Massachusetts
Division of Marine Fisheries

Massachusetts 2014 Compliance Report to the Atlantic States Marine Fisheries Commission – Horseshoe Crab

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I. Introduction

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

Spawning survey protocol changed to an "area swept" survey in 2014, deviating from the modified Delaware Bay survey protocol conducted from 2008-2013. In 2014, surveyors used fixed start and end points at each spawning beach survey location and counted all crabs within a 5 meter swath from the shoreline into the water. *MarineFisheries* staff and numerous volunteer groups conducted surveys during the full and new moons from mid-April through the end of June. We continued market sampling of horseshoe crabs to obtain prosomal width. During the summer of 2014 we conducted a pilot survey for juvenile horseshoe crabs in Wellfleet Harbor. Few juvenile crabs were observed.

Dealers reported 106,645 crabs harvested for bait in 2014 and an additional 10,704 reported as "food". Fishermen reported catching 83,246 crabs for bait in 2014. Marine Fisheries is investigating the reporting of horseshoe crab catch deposition as food, and discrepancies between dealer and fishermen catch reports.

The Commonwealth prohibited the importation, sale, and possession of the three Asian horseshoe crab species (*Tachypleus tridentatus*, *Tachypleus gigas*, and *Carcinoscorpius rotundicauda*), and set a 300 crab possession limit for the mobile gear fishery.

MarineFisheries transferred horseshoe crab biologist responsibilities from Vin Malkoski to Derek Perry in July.

II. *de minimus* status – not applicable

III. Previous calendar year's fishery

a. Bait Harvest

In 2014, 95 of 236 horseshoe crab bait permits issued by *MarineFisheries* were actively fished, representing a decrease of one active permit and five inactive permits over 2013. Fishermen reported 83,246 crabs harvested for bait use. Total catch consisted of 40,098 females, 27,749 males, and 15,399 unclassified crabs. Hand harvesters (including rakes, dipnets, and hand tongs) caught 63,239 crabs, mobile gear (trawl or dredge) 16,412, and 3,595 by other means (gill net, weirs, pots, etc). Harvester reported monthly bait harvest peaked in May (Table 1).

Table 1. Weight (lb) and count of horseshoe crabs harvested for bait fishery from fishermen trip reports (* indicates confidential data).

	BAIT	
Month	Lbs	Count
Mar	*	*
Apr	4,180	1,565
May	117,689	44,078
June	66,737	24,995
July	16,522	6,188
Aug	6,596	2,470
Sept	6,363	2,383
Oct	2,603	975
Nov	869	371
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. As of 27 February 2015, two research harvesters reported collecting horseshoe crabs in 2014.

c. Biomedical Fishery

Associates of Cape Cod (ACC) is the single biomedical company producing Limulus Ambocyte 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.

ACC complied with all handling regulations including; transporting crabs in a temperature controlled truck with the thermostat set between 50 and 60 °F, keeping crabs in the laboratory at ≤70 °F, holding crabs in Rubbermaid barrels no more than approximately 2/3 full. ACC covered barrels of crabs with moist burlap, and misted with a saline solution each evening.

Data collected from ACC is confidential.

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.

All 2014 data points from the spring survey are at or below time series medians (Figure 2 and 3). Male and female fall survey indices of stratified mean weight and number of crabs per tow are either at, or above time series median values in 2014. In general, the spring and fall survey indices for both sexes declined from the mid-1990's through mid 2000's. Subsequently, the survey trends have been relatively consistent, but at a level below the time series median.

Cape Cod is a geographical boundary that separates horseshoe crab populations. Horseshoe crabs are more prevalent south of Cape Cod and individual crabs grow larger compared to crabs north of Cape Cod (Shuster 1982, Walls et al. 2002). Trawl survey prosomal width frequencies are given for north (Gulf of Maine (GOM)) and south of Cape Cod (Southern New England (SNE)). The 2014 fall survey caught a larger size distribution of both sexes in SNE (Figures 4 and 5) and females in the GOM (Figure 6) than it has in several years, but infrequently observed male crabs in the GOM (Figure 7). The spring survey caught few female horseshoe crabs (Figure 8), did not catch any male crabs in SNE (Figure 9), and did not catch crabs of either gender in the GOM (Figure 10 and 11).

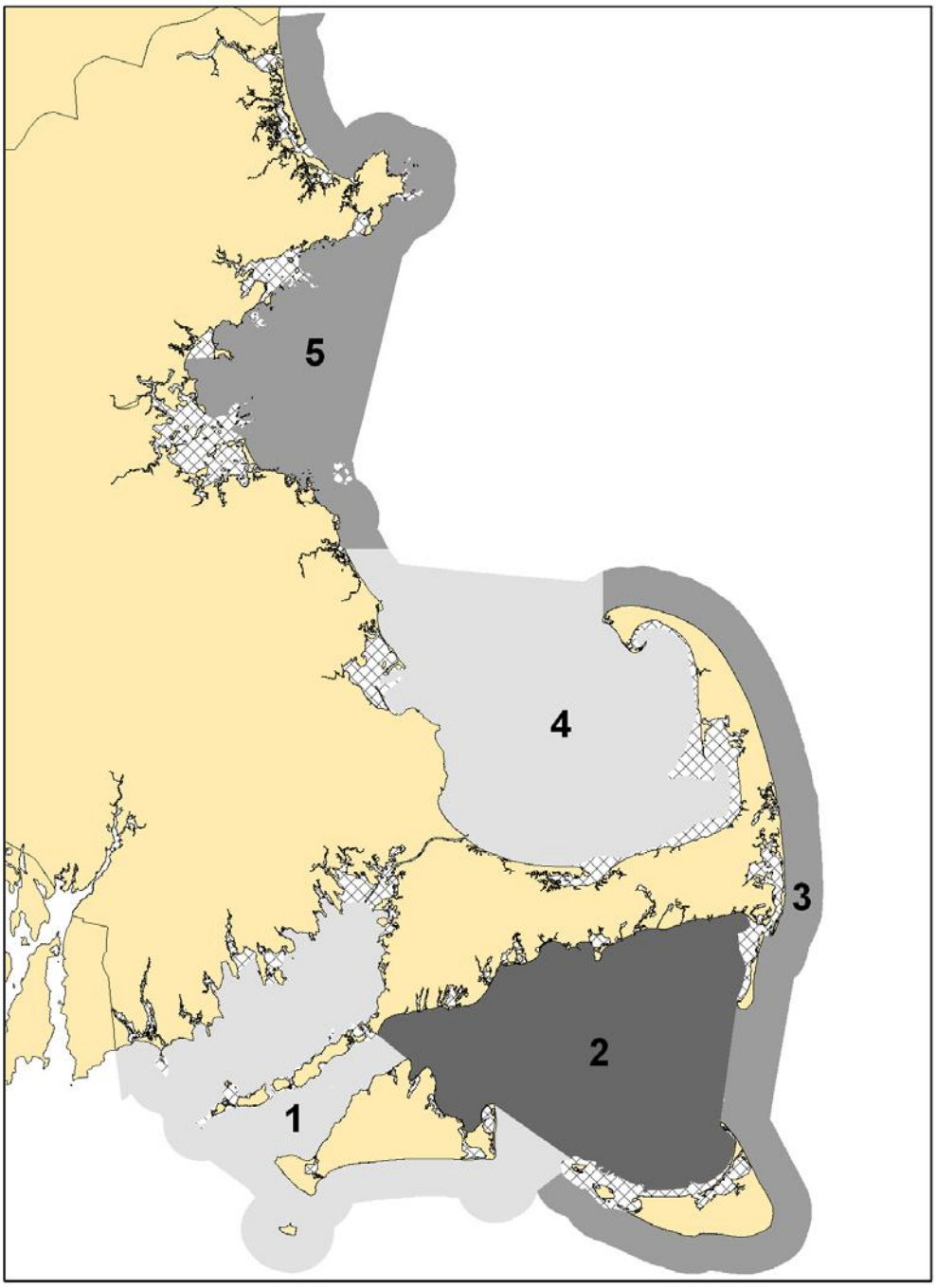

Figure 1. Map of *MarineFisheries* Resource Assessment Program trawl survey regions. For size distribution figures (Figures 6-13), regions 1-3 are considered Southern New England and regions 4 and 5 are Gulf of Maine. Figure supplied by *MarineFisheries'* Resource Assessment Program.

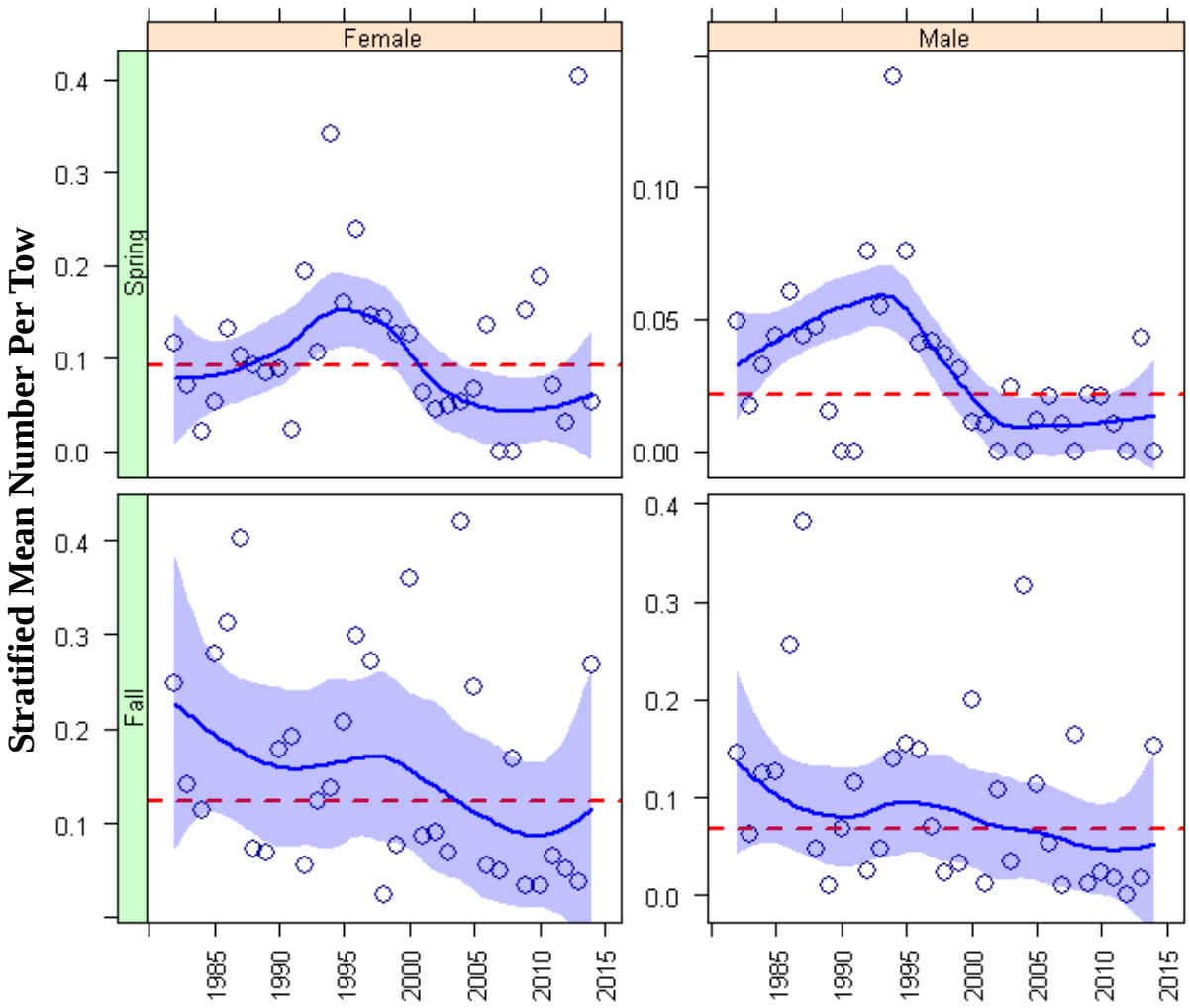

Figure 2. Bootstrapped horseshoe crab mean number per tow from *MarineFisheries* trawl survey. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to the timeseries. Blue shaded area is approximate 95% confidence interval for the fit. Figure supplied by *MarineFisheries'* Resource Assessment Program.

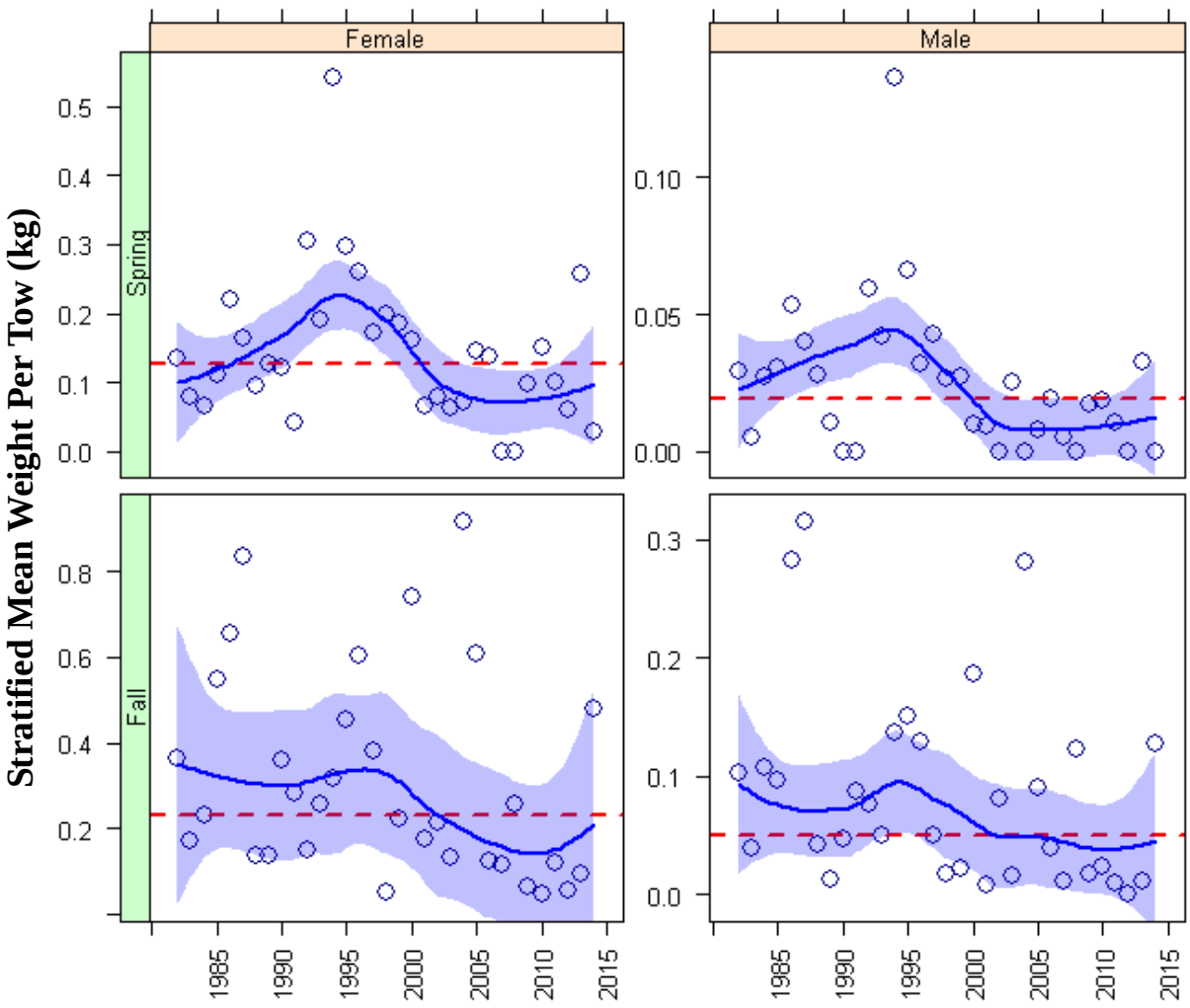

Figure 3. Bootstrapped horseshoe crab mean weight (kg) per tow from *MarineFisheries* trawl survey. Red, dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to the timeseries. Blue shaded area is approximate 95% confidence interval for the fit. Figure supplied by *MarineFisheries'* Resource Assessment Program.

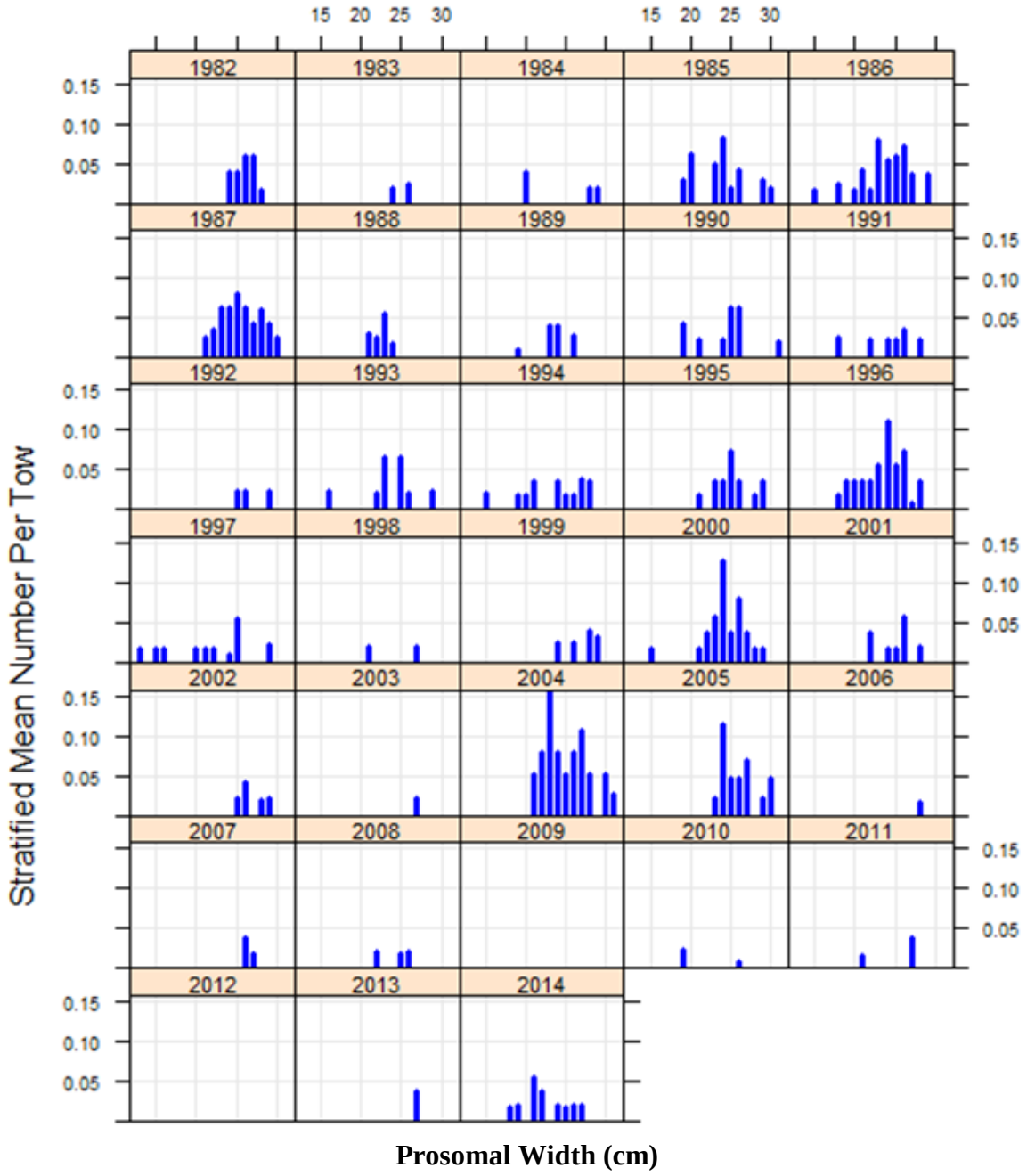

Figure 4. Southern New England female horseshoe crab size distribution from the *MarineFisheries* fall trawlsurvey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

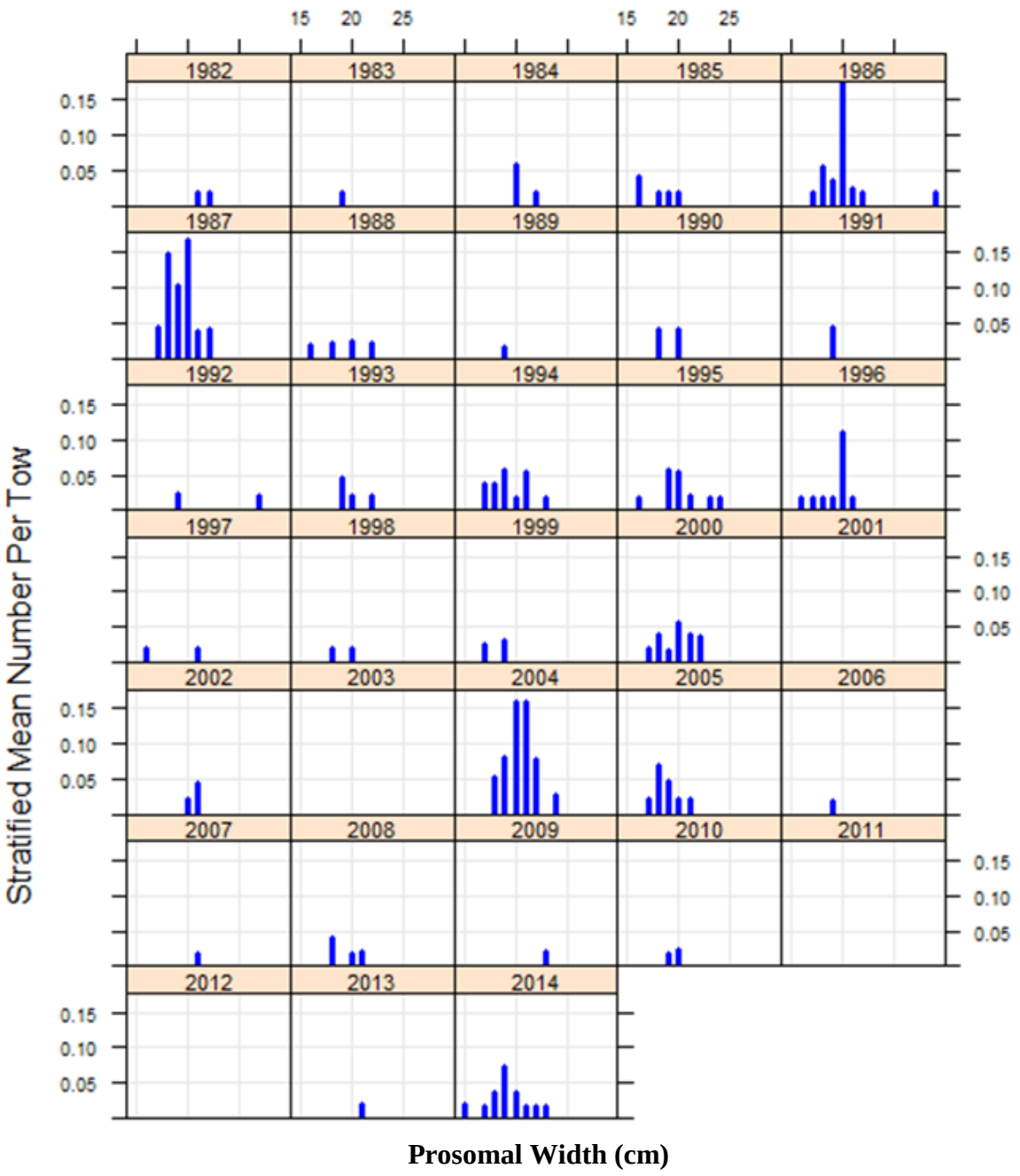

Figure 5. Southern New England male horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

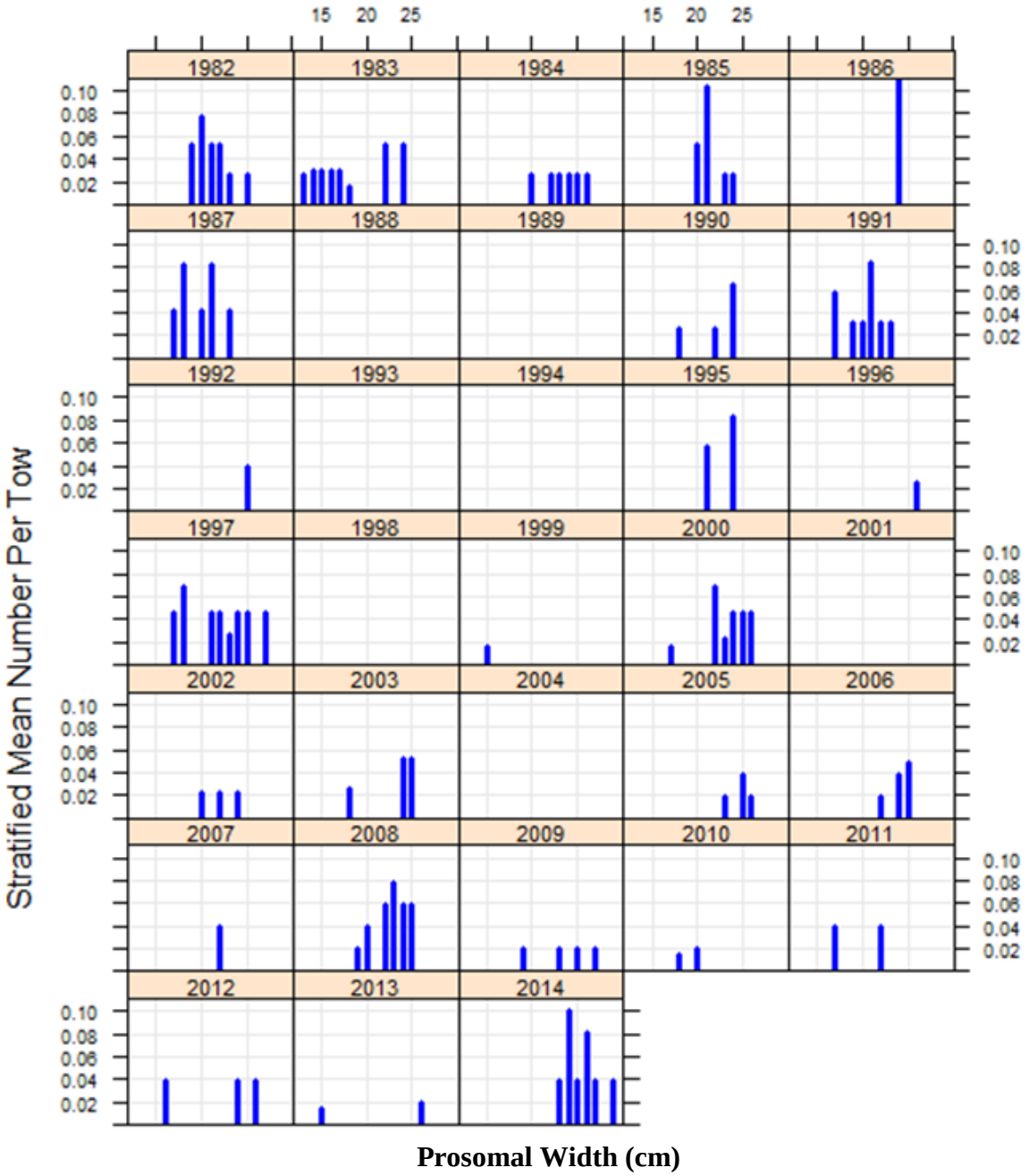

Figure 6. Gulf of Maine female horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

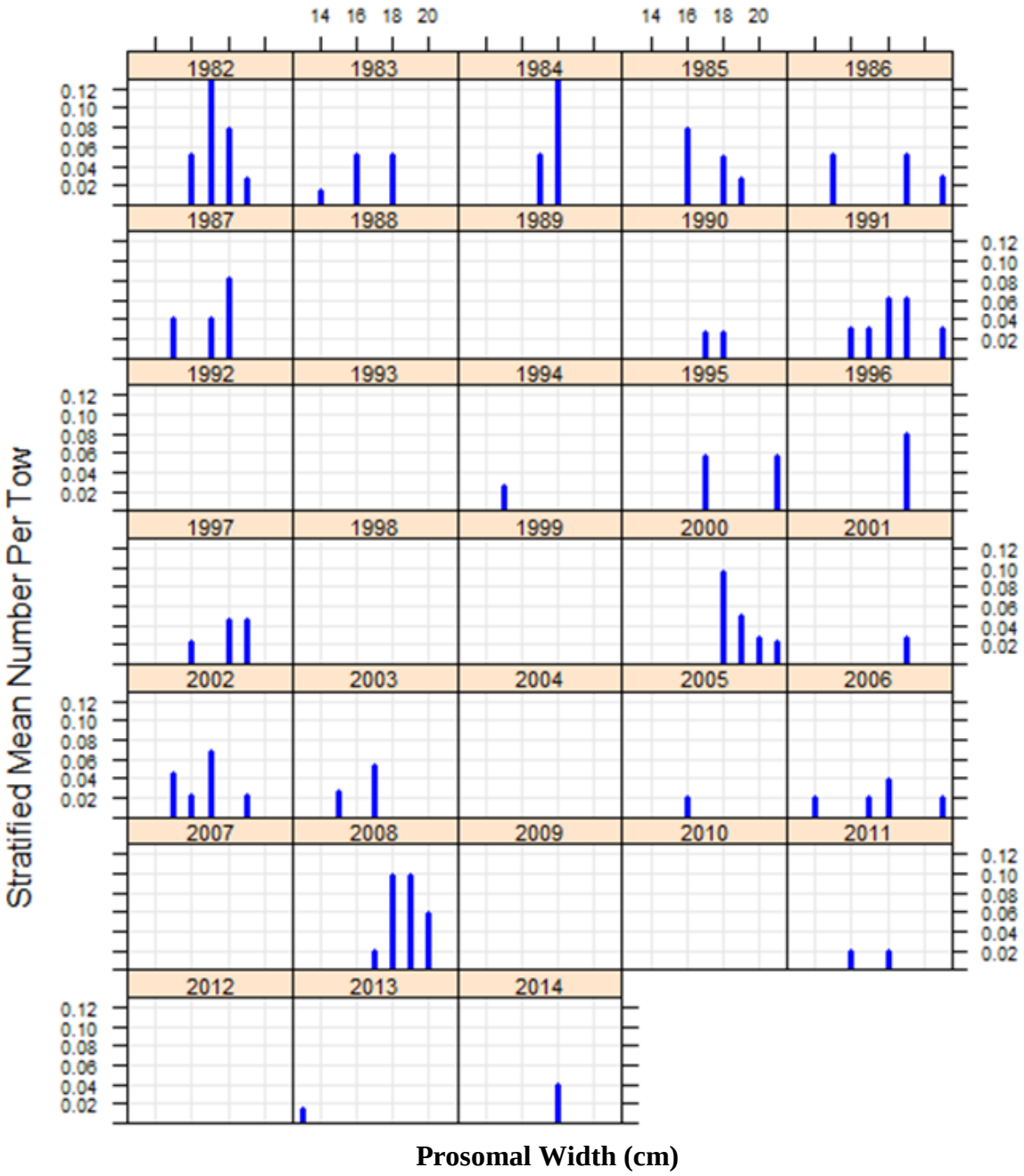

Figure 7. Gulf of Maine male horseshoe crab size distribution from the *MarineFisheries* fall trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

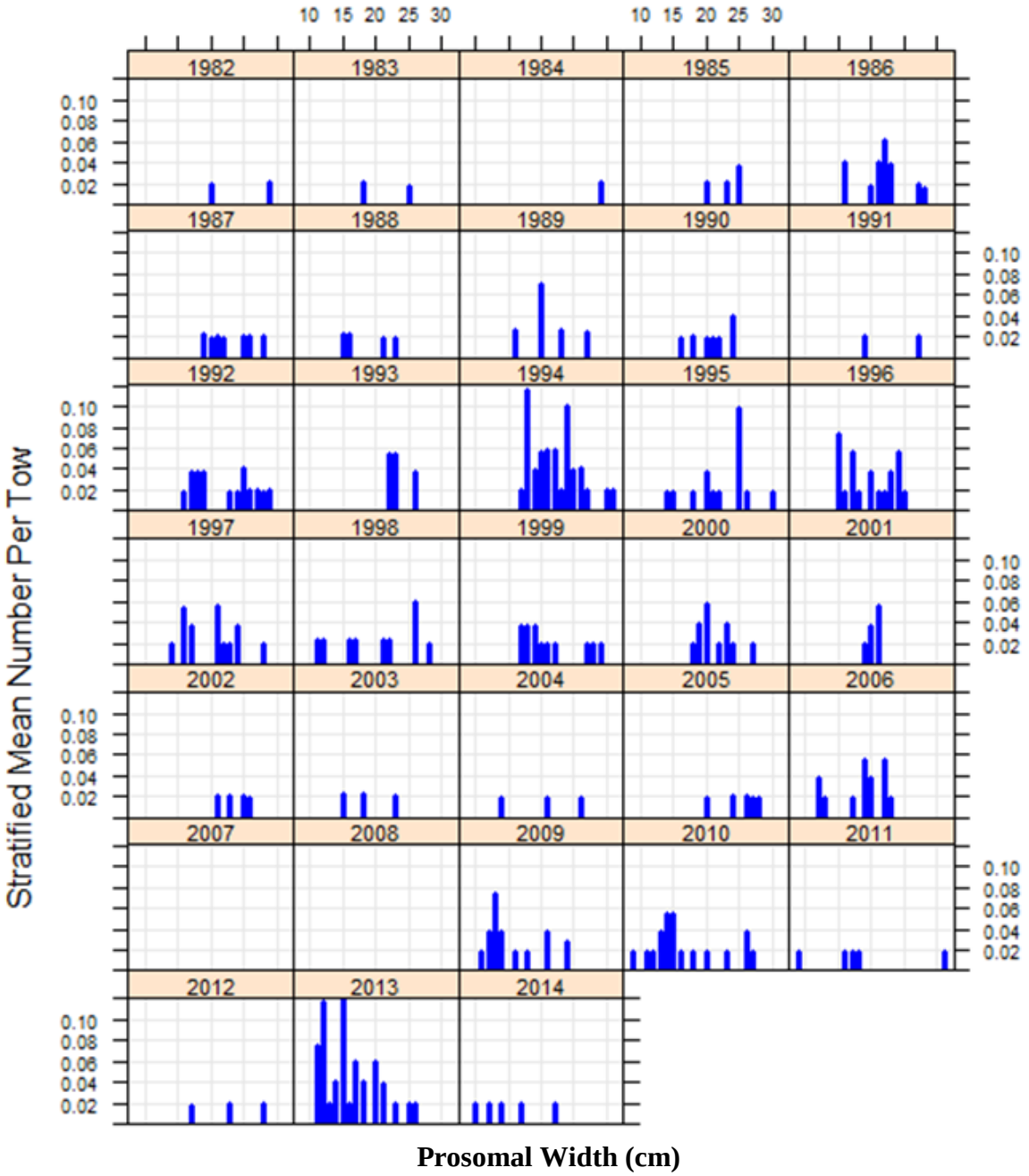

Figure 8. Southern New England female horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

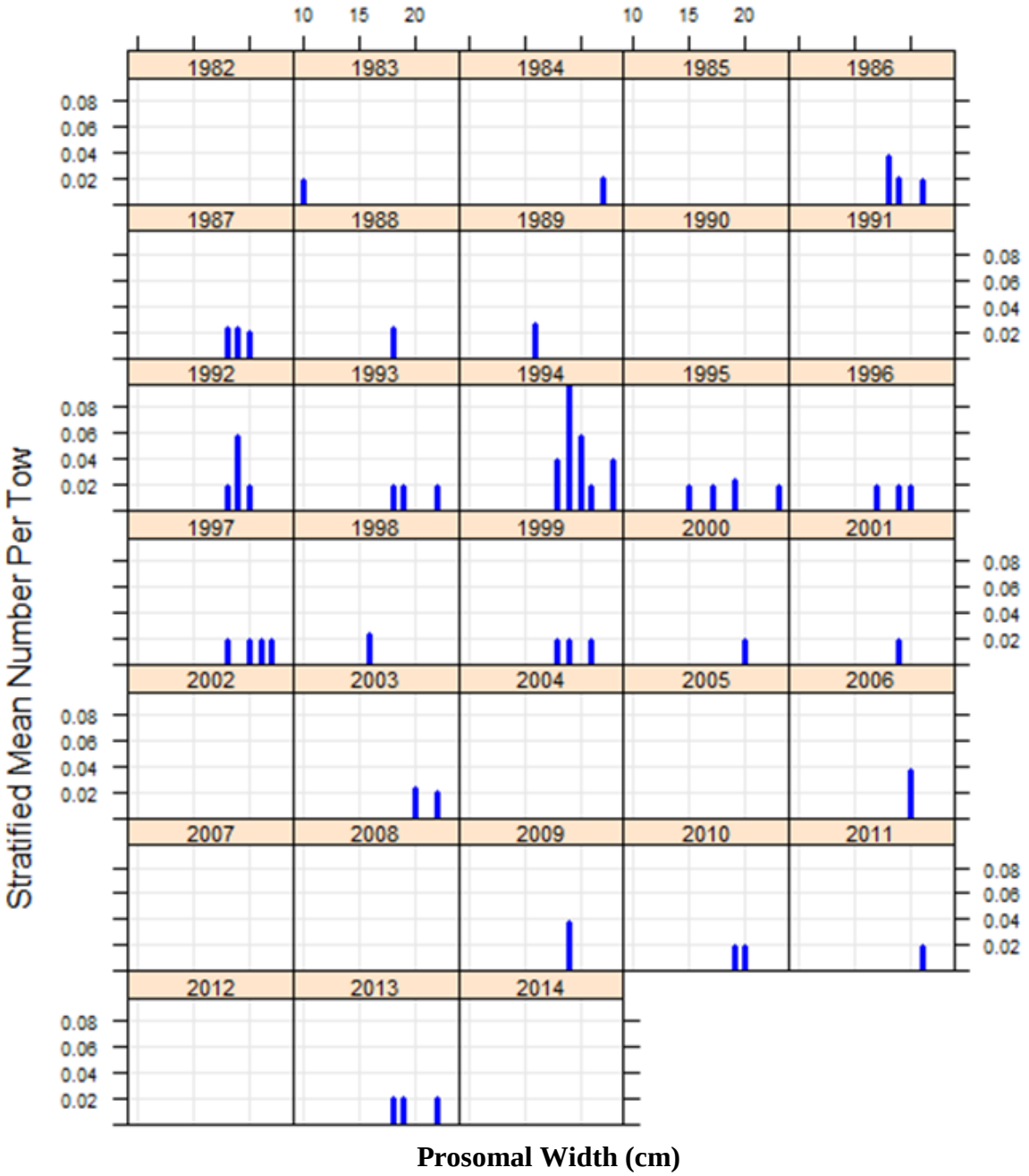

Figure 9. Southern New England male horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

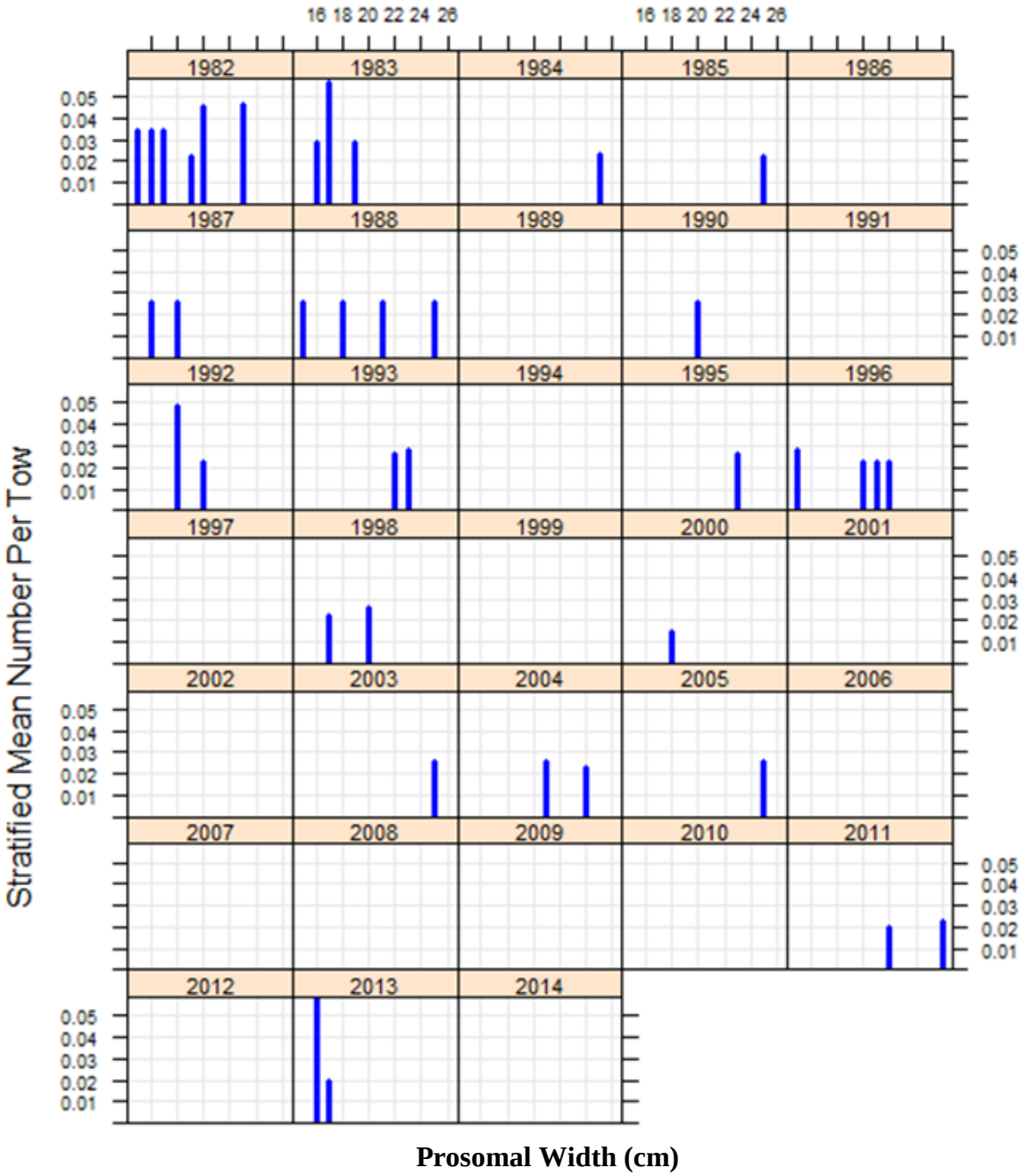

Figure 10. Gulf of Maine female horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

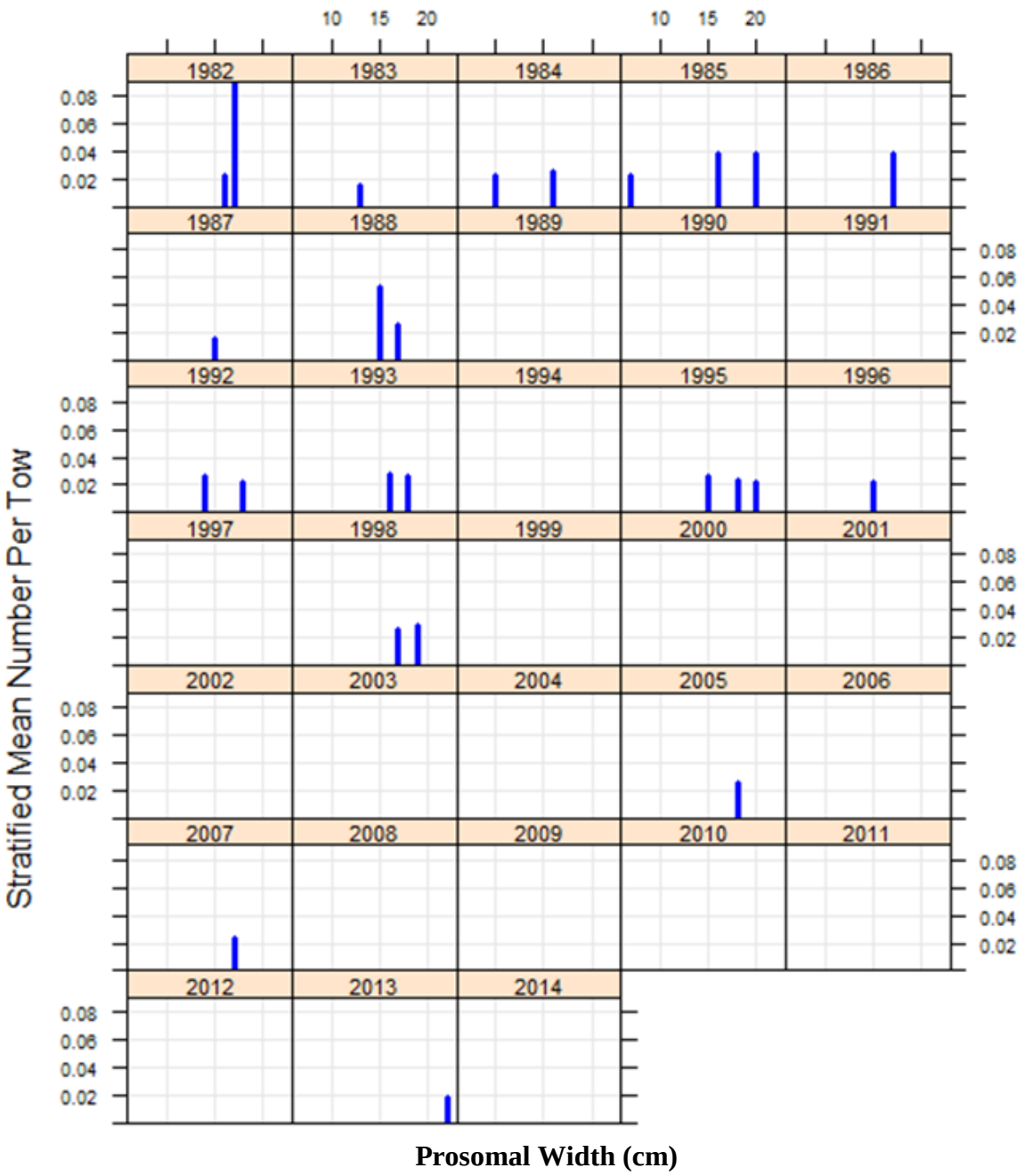

Figure 11. Gulf of Maine male horseshoe crab size distribution from the *MarineFisheries* spring trawl survey. Figure supplied by *MarineFisheries'* Resource Assessment Program.

f. <u>Juvenile Trawl Survey</u>- Not applicable

IV Planned management programs for the current calendar year

a. Summary of changes from previous years

Two regulatory changes pertaining to horseshoe crabs went into effect in 2014. The Commonwealth of Massachusetts prohibited the importation, sale, and possession of the three Asian horseshoe crab species (*Tachypleus tridentatus*, *Tachypleus gigas*, and *Carcinoscorpius rotundicauda*). This was done to protect the native population of horseshoe crab (*Limulus polyphemus*) from the importation of foreign diseases and parasites.

The mobile gear fishery now has a 300 crab possession limit. Mobile gear fishermen were concerned about the temptation to continue fishing after reaching the fluke trip limit to target "bycatch" species such as horseshoe crabs and whelks, discarding any additional fluke that may be caught.

b. Summary of monitoring program that will occur

- The spring spawning beach surveys will revert back to a modified Delaware Bay model survey.
- *MarineFisheries* will continue collecting catch reports from all crab harvesters, dealers, and scientific permit holders.
- ACC 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 continue to explore developing a juvenile survey in Wellfleet Harbor and Nantucket Sound.
- *MarineFisheries* will be developing a pilot study to quantify the efficacy of green crabs (*Carcinus maenas*), a readily available nuisance species, as commercial whelk bait.

V. Law Enforcement Reporting

a. No major violations were reported.

Appendix

Spawning surveys

The spawning beach survey design was changed for 2014, making comparisons between years impossible. The 2014 survey used an area swept technique where surveyors would walk a length of beach and count all crabs within 5 meters of the beach. Surveys were conducted at 16 Massachusetts beaches. Survey numbers were very low at most beaches, survey densities were frequently below 1 crab/25 m² (Figure 13).

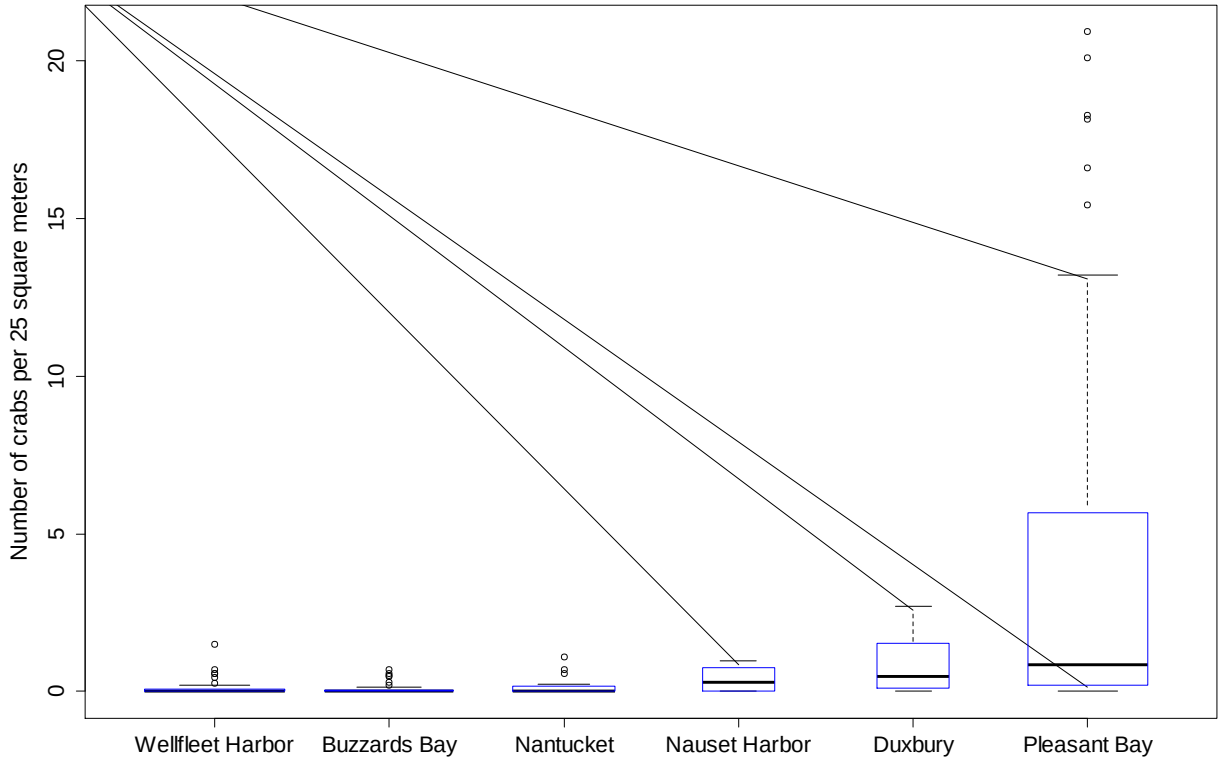

Figure 12. Box plot of the number of horseshoe crabs observed by area during horseshoe crab spawning surveys. Width of the box is representative of the number of surveys conducted in each region.