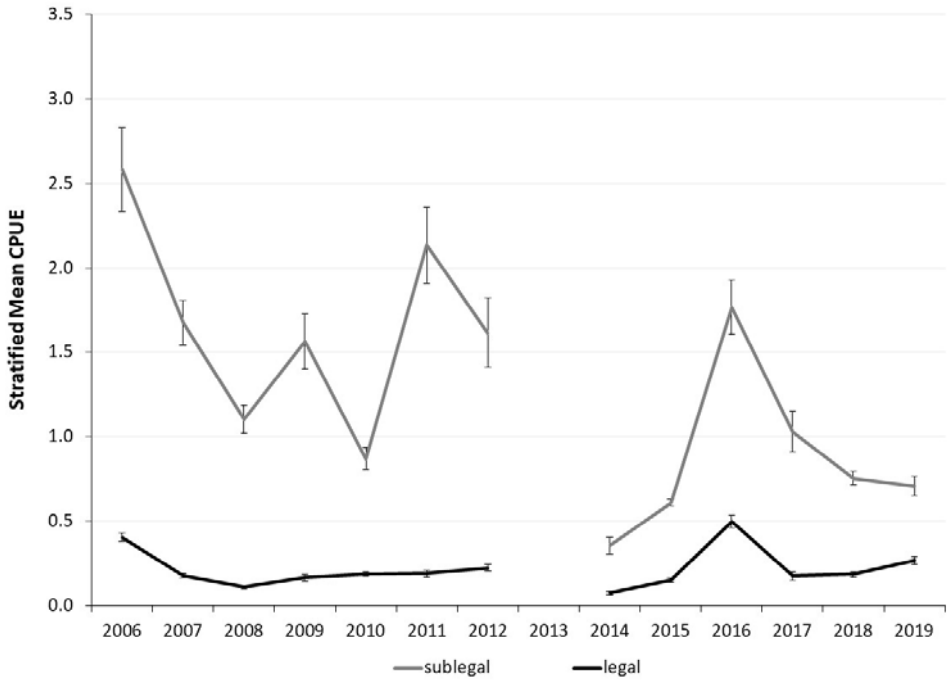

Figure 15: Stratified mean catch per trap haul (±S.E.) of sublegal (< 86 mm, grey line) and legal (≥ 86 mm, black line) lobsters in the original MA SNE survey area (within state waters), Area 538.

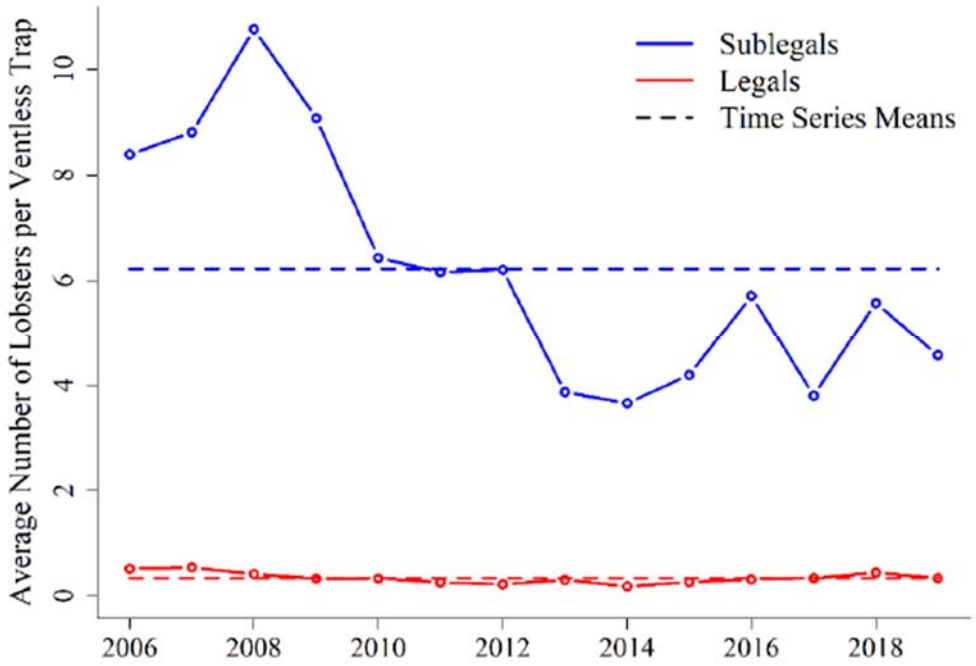

Figure 16: Stratified mean catch (#) per ventless trap for sublegal (<85.725 mm CL) and legal-sized (>=85.725mm CL) lobsters from RIDEM ventless trap survey. The dashed lines indicate time series means for the two indices.

Draft Document for Board Review

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

For Jonah Crab
(*Cancer borealis*)

2019 FISHING YEAR

Prepared by the Plan Review Team

September 2020

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Draft Document for Board Review

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Draft Document for Board Review

2019 REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR JONAH CRAB (*Cancer borealis*)

2018 FISHING YEAR

1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption:	FMP (2015)
Framework Adjustments:	Addendum I (2016) Addendum II (2017) Addendum III (2018)
Management Unit:	Maine through North Carolina
States with a Declared Interest:	Maine through Virginia (Excluding Pennsylvania and DC)
Active Committees:	American Lobster Management Board, Technical Committee, Plan Review Team, Advisory Panel, Electronic Reporting Subcommittee, Electronic Tracking Subcommittee

2.0 Status of the Fishery

2.1 Commercial Fishery

Historically, Jonah crab was taken as bycatch in the lobster fishery; however, in recent years a directed fishery has emerged causing landings to rapidly increase. Throughout the 1990's, landings fluctuated between approximately 2 and 3 million pounds, and the overall value of the fishery was low. In the early 2000's landings began to increase, with over 7 million pounds landed in 2005. By 2014, landings had almost tripled to 17 million pounds and a value of nearly $13 million dollars. This rapid increase in landings can be attributed to an increase in the price of other crab (such as Dungeness), creating a substitute market for Jonah crab, as well as a decrease in the abundance of lobsters in Southern New England, causing fishermen to redirect effort on Jonah crab.

Today, Jonah crab and lobster are considered a mixed crustacean fishery in which fishermen can target lobster or crab at different times of the year based on slight gear modifications and small shifts in the areas in which the traps are fished. While the majority of Jonah crab is harvested as whole crabs, fishermen from several states, including New York, Maryland and Virginia, land claws. Jonah crab claws are relatively large and can be an inexpensive substitute for stone crab claws. As a result, they can provide an important source of income for fishermen. A historic claw fishery takes place along the Delmarva Peninsula where small boat fishermen harvest Jonah crab claws because they do not have a seawater storage tank on board to store whole crabs.

In 2019, landings along the Atlantic Coast totaled approximately 16 million pounds of Jonah crab, representing $13.1 million in ex-vessel value. The states of Massachusetts (60%) and Rhode Island (25%) were the largest contributors to landings in the fishery. Landings in descending order also occurred in New Jersey, Maine, New York, New Hampshire, Maryland, Connecticut, and Delaware, and Virginia. Over 99% of coastwide landings in 2019 came from trap gear.

2.2 Recreational Fishery

The magnitude of the Jonah crab recreational fishery is unknown at this time; however, it is believed to be quite small in comparison to the size of the commercial fishery.

3.0 Status of the Stock

Jonah crab are distributed in the waters of the Northwest Atlantic Ocean primarily from Newfoundland, Canada to Florida. The life cycle of Jonah crab is poorly described, and what is known is largely compiled from a patchwork of studies that have both targeted and incidentally documented the species. Female crab (and likely some males) are documented moving inshore during the late spring and summer. Motivations for this migration are unknown, but maturation, spawning, and molting have all been postulated. It is also generally accepted that these migrating crab move back offshore in the fall and winter. Due to the lack of a widespread and well-developed aging method for crustaceans, the age, growth, and maturity of Jonah crab is poorly described.

The status of the Jonah crab resource is relatively unknown and no range wide stock assessment has been conducted. Massachusetts, Rhode Island, Maine, and New Hampshire conduct inshore state water trawl surveys, and NOAA Fisheries conducts a trawl survey in federal waters which collects data on Jonah crab abundance and distribution. In addition, several studies are on-going (Section 7.0) to gather more information on the species. A Data Workshop is scheduled for November 2020 to evaluate all available data sources and determine whether enough data of sufficient quality are available to conduct a stock assessment.

4.0 Status of Management Measures

Interstate Fishery Management Plan for Jonah Crab (2015)

Jonah crab is managed under the Interstate Fishery Management Plan (FMP) which was approved by the American Lobster Management Board in August 2015. The goal of the FMP is to promote conservation, reduce the possibility of recruitment failure, and allow for the full utilization of the resource by the industry. The FMP lays out specific management measures in the commercial fishery. These include a 4.75” minimum size and a prohibition on the retention of egg-bearing females. To prevent the fishery from being open access, the FMP states that participation in the directed trap fishery is limited to lobster permit holders or those who can prove a history of crab-only pot fishing. All others must obtain an incidental permit. In the recreational fishery, the FMP sets a possession limit of 50 whole crabs per person per day and prohibits the retention of egg-bearing females. Due to the lack of data on the Jonah crab

fishery, the FMP implements a fishery-dependent data collection program. The FMP also requires harvester and dealer reporting along with port and sea sampling.

Addendum I (2016)

Addendum I establishes a bycatch limit of 1,000 pounds of crab/trip for non-trap gear (e.g., otter trawls, gillnets) and non-lobster trap gear (e.g., fish, crab, and whelk pots). In doing so, the Addendum caps incidental landings of Jonah crab across all non-directed gear types with a uniform bycatch allowance. While the gear types in Addendum I make minimal contributions to total landings in the fishery, the 1,000 crab limit provides a cap to potential increases in effort and trap proliferation.

Addendum II (2017)

Addendum II establishes a coastwide standard for claw harvest. Specifically, it permits Jonah crab fishermen to detach and harvest claws at sea, with a required minimum claw length (measured along the forearm of the claw) of 2.75" if the volume of claws landed is greater than five gallons. Claw landings less than five gallons do not have to meet the minimum claw length standard. The Addendum also establishes a definition of bycatch in the Jonah crab fishery, whereby the total pounds of Jonah crab caught as bycatch must weigh less than the total amount of the targeted species at all times during a fishing trip. The intent of this definition is to address concerns regarding the expansion of a small-scale fishery under the bycatch limit.

Addendum III (2018)

Addendum III improves the collection of harvester and biological data in the Jonah crab fishery. Specifically, the Addendum improves the spatial resolution of harvester data collection by requiring fishermen to report via 10 minute squares. It also expands the required harvester reporting data elements to collect greater information on gear configurations and effort. In addition, the Addendum established a deadline that within five years, states are required to implement 100% harvester reporting, with the prioritization of electronic harvester reporting development during that time. Finally, the Addendum improves the biological sampling requirements by establishing a baseline of ten sampling trips/year, and encourages states with more than 10% of coastwide landings to conduct additional sampling trips.

5.0 Fishery Monitoring

The provisions of Addendum III went into effect January 1, 2019. Specifically, Addendum III requires reporting of additional data elements, the implementation of 100% harvester reporting within five years, and the completion of a minimum of ten sea and/or port sampling trips per year for biological sampling of the lobster/Jonah crab fishery. The Addendum III requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square will not be implemented until 2021. *De minimis* states are not required to conduct fishery-independent sampling or port/sea sampling.

Overviews of the states' port and sea sampling are as follows:

- Maine: In 2019, Jonah crab data were collected on 15 lobster sea sampling trips for a total of 1,794 crabs. Sampling occurs through the lobster sea sampling program, which has a sampling protocol for Jonah crab including collecting data on carapace width, sex, reproductive status, cull status, and shell hardness. Maine's lobster port sampling program was suspended in 2011.
- New Hampshire: Staff sampled 72 Jonah crab on 8 sea sampling trips and collected information on sex, the presence of eggs, cull condition, molt stage, and carapace length. NH initiated a quarterly port sampling program in late 2016. Quarterly sampling took place at shellfish dealers, where an interview with the captain occurred and a biological sample was taken. A total of 222 Jonah crab were sampled through this new program, which were sexed, measured for carapace length, and weighed (when feasible).
- Massachusetts: Massachusetts conducted 11 port sampling trips and sampled 7,452 Jonah crab from four different boats. Data collected include shell width, sex, egg bearing status, cull status, and shell hardness.
- Rhode Island: Rhode Island DMF did not conduct sea sampling for Jonah crab in 2019, due to a lack of funding specific to this purpose. Inshore lobstermen who also target Jonah crab generally target either lobster or crab during a given trip, so opportunity to sample Jonah crab and lobsters simultaneously is limited. Rhode Island DMF conducted port sampling of Jonah crab from two fishing trips in 2019, sampling a total of 345 Jonah crabs.
- Connecticut: No sea sampling or port sampling trips were conducted for Jonah crab.
- New York: Staff conducted 11 market sample trips, sampling 204 Jonah crab. No sea sampling trips were conducted for Jonah crab.
- New Jersey: No sea or port sampling trips were conducted for Jonah crab in 2019.
- Delaware: No sea or port sampling trips were conducted for Jonah crab.
- Maryland: Maryland conducted one multi-day sea sampling trip and sampled 100 Jonah crab. Data collected included carapace width, egg bearing status, cull status, shell hardness, sex and whether the landings are whole crabs or parts.
- Virginia: No sea or port sampling trips were conducted for Jonah crab.

6.0 Status of Surveys

The FMP for Jonah crab encourages states to expand current lobster surveys (i.e. trawl surveys, ventless trap surveys, settlement surveys) to collection biological information on Jonah crab. The following outlines the fishery-independent surveys conducted by each state.

Maine

A. Settlement Survey

The Maine settlement survey was primarily designed to quantify lobster young-of-year (YOY), but has also collected Jonah crab data from the sites throughout the survey. Jonah crab information collected includes carapace width, sex (when large enough), ovigerous condition, claw status, shell hardness, and location. The density of YOY Jonah crab has increased over the past two decades with high values in 2012 and 2016 (Figure 1). In 2019, density of YOY Jonah crab decreased sharply from 2018 (Figure 1). The density of all Jonah crabs also decreased from 2018 in each of the sampled areas.

B. State Trawl Survey

The ME/NH Inshore Trawl Survey began in 2000 and is conducted biannually (spring and fall) through a random stratified sampling scheme. Jonah crab data has been collected throughout the history of this survey. The 2019 spring survey completed all 120 scheduled tows and sampled a total of 179 Jonah crab. The spring abundance indices for Jonah crab significantly increased from 2013 to 2016, but declined in 2017, 2018, and 2019 (Figure 2). The 2019 fall survey completed 98 tows and sampled 225 Jonah crab. Abundance indices for Jonah crab declined in 2017 and 2018, and very slightly in 2019 (Figure 2).

C. Ventless Trap Survey

Maine began its Juvenile Lobster Ventless Trap Survey in 2006. Since the beginning of the survey, Jonah crab counts were recorded by the contracted fishermen, but the confidence in early years of this data is low because of the confusion between the two *Cancer* crabs (Jonah crab vs. rock crab) and similar common names. In 2016, the survey began collecting biological data for Jonah crab including carapace width, sex, ovigerous condition, claw status, shell hardness, and location. In 2019 concentrations of Jonah crab were highest in Statistical Area 511 and decrease to the southwest (Figure 3).

New Hampshire

A. Settlement Survey

Since 2009, species information has been collected on Jonah crab in the New Hampshire Fish and Game portion of the American Lobster Settlement Index. Figure 4 depicts the CPUE (#/m^2) of Jonah crab for all NH sites combined, from 2009 through 2019. The time series shows a general upward trend to a time series high in 2018, followed by a decrease in 2019.

B. Ventless Trap Survey

Since 2009, New Hampshire Fish and Game has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (statistical area 513). A total of six sites were surveyed twice a month from June through September in 2018. Beginning in 2016 all Jonah crab were evaluated for sex and carapace length. A total of 51 Jonah crab over 19 trips were measured during the 2019 sampling season.

Massachusetts

A. Settlement Survey

The Juvenile Lobster Suction Survey has consistently identified *Cancer* crabs to genus level since 1995Jonah crab since 2011, and to the species level since 2011. The number of Jonah crab per square meter were higher in 2018 and 2019 than any other point in the survey in all regions except Buzzards Bay, where Jonah crabs are rarely encountered (Figure 5).

B. Ventless Trap Survey

The MA DMF Ventless Tray Survey is conducted in MA territorial waters of NMFS SA 514 and 538. Stratified mean catch per trawl haul (CPUE) for the survey is standardized to a six-pot trawl

with three vented and three ventless traps. The Jonah crab relative abundance index from Area 514 (Figure 6) has been fairly stable since 2009, with the exception of a down year in 2012. NMFS SA 538 had shown a modest increase in abundance from 2010 to 2017 but has declined since (Figure 7).

C. Trawl Survey

The MA DMF Trawl Survey data are divided into two regions, Gulf of Maine (survey regions 4 and 5), and Southern New England (survey regions 1-3). Recent trends in both regions during the fall, and GOM in the spring have been positive (Figure 8). The spring survey in SNE consistently catches few, if any crabs. While trends are generally positive, 2019 data points for all seasons and regions were below their time series medians, except for the spring survey in GOM.

Rhode Island

A. Settlement Survey

The RI DEM DMF YOY Settlement Survey (Suction Sampling) intercepts Jonah crabs. The 2019 Jonah crab index was 0.14/m2 (Figure 9).

B. Ventless Trap Survey

Since its inception in 2006, the RI Ventless Trap Survey (VTS) has recorded counts of Jonah crab per pot. In 2014, carapace width and sex were also recorded for all individuals. In 2019, the stratified abundance index of Jonah crabs was 1.25 crabs per ventless trap, similar to the time series mean of 1.23 crabs per ventless trap (Figure 10).

B. Trawl Survey

RIDEM has conducted spring and fall trawl surveys since 1979, and a monthly trawl survey since 1990. However, the survey did not begin counting Jonah crab specifically until 2015. Given the short time series of Jonah crab data available and few Jonah crab observations by the surveys, the information is not available at this time. As the datasets for Jonah crab from these trawl surveys grow, these data will be provided as abundance indices.

Connecticut

A. Trawl Survey

Jonah crab abundance is monitored through the Long Island Sound Trawl Survey (LISTS) during the spring (April, May, June) and fall (September and October) cruises, all within NMFS statistical area 611. The survey documents the number of individuals caught and total weight per haul by survey site in Long Island Sound. The Long Island Sound Trawl Survey caught one Jonah crab in the fall 2007 survey and two in the fall 2008 survey. Both observations occurred in October at the same trawl site in eastern Long Island Sound. The fall 2018 trawl survey documented a total of 0.4 kg of Jonah crab, with crabs observed in one site in the central basin and one site in the eastern basin of Long Island Sound.

New York

A. Trawl Survey

New York initiated a stratified random trawl survey in the near shore ocean waters off the south shore of Long Island in 2018 from the Rockaways to Montauk Point and the New York waters of Block Island Sound. Three sampling cruises were conducted in 2019 during the winter (February), spring (June), and fall (December). The second trip in the spring during May and the summer trip in August were not conducted due to mechanical issues. Twenty-five to 30 stations were sampled each trip. Twenty-four Jonah crabs were caught during the 2019 survey. They ranged in size from 20 to 144 mm shell width (SW) and averaged 53 mm SW.

New Jersey

A. Trawl Survey

A fishery-independent Ocean Trawl Survey is conducted from Sandy Hook, NJ to Cape May, NJ each year. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), and offshore (60'-90'). In 2019, a cruise was not conducted in April. The mean CPUE, which is calculated as the sum of the mean weight of Jonah crab collected in each sampling area weighted by the stratum area, has remained low throughout the time series, but increased slightly in 2019 (Figure 11).

7.0 Recent and On-Going Research Projects

A. Maturity Study

MA DMF, in collaboration with AOLA and CFRF, has conducted a Jonah crab maturity study. Results suggest that females mature at a smaller size than males (~88-94mm carapace width vs. ~103-117mm carapace width, depending on region sampled). Importantly, the sizes at maturity for both sexes are below the current minimum legal size for harvest (121 mm).

In addition, a graduate student at the University of Maryland Eastern Shore completed a master's thesis on the size at sexual maturity and reproductive biology of Jonah crabs in the Mid-Atlantic Bight in the spring of 2018. Jonah crabs were collected as bycatch in black sea bass and lobster pots from December 2015 to September 2017 as well as from the 2016 and 2017 Virginia Institute of Marine Science Mid-Atlantic Sea Scallop dredge survey. Measurements included: sex, weight, length, width, chela length and height, abdomen width (females), molt condition, presence/absence of egg clutches, and presence/absence of external sperm plugs. A gonadosomatic index was created for female Jonah crabs.

B. Tagging Study

MA DMF, in collaboration with AOLA, NH F&G, and ME DMR, completed a Jonah crab tagging study in 2018 in which over 32,000 Jonah crabs were tagged across 12 different NMFS statistical areas. Preliminary data suggests that most Jonah crab are not migrating far; Most of the recaptures (over 900 crabs) were recaptured within 5 km of where they were released, though six crabs traveled more than 100 km. None of the seven crabs recaptured after more than 600 days had molted.

C. Declawing Study

New Hampshire Fish and Game and Wells National Estuarine Research Reserve conducted a laboratory study to investigate mortality rates associated with declawing Jonah crabs. Four mortality trials were conducted over three seasons. Mortality rates (% died) by treatment were: Controls=16%, 1-claw removed=51%, and 2-claws removed=70%. Additional research is being conducted to assess how declawing clawing affects mating, feeding and movement.

D. Growth and Fishery Dependent Data

In 2019, two collaborative studies between the University of Rhode Island and Rhode Island DEM were published. The first of these was a growth study, which described molt increments for adult females and males and molting seasonality and molt probabilities for adult males in Rhode Island Sound. The second was an interview study in which fifteen in-person interviews were conducted with Jonah crab fishermen to collect their knowledge concerning Jonah crab biology and fishery characteristics. The interviews provided insight into aspects of the species biology and life history that have not been characterized in the literature (e.g., seasonal distribution patterns); identified topics requiring further study (e.g., stock structure and spawning seasonality); and highlighted predominant concerns related to fishery management (e.g., inshore-offshore fleet dynamics).

E. CFRF Research Fleet

The Commercial Fisheries Research Foundation (CFRF) has expanded their lobster commercial research fleet to sample Jonah crab. Biological data collected include carapace width, sex, shell hardness, egg status, and disposition. As of September 2020, 90,701 Jonah crabs have been sampled through the program.

8.0 State Compliance

All states except New York have implemented the provisions of the Jonah Crab FMP and associated addenda. The implementation deadline for the Jonah Crab FMP was June 1, 2016; the implementation deadline for Addendum I was January 1, 2017; the implementation deadline for Addendum II was January 1, 2018; and the implementation deadline for Addendum III was January 1, 2019 (with the exception of the 10 minute square reporting requirement).

- New York has not yet implemented the full suite of management measures required under the Jonah Crab FMP or Addendum I and II. New York crab legislation currently prohibits harvest of female crabs with eggs, limits recreational harvest to 50 crabs, establishes a 4.75" minimum carapace width, and establishes a 2.75" minimum claw length for harvest of claws only. Regulations to limit the directed trap fishery to lobster permit holders only and the 1,000 crab bycatch limit have not been implemented. New York will need to revise the crab legislation to require a lobster permit for the directed trap fishery and adopt regulations to allow a 1,000 crab daily bycatch to crab permit holders; it is unclear how long it will take to get the legislation revised. The state notes that NY has been seeing a decline in Jonah crab landings over time, and according to the

draft FMP, New York contributed to 0.8% of the coastwide Jonah crab landings in 2019. New York does currently have limited entry for crab licenses and a moratorium on the lobster license.

9.0 De Minimis Requests.

The states of Delaware, Maryland, and Virginia, have requested *de minimis* status. According to the Jonah crab FMP, states may qualify for *de minimis* status if, for the preceding three years for which data are available, their average commercial landings (by weight) constitute less than 1% of the average coastwide commercial catch. Delaware, Maryland, and Virginia meet the *de minimis* requirement.

10.0 Research Recommendations

The following research questions were compiled by the Jonah Crab TC and need to be answered in order to complete a coastwide stock assessment.

- ***Growth Rates*** – While there has been some research on Jonah crab growth rates, more studies are needed to determine growth rates along the entire coast. In particular, it is necessary to determine the molt frequency, molt increment, and if there is a terminal molt.
- ***Maturity and Reproduction –*** Studies are needed to determine the size at maturity of crabs in different regions, the size ratio of mating crabs, and sperm limitations.
- ***Migration –*** There are several tagging studies on-going in the Jonah crab fishery. Hopefully these studies will elucidate the migrations of Jonah crab as well as seasonal habitat preferences.
- ***Natural Mortality*** – An estimate of natural mortality must be developed for Jonah crab in order to carry out a stock assessment. In particular, it will be critical to determine the natural mortality of mature crabs.

11.0 Plan Review Team Recommendations

The following are recommendations from the Plan Review Team:

- The PRT recommends the Board approve the *de minimis* requests of DE, MD, and VA.
- The PRT raises concerns about the unimplemented Jonah crab regulations in NY, particularly the regulations to limit the directed trap fishery to lobster permit holders only and the 1,000 crab bycatch limit. Similar issues were raised in the 2018 and 2019 compliance reports and have not been addressed within the last year.
- The PRT notes that MA and CT have been unable to meet the August 1 deadline for compliance reports for the last several years.
- The PRT recommends that jurisdictions with crab-only fishermen report on the number of these fishermen, their collective number of traps fished, and the rules governing their fishing activity.
- The PRT recommends continued research of the Jonah crab species so that a coastwide stock assessment can be completed in the near future.
- The PRT recommends the LEC review compliance in the Jonah crab fishery, given it is a fairly new fishery management plan and lessons may be learned.

12.0 Tables

Table 1. Landings (in pounds) of Jonah crab by the states of Maine through Virginia. 2010-2018 landings were provided by ACCSP based on state data submissions. 2019 landings were submitted by the states (except for Massachusetts and Connecticut) as a part of the compliance reports and should be considered preliminary. *C= confidential data*

	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
2010	1,093,962	C	5,689,431	3,720,440	C	968,122	30,441		18,045	C	11,690,987
2011	1,096,592	C	5,379,792	3,213,119	C	69,440	26,909		92,401	C	9,947,027
2012	556,675	C	7,540,510	3,774,300	2,349	410,349	68,459		C	C	12,560,390
2013	379,073	340,751	10,109,590	4,651,796	51,462	371,675	C		C	C	16,075,597
2014	348,295	404,703	11,904,611	4,435,934	C	83,060	C		153,714	C	17,413,451
2015	312,063	C	9,128,876	4,298,894	C	207,424	68,116	C	39,750	C	14,253,340
2016	602,206	150,341	10,660,871	4,224,092	C	165,427	260,856	C	14,656	C	16,093,104
2017	1,042,807	113,354	11,698,342	4,111,281	C	158,231	433,132	C	23,564	C	17,594,243
2018	1,054,489	22,118	13,227,380	4,665,701	C	231,642	880,192	C	60,628	C	19,816,742
2019*	761,695	70,704	9,697,607	4,078,838	C	122,879	1,262,451	C	47,739	C	16,043,181

**2019 values for MA and CT were provided by ACCSP because they were not provided in the state compliance reports. All other 2019 landings were provided in state compliance reports.*

13.0 Figures

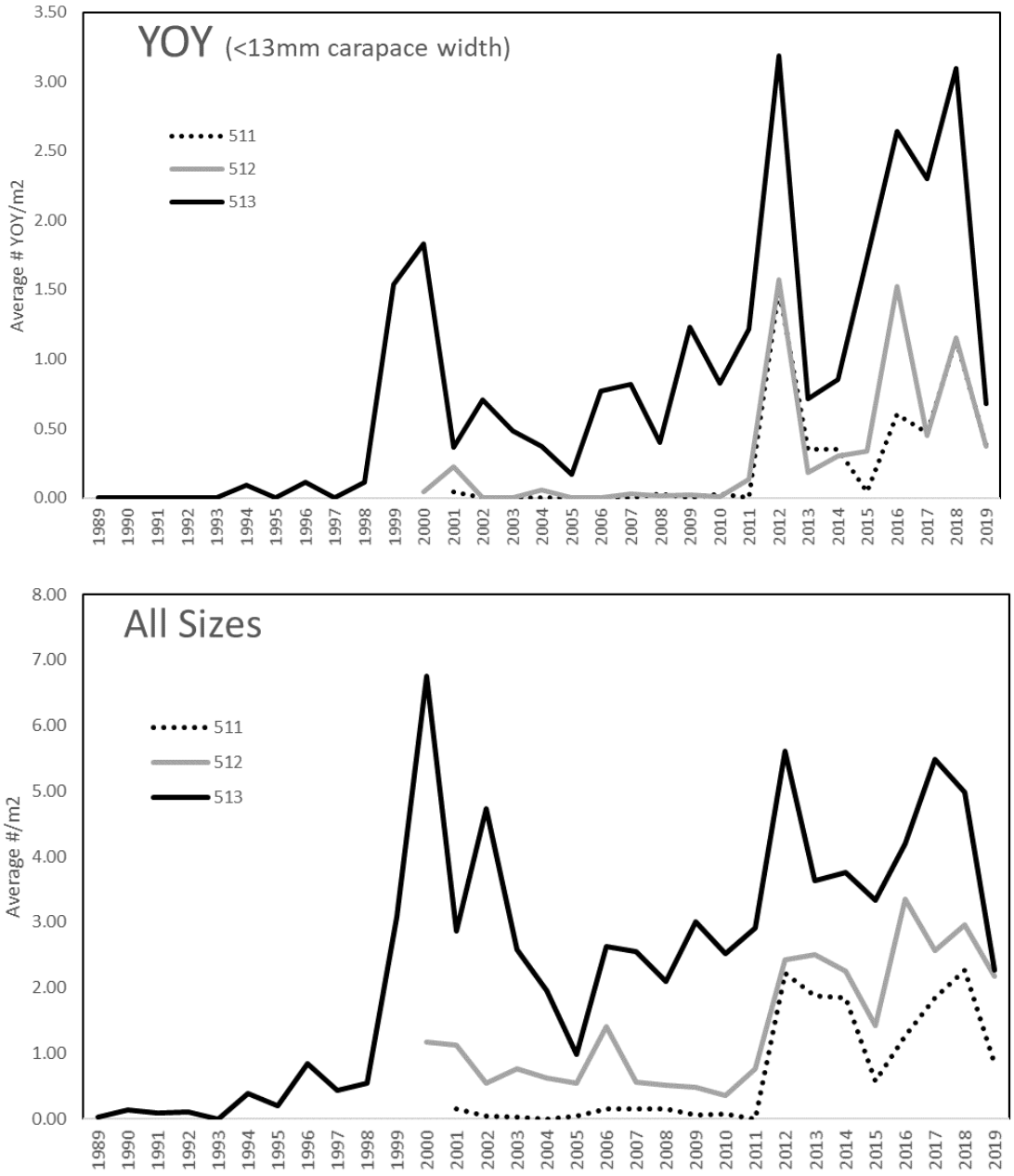

Figure 1: The density of Jonah crab measured over time in the Maine Settlement Survey by statistical area. The top graph shows the density of YOY Jonah crab (<13mm carapace width) and the bottom graph shows the density of all Jonah crab.

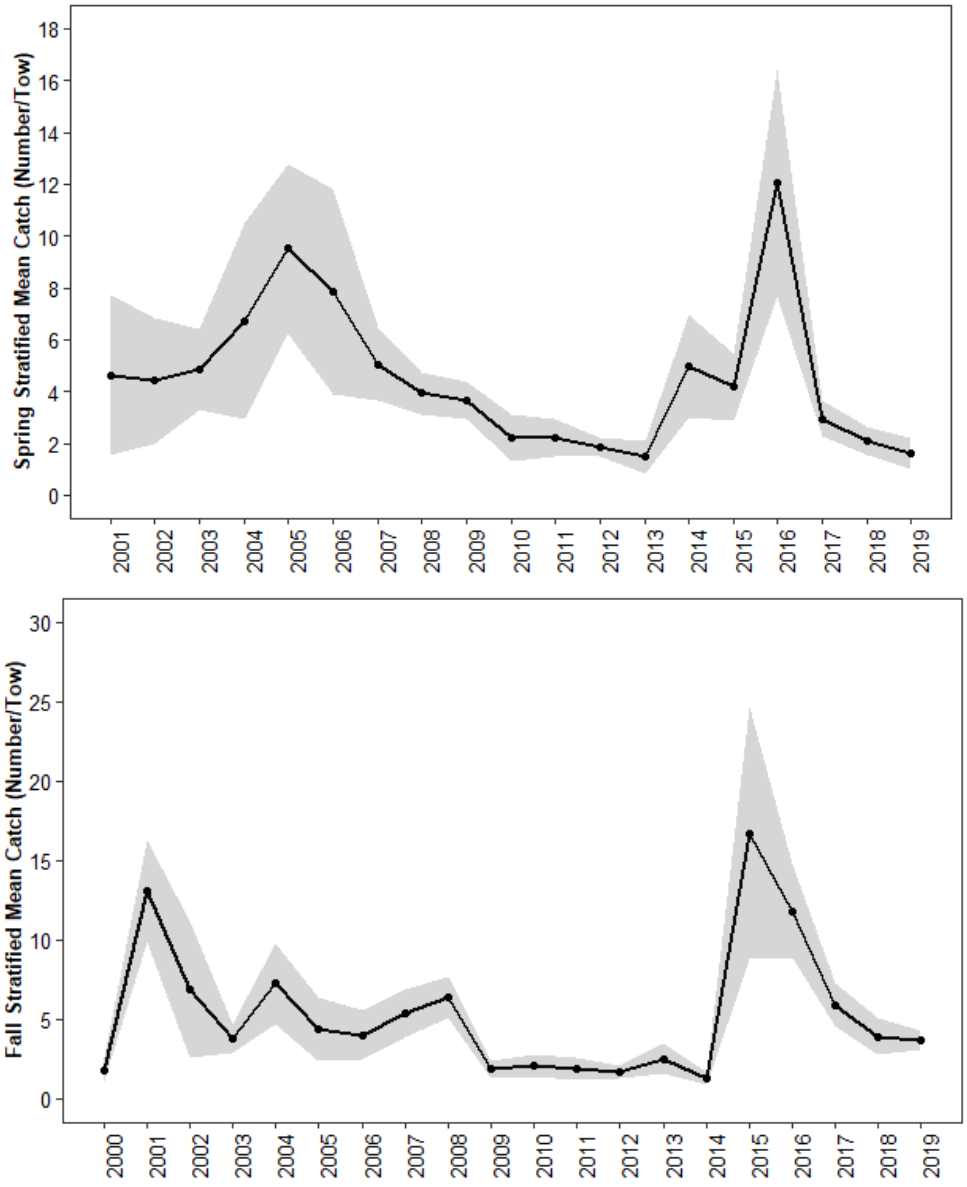

Figure 2: Maine-New Hampshire survey abundance indices for Jonah crab, 2001-2018. Results of the spring survey are on the top and results from the fall survey are on the bottom.

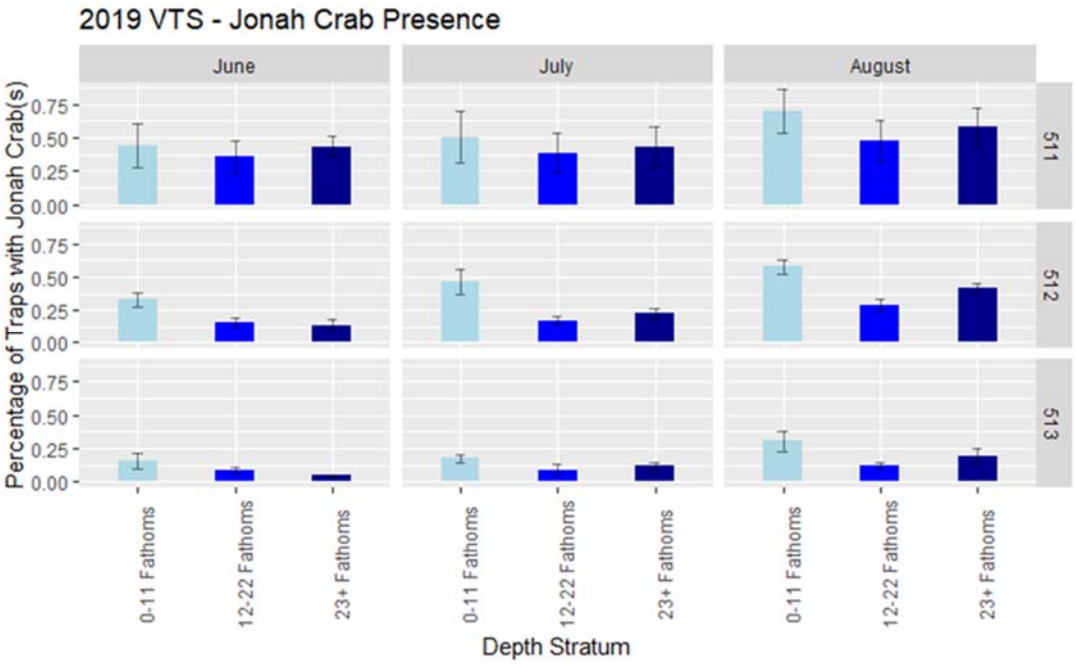

Figure 3: Jonah crab size frequency by sex from the 2018 Maine Ventless Trap Survey.

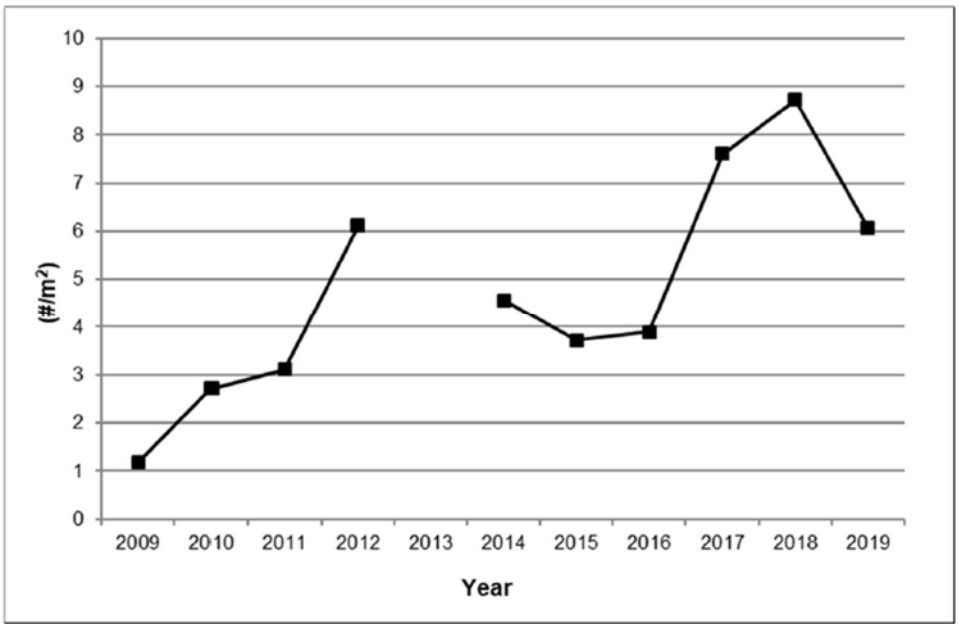

Figure 4: Catch per unit effort (#/m^2) of Jonah crab during the American Lobster Settlement Index Survey, in New Hampshire, from 2009 through 2018.

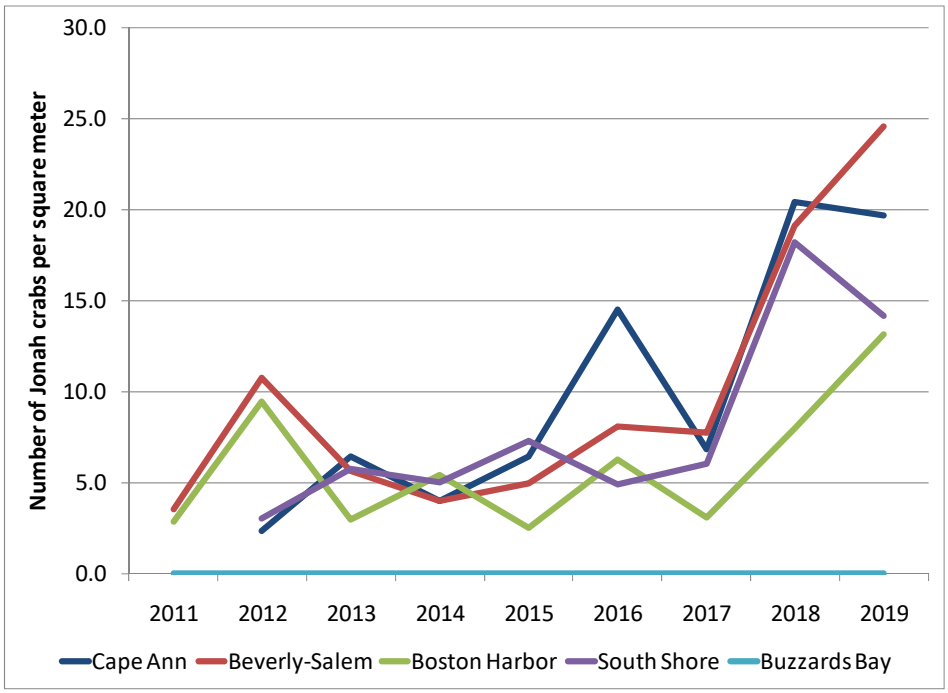

Figure 5: Number of Jonah crab per square meter from the MA DMF juvenile lobster suction survey. Cape Ann, Beverly/Salem, Boston Harbor, South Shore, and Cape Cod Bay are in NMFS statistical area 514; Buzzards Bay and Vineyard Sound are in statistical area 538.

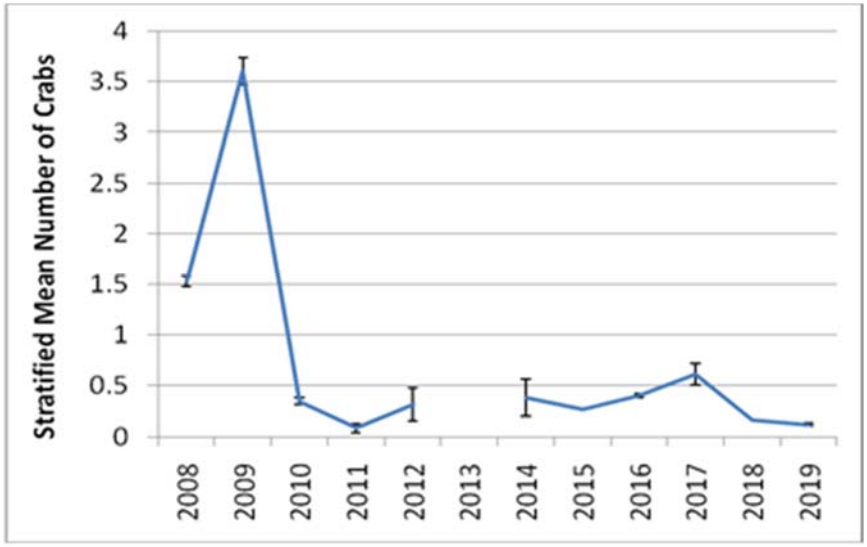

Figure 6. Number of Jonah crab per trawl haul from NMFS stat area 538 from the MA DMF Ventless Trap Survey. CPUE is standardized to a six pot trawl with three vented and three ventless traps. Error bars are ± two times the standard error. The survey did not occur in 2013.

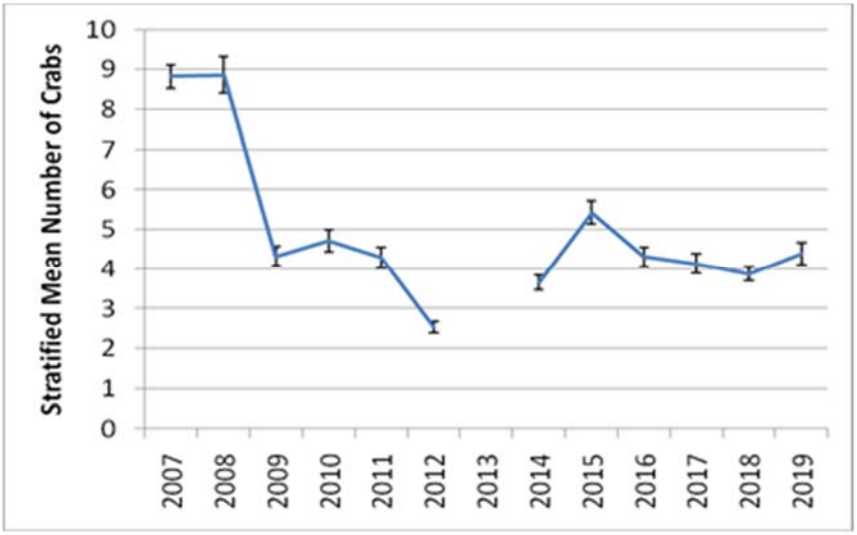

Figure 7. Number of Jonah crab per trawl haul from NMFS stat area 514 from the MA DMF Ventless Trap Survey. CPUE is standardized to a six pot trawl with three vented and three ventless traps. Error bars are ± two times the standard error. The survey did not occur in 2013.

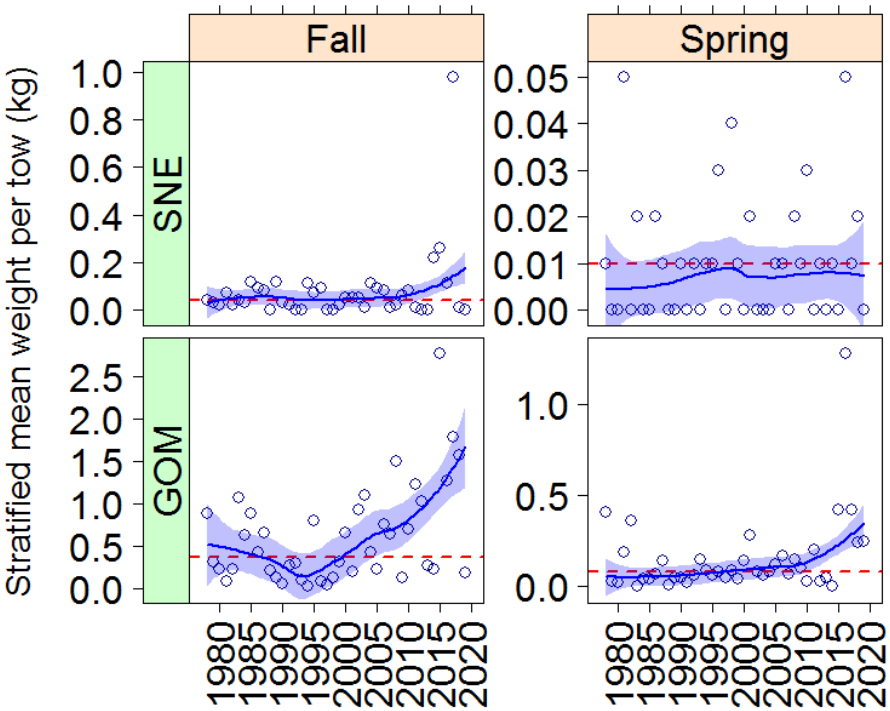

Figure 8. Bootstrapped Jonah crab mean weight (kg) per tow from the DMF bottom trawl survey by season and region. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to outliers at the end of the time-series. Blue shaded area is an approximate 95% confidence interval for the fit.

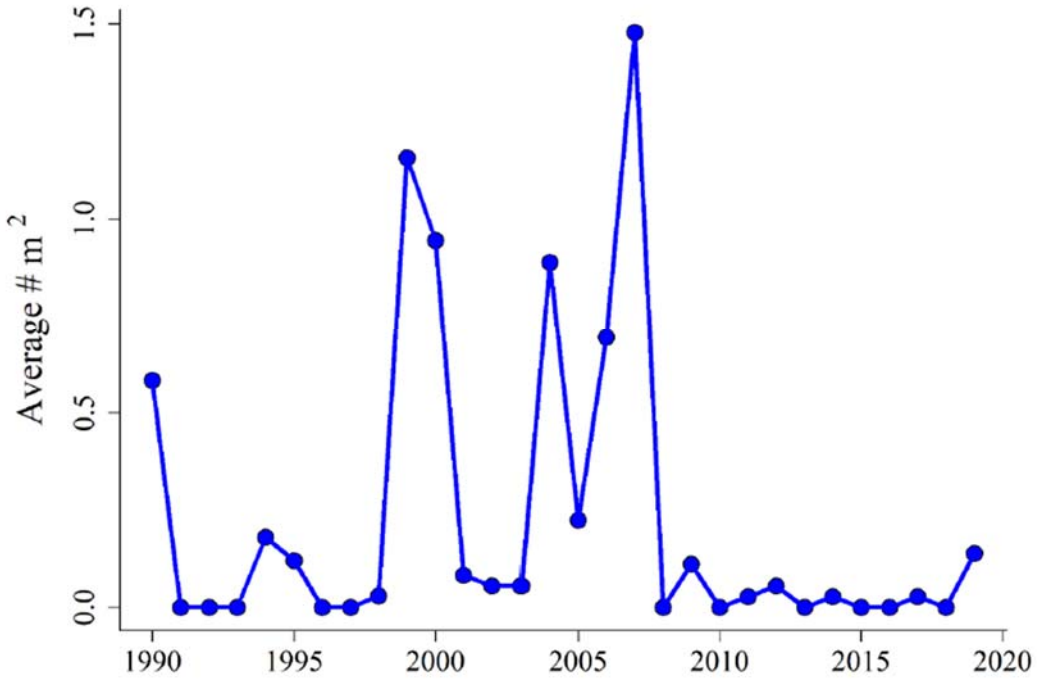

Figure 9. Rhode Island YOY Settlement Survey trend for all Jonah crabs caught.

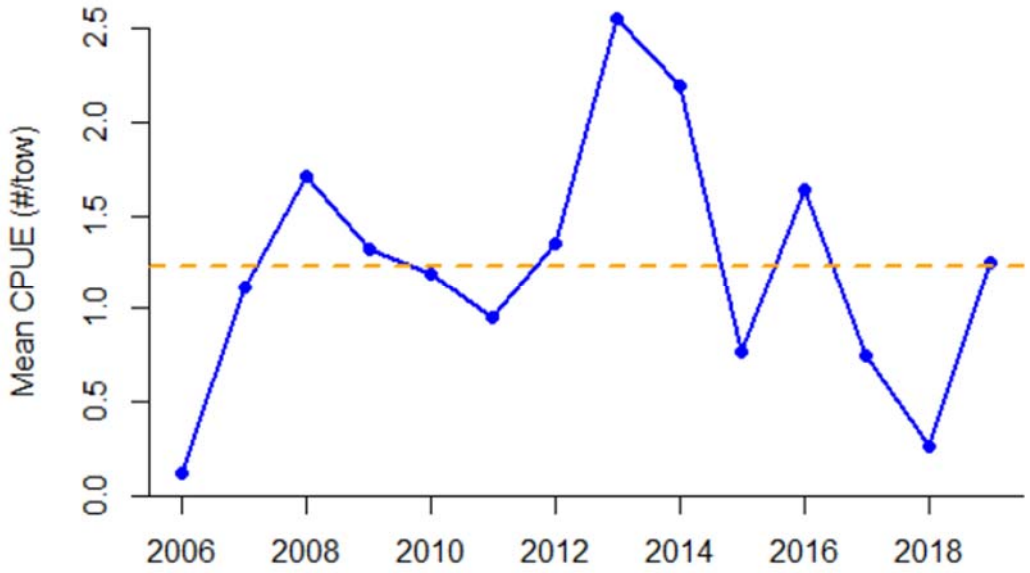

Figure 10. Average number of Jonah crabs caught per ventless trap in RI DMF's ventless trap survey, 2006-2019.

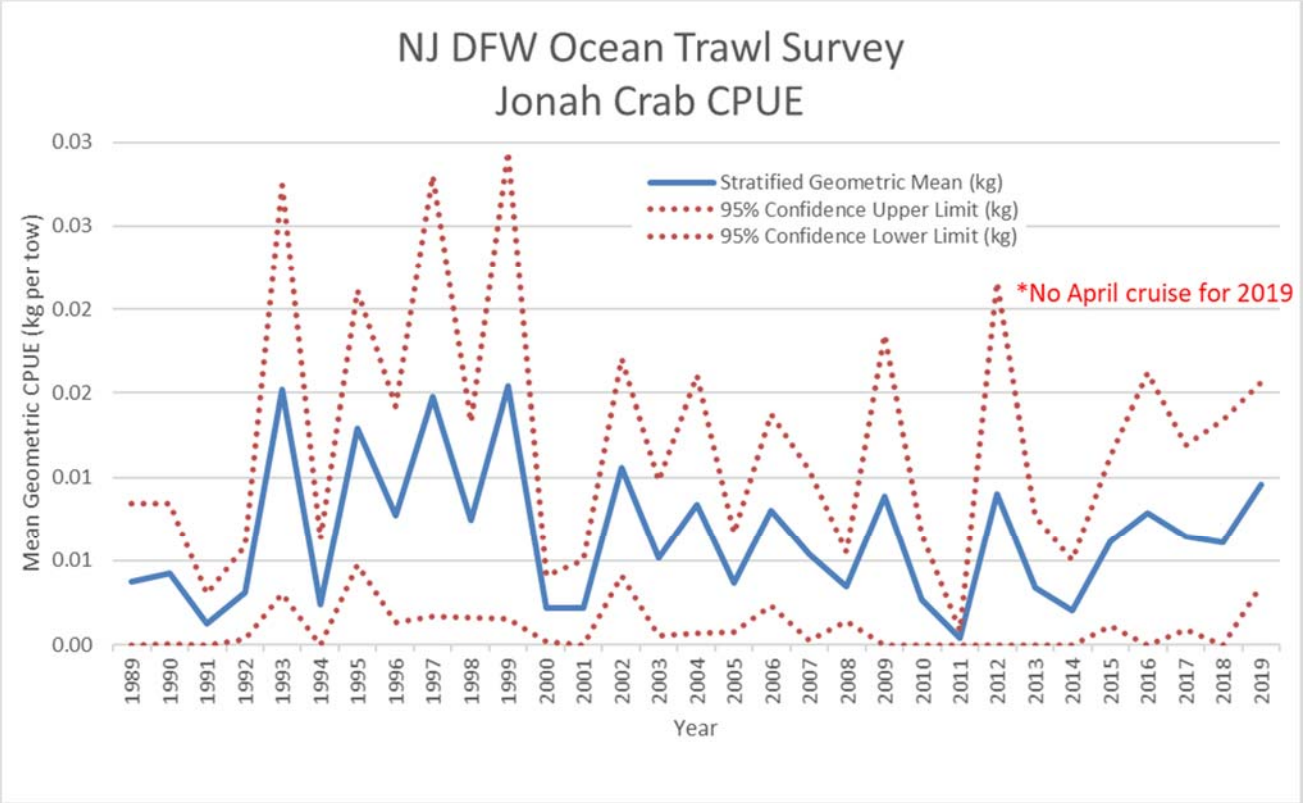

Figure 11. Stratified mean CPUE of all Jonah crab collected aboard the NJDFW Ocean Trawl Survey. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE was calculated as the sum of the mean weight (in kg) of Jonah crab per size class collected in each sampling area weighted by the stratum area.

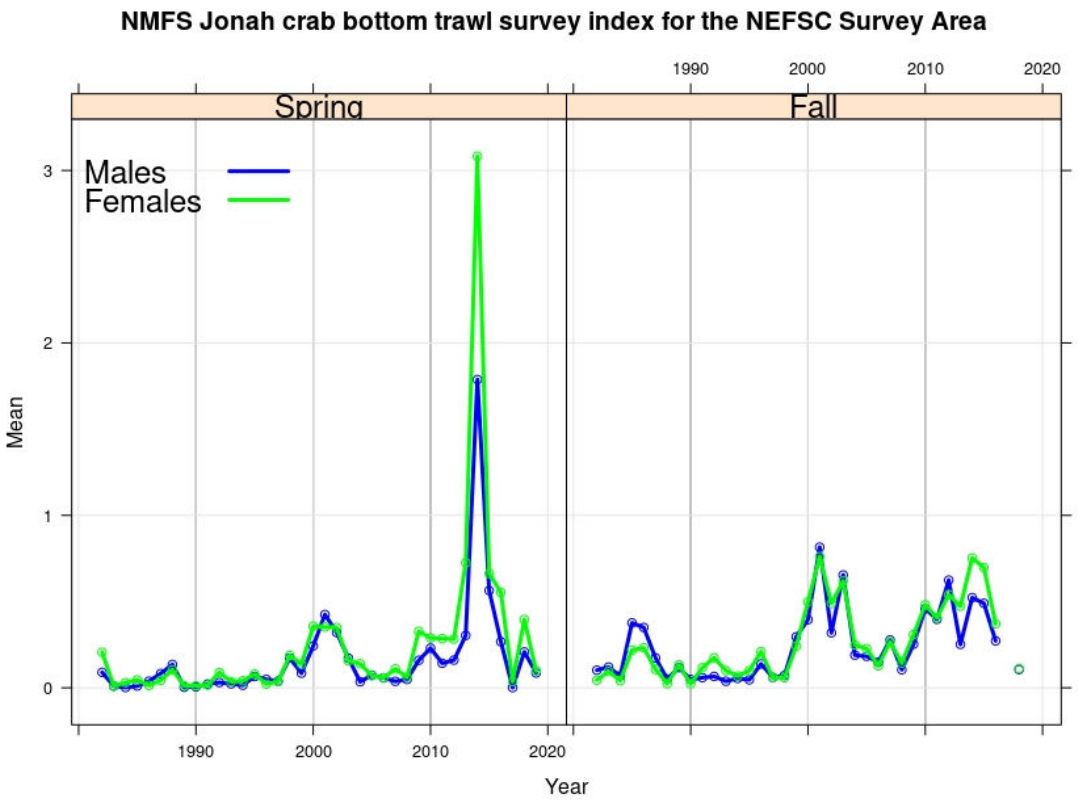

Figure 12. NMFS Jonah Crab index (mean number per tow) from the bottom trawl survey for the NEFSC Survey Area, through spring 2019.