ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR AMERICAN LOBSTER
(*Homarus americanus*)

2016 FISHING YEAR

Prepared by the Plan Review Team

Approved by the American Lobster Management Board
October 2017

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This document covers fishery activities in 2016 as well as trap reductions which took place ahead of the 2017 fishing year.

1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption:	Amendment 3 (1997)
Framework Adjustments:	Addendum I (1999) Addendum II (2001) Addendum III (2002) Addendum IV (2003) Addendum V (2004) Addendum VI (2005) Addendum VII (2005) Addendum VIII (2006) Addendum IX (2006) Addendum X (2007) Addendum XI (2007) Addendum XII (2008) Addendum XIII (2008) Addendum XIV (2009) Addendum XV (2009) Addendum XVI (2010) Addendum XVII (2012) Addendum XVIII (2012) Addendum XIX (2013) Addendum XX (2013) Addendum XXI (2013) Addendum XXII (2013) Addendum XXIII (2014) Addendum XXIV (2015)
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

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, reaching 92 million pounds in 2006. Landings have continued to increase over the last decade, reaching a high of 158 million pounds in 2016 (Table 1). The largest contributors to the 2016 fishery were Maine and Massachusetts with 83% and 11% of landings, respectively. Landings, in descending order, also occurred in New Hampshire, Rhode Island, New Jersey, Connecticut, New York, Maryland, Delaware, and Virginia. The ex-vessel value for all lobster landings in 2016 was $666.7 million, the highest value on record for the American lobster fishery.

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 2016, approximately 2.1% of coastwide landings came from the SNE stock.

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 2016, New Hampshire reported 8,281 pounds of lobster harvested recreationally, representing 0.14% of total landings in the state. New York reported 2,433 pounds of lobster harvested recreationally in 2016, representing 1.1% of state landings. Massachusetts reported the highest value of recreational catch at 212,112 pounds, representing 1.17% of total state landings. This was harvested through traps and by hand while diving. Connecticut and Rhode Island do not collect information on the number of pounds recreationally harvested but did issue 254 and 532 recreational lobster licenses, respectively.

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, population indicators show young-of-year estimates are trending downward. This indicates 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 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.

The next stock assessment is scheduled for 2020.

4.0 Status of Management Measure

4.1 Implemented Regulations

Amendment 3 established regulations which require coastwide and area specific measures applicable to commercial fishing (Table 4). The coastwide requirements are summarized below.

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.

Amendment 3 to the Interstate Fishery Management Plan for American Lobster (December 1997)

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.

4.2 On-Going Management Action

In May 2016, the Board initiated draft Addendum XXV to address the poor condition of the SNE stock by lowering fishing mortality and increasing egg production. At their May 2017 meeting, the Board approved a 5% increase in egg production, to be achieved through gauge size changes, season closures, and trap reductions, and tasked the LCMTs with developing proposals. At the August 2017 meeting, the Board decided not to move forward with Addendum XXV for management use at the current time. After reviewing TC input, which found only one out of the five proposals put forth by the LCMTs to be sufficient to achieve the 5% increase in egg production, the Board decided not to approve the Draft Addendum. Some members felt the proposed measures did not go far enough to protect the stock, while others were concerned the majority of LCMT proposals would not achieve the required 5% increase in egg production. Others believed significant reductions have already occurred in the fishery and no further action was needed. Ultimately, the Board decided to establish a Workgroup to discuss ways to manage SNE lobster in light of changing environmental conditions. Discussions by the workgroup, and subsequent recommendations to the Board, will occur this fall.

At its January 2017 meeting, the Board initiated Draft Addendum XXVI to improve harvester reporting and biological data collection in state and federal waters. This was prompted by recent management action in the Northwest Atlantic which highlighted several data deficiencies in the lobster fishery, including the poor spatial resolution of harvester data, the fact that not all lobstermen are required to report landings, and the lack of biological data collected offshore. The PDT continues to develop the management alternatives for this addendum and is expected to present a draft document to the Board in late 2017.

In response to signs of reduced settlement in the GOM/GBK stock, the Board initiated Draft Addendum XXVII in August 2017 to increase the resiliency of the stock. To this end, the Draft Addendum considers the standardization management measures in the GOM/GBK stock. A draft of Addendum XXVII will be developed over the coming months and be considered for public comment in 2018.

5.0 Ongoing Trap Reductions

Addendum XVIII established trap reductions in LCMA 2 and 3. The intention of this Addendum was to scale the size of the SNE fishery to the size of the resource by prescribing a series of trap reductions in LCMAs 2 and 3. Specifically, a 25% reduction in year 1 followed by a series of 5% reductions for 5 years were established in LCMA 2; a series of 5% reductions over five years were established in LCMA 3. The second year of reductions took place at the end of the 2016 fishing year and affect trap allocations in the 2017 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. In total, 6,781 traps were retired in Area 2 and 8,008 traps were retired in Area 3. Trap reductions by jurisdiction 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 partial business transfers.

6.0 Fishery Monitoring

Addendum X requires states to conduct sufficient biological sampling to characterize commercial catch. Specifically, it requires states weight sampling intensity by area and season to match the 3-year average of the area's seasonal commercial catch. This volume of sampling, however, well exceeds current state budgets for lobster biological sampling. Addendum X also requires states to conduct 100% mandatory dealer reporting and at least 10% reporting of active harvesters. Table 6 describes the level of reporting and sampling by each state.

Overviews of the states' port and sea sampling are below. Several states, including Rhode Island and Connecticut, did not complete sea sampling trips in 2017; however, both states noted staffing limitation and budget constraints. In particular, Connecticut noted an attrition in the staff at CT Marine Fisheries Program without the ability to fill these vacancies. A couple states commented that there are issues identifying fishermen for sea sampling trips. This is in part due to a decrease in the number of active fishermen in SNE, and in part due to a lack of cooperation on the part of fishermen to take state samplers out on their boats. States reported that fishermen are wary of the management implications of participating in sea sampling programs, making it difficult to identify fishermen for this program.

- Maine: Completed 168 sea sampling trips aboard 146 boats from 65 different ports. In total, 237,525 lobsters were sampled from 37,241 traps. Maine suspended its port sampling program following the 2011 sampling year.
- New Hampshire: Sampled 9,564 lobsters during 20 sea sampling trips and 1,200 lobsters through 12 port sampling trips.
- Massachusetts: Conducted a total of 71 sea sampling trips and 45,130 lobsters in LCMA's 1, 2, and OCC. No port sampling was conducted.
- Rhode Island: Conducted 6 port sampling trips and sampled 1,167 lobsters. No sea sampling was conducted by the state due to staffing and budget constraints.
- Connecticut: No sea sampling or port sampling trips were conducted in 2016.
- New York: Staff conducted 10 sea sampling trips in 2016 and sampled 1,693 lobsters. NY also inspected 2 vessels through port sampling and sampled 355 lobsters. In addition, the state conducted 9 market sampling trips, evaluating 282 lobsters.
- New Jersey: Conducted 5 sea sampling trips and sampled 3,710 lobsters.
- Delaware: No sea sampling or port sampling trips were conducted in 2016.
- Maryland: Conducted 2 sea sampling trips and sampled 542 lobsters.
- Virginia: No sea sampling or port sampling trips were conducted in 2016.

7.0 Status of Surveys

Addendum X 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. *De minimis* states are not required to conduct biological sampling of their lobster fishery.

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 122 tows and sampled 30,041 lobsters. Spring survey abundance indices increased from 2015, particularly in statistical area 513 and 511. The fall survey completed 83 tows and sampled 24,835 lobsters. Fall survey abundance indices slightly decreased from 2015, with the exception of sublegal lobsters in statistical area 511 which increased (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. In the GOM, relative abundance indices have generally increased over the last decade. In contrast, relative abundance indices in SNE remain low with the most recent values near or below the time series median (Figure 3).

Rhode Island: The RIDFW Trawl Survey program conducted seasonal surveys in the spring and fall. In 2016, 44 trawls were conducted in both the spring and fall. Spring 2016 mean CPUEs were 0 and 0.14 for legal and sub-legal lobsters, respectively. Fall 2016 CPUE were 0.05 for legal lobsters and 1.00 for sub-legal lobsters. All abundances were low except for the fall sub-legal abundance which showed a slight increase in 2015 and 2016 (Figure 4).

Connecticut and New York: Juvenile and adult abundance are monitored through the Long Island Sound Trawl Survey (LISTS) during the spring (April, May, June) and the fall (September and October) cruises. The spring 2016 lobster abundance index (geometric mean = 0.33 lobster/tow) was the second lowest in the time series but similar to the 2013-15 indices (0.44, 0.45, 0.31, respectively). The fall 2016 index (0.02) ranked lowest in the time series, joining all indices since 2005 as collectively the lowest in the 33-year time series (Figure 5).

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 2015 to 2016 for all three size classes (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: In 2000, settlement surveys were expanded to cover all seven of Maine's lobster management zones (LMZ) in order to create a statewide index of settlement. Settlement

surveys in 2016 continued to show low values in all statistical areas sampled (Figure 7). Survey index values were below the average in all statistical areas.

New Hampshire: New Hampshire Fish and Game (NHF&G) conducted a portion of the coastwide American Lobster Settlement Index (ALSI). In 2016, a total of 20 juvenile lobsters were sampled from three sites, 19 of which were deemed older juveniles and one which was a YOY. Figure 8 depicts the CPUE of lobsters for all NH sites combined, from 2008 through 2016. 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 2016.

Massachusetts: Annual sampling for early benthic phase/juvenile (EBP) lobsters was conducted from August to September in 2015. Sampling was completed at 21 sites spanning 7 regions in Massachusetts coastal waters. Data for all sites were used to generate annual density estimates of EBP lobster and other decapod crustaceans. In 2016, densities of YOY lobsters were relatively low compared to the time series average in all sampling location (Figure 9). In LCMA 1, there were no YOY lobsters found in two of the five locations (South Shore and Cape Cod Bay). In 2016, there were no YOY lobsters found in the Vineyard Sound sampling location.

Rhode Island: For 2016, the YOY Settlement Survey (Suction Sampling) was conducted at a total of six fixed stations with twelve randomly selected 0.5-meter quadrats sampled at each survey station. Average site abundance of lobster at suction sampling sites has generally declined since the mid-1990's with a time-series low in 2011 (Figure 10). The 2016 YOY settlement survey index was 0.31 YOY lobster/m^2.

Connecticut: The CT DEEP Larval Lobster Survey in western Long Island Sound (WLIS) was discontinued in 2013. Alternative monitoring data are available for the eastern Sound (ELIS) from the Millstone Power Station entrainment estimates of all stages of lobster larvae. Both programs show a decline in abundance following the 1999 die-off (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 and 2016 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 survey catches 90% sub-legal lobsters. The stratified mean was calculated for each area using depth and statistical area. Overall, there were increases the number of sub-legal and legal lobsters caught in 2016, compared to the previous year (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 six sites were surveyed twice a month from June through September in 2016. Catch per unit effort (stratified mean catch per trap haul) from 2009 through 2016 is presented in Figure 13. The highest catch values of the time series were recorded in 2015 and 2016.

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 mean CPUE in 2016 was the second highest observed at 6.44 and was above the time series average of 4.99. Legal sized lobsters comprised roughly 10% of catch over the survey's time series.

Figures 15 and 16 show 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 and northern Area 537; part of LCMA 2). The average catch of sub-legal lobsters was higher than the catch of legal-sized lobsters, and generally declined from 2006 through 2010 (the original time series). The spatial extent of the survey area was expanded in 2011 to include deeper waters outside Buzzards Bay, where thermal conditions are more tolerable. This expansion in survey area necessitates that the data from 2011 onwards be treated as a new survey index. In 2016, sublegal CPUE in the original survey area rebounded from low values in 2014 and 2015 and was above the time series average (Figure 15). The CPUE of legal sized lobsters also increased in 2016 and was the highest observed in the time series at 0.50. In the expanded survey area, the CPUE of sub-legal lobsters was the highest observed in the 5-year time series at 3.0 (Figure 16). The CPUE of legal sized lobsters was also the highest observed in the time series at 0.67.

Rhode Island: In 2016, the Ventless Trap Survey was conducted during the months of June-August over 18 sampling sites. A total of 3,482 lobsters were collected from 830 traps. All sampling was conducted in LCMA 2, NMFS Statistical Area 539. In general, the CPUE of sub-legal lobsters has increased since 2014 while the CPUE of legal lobsters has remained steady since 2010. The mean CPUE Index values for 2016 were 0.24 and 3.04 per trap for legal and sub-legal lobsters, respectively (Figure 17).

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 Connecticut and Rhode Island did not conduct any sea sampling, as specified in Addendum X. Both states noted staffing and budget constraints as contributors to the lack of sampling.

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 made the following changes to lobster regulations in 2016

- Based on a referendum of Chebeague Island lobster license holders and a recommendation from the island limited entry committee, Maine DMR adopted regulations to remove Chebeague Island from the island limited entry program.
- Based on a referendum of Swans Island lobster license holders and a recommendation from the interim island limited entry committee, Maine DMR adopted regulations to add Swans Island to the island limited entry program, with a base number of licenses of 72.
- DMR adopted regulations to require any individuals fishing in a zone other than their declared zone to have a secondary tag in their trap for the purpose of enforcing the requirement to fish a majority of their traps in their declared zone.
- DMR adopted regulations to expand the existing lobster and crab harvesting closure in the Penobscot River in order to protect public health due to the risk of mercury contamination.
- Statutes were amended to modify the entry system for lobster licenses to provide additional time for students to convert to a commercial lobster license, and improve the methodology by which the calculation for entry off the waiting lists in limited entry zones is conducted.

Massachusetts DMF made the following amendments to its lobster related regulations:

- Amended 322 CMR 4.00 and 12.00 to adopt the relevant provisions of the Atlantic Large Whale Take Reduction Plan (as amended in 2015).
- Amended 322 CMR 6.00 to prohibit the on-the-water possession and setting of non-trap structures designed to attract lobsters.
- Amended 322 CMR 6.00 to implement the LMA2 trap reduction schedule.
- Amended 322 CMR 7.00 to allow the transfer of offshore lobster trap permits with a federal trap allocation.
- Amended 322 CMR 7.00 to allow the issuance of new offshore lobster trap permits for LMA2 provided an existing federal lobster trap allocation is held.

11.0 Enforcement Concerns

- Maine Marine Patrol continues to look for solutions to fishermen utilizing untagged sunken trawls in an effort to exceed the trap limit and stop Patrol from inspecting gear at sea.
- MA took action to suspend a commercial lobster permit for 3 months due to violations of the size limit, v-notch, and egger rules. A commercial lobster permit was also revoked

due to theft and molestation of lobster gear owner by another individual, violation of protected species regulations (weak links), and improperly marked fishing buoys.

- RI noted concerns about the ability for enforcement to determine whether lobsters came from a lobster trap associated with a lobster trap allocation, or a trap targeting a different fishery (e.g. rock crab, black sea bass) operated by an individual with a lobster trap allocation.
- NY noted several enforcement challenges that occurred in 2016, including fishermen having traps in the water during a season closure, traps which have no trap tags, have multiple undersized vents, or inoperable escape panels, and several cases of undersized lobsters.

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

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

- The PRT recommends the Board approve the *de minimis* requests of DE, MD, and VA.
- The PRT notes an increase in the number of enforcement concerns reported by the states in their compliance reports. The PRT recommends improved enforcement of lobster management measures, especially the at-sea enforcement of trap limits. For areas which rely on permit specific trap limits as the primary metric for management, marine patrol enforcement needs to have a greater presence, particularly as trap reductions take place in LCMAs 2 and 3. In addition, greater enforcement efforts need to be directed offshore.
- The PRT recommends increased biological sampling, particularly offshore, as the spatial distribution of the fishery changes.
- The PRT recommends research is conducted to update growth and maturity data. 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 the Board investigate the best way to quantify 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 (whether than be through the number of permits, trap allocations, or trap hauls) will provide the Board with much needed information regarding fishery trends, particularly as stock conditions change in the GOM/GBK and SNE.
- In addition to the tagging studies noted above by the TC and SASC, the PRT recommends investigating the connectivity between the offshore portion of SNE and GBK. Catch in the offshore portion of SNE had remained fairly stable and may indicate some biological relationship with GBK.

14.0 Tables

Table 1. Landings (in pounds) of American Lobster by the states of Maine through Virginia.
C= confidential data

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
1981	22,631,600	793,400	11,220,500	1,871,067	1,010,800	890,200	593,700	55,700	63,200	2,200	39,132,367
1982	22,730,100	807,400	13,150,900	2,254,930	1,094,100	1,121,600	846,300	90,700	64,800	4,700	42,165,530
1983	21,976,500	1,310,560	12,421,000	5,020,895	1,854,000	1,207,500	769,900	56,700	86,500	600	44,704,155
1984	19,545,600	1,570,724	14,701,800	5,064,760	2,011,600	1,308,100	927,700	103,800	98,900	17,400	45,350,384
1985	20,125,000	1,193,881	16,295,100	5,080,163	1,676,000	1,240,900	1,079,600	118,500	82,300	1,100	46,892,544
1986	19,704,400	941,100	15,057,600	5,513,831	1,656,100	1,407,100	1,123,000	109,000	57,700	1,000	45,570,831
1987	19,747,800	1,256,170	15,116,800	5,217,300	1,735,591	1,146,700	1,397,100	84,100	49,900	1,000	45,752,461
1988	21,738,800	1,118,900	15,866,312	4,758,990	2,053,800	1,779,890	1,557,300	66,200	23,000	300	48,963,492
1989	23,368,800	1,430,400	15,444,300	5,725,641	2,096,900	2,345,051	2,059,600	76,500	17,500		52,564,692
1990	28,068,238	1,658,200	17,054,434	7,258,175	2,645,800	3,431,111	2,198,867	68,300			62,383,125
1991	30,788,646	1,802,035	16,528,168	7,445,170	2,674,000	3,128,246	1,673,031	54,700			64,093,996
1992	26,830,448	1,529,292	15,823,077	6,763,085	2,439,600	2,651,067	1,213,255	21,000			57,270,824
1993	29,926,464	1,693,347	14,336,032	6,230,855	2,177,022	2,667,107	906,498	24,000			57,961,325
1994	38,948,867	1,650,751	16,094,226	6,474,399	2,212,000	3,954,634	581,396	8,400			69,924,673
1995	37,208,324	1,834,794	15,755,840	5,363,810	2,536,177	6,653,780	606,011	500	2,855		69,962,091
1996	36,083,443	1,632,829	15,323,277	5,579,874	2,888,683	9,408,519	640,198		28,726	1,252	71,586,801
1997	47,023,271	1,414,133	15,087,096	5,766,534	3,468,051	8,878,395	858,426	648	34,208	2,240	82,533,002
1998	47,036,836	1,194,653	13,277,409	5,618,440	3,715,310	7,896,803	721,811			1,306	79,462,568
1999	53,494,418	1,380,360	15,533,654	8,155,947	2,595,764	6,452,472	931,064			6,916	88,550,595
2000	57,215,406	1,709,746	15,802,888	6,907,504	1,393,565	2,883,468	891,183			311	86,804,071
2001	48,617,693	2,027,725	12,132,807	4,452,358	1,329,707	2,052,741	579,753			19	71,192,803
2002	63,625,745	2,029,887	12,853,380	3,835,050	1,067,121	1,440,483	264,425	551			83,087,146
2003	54,970,948	1,958,817	11,385,049	3,474,509	671,119	946,449	209,956	2,831	22,778		71,683,639
2004	71,574,344	2,097,396	11,295,474	3,064,412	646,994	996,109	370,112	15,172	14,931	13	90,074,957
2005	68,729,861	2,556,232	9,879,983	4,343,736	713,901	1,154,470	369,264	5,672	39,237	21,255	87,813,611
2006	72,662,294	2,666,344	10,966,322	3,749,432	792,894	1,242,601	470,877	3,315	26,349	28,160	92,608,588
2007	63,959,191	2,468,811	10,143,301	3,268,075	568,696	716,300	680,392	5,918	6,128	26,765	81,843,577
2008	69,863,132	2,567,031	10,597,614	3,528,445	426,292	712,075	632,545	4,884	32,429	17,701	88,382,148
2009	81,175,847	2,985,166	11,781,490	3,174,618	451,156	731,811	179,740	6,067	30,988	21,472	100,538,355
2010	95,506,383	3,658,894	12,768,448	3,258,221	432,491	813,513	641,556	4,574	30,005	16,345	117,130,430
2011	104,693,316	3,917,461	13,717,192	2,513,255	191,594	344,232	627,077	C	C	C	126,066,050
2012	125,759,424	4,236,740	14,917,238	2,932,388	236,846	275,220	919,260	C	C	C	149,336,623
2013	127,773,264	3,822,844	15,738,792	2,149,266	133,008	248,267	660,367	C	C	C	150,621,935
2014	124,440,799	4,939,310	15,060,352	2,387,321	141,988	216,630	526,367	C	C	C	147,805,965
2015	122,212,133	4,716,084	16,418,796	2,879,874	158,354	146,624	445,195	C	C	C	147,037,850
2016	130,844,773	5,773,909	17,939,236	2,259,876	226,426	218,355	352,085	C	C	C	157,672,465

Table 2. Estimated lobster landings (in pounds) by lobster conservation management area (LCMA)* (*Source, ASMFC Lobster Data Warehouse*). This table can only be update in years when stock assessment reports are being 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 Megan Ware, at mware@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. 2016 LCMA specific management measures

Mgmt 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 allocations, transfers, and reductions as required by Addendum XVIII for LCMA 2 and 3 fishermen. Trap reductions for MA, RI, and CT in LCMA 2 include state, federal, and dual permit holders. Number of traps retired includes traps retired due to the 10% conservation tax on trap transfers.

	Jurisdiction	# of Trap Allocated (For 2017 Fishing Year)	# of Traps Transferred	# of Traps Retired (from 2016 to 2017 Fishing Year)
LCMA 2	**MA**	33,730	2,126 (traps transferred to MA) 1,140 (traps transferred out of MA)	1,746
	RI	83,259	1,748	4,562
	CT	3,935	0	238
	NOAA (ME, NH, NY, NJ)	3,345		235
LCMA 3	**NOAA**	128,910	10,485	8,008

Table 6. 2016 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	✓	✓	✓	✓	✓	✓	✓ (w/ ME)
MA	✓	✓	✓		✓	✓	✓
RI	✓	✓	None in 2016	✓	✓	✓	✓
CT	✓	✓	None in 2016			✓	✓
NY	✓	✓	✓	✓			✓ (w/ CT)
NJ	✓	✓	✓				✓
DE*	✓	✓	None in 2016				✓ (no lobsters encountered)
MD*	✓	✓	✓				✓
VA*	✓	✓	None in 2016				

15.0 Figures

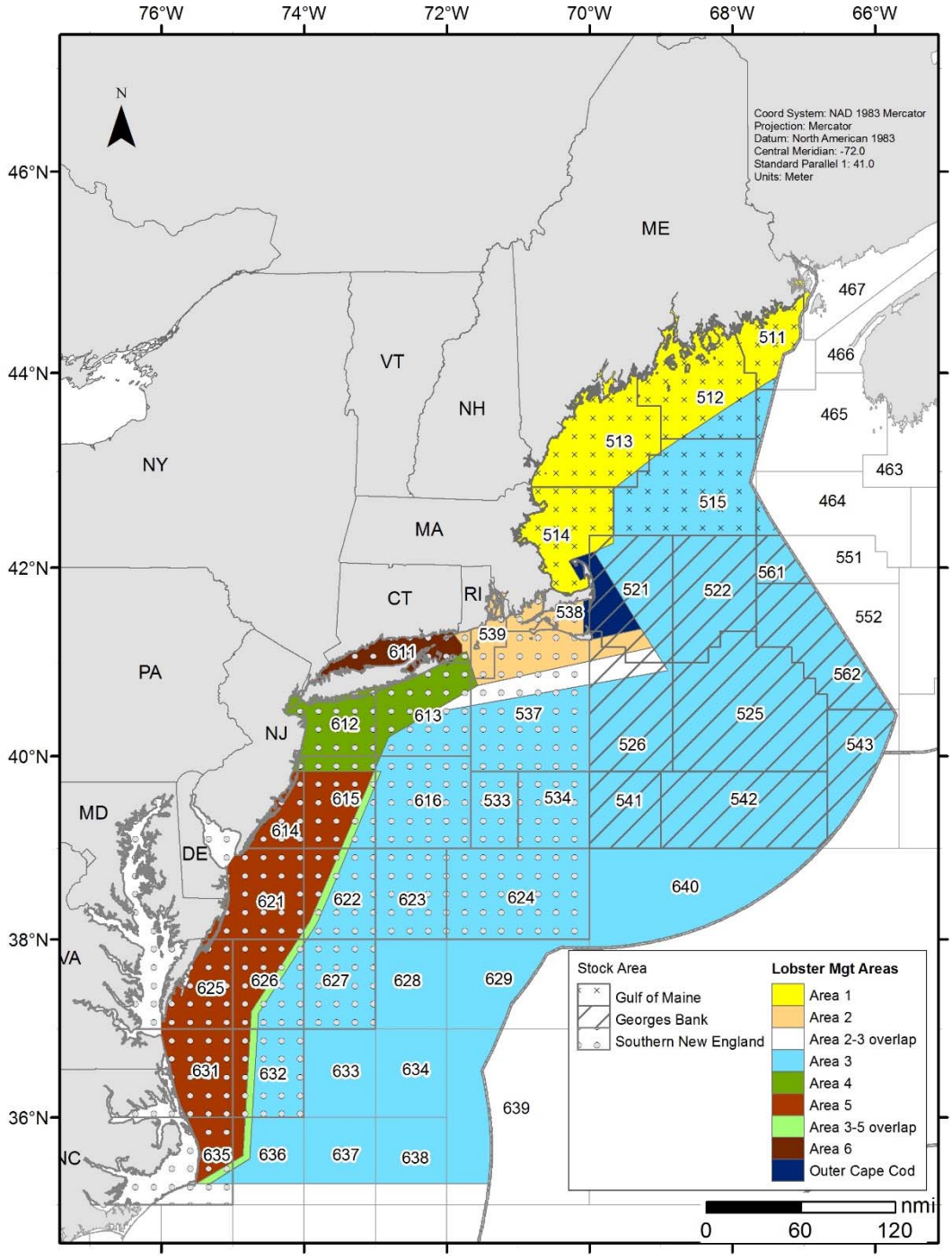

Figure 1: Lobster Conservation Management Areas (LCMAs) and stock boundaries for American lobster.

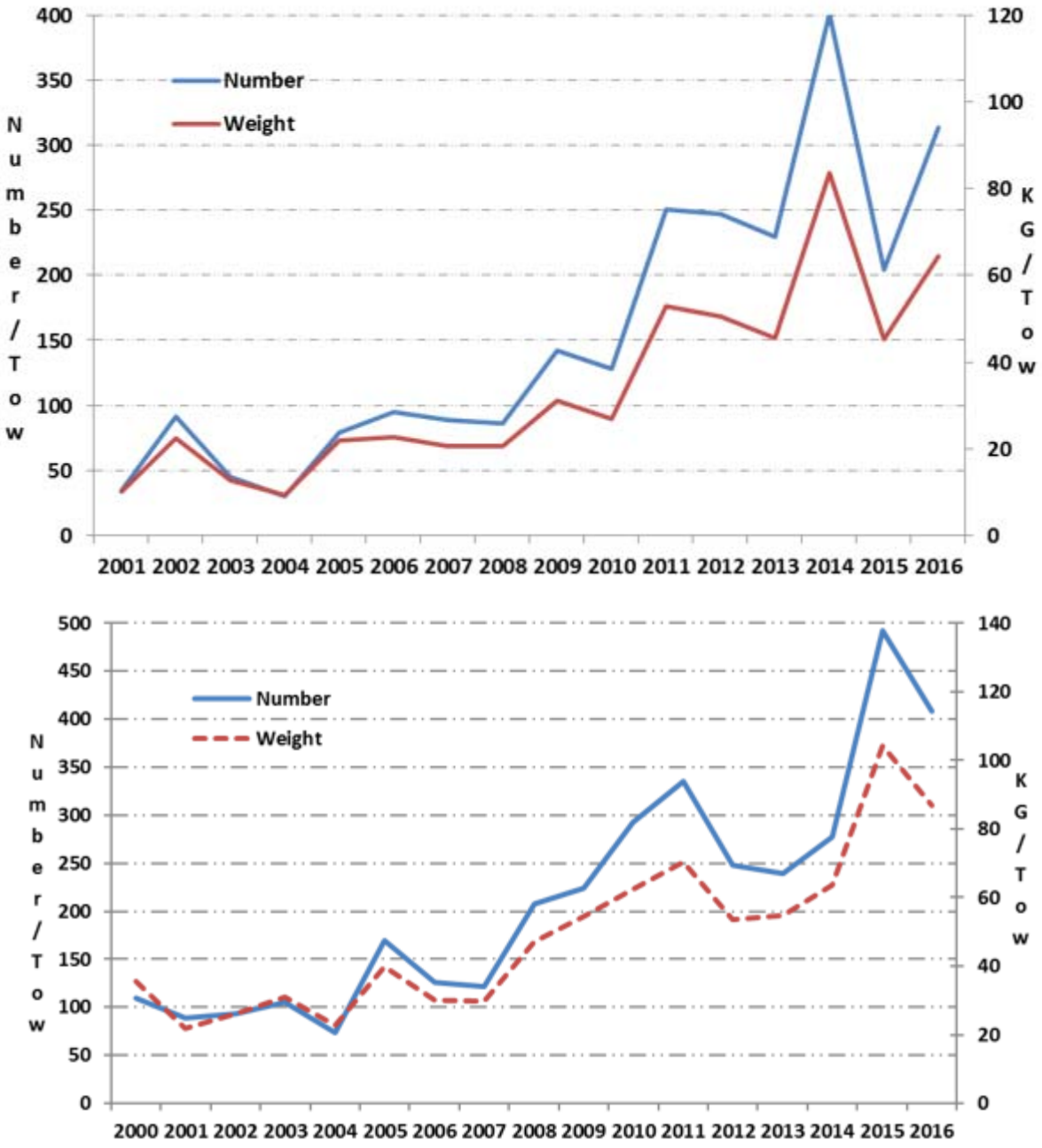

Figure 2: Maine-New Hampshire survey abundance indices for lobster, 2001-2016. Results of the spring survey are on the top and results from the fall survey are on the bottom.

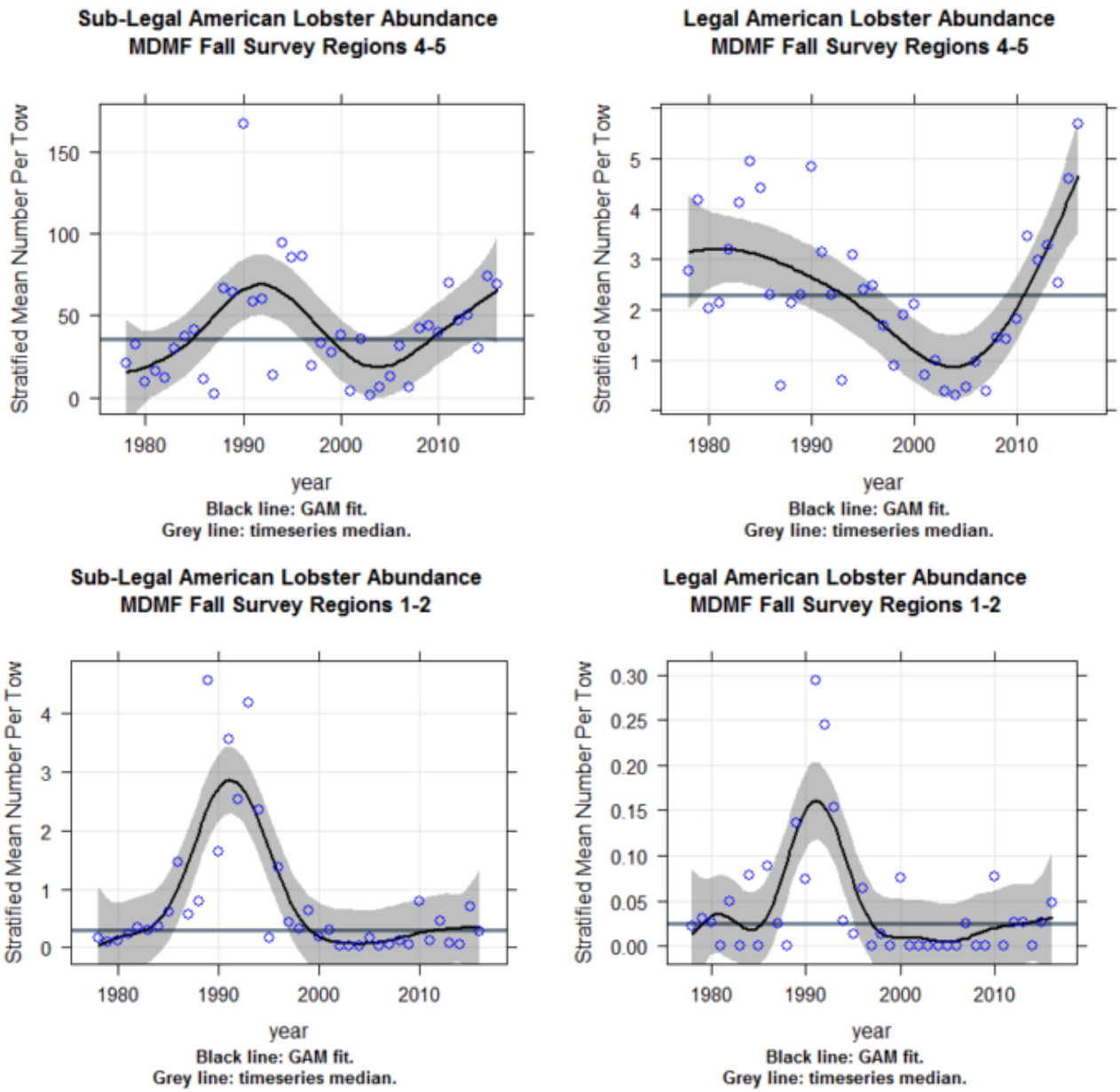

Figure 3: MADMF Fall Trawl Survey sub-legal and legal indices from 1978-2016. The top charts are from Gulf of Maine and the bottom charts are from Southern New England. For reference, Regions 4 and 5 are located off of Cape Ann and in Cape Cod Bay. Regions 1 and 2 are located along the southern portion of the Cape and Islands, as well as Buzzards Bay.

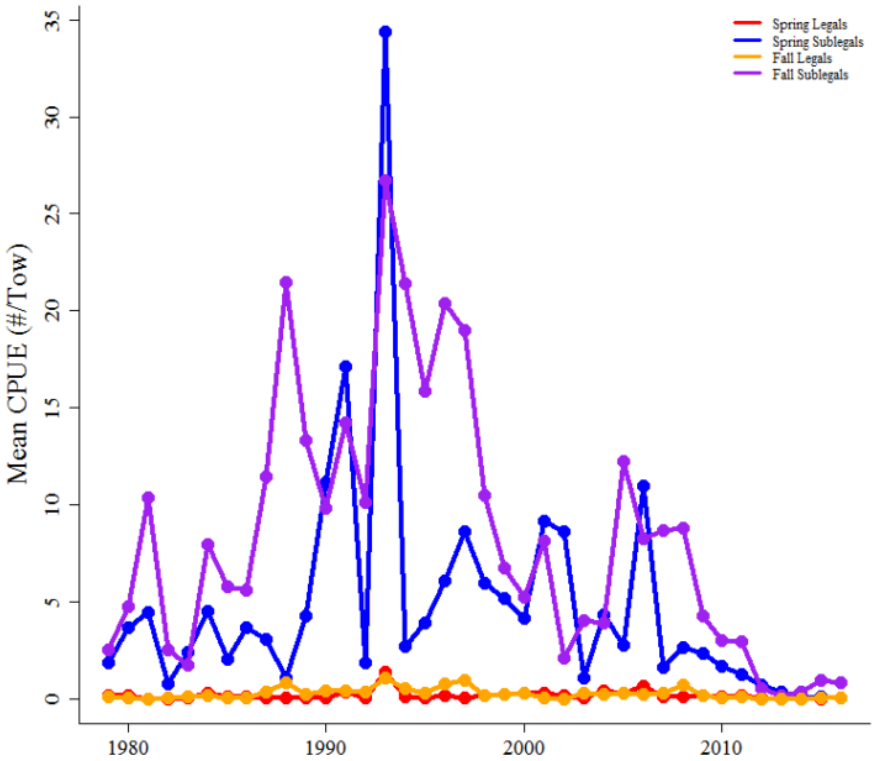

Figure 4: RIDFW Seasonal (Spring and Fall) Trawl lobster abundances. CPUE is expressed as the annual mean number per tow for sub-legal (<85.725mm CL) and legal sized (>=85.725mm CL) lobsters.

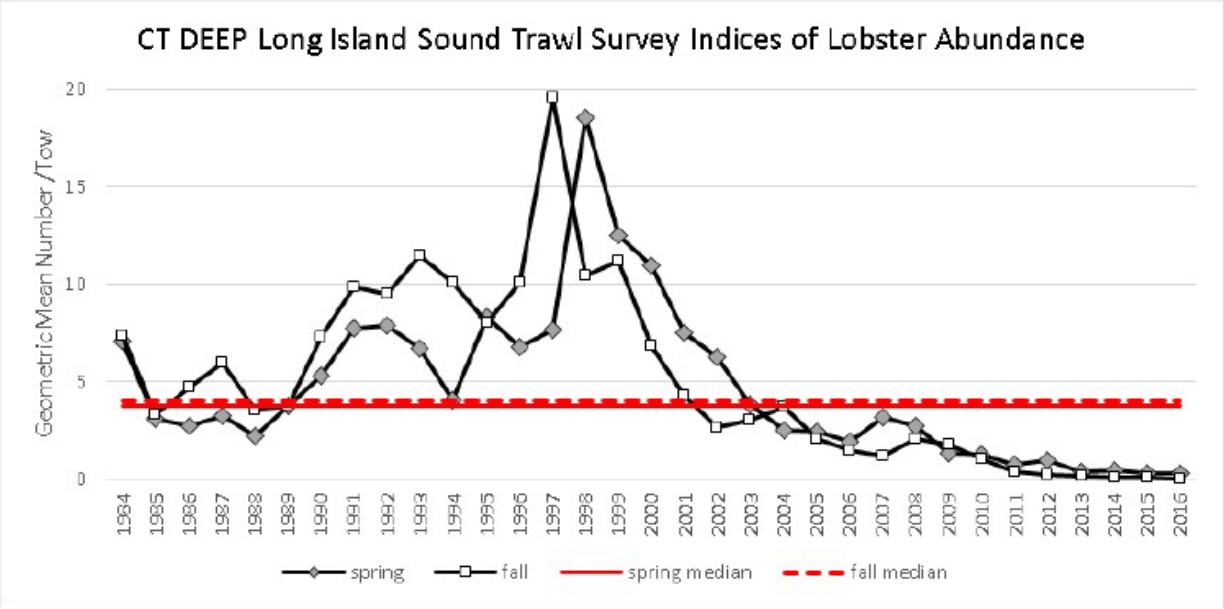

Figure 5: Results of the Long Island Sound Trawl Survey during spring (April-June) and fall (September-October) within NMFS statistical area 611.

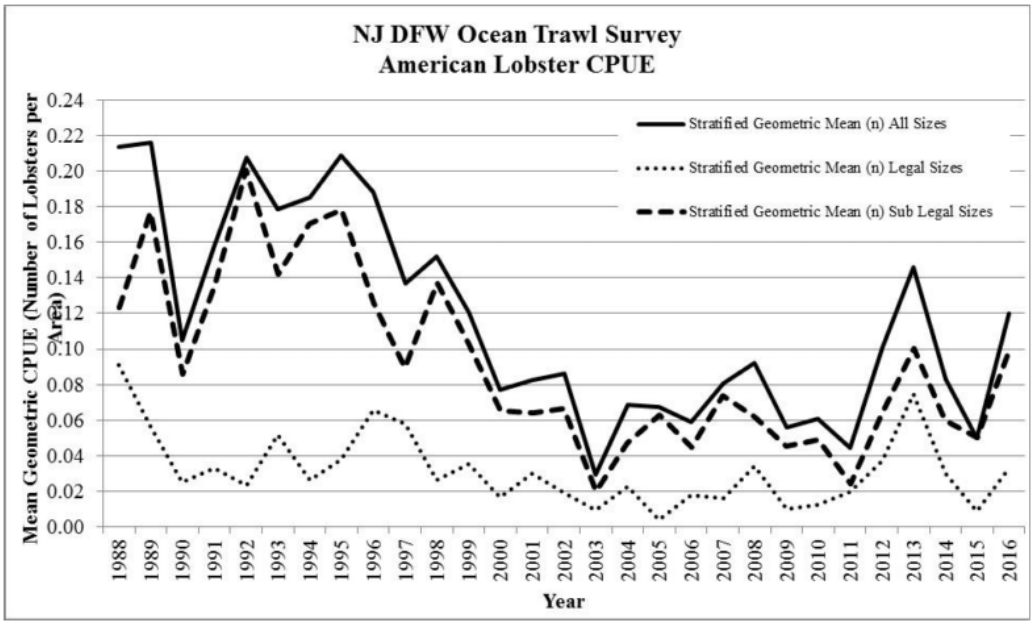

Figure 6: Stratified mean CPUE of all lobsters collected aboard the NJDFW Ocean Trawl Survey. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE was calculated as the sum of the mean number of lobsters per size class collected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

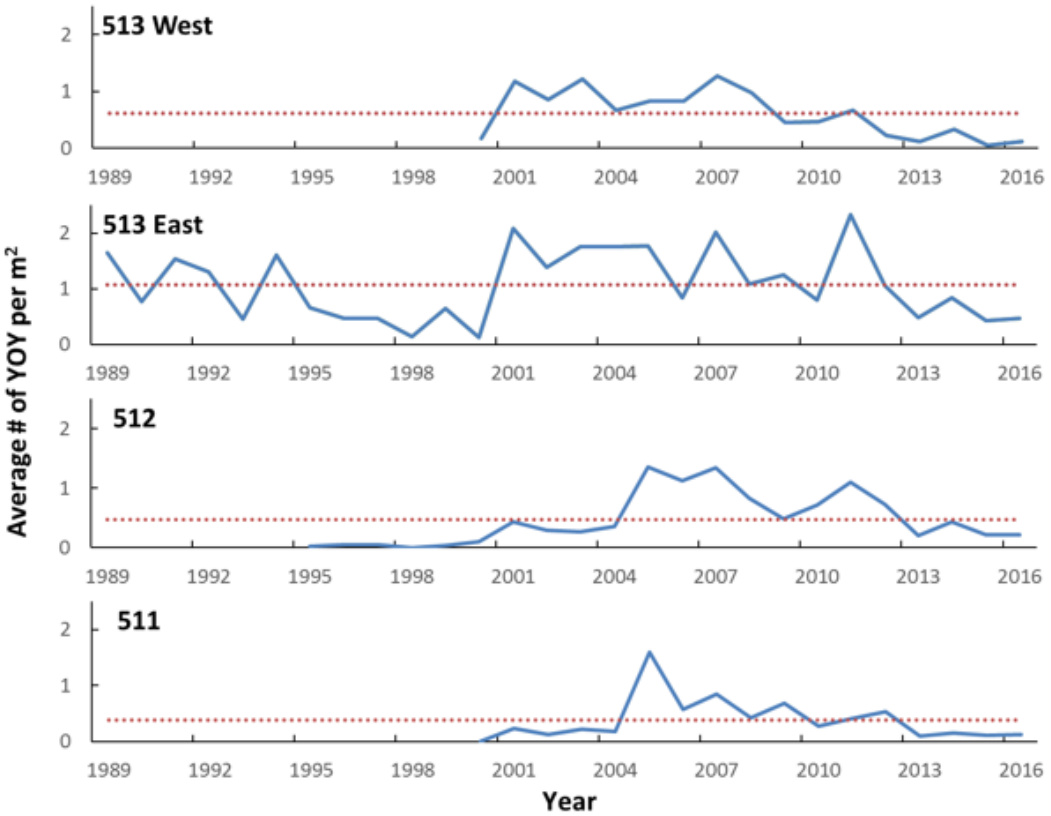

Figure 7: Settlement survey index for each statistical area in Maine (1989-2016).

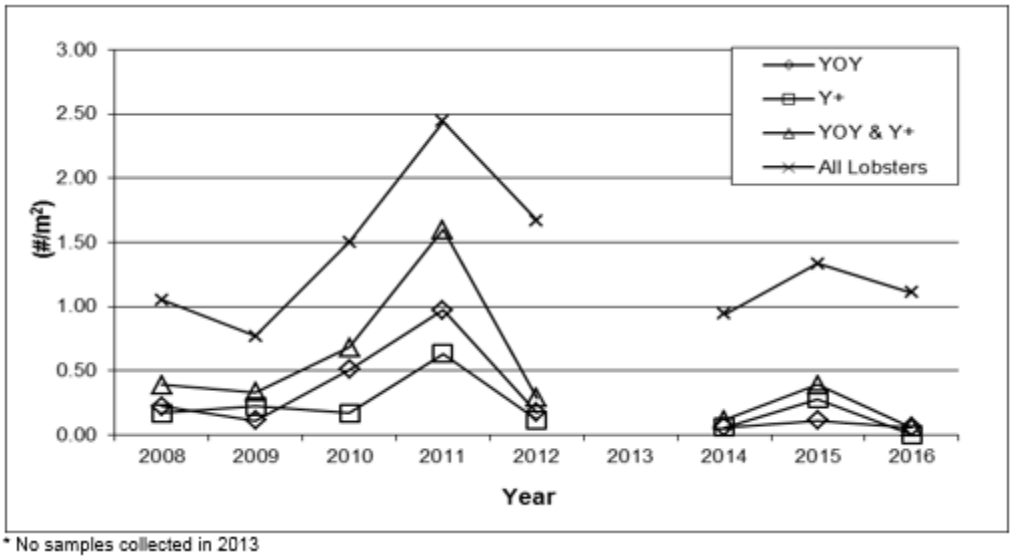

Figure 8: Catch per unit effort (#/m2) of YOY, Y+, and YOY/Y+ combined and all lobsters during the American Lobster Settlement Index, by location, in New Hampshire, from 2008 through 2016.

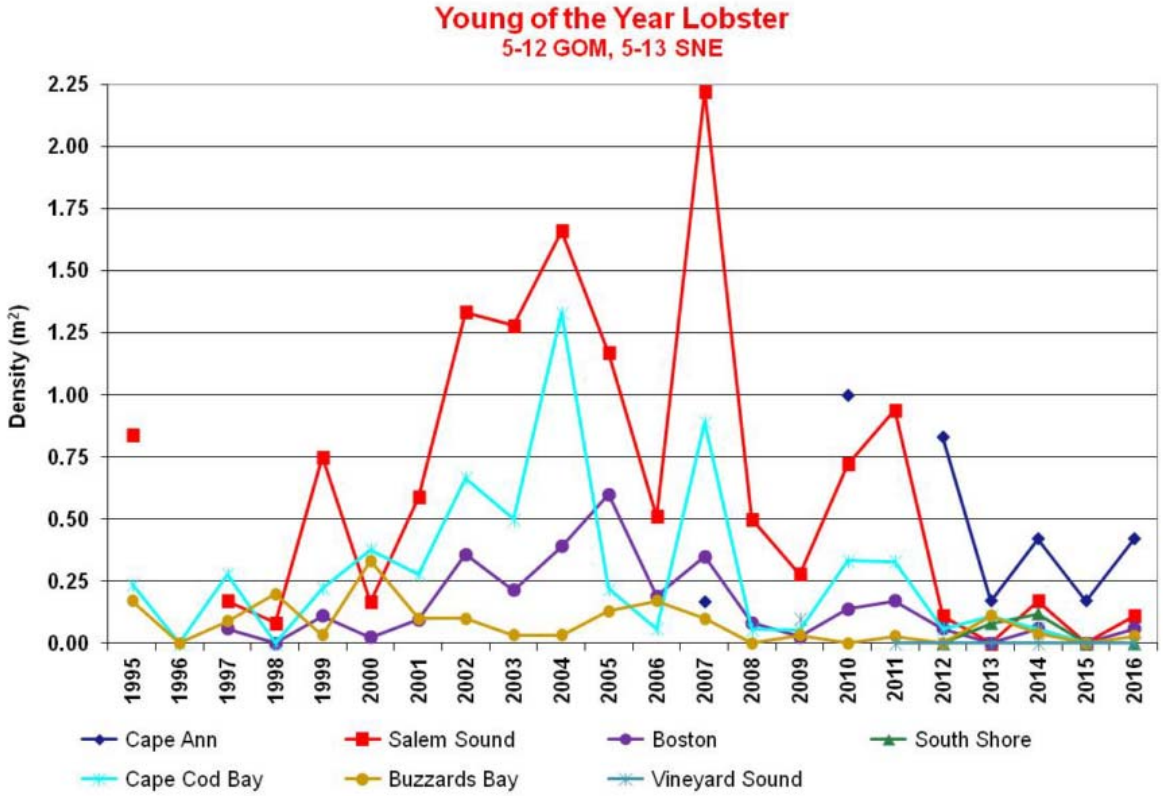

Figure 9: Young-of-year lobster density in seven Massachusetts regions; LCMA 1 – Cape Ann, Salem Sound, Boston, South Shore, Cape Cod Bay, LCMA 2 - Buzzards Bay, Vineyard Sound.

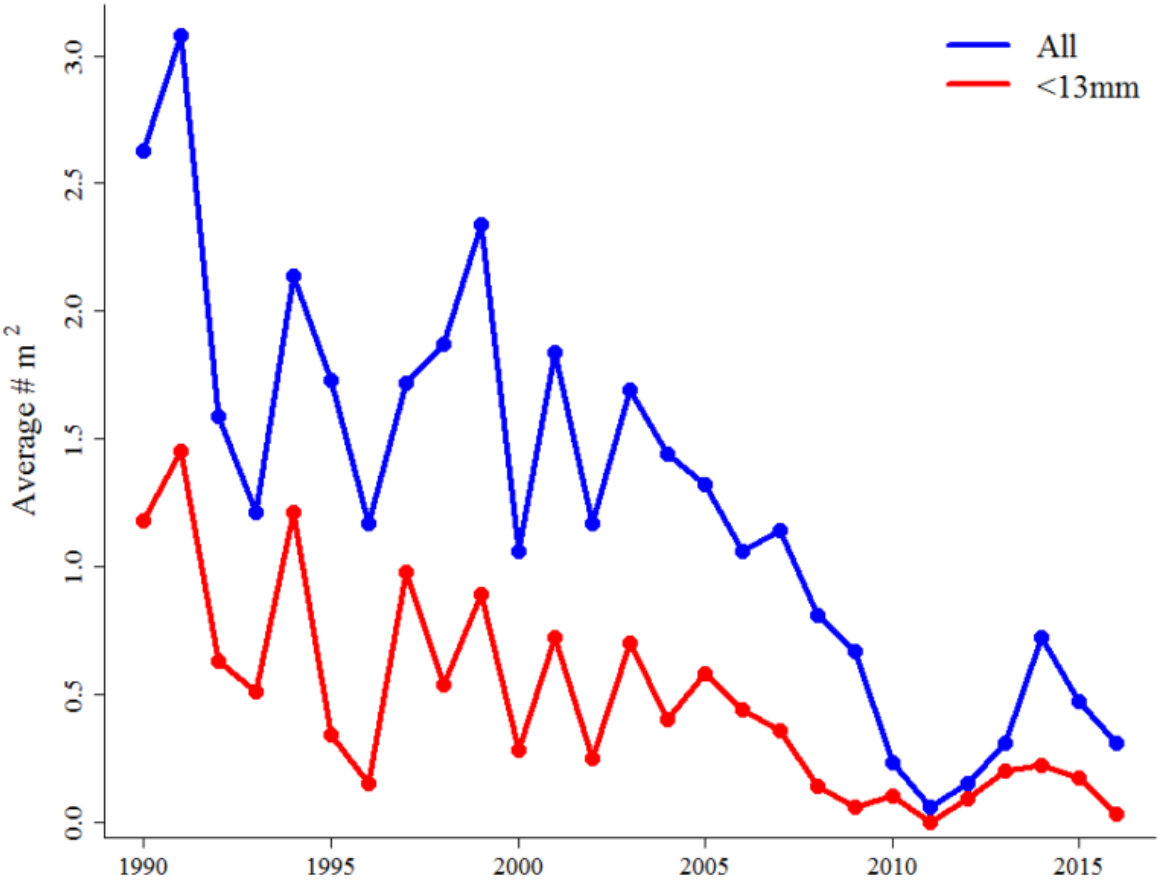

Figure 10: Average abundance of American lobster in Rhode Island suction sampling sites. Abundances are presented for lobsters less than or equal to 13mm (blue) and all lobster collected in sampling (red).

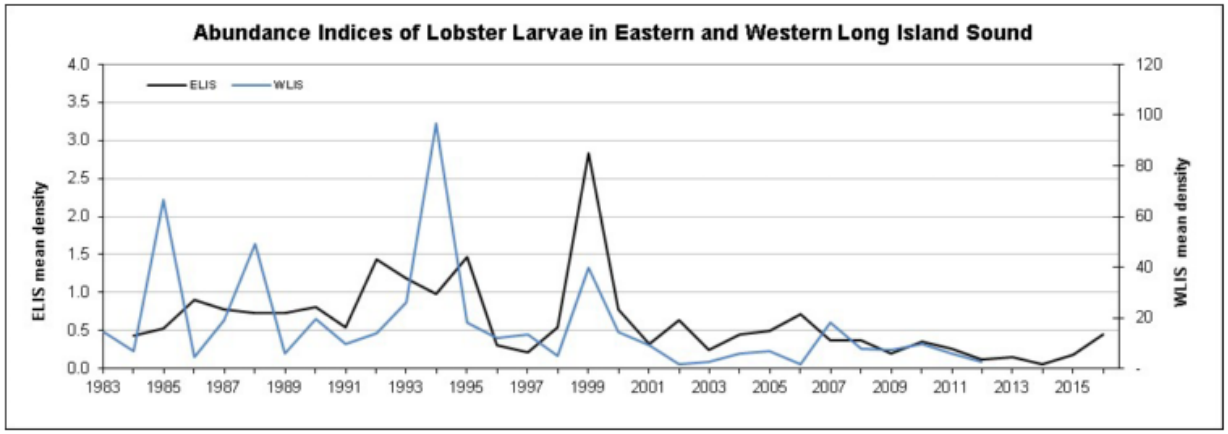

Figure 11: Abundance indices of lobster larvae from the Connecticut DEEP Larval Lobster Survey in western Long Island Sound and from the Millstone Power Station entrainment estimates in eastern Long Island Sound. The Connecticut DEEP survey was discontinued in 2013.

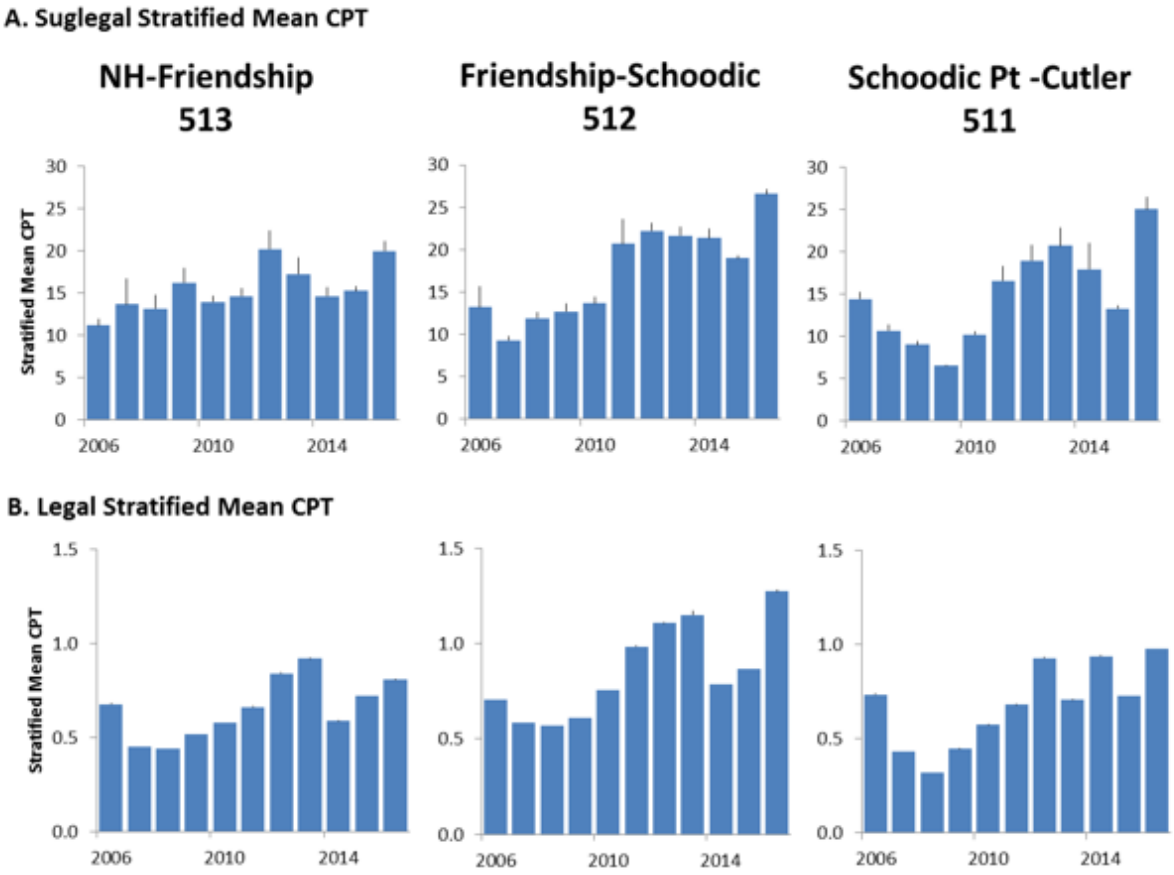

Figure 12: CPUE stratified mean for both sublegal and legal lobsters from Maine's Ventless Trap survey, 2006-2016, by statistical area. Only ventless traps were included in the analysis.

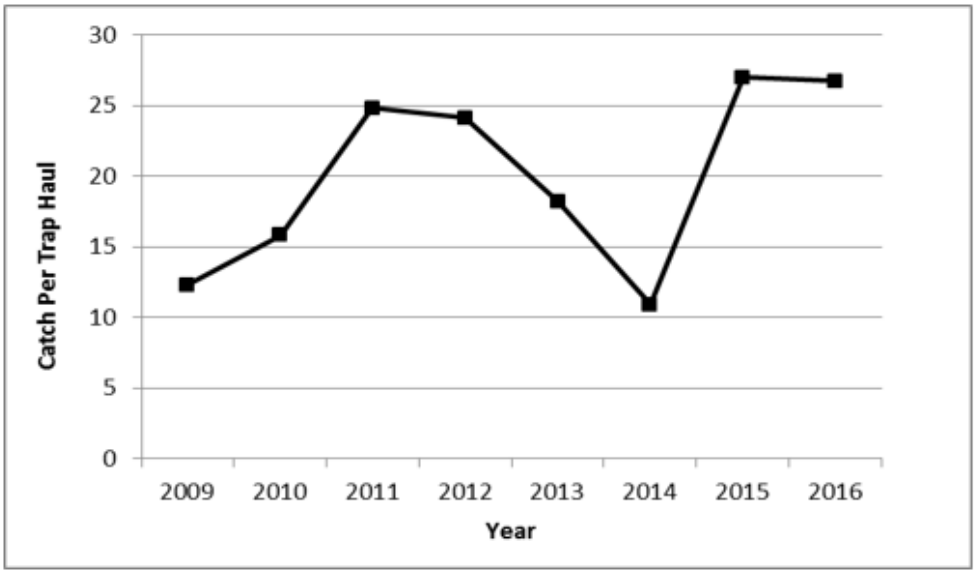

Figure 13: Stratified mean catch per trap haul, for all lobsters captured during the coast-wide random stratified Ventless Trap Survey in New Hampshire state waters from 2009 through 2016.

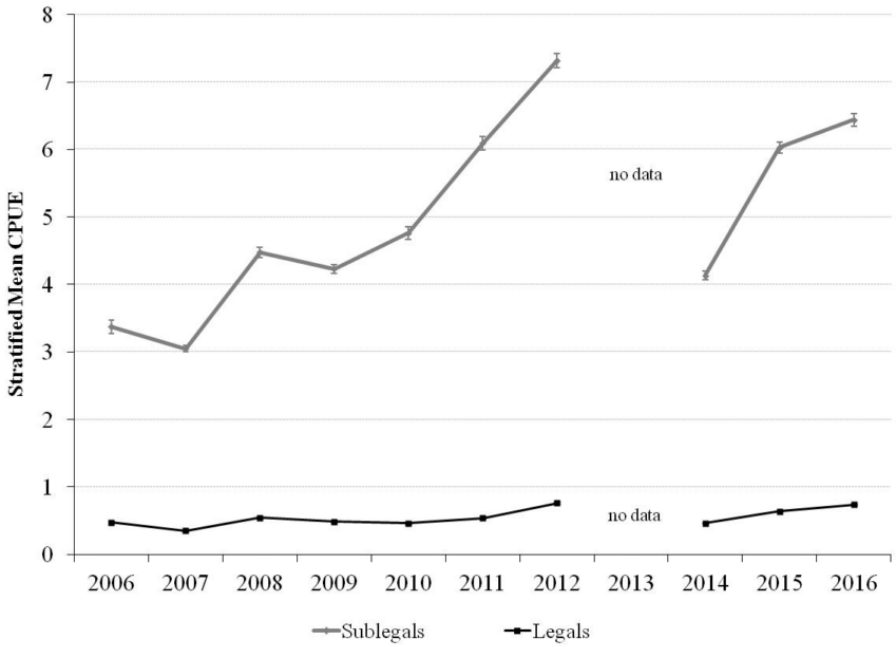

Figure 14: Stratified mean catch per trap haul (±S.E.) of sublegal (< 83 mm, grey line) and legal (≥ 83 mm, black line) lobsters in NMFS Area 514 from MADMF ventless trap survey. The figure includes lobsters from both the vented and ventless traps in the survey.

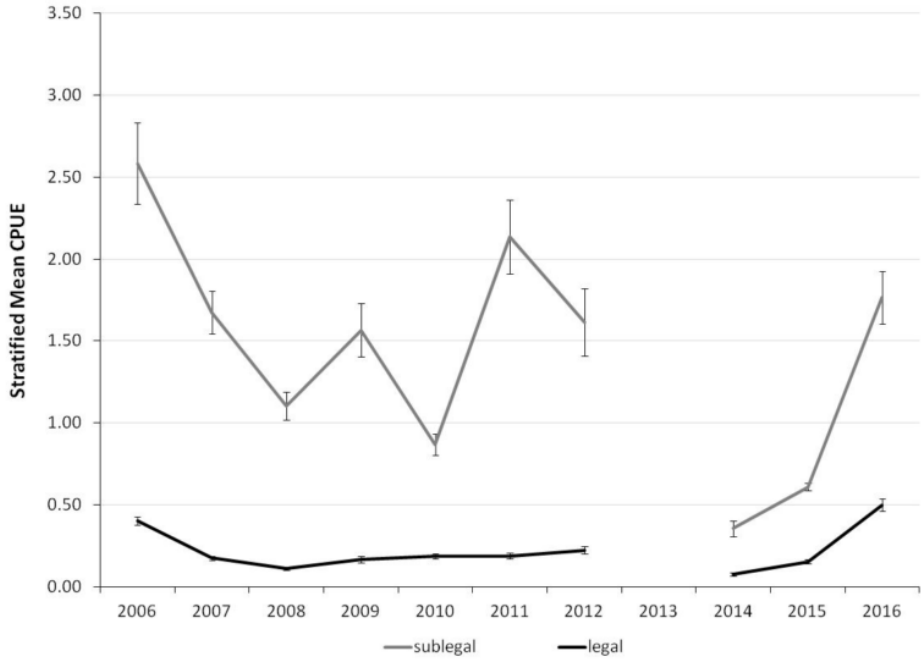

Figure 15: Stratified mean catch per trap haul (±S.E.) of sublegal (< 86 mm, grey line) and legal (≥ 86 mm, black line) lobsters in Area 538 and northern 537 (2011-2014) from MADMF ventless trap survey. The break in the time series from 2010 to 2011 and the subsequent dashed lines illustrate when the survey was expanded (starting in 2011), which should be interpreted as a new time series relative to the 2006-2010 time period. The figure includes lobsters from both the vented and ventless traps in the survey.

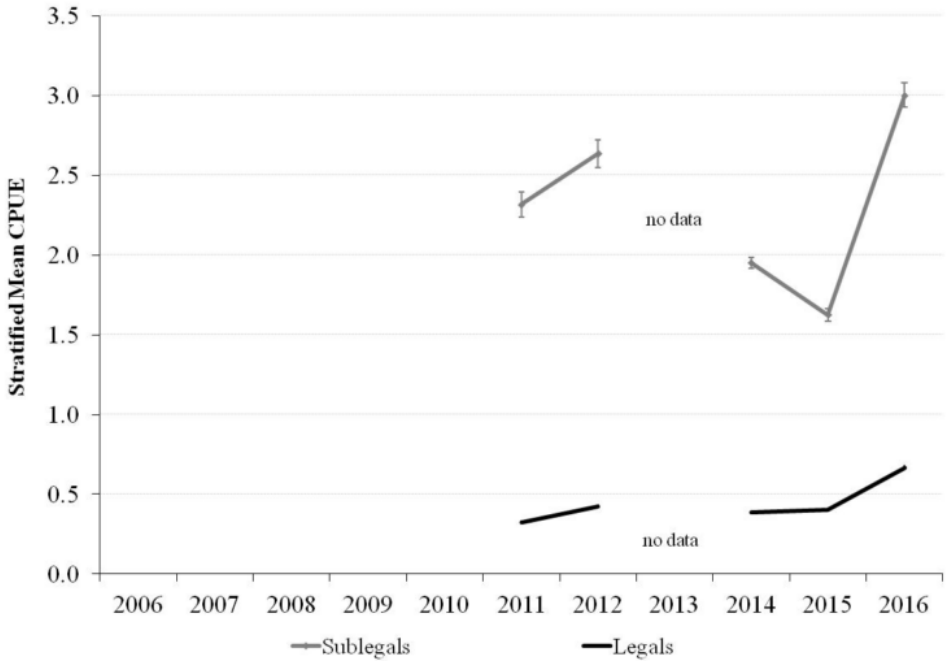

Figure 16: Stratified mean catch per trap haul (+/- S. E) of sublegal (<86 mm, grey line) and legal (>=86 mm, black line) lobsters in the expanded MA SNE survey area, which includes NMFS Area 538 and the northern portion of Area 537. The figure includes lobsters from both the vented and ventless traps in the survey.

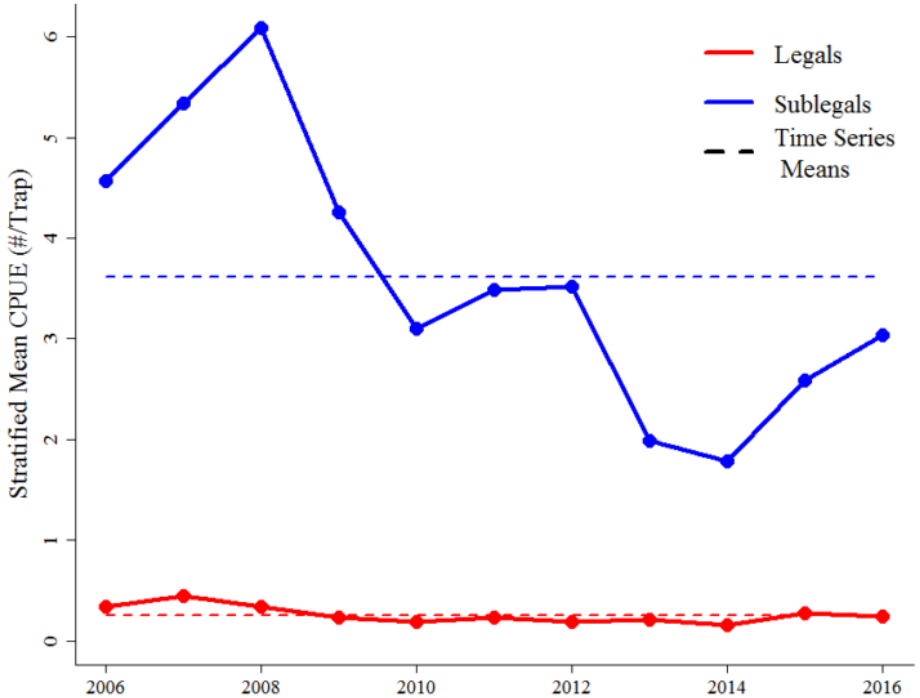

Figure 17: Stratified mean catch (#) per trap-haul for sublegal (<85.725 mm CL) and legal-sized (>=85.725mm CL) lobsters from RIDEM ventless trap survey. The figure includes lobsters from both the vented and ventless traps in the survey.