Massachusetts
Division of Marine Fisheries

Massachusetts 2015 Compliance Report to the Atlantic States Marine Fisheries Commission – Horseshoe Crab

Submitted by:
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I. Introduction

Summary of the year highlighting significant changes in monitoring, regulations or harvest.

MarineFisheries staff and numerous volunteer groups conducted spawning beach surveys during the full and new moons from mid-April through the end of June. Prosomal widths taken from over 2400 crabs measured as part of our market sampling program showed no difference compared to the size distribution from past years. We continued to develop a survey to monitor juvenile horseshoe crab abundance. After observing very few juveniles in the first year of survey development (2014), we observed large numbers of juveniles at all three potential survey locations (Wellfleet Harbor, Nantucket Sound, and Buzzards Bay) in 2015. Dealers reported 106,957 crabs harvested for bait, while fishermen reported catching 108,054 crabs for bait in 2015. *MarineFisheries* tested the efficacy of alternatives to the use of horseshoe crab as channeled whelk bait, including using the carcasses of processed Jonah crabs. On its own, the bait was ineffective. The number of crabs bled for biomedical purposes remains confidential due to the limited number of biomedical facilities in the state (one).

II. *de minimus* status – not applicable

III. Previous calendar year's fishery

a. Bait Harvest

In 2015, 58 of 234 horseshoe crab bait permits issued by *MarineFisheries* were actively fished, representing a decrease of 4 active permits and 5 inactive permits from 2014. Fishermen reported 108,054 crabs harvested for bait use. This represents 33% of the quota issued by ASMFC to Massachusetts (330,377 crabs), and 65% of the more restrictive state quota voluntarily imposed by Massachusetts (165,000 crabs). Total catch consisted of 41,291 females, 36,409 males, and 30,353 unclassified crabs. Hand harvesters (including rakes, dipnets, and hand tongs) caught 68,065 crabs, mobile gear (trawl or dredge) 36,909, and 3,079 by other means (gill net, weirs, pots, etc). Approximately 90% of crabs harvested came from areas south of Cape Cod. Harvester reported monthly bait harvest peaked in May (Table 1).

Table 1. Weight (lb) and count of horseshoe crabs harvested for bait fishery from Massachusetts Trip Level Reports and NMFS Vessel Trip Reports. Months with fewer than three harvesters reporting are confidential and noted with an asterisk.

	BAIT	
Month	lb	Count
MAR	*	*
APR	*	*
MAY	151,453	56,724
JUN	43,290	16,213
JUL	29,461	11,034
AUG	24,921	9,334
SEP	13,412	5,023
OCT	*	*
NOV	3,679	1,378
DEC	*	*

b. Scientific and Research Harvest

As a condition of permit renewal, researchers that wish to harvest horseshoe crabs in Massachusetts are required to report the number of horseshoe crabs taken for scientific purposes. There were seven scientific permits issued in 2015 to research institutions and educational organizations. Several clutches of eggs and 332 adult or juvenile crabs were collected, including 99 crabs that were released.

c. Biomedical Fishery

Associates of Cape Cod (ACC) is the single biomedical company producing Limulus Amebocyte Lysate (LAL) in Massachusetts. ACC filed monthly catch reports listing the harvesters they purchased crabs from, location of harvest, the number and sex of crabs purchased, and how the crabs were used (released or returned to bait market). ACC also reported the number of crabs they rejected or received dead. Per the terms of the Letter of Authorization (LOA) issued to ACC, they must keep crabs moist during transport and storage, transport crabs in a temperature controlled truck with the thermostat set between 50 and 60 °F, keep crabs in the laboratory at ≤70 °F, and hold crabs in barrels no more than approximately 2/3 full.

d. Shorebird monitoring- Not applicable

e. Benthic Sampling

The *MarineFisheries* Resource Assessment Project has conducted seasonal spring (May) and fall (September) bottom trawl surveys in state waters since 1978. Approximately 100 tows are made during each season in five bio-geographic areas (Figure 1), using a stratified random sampling design, with 22 total strata. The net's design (¾-sized two seam 39' x 51' otter trawl with 3 ½" cookies on a chain sweep, ¼" knotless codend liner) is appropriate for sampling horseshoe crabs, however, the vessel size precludes towing inside most shallow embayments less than approximately 25 feet. For this report, areas 1-3 are considered Southern New England (SNE), and areas 4 and 5 are the Gulf of Maine (GOM).

The stratified mean number, and stratified mean weight of female horseshoe crabs are given in Figure 2 and Figure 3, respectively. Both figures show increasing trends in the spring and fall in Southern New England (SNE) as both surveys are at or above their time series medians. In the GOM, the fall 2015 stratified female number per tow set a new time series high, while the stratified mean weight per tow was second only to 2014. The spring survey infrequently catches female horseshoe crabs in the GOM.

The stratified mean number, and stratified mean weight of male horseshoe crabs is given in Figure 4 and Figure 5, respectively. All survey indices are at or above their time series medians. Survey trends are going up in all seasons and regions with the exception of the spring survey in the GOM which infrequently catches horseshoe crabs.

The 2014 and 2015 fall surveys caught a larger size distribution of both sexes in SNE (Figure 6 and Figure 7) and females in the GOM (Figure 8) than they have in several years. Observations of male crabs in the GOM (Figure 9) continue to be infrequent. The 2015 spring survey mostly caught horseshoe crabs below 20 cm in SNE (Figure 10 and Figure 11). No horseshoe crabs were caught during the spring survey in the GOM (Figure 12 and Figure 13).

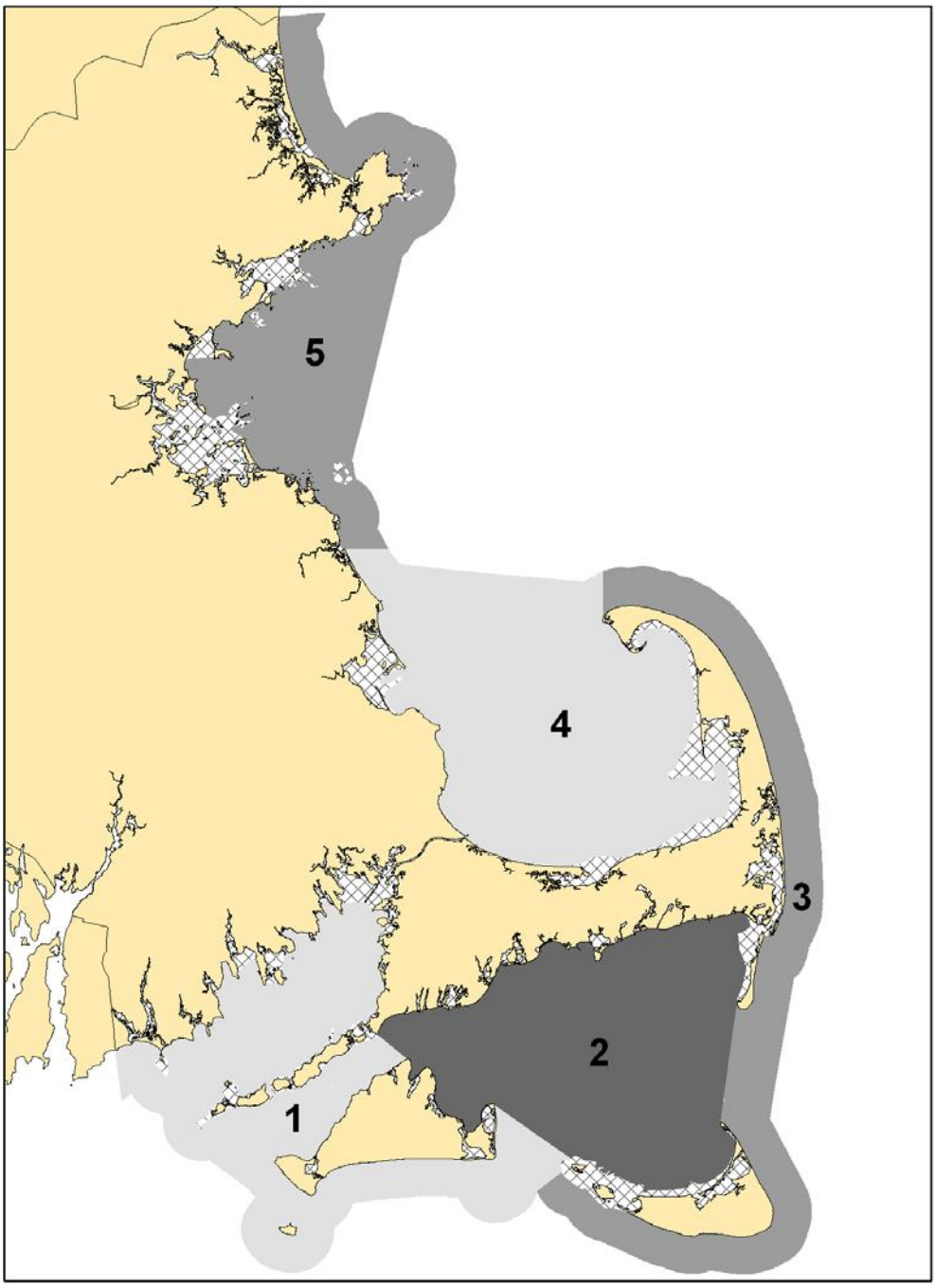

Figure 1. Map of *MarineFisheries* Resource Assessment Program trawl survey regions. For size distribution figures (Figures 6-13), regions 1-3 are considered Southern New England and regions 4 and 5 are Gulf of Maine. Figure supplied by *MarineFisheries'* Resource Assessment Program.

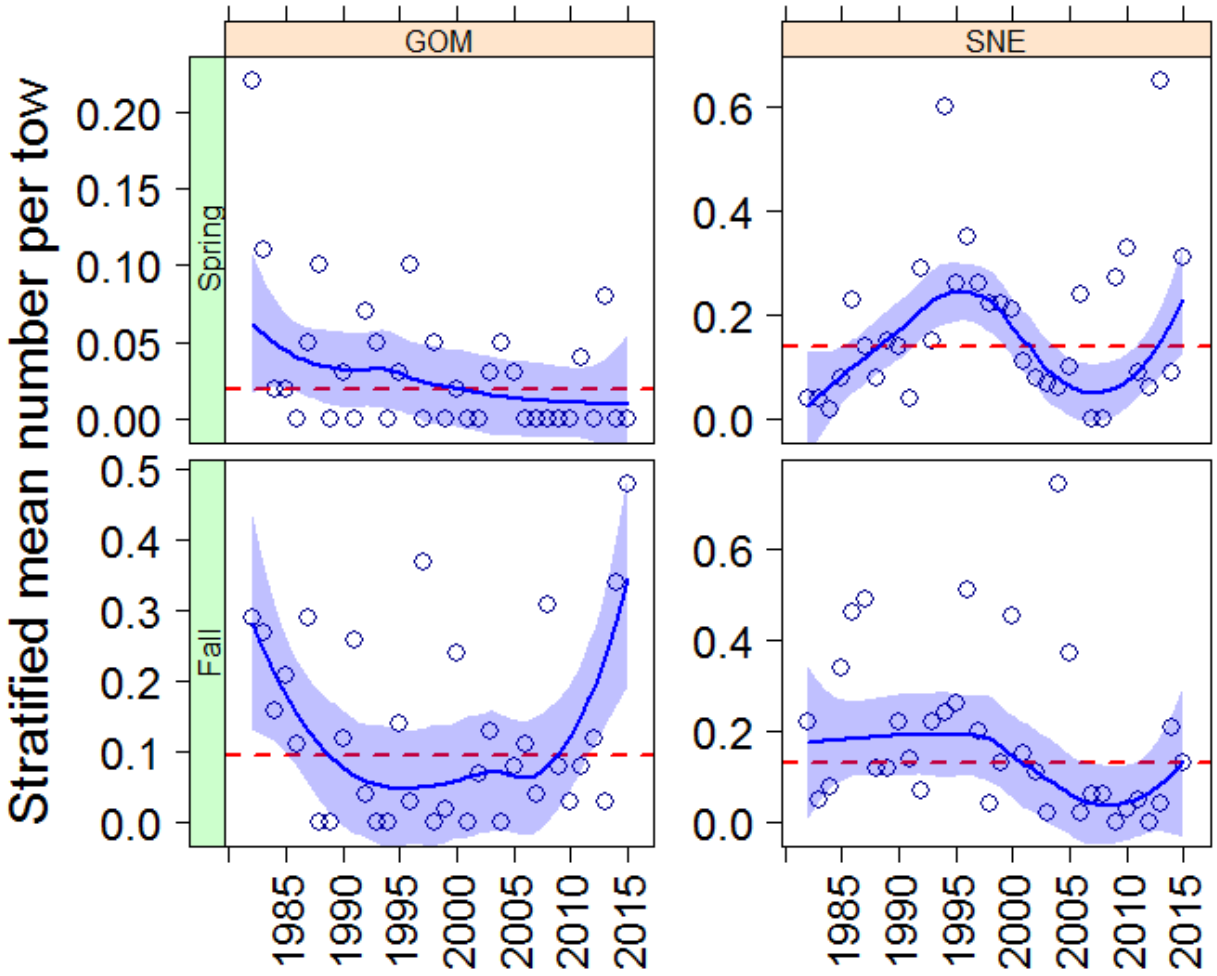

Figure 2. Bootstrapped female horseshoe crab mean number per tow from *MarineFisheries* trawl survey. Upper boxes are from the spring survey, lower boxes are from the fall survey. Left side boxes are from the Gulf of Maine, right side boxes are from Southern New England. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to the time-series. Blue shaded area is approximate 95% confidence interval for the fit.

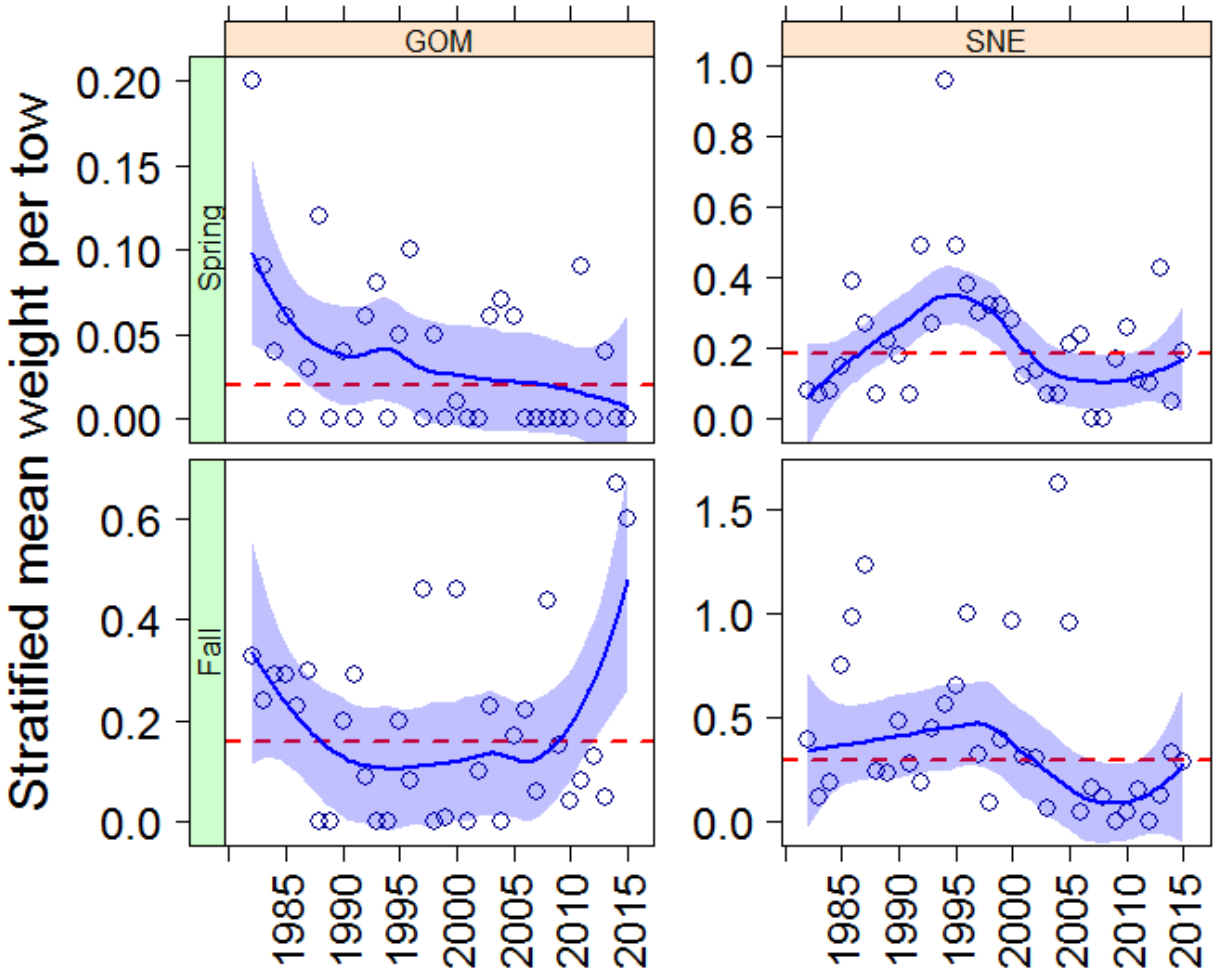

Figure 3. Bootstrapped female horseshoe crab mean weight (kg) per tow from *MarineFisheries* trawl survey. Upper boxes are from the spring survey, lower boxes are from the fall survey. Left side boxes are from the Gulf of Maine, right side boxes are from Southern New England. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to the time-series. Blue shaded area is approximate 95% confidence interval for the fit.

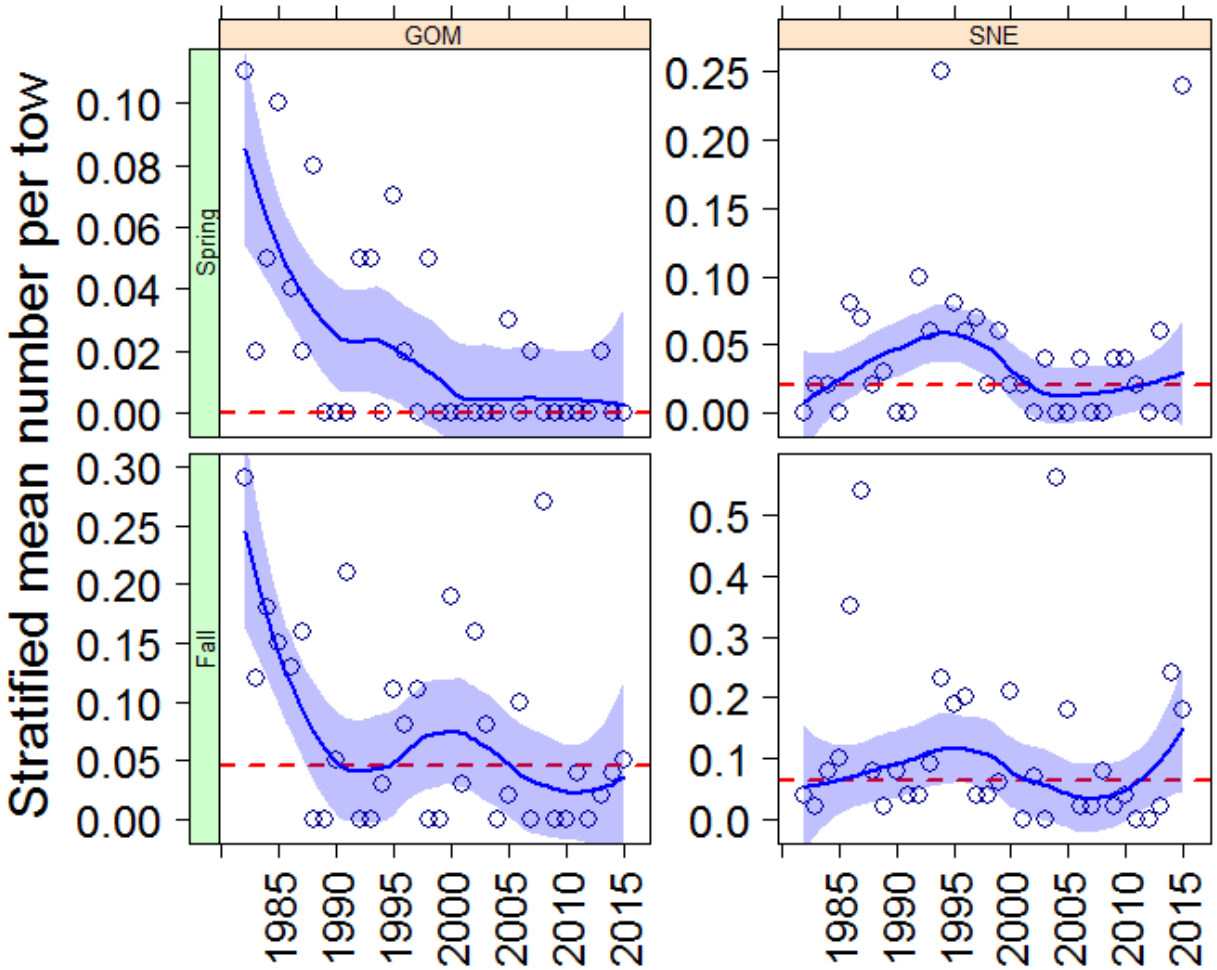

Figure 4. Bootstrapped male horseshoe crab mean number per tow from *MarineFisheries* trawl survey. Upper boxes are from the spring survey, lower boxes are from the fall survey. Left side boxes are from the Gulf of Maine, right side boxes are from Southern New England. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to the time-series. Blue shaded area is approximate 95% confidence interval for the fit.

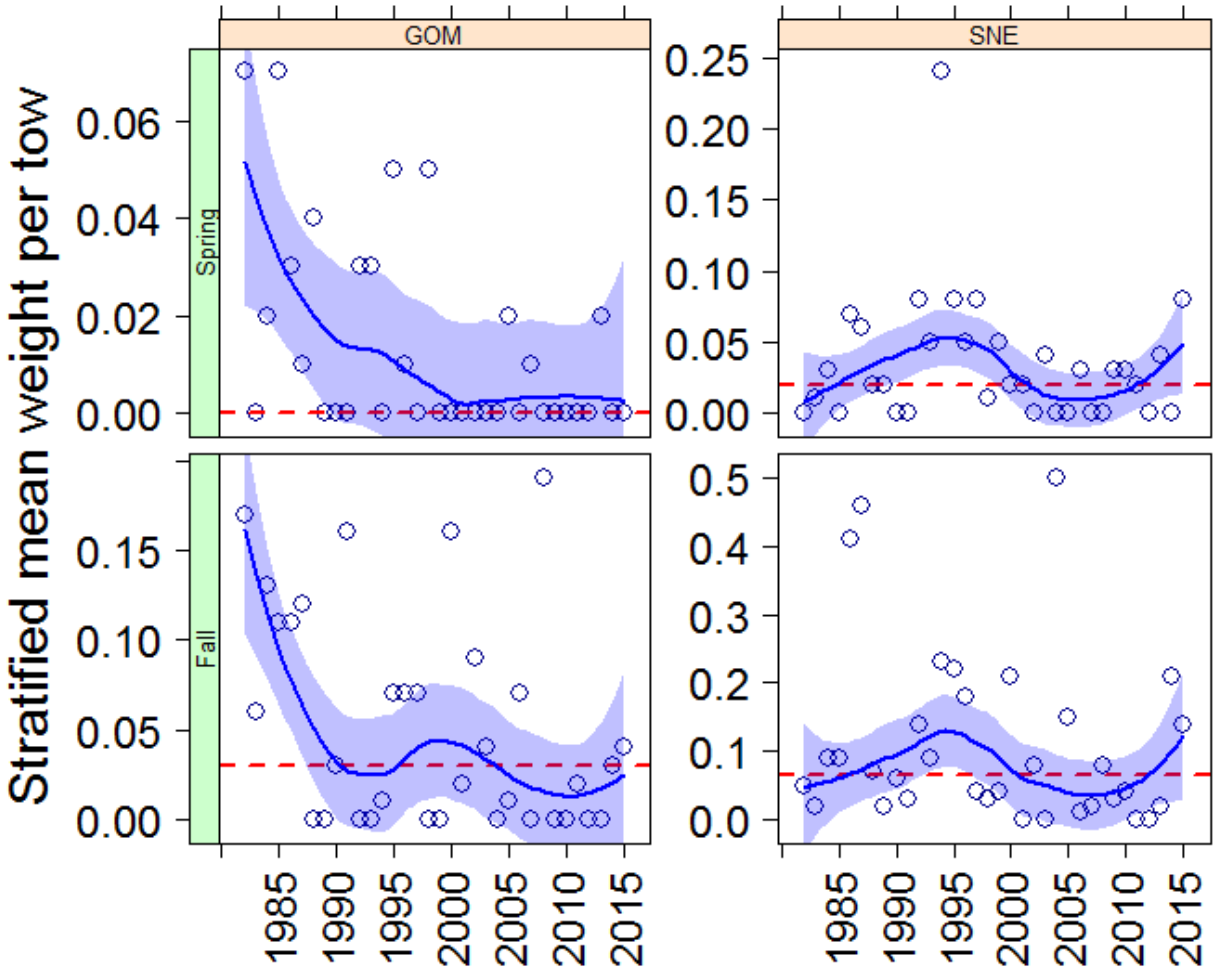

Figure 5. Bootstrapped male horseshoe crab mean weight (kg) per tow from *MarineFisheries* trawl survey. Upper boxes are from the spring survey, lower boxes are from the fall survey. Left side boxes are from the Gulf of Maine, right side boxes are from Southern New England. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to the time-series. Blue shaded area is approximate 95% confidence interval for the fit.

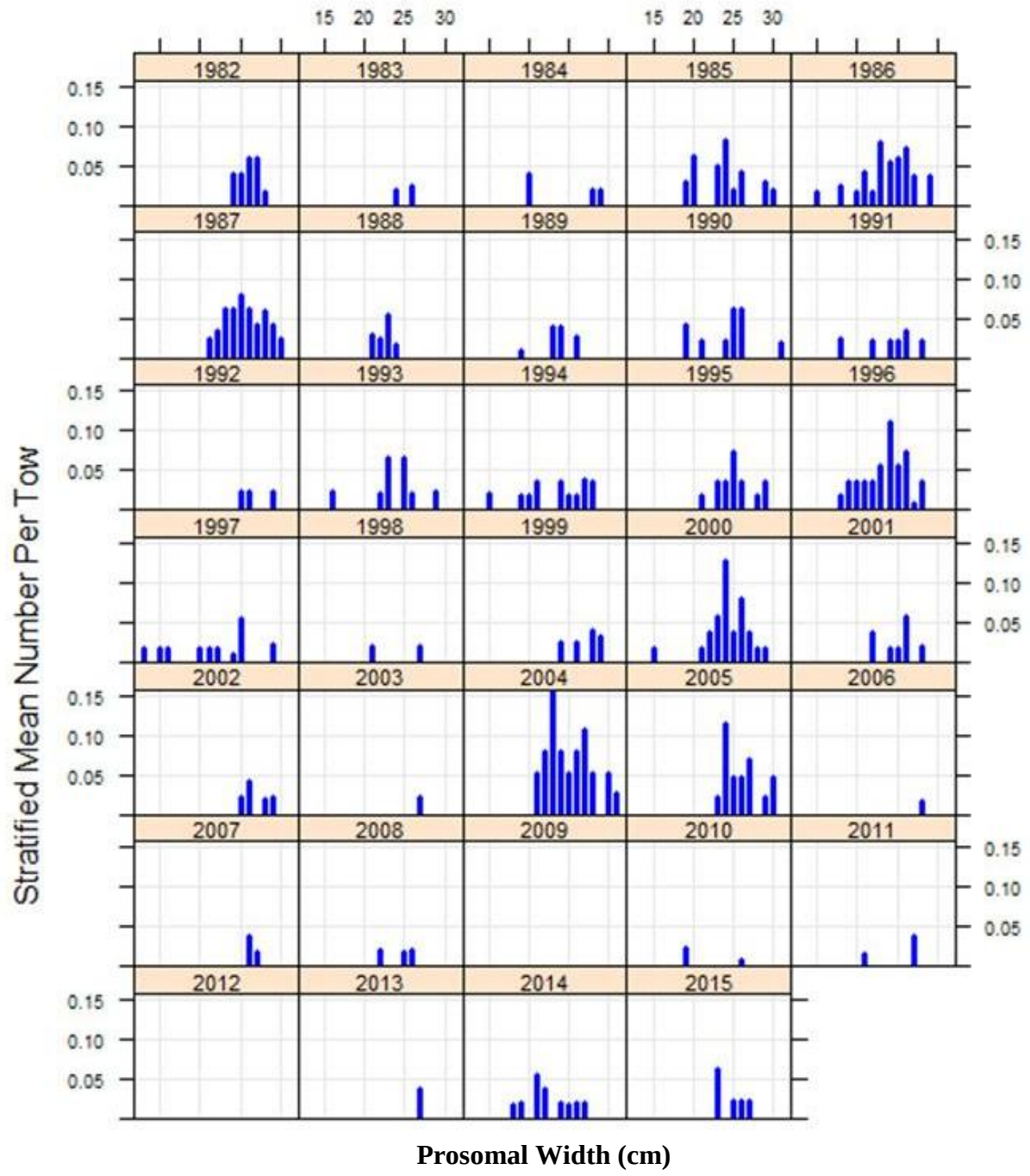

Figure 6. Southern New England female horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

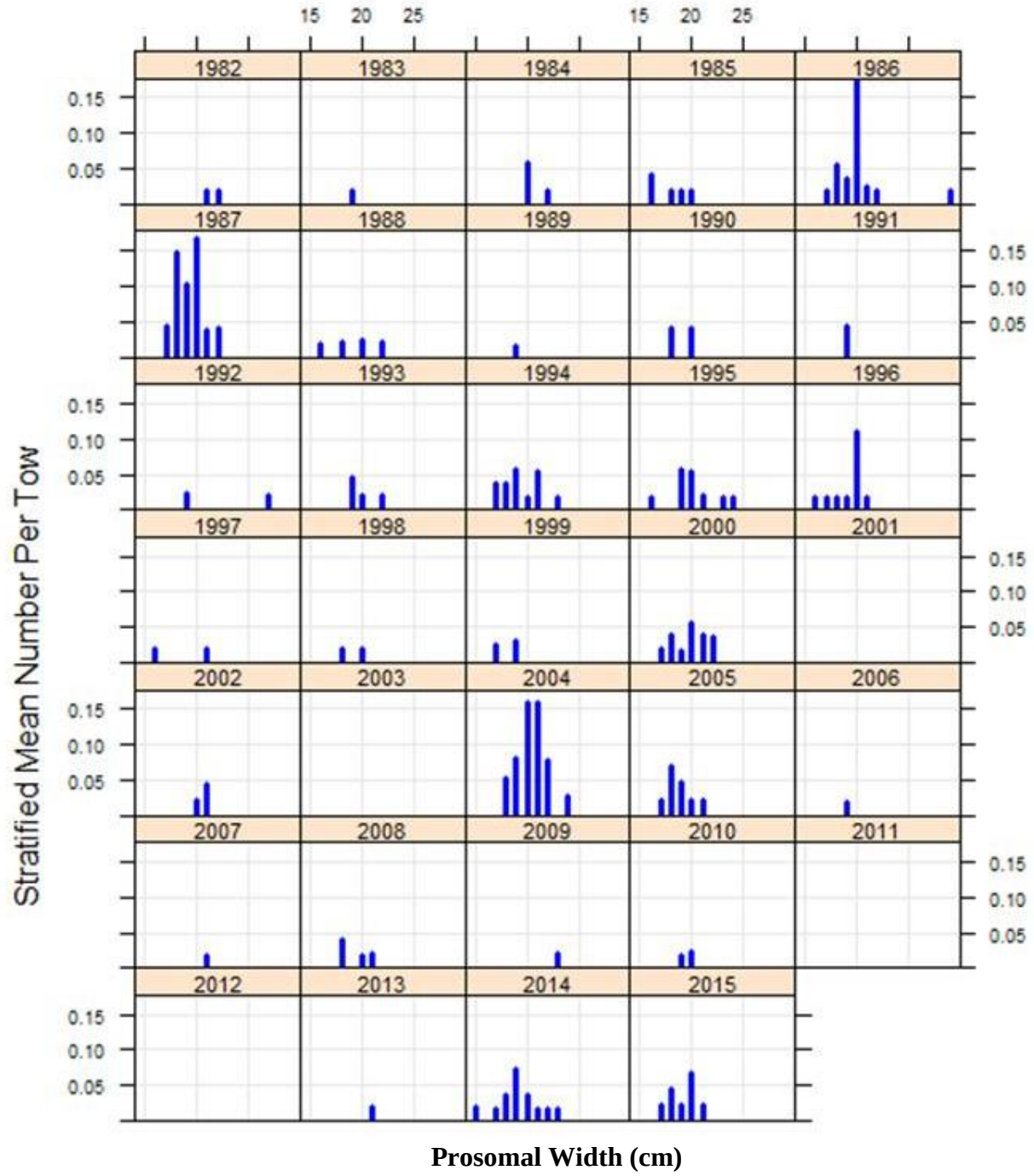

Figure 7. Southern New England male horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

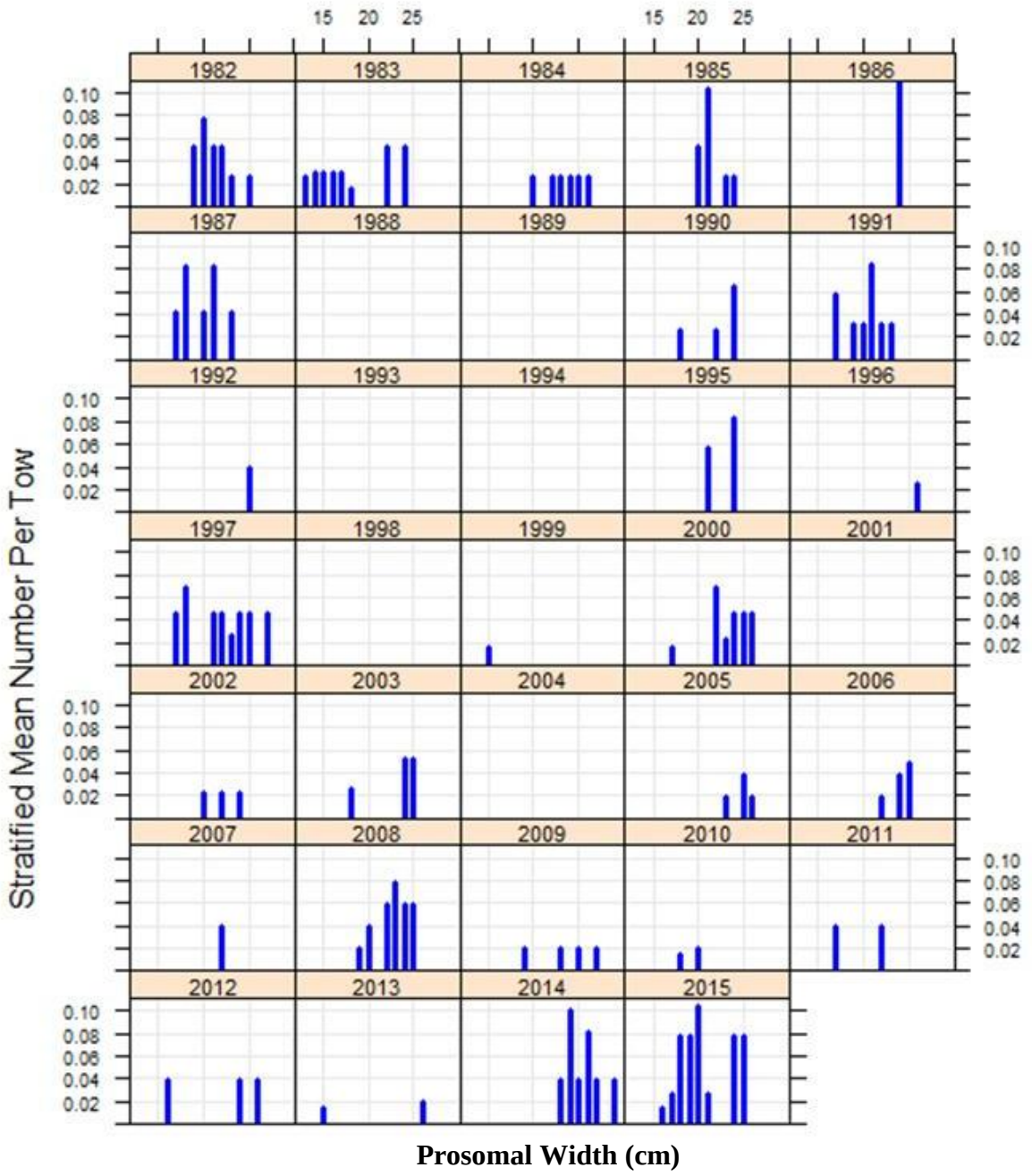

Figure 8. Gulf of Maine female horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

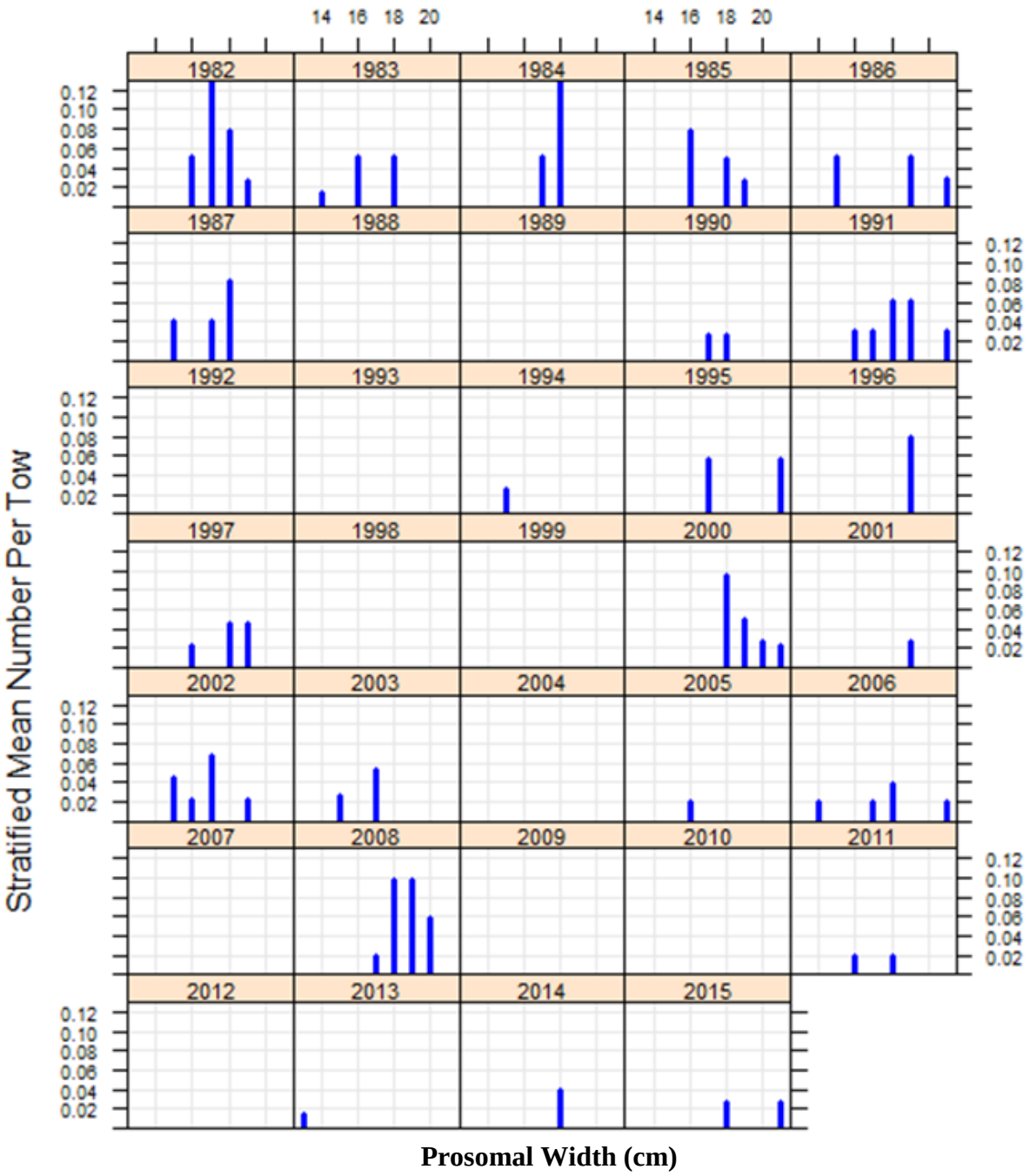

Figure 9. Gulf of Maine male horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

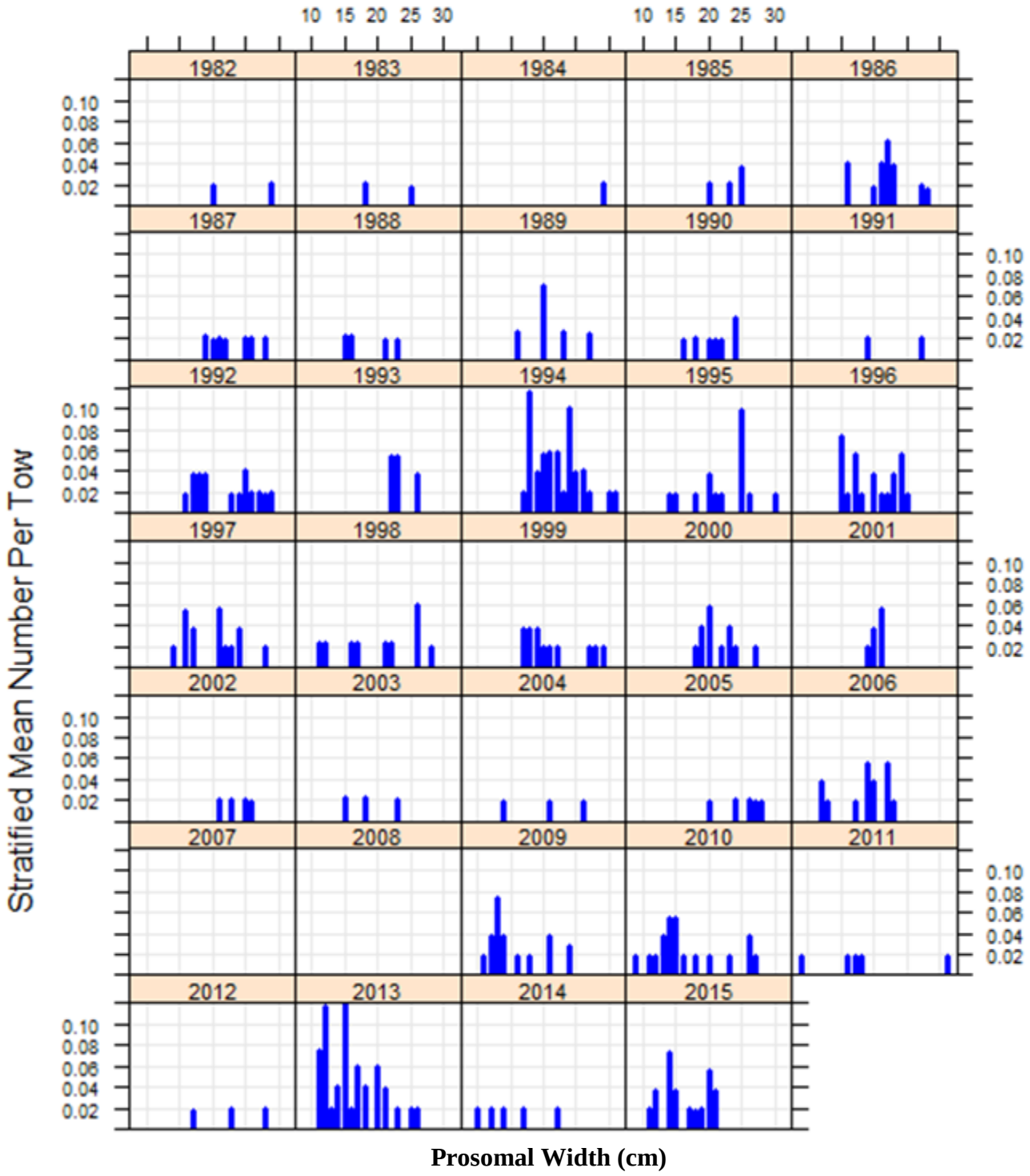

Figure 10. Southern New England female horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

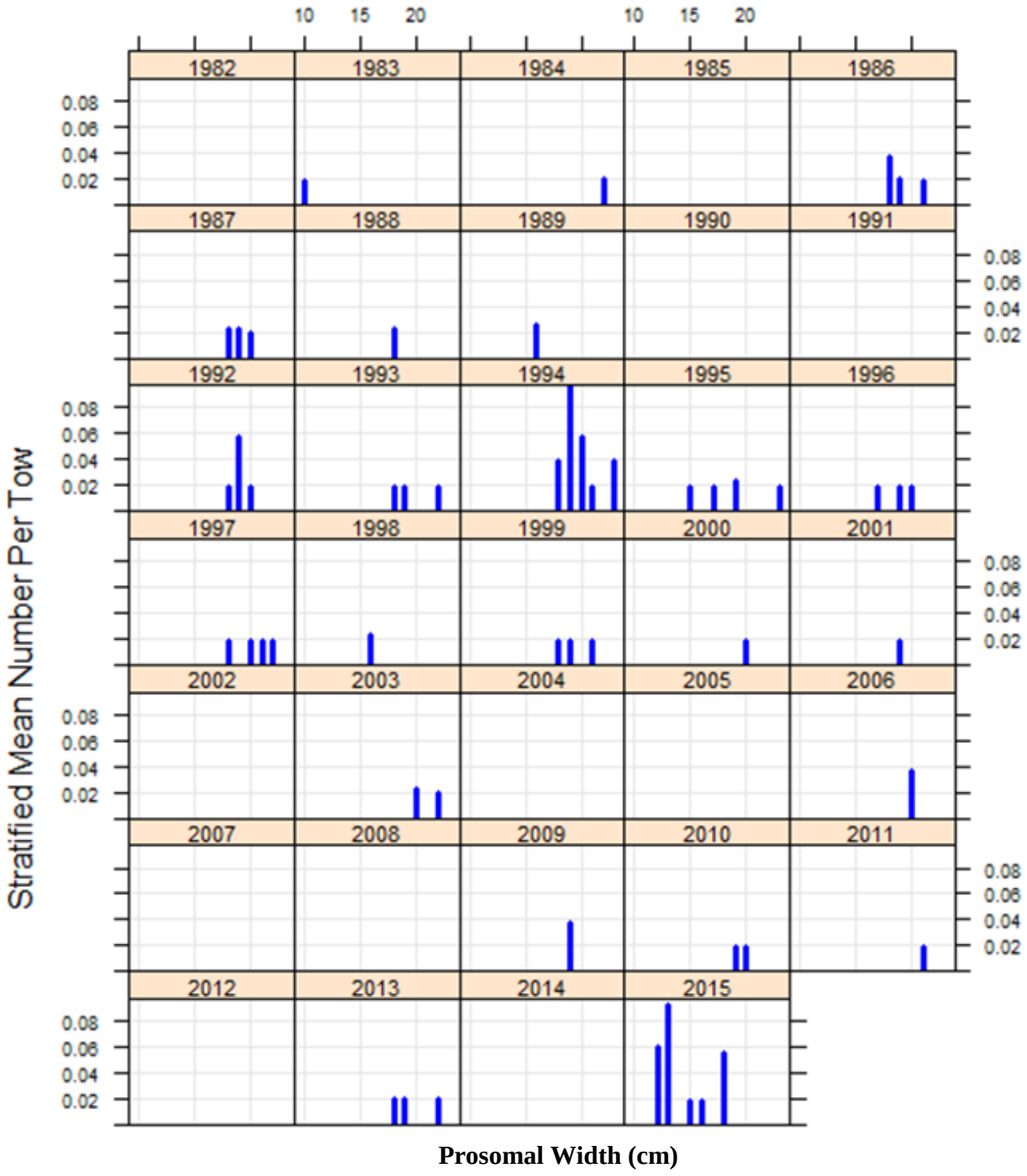

Figure 11. Southern New England male horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

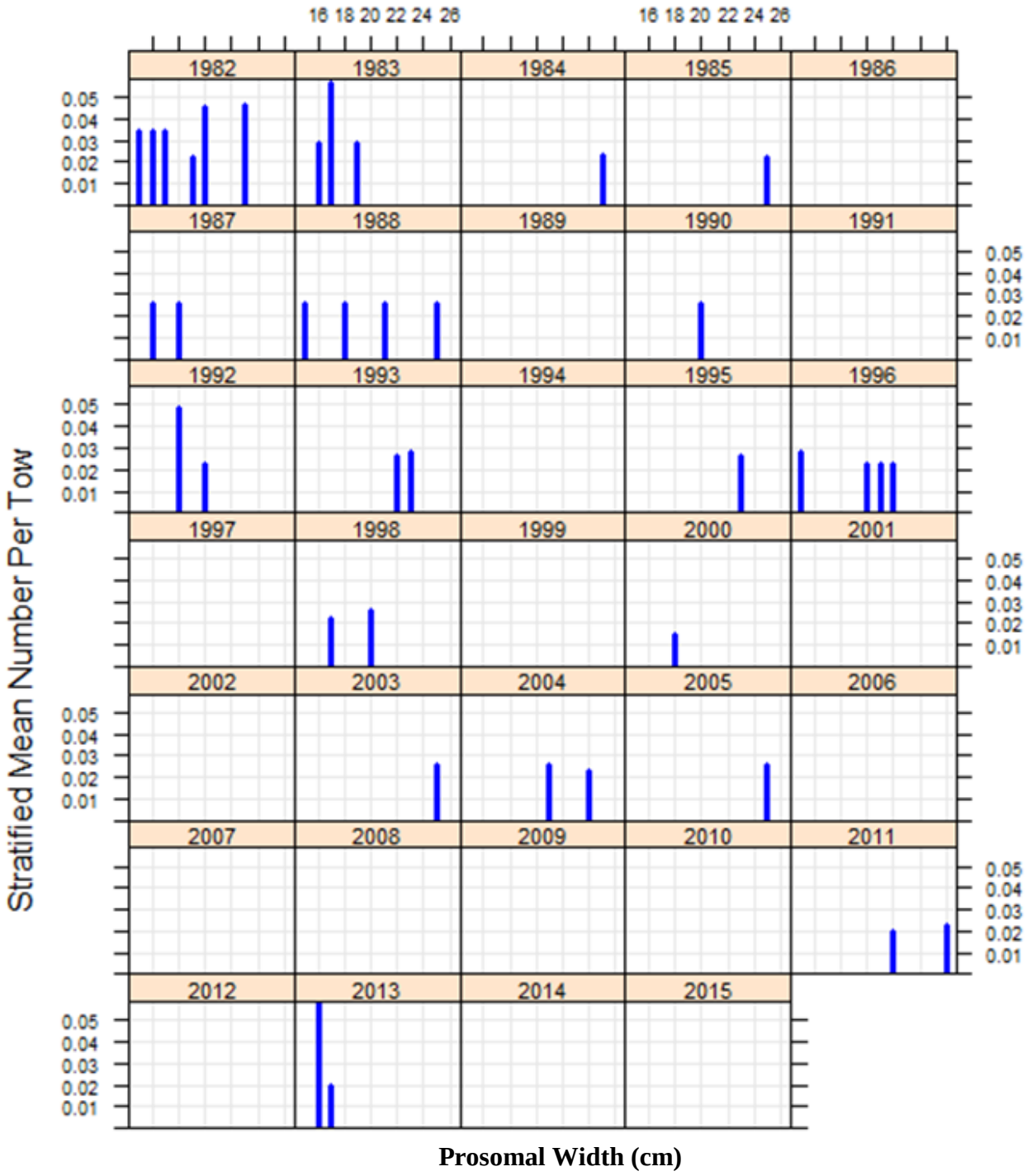

Figure 12. Gulf of Maine female horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

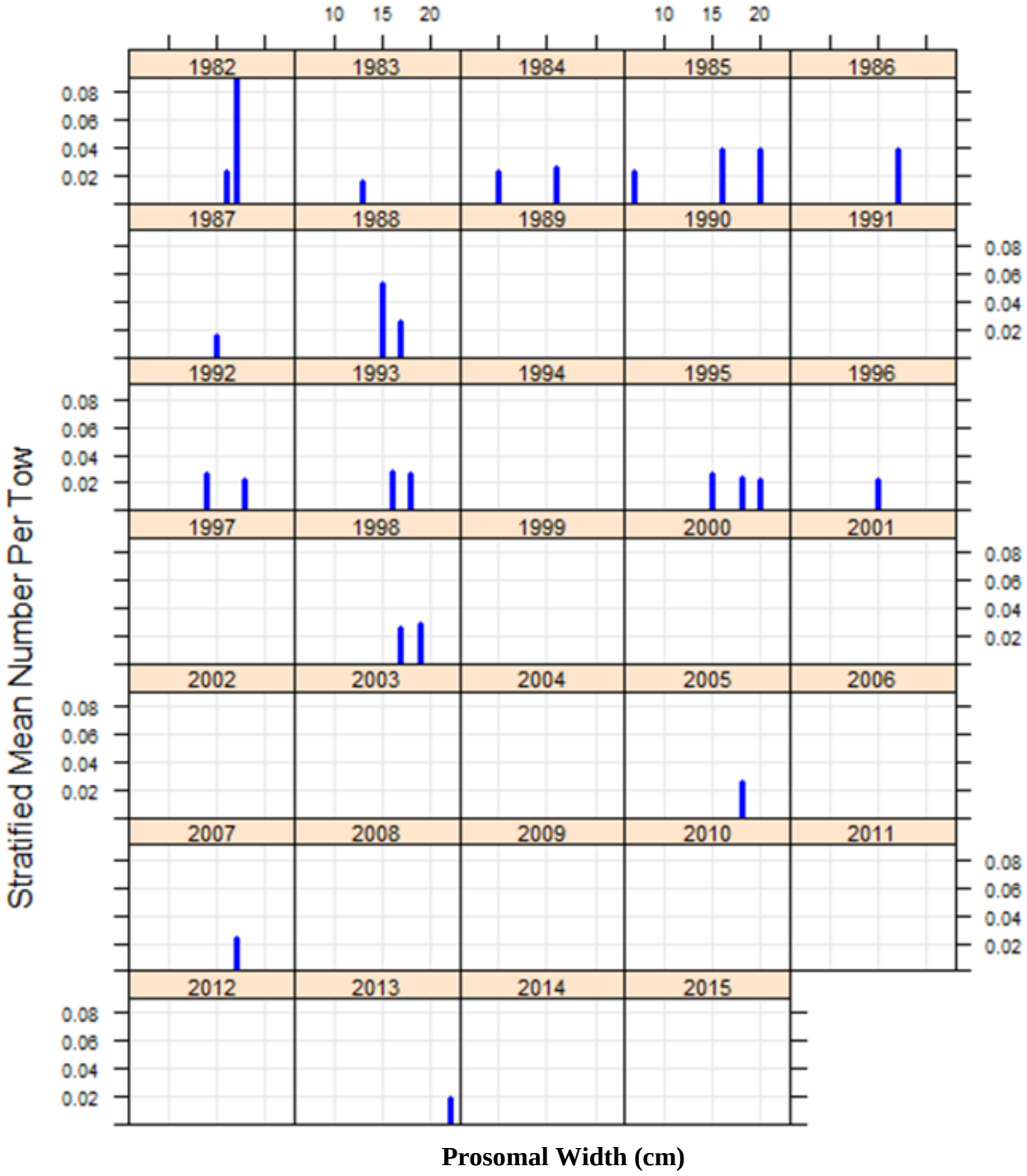

Figure 13. Gulf of Maine male horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

IV. Planned management programs for the current calendar year

a. Summary of changes from previous years

None.

b. Summary of monitoring programs that will occur

- *MarineFisheries* will continue collecting catch reports from all crab harvesters, dealers, and scientific permit holders.
- ACC (biomedical company) will continue to submit monthly reports.
- *MarineFisheries* will also continue to characterize the commercial fishery.
- The *MarineFisheries* spring and fall trawl surveys will continue to monitor and record weight, number and prosomal width by sex of individuals collected
- *MarineFisheries* will be conducting a juvenile survey in Wellfleet Harbor and Buzzards Bay.
- *MarineFisheries* will continue to explore the efficacy of alternatives to horseshoe crabs as bait in the commercial channeled whelk fishery.

V. Law Enforcement reporting requirements

There were no reported substantial horseshoe crab violations in 2015.