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Massachusetts
Division of Marine Fisheries

Massachusetts 2019 Compliance Report to the Atlantic States Marine Fisheries Commission – Horseshoe Crab

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I. Introduction

Massachusetts Division of Marine Fisheries (DMF) staff and numerous volunteer groups conducted spawning beach surveys at 17 beaches during the full and new moons from mid-April through the end of June. Prosomal widths were taken from 2,478 biomedical and bait crabs as part of our market sampling program. The bait fishery was projected to reach the voluntary, state-imposed quota of 165,000 crabs by August 31st, which prompted the closure of the fishery effective September 1st.

The number of crabs bled for biomedical purposes remains confidential due to the limited number of biomedical facilities in the state (one). Due to the early closure of the bait fishery, some fishermen holding bait permits requested and were granted biomedical harvest permits for the remainder of 2019.

Pleasant Bay has been closed to the harvest of horseshoe crabs for bait since 2006 through a Declaration of the Director. This prohibition was codified through regulation and approved by the Marine Fisheries Advisory Commission in 2019.

II. Request for *de minimis* status – not applicable

III. Previous calendar year's fishery

a. Bait Harvest

In 2019, 57 of 221 horseshoe crab bait permits issued by DMF were actively fished, representing a decrease of five issued bait permits from 2018. There was no change in the number of actively fished permits. In addition, 10 letters of authorization (LOA) were issued to allow the harvest of horseshoe crabs by mobile gear fishermen with a Coastal Access Permit (an increase from six in 2018), eight of these authorizations were actively fished. Three fishermen reported landings without proper permits. See Table 1 for the associated harvests. Based on dealer data, 52% of the quota issued by ASMFC to Massachusetts (330,377 crabs), and 105% of the more restrictive state quota voluntarily imposed by Massachusetts (165,000 crabs) was harvested. Dealers reported a higher total than what was reported by harvesters, with a discrepancy of crabs 6,049 (Table 2). This is attributed to a small number of harvester trips where catch was not reported but was reported by the dealer. Bait crabs were harvested primarily by mobile gear (trawl or dredge; 51% of harvest) or by hand (including rakes, dipnets, and hand tongs; 48%), with only 1% harvested by other means (gill net, weirs, pots, etc.) (Table 3). Bait crabs harvested in May and June accounted for 54% of all bait crabs landed in 2019 (Table 4).

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Table 1. Number of permits issued, number of permits actively fished, and number of crabs fishermen reported selling as bait (data source: Massachusetts Trip Level Reports and NMFS Vessel Trip Reports).

Permit Type	# of Permits Issued	# of Permits Fished	# of Crabs Harvested
COMMERCIAL	221	57	129,008
LOA	10	8	32,079
NON-PERMITTED	N/A	3	5,528

Table 2. Number of bait crabs reported by dealers and harvesters (data sources: SAFIS Dealer Reports, Massachusetts Trip Level Reports, NMFS Vessel Trip Reports).

	Male	Female	Unclassified	Total
Dealer Reported			172,664	172,664
Harvester Reported	38,267	19,961	108,387	166,615

Table 3. Number of bait crabs captured by method, as reported by harvesters (data source: Massachusetts Trip Level Reports and NMFS Vessel Trip Level Reports).

Harvest Method	# of Crabs	% of Total
HAND	79,186	47.5%
MOBILE	85,606	51.4%
OTHER	1,823	1.1%

Table 4. Number of bait crabs harvested by month, as reported by harvesters (data sources: Massachusetts Trip Level Reports and NMFS Vessel Trip Reports). Confidential data (fewer than three individuals reporting landings) is marked as an asterisk.

	# of Crabs
JAN	*
FEB	0
MAR	362
APR	4,015
MAY	53,740
JUN	37,698
JUL	40,240
AUG	30,135
SEP	217

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. In 2019, 12 research organizations applied for scientific permits to collect horseshoe crabs. Under these permits, 265 crabs were collected.

c. Biomedical Fishery

In 2019, DMF issued 19 biomedical harvest permits, six of which were actively fished. This represents an increase of five issued permits and two active permits from 2018.

Associates of Cape Cod (ACC) is the single biomedical company producing *Limulus* Amebocyte Lysate (LAL) in Massachusetts. ACC filed monthly catch reports listing the dealers from whom they purchased crabs, location of harvest, the number and sex of crabs purchased, and the ultimate disposition of the crabs (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 issued to ACC, they must adhere to the following conditions: 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 Rubbermaid barrels no more than approximately 2/3 full.

d. Shorebird monitoring- Not applicable

e. Benthic Sampling

DMF's 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 4–5 are the Gulf of Maine (GOM). All data reported are from the survey's two shallowest depth strata (0–30' and 30–60', combined) because 98.3% of the horseshoe crabs caught in this survey since 1978 have come from these two strata.

Horseshoe crab mean number and weight per tow from the bottom trawl survey were above time series median levels for both sexes and both regions during the spring 2019 survey (Figure 2 though Figure 5), but at or below time series medians during the fall survey. Mean number and weight of spring caught males and females in SNE (Figure 2 and Figure 3) were higher than any other point in their respective time series.

Size distribution data are given in Figure 6 through Figure 13. Most spring females were between 17 and 21 cm, regardless of region. Whereas most spring males were between 15 and

20 cm, regardless of region. The paucity of crabs in the 2019 fall survey makes it difficult to make any inferences regarding the size distribution of the catch.

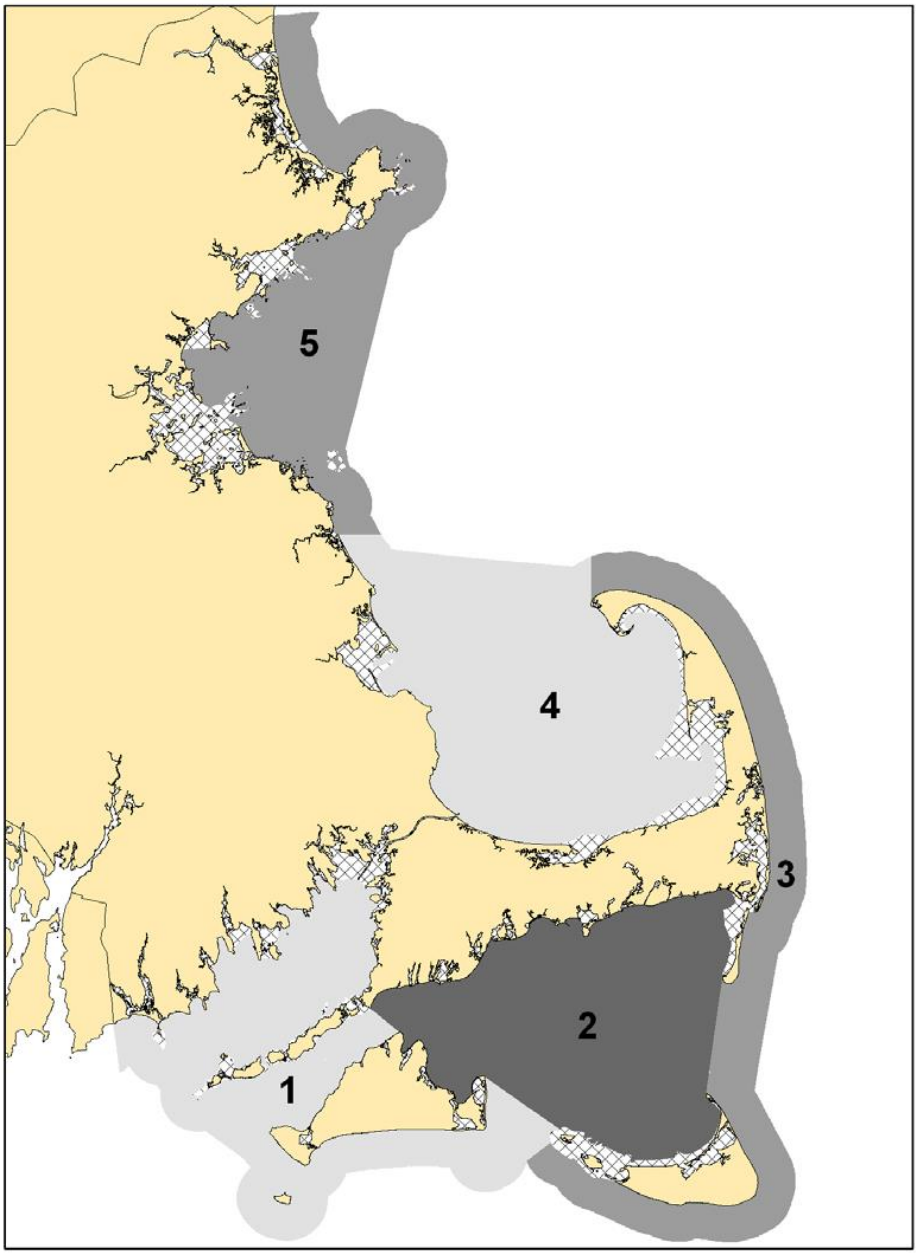

Figure 1. Map of regions for DMF's bottom trawl survey. For this report, regions 1–3 are considered Southern New England (SNE) and regions 4–5 are Gulf of Maine (GOM).

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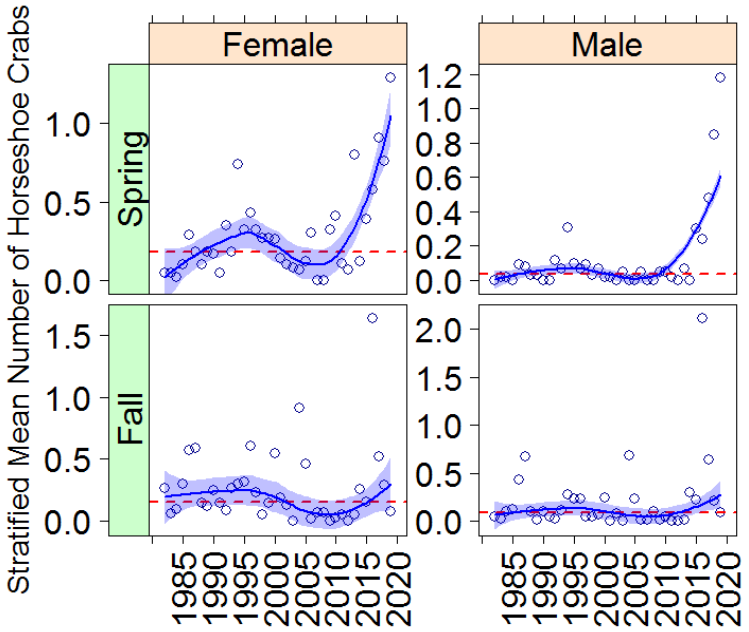

Figure 2. Bootstrapped mean number of horseshoe crabs per tow from the two shallowest depth strata (0–30' and 30–60' combined) of the DMF bottom trawl survey in SNE, by survey season and crab sex. The red dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to outliers at the end of the time-series. Blue shaded area is an approximate 95% confidence interval for the fit.

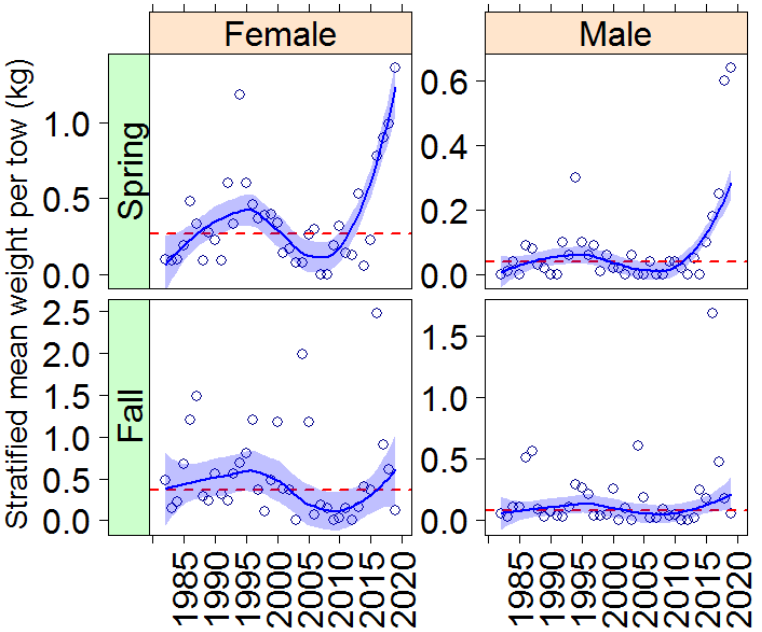

Figure 3. Bootstrapped horseshoe crab mean weight (kg) per tow from the two shallowest depth strata (0–30' and 30–60' combined) of the DMF bottom trawl survey in SNE, by survey season and crab sex. The red dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to outliers at the end of the time-series. Blue shaded area is an approximate 95% confidence interval for the fit.

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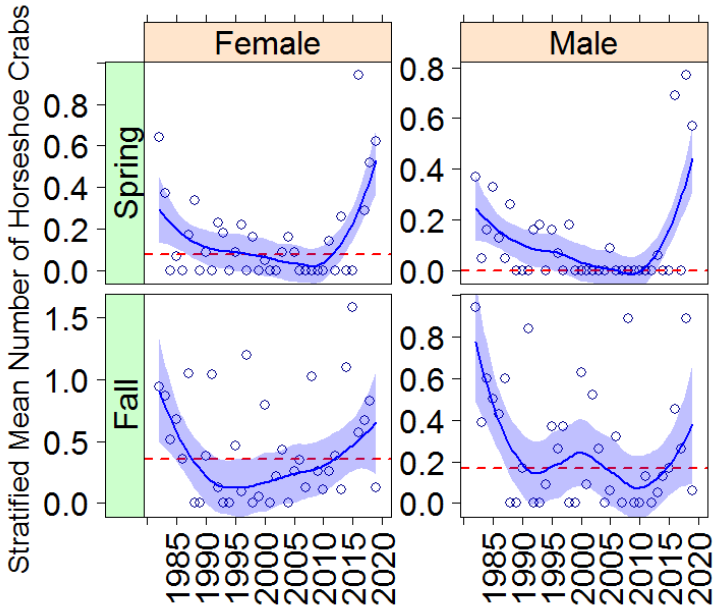

Figure 4. Bootstrapped mean number of horseshoe crabs per tow from the two shallowest depth strata (0–30' and 30–60' combined) of the DMF bottom trawl survey in GOM, by survey season and crab sex. The red dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to outliers at the end of the time-series. Blue shaded area is an approximate 95% confidence interval for the fit.

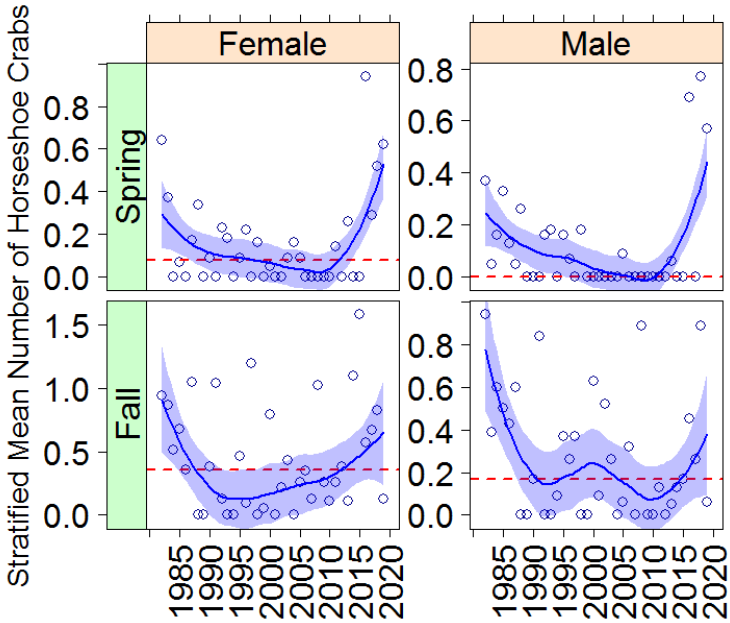

Figure 5. Bootstrapped horseshoe crab mean weight (kg) per tow from the two shallowest depth strata (0–30 and 30–60' combined) of the DMF bottom trawl survey in GOM, by survey season and crab sex. The red dashed line is the time series median, blue line is a loess fit using family=symmetric and span=0.66. These settings provide a resistant fit to outliers at the end of the time-series. Blue shaded area is an approximate 95% confidence interval for the fit.

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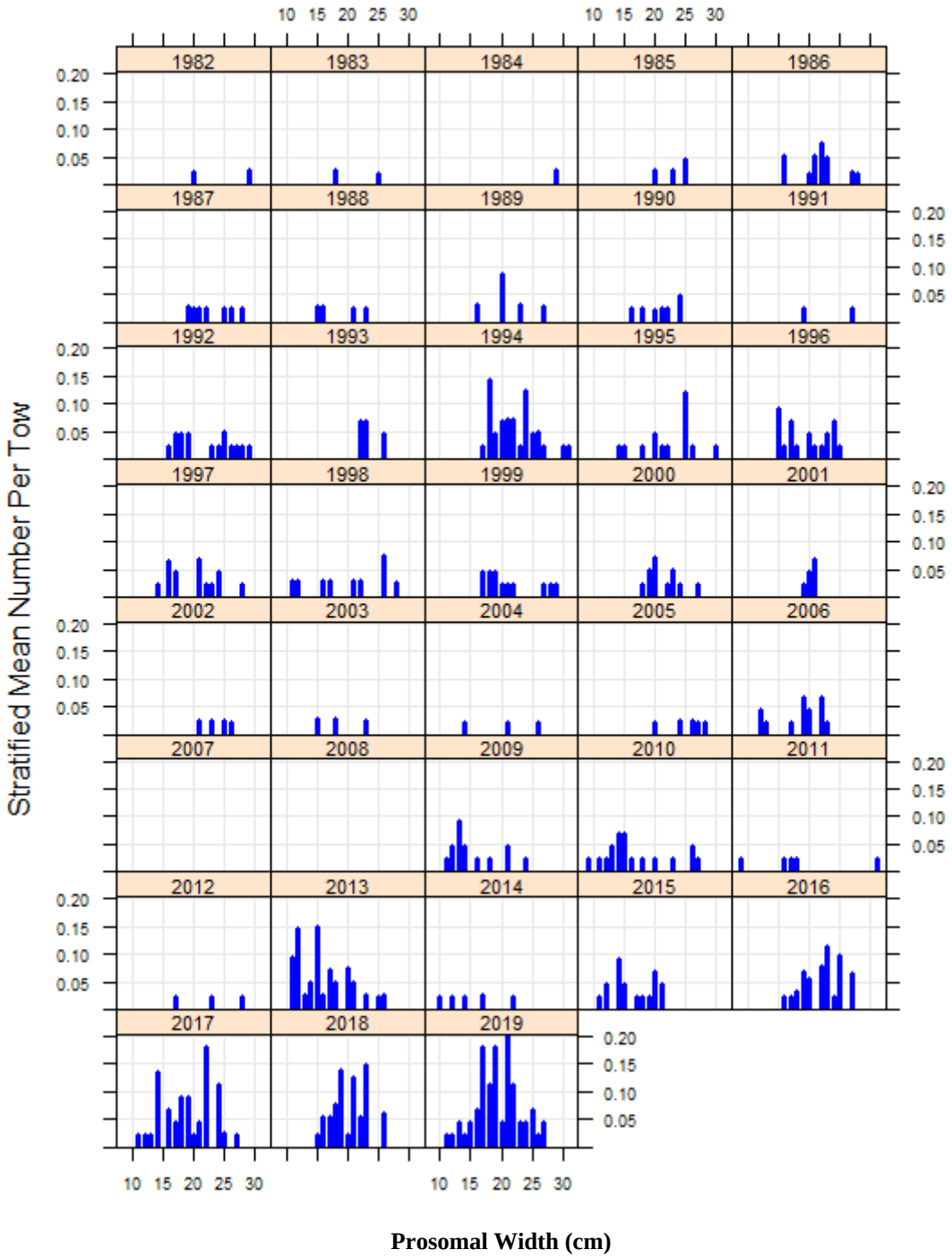

Figure 6. SNE female horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF spring bottom trawl survey.

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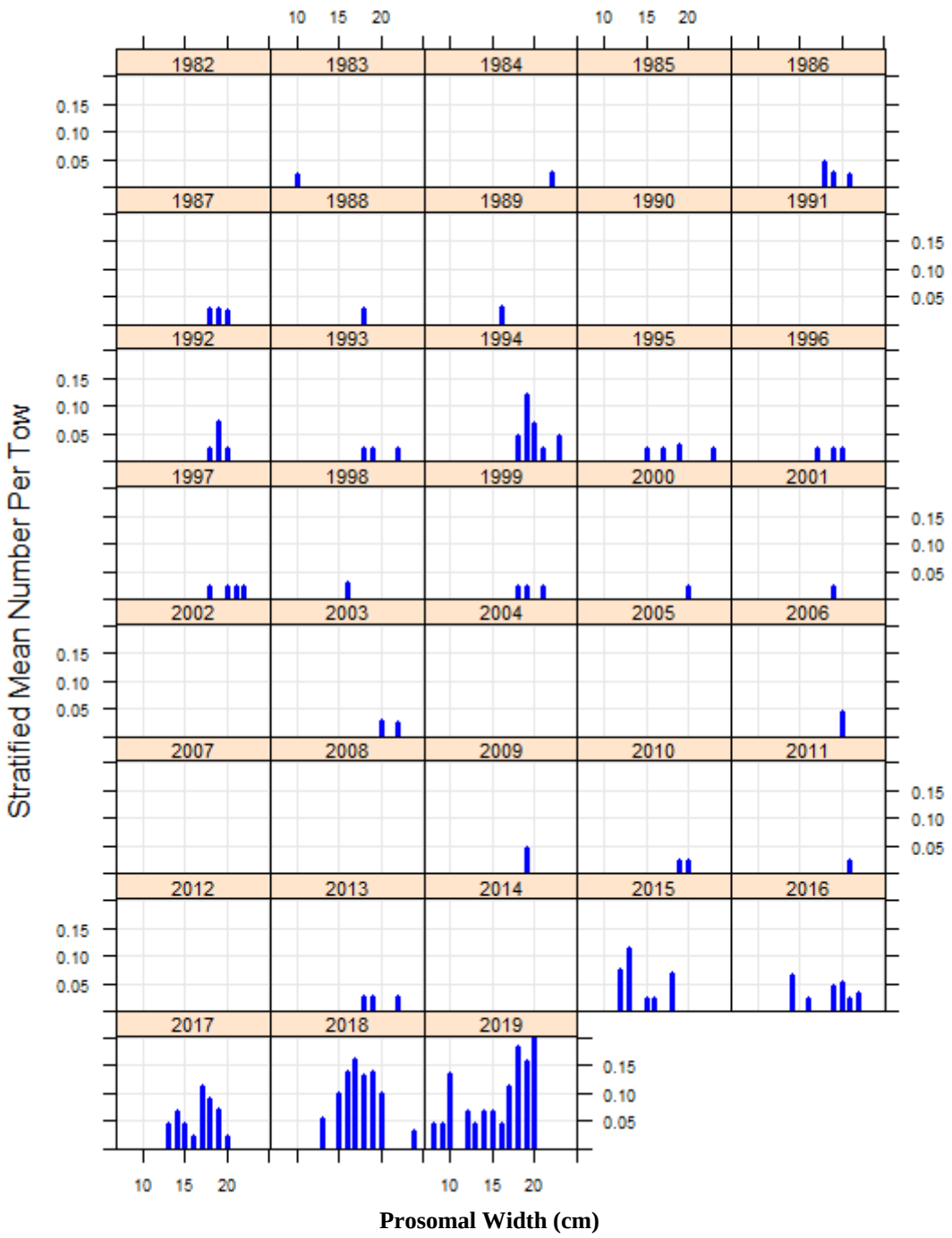

Figure 7. SNE male horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF spring bottom trawl survey.

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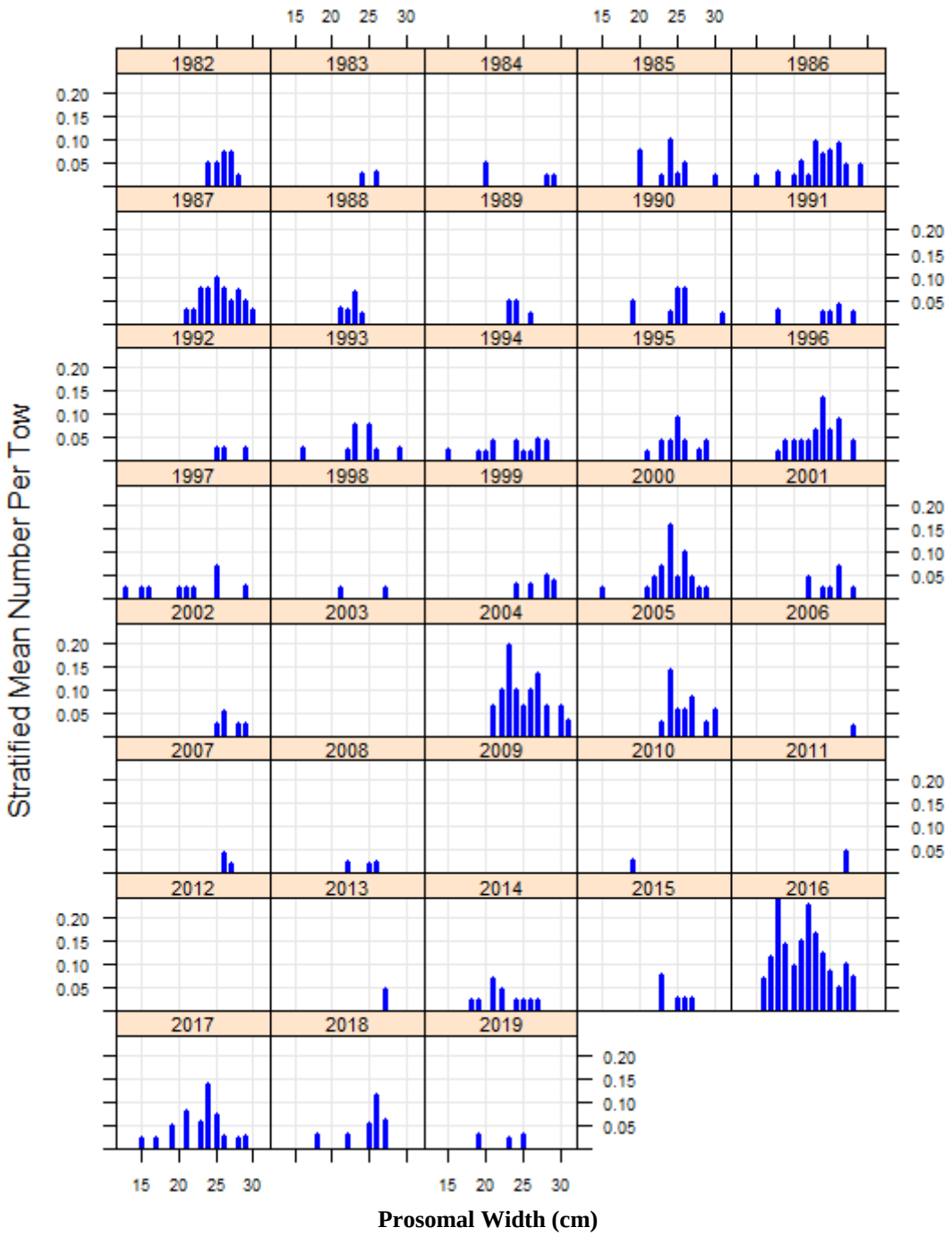

Figure 8. SNE female horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF fall bottom trawl survey.

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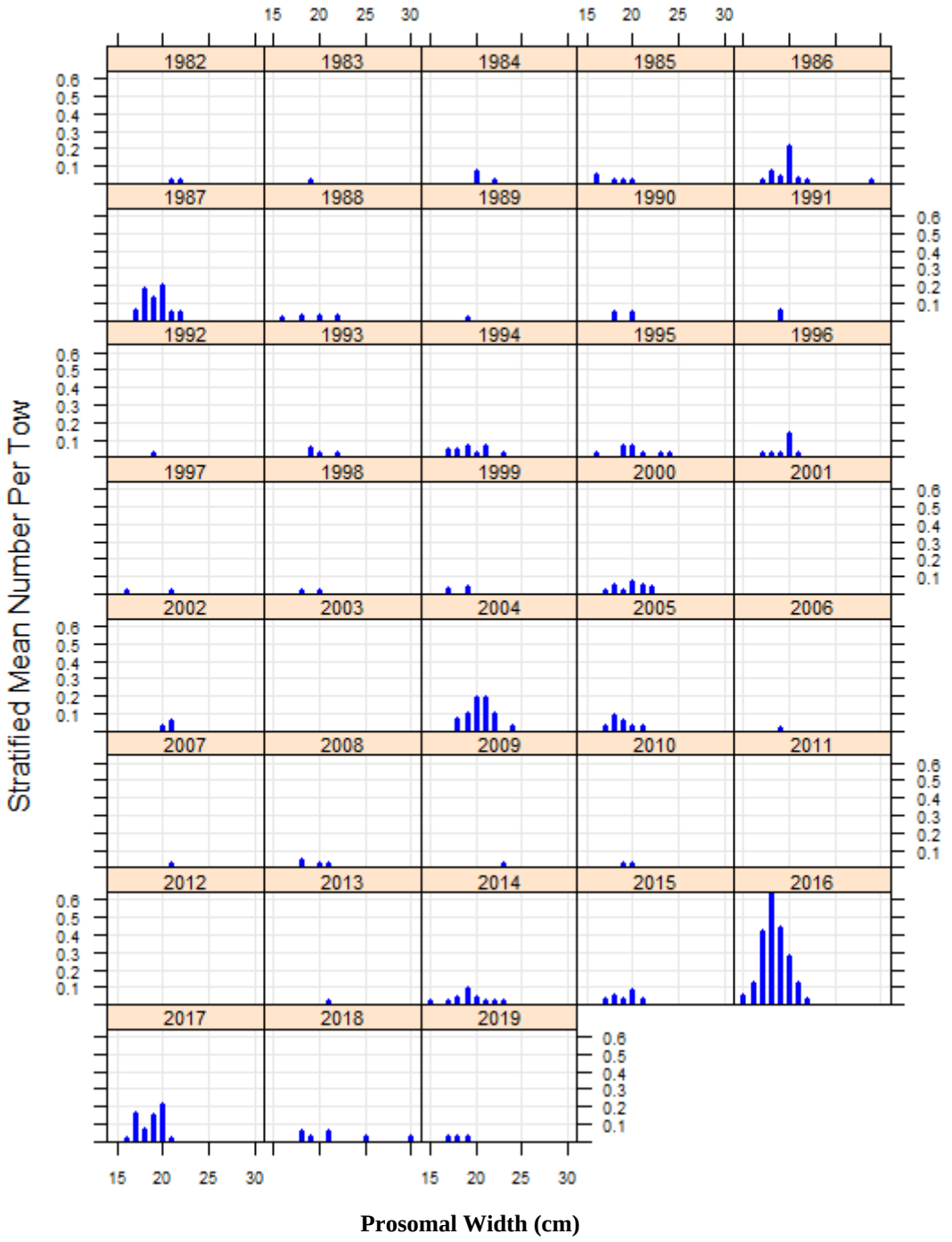

Figure 9. SNE male horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF fall bottom trawl survey.

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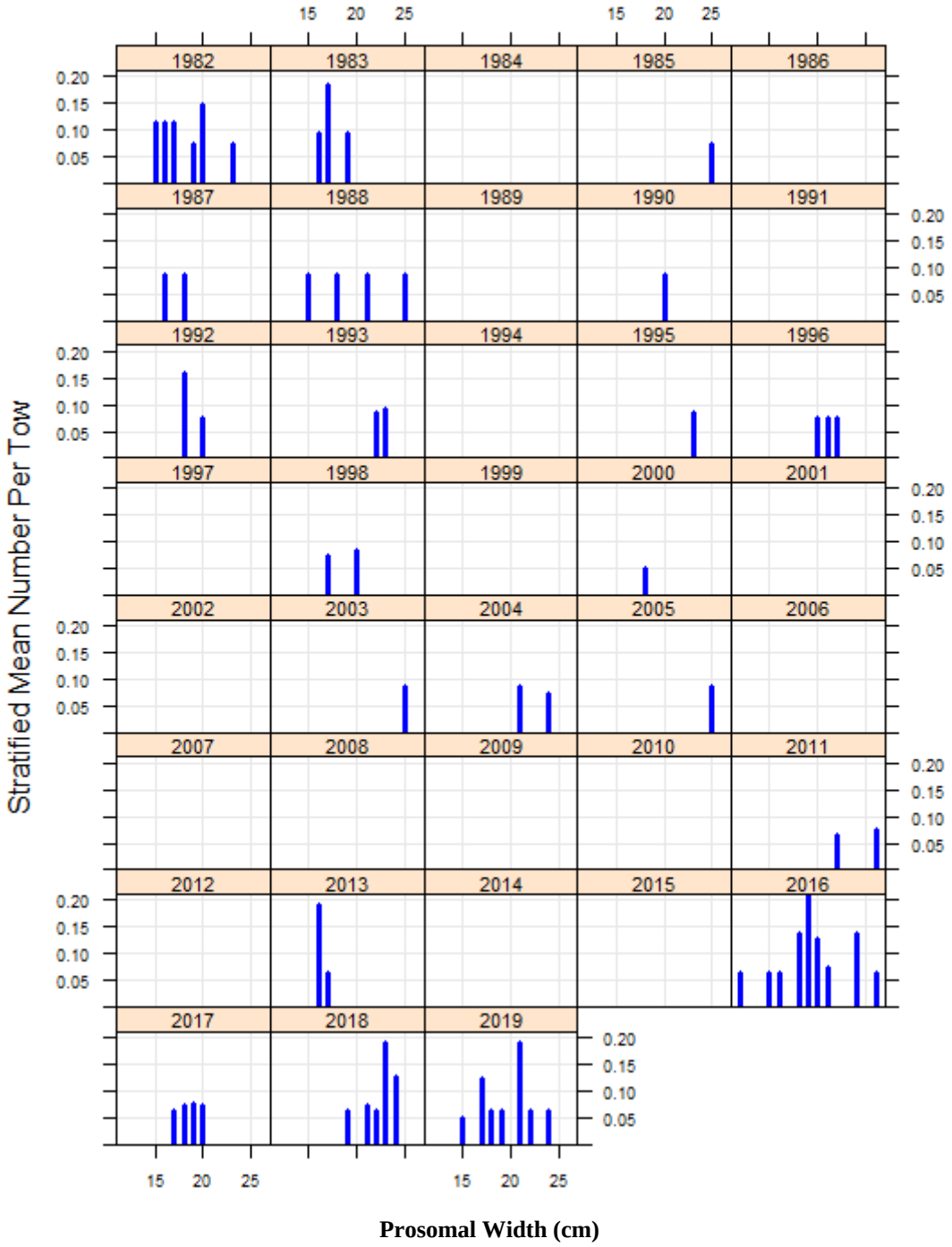

Figure 10. GOM female horseshoe crab size distribution from the two shallowest strata (0–30’ and 30–60’ combined) of the DMF spring bottom trawl survey.

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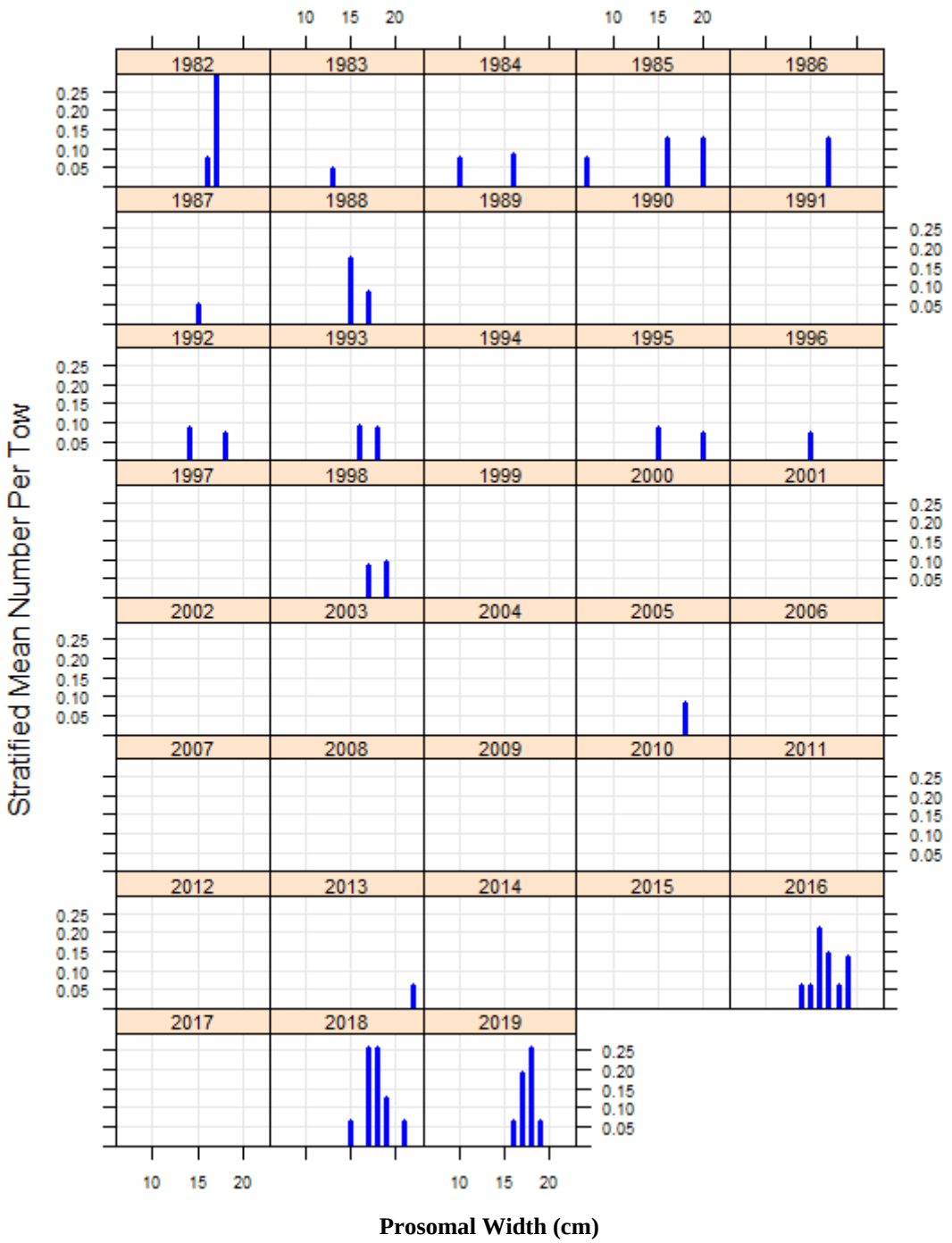

Figure 11. GOM male horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF spring bottom trawl survey.

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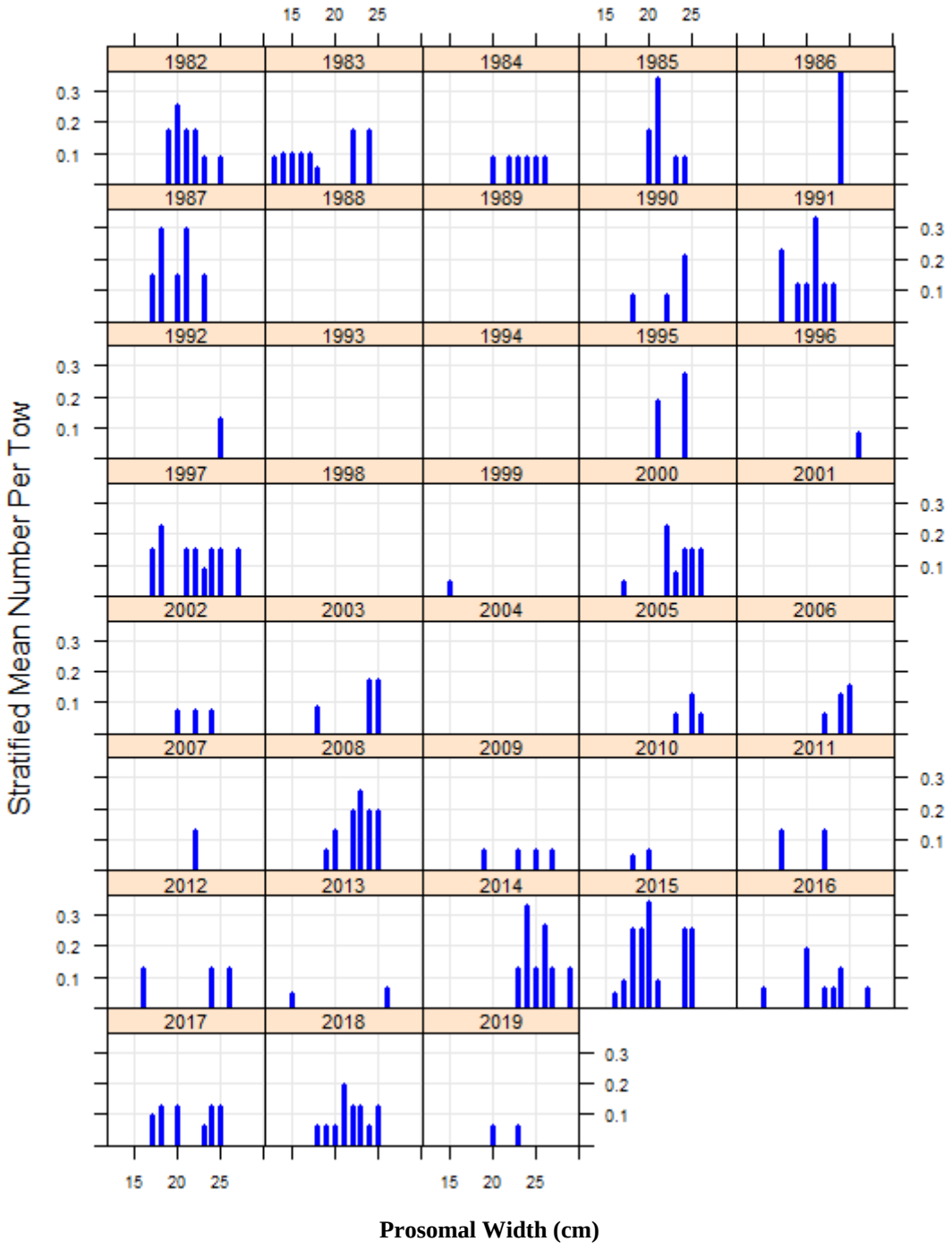

Figure 12. GOM female horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF fall bottom trawl survey.

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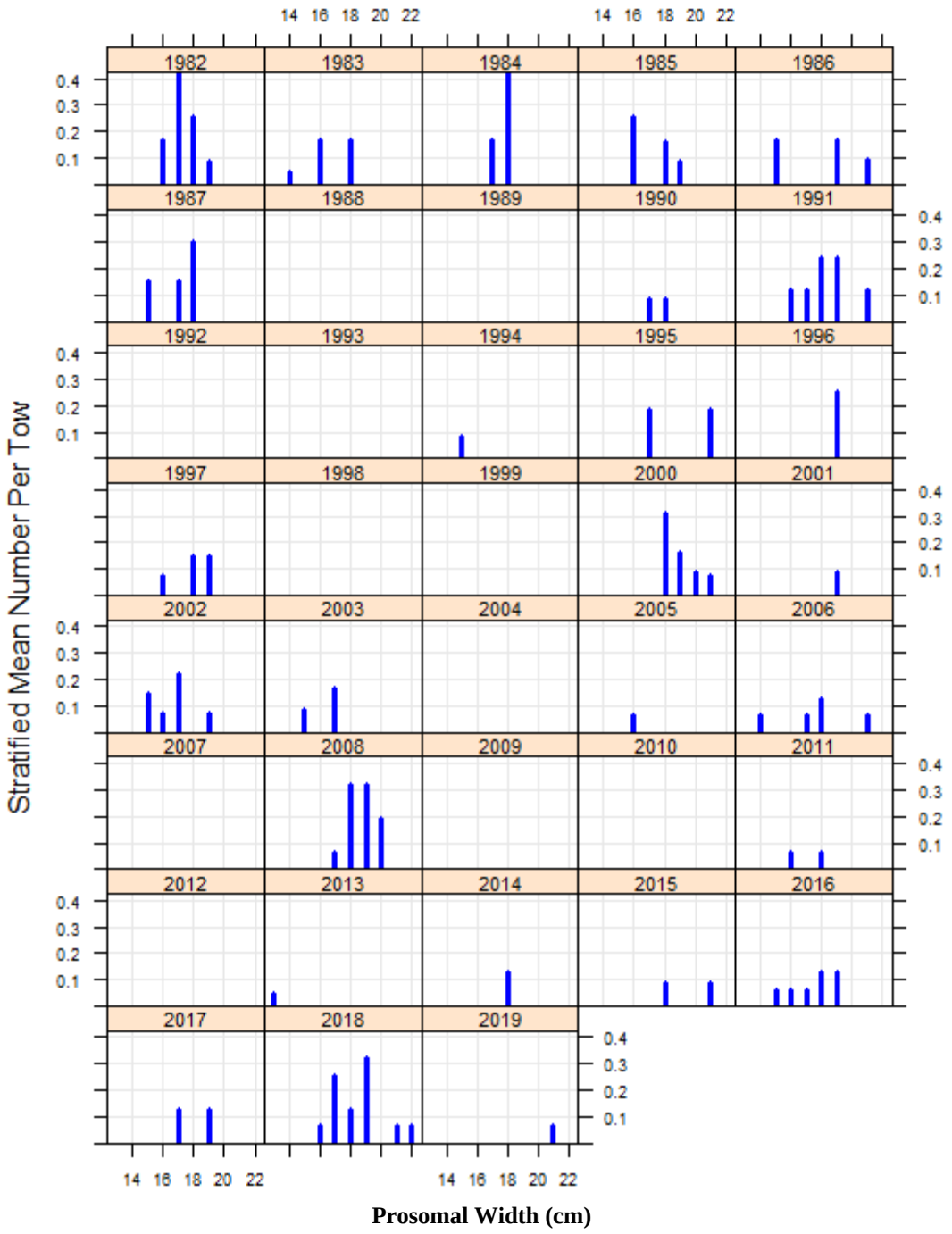

Figure 13. GOM male horseshoe crab size distribution from the two shallowest strata (0–30' and 30–60' combined) of the DMF fall bottom trawl survey.

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IV. Planned management programs for the current calendar year

a. Summary of changes from previous years

In April 2020, Massachusetts implemented an open entry trip limit of 75 horseshoe crabs for mobile gear fishermen that do not posses a horseshoe crab permit. Previously, fishermen needed a limited entry horseshoe crab permit or be granted a Letter of Authorization (LOA) from the director to retain more than six horseshoe crabs. Fishermen that were granted an LOA had the same trip limit as those with a horseshoe crab bait harvest permit (300 crabs). LOA's were no longer issued to harvest horseshoe crabs. In August 2020, DMF began to issue LOA's again to address the shortage of crabs caused by reduced participation in the fishery and unexpected fishery conditions due to Covid-19.

In response to in-season adjustments to increase use of the commercial fluke quota and to reduce regulatory discards, mobile gear fishermen were exempted from mobile gear "no-fishing days" (Fridays and Saturdays during the fluke season) beginning on October 9, 2020.

b. Summary of monitoring programs that will occur

- DMF will continue collecting catch reports from all crab harvesters, dealers, and scientific permit holders.
- DMF will continue to collect monthly reports from ACC (biomedical company).
- DMF will also continue to characterize the commercial fishery through market sampling.
- DMF's 2020 spring and fall bottom trawl survey have been canceled due to the Covid-19 pandemic. We are hopeful that the 2021 bottom trawl surveys will continue to monitor and record weight, number, and prosomal width by sex of individuals collected.
- DMF will continue to coordinate and support spawning beach surveys conducted in cooperation with various volunteer organizations.

V. Law Enforcement reporting requirements

The Massachusetts Environmental Police did not report any horseshoe crab related violations in 2019.