Technical Analysis of the Chronology and Spatial Extent of Area 2 Stock Declines

ASMFC Lobster Technical Committee

October 2002

Work Task Description

On August 26, 2002 the Lobster Management Board directed the Lobster Technical Committee (TC) to advise the Board on the magnitude of problems (e.g., significant reductions in landings, declining survey abundance, shell disease, and other influences on mortality) in Area 2 as well as recommend an appropriate response and associated timeline for response in that Area. Specifically Board members were interested in TC member's analysis of the chronology and spatial extent of stock declines. Board members also expressed interest in TC review of trawl survey and sea sampling information to provide insight into the current situation of stock declines in Area 2 and to advise if the current Amendment and supporting addenda are sufficient to remedy the problem.

Process for Technical Analysis and Development of Recommendations

The Lobster Technical Committee convened and reviewed a presentation from the TC chair regarding the current stock declines in Area 2. The TC then reviewed the information and drafted recommendations to the Lobster Board.

Summary of Technical Committee Discussions

(See attached report)

Technical Committee Finding(s)/Recommendation(s)

There was a consensus among the TC that the current overfishing definition (F10%) , in combination with the proposed management measures, are not sufficient to remedy the current stock declines observed in Area 2. The Lobster TC has the following recommendation**:**

Rebuild Spawning Stock Biomass (SSB) as soon as possible:

a.) Reduce Fishing Mortality in Area 2.

b.) Task LCMT 2 to develop a plan that immediately reduces system wide effective effort to levels that are consistent with rebuilding SSB. Although the exact levels of reduction are yet undefined, reduction should begin while the Model Development Sub-Committee determines those levels.

c.) Develop a control rule that incorporates both F- based and biomass based reference points to offer better management advice to respond to varying stock conditions.

Summary of Area 2 Stock Conditions

Summary of Area 2 Trawl Survey Indices: The MA and RI fall trawl survey lobster abundance indices were separated by sex and broken down into three 11 mm length categories; Pre-recruits (59 – 70 mm), Recruits (71 – 82 mm), and Legals (83 + mm).

MA Area 2 male survey indices have dropped substantially from higher levels observed in the late 1980's and early 1990's (Figure 1.) The male indices for pre-recruits, recruits, and legals respectively have remained below the time series mean for the last 5 years. The MA 2001 male survey indices were 67 %, 32 %, and 100 % below the time series mean for pre-recruits, recruits, and legals, respectively (Figure 5).

MA Area 2 female survey indices have dropped substantially from higher levels observed in the late 1980's and early 1990's (Figure 2). The female indices for pre-recruits, recruits, and legals respectively have remained below the time series mean for 4 of the last 5 years. The MA 2001 female survey indices were 87 %, 100 %, and 42 % below the time series mean for pre-recruits, recruits, and legals respectively.

Figure 1. MA Area 2 Fall Trawl Survey Indices

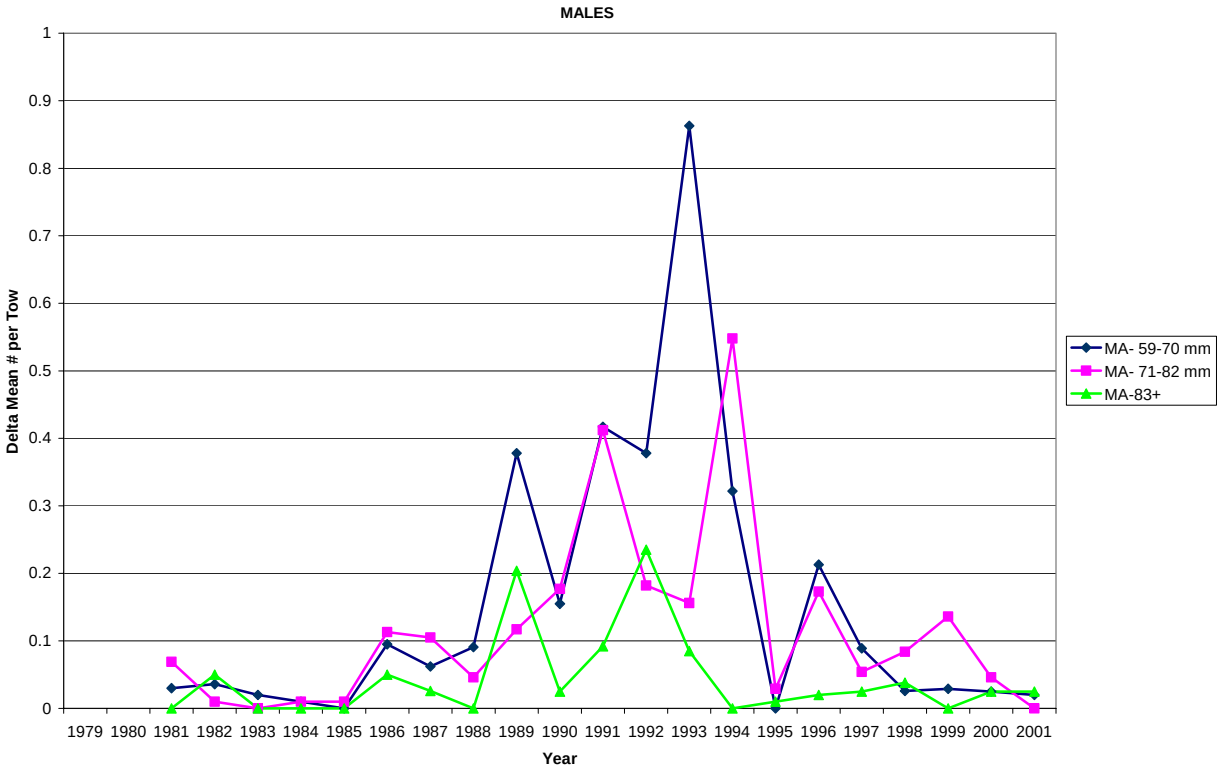
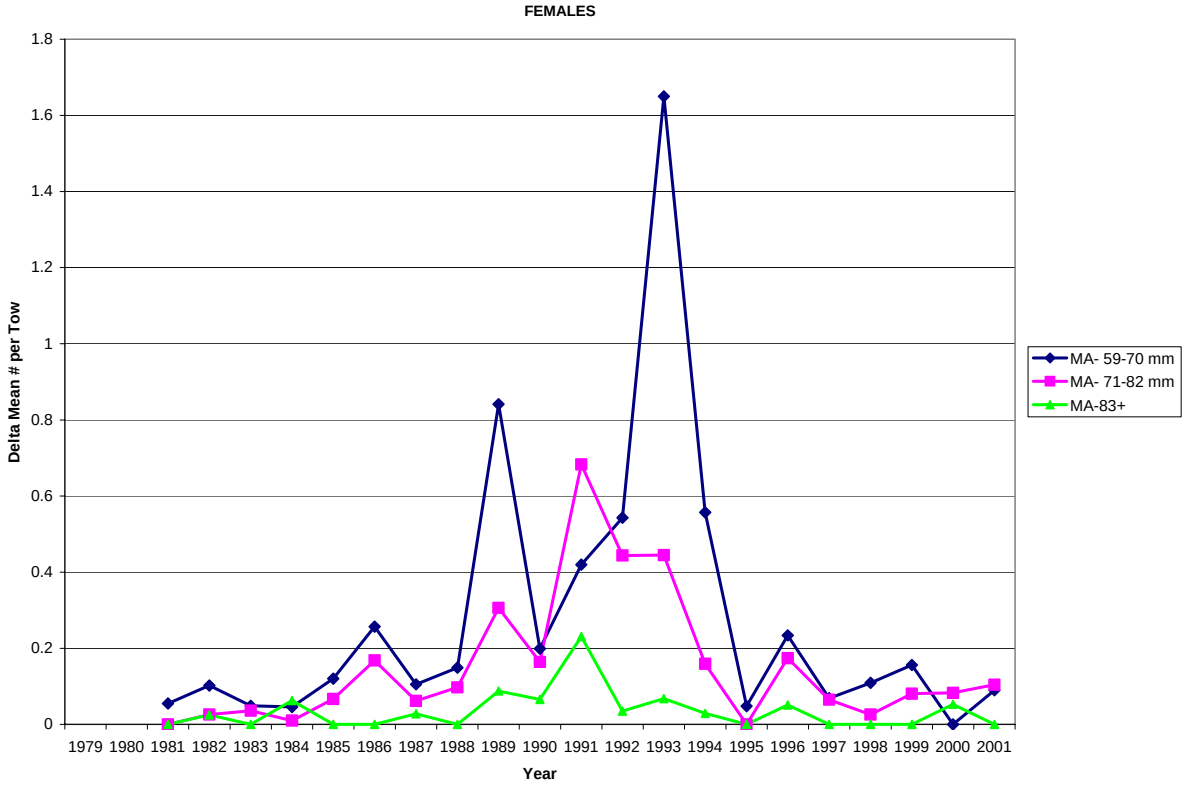


Figure 2. MA Area 2 Fall Trawl Survey Trends



RI Area 2 male survey indices have dropped substantially from higher levels observed in the late 1980's and early 1990's (Figure 3). The RI 2001 male survey indices for Pre-recruits and recruits dropped precipitously between 1996 and 2000, and experienced a slight increase in 2001. The legal male index has declined steadily from the time series high in 1997. In 2001 the pre-recruit and recruit male indices were close to the time series mean, however the legal index was 54% below the time series mean.

RI Area 2 female survey indices have dropped substantially from higher levels observed in the late 1980's and early 1990's (Figure 4). The female indices for pre-recruits, and recruits have dropped precipitously since 1996. Legal female index has dropped as well, but not to the same degree as pre-recruit and recruits. The RI 2001 female survey indices were 74 %, 51 %, and 66 % below the time series mean for pre-recruits, recruits, and legals respectively.

Figure 3. RI Area 2 Fall Trawl Survey Trends

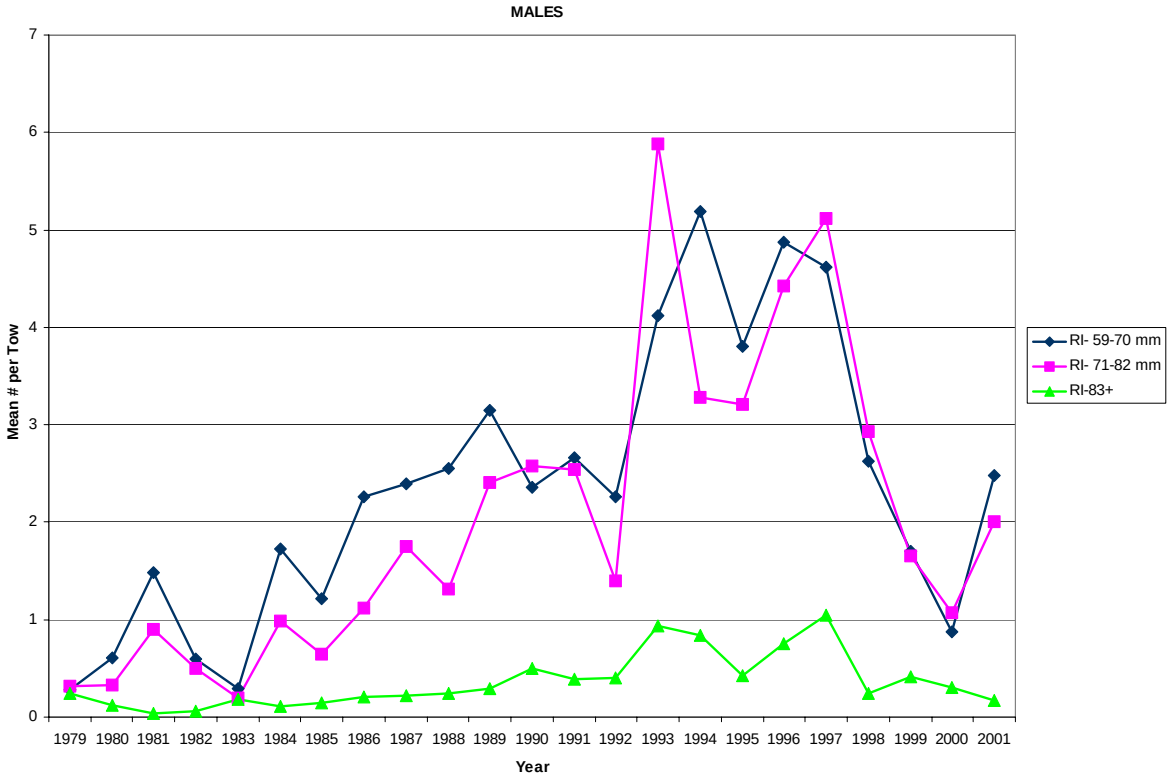


Figure 4. RI Area 2 Fall Trawl Survey Trends

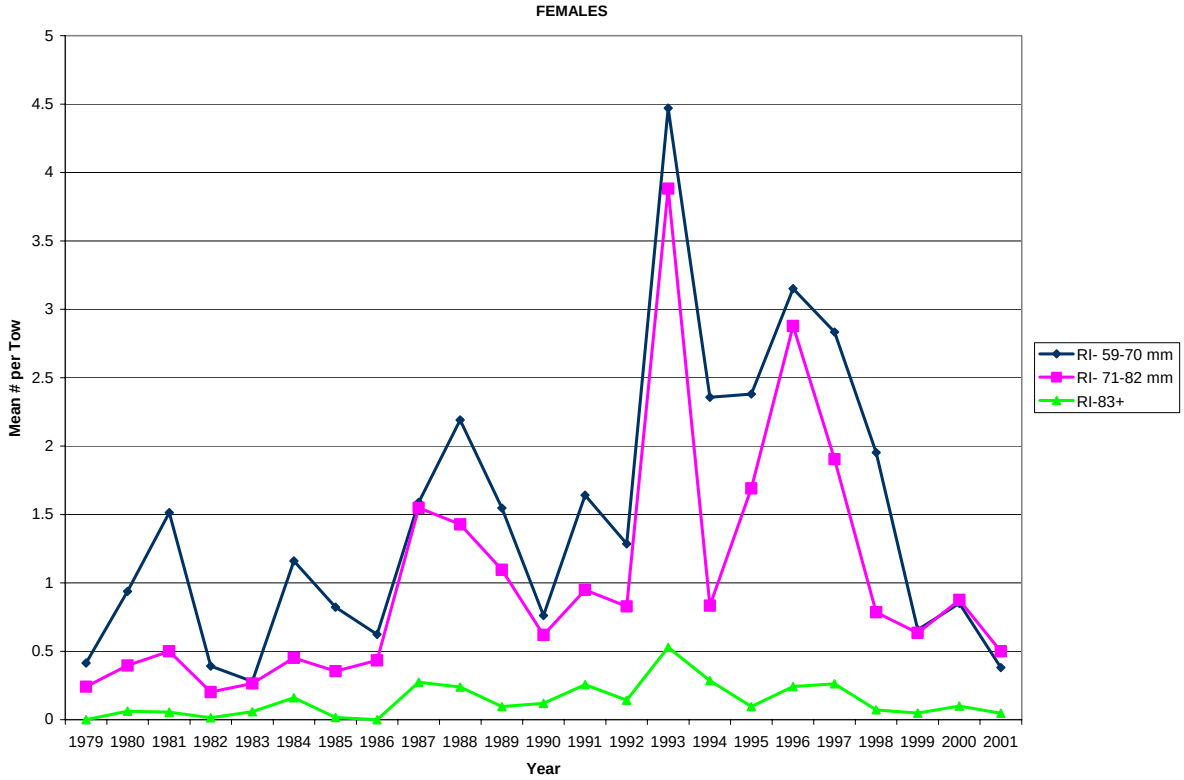
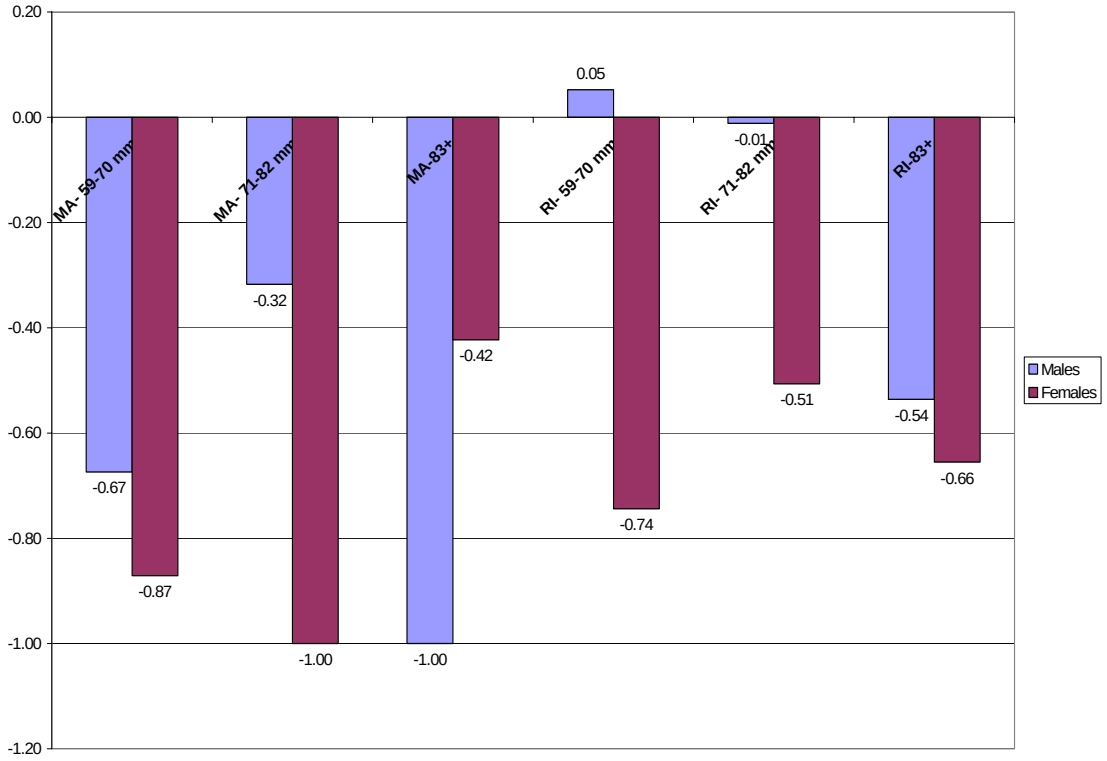


Figure 5. % Difference in 2001 Trawl Survey Indices From the Time Series Mean



Summary of RI and MA Area 2 Trap CPUE Trends:

Area 2 Sub-Legal CPUE

MA sub-legal CPUE shows increasing trend during 1984-1990, with a sharply decreasing trend during 1991-2001(Figure 6). 2001 MA sub-legal CPUE is the time-series low; and is 63% below the time-series mean. (Figure 9)

RI sub-legal CPUE shows a generally decreasing trend over the entire time-series and a constant decreasing trend during 1997-2001. 2001 RI sub-legal CPUE is the time-series low; and is 23% below the time-series mean. (Figure 9)

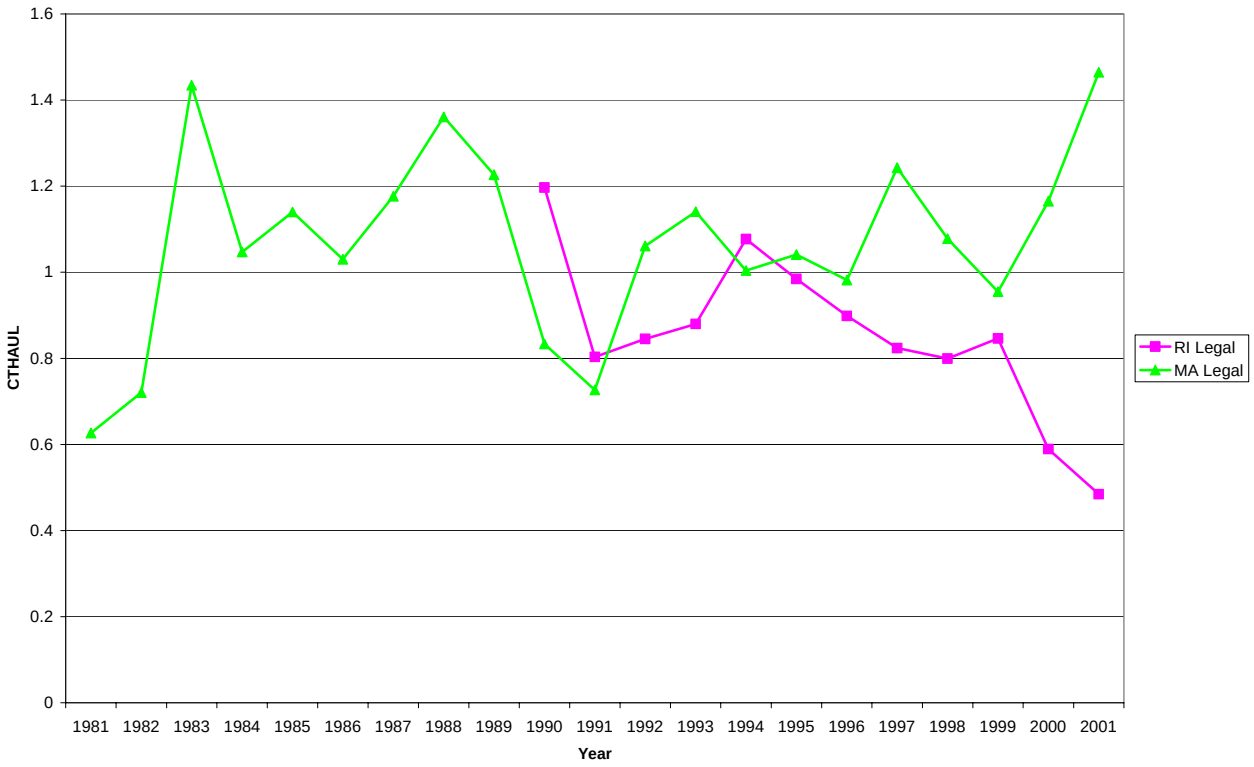
Figure 6. Area 2 Catch per Trap Haul from Sea-sampling (Sub-legals)

Area 2 Legal CPUE

The MA legal CPUE fluctuates over the time-series with a slight increasing trend (Figure 7). 2001 MA legal CPUE is the time-series high, but may be due to a shift in effort from Buzzard's Bay out to more offshore areas just south of the Elizabeth Islands. In recent years (1997-2001) fishermen in Buzzard's Bay have made this shift in an attempt to maintain catch rates. The 2001 MA legal CPUE is 37% above the time-series mean. (Figure 9)

The RI legal CPUE shows general, moderate decreasing trend over the time-series, with a sharp decline during 1999-2001(Figure 7). 2001 RI legal CPUE is the time-series low; 43% below the time-series mean. (Figure 9)

Figure 7. Area 2 Catch per Trap Haul from Sea-sampling (Legals)



Area 2 Ovigerous CPUE

The MA ovigerous CPUE shows an increasing trend during 1981-1990; fluctuates widely without trend during 1991-1994; appears relatively flat and stable during 1995-2001 (Figure 8). MA time-series shows slight decreasing trend overall. 2001 MA ovigerous CPUE is 33% below the time-series mean. (Figure 9)

The RI ovigerous CPUE is relatively stable and fluctuates without any apparent trend during 1991-1997; shows an increasing trend from 1997-1999; shows a decreasing trend from 1999-2001 (Figure 8). 2001 RI ovigerous CPUE is the second lowest in the time-series; 20% below the time-series mean. (Figure 9)

Figure 8. Area 2 Catch per Trap Haul from Sea-sampling (Ovigerous Females)

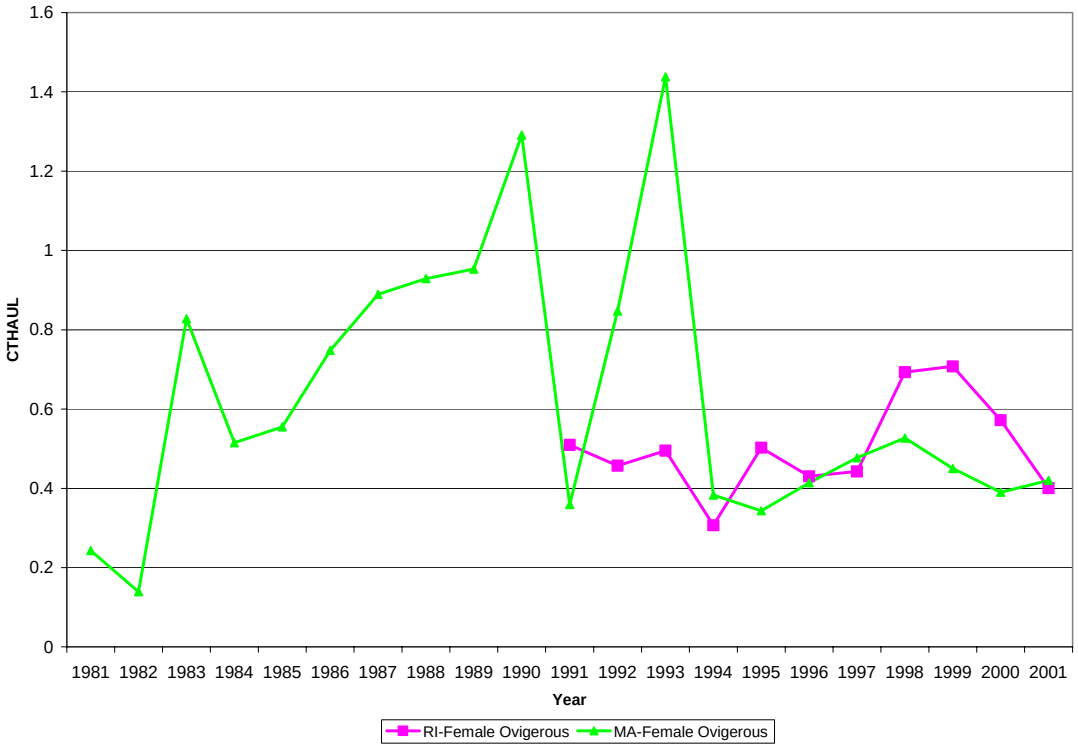
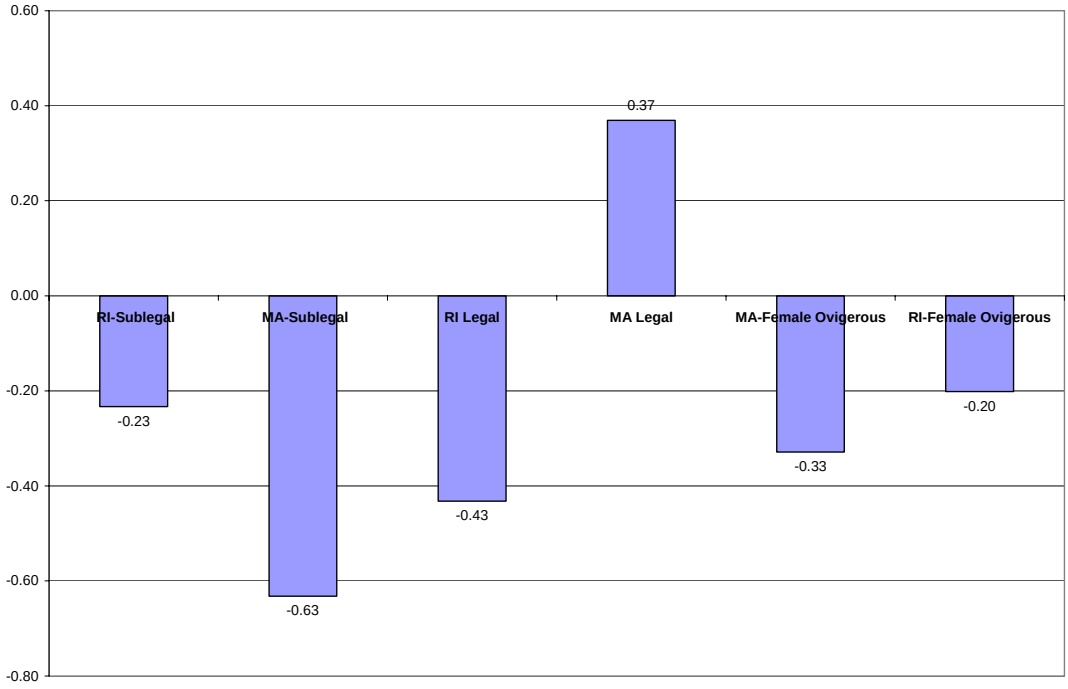


Figure 9. Area 2 % Difference in 2001 CTHAUL from the Time Series Mean

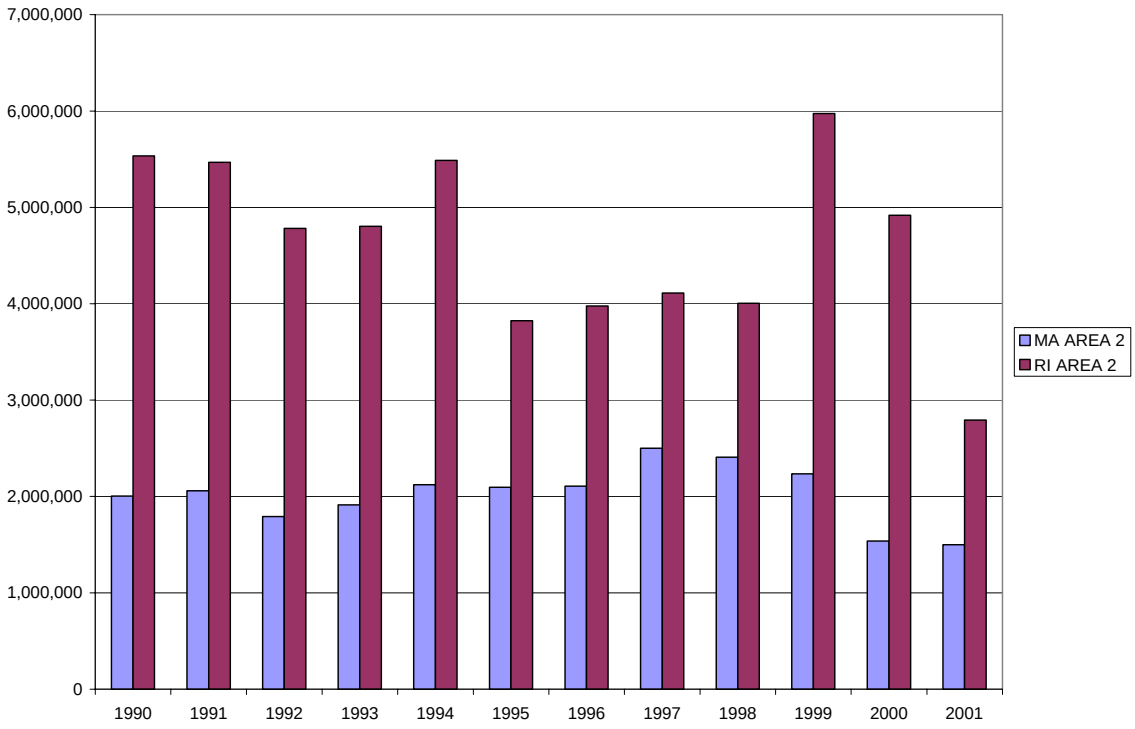


Summary of MA and RI Area 2 Lobster Landings Trends

The RI lobster landings time series primarily from NMFS weighout and canvas system except for 1999, 2000, and 2001, which are from RI, catch reports. The 1981 and 1982 landings appear abnormally low and may be incomplete. MA landings time series for Area 2 dates back to 1990 because prior to 1990 the MA catch report did not allow for an areal breakdown specific to Area 2.

MA and RI lobster landings trends are similar for Total, Offshore, and Inshore categories in that they show a significant decline from 1999 to 2001. (Figures 10, 11 & 12). The 2001 Total landings are 26% and 29% below the time series mean for MA and RI, respectively (Figure 13). 2001 Inshore landings are 30% and 29% below the time series mean for MA and RI, respectively (Figure 13). The 2001 Offshore landings are 24% and 29% below the time series mean for MA and RI, respectively (Figure 13). It is interesting to note that the MA offshore landings have decreased in recent years in spite of an apparent increase in offshore effort by MA lobstermen as inshore catch rates have dropped off.

Figure 10. Total Area 2 Lobster Landings



The magnitude of landing declines have been greater in some localized areas. For example, the lobster landings in Buzzards Bay have decline sharply since 1998 (Figure 14), with 2001 landings being 60% below the time series mean (Figure 13). This is roughly twice the decline observed in the rest of inshore Area 2.

Figure 11. Area 2 Offshore Landings

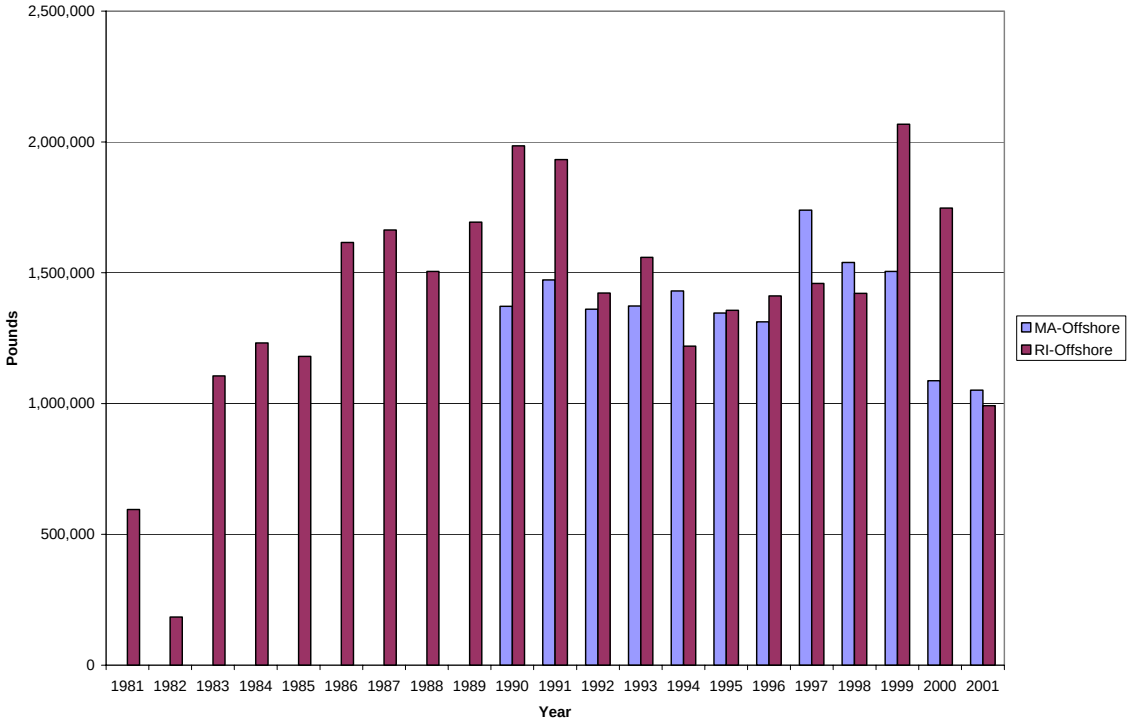


Figure 12. Area 2 Inshore Landings

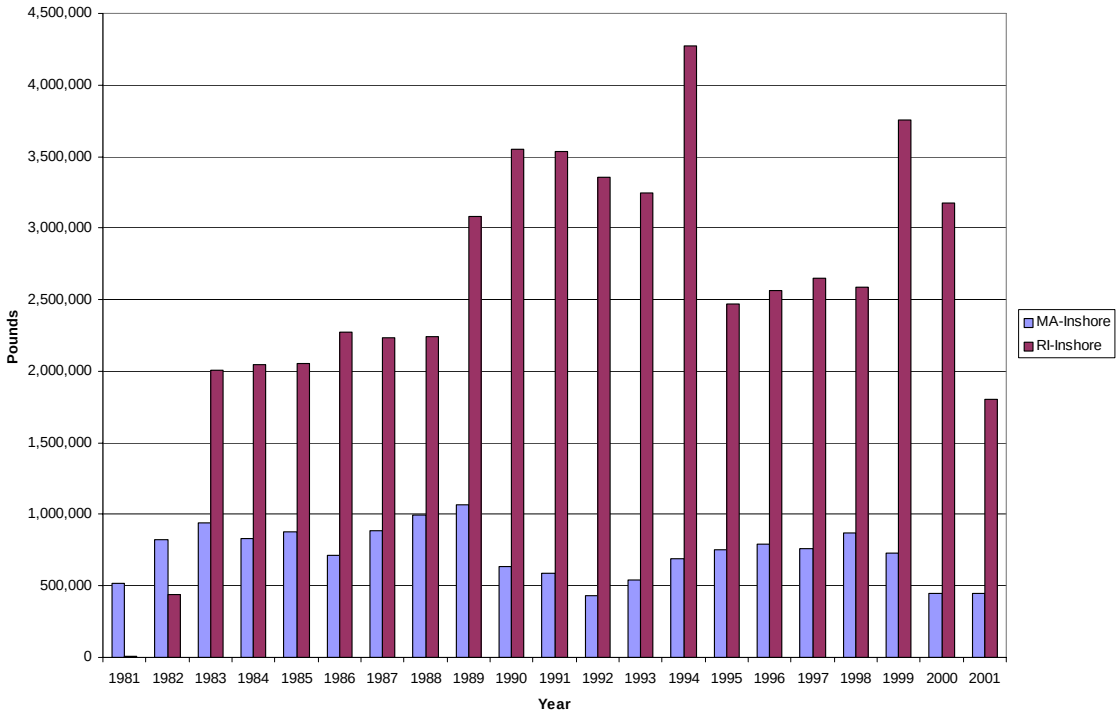


Figure 13. % Difference in 2001 Area 2 Landings from the Time Series Mean

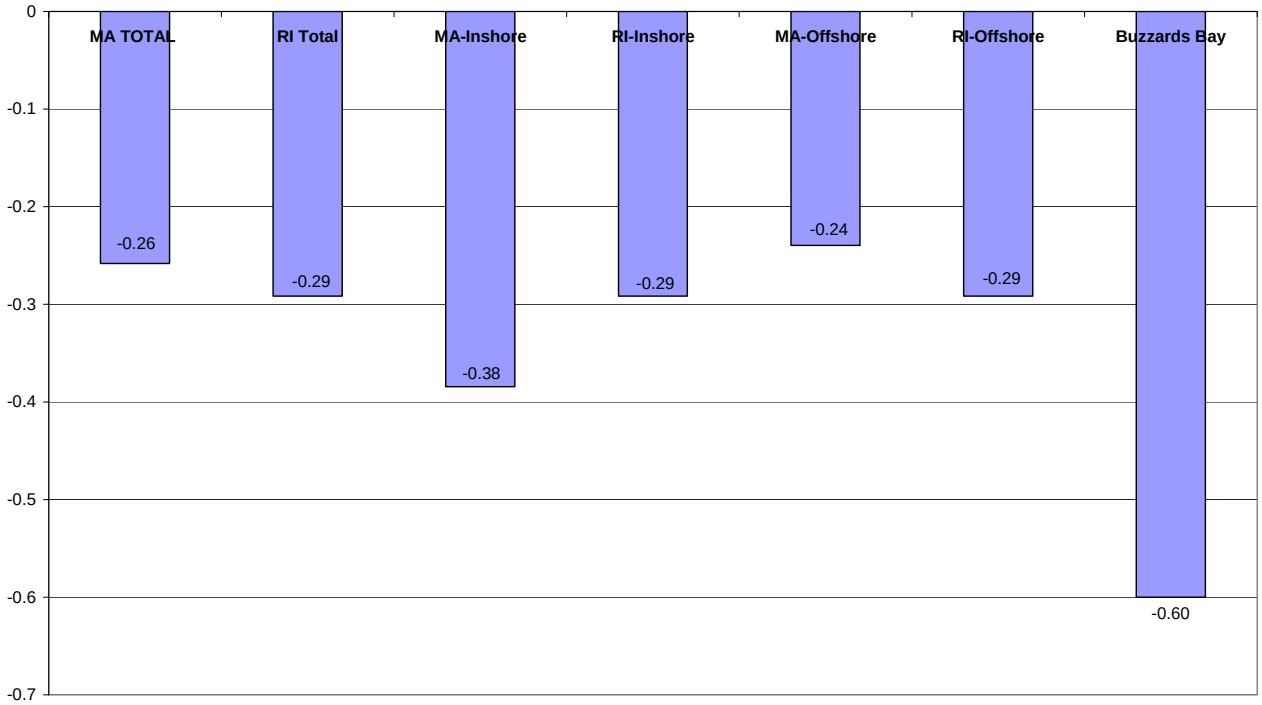
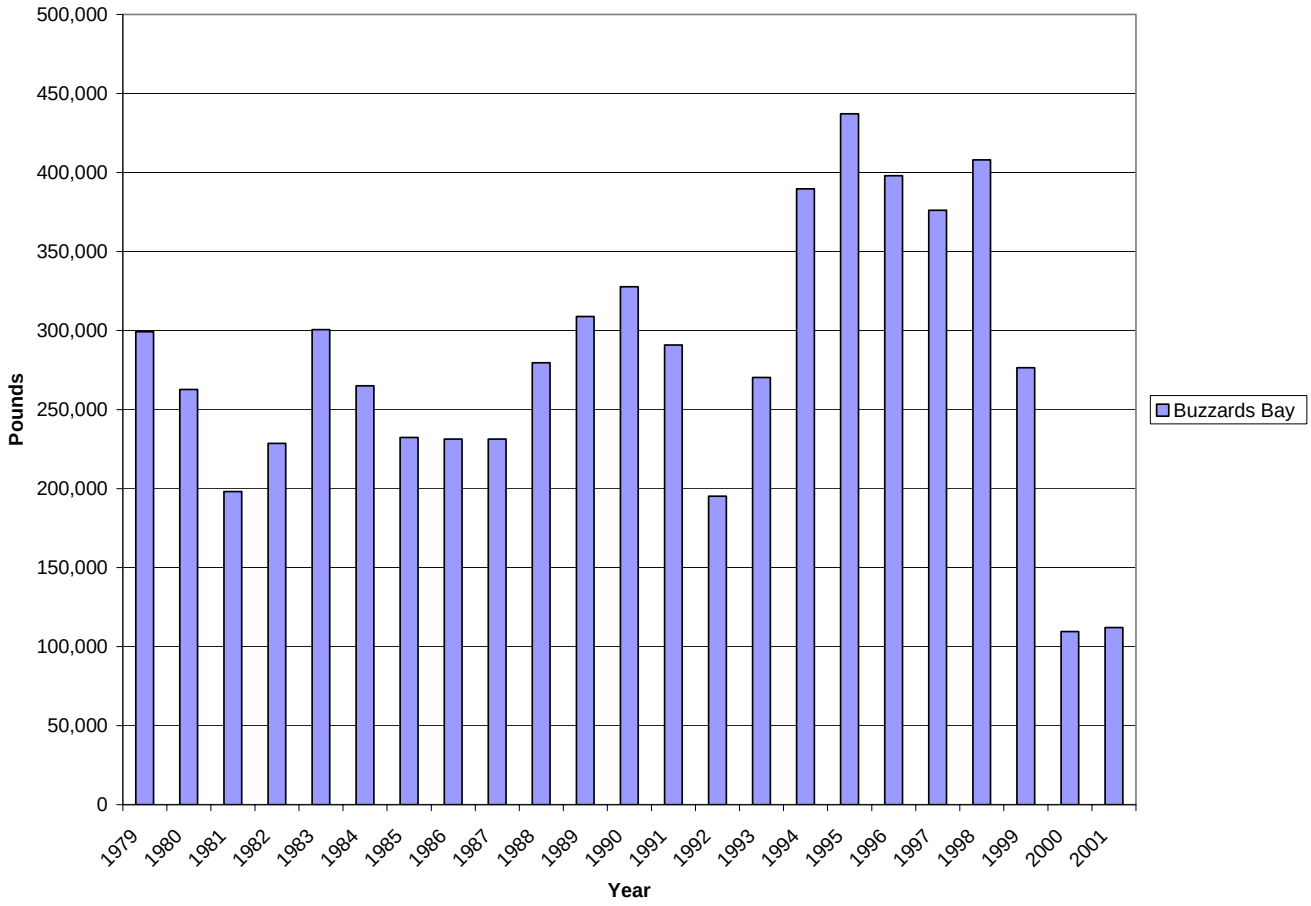


Figure 14. Buzzards Bay (MA) Lobster Landings



Summary of MA and RI YOY Lobster Settlement Indices

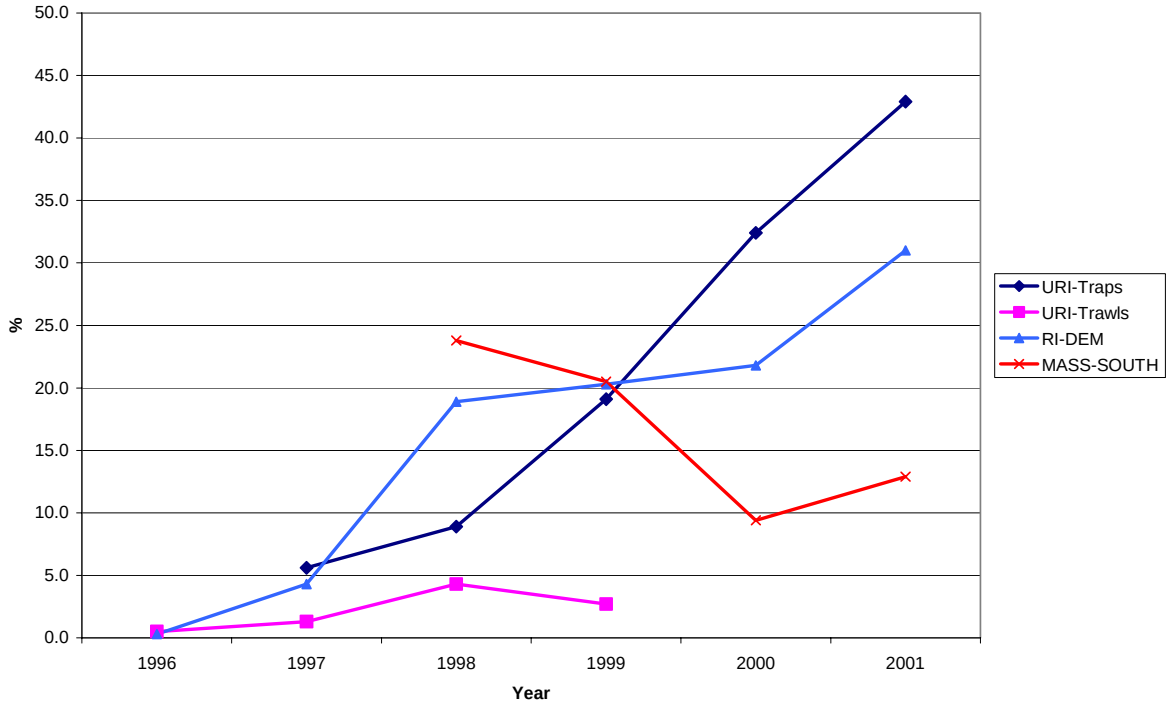
The RI lobster settlement index has varied widely but trended down since its inception in 1990 (Figure 15). The MA index started in 1995 near the low point in the RI time series, and has remained fairly steady but low. Without baseline data prior to 1990 it is impossible to determine how current settlement compares to historical levels.

Figure 15. Area 2 YOY Lobster Settlement Index

Summary of trends in the incidence of Shell Disease in Area 2

Subsequent to reported outbreaks of lobster shell disease in RI (1996) and MA (1997) state fisheries agencies that participate on the Lobster TC initiated a standard shell disease sampling protocol in June 2000 to monitor its prevalence. The prevalence of lobster shell disease in RI has increased steadily since monitoring began in 1996. In MA, shell disease levels were highest in 1998 and have declined since that time Figure 16). While the overall incidence of shell disease is fairly high in Area 2, there is no definitive work to date that relates shell disease to abnormal lobster mortality. At this time there is not sufficient information to characterize the impact of shell disease on the Area 2 lobster population.

Figure 16. Prevalence of Shell Disease in Area 2



Summary of Fishing Mortality and Abundance Trends in Area 2

Fishing mortality and abundance estimates were generated with CSA Analysis (Delury) using RI Spring and Fall trawl survey data. MA trawl survey data were not incorporated because of the complete absence of legal sized animals in many of the survey years. The fishing mortality rates presented are annual mean sexes combined estimates. Fishing mortality slowly declined from highs seen in the early 1980's to a time series low in 1995 (Figure 17). Subsequent to that, F has increased slightly and remained fairly steady between 1996 and 2001. Despite the overall declining trend in the time series, F has remained above 0.84, the current baseline reference point of F10%, for the entire time series. Abundance of legal and recruit lobsters increased steadily between 1978 and 1990, remained high and fairly steady between 1991 to 1997, and have decreased sharply from 1998 to present (Figure 18).

Fig.17- RI Inshore Lobster Fishing Mortality Rate From CSA Assessment Model Compared to ASMFC Overfishing Definition for SCCLIS Area

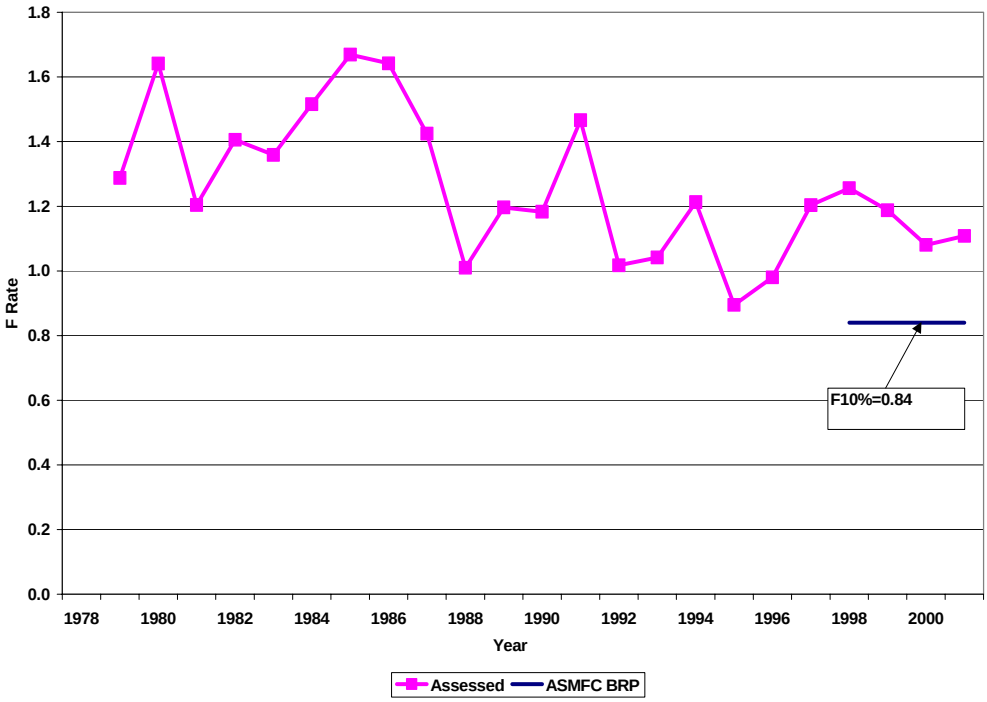
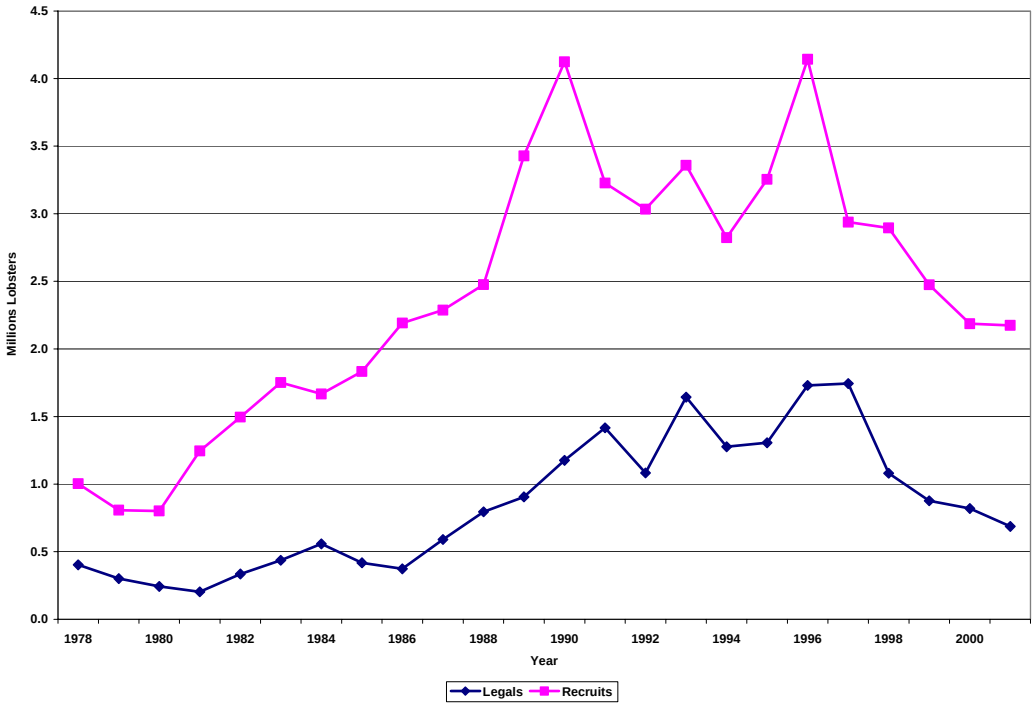


Fig. 18- RI Inshore Lobster Abundance From DeLury Assessment Model (Spring and Fall Average)



The TC discussed additional information and analyses that may shed more light on the magnitude and extent of the decline of lobster stocks in Area 2. The following is a list of additional information that the TC plans to review at upcoming meetings;

*Examine environmental trends (especially temperature) over the same time frame.

*Breakdown of shell disease prevalence data by sex, size category, and egg status.

*An analysis of CPUE trends broken down spatially (inshore and offshore) to note potential localized effects.

*Review information relative to the 1996 North Cape oil spill in Narragansett Bay.

*Examination of landings, cpue, and trawl survey trends in Long Island Sound to determine if the decline is limited to Area 2, or occurring in the entire SCCLIS stock unit.

*Examine the 1999 to 2001 mean of all indices to compare them with the time series means.