*Atlantic States Marine Fisheries Commission*

# ADDENDUM XVII TO AMENDMENT 3 TO THE INTERSTATE FISHERY MANAGEMENT PLAN FOR AMERICAN LOBSTER

***SOUTHERN NEW ENGLAND MANAGEMENT MEASURES***

***ASMFC Vision Statement:***
***Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015***

**Approved February 2012**

## Executive Summary

The Southern New England (SNE) lobster stock is at a low level of abundance (below the reference target and threshold) and is experiencing persistent recruitment failure caused by a combination of environmental drivers and continued fishing mortality (ASMFC, 2009). It is this recruitment failure that is preventing the SNE stock from rebuilding. The American Lobster Management Board first initiated this Addendum to reduce exploitation on the SNE stock by 50 or 75% in order to initiate stock rebuilding in2010. At the August 2011 Board meeting, the Board changed the document's purpose to reduce exploitation by 10%.

To respond to the Board objectives, the Plan Development Team (PDT) evaluated multiple input and output control measures, including: limited entry; trap limits; minimum and maximum sizes; escape vents; mandatory female v-notch requirements, a male-only fishery; closed seasons; closed areas; and quota-based landing limits. While the PDT acknowledged the effectiveness of certain output controls (such as a quota based on landings) and input controls, the PDT also looked at the ability to effectively monitor, administer, and uniformly enforce selected management tools in the short and long term.

The Addendum reduces exploitation by 10% by using a two-phased approach utilizing input controls for an initial short-term, with the intent to transition all jurisdictions towards effective and enforceable long-term management tools.

To address the second phase, the document established an immediate establishment of a subcommittee to evaluate all jurisdictions' ability to monitor various output controls, such as a quota-based management approach. The two-phase approach is to allow time for federal regulators to complete their regulatory action intended to align state and federal trap allocations in Area 2, (see Section 2.1.2–for details).

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## 1.0 Introduction

The Atlantic States Marine Fisheries Commission (ASMFC) has coordinated interstate management of American lobster (*Homarus americanus)* from 0-3 miles offshore since 1997. American lobster is currently managed under Amendment 3 and Addenda I-XVI to the Fishery Management Plan (FMP). Management authority in the exclusive economic zone (EEZ) from 3-200 miles from shore lies with NOAA Fisheries. The management unit includes all coastal migratory stocks between Maine and North Carolina. Within the management unit there are three lobster stocks and seven management areas. The Southern New England (SNE) stock (subject of this Addendum) includes all or part of six of the seven lobster management areas (LCMAs) (Appendix 1). There are nine states (Massachusetts to North Carolina) that regulate American lobster in state waters of the SNE stock, as well as regulate the landings of lobster in state ports.

While this Addendum is designed to address the single discrete SNE stock unit, past American Lobster Management Board (Board) actions were based on the management foundation established in Amendment 3 (1997), which established the current seven LCMAs that are not aligned with the three lobster stock boundaries. LCMA-specific input controls (limited entry, trap limits, and biological measures) have been the primary management tools used by the Board to manage lobster fisheries under the FMP. Managers working to recover the SNE stock face significant challenges since they must confront the complexity of administering and integrating six different management regimes crafted primarily (and largely independently) by the lobster conservation management teams (LCMT's). To be effective, management actions must not only address the biological goals identified by the Board, but also acknowledge and attempt to mitigate the socio-economic impacts that may vary by LCMA, while ensuring that multiple regulatory jurisdictions have the capability to effectively implement the various management tools available in this fishery.

The Board first initiated this Addendum to reduce exploitation on the SNE stock by 50 or 75% in order to initiate stock rebuilding. At the August 2011 Board meeting, the Board changed the document's purpose to reduce exploitation by 10% with the following motion: *Move to change the objective to reduce exploitation in the SNE stock by 10% in each LCMA to initiate rebuilding of the SNE stock and enable each jurisdiction to prepare their fishing industries for more substantive reductions in a subsequent addendum.*

## 2.0. Management Program

### 2.1 Statement of the Problem

#### *2.1.1 Resource Issues*

The SNE lobster stock is at a low level of abundance and is experiencing persistent recruitment failure caused by a combination of environmental drivers and continued fishing mortality (ASMFC, 2009). It is this recruitment failure that is preventing the SNE stock from rebuilding. This finding is supported by the 2009 Stock Assessment Peer Review Panel and the 2010 Center for Independent Experts review of Technical Committee (TC) findings and conclusions articulated in the April 2010 report to the Board: "Recruitment Failure in Southern New England Lobster Stock).

Current abundance indices are at or near time series (1984 to 2009) lows (ASMFC 2009) and this condition has persisted since the early 2000s. A 73% increase in abundance would be needed to rebuild the SNE stock to the target level established by the Board in 2010. In May 2009, , the Board set interim threshold and target values well below those recommended by the TC in recognition that stock productivity has declined in the past decade. Members of the Board and TC believe that environmental and ecosystem changes have reduced the resource's ability to rebuild to historical levels.

By definition, the stock is considered to be overfished when the last three years of calculated abundance falls below the threshold 25$^{th}$ percentile level of the reference years (1984-2003). The target stock abundance is the median level of the reference years (1984-2003). The target exploitation is the lower 25$^{th}$ percentile of the reference years (1984-2003). The SNE resource is considered to be overfished when exploitation exceeds the 50$^{th}$ percentile of the reference years (1984-2003). The Board set the SNE abundance reference points to a lower target level than the Gulf of Maine (GOM) and Georges Bank (GBK) stocks because it believes the SNE stock has limited ability to rebuild to higher historical levels.

Table 1. Current SNE Reference Points

| **Variable** | **SNE** |
|---|---|
| **Effective Exploitation (Annual Rate)** | |
| Threshold | 0.46 |
| Target | 0.41 |
| Recent | 0.32 |
| Recent < Threshold | YES |
| Overfishing Occurring | NO |
| **Reference Abundance (Number of adults lobster)** | |
| Threshold | 20,076,831 |
| Target | 25,372,745 |
| Recent | 14,676,703 |
| Recent > Threshold | **NO** |
| Overfished | **YES** |

Subsequent stock projections conducted by the TC suggest that lower interim abundance reference points may be difficult to achieve. Projection scenarios that included a fishery moratorium with continued poor recruitment and elevated natural mortality rates resulted in a brief stock rebuilding to the abundance threshold followed by a modest decline to just below the threshold. Scenarios that considered 50% - 75% reductions in exploitation would suggest only a slightly lower abundance than that predicted under a total moratorium.

In the spring of 2010, the TC reviewed the most recent trends in abundance (including 2008 and 2009) and considered a variety of biological and environmental factors that may be impacting SNE lobster stocks. In May 2010, the TC submitted a report to the Board stating that it was its belief that SNE stock was experiencing recruitment failure. Evidence suggested the reproductive potential and abundance of the SNE stock had continued to fall to lower levels than what was

presented in the 2009 assessment. While larval production and settlement are inherently variable, sustained poor production can only lead to reduced recruitment and ultimately to reduced year class strength and lower future abundance levels. The TC contended that recruitment failure was caused by overwhelming environmental and biological changes coupled with continued fishing. At that time, the TC recommended a 5 year moratorium on harvest in the SNE stock area to provide the maximum likelihood of rebuilding the stock above the threshold and toward the target abundance in the foreseeable future (ASMFC 2010a).

Following the presentation of the TC reports to the Board concerning recruitment failure and stock projections, the Board moved to have the findings reviewed by the Center for Independent Experts (CIE). The TC and comments from external independent reviewers (CIE 2010) concurred that environmental changes in concert with fishing mortality were the principal causes of the recent stock decline and resulting lower recruitment levels. Although it is not possible to predict how recruitment may change in the near future it has been noted that environmental conditions are unlikely to return to the previous favorable state observed in the early 1990's and that reducing exploitation is therefore necessary to prevent further avoidable erosion of the spawning stock, thereby increasing the chances of stock recovery should recruitment and natural mortality conditions improve. There was general agreement with the TC reports that a moratorium or severe reductions (75%) in fishing mortality are needed immediately to maximize chances of rebuilding the stock.

The stock assessment and peer review advice agree that significant management measures must be instituted to stabilize the SNE lobster stock. Fishing mortality was identified as an additional impediment to stock rebuilding given the high occurrence of females in the commercial harvest in deeper waters where the fishery has now become most active. Despite recent reduction in trap hauls and other management initiatives, recruitment in SNE has declined.

In 2006, the ASMFC American Lobster Stock Assessment Review Panel Report recommended that "managers be vigilant of recruitment patterns and be ready to impose substantial restrictions if recruitment declined." It was emphasized again in the 2009 CIE Report that "an improved understanding of the relationship between the parental lobster stock and subsequent recruitment in SNE is crucial as a scientific underpinning of any strong management action aimed at limiting the capacity of the fishery to reduce spawning stock size."

### *2.1.2Management*

While this Addendum is designed to address the single discrete stock unit in southern New England, past Board actions and the construct of the management plan and many of its addenda have not addressed single stocks. Rules have been adopted that are LCMA-specific and therefore cut across one or more stock units. Amendment 3 (1997) was written to provide for management of lobster throughout the range but the previously defined 7 management areas were not aligned with the stock boundaries as defined in 1997. Moreover, in 2006 the stock boundaries were redrawn (aligned with NMFS statistical areas), but still not aligned with the management areas. LCMA's were never redrawn nor adjusted to match stock boundaries.

*Input Controls*

Input controls (limited entry, trap limits, and biological measures) have been the primary management tools used by the Board to manage lobster fisheries under the plan, and because these measures were adopted on a LCMA-specific basis on different schedules since 2000, they are inconsistent among areas. The various limited entry schemes among the Areas 2, 3 ,4 ,5, and 6 had unique qualifying criteria and eligibility periods resulting in widely disparate levels of latent effort among and within the LCMAs. For the purposes of this document latent means unfished permits and or allocated traps. These levels of latent effort will reduce the effectiveness of any action to lower exploitation unless there are measures to constrain latent effort from becoming active.

Regarding biological measures of minimum and maximum sizes and (female) v-notch standards, there is far less discrepancy among the management areas since the adoption of Addendum XI in 2007. All management areas within the SNE stock area have a 3 3/8" minimum size and a 5 ¼" maximum size - except Area 3, which has a 3 ½" minimum size and 6 ¾" maximum.

The disparate biological measures in Area 3 represent a management conundrum. Area 3 extends beyond SNE; including the offshore portions of the other two stock units: Gulf of Maine and Georges Bank, neither of which is overfished nor where overfishing is occurring. Most of the Area 3 landings come from within the Georges Bank stock.

To date there has been no permit requirements that delineate which stock area an Area 3 fisherman is eligible to fish in. Prior to this Addendum, nearly all Area 3 rules [1] applied across all three stocks. Given that the conservation burden of this addendum applies only to southern New England, new conservation rules must either apply to all Area 3 fishermen regardless of location and stock fished (and have negative consequences on the Georges Bank and Gulf of Maine fisheries) or new measures would have to be stock (and geographic area) specific. For example, Area 3 fishermen seeking to continue fishing in SNE may have to declare and be permitted to fish within the area to be held accountable – or opt to not participate in the SNE fishery to avoid the upcoming rebuilding measures.

Landings in Massachusetts and Rhode Island ports from the Georges Bank stock are substantial and exceed the landings from the southern New England stock. Because all vessels fishing the Georges stock area must travel through the southern New England stock area to reach ports of landing, any SNE–specific rules designed to be enforced only at the port of landing will be challenging for enforcement to ensure compliance. At-sea enforcement will be critical given the ease of illegal at-sea transfers between vessels permitted to fish the depleted stock (SNE) to those allowed to fish the more abundant (Georges) stock.

*Output Controls*

Proposals that include output controls, i.e. a quota, that are specific for the SNE stock will need to considerer the associated monitoring, enforcement and compliance challenges particularly in states with landings from the Georges Bank or Gulf of Maine stocks which produce in excess of 95% of US lobster landings and do not have similar controls. As with other quota managed

[1] The only Area 3 rule that is stock specific is the mandatory v-notch requirement for vessels fishing north of 42 30 in the Gulf of Maine.

species, timely (weekly) dealer reporting is needed for active in-season management of the quota. Many jurisdictions presently lack the comprehensive reporting that includes both federal and numerous state dealers needed to manage a quota. In addition, the lobster fishery has an unusually large number of points of landing owing to the size of the fleet, minimal dockage requirements and ability to sell either directly to the consumer or to small wholesale/retail markets without the need for the central processing and distribution facilities required for most finfish products.

*Multi-Jurisdictional Management*

The Commission has advanced numerous management measures within SNE since approval of Amendment 3 in September 1997. Lobster management has evolved into an increasingly complex regulatory environment. The Commission (and its Lobster Board) is not one regulatory body so much as it is an amalgamation of multiple independent regulatory agencies. Specifically, the Lobster Board is composed of eleven (11) states and the Federal Government. Each government has its own laws and authorities that govern what it can do and how it can do it. Governments have different rulemaking processes; as a result, regulations are often enacted on different timelines.

Within SNE, limited access within specific LCMAs, and individual trap allocations based on historic participation, are in place at the state and/or federal level. In SNE, the states and or NOAA Fisheries have established limited access programs (LAPs) in Areas 3, 4, 5, and 6, and assigned individual trap allocations (ASMFC Addendum I - approved August, 1999; and NOAA Fisheries: 68 FR 14902. March 27, 2003). For Area 2, the LCMA with the largest number of participants within the SNE stock area, the Commission approved final criteria for a LAP and individual trap allocation criteria for Area 2 (Addendum VII, November, 2005). As the impacted states began to implement the Area 2 LAP criteria in Addendum VII, individual lobstermen, often those with smaller trap allocations identified the need to establish transferable trap programs to allow for the purchase and sale of individual LCMA-specific trap allocations. With full support of the Board, over a three year period, impacted jurisdictions worked to address multi-jurisdictional concerns and ensure each jurisdiction consistently applied the principles and guidelines necessary to govern the transfer of permits and trap allocations across all applicable lobster LCMAs. In February 2009, the Commission approved Addendum XII to establish uniform transferable trap programs intended to improve the overall economic efficiency of the lobster industry, and enhance the potential to reduce trap fishing effort in the fishery through the use of a conservation "tax".

Upon approval of Addendum XII, NOAA Fisheries began a regulatory process to complement the Commission's ISFMP and addenda and evaluated federal implementation of LAPs in two LCMAs (Area 2 and the Outer Cape Area) and transferable trap programs in 3 LCMAs (Areas 2, 3, and the Outer Cape Area). Implementation of a transferable trap program for federal permit holders, to establish fishing privileges for U.S. lobster fishers heretofore unseen in a federal lobster management program, has been determined to be a significant action. In May 2010, NOAA Fisheries announced the availability of a Draft EIS, which extensively analyzed proposed the LAP and ITT alternatives based on the recommendations by the Commission (75 FR 23245, May 3, 2010). The NOAA Fisheries Draft EIS also evaluated options to effectively align state and federal qualification and trap allocations.

In the Draft EIS, NOAA Fisheries acknowledged the time lag between state and federal rulemaking, and the challenge to fully reconcile independently developed and already enacted state regulations, which are themselves not always consistent with one another, before NOAA Fisheries could issue its own regulations. However, proposed Commission actions specified in Section 3.0 to address the SNE resource condition highlights the need for the involved state and federal jurisdictions to make consistent decisions if possible, acknowledging longer term disincentives should the impacted jurisdictions not do so. Under the federal regulatory process, it is expected NOAA Fisheries may issue a proposed rule for public comment on the Federal implementation of LAPs in two LCMAs and transferable trap programs in 3 LCMAs in 2011. Although the Draft EIS notes state/federal regulatory consistency has become increasingly difficult to achieve, if NOAA Fisheries is able to align federal regulations with Commission recommendations in SNE, a Final EIS would be developed by NOAA Fisheries, and would likely be available for public comment in early 2012, followed by a Final Rule in 2012 to implement compatible federal measures.

If all jurisdictions are able to align trap allocations in Area 2, the ability to affect future fishing exploitation through input or output controls would likely become more effective. The ability to increase or decrease trap fishing effort through implementation of transferable trap programs would allow industry more economic efficiency in their business planning to respond to management actions. The Commission, in response to needs specified in Addendum XII, is currently in development of a central database to monitor permit and trap allocations and authorize inter-jurisdictional trap transfers, a necessary prerequisite to an effectively managed multi-jurisdictional transferable trap program.

### *2.1.3 Data Collection*

An additional challenge to managing the SNE lobster stock is the quantity and quality of biological and fisheries data. Effective fisheries management requires data with sufficient spatial and temporal resolution to be able to track trends in the fishery and the stock. Key data elements include commercial landings, effort (trap hauls), size distribution and sex ratio of the commercial catch, and a fisheries independent estimate of relative abundance of recruit and fully-recruited lobster. The major lobster harvesting jurisdictions within SNE (MA, RI, CT, NY, NJ, and NMFS) administer both fisheries dependent and fisheries independent monitoring programs with the intent of collecting these key data elements. Unfortunately, these data collection programs are not standardized among the jurisdictions, and as result there is substantial variation in the resolution of fisheries and biological data on a regional basis within SNE. The varying resolution among data collected regionally within SNE adds to the complexity of assessing the status of the resource, assessing the status of the fishery, and judging the efficacy of a management measure or management strategy.

*Landings and Effort Data*

One of the central pieces of data required to assess the stock and to manage the fishery are commercial landings and effort. Landings are collected via two mechanisms, dealer reporting and harvester reporting. In theory, these two landings data collection programs provide a system of checks and balances in which they are cross referenced to ensure the accuracy of the landings data. Accurate landings data with sufficient spatial (statistical area and LCMA designation) and temporal (month) resolution are required to calculate fishing mortality and abundance. These

data would be critical components to monitoring quota based management programs. Effort data are collected from harvester reporting programs. The best indicator of effort in the lobster fishery is the cumulative number of trap-hauls  Effort data with sufficient spatial (statistical area and LCMA designation) and temporal resolution (trip level) would be necessary to monitor the effectiveness of an effort reduction program.

In the SNE lobster fishery there is universal standardized dealer level reporting among all jurisdictions (MA, RI, CT, NY, NJ, and NMFS) through the Standard Atlantic Fisheries Information System (SAFIS). Landings data are collected at the trip level and reported for every sale of lobster by a permitted harvester to a permitted dealer. In most states, SAFIS does not account for dockside cash sales to the public or for personal consumption. Dealers are required to report to SAFIS weekly. As such the turnaround time between the time of harvest and the time the landings data are compiled is only a few weeks. This aspect of SAFIS could make it a valuable tool for monitoring quota based management programs. However, statistical area and LCMA are currently not required reporting elements of the SAFIS system. As such it is not possible to readily assign landings data collected by SAFIS to a statistical area, a LCMA, or even to a stock unit. For this reason the SAFIS landings data collection system, as currently constituted, does not have adequate spatial resolution to monitor a stock or LCMA specific quota.

There are varying degrees of participation, resolution, and compliance with harvester reporting among jurisdictions in the SNE lobster fishery.  The states of Massachusetts, Rhode Island, Connecticut, and New York currently require 100% of all harvesters to submit trip level catch reports. The harvester reporting systems vary from state to state, however, they all collect landings and effort data by statistical area (and in some cases by LCMA) at the trip level. Massachusetts, Connecticut, and New York require fishermen to submit their logs monthly, Rhode Island requires them to submit reports quarterly. The minimum time lag between harvest and accounting for the catch is roughly 40 days. However, the average time lag between harvest and accounting for the catch in most cases is substantially greater than that because of poor compliance with reporting deadlines, minimal deterrents for not reporting in a timely fashion, and seasonal staff limitations. Compliance with trip level reports also varies by state. Connecticut, which has had trip level reporting in place for a long time, has good compliance rates. In Massachusetts and Rhode Island, where trip level reporting is fairly new, compliance with timely reporting has been moderate to low. The primary deterrent for non-reporting in Massachusetts, Rhode Island, and Connecticut is refusal to renew fishing permits the following year until all reports are received. While this is effective for ensuring that most data are eventually received, it is not an effective deterrent for ensuring timely reporting of landings and effort data.  The compliance rate with trip level reporting in New York is poor, and could be related to the fact that New York does not have any deterrents in place for non-reporting. New Jersey does not administer a harvester reporting system; instead they require fishermen to submit landings and effort information data through the federal Vessel Trip Report (VTR) system. NOAA Fisheries requires all fishermen with a federal multi-species permit to submit VTR's weekly. However, NOAA Fisheries does not require vessels which only have a federal lobster permit to submit VTR's or otherwise report their landings. Vessels with federal lobster permits who hail out of Massachusetts, Rhode Island, Connecticut, or New York are required to submit harvester reports to their respective state's program, however, the states of New Jersey,

Delaware, Virginia, Maryland, and North Carolina do not have such requirements. As currently constituted the harvester reporting systems utilized in the SNE lobster fishery as a whole do not have complete coverage of all vessels participating in the fishery, do not have sufficient compliance, and are not collected in a timely enough fashion, to be utilized to monitor a stock wide quota based management program or effort reduction program.

*Biological Data*

Another key element for both assessing the status of the stock and the effectiveness of management measures are biological data collected from both fisheries dependent and fisheries independent sampling programs. Fishery-dependent sea-sampling programs provide size distribution, sex ratio, and other biological characteristics of both the harvested and discarded components of the commercial catch, while port sampling provides the biological characteristics of the harvested component only. Fishery-independent sampling programs are used primarily to estimate relative abundance of the stock. For lobster, these primarily include trawl surveys and the ventless trap survey.

The states of Massachusetts, Rhode Island, Connecticut, and New York all administer commercial sea-sampling programs. These programs do a good job of characterizing the size distribution, sex ratio, and disposition of the discards of the commercial catch from state waters. New Jersey has recently implemented a sea-sampling program to characterize their federal waters fishery. NOAA Fisheries has an extensive fishery dependent observer program, however, lobster is not a sampling priority for this program, and as such there are very limited commercial sea-sampling data for lobster in federal waters. Rhode Island and NOAA Fisheries also have port sampling programs which target vessels fishing federal waters. These programs are limited in scope and only provide data on the size distribution and sex ratio of the commercial catch retained. They do not provide any insight on the proportion of the catch which is discarded due to regulation.

In general, the catch disposition of the state waters portion of the SNE lobster fishery is fairly well characterized. Fishery-dependent monitoring programs currently in place would be sufficient to detect and assess the effectiveness of input controls, such as changes in the minimum and maximum legal size and v-notch programs in the state waters portion of SNE. The catch disposition for a substantial portion of the SNE lobster fishery which occurs in federal waters is poorly characterized. As a result it would be difficult to detect and assess the effectiveness of commonly used input controls in the federal waters portion of SNE.

Massachusetts, Rhode Island, Connecticut, and New Jersey, and NOAA Fisheries all administer bottom trawl surveys which have sufficient resolution to provide estimates of relative abundance for lobster in the SNE stock. In state waters, these data are complimented by the Regional Ventless Lobster Trap Survey (will provide an additional complimentary estimate of relative abundance) once the survey time series attains sufficient length. It will be important in moving forward that steps are taken to both maintain these programs in state waters and possibly expand them into federal waters where the data resolution is lower.

*Management Limitations Related to Data*

The current system of landings reporting used for the SNE lobster fishery is not adequate for monitoring a quota based management program. To allow for adequate accounting of a quota it would be necessary to implement the following changes to the landings reporting system;

- Implement 100% trip level reporting for ALL state and federally licensed vessels
- Substantially shorten the time lag between harvest and harvester reporting to allow for timely accounting of a quota
- Collect spatial information (statistical area and LCMA) for the landings data reported to SAFIS
- Assign a unique id to all licensed vessels that would be used in both the harvester and dealer reporting systems to allow for 100% reconciliation of the two data types.
- Address dockside sales and timely capture the reporting of dockside sales

The biological data collection programs currently administered in SNE are sufficient to characterize the disposition of the catch in the state waters portion of SNE. These programs would make it possible to detect and monitor the effects of input control based management, such as changes in the minimum and maximum legal size, v-notching programs, and closed seasons. However, the resolution of these programs are lacking in federal waters where a substantial portion (> 50%) of the SNE fishery currently occurs. As such, it would be difficult to assess the effectiveness of input control based management in the federal waters portion of SNE and the SNE stock as whole since a large portion of the fishery occurs in federal waters. To allow for the adequate quantification and assessment of the effectiveness of input control based management it would be necessary to expand commercial sea-sampling and port sampling programs into the federal waters portion of SNE.

## 2.2 Fishery Status

### *2.2.1 Commercial Fishery*

The SNE fishery is carried out by fishermen from the states of Connecticut, Massachusetts, New York, and Rhode Island, with smaller contributions from the states of New Jersey, Delaware, and Maryland. This fleet is comprised mainly of small vessels (22' to 42') that make day trips in near shore waters (less than 12 miles). Southern New England also has a considerable offshore fishery comprised of larger boats (55' to 75') that make multi-day trips to the canyons along the continental shelf. Approximately half of the landings for SNE come from the offshore fishery. There were a total of 623 permit holders reporting landings in 2009 out of the approximately 1486 individuals that could fish for lobster (Table 2). Of the 623 permit holders actively fishing, 132 fishermen landed 10,000 to 100,000 pounds and only 5 landed more than 100,000 pounds 2009 (Table 3). The majority of SNE lobstermen landed less than 10,000 pounds in 2009. In both Connecticut and New York fishermen only purchased about a 1/3 of the traps they are permitted and New Jersey fishermen purchase just over half of the tags they are permitted (Table 4).

Commercial landings in the SNE stock increased sharply from the early 1980s to the late 1990's, reaching a time series high of 9,935 metric tons in 1997 (Table 5). Landings remained near time series highs until 1999, then declined dramatically back to levels observed in the early 1980's. Four out of the five lowest levels of lobster landings in the SNE stock have occurred since 2003.

The largest proportion of total catch in SNE is landed by Rhode Island (1981 to 2009 mean = 37 %), followed by New York (25%), Connecticut (15%), Massachusetts (14%), and New Jersey/Delaware/Maryland/Virginia (9%) in descending order. Landings trends among states within the SNE stock were generally similar to the overall trend. One notable exception is New York and Connecticut, where the increase in the late 1990s and decline in the early 2000s are much more dramatic. The majority of SNE landings are from LCMAs 3 and 2, followed by 6, 4, and 5 respectively (Table 6).

The estimated total number of traps reported fished for the SNE stock unit only includes data from Connecticut, Massachusetts, Rhode Island, and New York. Data are not available for states south of New Jersey. Between 1981 and 1998 the number of traps fished in SNE increased six fold and reached a series high of 600,000 traps in 1998. Between 2000 and 2009, the number of traps fished declined by 39%, though current numbers of traps are twice the numbers reported in the early 1980s (Table 7). This large decline in fishing effort is most likely the result of a combination of regulatory changes to reduce effort, declining stock size and substantial increases in operating costs in the fishery associated with fuel and bait.

The total ex-vessel value of the SNE fishery in 2009 was $ 18,718,509. Approximately 50% of the revenue from lobster fishing in SNE comes from Rhode Island (Table 8). LCMA 2 brings the largest portion of this value at $ 6,619,144. LCMA 3 is second with $6,411,191 with more than half coming from Rhode Island. Very little economic data have been collected in SNE in recent years which make it difficult to assess the economic impacts of management measures on the fishery. A reduction in landings will reduce the ex-vessel value for SNE.

The non-trap fishery for lobster is a small percentage of the overall SNE landings. In 2010, a total of 88,038 pounds were landed (Table 9). The ex-vessel value is estimated at approximately $338,705. There are 1819 individuals with permits to fish for lobster without traps of those only 141 reported landings in 2010.

Table 2. Characterization of the 2010 trap fishery permits by state (data from NJ are from 2009).

| State | 2010 Total Permits | Active Permits (reported landings) | Total # of permits that reported did not fish | Total # of permits that did not report | Total # of State only permits | Total # of Dual permits | Total # of Federal only permits |
|---|---|---|---|---|---|---|---|
| MA | 146 (Area 2)<br>30 (Area 3) | 80 (Area 2)<br>24 (Area 3) | 42 (Area 2)<br>4 (Area 3) | 24 (Area 2)<br>2 (Area 3) | 85 (Area 2)<br>1 (Area 3) | 51 (Area 2)<br>3 (Area 3) | 9 (Area 2)<br>26 (Area 3) |
| RI** | 405 total;<br>362 Area 2,<br>43 Area 3 | 234 total;<br>210 Area 2,<br>24 Area 3 | 171 total;<br>152 Area 2,<br>19 Area 3 | 9** | 239 | 162 total;<br>123 Area 2,<br>39 Area 3 | 5 |
| CT | 460* | 129 | 73 | 258** | 447 | 4 | 13 |
| NY | 335 | 105 | 92 | 138 | 289 | 30 | 16 |
| NJ | 110 | 51 | N/A | 59 | 10 | 52 | 48 |

*number with allocations of which 246 had a license

**10 license holders did not report

** all of these are federal permits that are inactive and have been placed in "confirmation of permit history"; may have reported "did not fish" for requirements under RI Catch/Effort Logbook

Table 3. 2010 SNE Landings (data from NJ are from 2009)

| State | Total SNE Landings | Number of permit holders landing 1-100 lbs | Number of permit holders landing 101-1,000 lbs | Number of permit holders landing 1,001-10,000 lbs | Number of permit holders landing 10,001-100,000 lbs | Number of permit holders landing >100,000 lbs |
|---|---|---|---|---|---|---|
| MA | 698,097 | 21 | 33 | 35 | 25 | 0 |
| RI | 2,230,392 | 61 total;<br>17 trap,<br>44 non-trap | 92 total;<br>64 trap,<br>28 non-trap | 67 total;<br>60 trap,<br>7 non-trap | 53 total;<br>52 trap,<br>1 non-trap | 5 total (all trap) |
| CT | 442,110 | 22 | 55 | 48 | 11 | 0 |
| NY | 730,539 | 35 | 47 | 50 | 23 | 0 |
| NJ | 767,716 | 1 | 4 | 7 | 20 | confidential |

- NY landings are based on ACCSP reconciliation which includes all gear types, while the # of permit holders in each poundage category are based on NY reconciled landings (# of permit holders includes all gear types)

Table 4. 2010 SNE Trap Tag Trends

| State | SNE Trap Tags Authorized | SNE Trap Tags ordered | Number of Trap Hauls (not traps fished) |
|---|---|---|---|
| MA | 51,040 (Area 2 only)<br>40,326 (Area 3 only) | 36,342 (Area 2 only)<br>33,448 (Area 3 only) | 697,127 |
| RI | State = 42,719 traps / 47,021 tags (10% extra); Federal Area 2 = 87,213 traps / 95,056 tags (10% extra); Federal Area 3 = 50,670 traps / 55,746 tags | State = 34,261 (including extra tags); Federal Area 2 = 79,417 (including extra tags); Federal Area 3 = 39,035 (including extra tags) | 2,294,959 |
| CT | 301,460 (2010=300,330) | 88,363 (2010=88,646) | 997,551 (2010=828,228) |
| NY | 247,515 | 99,501 | NA |
| NJ | 83,500 | 45,095 | 484,137 |

Table 5. SNE Landings by state 1981 to 2010 (Data from NJ through 2009)

| | CT | MA | NY | NMFS_SNE | RI | Total |
|---|---|---|---|---|---|---|
| 1981 | 807,911 | 952,657 | 834,818 | 714,385 | 720,951 | **4,030,722** |
| 1982 | 880,636 | 1,162,922 | 1,119,143 | 1,006,416 | 1,669,873 | **5,838,990** |
| 1983 | 1,654,163 | 1,339,677 | 1,207,442 | 913,424 | 3,235,843 | **8,350,549** |
| 1984 | 1,796,794 | 1,495,383 | 1,308,023 | 1,167,629 | 3,611,570 | **9,379,399** |
| 1985 | 1,381,029 | 1,277,107 | 1,240,928 | 1,323,399 | 3,508,873 | **8,731,336** |
| 1986 | 1,253,687 | 1,300,797 | 1,416,779 | 1,382,713 | 4,309,815 | **9,663,791** |
| 1987 | 1,571,811 | 1,275,010 | 1,146,613 | 1,591,306 | 4,241,977 | **9,826,717** |
| 1988 | 1,923,283 | 1,383,499 | 1,571,308 | 1,700,084 | 3,897,431 | **10,475,605** |
| 1989 | 2,076,851 | 1,485,148 | 2,344,832 | 2,198,909 | 4,989,129 | **13,094,869** |
| 1990 | 2,645,951 | 2,004,577 | 3,414,911 | 2,350,427 | 6,382,563 | **16,798,429** |
| 1991 | 2,673,674 | 2,059,067 | 3,128,246 | 1,762,090 | 5,997,765 | **15,620,842** |
| 1992 | 2,534,161 | 1,792,128 | 2,651,067 | 1,262,287 | 5,502,215 | **13,741,858** |
| 1993 | 2,177,022 | 1,913,042 | 2,667,107 | 980,088 | 5,508,819 | **13,246,078** |
| 1994 | 2,146,339 | 2,157,734 | 3,954,634 | 598,248 | 6,007,655 | **14,864,610** |
| 1995 | 2,541,140 | 2,160,576 | 6,653,780 | 663,276 | 5,033,502 | **17,052,274** |
| 1996 | 2,887,573 | 2,151,980 | 9,408,519 | 690,672 | 4,971,278 | **20,110,022** |
| 1997 | 3,466,741 | 2,575,621 | 8,878,395 | 895,558 | 5,443,201 | **21,259,516** |
| 1998 | 3,712,680 | 2,421,038 | 7,896,803 | 744,233 | 5,273,615 | **20,048,369** |
| 1999 | 2,594,741 | 2,181,391 | 6,452,472 | 985,927 | 7,656,157 | **19,870,688** |
| 2000 | 1,385,764 | 1,628,542 | 2,883,468 | 1,005,708 | 6,484,219 | **13,387,701** |
| 2001 | 1,321,904 | 1,649,837 | 2,052,741 | 640,557 | 4,179,518 | **9,844,557** |
| 2002 | 1,063,217 | 1,653,592 | 1,440,165 | 293,321 | 3,600,040 | **8,050,335** |
| 2003 | 667,817 | 1,024,079 | 945,895 | 249,947 | 2,743,104 | **5,630,842** |
| 2004 | 640,351 | 989,308 | 1,171,210 | 425,828 | 2,250,458 | **5,477,155** |
| 2005 | 710,990 | 1,117,459 | 1,225,428 | 436,192 | 2,243,458 | **5,733,527** |
| 2006 | 790,259 | 1,199,155 | 1,301,440 | 529,243 | 2,768,815 | **6,588,912** |
| 2007 | 545,481 | 850,371 | 888,898 | 760,988 | 2,322,336 | **5,368,074** |
| 2008 | 416,722 | 751,508 | 706,843 | 798,390 | 2,932,826 | **5,606,289** |
| 2009 | 442,110 | 880,517 | 730,539 | 815,703 | 2,397,574 | **5,266,443** |
| 2010 | 350,982 | 698,097 | 794,753 | | 2,230,392 | Incomplete |

Table 6. 2010 SNE Landings by LCMA (NJ data are from 2009)

| State | LCMA 2 | LCMA 3 | LCMA 4 | LCMA 5 | LCMA 6 |
|---|---|---|---|---|---|
| MA* | 449,574 | 240,361 | None | None | None |
| RI | 1,035,983 | 1,194,353 | 56 | 0 | 0 |
| CT | 16,056 | 269 | 0 | 0 | 334,657 |
| NY** | 11,005 | 164,251 | 80,659 | 0 | 474,624 |
| NJ | 0 | 238,778 | 519,907 | 9,031 | 0 |

*A small portion of MA SNE landings are in OCC
**NY landings are based on ACCSP reconciliation which includes all gear types

Table 7. Traps reported fished from 2000 to 2010 in SNE by State (2010 data for RI not available)*

| Year | Connecticut | Massachusetts | New York | Rhode Island | Total |
|---|---|---|---|---|---|
| 2000 | 122,386 | 68,162 | 212,767 | 170,616 | 573,930 |
| 2001 | 121,501 | 65,225 | 191,853 | 173,133 | 551,712 |
| 2002 | 117,731 | 78,965 | 157,747 | 152,021 | 506,464 |
| 2003 | 85,048 | 63,444 | 101,207 | 133,687 | 383,386 |
| 2004 | 84,071 | 55,191 | 102,351 | 128,081 | 369,694 |
| 2005 | 83,946 | 47,779 | 85,817 | 117,610 | 335,152 |
| 2006 | 90,421 | 52,990 | 89,301 | 120,242 | 352,954 |
| 2007 | 81,792 | 51,807 | 81,424 | 136,248 | 351,271 |
| 2008 | 56,355 | 44,704 | 69,884 | 113,808 | 284,751 |
| 2009 | 63,824 | 40,841 | 53,265 | 110,236 | 268,166 |
| 2010 | 53,516 | 40,475 | 69,410 | not available | |

Table 8. 2010 Ex-vessel value of SNE Landings (in dollars) (NJ value is for 2009)

| State | All SNE | LCMA 2 | LCMA 3 | LCMA 4 | LCMA 5 | LCMA 6 |
|---|---|---|---|---|---|---|
| MA* | $2,994,836 | $1,928,672 | $1,031,147 | na | na | na |
| RI | $9,307,164 | $4,323,035 | $4,983,895 | $234 | 0 | 0 |
| CT | $1,453,279 | $66,472 | $1,114 | na | na | $1,385,480 |
| NY** | $2,565,638 | $300,965 | $395,035 | $186,992 | $135,413 | $1,547,233 |
| NJ | $2,397,592 | TBD | TBD | TBD | TBD | TBD |

*A portion of MA landings are from the area 2/3 overlap therefore those are only accounted for in the total $ of SNE ex vessel

**NY ex vessel $s and landings by month and LCMA from SAFIS were used to determine the $/lb by area, this was then applied to ACCSP reconciled landings (which include all gear types) by month and LCMA to estimate the ex vessel $

Table 9. Number of SNE non-trap permits that can land lobster in 2010 (NJ values are for 2009).

| State | Total Permits in SNE | Total numbers of permits with landings in SNE | Total non-trap landings in SNE | Ex-Vessel Value |
|---|---|---|---|---|
| MA | 517 | 16 | 3,502 | $15,023 |
| RI | 1,168 | 82 | 50,985 | $212,754 |
| CT | 44 | 14 | 1,268 | $ 5,250 |
| NY** | 90 | 29 | 32,303 | $120,167 |
| NJ | 0 | N/A | 1,777 | $5,511 |

** Landings were calculated by determining % landings from non-trap gear from NY recall survey and applying this percentage to the reconciled landings. The average ex-vessel $ values for the year were applied to these landings.

### *2.2.2 Recreational Fishery*

The states of Massachusetts, Rhode Island, Connecticut, and New York collect recreational information on lobster landings (Table 10). The recreational landings are generally only a few percent of the state's total landings. Lobster are mainly harvested by traps and diving.

**Massachusetts**

Basic recreational lobster catch and effort data (i.e. number of lobster harvested, number of traps fished) have been collected via the permit-renewal process since 1971. The report form was modified in 2007 to include an 'area-fished' component. Consequently, recreational catch and effort data are now available by stock area. In 2009, 826 recreational lobster permits were issued in SNE. 5, 246 pots were fished to catch 17, 125 pounds of lobster. 1,927 pounds were caught diving.

**Rhode Island**

Since 1999, submission of recreational lobster catch/effort data from recreational lobster trap and lobster diver s has been voluntary. During the period 1999-2007, RI recreational lobster landings have averaged 0.224% of the total RI lobster landings. In 2009 644 recreational pot permits were issued. Of the 3,220 total maximum allowed 209 pots were reported fished catching 3,675 pounds. 496 pounds were caught by divers. As of 2011, Rhode Island no longer collects data from recreational fishermen.

**Connecticut**

From 1983 to 1999, the recreational lobster fishery in Connecticut landed between 38 and 105 thousand lobster annually, equivalent to a maximum of 6% of commercial landings during those years. Since the mortality event that occurred in Long Island Sound in 1999, the recreational lobster fishery in Connecticut waters has landed 15-30 thousand lobster, equivalent to about 2% of commercial landings. Total pots fished recreationally declined from 4,000 - 9,500 in 1983-1999 to less than 3,700. The number of license holders has also declined from 1,200–2,800 issued between 1983 and 1999 to 900-1,200 issued between 2000 and 2006. On average, 73% of recreational lobster license holders reported using their licenses between 1983 and 1999.

**New York**

New York recreational lobster landings from 1998 – 2007 averaged 0.4% (range of 0.1%-1.4%) of the total New York landings. The number of licenses ranged from 1,728 in 1998, to 882 in 2000. On average, 65% of the harvest was from traps and 32% from diving.

**New Jersey**

New Jersey collects no recreational landings data for American lobster. However, a recreational lobster pot permit is available which allows the permitee to fish up to 10 lobster traps in state waters. Hand-harvest by divers is also allowed and requires no permit. Recreational harvesters may take no more than six lobster per day.

Table 10**.** Characterization of the 2010 SNE recreational lobster fishery

| State | Number of Recreational Pot permits | Total number of Pots | Total Recreational Landings by Pots | Total Landings by Divers |
|---|---|---|---|---|
| MA (2009 data) | 826 | 5,246 | 17,125 | 1,927 |
| RI | 568 | 2,840 total maximum allowed; 351 reported fished | 4,381 | 887 |
| CT (2009 data) | 875 (2010=505) | 3,474 | 8,307 | 608 |
| NY (2009 data) | 1,160 | 855 | 6,333 | 2,029 |
| NJ (2009 data) | 23 | 230 | unknown | unknown |

## 2.3 SNE Management Status

Lobster are currently managed under Amendment 3, and its sixteen addenda. Table 11 describes current management measures for all LCMAs that fall within SNE. Since 2010 all areas have a minimum size of 3 ⅜", with the exception of LCMA 3, which has a 3 ½". All areas also have the same maximum size of 5 ¼", with the exception of LCMA 3, which is at 6 ¾". All areas have the same definition of a v-notch which is the notch is at least as deep as 1/8 inch, with or without setal hairs. It is only mandatory to notch all eggers in the Gulf of Maine portion of LCMA 3. All areas have history-based effort control programs. LCMA 2 has the lowest trap cap set at 800 traps. Addenda I, IV, VII, XIV established the various effort control programs.

Table 11. Current Management measures by LCMA in SNE.

| Management Measure | Area 2 | Area 3 | Area 4 | Area 5 | Area 6 |
|---|---|---|---|---|---|
| Trap Limits/Number | Hist. Part (800 max) | Hist. Part.* (1945 max) | Hist. Part. (1440 max) | Hist. Part. (1440 max) | Hist. Part. |
| Gauge Size | 3-3/8" | 3-1/2" | 3-3/8" | 3-3/8" | 3-3/8" |
| Vent Rect. | 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" |
| Vent Cir. | 2-5/8" | 2-11/16" | 2-5/8" | 2-5/8" | 2-5/8" |
| V-notch requirement | None | Mandatory for all eggers above 42°30' | None | None | None |
| V-Notch Definition (possession) | 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] |
| Max. Gauge (male & female) | 5 ¼" | 6 3/4" | 5 ¼" | 5 ¼" | 5 ¼" |

[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 inch, 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.
*LCMA 3 started with a max trap limit of 2656 and was reduce through trap reductions that were completed in 2010.

The non-trap commercial fishery is managed by a trip limit. The current trip limit for non trap fishermen is 100 lobster (per 24 hour period) or 500 lobster for trips longer than 5 days.

## 2.4 Economic Impacts

### *2.4.1 Commercial*

Based on data provided by Connecticut and Maine the lobster fishery includes a broad range in participation where a small number of fishermen account for a disproportionate percentage of the landings. Lobster landings in Connecticut were distributed such that 5% of active permit holders

in 1988 (24 of 476) were responsible for about 50% of the state's total landings (948k of 1.9 million lbs). In 1998, a period of peak abundance and landings in Long Island Sound, 11% (30 of 283) of active permit holders were responsible for 50% of the landings (1.88 m of 3.7 million pounds). This increase in the percent of lobstermen contributing to those landings is attributed to high lobster abundance and the consequent increase in the number of full time fishermen following the die-off of 1999 and the resultant decreased abundance, many fishermen dropped out of the fishery and of those remaining fewer fished full-time. Consequently, the distribution of landings per fishermen returned to a state where just 6% of permit holders (7 out of 122) were responsible for half of the landings in 2009 (2010K of 415K pounds). Though Connecticut is responsible for a small portion of the total American lobster landings on the Atlantic Coast, a similar pattern in the distribution of landings among fishermen has been observed in Maine's fishery which accounts for 95% of the total coast wide landings. In that state 17% of permit holders (750 of 4,502) accounted for 50% of the landings in 2008 (Figure 1), a ratio similar to that observed at the height of the Connecticut commercial lobster fishery in 1998. During years of high abundance more participants fish intensely, consequently a larger percentage of fishermen account for the top 50% of landings. The broad continuum of landings per fisherman with many small players, fewer intermediate level participants and a very few fishermen with large landings follows a "Pareto distribution" sometimes used in economics to model the non-normal distribution of incomes or of human population densities extending from country to suburb to city. The non-normal distribution of landings per participant in the lobster fishery is an important attribute to consider when evaluating management options, particularly through input controls.

Despite large differences in total participation and ex-vessel value, the distribution of permit holders by landings category is similar among SNE states (Figure 2). Data for 2009 show that, independent of resident state*, the large majority (81%) of permit holders land 10,000 pounds or less per year (Table 12). Given the large percentage of lobstermen that land in this category, fewer than 5% of permit holders (10 out of 575 total) in any SNE state* land more than 100,000 pounds per year. This amounts from zero to nine permit holders out of a range of 51 to 237 issued by these states in 2009.

When the ex-vessel value of the lobster fishery is examined by state, 2009 data show that approximately 50% of the total SNE value is derived from landings made in Rhode Island (Figure 3) with the majority (26% and 24%) of the value coming from LCMAs 3 and 2 harvest respectively. The remainder of the SNE value is comprised of 18% landed in Massachusetts with the other states contributing 10-12% each of the value of landings. Based on ex-vessel value, LCMAs 2 and 3 dominate the SNE lobster fishery, contributing $6.6 and $8 million respectively, with LCMA 6 ranking third at $3.6 million (Table 8, Figure 4).

### 2.5 Management Tools Considered

To respond to the original Board objectives to reduce exploitation by 50 to 75%, the Plan Development Team (PDT) evaluated multiple input and output control measures, including: limited entry; trap limits; minimum and maximum sizes; escape vents; mandatory female v-notch requirements, a male-only fishery; closed seasons; closed areas; and quota-based landing limits. While the PDT acknowledged the effectiveness of certain output controls (like a quota based on

landings) and input controls, the PDT also looked at the ability to effectively monitor, administer, and uniformly enforce selected management tools in the short and long term.

For this evaluation, the PDT made extensive use of the TC's expertise, including the document: Southern New England Exploitation Reduction Recommendations (ASMFC M-10-120), Appendix 2. Based on the PDTs intent to evaluate effective input and output management measures - not only for their biological effectiveness, but also the ability of jurisdictions to effectively monitor, administer, and uniformly enforce selected management tools in the short and long-term, several potential management tools were considered. Many were not recommended for this action.

Regarding biological measures of minimum and maximum sizes and v-notch standards for females, there is far less discrepancy among the management areas - all areas have a 3 3/8" minimum size and a 5 ¼" maximum size - except LCMA 3 that has a 3 ½" minimum size and 6 ¾" maximum. The PDT acknowledges the disparate biological measures in Area 3 represent a management conundrum, and this issue is discussed in detail later in this section. On balance, size limits can lead to increased egg production, and uniform size limits can be effectively enforced at sea or at shore.

The use of trap limits as an input control, and the ability to determine percent landings reductions based on trap reductions is poorly understood (ASMFC M10-120). A modest decline in recent fishing mortality was detected in the latest assessment following a major decline in traps fished strongly suggesting that mandated trap reductions implemented to reduce landings/exploitation rates will need to be much larger on a percentage basis than the percentage reduction in landings being sought. However, although some studies relating fishing effort (traps) to landings have been done in Maine, no similar studies have been done in southern New England to more precisely quantify the relationship between traps fishing and landings. Consequently, the TC is reluctant to provide advice on the percent reduction in active traps that may be required to achieve either a 50%, 75% or other percentage reduction in landings.

The limited entry programs in LCMA 2, 3, 4, 5, and 6 each had unique qualifying criteria and eligibility periods resulting in widely disparate levels of latent effort among the areas. Consequently, measures to remove latent effort from the fishery will need to be developed for each LCMA based on the current amount of latency and the unique qualifying criteria and eligibility periods used by each management jurisdiction. For trap limits to be effective in reducing harvest and rebuilding the stock, latent effort must first be addressed to prevent this effort from coming back into the fishery as the stock grows and catch rates increase. Without action being taken to remove latent effort from the fishery any effort to rebuild the stock will be undermined by re-entry of trap effort. Further, currently active participants run the risk of never benefitting from the sacrifices made potentially over several years to rebuild the stock as former participants re-enter to take advantage of the increased stock.

The PDT also evaluated other measures such as a male-only fishery, or the use of mandatory v-notching, however the PDT took note of the TC opposition to a management strategy that focuses solely on a single sex harvest. In addition, the TC noted a concern for the reproductive dynamics of the SNE stock, since there are several areas in SNE where the sex ratio is already

highly skewed towards females, in some regions it is as high as 90%. Concern over the possible impacts of elevated water temperature on v-notched lobster and the potential for bacterial infections is also noted. In addition, either measure would increase the level of regulatory discards in the fishery and the potential for accelerated environmental stress from more frequent trap hauls. As a result, the PDT did not support either management tool for this action.

The use of season closures is another tool the TC identified and recommended to address the stock rebuilding in SNE. The TC noted that a seasonal closure, especially during the summer period, would likely provide greater biological benefit, by reducing handling during elevated water temperatures and high environmental stress periods. A closed season could also be effectively enforced. However, the PDT acknowledges the potential for adverse impacts to recreational users, industry that is reliant on the summer tourist trade, and the and the potential vessel safety concerns associated with restricting fishing to fall, winter and spring seasons.

Any proposals to establish output controls, i.e. a hard a quota, that is specific for the SNE stock will need to be considered very carefully, assuming fisheries in the other stocks (Gulf of Maine and Georges Bank) will not be quota managed. The enforcement and compliance challenges are significant in the short term if the SNE fishery were quota managed yet the other two stocks that are producing in excess of 95% of the northeast region's lobster landings do not have similar controls.

At the March Board meeting, the Board directed the PDT to include additional options that were submitted to the PDT Chair by June 15, 2011. Three proposals were submitted (LCMA 3, The State of New Jersey, and Effort Consolidation Measures). These proposals were reviewed by the Technical Committee and the PDT. The Technical Committee concluded that none of the options met the original Board direction to reduce exploitation by 50 to 75%. The PDT considered but excluded each of the proposals because they did not meet the purpose and goal of the document to reduce exploitation by 50 to 75% in order to begin rebuilding the stock. The PDT recommended that these plans be examined more thoroughly once clear goals and objectives are established by the Board if they address effort control in the future and noted that effort control among the LCMAs should have common objectives. The Board may want to consider elements of the excluded proposals as a way to address effort control. At the August 2011 Management Board meeting the Board changed the objective to reduce exploitation by 10%. The PDT adjusted the proposed management options to reflect the new board direction for the final draft to be released for public comment.

## 3.0 Management Options

The following measures have are implemented to reduce the level of American lobster removals in SNE for LCMAs 2, 3, 4, 5, and 6. These measures are for all gear types and for both the commercial and recreational sectors, unless otherwise noted.

**3.1 10% Exploitation Reduction**: All SNE LCMAs must reduce exploitation by 10%. A 10% exploitation reduction can only be achieve through an increase in minimum size, a decrease in maximum size, or a season, a combination of these three could also be used to achieve the 10% reduction. LCMAs may also submit conservation equivalency plans. Each LCMAs measures are listed below.

a. **Increase in Minimum Size:** Only one minimum size can be implemented for each LCMA. States would use Table 12 to determine the minimum size limit that would achieve the 10% reduction
b. **Decrease Maximum Size:** Only one maximum size can be implemented for each LCMA. States would use Table 12 to determine the maximum size limit that would achieve the 10% reduction.
c. **Closed season:** Only one season closure can be implemented for each LCMA, meaning that all states/jurisdictions that land lobster from an LCMA must be closed at the same time. States would use Table 13 to determine the dates of the closed season to achieve the 10% reduction. Closures must be a minimum of one month. Note: a season closure will impact the GOM and GBK portion of LCMA 3 unless the Board considers dividing the SNE portion of LCMA 3 into its own management area or sub management area.

In SNE, a closed season could have additional conservation benefit if it occurred during the molt (June-July) and/or just prior to the time most females extrude eggs (July-August) (Appendix 2) so as to allow more females to extrude eggs prior to being harvested. Additionally, limiting fishing activity in late spring (April-June) would minimize premature egg loss for females carrying developing (brown/tan) eggs before their hatch. Extending a closure from June through September would protect the lobster stock during part of the elevated water temperature period (Appendix 2 need to get figure in excel format will then add to document), thereby preventing handling stress and mortality when water temperature are above 20°C, the threshold temperature causing immune, respiratory and cardiac trauma (Dove et al. 2005, Powers et al. 2004).

**LCMA Specific Plans to reduce exploitation by 10% (some plans were approved by the Board as conservation equivalency plans).**

LCMA 2

- Mandatory V-notching and immediately release of legal sized egg-bearing female lobsters effective June 1, 2012
- V notches must be to the right of the center flipper as viewed from the rear of the female lobster when the underside of the lobster is down. The v notch should be made by means of a sharp blade bladed instrument, at least ¼ inch and not greater than a ½ inch in depth and tapering to a sharp point.

LCMA 3

- Minimum gauge increases to 3 17/32 inches effective January 1, 2013

LCMA 4

- Mandatory V-notching and immediately release of egg-bearing female lobsters effective July 1, 2012
- V notches must be to the right of the center flipper as viewed from the rear of the female lobster when the underside of the lobster is down. The v notch should be made by means of a sharp blade bladed instrument, at least ¼ inch and not greater than a ½ inch in depth and tapering to a sharp point.
- A season closure to the landing of lobsters from February 1 through March 31.

- During the February 1-March 31 closure, lobster potters will have a two week period to remove lobster pots from the water and may set lobster pots one week prior to the end of the closed season.

LCMA 5

- Mandatory V-notching and immediately release of egg-bearing female lobsters effective January 1, 2013
- V notches must be to the right of the center flipper as viewed from the rear of the female lobster when the underside of the lobster is down. The v notch should be made by means of a sharp blade bladed instrument, at least ¼ inch and not greater than a ½ inch in depth and tapering to a sharp point.
- A season closure to the landing of lobsters from February 1 through March 31.
- During the February 1-March 31 closure, lobster potters will have a two week period to remove lobster pots from the water and may set lobster pots one week prior to the end of the closed season.

LCMA 6

- A season closure to the landing of lobsters from September 8-November 28
- During the September 8-November 28 closure, lobster potters will 2 week gear removal and 2 week gear replacement grace period during the closed season, and no lobster traps can be baited more than 1 week prior to season reopening.

Closure Dates achieving a nominal 10% reduction in total landings

| | First | Last | Commercial | Recreational | Wt'd Total |
|---|---|---|---|---|---|
| Option 1 | **3-Sep** | **20-Nov** | **9.977%** | **13.280%** | **10.033%** |
| Option 2 | **8-Sep** | **28-Nov** | **10.043%** | **12.759%** | **10.090%** |
| Option 3 | **10-Sep** | **2-Dec** | **10.099%** | **12.159%** | **10.134%** |
| Option 4 | **15-Sep** | **7-Dec** | **10.198%** | **10.983%** | **10.211%** |

Table 12. Percent reduction in harvest with changes in minimum and maximum size limit by LCMA.

| Alternative Minimum Sizes & 5-1/4" Maximum Size *for LCMA 3 it is max is 6-3/4" | LCMA 2 | LCMA 3* | LCMA 4 | LCMA 5 | LCMA 6 | SNE |
|---|---|---|---|---|---|---|
| > 3-1/2" (88.9 - 133.4mm) | -37.1% | 0.0% | -26.3% | -7.1% | -45.6% | -22.8% |
| > 3-17/32" (89.7 - 133.4mm) | -45.3% | -4.4% | -32.1% | -9.4% | -54.0% | -28.5% |
| > 3-9/16" (90.5 - 133.4mm) | -53.4% | -9.3% | -39.0% | -11.7% | -61.9% | -35.0% |
| > 3-19/32" (91.3 - 133.4mm) | -62.8% | -13.9% | -46.9% | -14.5% | -70.8% | -42.2% |
| > 3-5/8" (92.1 - 133.4mm) | -69.8% | -18.8% | -53.9% | -16.5% | -75.0% | -48.5% |
| > 3-21/32" (92.9 - 133.4mm) | -75.1% | -23.5% | -59.9% | -18.6% | -79.4% | -54.0% |
| | | | | | | |
| **3-3/8" Minimum Size & Alternative Maximum** | **LCMA 2** | **LCMA 3** | **LCMA 4** | **LCMA 5** | **LCMA 6** | **SNE** |
| > 3-3/8" - 4" (85.7 - 101.6mm) | -1.9% | -26.2% | -5.7% | -55.3% | -2.1% | -11.1% |
| > 3-3/8" - 3-5/8" (85.7 - 92.1mm) | -30.2% | -75.6% | -46.1% | -83.5% | -25.0% | -51.1% |
| | | | | | | |
| **3-1/2" Minimum Size & Alternative Maximum** | **LCMA 2** | **LCMA 3** | **LCMA 4** | **LCMA 5** | **LCMA 6** | **SNE** |
| > 3-1/2" - 5 3/4" (88.9 - 146mm) | | -1.8% | | | | |
| > 3-1/2" - 5 1/2" (88.9 - 139mm) | | -2.9% | | | | |
| > 3-1/2" - 5 1/4" (88.9 - 133.4mm) | -37.1% | -3.9% | -26.3% | -7.1% | -45.6% | -22.8% |
| > 3-1/2" - 5" (88.9 - 127.0mm) | -37.1% | -5.8% | -26.4% | -12.6% | -45.6% | -23.4% |
| > 3-1/2" - 4 1/2" (88.9 - 114.3mm) | -37.4% | -17.3% | -27.1% | -25.9% | -45.8% | -28.1% |

Table 13. 2007-2009 Average SNE Landings (Percentage) By Month and LCMA

| LCMA | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Totall |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 3.1% | 1.4% | 1.8% | 3.4% | 5.6% | 13.3% | 25.2% | 18.1% | 10.8% | 7.3% | 5.4% | 4.6% | 100% |
| 3 | 2.0% | 1.0% | 1.4% | 2.5% | 7.2% | 10.2% | 14.8% | 17.0% | 15.8% | 14.5% | 9.2% | 4.3% | 100% |
| 4 | 3.2% | 1.8% | 1.9% | 5.1% | 9.3% | 14.4% | 16.9% | 14.8% | 11.5% | 9.2% | 6.5% | 5.5% | 100% |
| 5 | 2.0% | 1.8% | 1.4% | 5.5% | 13.3% | 16.5% | 14.7% | 12.2% | 9.0% | 9.9% | 7.5% | 6.2% | 100% |
| 6 | 4.6% | 1.4% | 1.6% | 4.3% | 9.3% | 11.7% | 29.1% | 20.2% | 5.7% | 2.6% | 3.1% | 6.5% | 100% |
| All of SNE | 2.9% | 1.3% | 1.6% | 3.4% | 7.6% | 12.0% | 20.6% | 17.5% | 11.8% | 9.5% | 6.7% | 5.0% | 100% |

**3.2 Input/Output Controls Subcommittee:** Immediate establishment of a subcommittee to evaluate all jurisdictions ability to monitor various input or output controls, such as a quota-based approach.

## 4.0 Compliance

If the existing lobster management program is revised by approval of this draft addendum, the American Lobster Management Board will designate dates by which states will be required to implement the addendum. The compliance schedule will take the following format:

April 2012: States must submit programs to implement Addendum XVII for approval by the American Lobster Management Board

May 2012: The American Lobster Board Approves State Proposals

January 1, 2013: All states must implement Addendum XVII through their approved management programs. States may begin implementing management

programs prior to this deadline if approved by the Management Board (see LCMA specific measures in section 3.0).

## 5.0 Recommendation for Federal Waters

The SNE lobster resource has been reduced to very low levels. The Atlantic States Marine Fisheries Commission believes that additional fishery restrictions are necessary to prevent further depletion of the resource.

The Atlantic States Marine Fisheries Commission believes that the measures contained in Amendment 3 and Addenda I-XVII are necessary to limit the expansion of effort into the lobster fishery and to rebuild lobster stocks to recommended levels. ASMFC recommends that the Federal government promulgate all necessary regulations to implement the measures contained in Section 3 and 4 of this document.

## 6.0 References

ASMFC, 2009. Stock Assessment Report No. 09-01.

ASMFC 2010, SNE Exploitation Reduction No. 10-120.

**Appendix 1**

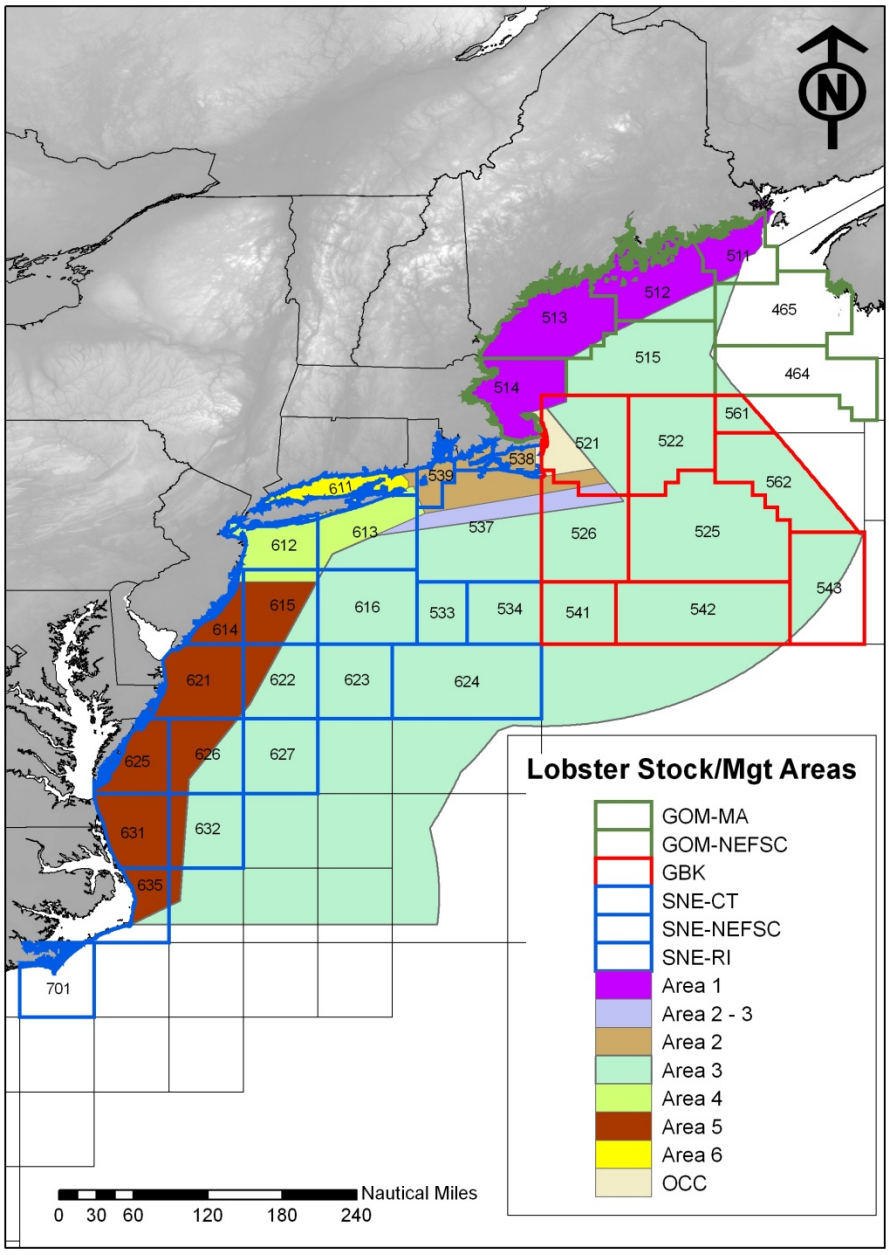


Figure 1. Chart of Lobster stock units (GOM, GMB, and SNE), management conservation areas (1-6 and OCC), and NMFS statistical areas.

**Appendix 2**

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**MEMORANDUM**

November 2, 2010

To: American Lobster Board

From: American Lobster Technical Committee

Re: Southern New England Exploitation Reduction Recommendations

At the Special July Board meeting the American Lobster Board (Board) tasked the Technical Committee (TC) with evaluating the impacts on Southern New England (SNE) landings by using a variety of management options:

- closed season by state, Lobster Conservation Management Area (LCMA), and time period [1-month intervals],
- closed areas evaluated by state, LCMA and/or statistical area,
- quota based output controls based on landings by state and LCMA,
- trap limits as an input control and determine percent landings reduction associated with levels of trap reductions,
- male only / v-notch program,
- modifications to the minimum and maximum gauge size.

In addition, the Board tasked the TC to evaluate scenarios relative to a 50 or 75% reduction in exploitation to the status quo. The TC has proceeded with the assumption that exploitation reductions are equivalent to an equal percentage in landing reductions for the base years of 2007-2009, as shown in table one. As presented in previous reports, the TC would like to remind the Board that only under favorable natural mortality conditions would deterministic projections result in the SNE stock rebuilding with the proposed exploitation reductions.

There is tremendous uncertainty in the effectiveness of any measure to reduce exploitation short of direct controls on landings. The TC is not able to quantitatively evaluate the impact of each management measure listed above. Regardless, the TC has provided the Board with advice on each measure relative to previous experience in other fisheries, information currently available to the TC from the SNE stock, and a biologically driven approach to provide the maximum benefit to the resource.

*The Technical Committee recommends that the Board use a combination of a quota and season closure (June through September) to achieve a 75% reduction in exploitation. The incorporation of a limited closed season in concert with a quota would provide maximum biological benefit during molt, egg extrusion, and high environmental stress periods.*

**I. QUOTAS**

The establishment of a SNE stock quota that is a 50 or 75% reduction from the previous three years' landings is the preferred option to provide maximum benefit to the SNE lobster stock. The TC recommends a quota be distributed for the SNE stock, based on the previous landing trends (Table 1). Furthermore, the TC feels that a quota combined with seasonal closure timed to avoid molting, egg extrusion, and high environmental stress periods from June through September, would provide maximum benefit to the stock. Table 2 and 3 show what the overall SNE quota would be for a 50 and 75% reduction, respectively, based on the average landings for 2007-2009.

It is possible to control the exploitation rate by directly controlling the amount of lobster taken through a quota. The quota could be adjusted to account for changes in the abundance of lobster if the stock begins to rebuild. Quota systems could be established for total and/or individual catch as these systems have different incentives for rate of catch. Quotas place a large administrative burden on resource agencies, and to be effective, require good monitoring and enforcement. Measurements of conservation benefits are generally pre-determined. A quota set lower than the historic catch, constitutes a direct reduction in exploitation. Distributional effects of quota management systems remain an important consideration and should be thoroughly investigated by the social and economic subcommittee.

Quota Management Systems (QMS) have been introduced in a variety of lobster fisheries worldwide. The offshore Canadian Lobster Fishery (LFA 41) established a total allowable catch (TAC) in 1985. Landings in this area have remained at or below the TAC level since introduction, and are remarkably stable when compared to adjacent inshore areas in Canada/US and offshore areas in the US (DFO 2009). Full Individual Transferable Quota (ITQ) systems have been established in New Zealand (1988) and Tasmania lobster fisheries (1998). After eight years of QMS in New Zealand, Annala (1996) reports that the biological status of the stock has improved, discards have been reduced, the stock assessment process/TAC setting has become more transparent and the economic performance of the fishery has improved. In Tasmania, initial results following establishment of a QMS indicate that fishing mortality has measurably declined and fishing effort has declined by nearly 30% (Ford 2001).

**II. SEASON CLOSURES**

In addition to a stock-wide quota, the TC recommends a seasonal closure during June through September to provide maximum benefit during molt, egg extrusion, and periods of high environmental stress. Extending the closure through September would include the entire high water temperature period. The TC recommends a seasonal closure as an effective way of implementing the QMA discussed above, not as a means of achieving a 50 or 75% reduction in exploitation because of the unknown compensatory ability of the fishery to shift exploitation to the open fishing season (i.e. recoupment).

In SNE, a closed season would have the greatest conservation benefit if it occurred during the molt (June-July and secondarily November-December), and/or just prior to the time most females extrude eggs (July-August) so as to allow more females to extrude eggs prior to being captured. Additionally, limiting fishing activity in late spring (April-June) would minimize premature egg loss for females carrying developing (brown/tan) eggs before their hatch (Appendix 2A). Extending a closure from June through September would protect the lobster stock during the entire high water temperature period (Figure 1), thereby preventing handling stress and mortality when water temperature are above 20°C, the threshold temperature causing immune, respiratory and cardiac trauma (Dove et al. 2005, Powers et al. 2004).

Currently, lobster landings occur in every month in all states and LCMAs, however they show a strong and consistent seasonal pattern (Figure 2 and Table 4). In 2007-2009, less than 5% of the total was landed per month in the first quarter of the year, while 3-14% (average 7.5%) was landed per month in the second and fourth quarters, and 8-27% (average 17%) was landed per month in the third quarter (Table 4). If fishing patterns do not change, a closure encompassing the third quarter (July-September) would reduce harvest by 50% (Table 5). Closing spring and fall months along with summer months would reduce harvest by 75%. However, there are many factors which would compel fishers to change their fishing patterns to accommodate a closed season by recouping lost harvest during the open season.

Closed seasons have been used to manage American lobster in Canadian waters for many years. The Canadian experience has shown that a short fishing season of several months duration can result in fishing mortality rates comparable to a completely open season because the fishery is able to recoup all of their catch during the months open to harvest. Recoupment can be 100% in areas where the lobster population is particularly stationary. For example, currently winter landings (January-March) in all areas average only 6% of the total; however, prohibiting harvest in preceding months may increase fishing effort as well as resource availability during this historically inactive season.

Economic implications of seasonal closures in Maine were evaluated by Cheng and Townsend (1993); they found that gross revenues would increase from extended seasonal closures (e.g. August to November) due to a redistribution of landings across seasons which evened out prices and strengthened markets. This analysis also showed that short (1-2 months) regional closures in peak months (August and/or September) increased the value of landings, but only by a small amount because landings increased immediately after the closures, seriously depressing prices in the late fall (October-December). Optimal readjustment of landings required moving landings from July through December into January through June. In other words, closures of at least an entire season (3-4 months) were required to stabilize the fishery from an economic standpoint.

Eliminating harvest during the molt and times of high water temperature may substantially reduce total mortality and aid in rebuilding the spawning stock by minimizing gear-induced immediate and delayed mortality as well as sublethal stress. In inshore areas of Southern New England late summer and fall (July-October) bottom water temperatures often exceed 20$^{o}$C, the physiological stress point for American lobster. Warm hypoxic waters are known to herd lobster into ‘islands’ of marginally sustainable habitat. During this time of year, repeated catch and

throwback into warm low-oxygen water can be at least stressful if not fatal, especially if major predators are actively feeding in the same area.

## III. AREA CLOSURES

The TC does not recommend using area closures as the primary method of reducing exploitation. Levels of exploitation reduction, using landings as a proxy, can only be assigned Statistical Area scale or approximated to an LCMA with numerous assumptions (see notes in Table 7) Quantifying lobster concentrations on a smaller scale can only be done using patterns in randomized research trawl surveys or anecdotal information, with unacceptable levels of uncertainty associated with either approach. It is therefore impossible to assess what the impacts of smaller areal closures on the SNE stock as a whole. Implementing and enforcing smaller area closures would require restructuring reporting regulations to march closure boundaries. Additional measures would be needed to prevent effort from shifting from closed to open areas.

Analyses of existing closed reserves (Murawski et. al 2000) have shown that optimal closed-area boundaries should be placed so as to protect spawning concentrations and/or nursery areas. These areas have not been clearly identified in all SNE LCMAs and may be quite variable, both seasonally and regionally, due to changes in dispersion/migration of spawning adults and larval drift.

No-take zones and marine reserves have been instituted in areas inhabited by the Florida spiny lobster and the New Zealand spiny lobster (Babcock et. al 1999, Kelly et. al 2002, Cox and Hunt 2005). After several years of protection, lobster populations within these reserves have increased in average size, and therefore reproductive potential, and in some cases increased in overall density compared to abundance outside the reserve boundaries. However, these conservation benefits may be species-specific and depend upon behavior, migration patterns, and size of the reserve. The animal's need to migrate out of a closed area is a critical determinant of the effectiveness of an area closure. Existing spiny lobster reserves range from 350-3000 hectares or 90-777 sq. miles (Babcock et. al 1999, Cox and Hunt 2005). Area closures of this magnitude would be equivalent to a complete moratorium for those fishers whose grounds are closed, or trigger a large influx of effort into open areas. Either outcome would have a significant negative impact on the fishery without clear benefit to the resource.

Currently, the majority of landings in each LCMA are taken a single statistical area (SA) (Table 6 and 7). The exact locations of where fishing occurs are not recorded the landings database. The database only provides landing by statistical area. Closure at the statistical area or LCMA scale would either shut the fishery down or have little or no effect. The greatest poundage is taken in LCMA 3, 69% of which was taken in SA 537 in 2007-2009, followed by 20% taken in SA 616. Similarly, 79% of LCMA 2 landings were taken in SA 539, and 85% of LCMA 4 landings were taken in SA 612. All of LCMA 6 landings were taken in SA 611. Only the fishery in LCMA 5, which contributed 3% to 2007-2009 SNE landings, is dispersed widely enough that closure of one or two statistical areas would almost eliminate the fishery.

## IV. TRAP LIMITS

The TC does not recommend the use of trap reductions alone as a mechanism to reduce exploitation because the recoupment potential for the industry to recover from trap reductions is considerable and poorly understood. There is a poorly understood non-linear relationship between the number of traps fished and landings, therefore we are unable to recommend the number of traps that would need to be removed from the SNE fishery to reduce exploitation by 50 or 75 %. However, it is the TC's belief that the current fishery needs be scaled to the size of the of the SNE stock, and that the total fishing capacity (both active and latent traps) of the SNE fishery severely limits the Boards ability to manage this fishery and to provide adequate conservation to the SNE stock.

If trap reductions were used as a management tool, the TC recommends the Board take an iterative approach, as the relationship between traps and landings in SNE is not known. To achieve a 50 or 75 % reduction in landings we would recommend a 75% reduction in actively fished traps from the 2005-2007 levels. The initial reduction would translate to overall SNE trap levels dropping from 221,000 to 55,000 traps. Additional reductions will likely be needed until the desired levels are achieved. It is important that latent, or unused trap allocations, are not part of the 75% reduction and would not re-enter the fishery unless the resource were to rebuild. We recommend proportional decreases in trap numbers throughout all of the LCMA's within SNE stock area. Trap reductions that do not achieve 50% or 75% reductions in landings could still enhance the benefits of other types of regulation changes.

The number of traps reported as actively fished has dropped by 56% from 2000 (573,931) through 2009 (251,542) (Figure 3). However, traps have not declined proportionally among SNE states. From information that is available, New York has seen the largest decline at 79%; followed by Connecticut, 54%; Massachusetts, 40%; and Rhode Island at 35%. The board should be cognizant that the observed reductions in the active number of traps fished are not always the result of a management measure and do not represent the large amount of latent traps that exist in each LCMA. There is no time series of trap use available for states south of New York.

Trap reductions are eventually expected to result in overall effort reductions, however the number of traps allowed in the fishery is a poor definition of effort. It is generally agreed that one unit of trap reduction will not equal one unit of effort reduction. The numbers of trap hauls, with knowledge of their respective soak times and location represents a more direct measure of effort. However it is difficult to predict how reductions in total traps will affect these other variables.

A recent example of this lack of direct relationship between traps and harvest is in the Florida spiny lobster fishery where traps were recently reduced by just over 40 % resulting in a 16% decline in fishing mortality (Muller et al 1997). Experimental (Wilson 2010) and theoretical (Fogarty and Addison 1997) results suggest that large trap reductions would be required to reduce fishing mortality in the American lobster fishery. This is due to both the excess of gear currently being fished and the ability of the fishing industry to adjust fishing practices.

Regional examples of recoupment of catch by the lobster industry with reduced numbers of traps and/or seasons include the Outer Cape Cod (OCC) LCMA, Monhegan Island Lobster

Conservation Area in Maine and the Southwest Nova Scotia fishery (Lobster Fishing Area 34). Following the implementation of the OCC trap allocation plan in 2004 there was 25.6% reduction in the number of active traps reported fished. Despite the decline in traps fished, the number of trap hauls has stayed remarkably stable at roughly 600,000 per year. This indicates that the fishery has maintained its effective level of effort by hauling traps more frequently and over a longer season to compensate for having fewer in number. The OCC LCMA reached the goal of a 20% reduction of active traps fished as intended in Addendum III. However, there has been no reduction in fishing mortality as intended by the trap reduction. In fact there is evidence that there has been a 40% increase in fishing mortality on the Georges Bank stock since 2002 in the OCC LCMA (ASMFC 2009, 2010).

The Monhegan Island Lobster Conservation Area (MILCA) is an approximately 30 $nm^2$ body of water surrounding Monhegan Island, located in the mid-coast Maine. Monhegan Island fishermen have observed a summer closed season since 1907. By statute, MILCA may have a maximum of 17 participants (there are currently 12). Recent legislative action expanded the open fishing to a maximum of 270 days starting no earlier than October 1, but reduced the maximum allowable traps from 600 to 475 (12 M.R.S. §6471). The final season length and trap numbers is at the discretion of Maine's Marine Resource Commissioner. In the past three fishing seasons the Commissioner has set the season length at 270 consecutive days starting October 1 with a maximum of 300 traps. MILCA participants have consistently caught 50% of their annual catch within the first seven weeks of the season. The median catch of MILCA participants exceeds the median catch in southern and mid-coast Maine, areas with a maximum of 800 or 600 traps and a year round fishery (C. Wilson, 2010, personal communication).

Finally, LFA 34 is the most productive lobster fishing area in Canada, accounting for 40% of Canadian landings and 23% of the combined US/CA lobster landings. LFA 34 has a six month open fishing season that opens the last Monday in November and ends May 31 the following year. There are 967 licenses with a maximum trap limit of 375 (an additional 25 traps tags are issued after April 1)(DFO 2006). Annual landings in the last ten years have averaged approximately 30 million pounds. During this period 50% of the annual catch is landed in the first 15-22 days (D. Pezzack ,2010, personal communication) with an average of 3.75 to 5.5 pounds per trap per day at the start of the season. Early season catch rates are approximately ten times those observed in SNE in recent years. When compared to the Maine fishery, LFA 34 has approximately 1/5 the fishermen and 1/10 the traps as Maine.

Although trap reductions may improve profists to some fishermen, they have the most immediate negative impact on those who are fishing all their gear in the most efficient means possible. Unintended negative impacts may also be felt by deck hands, whose services may no longer be required by captains pulling less gear. The perceived economic effects of trap reductions are open to wide debate and have been the topic of many past LCMT deliberations. Trap reductions coupled with a transferability system may improve profits to fishermen and would provide a mechanism for some fishers to survive a stock wide 75% reduction in the exploitation rate.

## V. SIZE LIMITS

The TC does not recommend using additional gauge increases/decreases as the sole means to reduce exploitation in the SNE stock. The TC explored the development of a uniform size

window to balance restrictions that approximate equivalent reductions for areas that are dominated by smaller (inshore) and larger (offshore) lobster. However, at the size limits estimated (3 ½" - 3 ¾" or 3 ⅞" for a 50% reduction and 3 ½" - 3 ⅝" or 3 ¾" for a 75% reduction), the fishery would be targeting a very narrow gauge range, 1/4 - 3/8" to acheive a 50% reduction and 1/8-1/4" for a 75% reduction. This would result in extremely high discard rates (approximately 80 to 90 %; Table 8), causing increased stress on lobster due to trapping, handling, and temperature fluctuations and exposure to predation while being hauled to the surface.

Size limits can lead to increased egg production. The minimum gauge size can be set to achieve a desired level of egg production before lobsters are legally susceptible to harvest. SNE sea sampling data indicate approximately 27% of mature female lobster are egg bearing annually (Table 9). The TC does not recommend managing the fishery solely through minimum gauge restrictions because it does not reduce the fisheries' current reliance on newly recruited lobster. At high exploitation rates there would still be complete dependence on newly recruited lobster to sustain the resource and the fishery. Under this scenario annual fluctuations in recruitment can create an unstable fishery and recruitment shortfall, as has occurred in SNE.

In addition, minimum size limits can select for slower growing individuals and may cause evolutionary changes to the population (Conover and Munch, 2002; Williams and Shertzer, 2004). The areas of SNE that have had the greatest effort have the smallest sized lobster. In contrast, maximum size limits can provide protection against recruitment variation because large lobsters have proportionally more eggs which have a greater rate of survival. A pool of large lobster would provide a buffer against recruitment variations and dependence on first time spawners. Additionally, it will conserve the genes of fast growing individuals in the population.

The maximum gauge restriction raises a concern because it will have the biggest impact on offshore fishermen where there is a higher proportion of larger lobster. Lobster above the maximum size represent a permanent loss of yield to the fishery. In inshore areas, where exploitation rates are high, very few lobster live long enough to reach the current maximum size limit (5 1/4 inch). However, if fishing rates where reduced in high exploitation areas then more lobster may survive to the maximum size. Despite these concerns the fishery would benefit from increased egg production and protection from recruitment variation.

However, uniform minimum and maximum gauge sizes in all areas would be desirable to minimize stock assessment uncertainty and social, political, and enforcement problems. In addition, concerns have been raised about diminished conservation value of non-uniform size limits if there is movement of lobster between jurisdictions. However, a uniform gauge will have varying impacts due to differences in lobster size distribution among areas, which varies greatly among areas in SNE. This can be seen in the plot of sea and port samples by LCMA and NMFS statistical area (Figure 4 and Appendix 2B). This variation is due to the different LCMA gauge regulations, population characteristics, and sample size. In general, the size distributions of lobster in the inshore LCMAs (2, 4, and 6) are smaller than off shore (LCMA 3) (Figures 5 and 6). The one exception is lobster sampled in LCMA 5 whose size distribution is much larger than the distributions of the other inshore LCMAs and more similar to distributions seen offshore (Figures 5 and 6).

Due to this geographic variation in size distribution, changes in gauge size will affect LCMAs differently. Increases to the minimum gauge while holding the maximum size at 5 ¼" will largely affect the inshore fishery. Decreases in the maximum gauge will mainly affect the offshore fishery (Table 10). To develop a uniform minimum and maximum size limit that would reduce both the inshore and offshore landings by similar proportions, the minimum size limit inshore would need to increase and the maximum size limit offshore would need to decrease. Of the combinations examined in Table 2, a minimum size of 3 ½" and a maximum size between 3 ¾ and 3 ⅞would generally result in a 50% reduction of landings and a minimum size of 3 ½" and a maximum size between 3 ¾ and 3 ⅝ would generally result in a 75% reduction of landings.

The TC has serious concerns about the use of a minimum and maximum size limit as the sole means of achieving a reduction in exploitation.. At the size limits estimated above, the fishery would be fishing on a very narrow range of size, ¼ - ⅜" for 50% reduction and ⅛-¼" for a 75% reduction. This would result in extremely high discard rates, of approximately 80 to 90% (Table 8). This is an additional 13 to 24 % above the current discard rate. While these lobster would be protected from harvest, the high rate of discard would cause increased stress on lobster due to trapping, handling, and exposure to temperature fluctuations while being hauled to the surface. Lobster may also experience increased exposure to predators while being discarded. In addition, the efficiency of the fishery would decrease significantly since an increased percentage of the lobster caught would need to be discarded. It may be possible to modify trap gear to decrease the discard rate by increasing the vent size and decreasing the entrance size, but this would still affect the efficiency of the fishery. The TC does not recommend that changes to the minimum and maximum size limits be used as a primary management tool due to the concerns about the increased discard rate and decreased efficiency in the fishery. However, they feel that changes to the minimum and maximum size could have substantial benefit if used in a complimentary fashion with other management tools.

## VI. MALE ONLY/V-NOTCH FISHERY

The TC does not recommend a management strategy that focuses solely on single sex harvest. This type of management would be precedent setting for American lobster and the TC can not predict the affect this management strategy would have on the reproductive dynamics of the SNE stock. There are several areas within SNE, where the sex ratio is already highly skewed toward females.

Male Only Fishery

The TC strongly cautions the Board about the use a of male-only harvest strategy. While it would likely cause a substantial reduction in catch (40 to 80%), this reduction would not be equitable among LCMA's and states, nor would it be equitable within LCMA's, states, and regions. This strategy would likely lead to increases in effort, and to changes in the distribution of fishing gear which would lead to gear conflicts. The impact of a highly female skewed sex ratio on American lobster populations is largely unknown, but could be damaging to the reproductive dynamics of the SNE stock.

American lobster are known to segregate by gender seasonally. In general, male lobster tend to be more resilient to changes in temperature and salinity and as a result are more likely to be found in shallow estuarine waters and tend to make smaller scale seasonal migrations. Female lobster are more likely to be found in deeper water where temperature and salinity are more stable. This phenomenon appears to be related to behavioral thermoregulation, whereby egg-bearing females undergo seasonal migrations along depth contours to maintain stable water temperature for developing embryos. As a result of these sex specific behavioral tendencies, the bathymetry and oceanographic conditions of a specific location have a large influence on the population demographics (density, gender, maturity status, molt stage) of the lobster living there. Ultimately it is these demographics which determine the composition of the catch in these areas.

The sex ratios of the commercial catch from 2007 and 2009 were examined spatially and temporally to determine the impact of a male-only harvest program on the SNE lobster fishery, and it's potential effectiveness as a management strategy. The percentage of the commercial catch comprised of females in the SNE stock varies substantially among seasons, among statistical areas, and even within statistical areas (Table 11). The shallower embayments tend to be closer to a 1:1 female to male sex ratio, or even slightly male dominated; the deeper portions of inshore waters and nearshore waters tend to be female dominated; and the SNE canyons tend to be male dominated. As a result the impact of a male-only harvest strategy on the Southern New England lobster fishery would be dramatically different among LCMA's, within segments of LCMA's, within segments of statistical areas, and within states. As expected, the reduction in catch would be most dramatic in areas with female dominated sex-ratios. For example a male only fishery would result on average in > 80% reduction in catch within statistical area 538, whereas it would result in only a 51% reduction in catch in central Long Island Sound. These differences in sex ratio within specific portions of LCMA's would likely cause some fishermen to move their gear into areas with higher proportions of males to obtain higher catch rates. Therefore it is not possible for the TC to accurately predict the overall impact of a male-only harvest strategy on the SNE stock, a specific LCMA, or even within a state.

The TC also has concern that a male-only harvest strategy will cause fishermen to increase their effective effort (trap hauls) to compensate for the loss of catch. This would cause increased pressure on the male portion of the stock, and would also cause increased stress to female lobster that will likely be caught and released multiple times in the process. The TC also anticipates that a male-only harvest strategy will substantially skew the sex-ratio toward females. This raises additional concern about potential problems with sperm limitation within the Southern New England stock. There is no concrete evidence of sperm limitation occurring in American lobster, however, male-only harvest strategies have been linked sperm limitation and disruption of the reproductive output of opilio crabs (Sainte-Marie et al 2008) and spiny king crabs (Sato *et al.* 2007).

V-Notch Fishery

The TC does not have any empirical evidence to support that a mandatory v-notch program or a mitigation style v-notch program would be successful at reducing the exploitation rate of the total SNE stock by 50 or 75%. The TC reiterates its concerns about a management strategy that focuses solely on females and cautions the Board about using a management strategy that requires the fishery to maintain substantial harvest rates to be successful.

It is difficult for the TC to provide meaningful advice relative to the effectiveness of a v-notch program without having specific details about the nature of any proposed program. Currently, the observed proportion of v-notched female lobster in the overall SNE catch is low. Those that are observed are the result of remnants of the North Cape Oil Spill Mitigation Program, the CT v-notch management initiative in 2008, as well as result of a small number of fishermen actively v-notching. The current observed rates of v-notching in the SNE stock do not reflect the results of any on-going management program.

A mandatory v-notch program would have the potential to substantially reduce exploitation on the female portion of the stock if there were good compliance with this management measure. In Maine, where v-notching has been a "management staple" since the late 1940's and the fishery has been extremely productive in the last decade, v-notching protects roughly 35% of the exploitable female population from harvest. The amount protected in the SNE fishery by this type of management program would depend on the exploitation rate, the rate of compliance, and the length of time a female would be protected by the v-notch definition used. Given the condition of the SNE fishery the TC warns that there would be substantial financial disincentive to participate in a mandatory v-notch program and that this management measure is difficult to enforce.

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# Tables

Table 1. 2007-2009 Average State SNE Landings (Pounds) By Month

| State | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Total | %Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Connecticut | 26,446 | 9,946 | 9,511 | 18,335 | 32,943 | 60,792 | 133,432 | 90,873 | 24,353 | 7,427 | 16,789 | 36,869 | 467,714 | 9% |
| Massachusetts | 20,375 | 13,165 | 21,326 | 35,550 | 54,358 | 78,795 | 146,226 | 151,753 | 120,858 | 96,033 | 55,594 | 33,431 | 827,465 | 15% |
| New York | 26,647 | 7,313 | 10,329 | 25,018 | 54,613 | 94,751 | 196,153 | 171,495 | 106,399 | 65,008 | 43,790 | 31,547 | 833,062 | 15% |
| NJ-DE-MD-VA | 19,658 | 12,215 | 14,059 | 45,132 | 79,463 | 111,265 | 123,702 | 105,959 | 82,176 | 88,608 | 64,349 | 45,107 | 791,693 | 14% |
| Rhode Island | 64,302 | 28,975 | 31,619 | 64,956 | 171,720 | 317,532 | 503,107 | 441,070 | 336,239 | 281,536 | 194,301 | 115,556 | 2,550,912 | 47% |
| Grand Total | 157,428 | 71,614 | 86,845 | 188,991 | 393,097 | 663,136 | 1,102,619 | 961,149 | 670,025 | 538,612 | 374,822 | 262,510 | 5,470,846 | |

Table 2. SNE Stock Quota by state based on a 50% reduction in the average landings from 2007-2009

| State | Quota |
|---|---|
| Connecticut | 233,857 |
| Massachusetts | 413,733 |
| New York | 416,531 |
| NJ-DE-MD-VA | 395,847 |
| Rhode Island | 1,275,456 |
| Grand Total | 2,735,423 |

Table 3. SNE Stock Quota by state based on a 75% reduction in the average landings from 2007-2009

| State | Quota |
|---|---|
| Connecticut | 116,928 |
| Massachusetts | 206,866 |
| New York | 208,266 |
| NJ-DE-MD-VA | 197,923 |
| Rhode Island | 637,728 |
| Grand Total | 1,367,712 |

Table 4. 2007-2009 Average SNE Landings (Percentage) By Month and LCMA

| LMA | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 3.1% | 1.4% | 1.8% | 3.4% | 5.6% | 13.3% | 25.2% | 18.1% | 10.9% | 7.3% | 5.4% | 4.6% | 100% |
| 3 & 5 | 2.0% | 1.1% | 1.5% | 2.9% | 7.5% | 10.7% | 14.5% | 16.5% | 15.5% | 14.3% | 9.0% | 4.4% | 100% |
| 4 | 2.8% | 1.5% | 1.7% | 5.9% | 9.7% | 14.2% | 17.1% | 14.7% | 10.6% | 8.9% | 7.2% | 5.7% | 100% |
| 6 | 4.6% | 1.5% | 1.5% | 3.7% | 7.5% | 12.7% | 27.2% | 20.5% | 7.8% | 3.8% | 3.8% | 5.5% | 100% |
| All of SNE | 2.9% | 1.3% | 1.6% | 3.5% | 7.2% | 12.1% | 20.2% | 17.6% | 12.2% | 9.8% | 6.9% | 4.8% | 100% |

Table 5. Percent of Annual Landings Occurring in Various Seasons by LCMA and for the Total Stock

| LCMA | Jul-Sept | Jun- Sept | May-Sept | Jun-Oct | Jul-Nov |
|---|---|---|---|---|---|
| 2 | 54% | 67% | 73% | 75% | 67% |
| 6 | 56% | 68% | 76% | 72% | 63% |
| 4 | 42% | 57% | 66% | 66% | 59% |
| 3 & 5 | 46% | 57% | 65% | 71% | 70% |
| All of SNE | 50% | 62% | 69% | 72% | 67% |

Table 6. 2007-2009 Average Landings (pounds) by Statistical Area

| Stat Area | Total Pounds | %Total |
|---|---|---|
| 537 | 1,655,963 | 30% |
| 538 | 184,546 | 3% |
| 539 | 1,171,210 | 21% |
| 611 | 1,098,707 | 20% |
| 612 | 431,461 | 8% |
| 613 | 75,207 | 1% |
| 614-615 | 118,222 | 2% |
| 616-533 | 452,309 | 8% |
| 621-622 | 123,879 | 2% |
| 623 | 127,077 | 2% |
| 624-633 | 32,266 | 1% |
| Total | 5,470,846 | 100% |

Table 7. 2007-2009 Average Landings (pounds) by LCMA

| LCMA | Total Pounds | %Total |
|---|---|---|
| 2 | 1,476,313 | 27% |
| 3 | 2,237,475 | 41% |
| 4 | 506,701 | 9% |
| 5 | 165,912 | 3% |
| 6 | 1,084,445 | 20% |
| Total | 5,470,846 | 100% |

| | |
|---|---|
| Massachusetts: | Stat Area 538 and 539 landings were assigned to LMA 2; Stat Area 537 landings were assigned to LMA 3. |
| Rhode Island: | Landings from all stat areas were assigned to LMA based on annual tallies of license holders' known fishing practises and permit history. |
| Connecticut: | Stat Area 611 landings were assigned to LMA 6 except those from subarea 149 which were assigned to LMA 2. |
| New York: | Landings from all stat areas were assigned to LMA based on annual tallies of license holders' known fishing practises and permit history. |
| New Jersey: | Inshore Stat Area landingss were assigned to LMA 5 (614 & 615), LMA 4 (612 & 613), and LMA 6 (611); all other landings were assigned to LMA 3. |
| DE, MD, VA: | Compliance report total reported landings for 2008 and 2009 were apportioned to Stat Areas based on NMFS partial reporting; (2008: 42,960 lbs expanded to 52,570 lbs; 2009: 30,390 lbs expanded to 49,861 lbs). 2007 landings as reported in Assessment. Inshore Stat Area landingss were assigned to LMA 5 (614,615,621,625,631,635) or LMA 4 (612); all other landings were assigned to LMA 3. |

Table 8. Percentage of catch discarded due to size limit changes, and percentage increase of discards over current levels.

| | LCMA 2 | | LCMA 3 | | LCMA 6 | | SNE | |
|---|---|---|---|---|---|---|---|---|
| **% Released at Current Slot Limit** | 70% | Addn'l bycatch above current levels | 59% | Addn'l bycatch above current levels | 76% | Addn'l bycatch above current levels | 66% | Addn'l bycatch above current levels |
| **% of total catch released at:** | | | | | | | | |
| **Alternative Minimum Sizes (5-1/4" max)** | | | | | | | | |
| > 3-1/2" (88.9 - 133.4mm) | 82% | 12% | 59% | 0% | 88% | 12% | 73% | 7% |
| > 3-17/32" (89.7 - 133.4mm) | 84% | 14% | 62% | 3% | 90% | 14% | 75% | 9% |
| > 3-9/16" (90.5 - 133.4mm) | 86% | 16% | 65% | 5% | 92% | 16% | 77% | 11% |
| > 3-19/32" (91.3 - 133.4mm) | 87% | 17% | 65% | 6% | 93% | 17% | 78% | 12% |
| > 3-5/8" (92.1 - 133.4mm) | 91% | 21% | 71% | 11% | 95% | 19% | 82% | 16% |
| > 3-21/32" (92.9 - 133.4mm) | 92% | 23% | 73% | 14% | 96% | 20% | 84% | 18% |
| >3-3/4 (95.3 - 133.4 mm) | 96% | 26% | 80% | 21% | 98% | 23% | 89% | 23% |
| **3-3/8 Minimum & Alternative Maximum** | | | | | | | | |
| > 3-3/8" - 4" (85.7 - 101.6mm) | 71% | 1% | 42% | -17% | 76% | 0% | 59% | -7% |
| > 3-3/8" - 3-5/8" (85.7 - 92.1mm) | 79% | 9% | 66% | 6% | 81% | 5% | 73% | 7% |
| > 3-3/8" - 3-17/32" (85.7 - 89.7mm) | 86% | 16% | 74% | 15% | 86% | 10% | 80% | 14% |
| > 3-3/8" - 3-1/2" (85.7 - 88.9mm) | 88% | 18% | 77% | 18% | 88% | 12% | 83% | 17% |
| > 3-3/8" - 3-15/32" (85.7 - 88.1mm) | 91% | 21% | 80% | 21% | 90% | 14% | 85% | 19% |
| > 3-3/8" - 3-7/16" (85.7 - 87.3mm) | 94% | 24% | 85% | 25% | 93% | 17% | 89% | 23% |
| **3-1/2 Minimum & Alternative Maximum** | | | | | | | | |
| > 3-1/2" - 5" (88.9 - 127.0mm) | 82% | 12% | 60% | 0% | 88% | 12% | 73% | 7% |
| > 3-1/2" - 4" (88.9 - 101.6mm) | 83% | 13% | 66% | 7% | 88% | 13% | 76% | 10% |
| > 3-1/2" - 3-7/8" (88.9 - 98.4mm) | 83% | 13% | 71% | 12% | 89% | 13% | 79% | 13% |
| > 3-1/2" - 3-3/4" (88.9 - 96.8mm) | 86% | 16% | 79% | 20% | 90% | 14% | 84% | 17% |
| > 3-1/2" - 3-5/8" (88.9 - 92.1mm) | 91% | 21% | 89% | 30% | 93% | 17% | 90% | 24% |
| > 3-1/2" - 3-19/32" (88.9 - 91.3mm) | 93% | 23% | 92% | 32% | 94% | 19% | 93% | 26% |

Table 9. 2007 - 2009 Percent of egg bearing females 1-5mm below legal size

| State | 2007 | 2008 | 2009 | 2007-2009 Average |
|---|---|---|---|---|
| CT | 41.7% | 29.3% | 30.1% | 33.2% |
| MA | 31.5% | 38.7% | 33.8% | 34.7% |
| NJ | NA | 12.5% | 13.2% | 12.8% |
| NY | 17.2% | 13.2% | 15.5% | 15.3% |
| RI | 32.8% | 37.8% | 42.5% | 37.7% |
| Average SNE | 30.8% | 26.3% | 27.0% | 26.7% |

Table 10. Percentage Reduction in Landings due to size limit changes (gray boxes indicate where there is a > 50% reductions and bolded boxes where there is > 75% reductions.

| Alternative Minimum Sizes (5-1/4" max) | LCMA 2 | LCMA 3 | LCMA 4 | LCMA 5 | LCMA 6 | SNE |
|---|---|---|---|---|---|---|
| > 3-1/2" (88.9 - 133.4mm) | -37.1% | -3.9% | -26.3% | -7.1% | -45.6% | -22.8% |
| > 3-17/32" (89.7 - 133.4mm) | -45.3% | -8.4% | -32.1% | -9.4% | -54.0% | -28.5% |
| > 3-9/16" (90.5 - 133.4mm) | -53.4% | -13.3% | -39.0% | -11.7% | -61.9% | -35.0% |
| > 3-19/32" (91.3 - 133.4mm) | -62.8% | -17.8% | -46.9% | -14.5% | -70.8% | -42.2% |
| > 3-5/8" (92.1 - 133.4mm) | -69.8% | -22.8% | -53.9% | -16.5% | **-75.0%** | -48.5% |
| > 3-21/32" (92.9 - 133.4mm) | **-75.1%** | -27.4% | -59.9% | -18.6% | **-79.4%** | -54.0% |
| >3-3/4 (95.3 - 133.4 mm) | **-88.0%** | -41.4% | **-75.7%** | -27.3% | **-90.4%** | -68.7% |
| | | | | | | |
| **3-3/8 Minimum & Alternative Maximum** | | | | | | |
| > 3-3/8" - 4" (85.7 - 101.6mm) | -1.9% | -26.2% | -5.7% | -55.3% | -2.1% | -11.1% |
| > 3-3/8" - 3-5/8" (85.7 - 92.1mm) | -30.2% | **-75.6%** | -46.1% | **-83.5%** | -25.0% | -51.1% |
| > 3-3/8" - 3-17/32" (85.7 - 89.7mm) | -54.7% | **-90.4%** | -67.9% | **-90.6%** | -46.0% | -71.3% |
| > 3-3/8" - 3-1/2" (85.7 - 88.9mm) | -62.9% | **-94.9%** | -73.7% | **-92.9%** | -54.4% | **-77.0%** |
| > 3-3/8" - 3-15/32" (85.7 - 88.1mm) | -70.3% | **-97.7%** | **-78.8%** | **-94.8%** | -63.4% | **-81.9%** |
| > 3-3/8" - 3-7/16" (85.7 - 87.3mm) | **-79.4%** | **-99.4%** | **-85.6%** | **-96.8%** | **-74.5%** | **-87.8%** |
| | | | | | | |
| **3-1/2 Minimum & Alternative Maximum** | | | | | | |
| > 3-1/2" - 5" (88.9 - 127.0mm) | -37.1% | -5.8% | -26.4% | -12.6% | -45.6% | -23.4% |
| > 3-1/2" - 4" (88.9 - 101.6mm) | -39.0% | -31.3% | -32.0% | -62.5% | -47.7% | -34.1% |
| > 3-1/2" - 3-7/8" (88.9 - 98.4mm) | -41.4% | -44.7% | -38.0% | -69.8% | -50.1% | -41.2% |
| > 3-1/2" - 3-3/4" (88.9 - 96.8mm) | -49.1% | -67.7% | -50.6% | **-79.8%** | -53.0% | -55.1% |
| > 3-1/2" - 3-5/8" (88.9 - 92.1mm) | -67.3% | **-80.8%** | -72.5% | **-90.7%** | -70.6% | -74.1% |
| > 3-1/2" - 3-19/32" (88.9 - 91.3mm) | **-74.4%** | **-86.1%** | **-79.4%** | **-92.7%** | **-76.7%** | **-80.6%** |

Table 11. Percentage of the "marketable" comprised of female lobsters by statistical areas – 2007–2009; **a.)** SA 611 – LMA 6, **b.)**SA 538 – LMA 2, **c.)** SA 539 – LMA 2, **d.)** SA 537 – LMA 2 & 3, **e.)** SA 616 – LMA 3.

A. **Connecticut - Stat Area 611 - inshore**

| % Female - marketable lobsters only | | | |
|---|---|---|---|
| | 2007 - 2009 Average | | |
| | EAST | CENTRAL | WEST |
| Jan | 47% | 38% | 40% |
| Feb | 64% | | 44% |
| Mar | 71% | | |
| Apr | | | |
| May | | 49% | 33% |
| Jun | 77% | 40% | 83% |
| Jul | 73% | 43% | 52% |
| Aug | 85% | 72% | 78% |
| Sep | 79% | 80% | 45% |
| Oct | 57% | | |
| Nov | 51% | 71% | 42% |
| Dec | 44% | 28% | 18% |

***box is gray where the sample size < 50**

**B. Massachusetts Stat Area 538 - inshore**

| % Female - marketable lobsters only | | | |
|---|---|---|---|
| | 2007 | 2008 | 2009 |
| May | 77% | 67% | 82% |
| Jun | 83% | 83% | 90% |
| Jul | 73% | 57% | 77% |
| Aug | 85% | 72% | 70% |
| Sep | 83% | 90% | |
| Oct | 86% | 93% | 89% |
| Nov | 86% | 91% | 93% |

**C. Rhode Island - Stat Area 539 - inshore**

| % Female - marketable lobsters only | | | | | | |
|---|---|---|---|---|---|---|
| | 2007 | | 2008 | | 2009 | |
| | NARRAGANSETT BAY | RI SOUND | NARRAGANSETT BAY | RI SOUND | NARRAGANSETT BAY | RI SOUND |
| Jan | 53% | 55% | 52% | 76% | 54% | 74% |
| Feb | 26% | 55% | 51% | 59% | 38% | 93% |
| Mar | 28% | 57% | 50% | 39% | 37% | 71% |
| Apr | 39% | 47% | 52% | 72% | 40% | 48% |
| May | 24% | 38% | 36% | 88% | 29% | 61% |
| Jun | 52% | 58% | 34% | 59% | 18% | 37% |
| Jul | 70% | 65% | 49% | 41% | 51% | 42% |
| Aug | 69% | 67% | 51% | 81% | 60% | 51% |
| Sep | 70% | 69% | 44% | 84% | 46% | 88% |
| Oct | 42% | 74% | 32% | 88% | 31% | 85% |
| Nov | 37% | 88% | 24% | 92% | 23% | 85% |
| Dec | 49% | 80% | 49% | 84% | 28% | 88% |

**D. Rhode Island - Stat Area 537- offshore**

| % Female - marketable lobsters only | | | |
|---|---|---|---|
| | 2007 | 2008 | 2009 |
| Jan | 27% | 25% | 18% |
| Feb | 32% | 32% | 40% |
| Mar | 28% | 29% | 27% |
| Apr | 33% | 39% | 25% |
| May | 32% | 28% | 25% |
| Jun | 27% | 23% | 25% |
| Jul | 21% | 19% | 27% |
| Aug | 26% | 27% | 28% |
| Sep | 42% | 30% | 37% |
| Oct | 31% | 40% | 38% |
| Nov | 53% | 63% | 39% |
| Dec | 51% | 41% | 42% |

**E. Rhode Island - Stat Area 616- offshore**

| % Female - marketable lobsters only | | | |
|---|---|---|---|
| | 2007 | 2008 | 2009 |
| Jan | | 40% | 24% |
| Feb | | 39% | 20% |
| Mar | | 38% | 33% |
| Apr | | 28% | 39% |
| May | | 22% | 34% |
| Jun | 21% | 16% | 21% |
| Jul | 22% | 24% | 17% |
| Aug | 22% | 34% | 33% |
| Sep | 45% | 40% | 36% |
| Oct | 40% | 31% | 37% |
| Nov | 39% | 31% | 38% |
| Dec | 33% | 32% | 30% |

# Figures

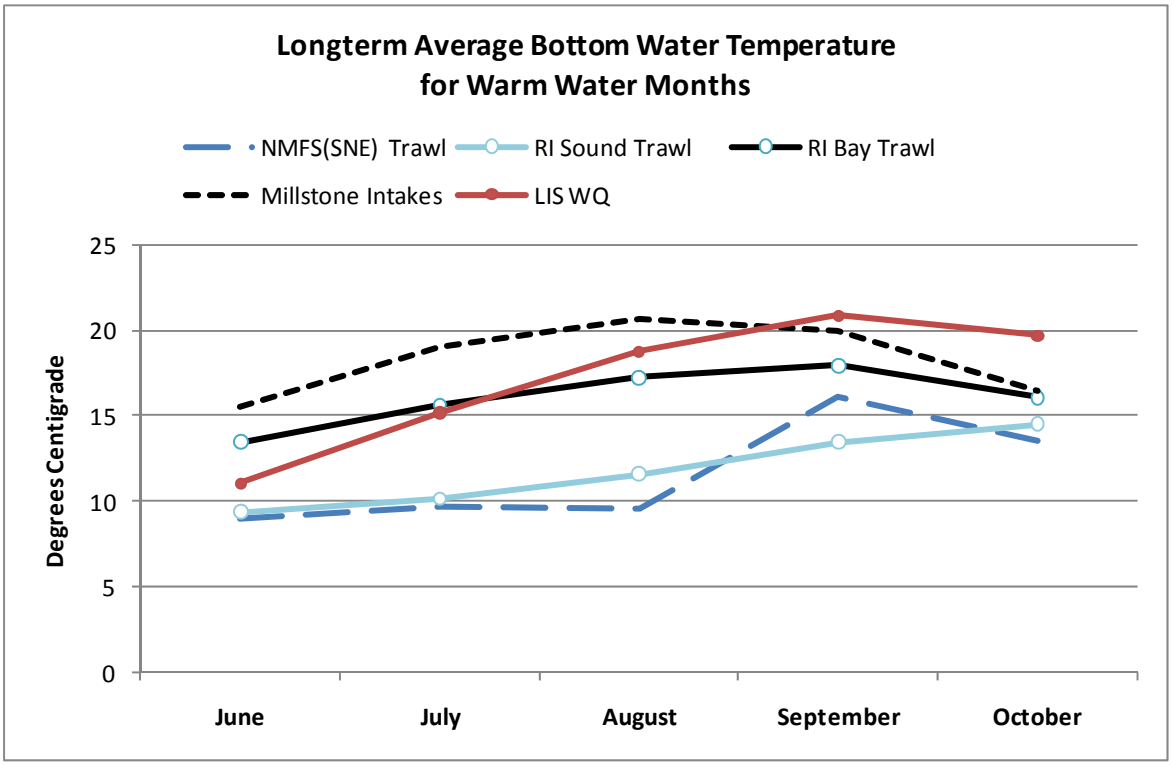



Figure 1. Longterm average bottom water temperature for warm water months. Average temperatures (°C) taken is four longterm monitoring programs: NMFS bottom trawl survey at SNE sites (1964-2009); RI Trawl Survey at RI Sound sites and Lower Narragansett Bay sites (1995-2009); Millstone Power Station intakes in eastern Long Island Sound (1976-2009); and CT DEP Long Island Sound (LIS) Water Quality (WQ) Survey (1991-2008).

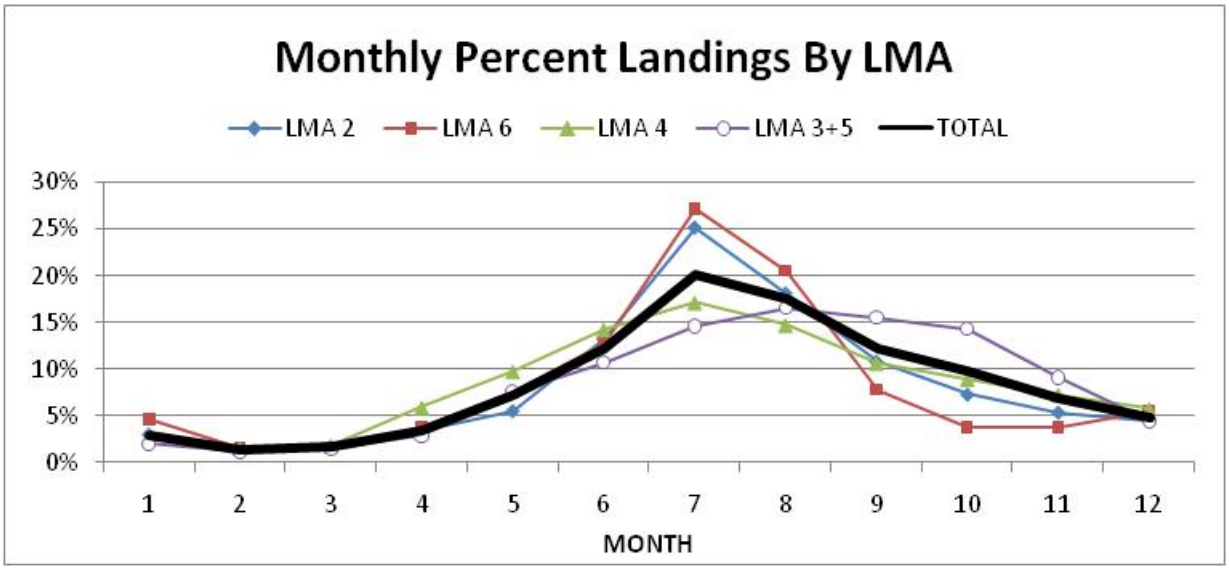



Figure 2. 2007-2009 Monthly Lobster Landings in SNE by LCMA.

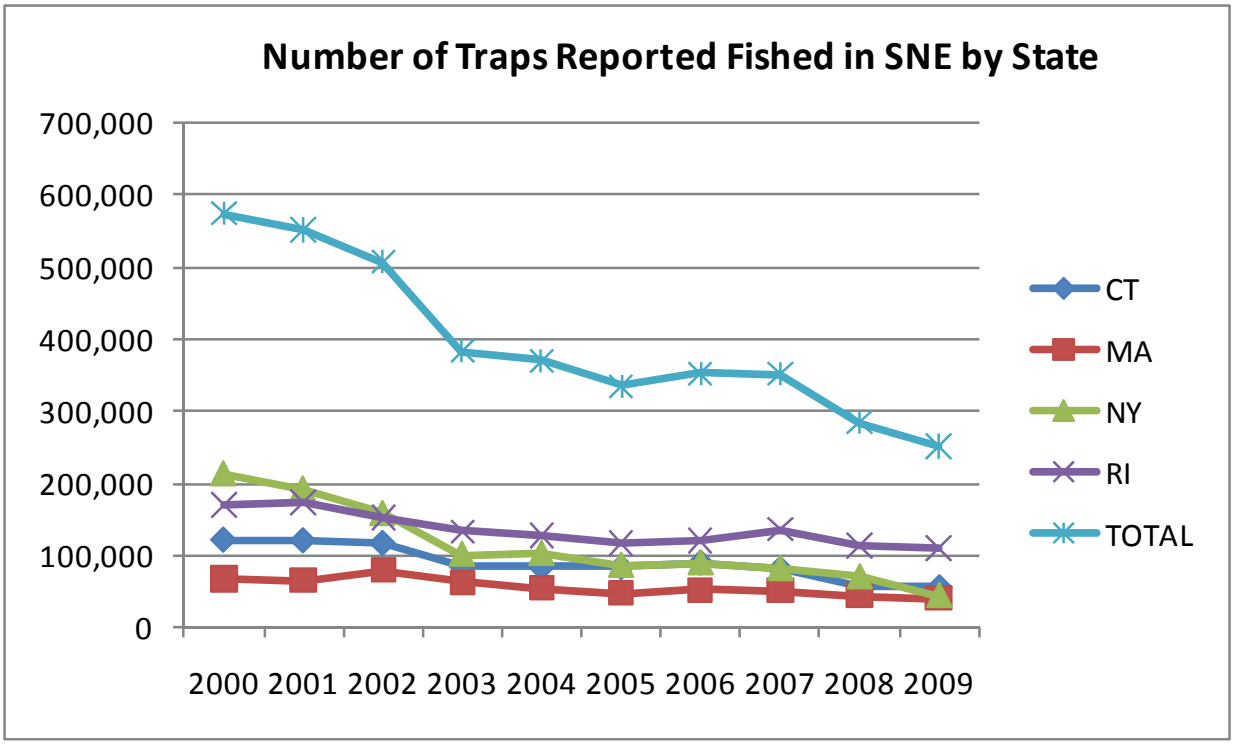



Figure 3. Number of traps reported fished from 2000-2009 by state in SNE (the 2009 number for CT was not available at the time of the report, the 2008 number was used as a proxy for 2009. This number will be updated when the 2009 number is available).

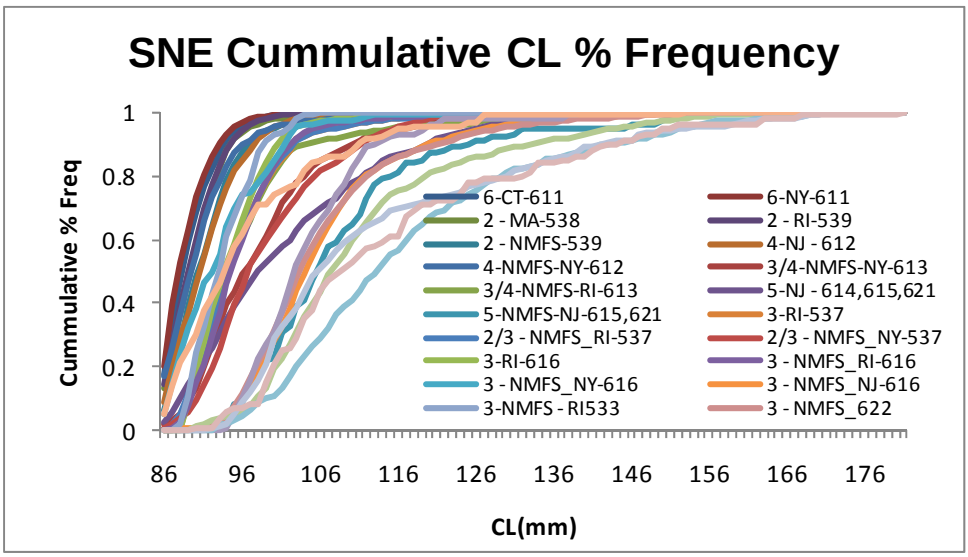


Figure 4. Cumulative % frequency of SNE sea and port samples by agency, LCMA and stat area

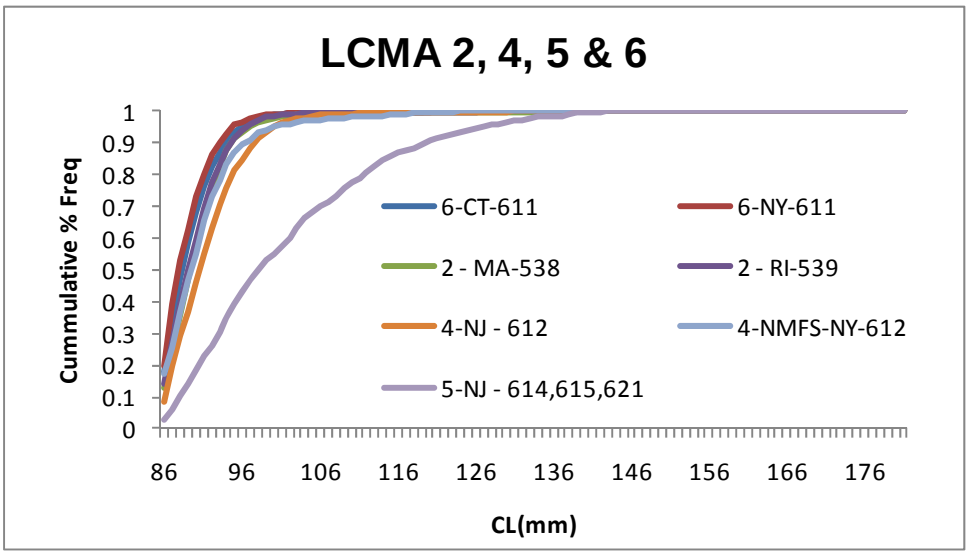


Figure 5. Inshore LCMA size distribution.

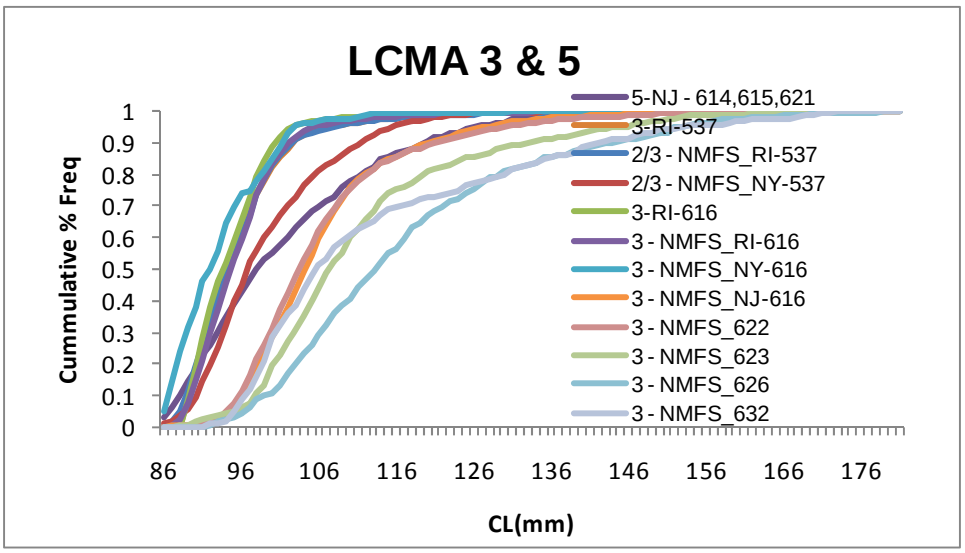
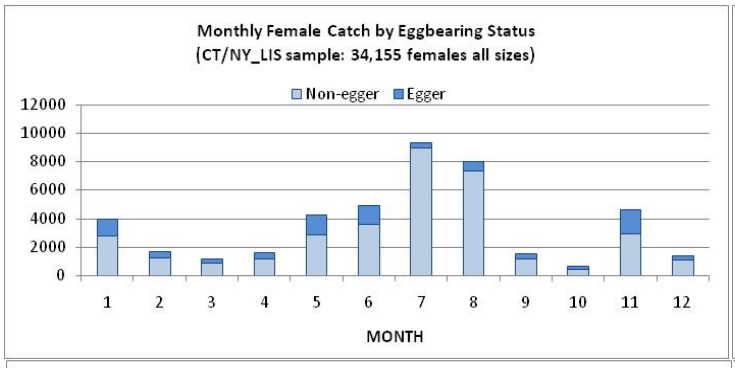
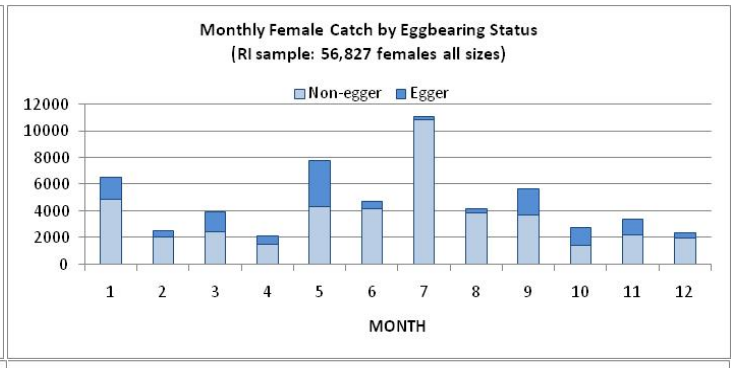


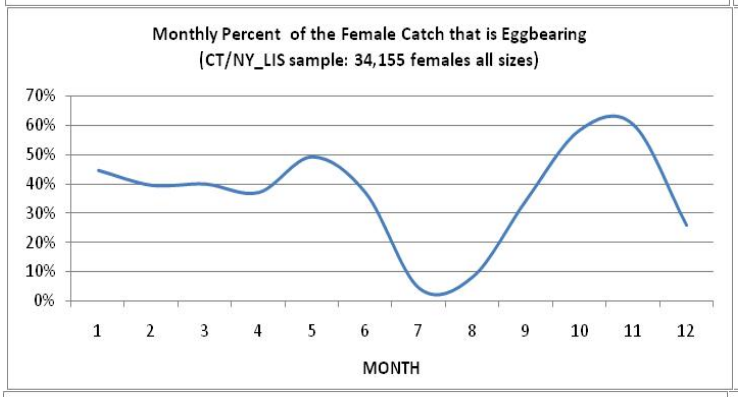
Figure 6. Offshore size distribution (LCMA 3 and 5)

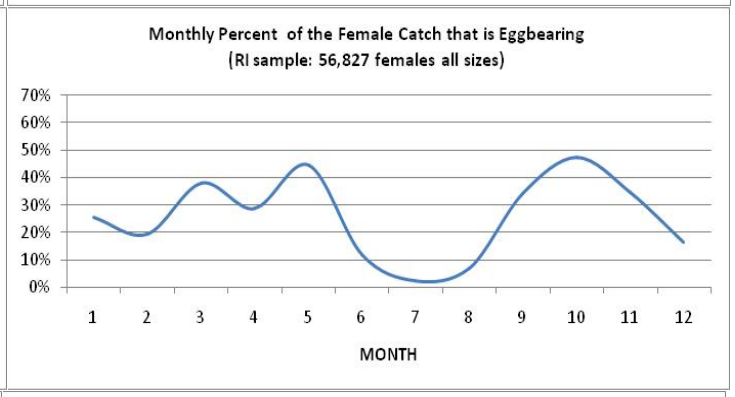
# Appendix 2A

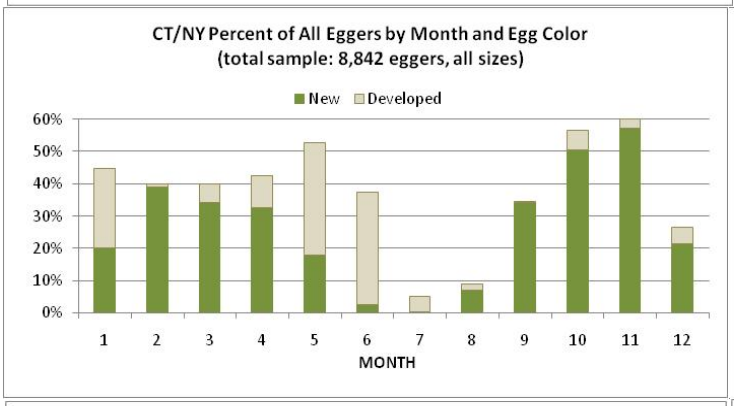
## SOUTHERN NEW ENGLAND LOBSTER CATCH CHARACTERISTICS
## 2007-2009 Sea Sampling Data

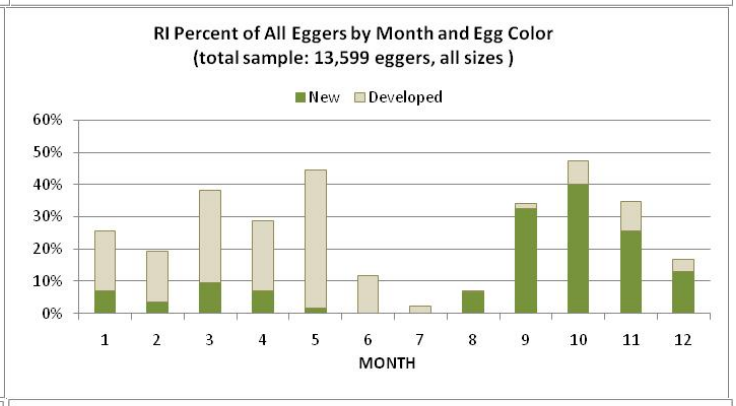


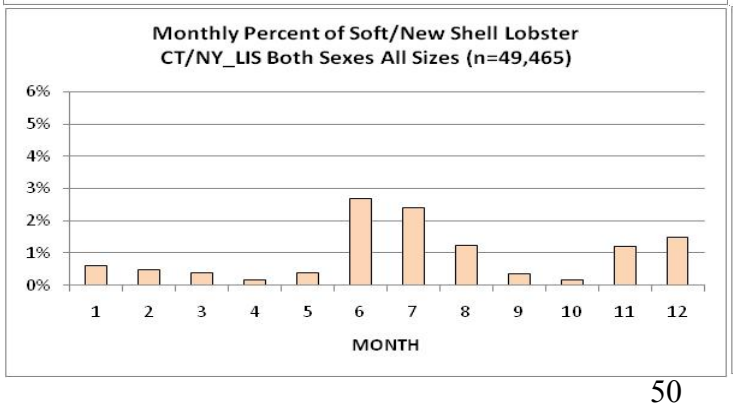



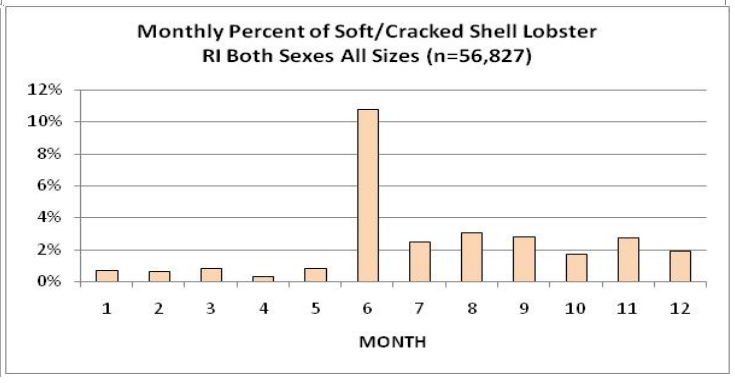



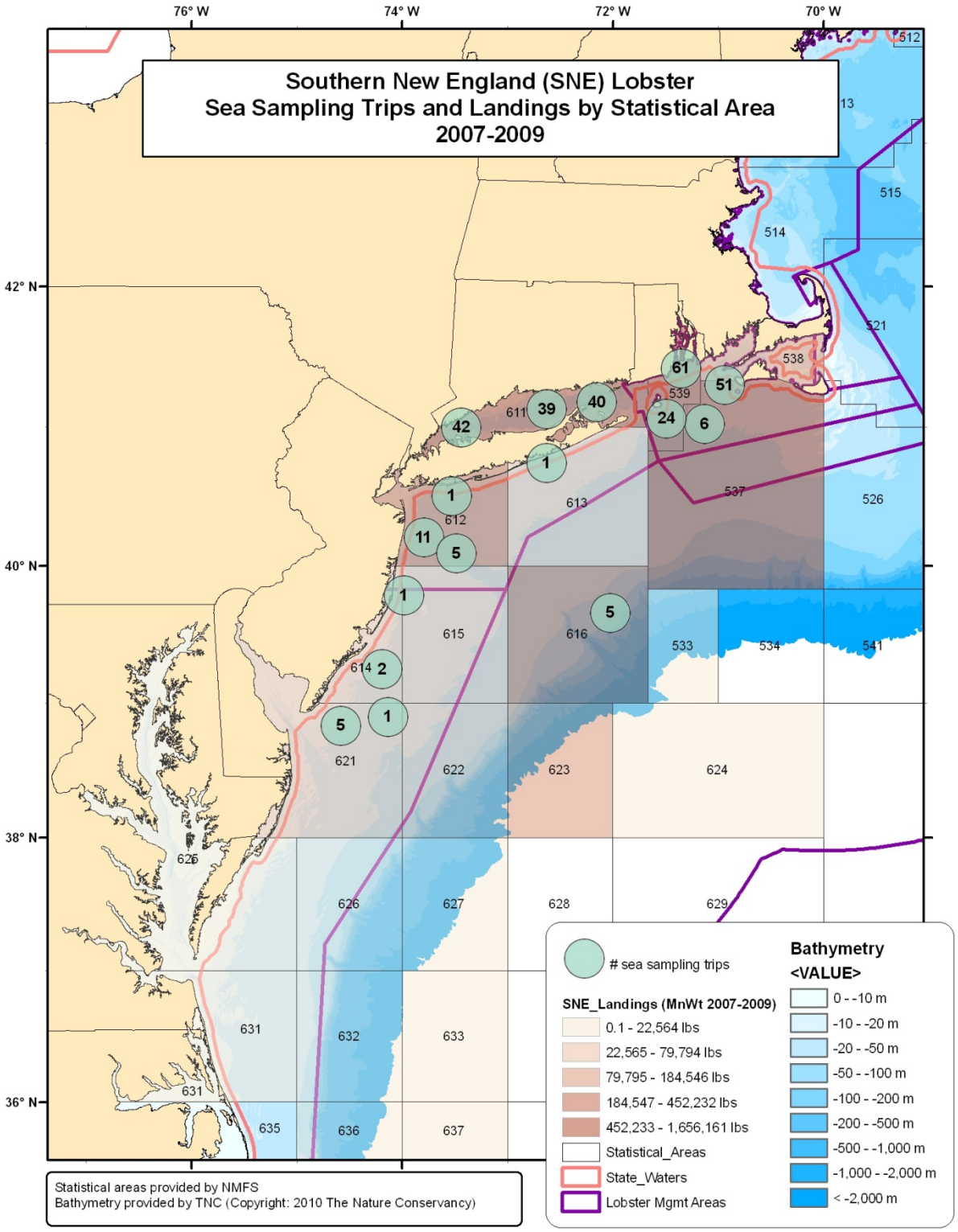



## Appendix 2B


Southern New England (SNE) Lobster
Sea Sampling Trips and Landings by Statistical Area
2007-2009
76° W
74° W
72° W
70° W
42° N
40° N
38° N
36° N
512
13
515
514
521
538
539
537
526
533
534
541
611
612
613
614
615
616
621
622
623
624
625
626
627
628
629
631
632
633
635
636
637
61
51
40
39
42
24
6
1
1
11
5
1
5
2
5
1
# sea sampling trips
SNE_Landings (MnWt 2007-2009)
0.1 - 22,564 lbs
22,565 - 79,794 lbs
79,795 - 184,546 lbs
184,547 - 452,232 lbs
452,233 - 1,656,161 lbs
Statistical_Areas
State_Waters
Lobster Mgmt Areas
Bathymetry
<VALUE>
0 - -10 m
-10 - -20 m
-20 - -50 m
-50 - -100 m
-100 - -200 m
-200 - -500 m
-500 - -1,000 m
-1,000 - -2,000 m
< -2,000 m
Statistical areas provided by NMFS
Bathymetry provided by TNC (Copyright: 2010 The Nature Conservancy)