ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR AMERICAN LOBSTER
(*Homarus americanus*)

2011 FISHING YEAR

Prepared by the Plan Review Team

Approved by the American Lobster Management Board October 2012

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1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption: Amendment 3 (1997)

Framework Adjustments:

Addendum I (1999)	Addendum VII (2005)	Addendum XIII (2008)
Addendum II (2001)	Addendum VIII (2006)	Addendum XIV (2009)
Addendum III (2002)	Addendum IX (2006)	Addendum XV (2009)
Addendum IV (2003)	Addendum X (2007)	Addendum XVI (2010)
Addendum V (2004)	Addendum XI (2007)	Addendum XVII (2012)
Addendum VI (2005)	Addendum XII (2008)	Addendum XVIII (2012)

Management Unit:	Maine through North Carolina Lobster is managed in 7 areas (see appendix A)
States with a Declared Interest:	Maine through North Carolina (Excluding Pennsylvania and DC)
Active Committees:	American Lobster Management Board, Technical Committee, Lobster conservation Management Teams, Plan Development Team, Plan Review Team, Transferability Subcommittee

2.0 Status of the Fishery

2.1 Landings History

The lobster fishery has seen incredible expansion in effort and landings since the late 1940s and early 1950s, when landings varied around 25 million pounds. The last ten years have seen large increases in lobster landings, rising from 71 million pounds in 2001 and peaking in 2011 at 126 million pounds (Table 1). The significance of this increase in harvest is most easily illustrated by comparing 2011 landings to that of the period between 1978-1987 where landings ranged from 33-44 million pounds per year. Landings have continued to increase over time with a slight decrease in 2007 with harvest estimates of 81 million pounds and rose to 88.8 million pounds in 2008. Since 2009 landings have been over a million pounds. Maine and Massachusetts account for 94% of the 2011 commercial landings, 83% and 11% respectively. The ex vessel value for all lobster landings in 2011 was 423 million dollars.

Lobster pots are the predominant commercial gear, other gear types include otter trawls, gill net, dredge and SCUBA. Lobster is also taken recreationally with pots and by hand while SCUBA diving. The magnitude of recreational landings is unknown because all states do not collect recreational harvest data.

2.2 Recent Management Actions

The 2009 assessment that indicated the resource presented a mixed picture of stock abundance throughout its U.S. range, with low abundance and poor recruitment in SNE T. In the spring of 2010, the ASMFC Lobster Technical Committee reviewed trends in abundance from 2008 and 2009 and considered a variety of biological and environmental factors that may be impacting SNE lobster stocks. In May 2010, the ASMFC Lobster Technical Committee submitted a report to the Board contending that it was their 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.

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 the CIE reviewers 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 were needed immediately to maximize chances of rebuilding the stock.

To address the concerns of the declining resource the Management Board approved addendum XVII which reduced exploitation by 10% in the management areas within SNE in February of 2012. The management areas have initiated either mandatory v-notch programs or season closures or a combination of the two meet the requirements of the addendum.

The Board also approved addendum XVIII to scale the SNE fishery to the size of the SNE resource, including an option for a minimum reduction in traps fished by 25% for LCMA 2 and 3. Other LCMAs in SNE are working on plans to address this Board task.

Table 1. Landings of American Lobster by the states of Maine through Virginia (Sources NMFS, ME DMR, NY DMR)

Year	Connecticut	Delaware	Maine	Maryland	Massachusetts	New Hampshire	New Jersey	New York	Rhode Island	Virginia	Total
1981	1,010,800	55,700	21,739,067	63,200	11,220,500	793,400	593,700	890,200	1,871,200	2,200	38,239,967
1982	1,094,100	90,700	23,368,719	64,800	13,150,900	807,400	846,300	1,121,600	3,173,700	4,700	43,722,919
1983	1,854,000	56,700	28,068,238	86,500	12,421,000	1,310,560	769,900	1,207,500	5,114,400	600	50,889,398
1984	2,011,600	103,800	30,788,646	98,900	14,701,800	1,570,724	927,700	1,308,100	5,259,900	17,400	56,788,570
1985	1,676,000	118,500	26,830,448	82,300	16,295,100	1,193,881	1,079,600	1,240,900	5,140,100	1,100	53,657,929
1986	1,656,100	109,000	29,926,464	57,700	15,057,600	941,100	1,123,000	1,407,100	5,667,900	1,000	55,946,964
1987	1,735,591	84,100	38,948,867	49,900	15,116,800	1,256,170	1,397,100	1,146,700	5,317,100	1,000	65,053,328
1988	2,053,800	66,200	37,208,324	23,000	15,866,312	1,118,900	1,557,300	1,779,890	4,759,100	300	64,433,126
1989	2,096,900	76,500	36,083,443	17,500	15,444,300	1,430,400	2,059,600	2,345,051	5,725,800		65,279,494
1990	2,645,800	68,300	47,023,271		17,054,434	1,658,200	2,198,867	3,431,111	7,258,175		81,338,158
1991	2,674,000	54,700	47,036,836		16,528,168	1,802,035	1,673,031	3,128,246	7,445,172		80,342,188
1992	2,439,600	21,000	53,494,418		15,823,077	1,529,292	1,213,255	2,651,067	6,763,087		83,934,796
1993	2,177,022	24,000	57,215,406		14,336,032	1,693,347	906,498	2,667,107	6,228,470		85,247,882
1994	2,212,000	8,400	48,617,693		16,094,226	1,650,751	581,396	3,954,634	6,474,399		79,593,499
1995	2,536,177	500	63,625,745	2,855	15,755,840	1,834,794	606,011	6,653,780	5,362,084		96,377,786
1996	2,888,683		54,970,948	28,726	15,323,277	1,632,829	640,198	9,408,519	5,295,797	1,252	90,190,229
1997	3,468,051	648	71,574,344	34,208	15,087,096	1,414,133	858,426	8,878,395	5,798,529	2,240	107,116,070
1998	3,715,310		68,729,861		13,277,409	1,194,653	721,811	7,896,803	5,617,873	1,306	101,155,026
1999	2,595,764		75,416,341		15,533,654	1,380,360	931,064	6,452,472	8,155,947	6,916	110,472,518
2000	1,393,565		63,981,361		15,802,888	1,709,746	891,183	2,883,468	6,907,504	311	93,570,026
2001	1,329,707		69,908,504		12,132,807	2,027,725	579,753	2,052,741	4,452,358	19	92,483,614
2002	1,067,121	551	81,171,618		12,853,380	391	264,425	1,440,483	3,835,050		100,633,019
2003	671,119	2,099	96,196,769	22,778	11,385,049		209,956	946,449	3,474,508		112,908,727
2004	646,994	13,322	103,875,022	14,931	11,295,474	2,097,396	370,112	996,109	3,064,417	13	122,373,790
2005	713,901		68,729,861	39,237	9,879,983	2,556,232	369,264	1,154,470	4,343,736	21,988	87,808,672
2006	792,894	3,706	72,662,294	26,349	10,966,322	2,666,344	470,877	1,242,601	3,749,432	28,160	92,608,979
2007	568,696	5,946	63,959,191	6,128	10,143,301	2,468,811	680,392	716,300	2,293,494		80,842,259
2008	426,292	4,347	69,863,132	32,429	10,597,614	2,567,031	632,545	712,075	2,771,968		87,607,433
2009	446,861	6,064	81,175,847	30,988	11,781,490	2,985,166	179,740	713,811	2,831,742	21,472	100,173,181
2010	396,391	108	95,506,383	30,005	12,768,448	3,658,894	641,556	813,513	2,922,823	16,347	116,754,468
2011	159,493	10	104,693,316	40,090	13,717,192	3,917,461	627,077	344,233	2,752,505	12,878	126,264,255

Table 2. Estimated lobster landings (lbs) by lobster conservation management area (LCMA).* (Source, ASMFC Lobster Data Warehouse) **This table can only be update in years when stock assessment reports are being conducted.**

Year	LCMA 1	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 6	LCMA OCC	Grand Total
1981	32,369,320	527,284	4,321,500	441,478	115,653	1,220,159	134,327	39,129,721
1982	32,123,750	1,656,479	4,961,680	622,674	99,093	1,359,058	163,105	40,985,839
1983	32,826,685	2,958,366	5,645,179	633,254	71,804	2,428,633	198,448	44,762,369
1984	29,862,411	2,978,985	6,409,741	795,180	135,652	2,704,070	208,832	43,094,871
1985	31,590,759	2,992,330	5,853,851	964,043	170,998	2,273,337	261,929	44,107,247
1986	30,080,507	3,081,903	5,829,275	1,084,282	125,969	2,362,128	298,747	42,862,811
1987	30,682,754	3,219,900	5,357,273	1,473,841	98,486	2,378,765	276,250	43,487,269
1988	32,362,492	3,259,336	5,132,943	1,666,439	85,142	3,195,208	295,985	45,997,545
1989	36,800,166	4,175,114	5,450,786	2,232,935	106,126	3,735,250	352,155	52,852,532
1990	41,720,481	4,374,062	8,783,629	2,431,198	237,410	4,250,654	581,447	62,378,881
1991	43,648,773	4,140,145	8,537,053	2,096,138	115,020	4,393,986	740,267	63,671,382
1992	39,055,380	3,795,367	7,124,248	1,448,866	77,854	4,362,551	738,026	56,602,292
1993	40,962,969	3,772,494	6,773,992	1,597,447	89,495	3,968,663	938,486	58,103,546
1994	51,597,880	5,602,507	5,684,252	554,367	26,013	5,738,398	848,181	70,051,598
1995	49,771,715	4,960,453	5,008,551	962,077	45,054	8,564,325	1,000,609	70,312,784
1996	47,992,628	4,880,328	4,896,782	978,376	52,758	11,705,439	852,532	71,358,843
1997	58,016,197	5,324,775	5,549,295	1,162,862	36,623	11,650,701	849,126	82,589,579
1998	56,187,841	5,273,463	5,043,939	1,534,067	41,963	10,575,143	797,019	79,453,435
1999	65,375,535	6,938,658	6,166,601	1,346,509	77,621	8,331,142	739,904	88,975,970
2000	69,265,611	5,651,160	5,436,618	1,123,486	53,364	3,802,880	765,801	86,098,920
2001	57,531,942	3,862,054	5,525,209	762,408	55,537	3,013,551	611,242	71,361,943
2002	73,607,600	3,445,004	5,483,983	442,425	14,838	2,230,869	786,137	86,010,856
2003	63,005,041	1,110,534	6,978,808	423,583	17,394	1,448,011	804,355	73,787,725
2004	80,448,651	1,184,942	6,722,671	480,203	93,270	1,534,130	993,689	91,457,556
2005	76,240,627	1,464,433	7,442,771	457,275	54,181	1,673,396	966,787	88,299,470
2006	80,846,400	1,853,505	7,588,539	516,130	59,928	1,840,308	1,048,051	93,752,862
2007	70,862,089	1,430,836	6,375,646	617,978	56,866	1,263,648	1,132,991	81,740,055
Grand Total	1,354,836,205	93,914,418	164,084,815	28,849,521	2,214,112	112,004,403	17,384,426	1,773,287,900

*Landings data are not collected by LCMA in all states. To separate landings by LCMA NMFS statistical areas are placed into a single LCMA. For a complete description of how estimates are completed send a request to the PRT Chair, tkerns@asmfc.org.

3.0 Status of Assessment Advice

3.1 Most Recent Assessment (2009)

The 2009 peer-reviewed stock assessment report indicated the American lobster resource presents a mixed picture, with record high stock abundance and recruitment throughout most of the Gulf of Maine (GOM) and Georges Bank (GBK), continued low abundance and poor recruitment in Southern New England (SNE), and further declines in recruitment and abundance in NMFS Statistical Area 514 (Massachusetts Bay and Stellwagen Bank) since the last assessment. The Peer Review Panel noted particular concern regarding the status of the stock throughout the SNE assessment area and within Area 514 and recommended that further restrictions are warranted for both areas.

The assessment showed current abundance of the GBK stock is at a record high and recent exploitation rates are at a record low. Recruitment has remained high in GBK since 1998. Sex ratio of the population in recent years is largely skewed toward females (~80% from 2005 to 2007) for unknown reasons. The Technical Committee noted the stock could experience recruitment problems if the numbers of males in the population are low.

The assessment showed current abundance of the SNE stock is the lowest observed since the 1980s and exploitation rates have declined since 2000. Recruitment has remained low in SNE since 1998. Given current low levels of spawning stock biomass and poor recruitment further restrictions are warranted.

The assessment recommended revisions to the reference points set in the FMP, which the Board approved in 2010. Stock status is determined by comparing threshold values to the average abundance and exploitation rate during recent years (2005-2007). Thus, "overfishing" would occur if the average recent exploitation rate were higher than the threshold. A stock would be "depleted" if average recent abundance fell below the threshold. . The GOM and GBK stocks are not depleted and overfishing is not occurring, while the SNE is depleted but not experiencing overfishing. The Board set the SNE abundance reference points to a lower target level than the GOM and GBK stocks because it believes the SNE stock has limited ability to rebuild to higher historical levels.

The next assessment is scheduled for peer review in 2014.

4.0. Status of Research and Monitoring

4.1 Research Needs

4.1.1 University of Maine Model Development

The University of Maine lobster model used for this assessment should be revised and enhanced in the following ways in order to improve future assessments:

- Explore feasibility of estimating all or a portion of the growth transition matrix.
- Expand model to include any number of surveys by sex. This includes changing the structure of input data files, modifying corresponding sections of code to accommodate any number of surveys and fishery types by sex or both sexes combined, and estimation of survey selectivity by sex.
- Incorporate trends in natural mortality, maturity, and growth, where appropriate.

- Check estimation and form of non-linear CPUE relationship with abundance, explore standardization/treatment of commercial CPUE.
- Explore incorporation of ventless trap and settlement surveys.
- Create graphics viewer in R for examining MCMC and projection outputs; include MCMC chain convergence criteria / diagnostics.
- Reduce gap-filling of landings and biosamples to the extent possible and allow the model to handle data gaps statistically.
- Specify number of years across which to conduct the assessment (e.g. to ease performance of sensitivity and retrospective analyses).

4.1.2 Program Research

New research and expansion of existing monitoring programs in the following areas would provide information needed to improve future stock assessments as described in the assessment and peer review report:

1 - Fishery-Dependent Information

Accurate and comparable landings are the principal data needed to assess the impact of fishing on lobster populations. The quality of landings data has not been consistent spatially or temporally. Aligning stock management areas with area designations for landings and management is necessary. Enhanced sea sampling and port sampling to create a more complete record of biological characteristics of the catch and harvest would also improve the usefulness of these data. This is especially needed in offshore waters. In addition, investigations are needed to determine where lobster are being caught and if and how this changes over time. A lot of progress has been made recently by improvements in landing reporting programs (SAFIS, 10% mandatory reporting, and mandatory vessel trip reports in some areas) and increased port and sea-sampling programs. However, many of these gains are about to be lost due to lack of funding. There was very little funding for the offshore port-sampling program and shrinking funds for sea-sampling programs will impact the spatial and temporal extent of sampling efforts in 2011. These types of programs are essential for accurate lobster assessments and must have dedicated funding.

2 - Growth

The apparent mismatch of biological reference points and current stock status from this and previous assessments, poor model fits to certain length data sources in the new assessment, and samples of large lobster from Georges Bank with clean shells (no fouling or shell disease), suggest that growth and maturity may not be characterized correctly. All of the information used to estimate molt frequency and much of the information used to estimate molt increments was collected from hatchery reared lobster. Hatchery growth may not be an accurate model of growth in the wild, particularly for large lobster. Research and tagging programs should be developed to generate better more accurate information on growth, particularly for large lobster.

3 - Fishery-Independent Information

There is a need to develop consistent techniques that monitor distribution and abundance of lobster independent of the fishery. Current methods (e.g. trawls) are limited in area (gear conflicts) and do not target primary lobster habitat (unable to access complex bottom). A coastwide ventless trap survey was initiated in 2006 to develop a time series of lobster relative

abundance and recruitment while attempting to eliminate the biases identified in conventional surveys. The survey was conducted from 2006 to 2012 from the Gulf of Maine to Long Island Sound. Funding is necessary to continue the survey. These data will need to properly integrated as indices of abundance into future assessment models.

Little is known about the cause and implications of the sudden recent increase in proportion females in offshore GOM and GBK. Given the potential for sperm limitation and decreased stock productivity that could result, more research is needed on this phenomenon.

Current stock boundaries separate the US and Canadian lobster population into semi-discrete stocks, so it is necessary to understand how much adult and larval exchange occurs between stocks and if this exchange represents a significant recruitment subsidy to US stocks. How do differing management strategies in adjacent stocks fit if exchange rates are high? This is particularly important given the similarities in the increasing size and proportion of female in the offshore Gulf of Maine and Georges Bank stocks.

4 - Age

All assessments of lobster stock status have been based on analyses of length data. Age is assumed by applying per-molt growth increments and molt frequencies to the length data. Based on these analyses, the American lobster has been treated as an extremely long-lived animal, reaching a reproductive maximum at a relatively old age. These assumptions are based on no actual age data. Applying aging techniques developed in England and Australia for lobster and other crustaceans would greatly improve our understanding of how many year-classes support the current trap fishery, how length relates to age, and how variable the age structure is over stock area and time. Research has been initiated on ageing techniques in New England in ME and CT. This work should be continued and expanded.

5 - Ecosystem-based Management

NOAA's 2009-2014 Strategic Plan for Fisheries Research recommends the inclusion of ecosystem and environmental information in all stock assessments. Further examination of lobster mortality not related to the fishery would provide a better understanding of factors limiting productivity and longevity. Research has been conducted in Southern New England in response to the Long Island Sound lobster die off elucidating the affects of temperature, pesticides and shell disease. Initial modeling work has been developed relating North Atlantic Oscillation (NAO) and water temperature shifts to larval and adult survival. Additional topics should include: predator/prey interactions and community structure (e.g. gut content analyses), directed tagging studies to estimate natural mortality, climatic shifts in ocean currents and temperature in all stock areas, and toxic substances causing chronic stress or disease. Investigations of stock unit carrying capacity should be explored, specifically: How should lobster be managed in a stock whose carrying capacity has declined or may be declining? What metric should be used to measure carrying capacity for lobster? How would a climate- induced range contraction be defined, and how should a stock whose range has contracted be managed?

6 - Investigation of Trans-boundary Assessments

Investigate conducting joint US and Canadian assessments. The two most productive U.S. stocks, (Gulf of Maine and Georges Bank), are shared with Canada. The two stock areas should

be assessed as a jointly, and linkages between US and Canadian fisheries and the dynamics of different management strategies on shared stocks should be examined.

7 - Investigation of Historical Levels of Stock Production

One limitation of current trend-based reference points is the period covered by the assessment. Investigations of past levels of stock size and size structure could provide additional insight into setting reference points that relate to the full range of stock productivity. Current status should be compared to some reasonably high stable period of stock production. Otherwise current stock status may be compared to a median value that is a continued diminishing return. In addition, extending backwards in time, to the extent practicable, all data sources in the stock assessment model should be explored. Internally generating estimates of the stock-recruitment relationship within the length-based model is recommended as well.

4.2 Monitoring

Table 3. 2011 sampling requirements and state implementation (.✓- sampling conducted but below FMP requirement, ✓ sampling conducted at level required by FMP, ✓+ sampling conducted beyond FMP requirement). There is no specific requirement for port and sea sampling (see text below).

State	100% Dealer reporting	10% Harvester Reporting	Overall Fishery Dependent Biological Sampling	Sea Sampling	Port Sampling	Ventless Trap Survey	Settlement Survey	Trawl Survey
ME	✓	✓	✓-	✓	✓	✓	✓	✓
NH	✓	✓+ 100%	✓-	✓	✓	✓	✓	✓ (ME)
MA	✓	✓+ 100%	✓-	✓		✓	✓	✓
RI	✓	✓+ 100%	✓-	✓	✓	✓	✓	✓
CT	✓	✓+ 100%	✓-	✓			✓	
NY	✓	✓ 100%	✓-	✓-	✓			✓(CT)
NJ	✓	✓	✓-	✓				

Addendum X requires that states conduct sufficient biological sampling to characterize the commercial catch. Specifically it requires that states weight sampling intensity by areas and season to match 3-year average of area's seasonal commercial catch. This volume of sampling well exceeds current state budgets for lobster biological sampling. In table 3 for the sea and port sampling, a check indicates that states are completing sufficient sampling to characterize the state waters catch a check minus indicates a state has decreased its sampling in the recent years.

In 2006, New Hampshire, Massachusetts, Rhode Island, and New York added port sampling to collect representative samples of lobster catches in offshore waters. This data will be analyzed and used for future lobster assessments. This sampling program is designed to improve the catch, effort, and biological data that are representative of the states fishery as a whole.

The PRT is concerned that funding for both fishery independent and dependent data collection is at risk. State resources are shrinking making it more difficult to secure funding for these

programs. These data collection programs need long-term funding in order for the stock assessment committee to use them for stock assessments.

Young of the Year Settlement

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

Maine: In 2000 settlement surveys were expanded to cover all seven of Maine's lobster management zones (LMZ) in order to create a statewide index of settlement to further this goal. The 2011 survey was conducted entirely by DMR staff and dive team members. Forty fixed sites statewide were surveyed with a minimum of four sites per LMZ. The settlement surveys remains the one opportunity to index one year class of lobsters.

Highlights of the 2011 sampling season:

- In all regions, settlement improved in 2011 from recent declines (Figure 1).
- In Zone E (midcoast) ten additional sites were randomly selected and generally agree with permanent sites in the region.

Figure 1. Lobster settlement in Maine seven lobster management zones. Zones run from east (Zone A) to west (Zone G).

New Hampshire: NHF&G has conducted a portion of the coastwide American Lobster Settlement Index (ALSI) for the past 4 years. In 2011, a total of 43 juvenile lobsters were sampled from three sites, 17 were YOY, 11 were one year olds (Y+), and 15 were older juveniles.

The CPUE (#/m^2) index associated with YOY lobsters decreased from 2008 to 2009 and showed an increase in 2010 and again in 2011 to the time series high (0.97/m^2) (Figure 2). The index for Y+ lobsters varied around 0.2 (#/m^2) from 2008 through 2010 and increased in 2011 to 0.63

(#/m^2). The ALSI is still in its infancy in New Hampshire, as a longer time series becomes available trends will be further analyzed.

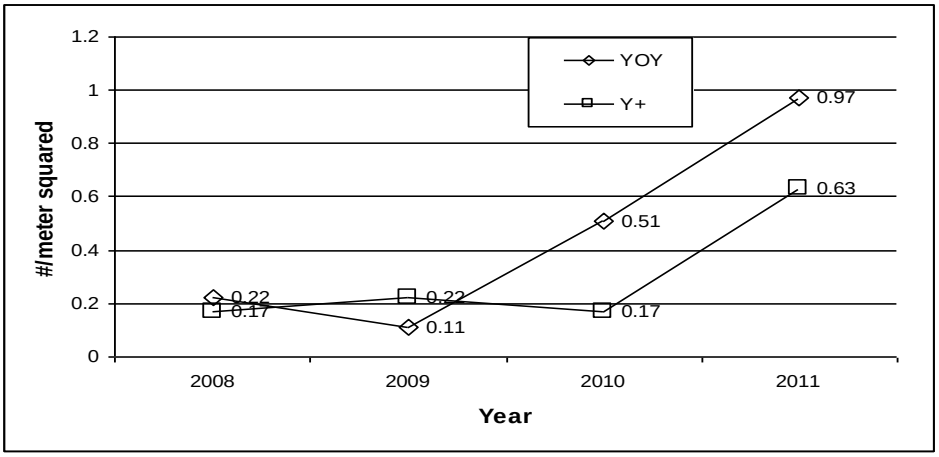

Figure 2. Catch per unit effort (#/meter^2) of both Young of the Year (YOY) and one year old (Y+) lobsters captured during the American Lobster Settlement Index in New Hampshire state waters from 2008 through 2011.

Massachusetts: Annual sampling for early benthic phase/juvenile (EBP) lobsters was conducted using SCUBA and airlift suction sampling equipment during August and September, 2011. Density indices of newly settled post-larval lobsters were calculated (16 year time series) and coastal habitat important to the settlement of these juveniles continues to be defined. Sampling was completed at 18 sites spanning 4 regions in Massachusetts coastal waters (8 Buzzards Bay sites, 3 Cape Cod Bay sites, 7 Boston Harbor sites, and 3 sites in Salem Sound). Data for all sites were used to generate density estimates of EBP lobster and other decapod crustaceans. Densities of EBP lobsters from 1995 to 2011 are presented in Figure 3. Salem Sound, Boston, and Cape Cod Bay are all part of LMA 1, and Buzzards Bay is part of LMA 2.

In 2011 densities of YOY lobsters were well above the time series medians in all three regions (Salem Sound, Boston Harbor, Cape Cod Bay) within LMA 1. The 2011 YOY lobster density in LMA 2 (Buzzards Bay) was near time series lows and well below the time series median.

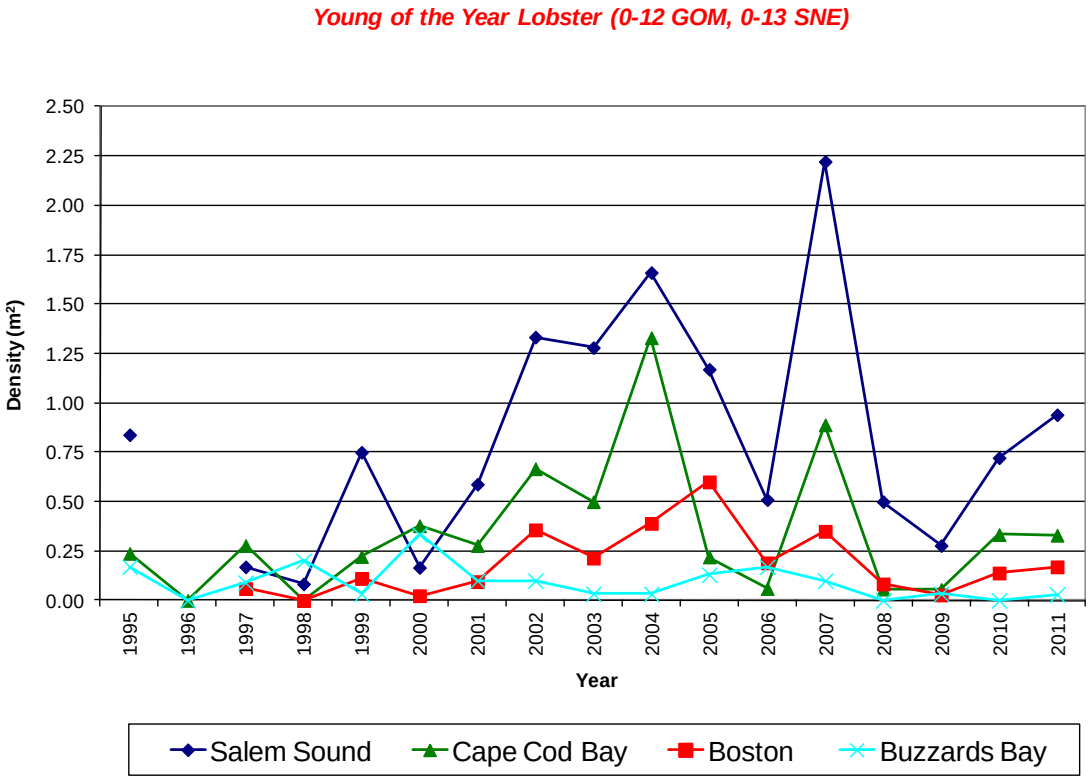

Figure 3. Young of Year Lobster Density in 4 Massachusetts regions; LMA 1 – Salem Sound, Boston, Cape Cod Bay, LMA 2 – Buzzards Bay

Rhode Island

The 2011 YOY Settlement Survey index was **0.00** YOY lobster per meter squared. The relative abundance of YOY lobsters has indicated a decreasing trend for the entire time series. The number had been variable from year to year, but since 2005 has consistently decreased without any period of significantly increasing abundance. This has culminated in to a complete lack of any settlers in 2011 (Figure 4).

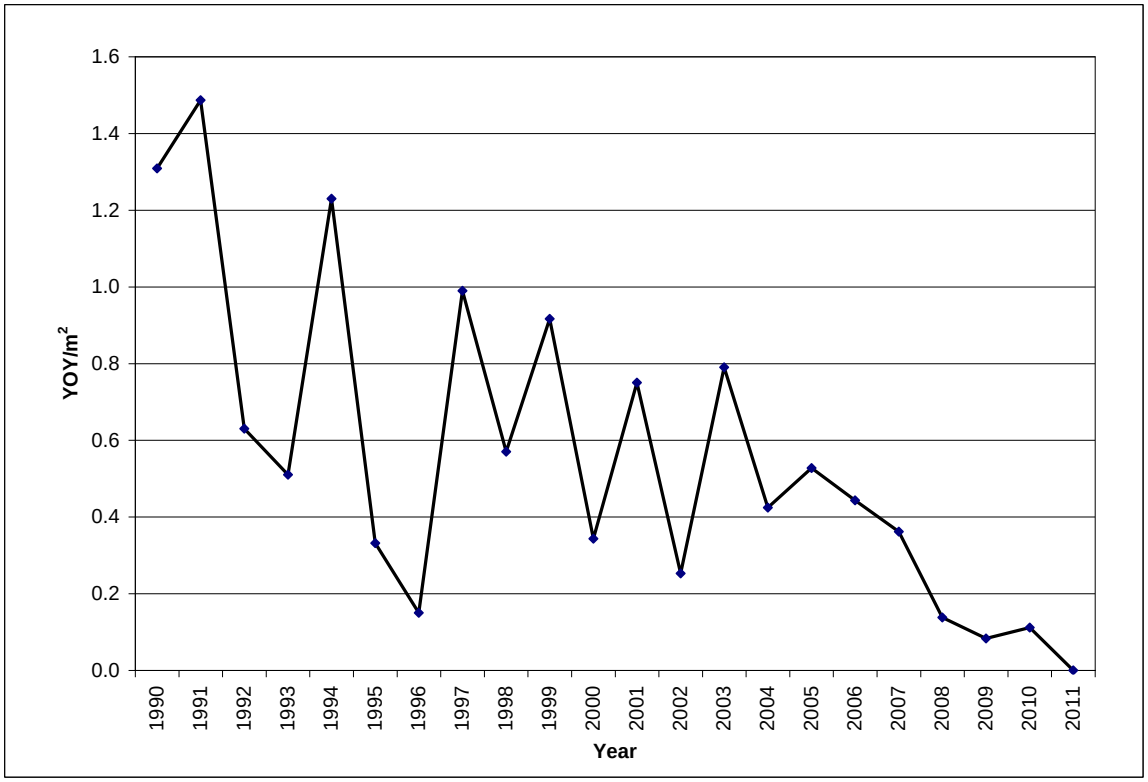

Figure 4. Mean catch per meter squared of YOY lobsters (<14 mm carapace width) from 1990 – 2011. This represents an index of relative abundance for YOY lobsters in Area 539.

Connecticut: The CT DEEP Larval Lobster Survey is conducted each summer to provide an index of zero-class recruitment in western Long Island Sound. The annual production index in 2011 (17.9 larvae per 1000 m^3 water sampled) ranked 27rd or third lowest in the 29-year time series (1983-2011) (Figure 5). This value is well below the time-series median of 86.1 larvae/1000 m^3. The median value has been exceeded only once, in 2007, since 2000 with the other 10 years' production well below the median value. The lowest value in the time series was recorded in 2006 (9.1 larvae/1000 m^3), followed by 2002 (15.0 larvae/1000 m^3, see figure below).

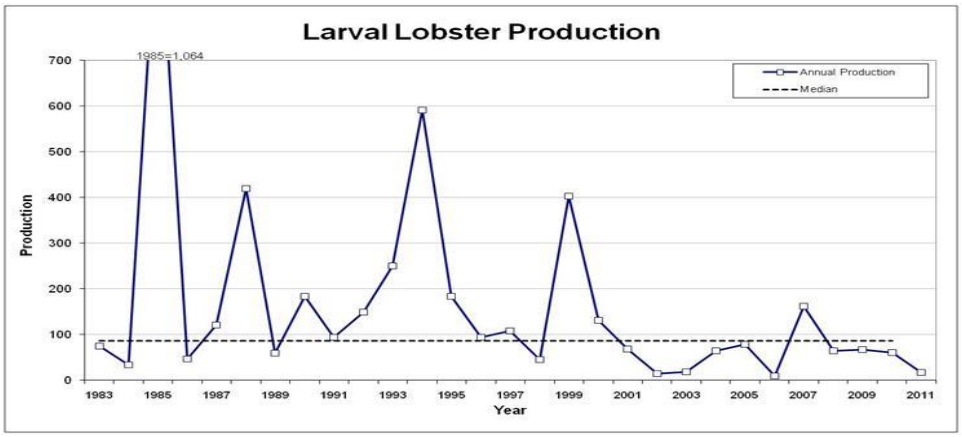

Figure 5. CT DEEP Larval Lobster Survey time series.

Ventless Trap Survey

To address a need for a reliable index of lobster recruitment, a cooperative random stratified ventless trap survey was designed to generate accurate estimates of the spatial distribution of lobster length frequency, lobster relative abundance while attempting to limit the biases identified in conventional fishery dependent surveys. In the past, fishery-dependent trap sampling data have not been included in generating relative abundance indices for the American lobster due to associated bias with the data collection method. In order to collect unbiased data, a fishery-independent survey, wherein scientists and contracted fishermen cooperatively collect the data, will provide greater control over the sampling design and data quality and quantity necessary to maintain a stratified sampling approach.

A random-stratified sampling design was applied to nearshore statistical areas from Maine to New York. The survey was a cooperative effort between state fisheries agencies and commercial lobstermen, who were contracted to fish at pre-determined sampling locations along the New England coast from Maine to New York. Each statistical area was assigned three depth strata (1-20 m, 21- 40 m and 41-60 m).

Maine: Since 2007, Maine coastal waters, the three statistical areas (511, 512 and 513) have been divided into eight (8) stations for each depth of three strata (Figure 6) (In 2006 eight sampling stations were sampled for each depth within each of the statistical areas). A total of 138 stations were randomly selected, and visited twice monthly during June, July and August. A total of 50,796 lobsters were measured this sampling season.

The highest catch rates for the whole time series, since 2006, occurred in 2011 in Statistical Areas 511 (eastern) and 512 (midcoast) in both ventless and vented traps (Figure 6). Catch rates in 513 in 2011 were the 2nd highest in both ventless and vented traps over the 6-year time series. Of the lobsters sampled, 92% were sublegal size (<83 mm). There were 151 lobsters sampled that showed signs of shell disease.

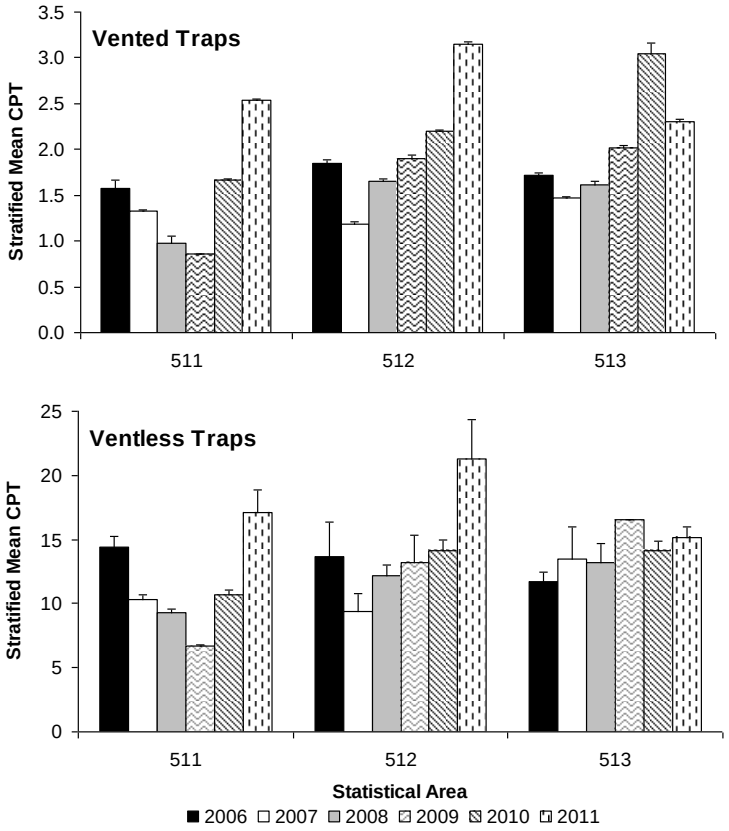

Figure 6. The stratified mean catch per trap for vented and ventless trap types by Statistical Area for 2006-2011 (all sizes).

New Hampshire: Since 2009, NHF&G has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (statistical area 513). New Hampshire follows the standardized coastwide procedures for this survey. A total of three sites were surveyed twice a month from June through September in 2011. Catch per unit effort (stratified mean catch per trap haul) from 2009 through 2011 is presented in Table 4. The relative abundance indices associated with this survey shows an upward trend from 2009 through 2011.

Table 4. Stratified mean catch per trap haul, for all lobsters captured during the coastwide Random Stratified Ventless Trap Survey in New Hampshire state waters from 2009 through 2011.

Year	Stratified mean catch per trap
2009	6.9
2010	9.2
2011	13.9

Massachusetts: The coast-wide ventless trap survey was initiated in 2006 and expanded in 2007. Each station was sampled with a six pot trawl in which vented and ventless lobster traps were

alternated (3 of each per trawl). The survey took place from June through September in statistical areas 514 and 538, and stations were sampled twice monthly.

Figure 7 shows the stratified mean CPUE for lobsters in S.A. 514 (part of LMA 1). The average catch of sublegal lobsters is much higher than the catch of legal-sized lobsters, and has shown an increasing trend since 2007. The catch of legal-sized lobsters has remained relatively steady, varying around the time series mean of 0.5 lobsters per trap.

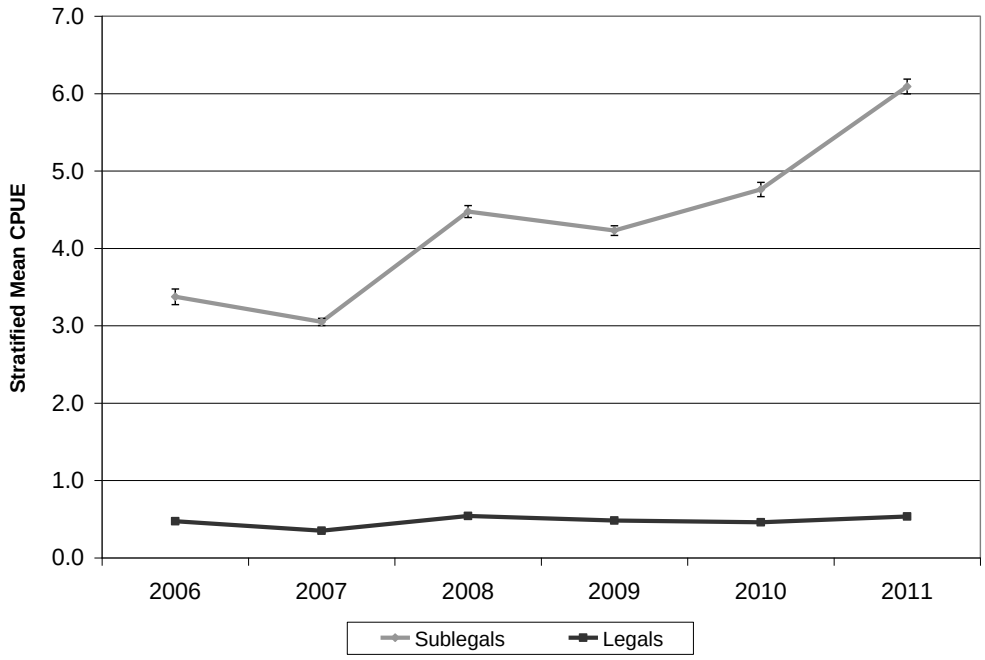

Figure 7. Stratified mean catch per trap haul (±S.E.) of sublegal (< 83 mm, grey line) and legal (≥ 83 mm, black line) lobsters in Area 514.

Figure 8 shows the stratified mean CPUE for lobsters in S.A. 538 (part of LMA 2). The average catch of sublegal lobsters is again higher than the catch of legal-sized lobsters, and generally declined through 2010. In 2011, sublegal CPUE increased, although this may in part be related to an expansion of the survey area to regions outside Buzzards Bay, where thermal conditions may be more tolerable. The legal-size CPUE (CTH_6) has remained below 0.5 all throughout the time series, with the lowest value observed in 2008 (0.11).

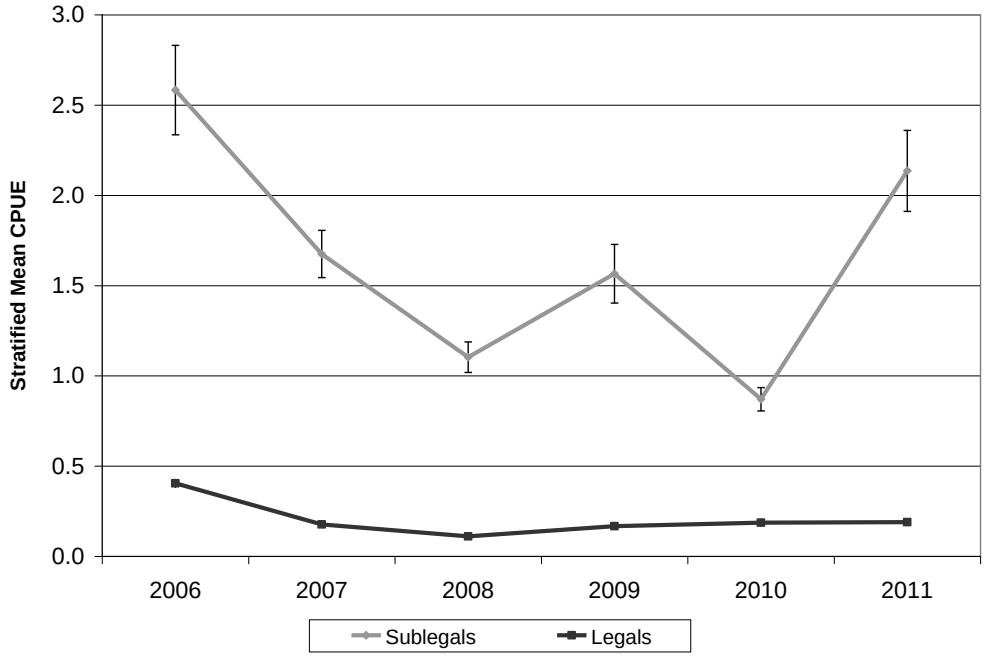

Figure 8. Stratified mean catch per trap haul (±S.E.) of sublegal (< 86 mm, grey line) and legal (≥ 86 mm, black line) lobsters in Area 538.

Rhode Island

The relative abundance of sublegal lobsters increased in the first three survey years (2006 – 2008), then decreased from 2009 – 2010 by roughly 50%. The number increased slightly (approximately 13%) in 2011 from the time series low value in 2010. The relative abundance of legal lobsters varied around 0.5 per trap haul for the first three years, and then dropped to approximately 0.3 per trap haul from 2009 – 2010 (Figure 9). Sublegal-sized lobsters are approximately 10 times more abundant than legal-sized lobsters in this survey.

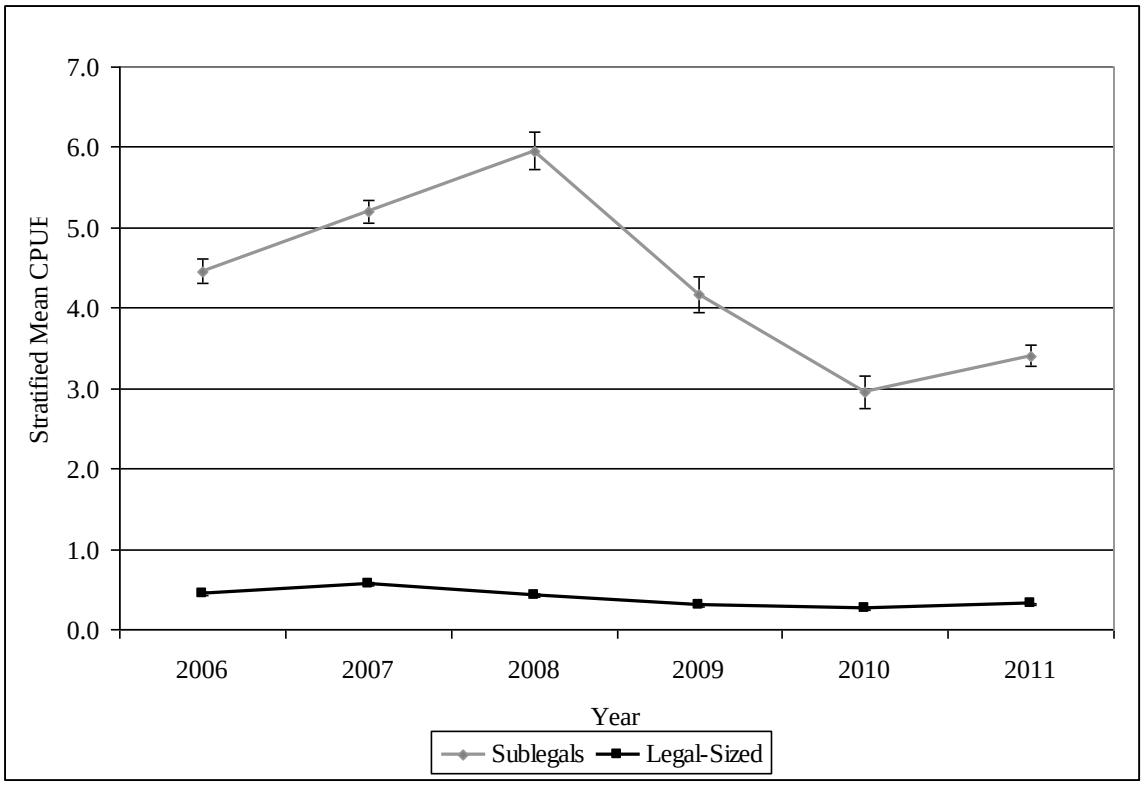

Figure 9. Stratified mean catch per trap haul (± S.E.) of sublegal and legal lobsters from 2006 – 2011. This represents an index of relative abundance for sublegal (<83 mm CL) and legal (≥ 83 mm CL) lobsters in Area 539.

New York: New York received funding from ASMFC from 2006 through 2009 to conduct the NMFS stat area 611 portion of the Coastwide Ventless trap survey. The relative abundance of sublegal lobsters was decreasing in the first three survey years, then increased by roughly 56% in 2009. The relative abundance of legal lobsters increased slightly in 2007 with no substantial increase or decrease in the last two years of the survey (Figure 10). Sublegal-sized lobsters were 7 – 19 times more abundant than legal-sized lobsters in this survey.

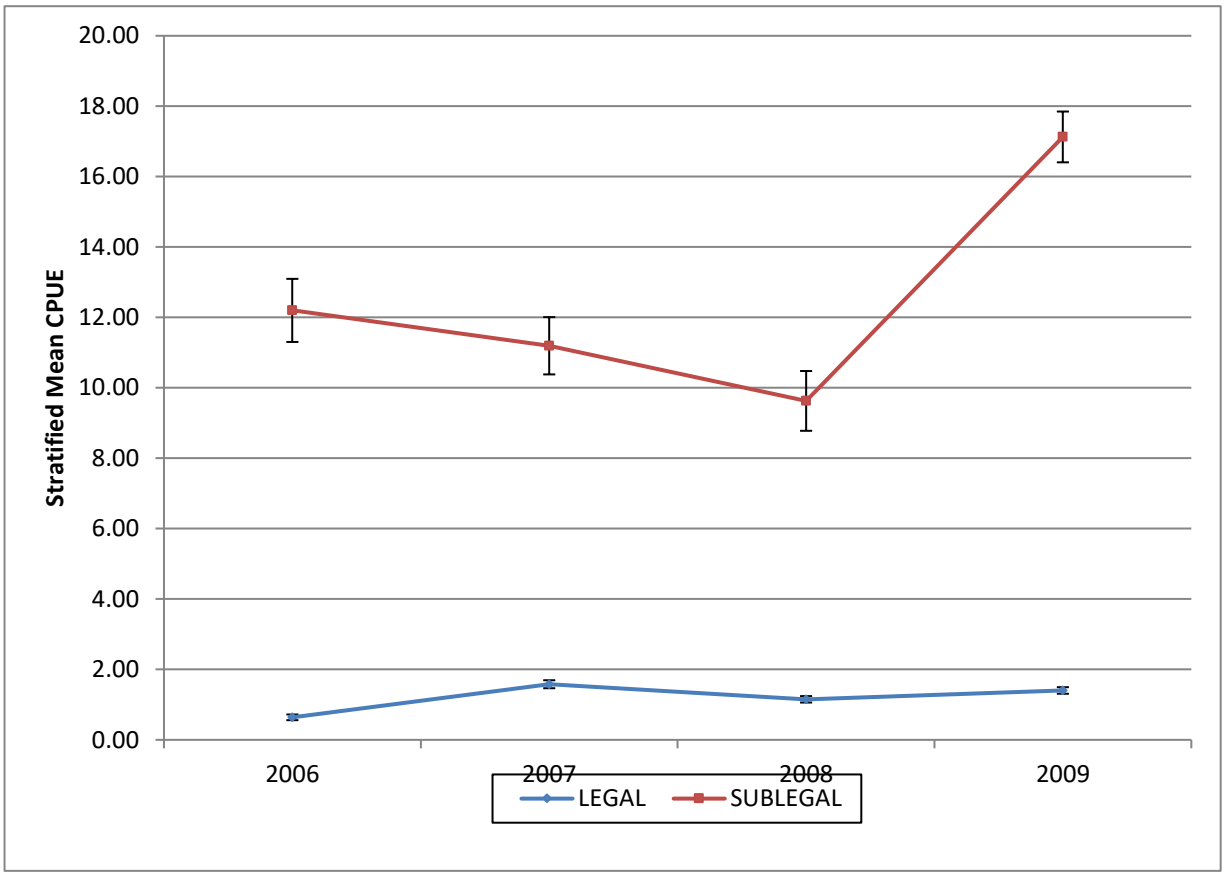

Figure 10. Stratified mean catch per trap haul (±SE) of sublegal and legal lobsters from 2006 – 2009. This represents an index of relative abundance for sublegal (<84mm CL) and legal (≥84 mm CL) lobsters in Area 611.

V. Status of Management Measures and Issues

Amendment 3 established management measures that require coastwide and area specific measures applicable to commercial fishing. The coastwide requirements are summarized in Table 3.

Table 3. Coastwide requirements and prohibited actions

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

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

American lobster is managed under Amendment 3 to the Interstate FMP for American Lobster. I

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

Amendment 3 also provides the flexibility to respond to current conditions of the resource and fishery by making changes to the management program through addenda.

The commercial fishery is primarily controlled through minimum/maximum size limits, trap limits, and v-notching of egg-bearing females.

Addendum I (August 1999)

Establishes trap limits in the seven lobster conservation management areas (LMCAs)

Addendum II (February 2001)

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

Addendum III (February 2002)

Revises management measures for all seven LCMAs in order to meet the revised egg-rebuilding schedule.

Technical Addendum 1 (August 2002)

Eradicates the vessel upgrade provision for Area 5.

Addendum IV (January 2004)

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

Addendum V (March 2004)

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

Addendum VI (February 2005)

Replaces two effort control measures for Area 2 – permits an eligibility period

Addendum VII (November 2005)

Revises Area 2 effort control plan to include capping traps fished at recent levels and maintaining 3 3/8" minimum size limit

Addendum VIII (May 2006)

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

Addendum IX (October 2006)

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

Addendum X (February 2007)

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

Addendum XI (May 2007)

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

Amendment 4

In 2000, the Lobster Board considered and failed to approve Amendment 4 to the FMP. The Amendment proposed allowing conservation equivalency be applied to two provision of Amendment 3- limits on non-trap gear and a prohibition on the possession of v-notched lobsters. The v-notch proposal, in particular, arose out of an effort to resolve ongoing litigation brought by fishermen challenging the validity of the Commission's fishery management plan.

Addendum XII (February 2009)

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

Addendum XIII (May 2008)

Solidifies the transfer program for OCC and stops the current trap reductions.

Addendum XIV (May 2009)

This addendum alters 2 aspects of the LCMA 3 trap transfer program. It lowers the maximum trap cap to 2000 for an individual that transfers traps. It changes the conservation tax on full business sales to 10% and for partial trap transfers to 20%.

Addendum XV (November 2009)

This addendum establishes a limited entry program and criteria for Federal waters of lobster conservation management area 1.

Addendum XVI: Reference Points (May 2010)

This addendum establishes new biological reference points to determine the stock status of the American lobster resource (fishing mortality and abundance targets and thresholds for the three stock assessment areas). The addendum also modifies the procedures for adopting reference points to allow the Board to take action on advice follow a peer reviewed assessment.

Addendum XVII (February 2012)

This addendum establishes a 10% reduction in exploitation for LCMA within Southern New England (2, 3, 4, 5, and 6). Regulations are LCMA specific but include v notch programs, closed seasons, and size limit changes. While approved, the addendum is not final until the inclusion of LCMA 6 plan.

Addendum XVIII (August 2012)

This addendum reduced traps allocated by 50% for LCMA 2 and 25% for LCMA 3.

Table 4: Current (2012) Area specific management measures

Management Measure	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	OCC
Min Gauge Size	3-1/4”	3-3/8”	3-1/2”	3-3/8”	3-3/8”	3-3/8”	3-3/8”
Vent Rect.	1-15/16 x 5-3/4”	2 x 5-3/4”	2-1/16 x 5-3/4”	2 x 5-3/4”	2 x 5-3/4”	2 x 5-3/4”	2 x 5-3/4”
Vent Cir.	2-7/16”	2-5/8”	2-11/16”	2-5/8”	2-5/8”	2-5/8”	2-5/8”
V-notch requirement	Mandatory for all eggers	Mandatory for all legal size eggers June 1, 2012	Mandatory for all eggers above 42°30’	Mandatory for all eggers July 1, 2012	None	None	None
V-Notch Definition (possession)	Zero Tolerance	1/8” with or w/out setal hairs[1]	1/8” with or w/out setal hairs[1]	1/8” with or w/out setal hairs[1]	1/8” with or w/out setal hairs[1]	1/8” with or w/out setal hairs[1]	State Permited fisherman in state waters 1/4” without setal hairs Federal Permit holders 1/8” with or w/out setal hairs[1]
Max. Gauge (male & female)	5”	5 ¼”	6 3/4”	5 ¼”	5 ¼”	5 ¼”	State Waters none Federal Waters 6 3/4”
Measures to change in 2013							
Min Gauge size			3 17/32” Jan 1, 2013				
V-notch requirement					Mandatory for all eggers Jan 1, 2013		
Season Closure				Feb 1- Mar 31, 2013	Feb 1- Mar 31, 2013		

VI. Current State-by-State Implementation per Compliance Requirements

All states are currently in compliance with all required measures under Amendment #3 and Addendum I-XVIII.

VII. *De Minimis* requests.

The states of North Carolina, Virginia, Maryland, and Delaware have requested *de minimis* status. Each state meets the *de minimis* requirement. The PRT recommends that the states implement all biological measures contained in the FMP. The PRT recommends the states conduct biological sampling of their lobster fishery to improve the stock assessment but not require sampling. *De minimis* states are required to collect harvest annual harvest data, but the PRT recommends harvest data is collected monthly for use in the stock assessment.

VIII. Recommendations and Issues

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

1. With the decline of resources for data collection programs, including Interjurisdictional Fisheries funding, and the need for development of consistent techniques to monitor distribution and abundance of lobster, the PRT recommends that a regional data collection program be implemented. A regional initiative would stream line state and regional programs and provide consistent information for assessment use.

2. PRT recommends the ASMFC socioeconomic subcommittee evaluate the socioeconomic data being collected by states and determine what additional data should be collected in order to provide more robust evaluations of management changes. The development of the trap transfer programs will also have significant impacts on the lobster fishery. The PRT recommends the socioeconomic subcommittee recommend specific data that should be collected as transfers occur in-order to provide reports to the board on socioeconomic impacts of transfers once the program begins.

3. The PRT is concerned about the ability of the lobster management program to respond to changing stock conditions and encourages the Board to explore stock assessment updates between benchmarks to lobster management.

4. The PRT encourages the full implementation of data collection programs to lobster management. The PRT recommends that all states implement 100% harvester and dealer programs as outlined in Addendum X.

5. The PRT encourages state and federal jurisdictions to continue to work cooperatively to achieve the goals of the FMP.

6. The PRT recommends the technical committee explore oceanographic and climate change impacts on lobster stock, including lobster productivity.

7. The PRT recommend that states add to the annual compliance report the number of permits issued and number of those permits that are active by state and LCMA (and zone for ME).