Atlantic States Marine Fisheries Commission

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MEMORANDUM

May 29, 2015

To: **New England Fishery Management Council**

From: **American Lobster Technical Committee**

RE: **Responses to lobster analyses questions for Omnibus Essential Fish Habitat Amendment 2**

The Atlantic States Marine Fisheries Commission received a letter from the New England Fishery Management Council on May 14, 2015 asking for clarification on points made in the January 2 memorandum from the Technical Committee to the American Lobster Management Board. The following are the Technical Committee's responses to the questions posed by the Council. Answers follow the order in which they were asked. Bolded and italicized text reflects language from the original Technical Committee report. Italicized text are the questions posed by the Council.

1. ***The lobsters observed in this region are primarily large females, egg-bearing, with hard shells, and are much more abundant in the closed area during the summer and fall.***
   - *What information is used to indicate relative abundance – changes in survey indices between spring and fall trawl survey data? Is the scallop dredge survey being used as an indication of relative seasonal abundance?*

     General seasonal differences in lobster abundance, sex ratio, individual sizes, and ovigery are based on the NEFSC spring and fall bottom trawl survey. Finer temporal scale data on the presence of lobsters and the timing of migrations on the Bank were inferred from the presence of lobsters in scallop observer data.

   - *Does the updated assessment discuss how these large females are connected through larval export to the Georges Bank (GBK) stock as a whole, and/or to the Gulf of Maine (GOM) stock?*

     Evidence for the seasonal migration of ovigerous lobsters between the GOM and GBK is discussed in the benchmark assessment, however, larval connectivity is not discussed due to a lack of data. Ovigerous females are presumed to be using GBK as an area to brood eggs and release larvae due to optimal environmental conditions. Additional research needs to be conducted in this area to fully explore the connectivity between the two stocks. The current assessment addresses this subject as a high research recommendation.

   - *Does the assessment or has the Technical Committee discussed incidental mortality of these large females in trap gear, as either a rate or as a number of lobsters?*

     In a paper by Smith and Howell (1987), trap gear caused minimal damage to the Long Island Sound lobster population. Specifically, 0.9% of the population had major damage from trap gear in July, 1.3% in August, 3.5% in September, and 0.6% in October and

November. Here, major damage is defined as "death, broken or crushed body parts or claw(s), and multiple injuries, even when each individual wound is minor." In contrast, the trawl fishery caused significantly higher damage to the lobster population. 12.7% of the lobster population had major damage in July, 2.1% had major damage in August, 5.9% had major damage in September, and 14.4% had major damage in October and November. Additionally, trawl-caught lobsters, not trap-caught lobsters, sustained delayed mortality.

Jamieson and Campbell (1985) found the incidences of capture or damage to lobsters from scallop dredges to be very low. However, this research was performed in an area where many lobsters were small enough to pass through the rings of the scallop dredge.

Recent research by the Coonamessett Farm Foundation on seasonal bycatch in scallop dredges provides more applicable results. It recorded catching 425 lobsters in Closed Areas I and II in their 2013 bycatch study, 343 of which were female and 162 of which were ovigerous (Coonamessett Farm Foundation unpublished). Mean carapace lengths were 135 mm and 126 mm for females and males, respectively. Captured lobsters were graded for physical damage using a protocol similar to Smith and Howell (1987). Overall, 32.3% of lobsters exhibited lethal levels of damage from the dredges and another 38.9% exhibited moderate damage, meaning damage to the carapace or loss of legs or claws.

Though these results are still preliminary, analyses using binomial generalized additive models suggest that shell hardness, size, and sex are useful predictors of damage rates from scallop dredges (Figure 1). Only three soft shell lobsters were observed, all of which exhibited lethal damage. New shell lobsters are more likely to suffer damage than hard shells and males exhibited marginally higher damage rates than females. At the observed median size of females, 89% of new-shelled lobsters are predicted to exhibit moderate damage or worse and 68% are predicted to exhibit lethal damage. Similarly, 66% of hard-shelled female lobsters are predicted to exhibit moderate damage or worse and 36% are predicted to exhibit lethal damage. It's also important to keep in mind these mortality and damage rates are for lobsters retained by the dredge, damage to lobsters not retained is unknown and presumably not negligible.

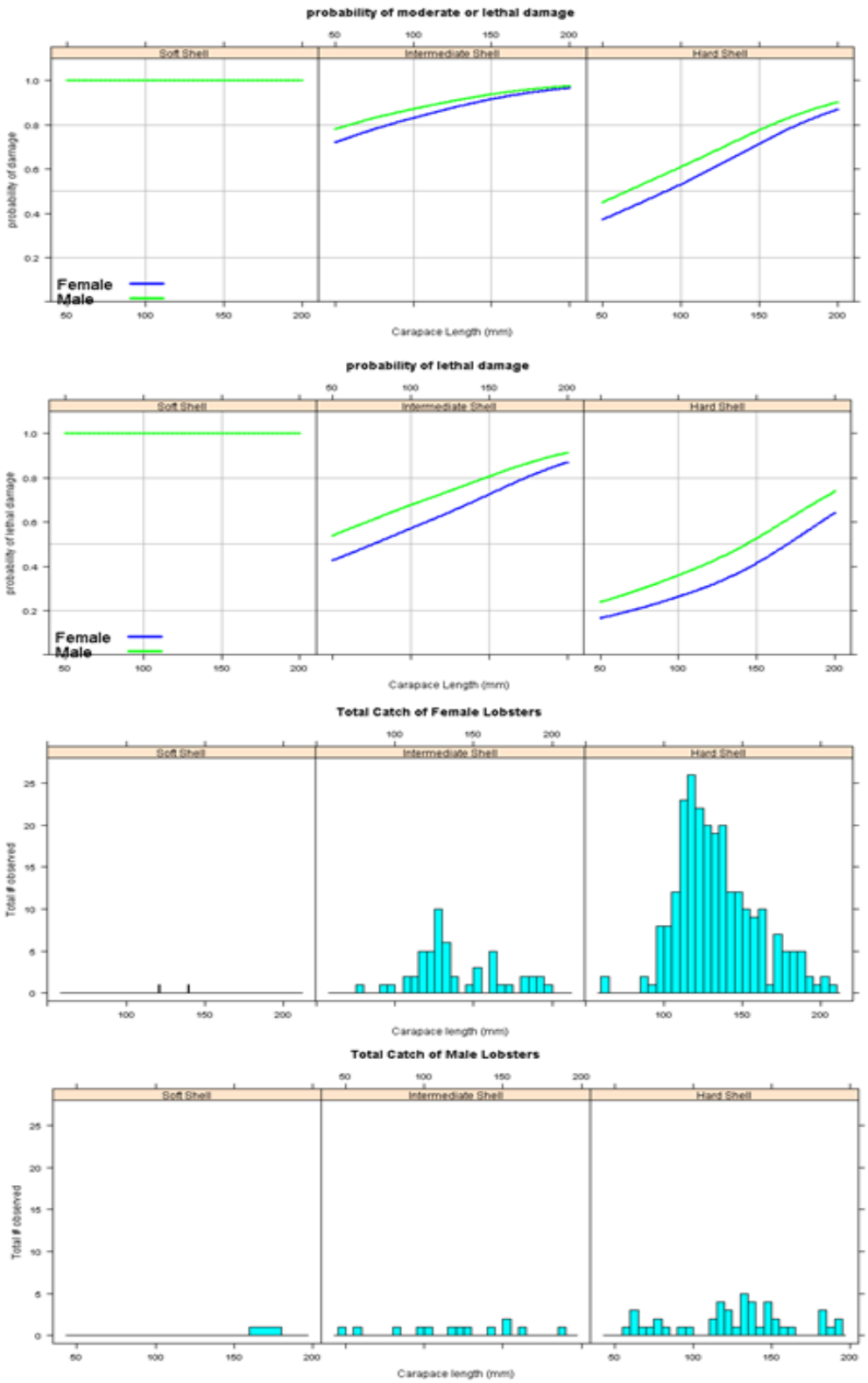


Figure 1. Probability of moderate or lethal damage to lobsters from capture in commercial scallop dredges (first and second plots) and observed size distributions by sex (third and fourth plots).

2. ***In the fall, lobsters are primarily found in the central closed area (54%) and southern access area (43%) with fewer in the Habitat Area of Particular Concern (HAPC, 3%).***

- *Are the percentages of abundance in numbers or weight from the NMFS trawl survey data? If so, for what years? What is the data set used to calculate these percentages?*

  This is based on the NEFSC fall trawl survey from 1982 - 2014 for lobsters >=100 mm CL. Abundance is measured in number of lobsters.

- *Is there additional fishery-dependent or independent information in the forthcoming assessment report that could help us understand the spatial distribution of lobsters by month in Closed Area II?*

  Maps from the upcoming assessment which plot the spatial distribution of lobsters from the GBK fall and spring trawl survey data can be found in Appendix I of this memo. The figures break down the survey data by year, not month, as well as by category of lobster (eggers vs. large lobsters vs. all lobsters).

  Maps plotting the distribution of lobsters and scallops in Closed Area II are also in Appendix 1. In general, lobsters tend to be shallower and further north than the scallop resource during the summer; however, there is certainly some overlap in the two species distributions.

  The Coonamessett Farm Foundation also has data on the spatial distribution and seasonal movement of lobsters from its scallop dredge bycatch survey. Figure 2 shows the seasonal incidence of lobsters on GBK and the annual scallop meat weight cycle. Incidence of lobsters is low in the winter through May, but rises dramatically in June and remains high through the fall. A similar and consistent seasonal pattern is evident in sea scallop observer data since 1992, though the cycle is more dramatic in recent years as the lobster resource on GBK has increased.

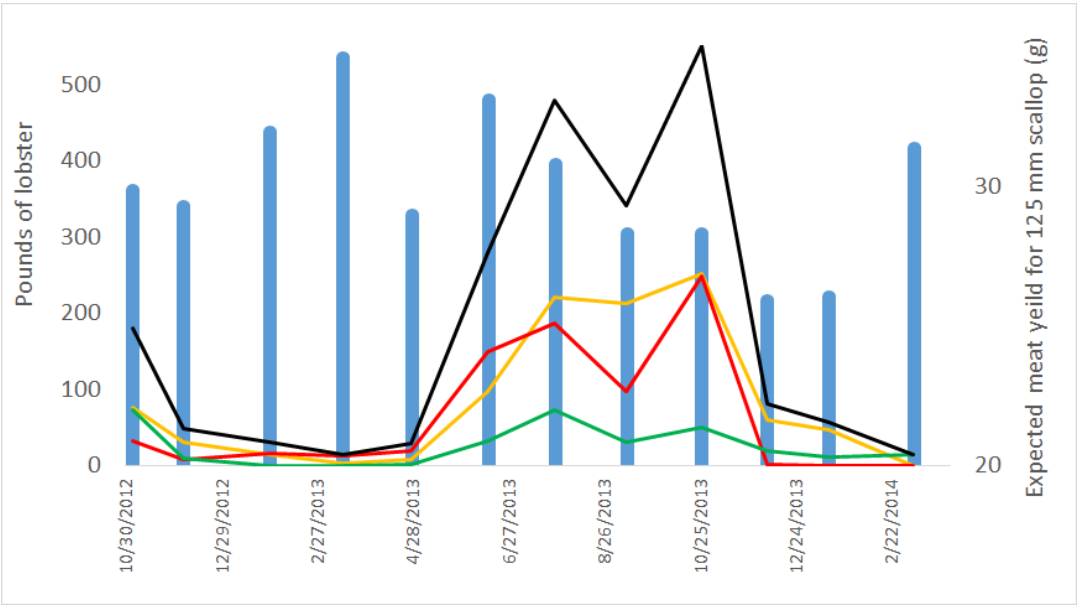


Figure 2. Seasonal catch rates of lobsters on Georges Bank in scallop dredges from Nov 2012 - March 2014. Dates represent trip departure dates. (Coonamessett Farm Foundation).

- *Is the Board or Technical Committee aware of any bycatch issues in the southern part of Closed Area II?*

  This has not been investigated by the Technical Committee but estimates of total catch would be possible from D/K ratios from scallop observer data and the Coonamessett Farm Foundation data.

3. ***On average, ~35% of all egg-bearing lobster biomass is within the closed area during the fall including ~45% of all egg-bearing females >120 mm carapace length, for the combined stocks in the Gulf of Maine and Georges Bank that are accessible to the federal survey. In contrast, in the spring, female lobsters in the closed area represent <3% of the combined stock.***
   - *What does 'combined stocks accessible to the federal survey' mean, i.e., what fraction of the combined stocks is accessible to the federal survey? Our understanding is that biomass estimates are done at the stock level, so how was the biomass estimate for Closed Area II calculated to determine the percentages of the total?*

     The percentages are based on the spatial distribution of lobsters observed in the NEFSC trawl survey, which covers trawlable habitats on GBK and GOM with the exception of shallow inshore areas (Figure 3a below). Geographically, the NEFSC trawl survey covers 91.5% of the combined GOM/GBK stock areas including all of lobster conservation management area 3 (LCMA 3), 74.6% of LCMA 1, and 72.5% of the Outer Cape Cod area (OCC, Figure 3). Because the efficiency of the trawl gear is not known, the Technical Committee cannot directly calculate the portion of the total population inside vs outside of the trawl area. However, the assessment estimates the contribution of each LCMA to the total stock for each size class. Based on this, greater than 40% of female lobsters larger than 110 mm CL in the combined GOM/GBK stock areas were landed from LCMA 3 and the OCC management areas. The percentages of egg-bearing females from the original Technical Committee report are based on lobsters from LCMA 3 plus the 74.6% of LCMA 1 and the portion of the OCC that is sampled by the federal survey. Given the high lobster fishing effort and exploitation rates in the inshore GOM (LCMA 1) and that the majority of LCMA 1 and OCC are covered by the federal survey, 40% can be considered a very conservative lower bound on the proportion of large lobsters in the population that are contained within the survey area. The actual proportion is probably much higher.

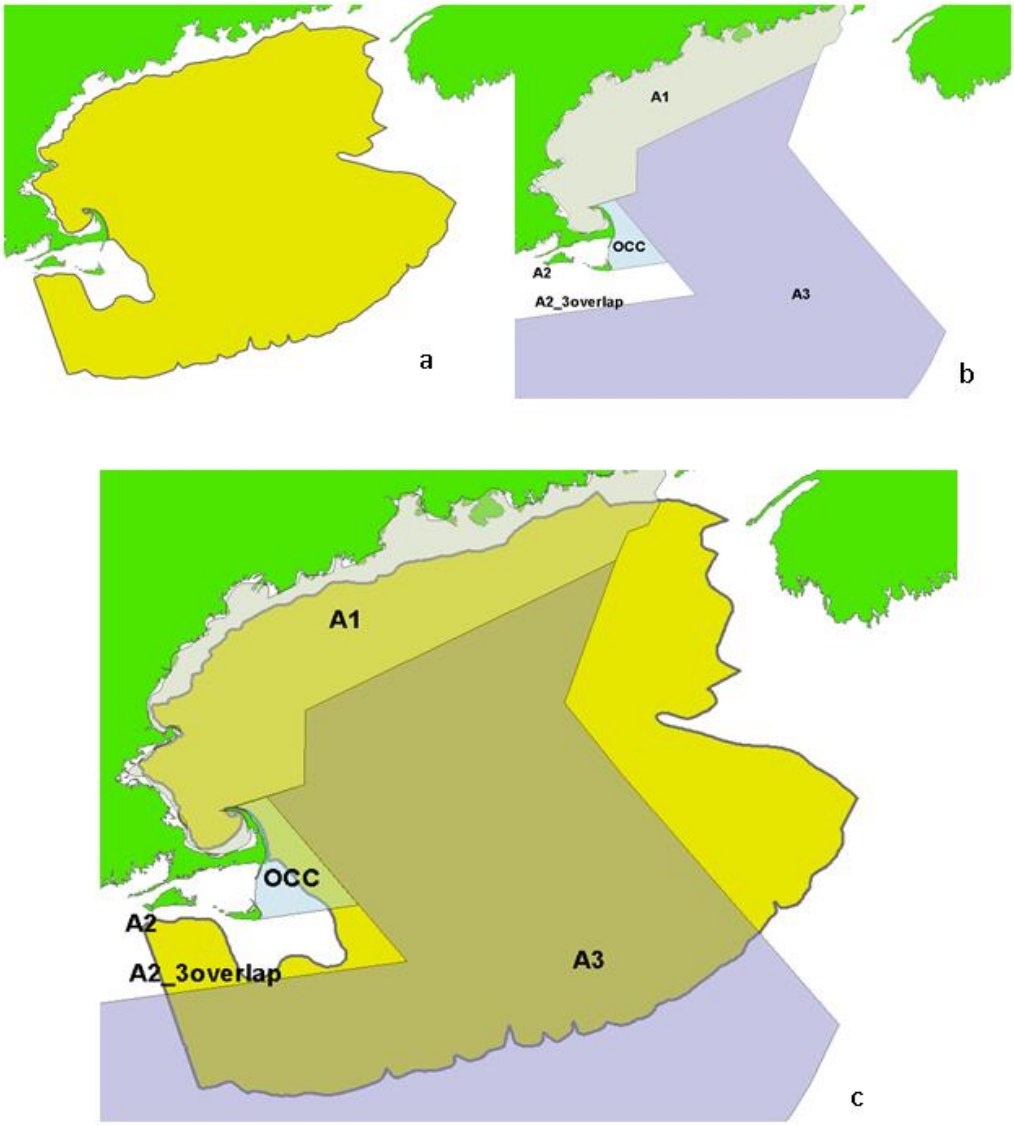


Figure 3: Geographic extent of the Gulf of Maine/Georges Bank stocks for (a) the NEFSC bottom trawl survey, (b) the lobster conservation management areas and (c) the two layers overlayed.

4. ***Federal survey data and recent federal observer data both indicate that the habitat contained within Closed Area II is fairly unique to Georges Bank, with smaller sizes, lower proportions of egg-bearing females, and higher proportions of males on most of the rest of the bank.***
   - *Do you mean to say the lobster population in Closed Area II vs. habitat in Closed Area II? What years of data were reviewed to support this statement? Is this based on observations of trawl, dredges, and/or trap effort? How many trips were observed in Closed Area II for each gear type? Our understanding is that few lobster trap trips have been observed, and there has been limited trawl effort within Closed Area II except for special access programs, due to its long-term status as a groundfish closure.*

Clarifying the above statement: "Federal survey data and recent federal observer data both indicate that the lobsters found seasonally in Closed Area II are fairly unique to GBK, with larger sizes and higher proportions of egg-bearing females than those lobster found elsewhere on the Bank. The Technical Committee believes the presence of this migrant population of large ovigerous females may be attributed to the unique environmental characteristics of this area."

The federal survey data are based on the 1982 – 2014 time series used for the assessment. Between 2012 and 2014, the NEFSC observed 867 hauls across 26 multi-day lobster trips on GBK. While a small data set, it corroborates the spatial patterns observed in the federal trawl survey.

5. ***[High deck temperatures] could lead to dead loss in mobile gear fisheries which presumably would be replaced by harvesters to ensure the trip limit was landed.***
   - *What is meant by 'replaced by harvesters'? Is the reference to incidental lobster trip limits?*

     Yes, this is a reference to the 100/500 trip limit and the issues associated with holding these lobsters on deck during the warmest parts of the year. Replacing by harvester means replacing dead lobsters or high-grading to larger/better quality individuals. There is also the unknown effect of high temperatures and air exposure on ovigerous females and their eggs while the catch is on deck being sorted.

Works Cited:

Coonamessett Farm Foundation. (May 13, 2015). Summary of Scallop Disease and Lobster Catch From the Seasonal Bycatch Survey. Joint Scallop PDT and Advisory Panel Meeting.

Jamieson and Campbell 1985. Sea scallop fishing impact on American lobsters in the Gulf of St. Lawrence. Fish Bull 83: 575-586.

Smith, E.M. and Howell, P.T. 21987. The effects of bottom trawling on American lobsters *Homarus americanus,* in Long Island Sound. Fishery Bulletin, 85(4): 737-744.

APPENDIX 1

Spatial Distribution of Lobsters from Georges Bank Trawl Survey Data (Source: Upcoming Lobster Stock Assessment)

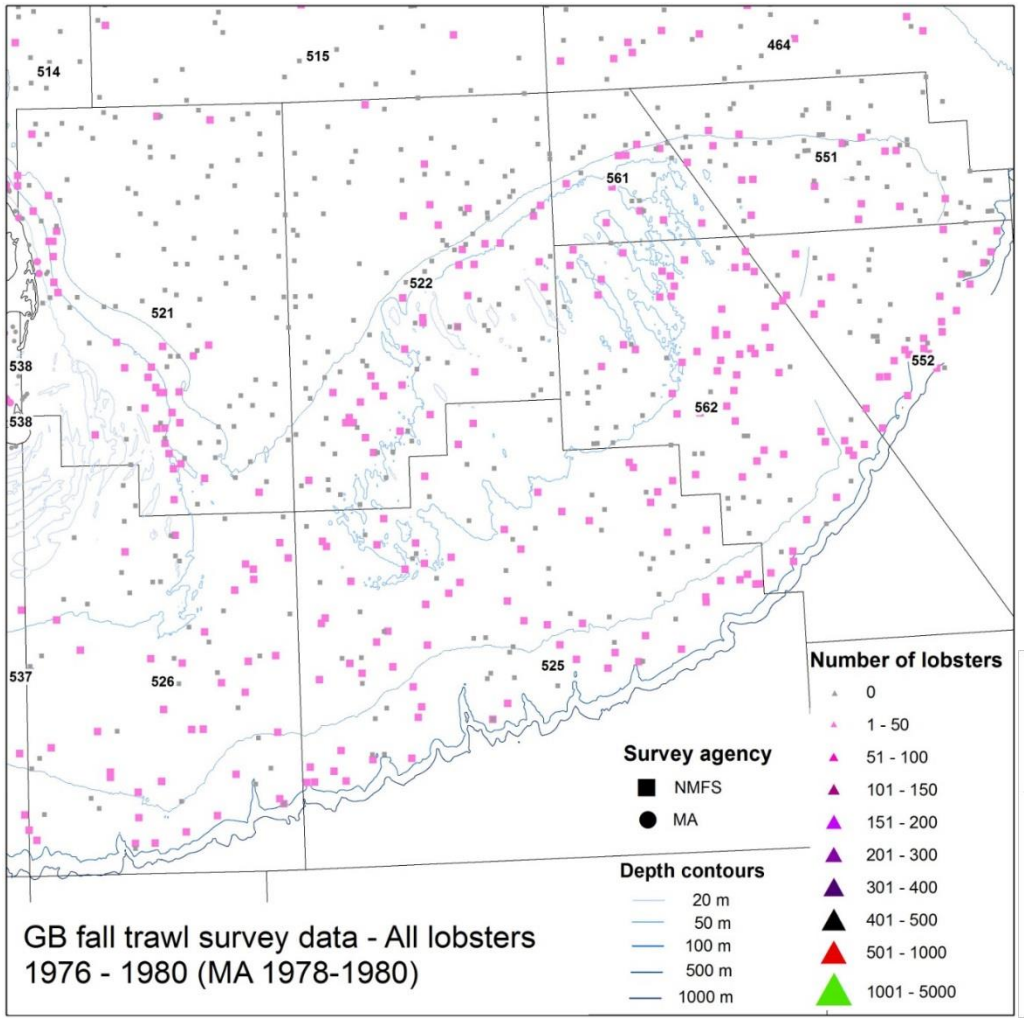
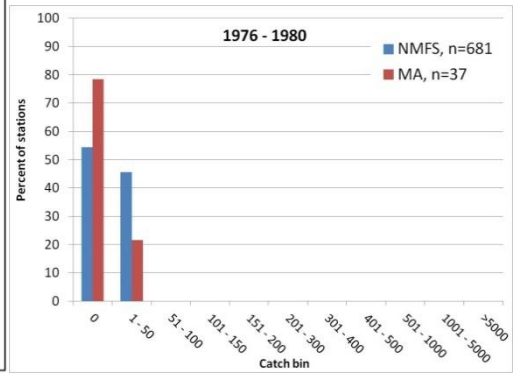
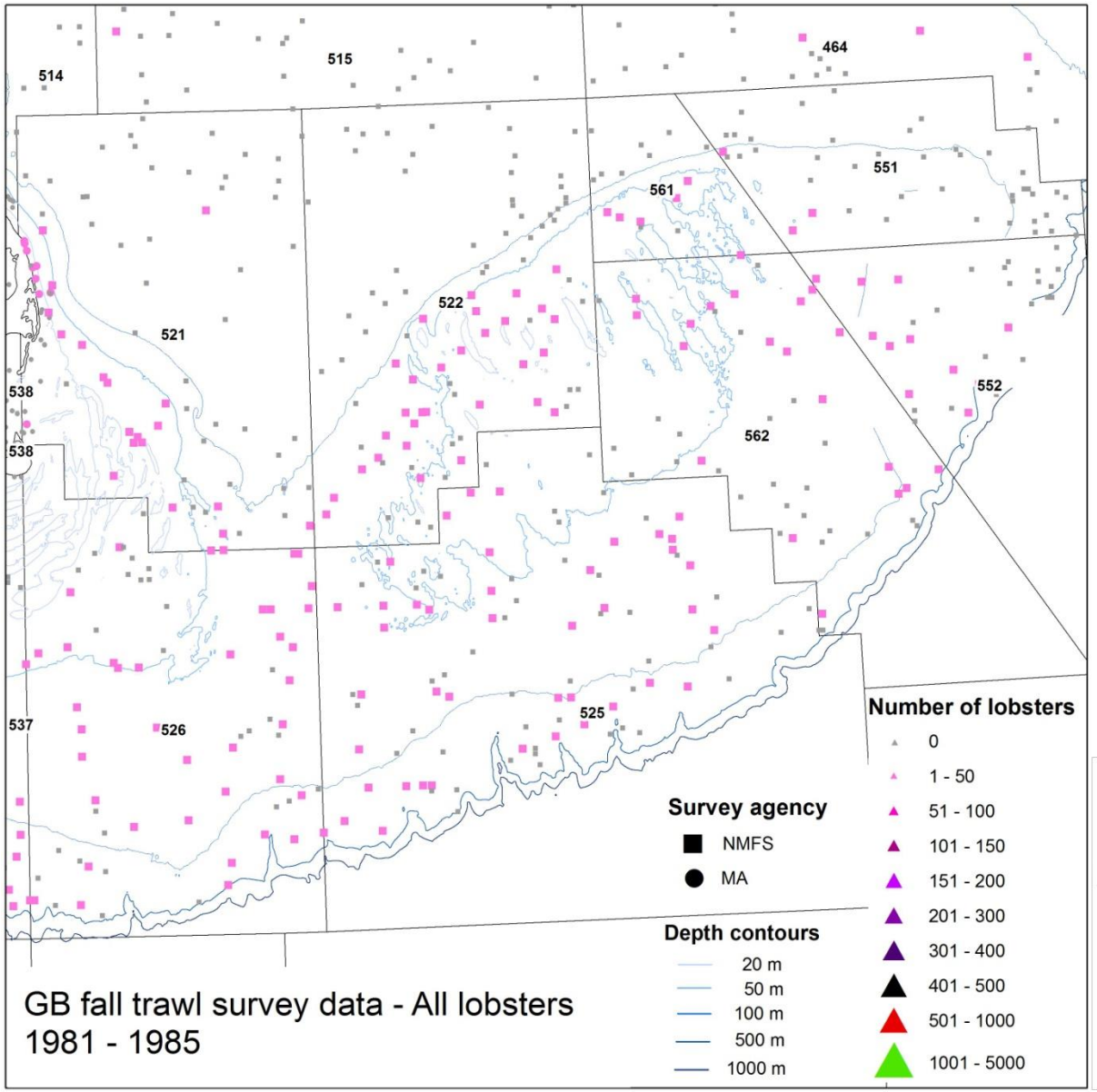


Figure 4.2.1.3.2.1 A – H. Mean catch per tow of lobsters (all sizes) at each fall sampling location from all GBK bottom trawl surveys (NMFS and MA), shown in 5 year time periods. Histograms show the percent of stations that fell within each catch bin by survey agency for each 5 year time period.

Figure 4.2.1.3.2.1 A





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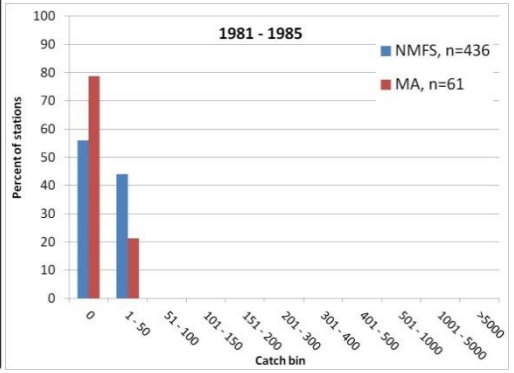

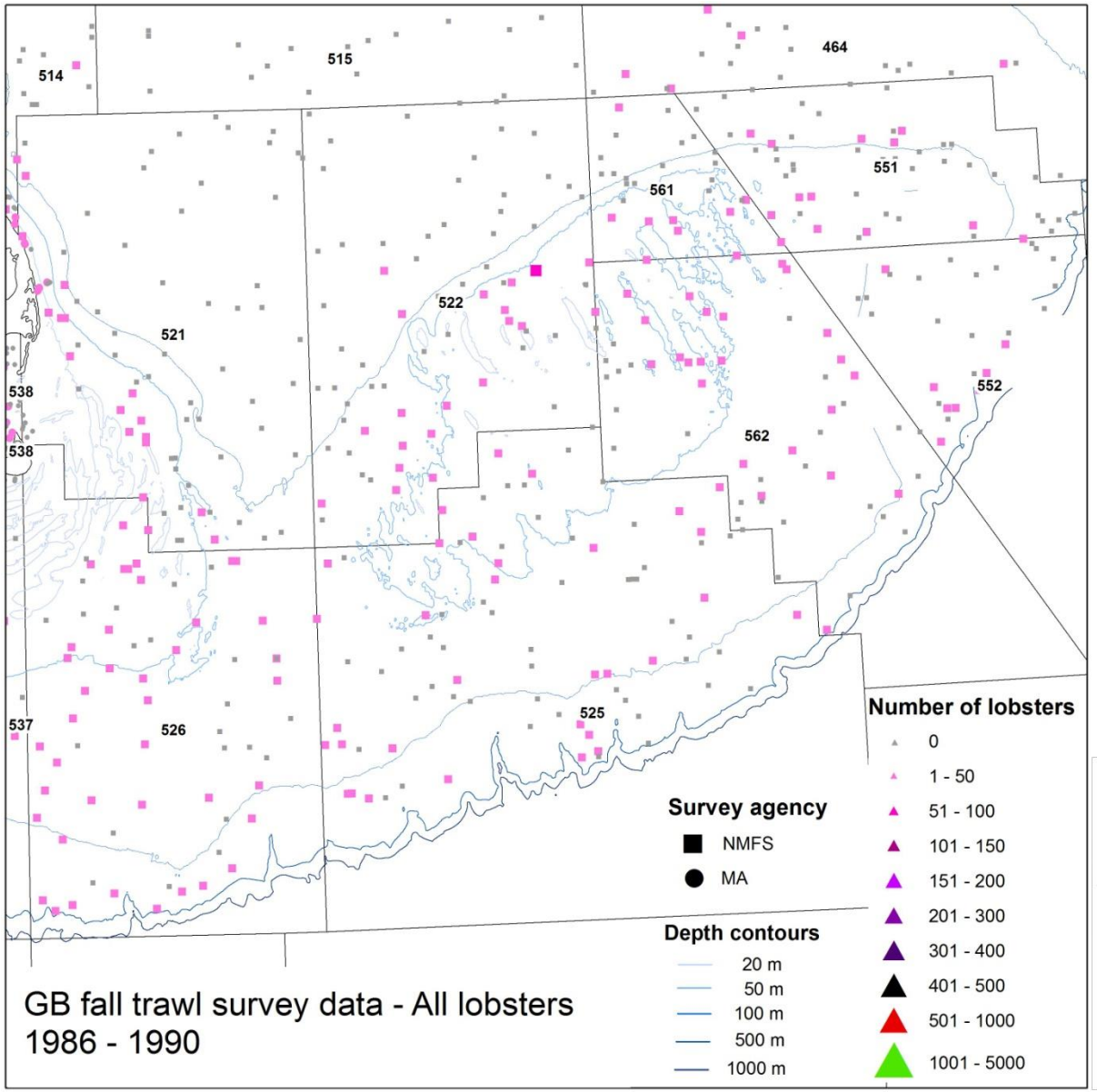

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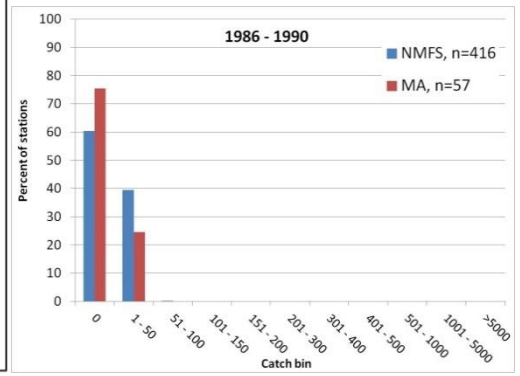

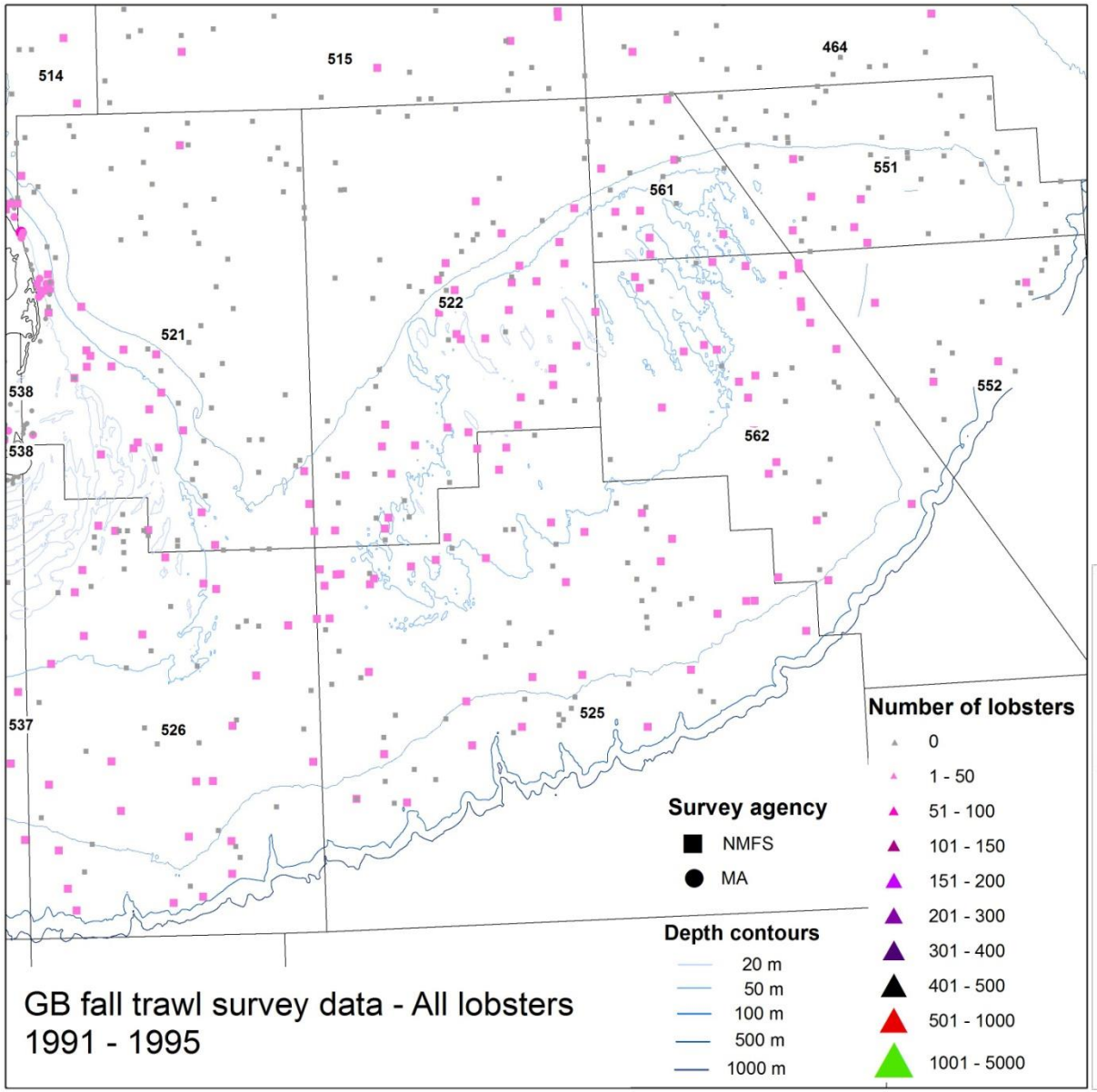

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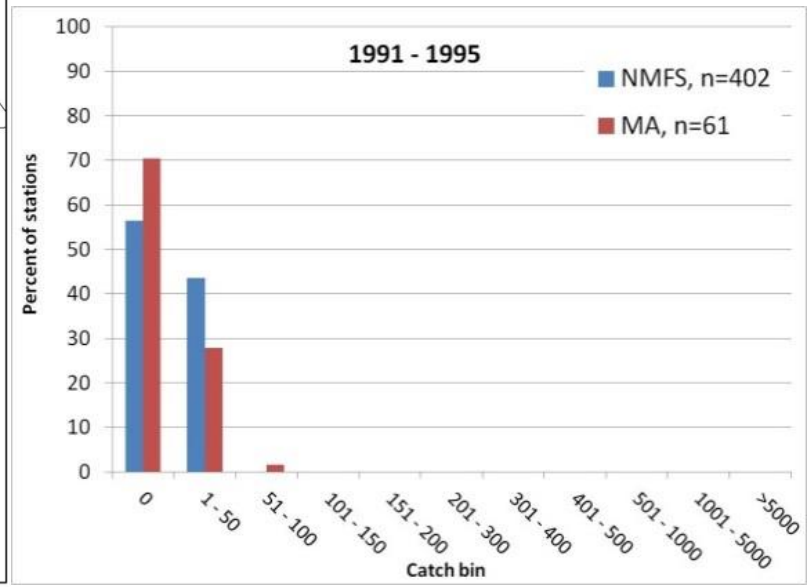

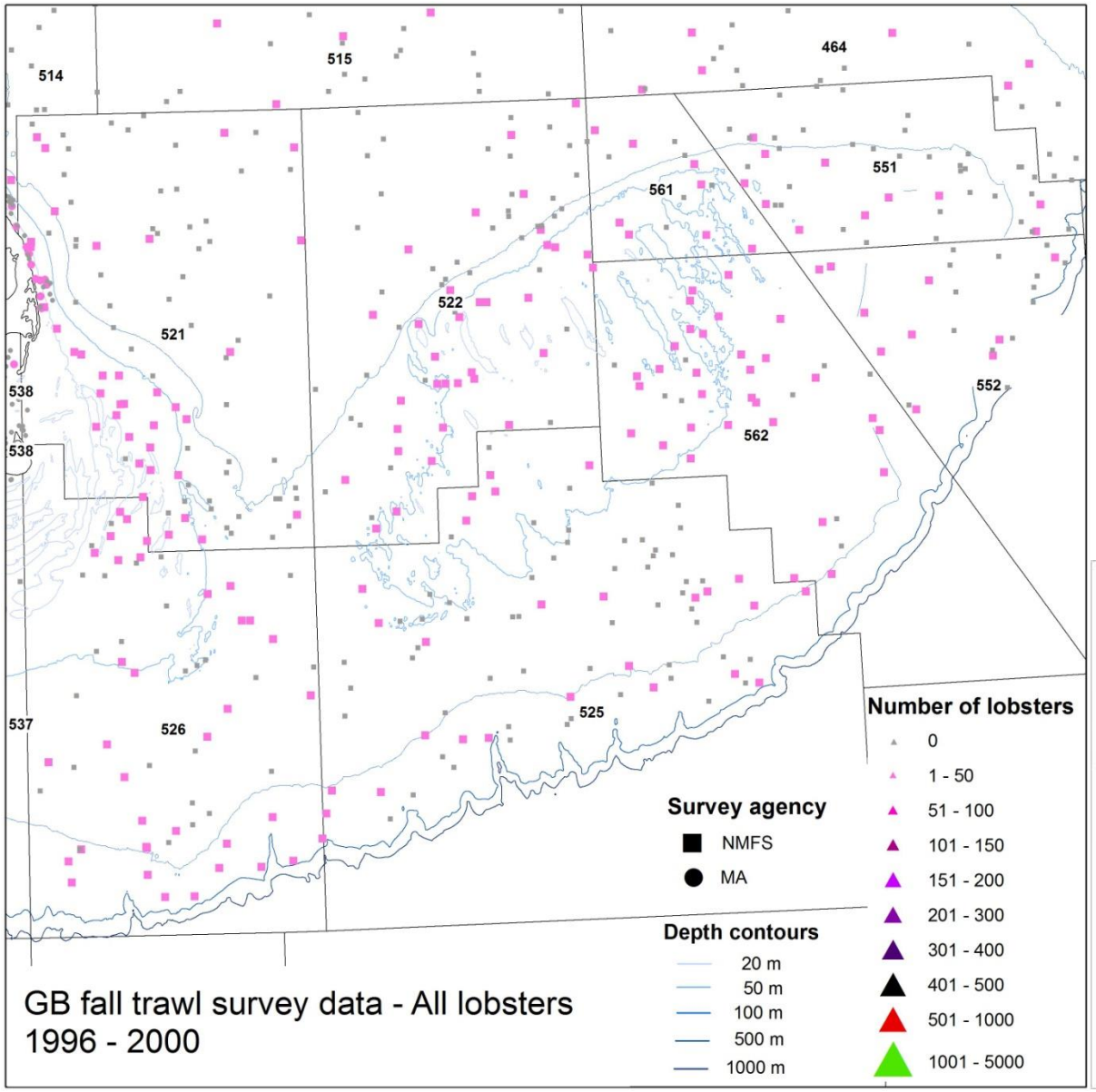

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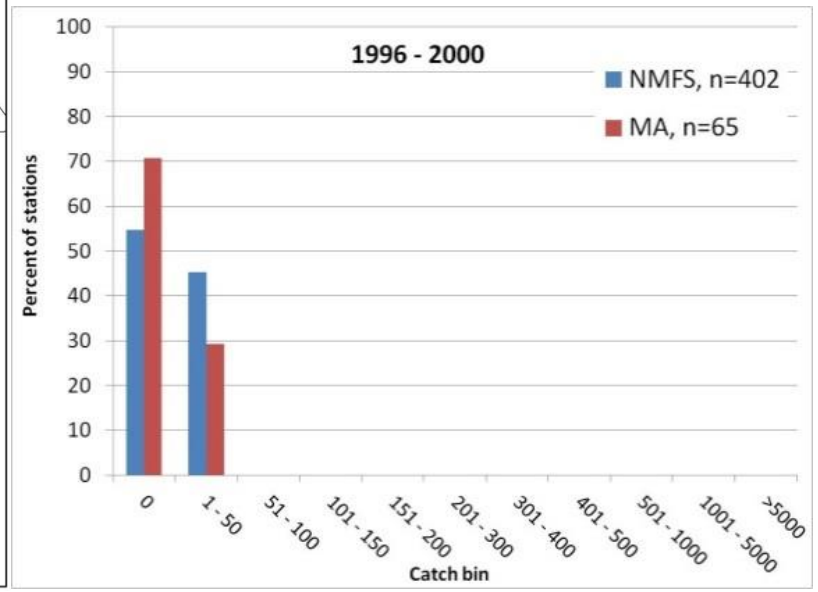

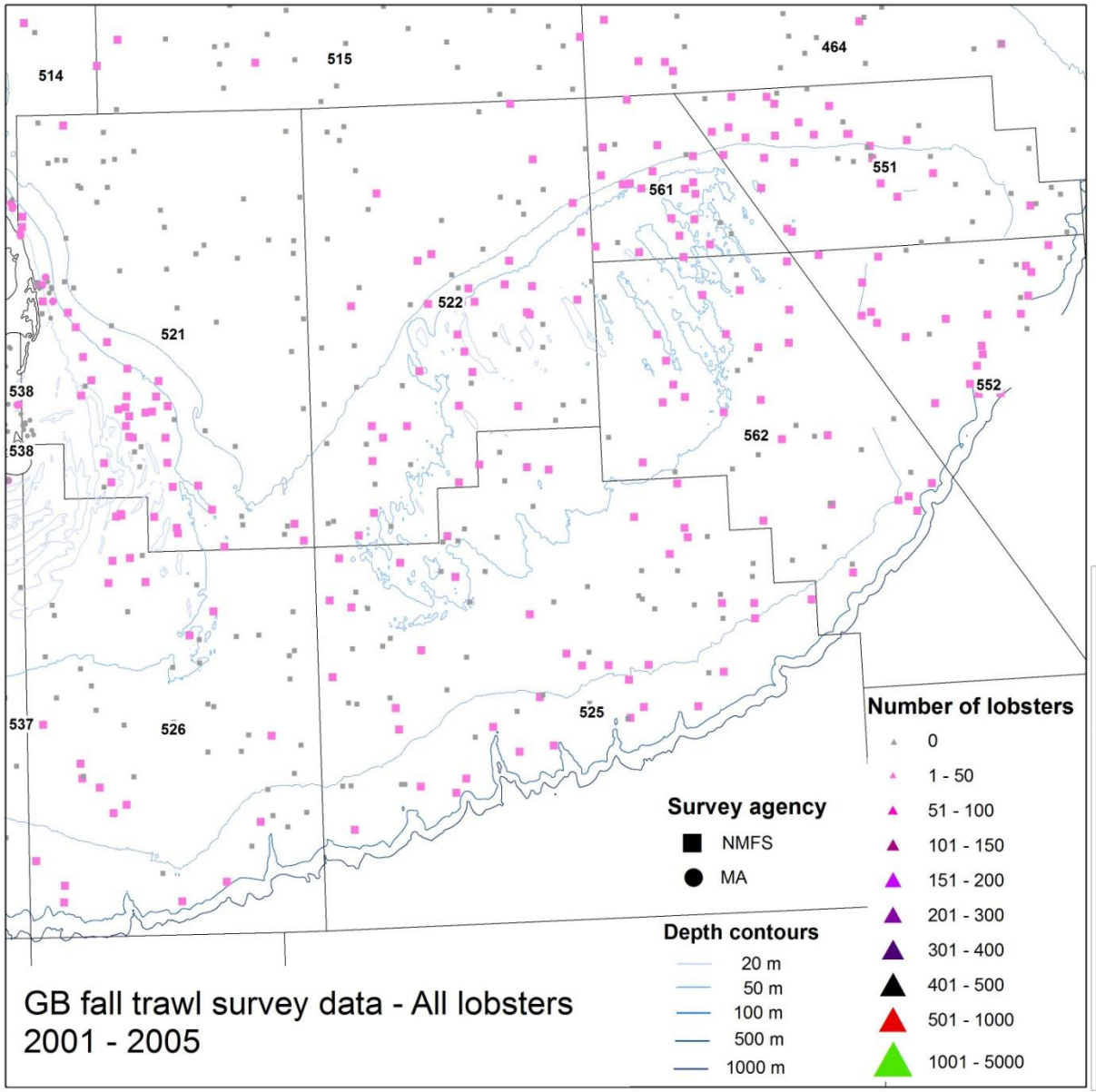

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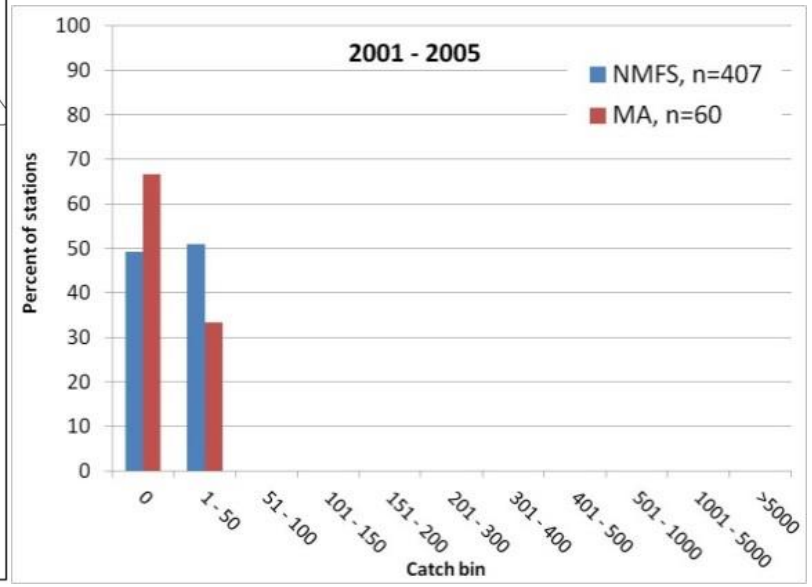

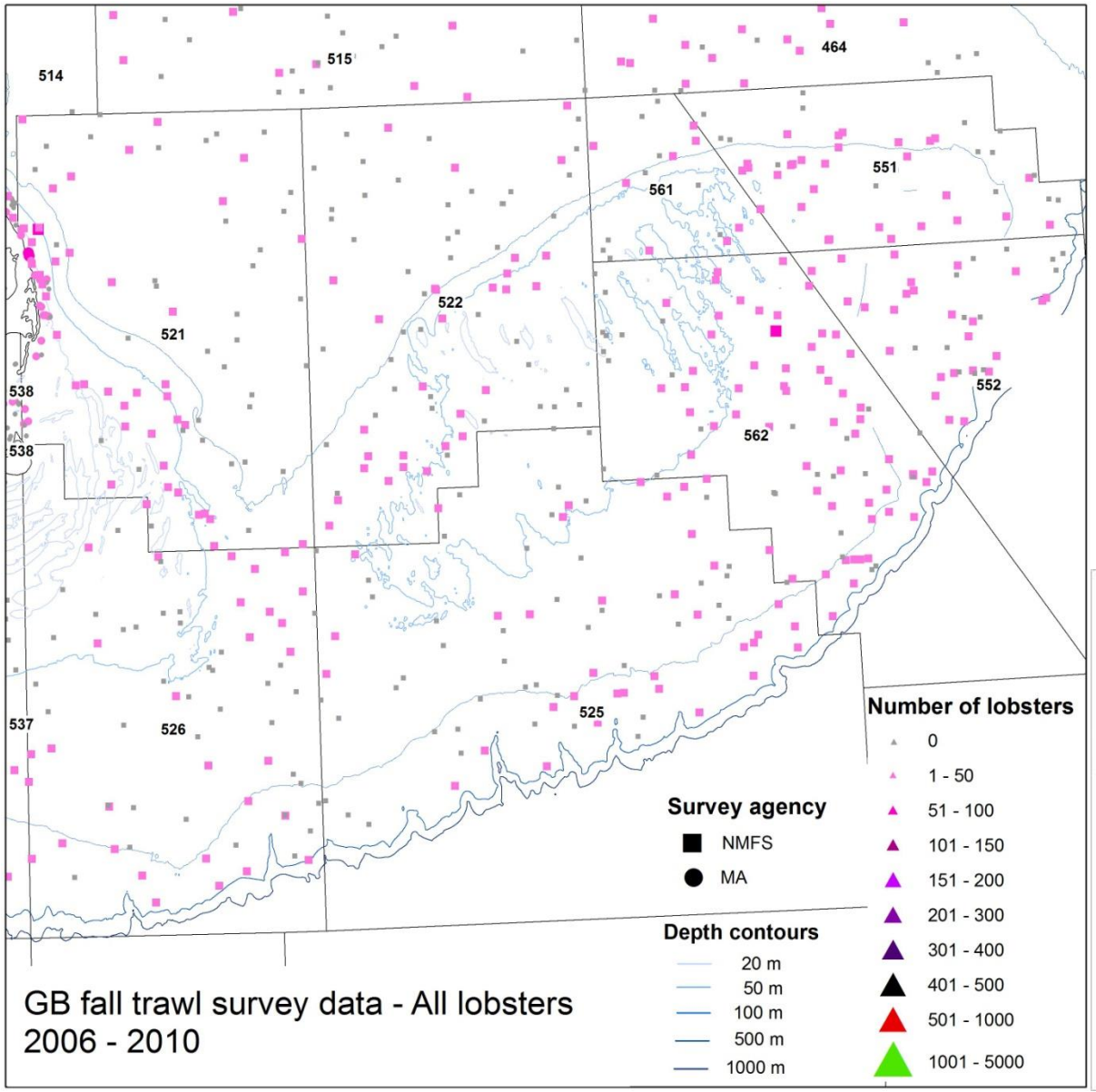

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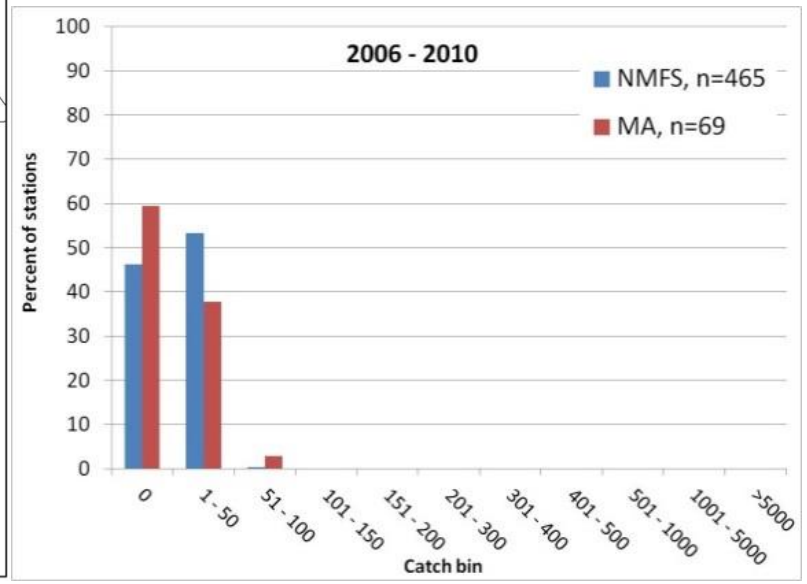

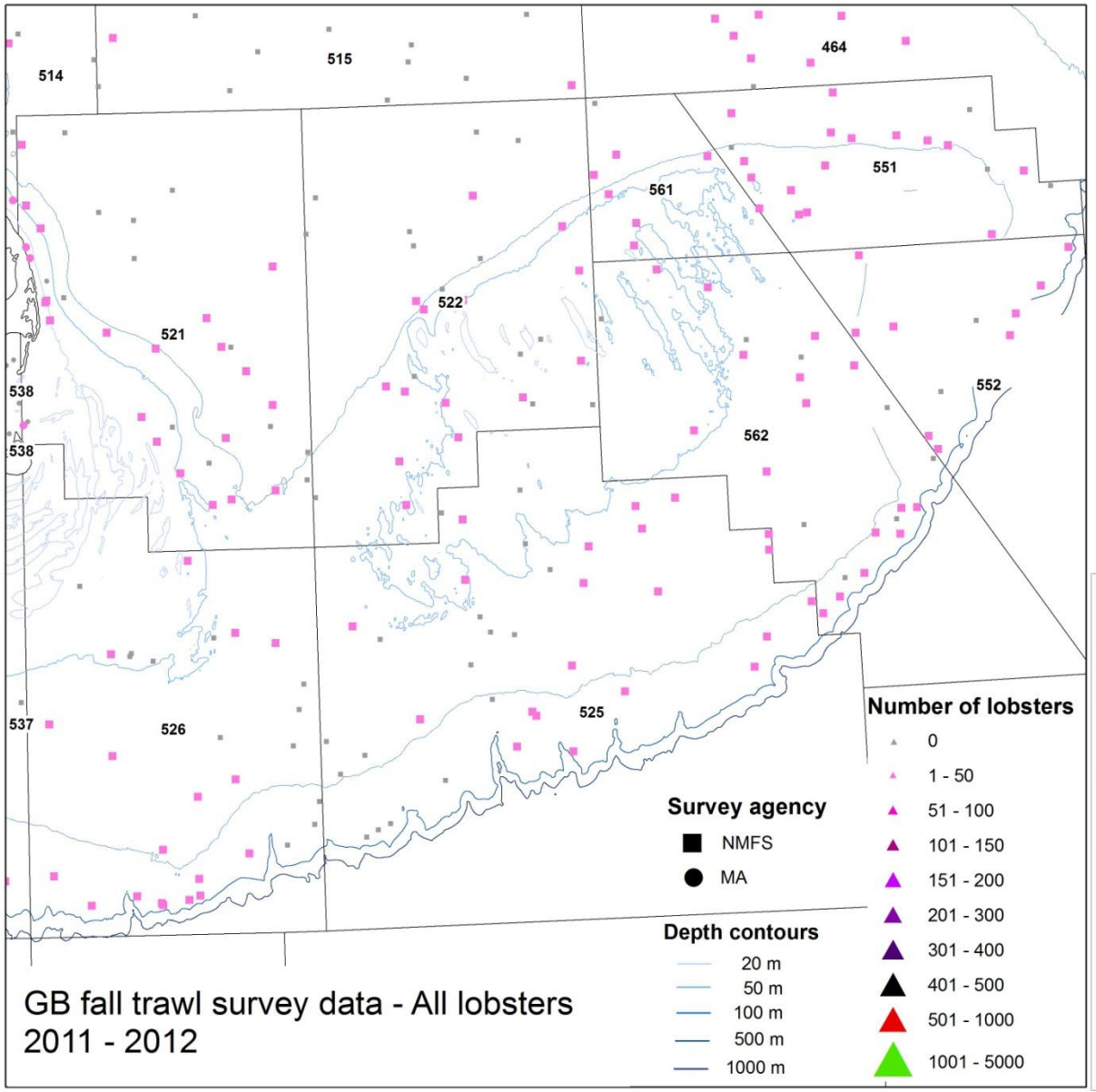

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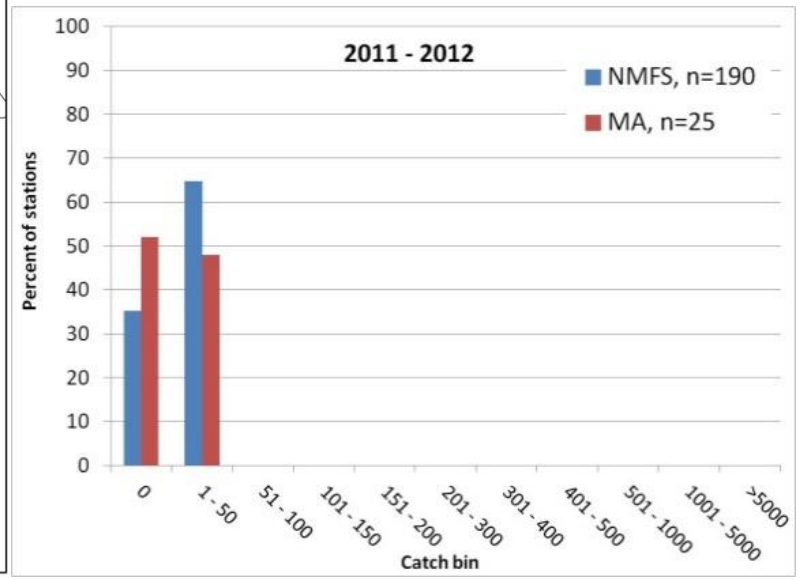


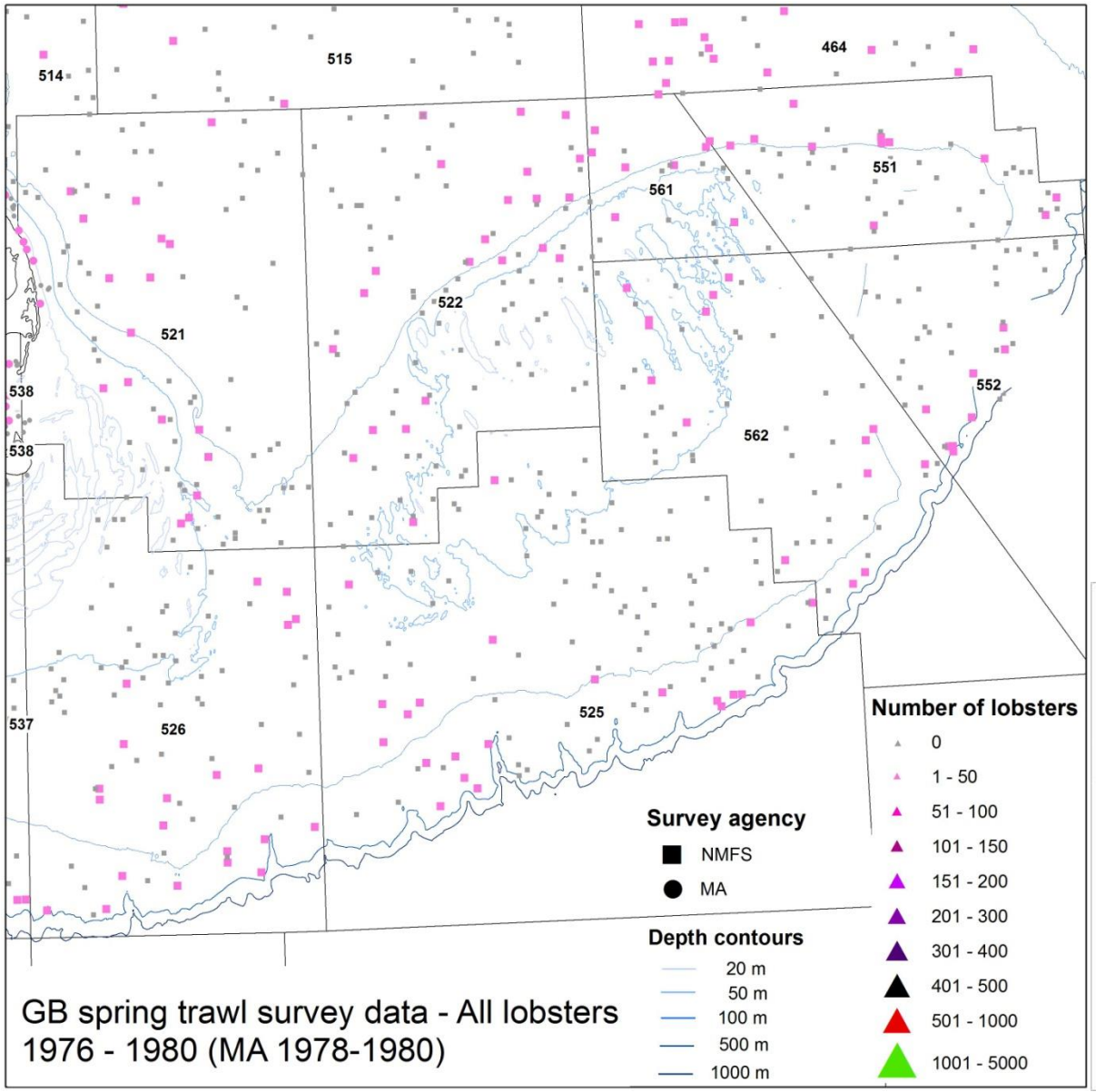
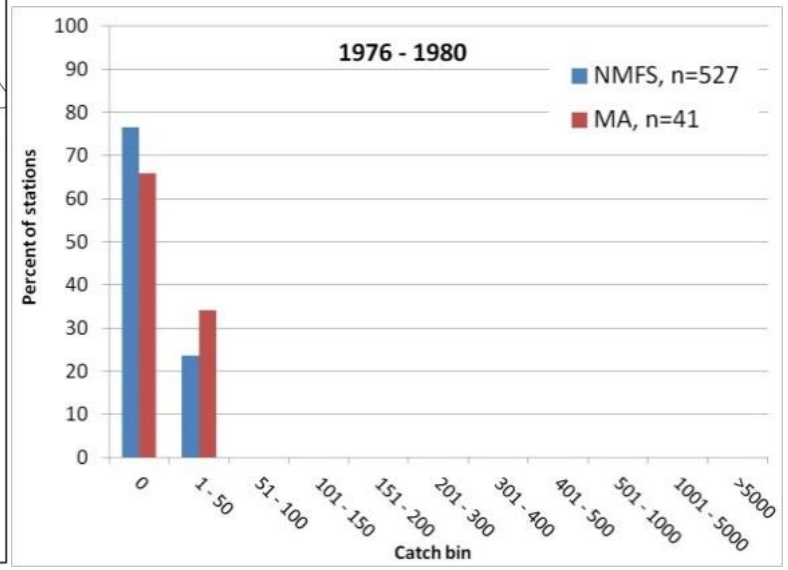
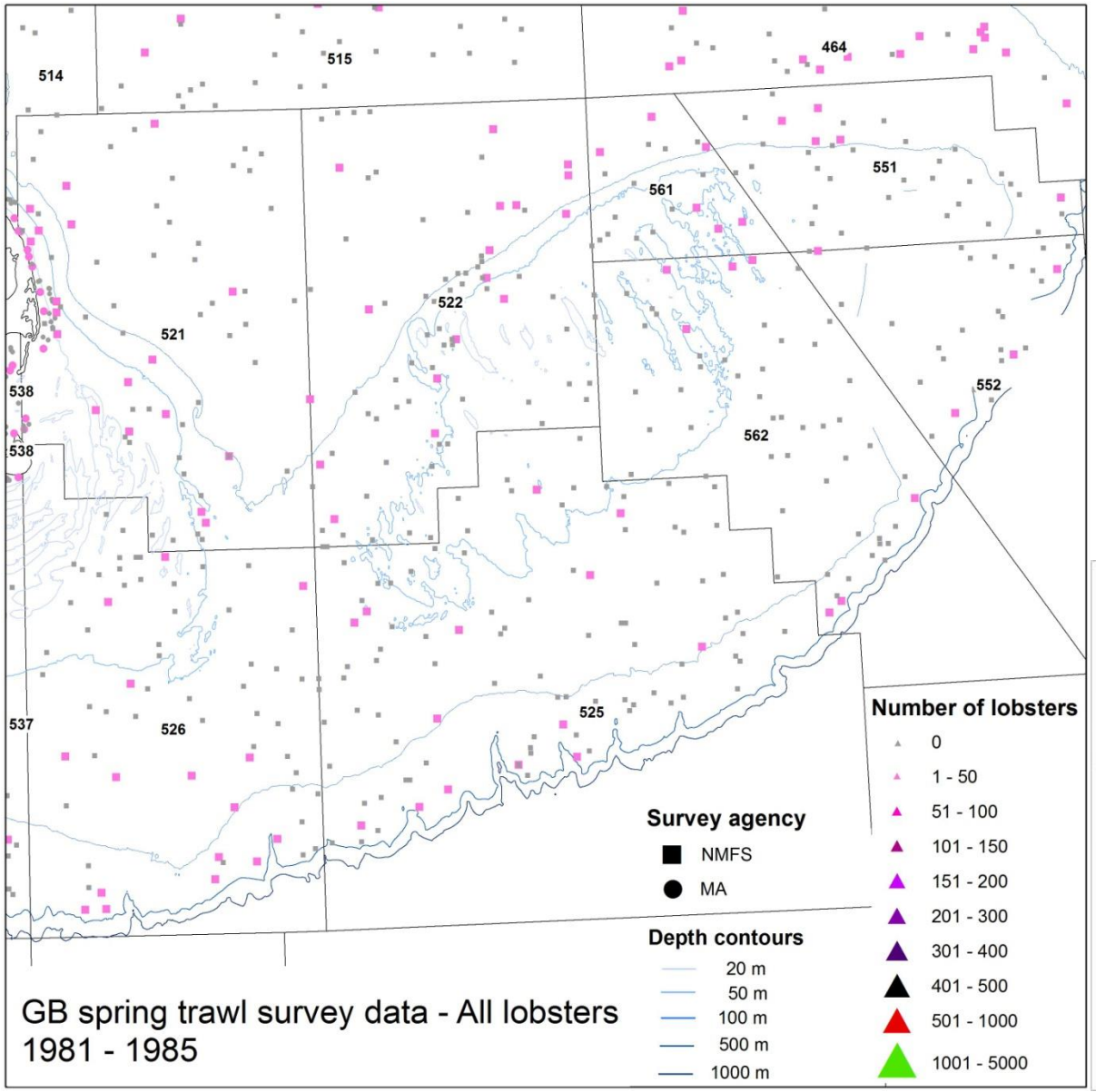


Figure 4.2.1.3.2.2 A – H. Mean catch per tow of lobsters (all sizes) at each spring sampling location from all GBK bottom trawl surveys (NMFS and MA), shown in 5 year time periods. Histograms show the percent of stations that fell within each catch bin by survey agency for each 5 year time period.

Figure 4.2.1.3.2.2 A





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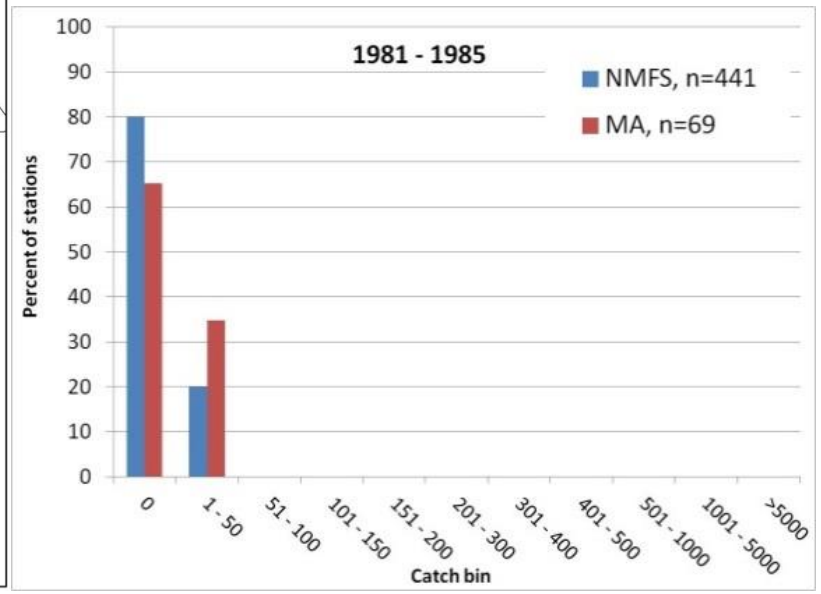

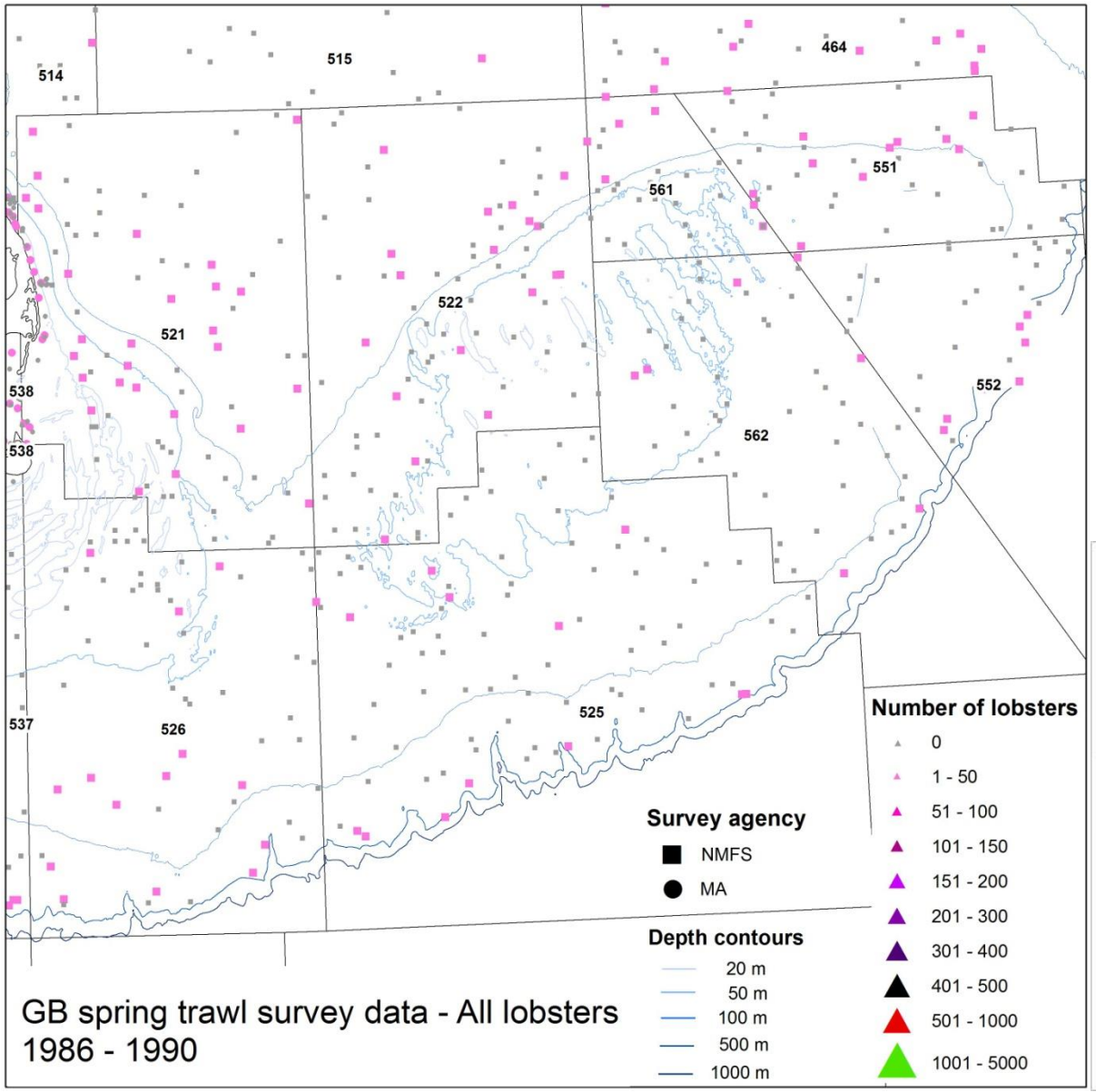

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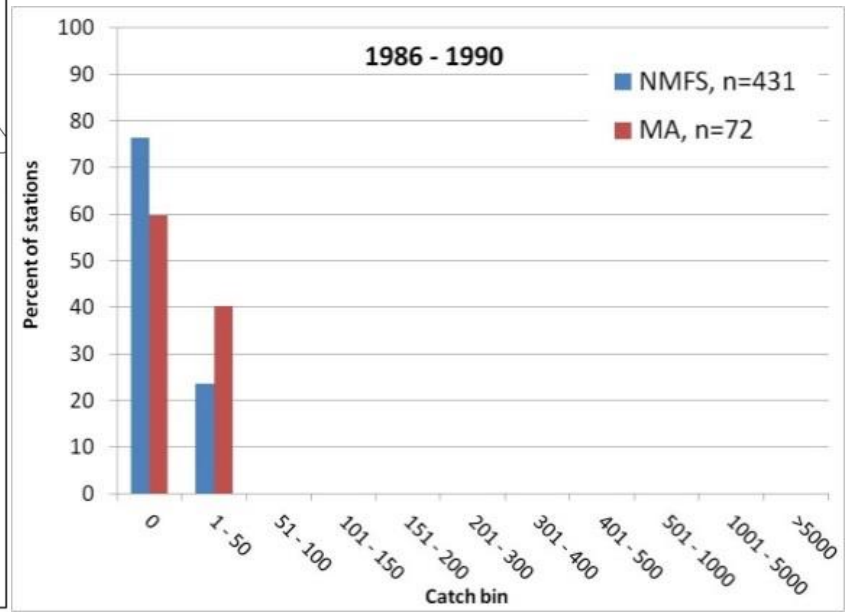

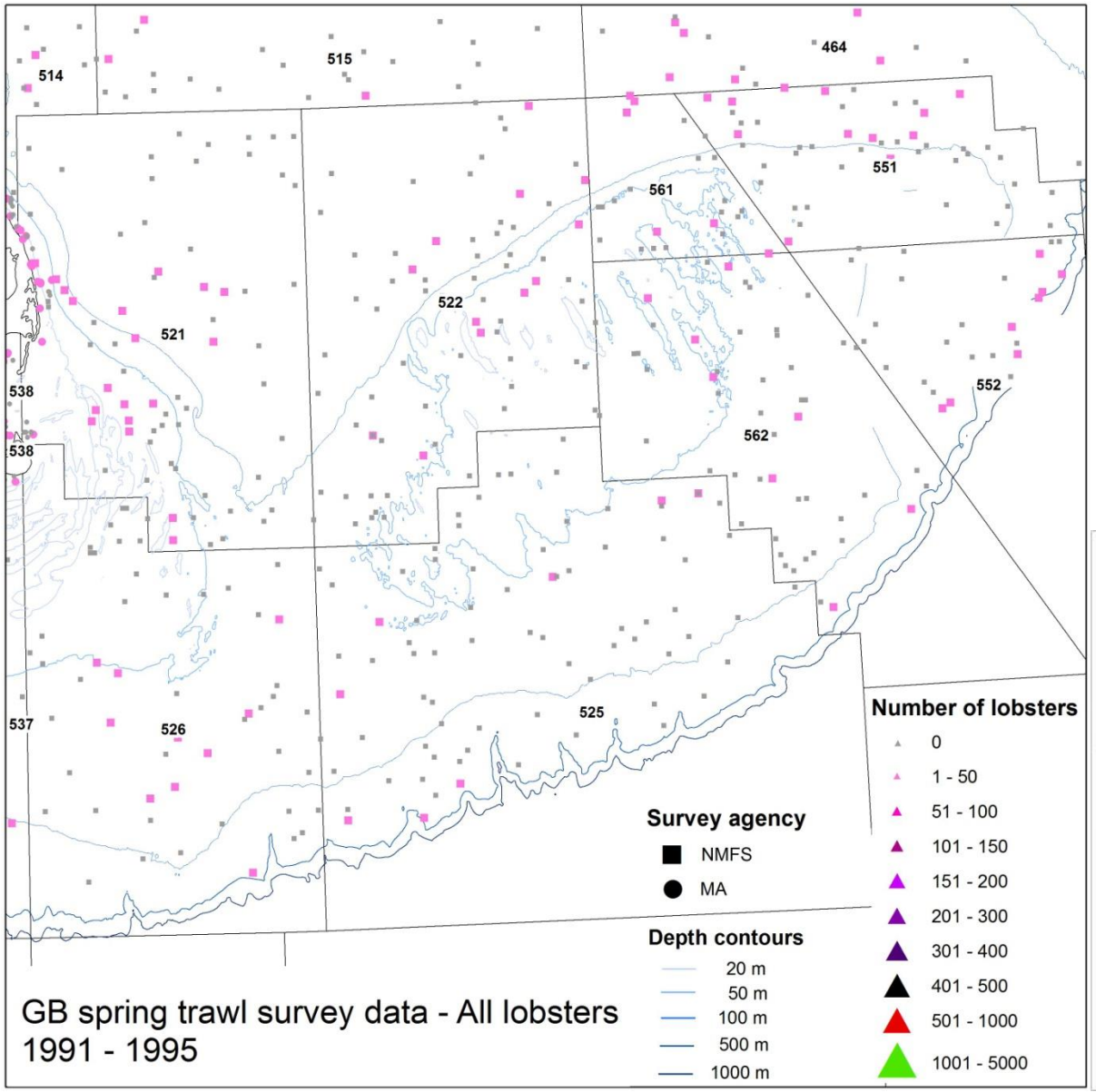

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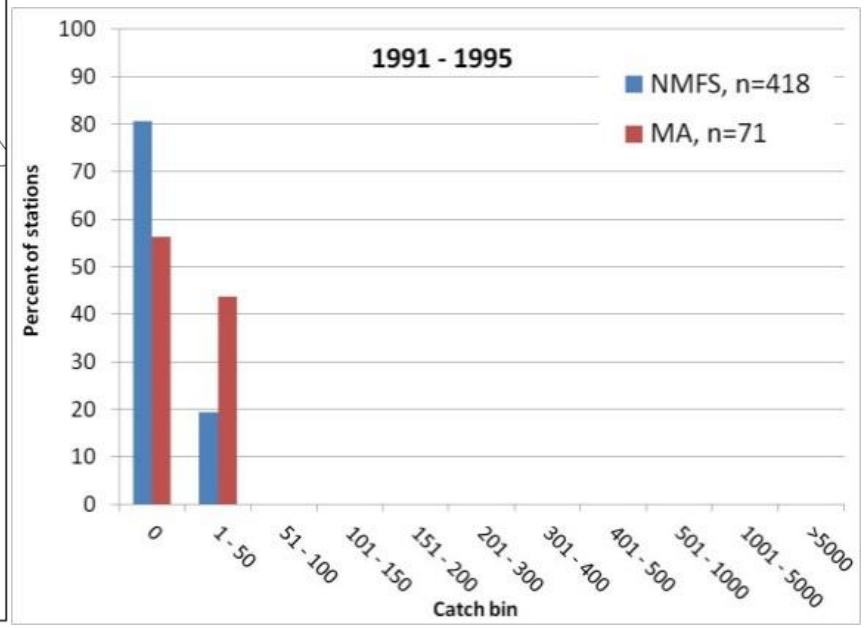

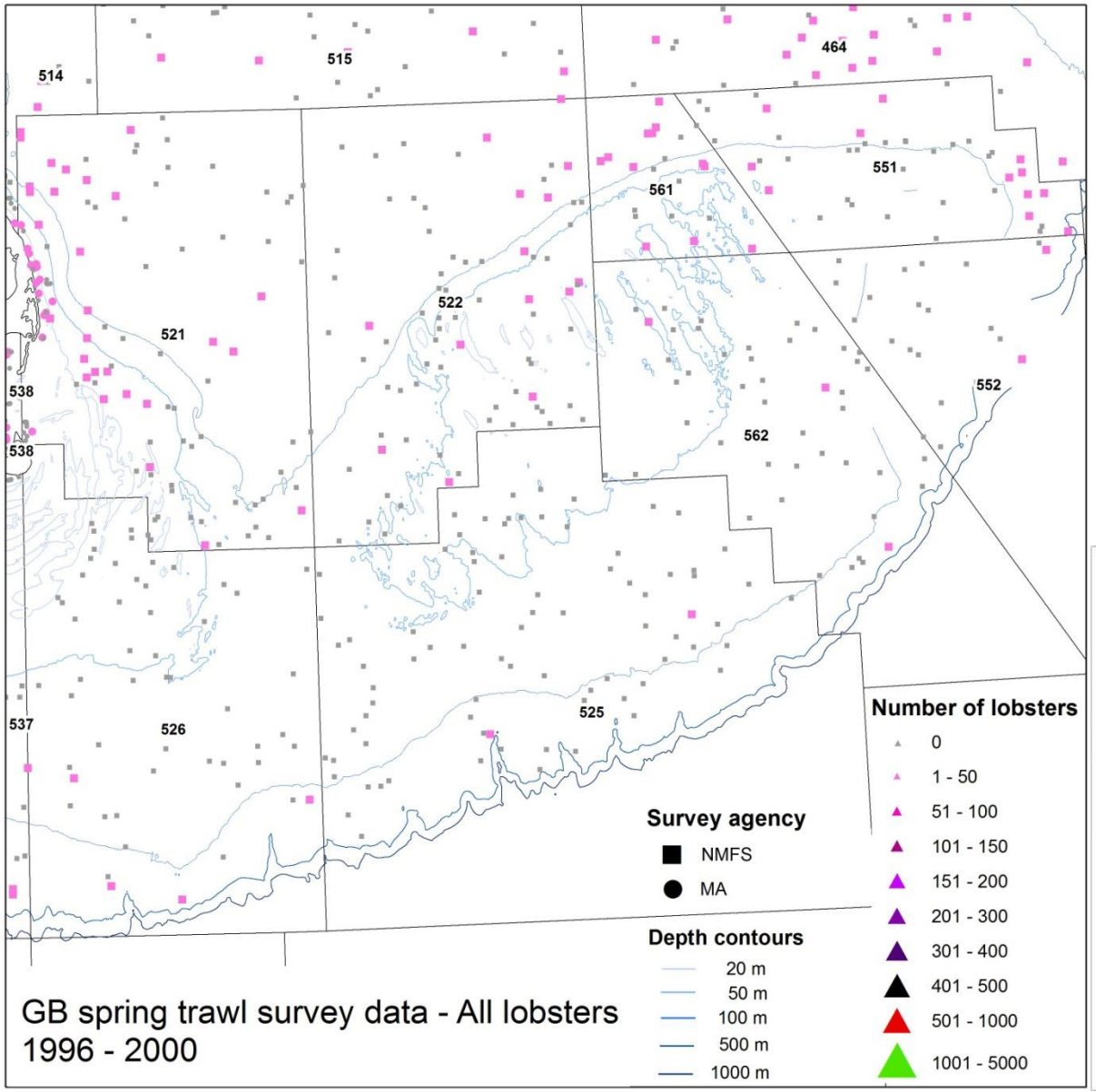

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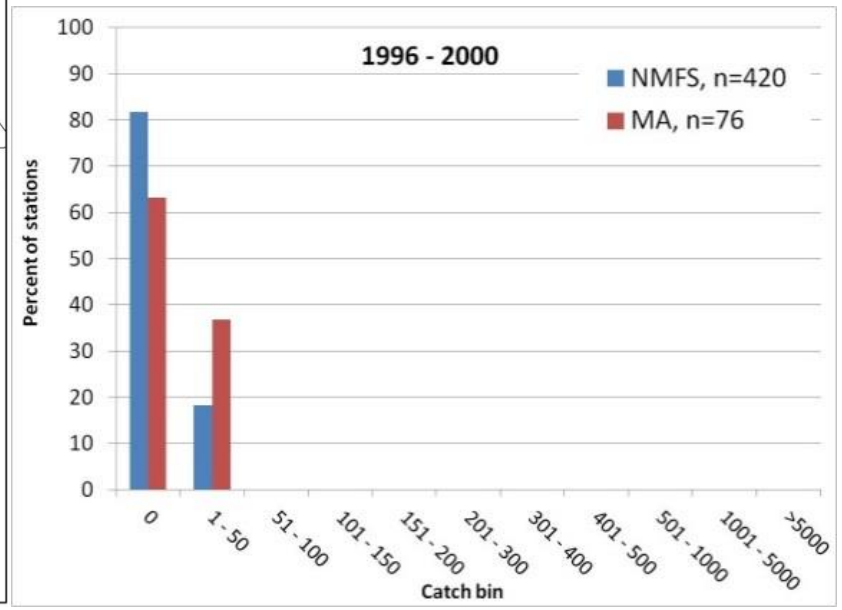

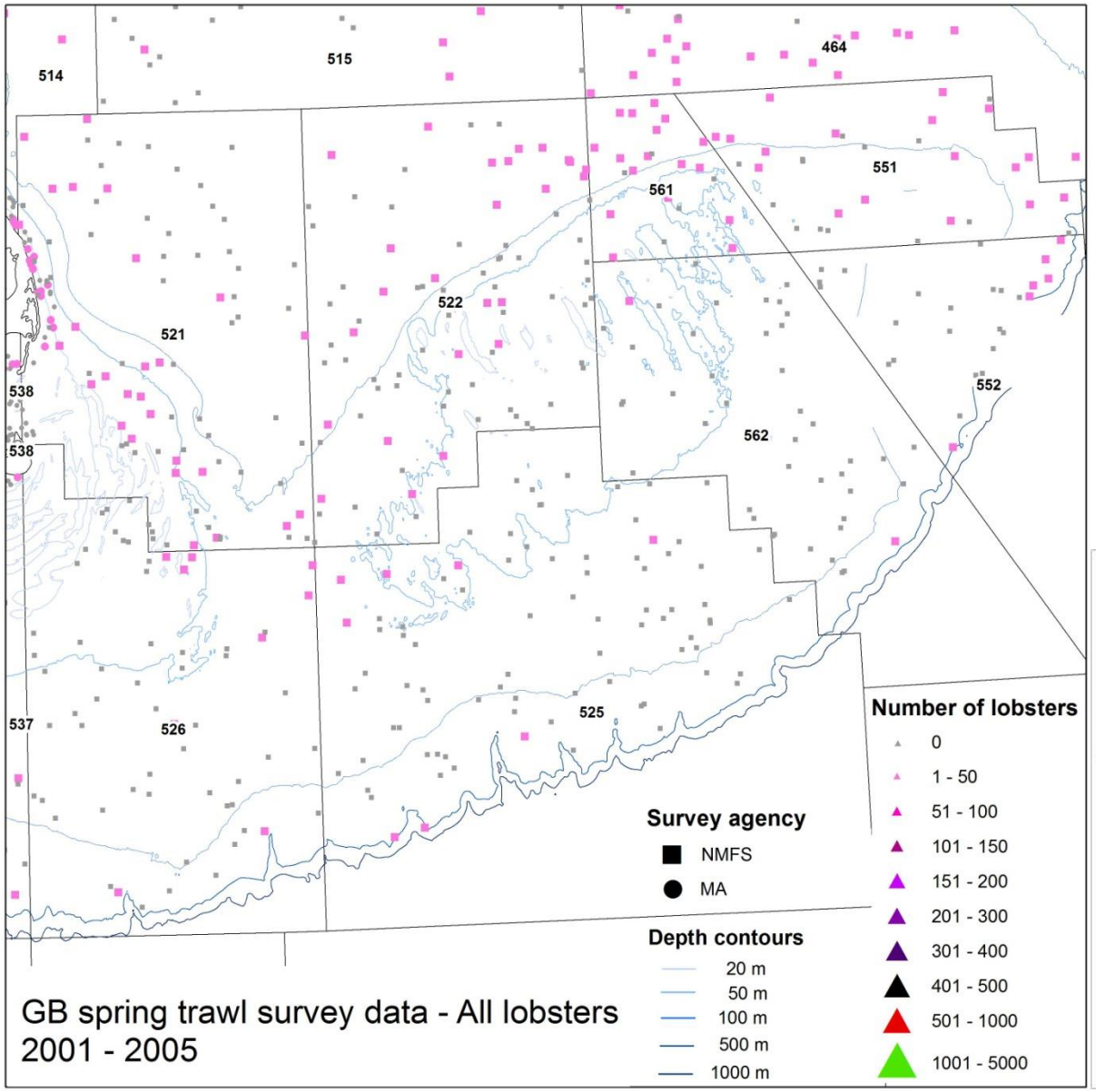

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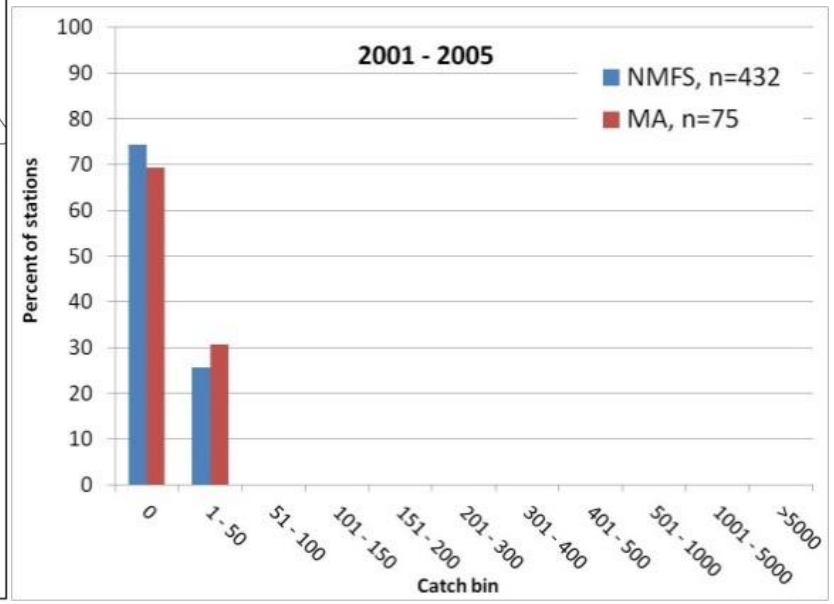

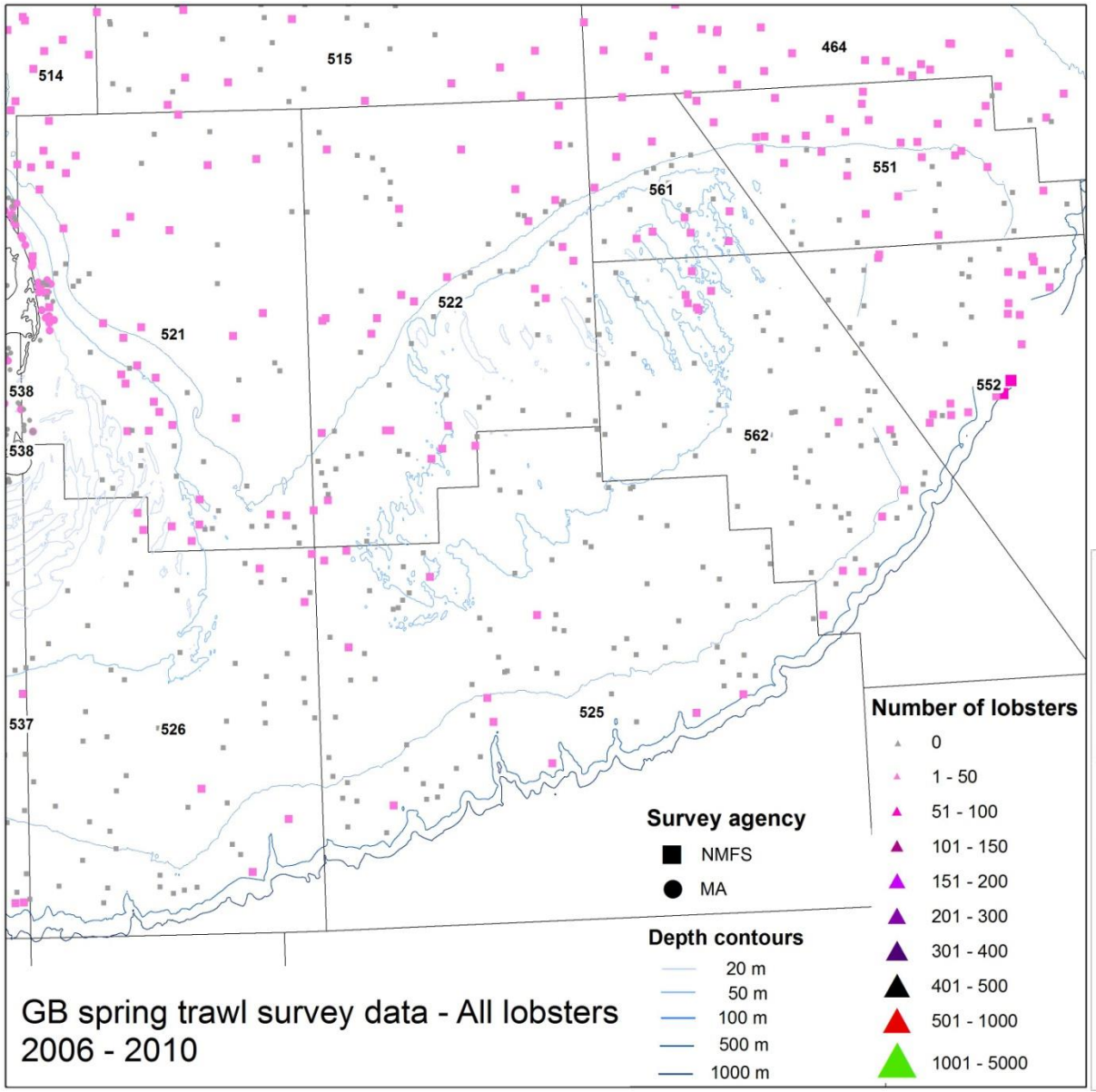

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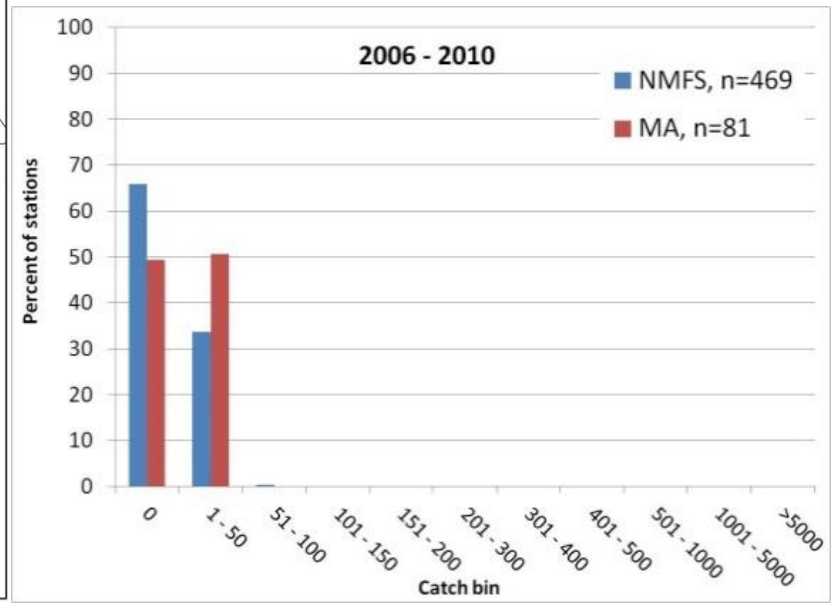

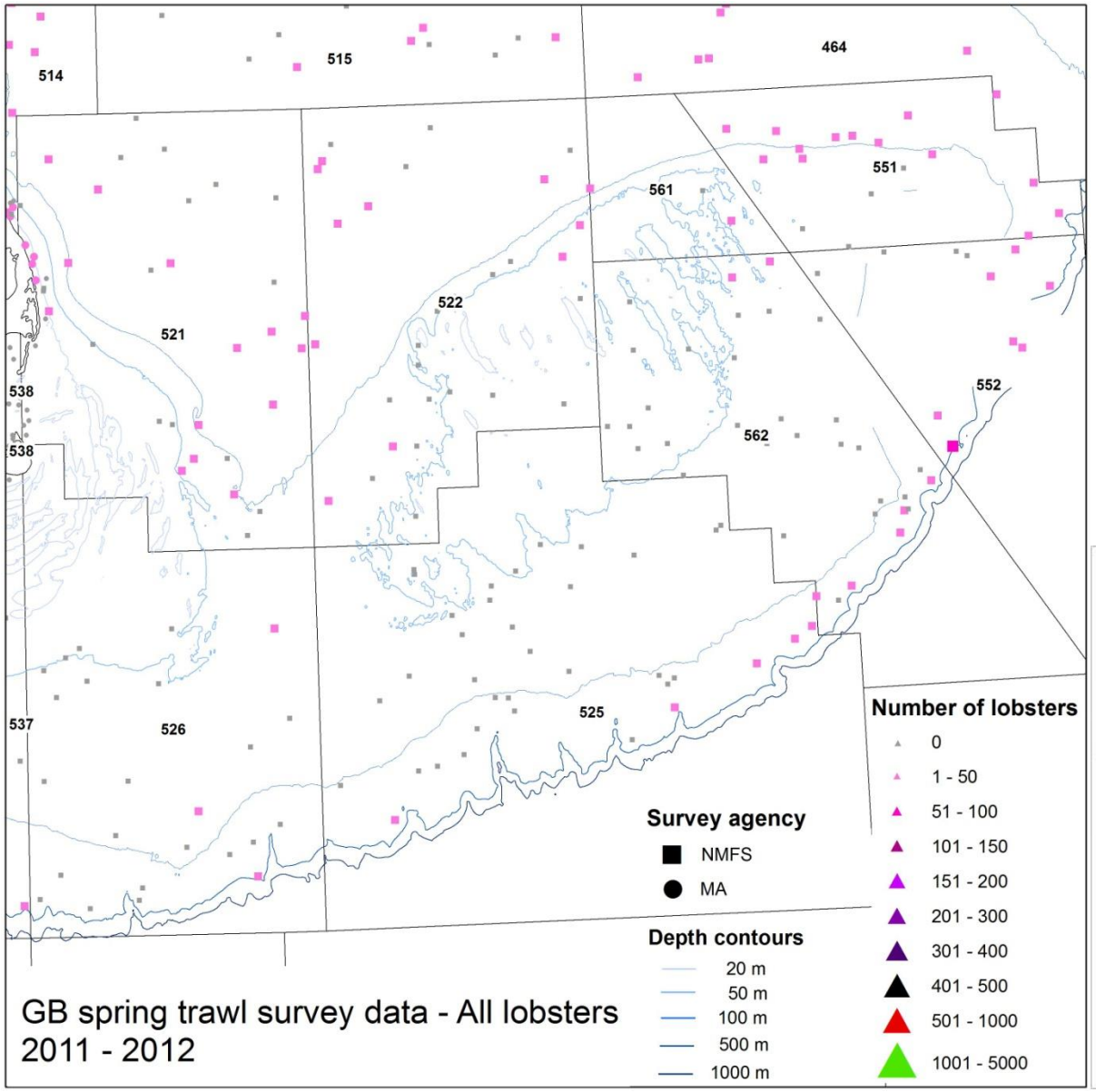

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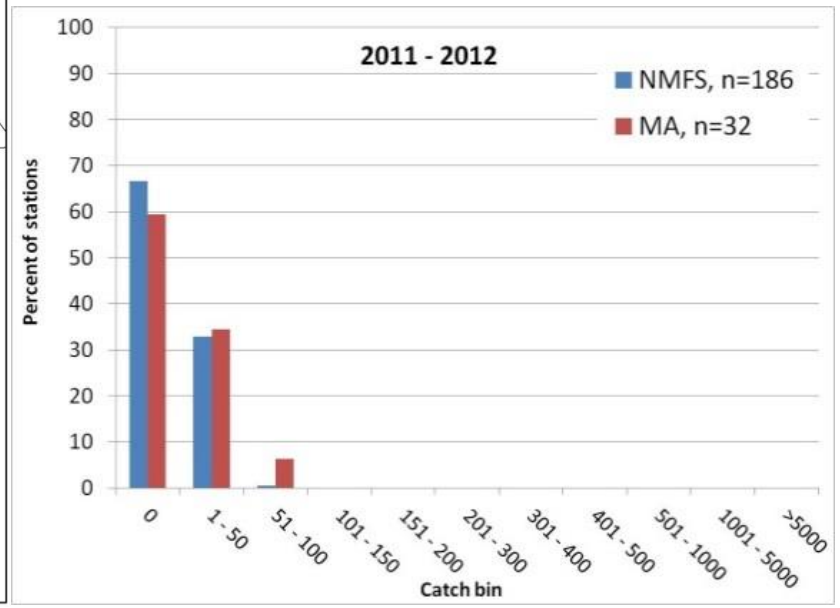

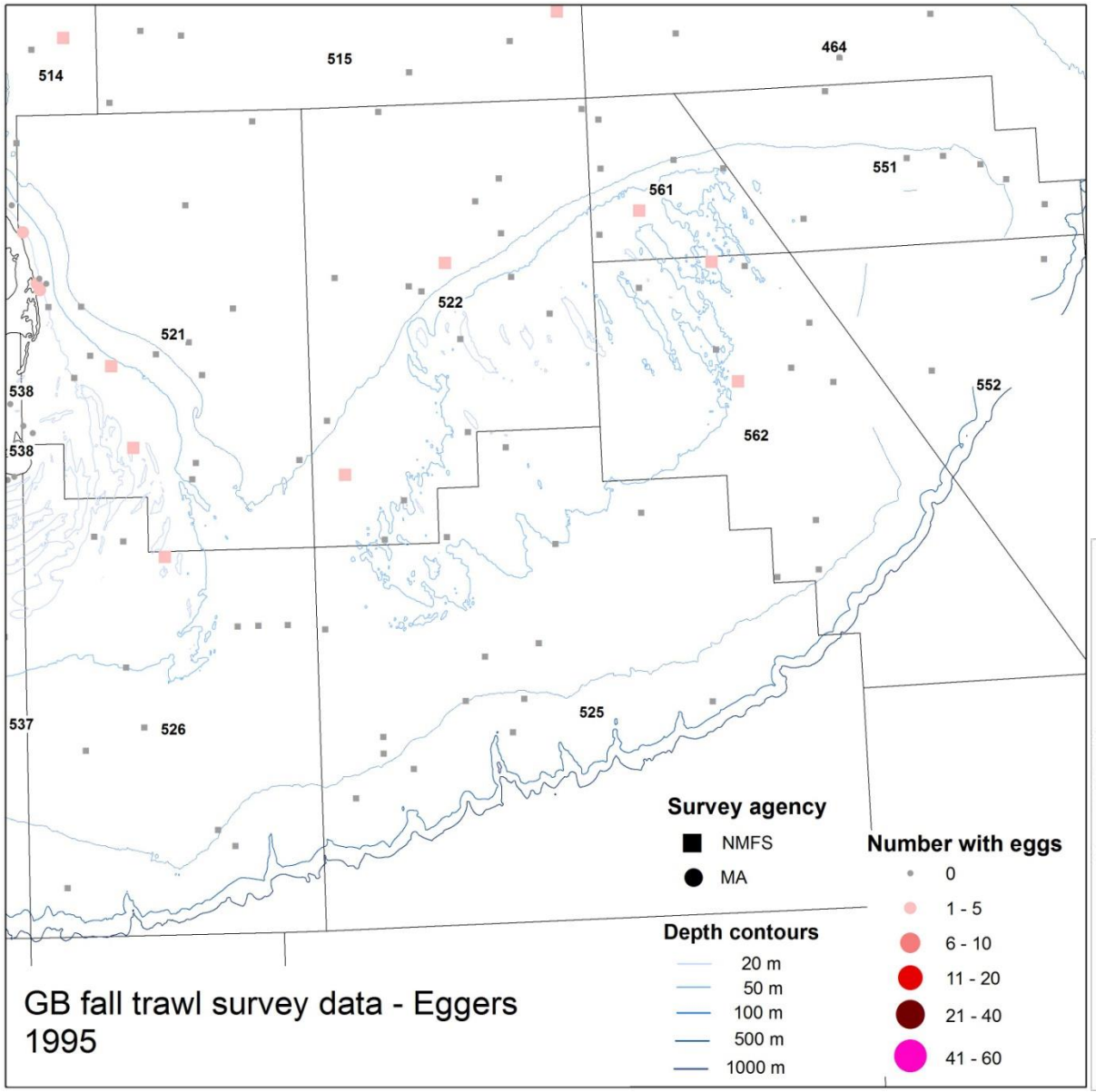

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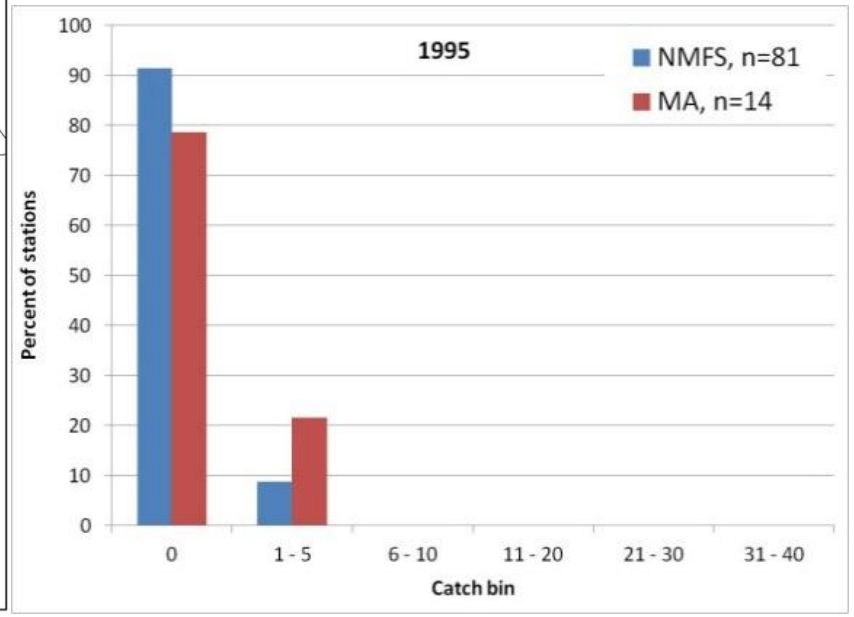
Figure 4.2.1.3.2.3 A



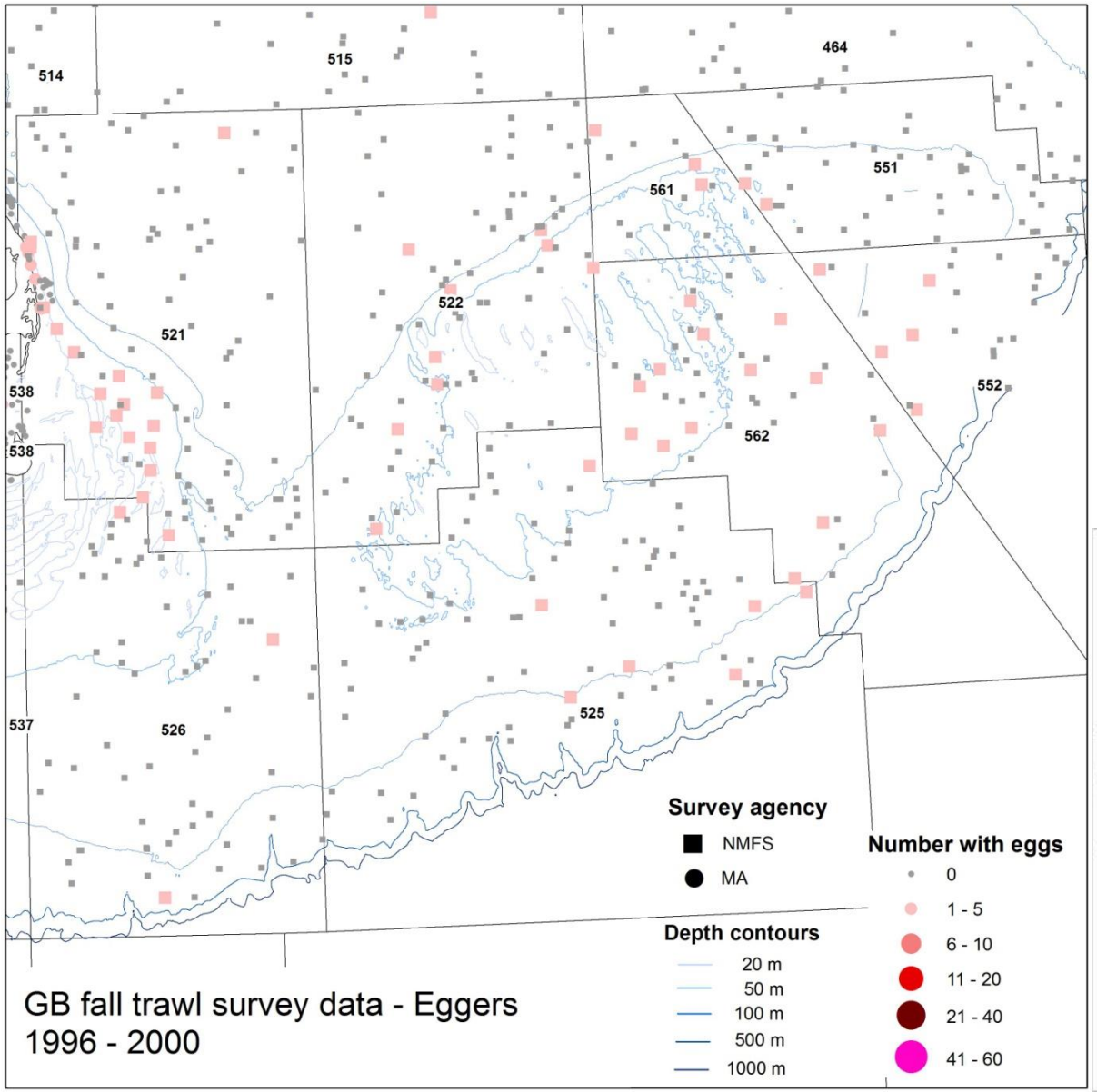
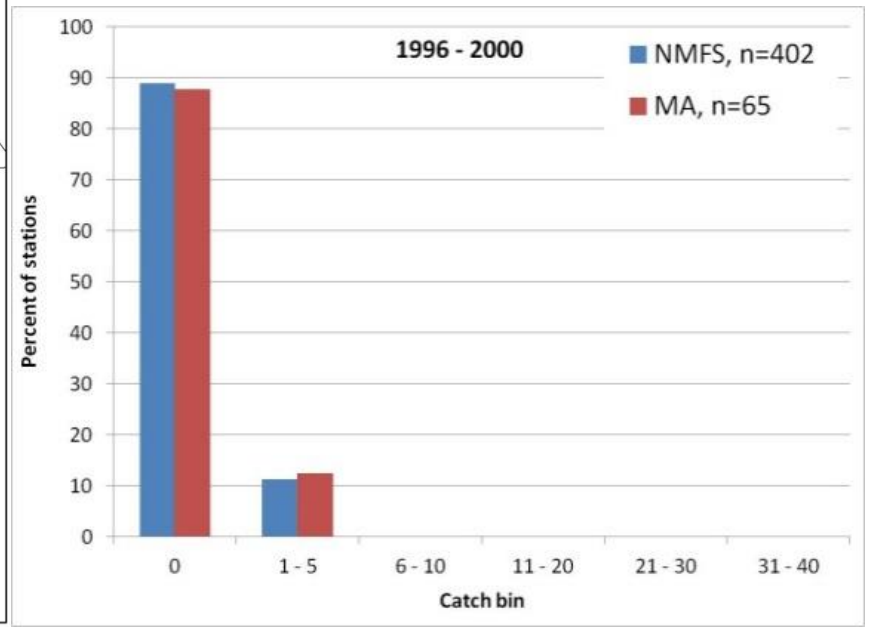
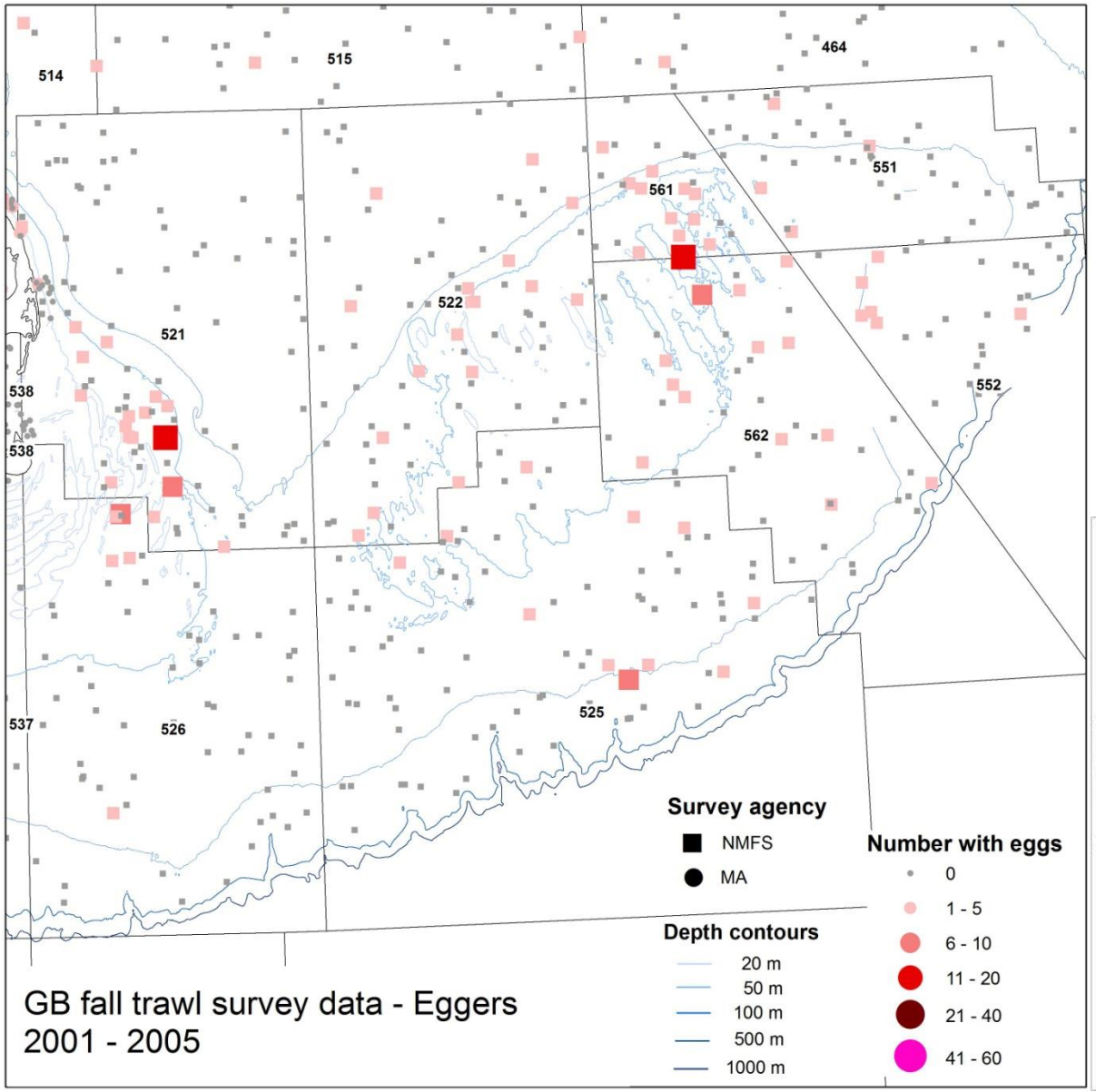


Figure 4.2.1.3.2.3 B





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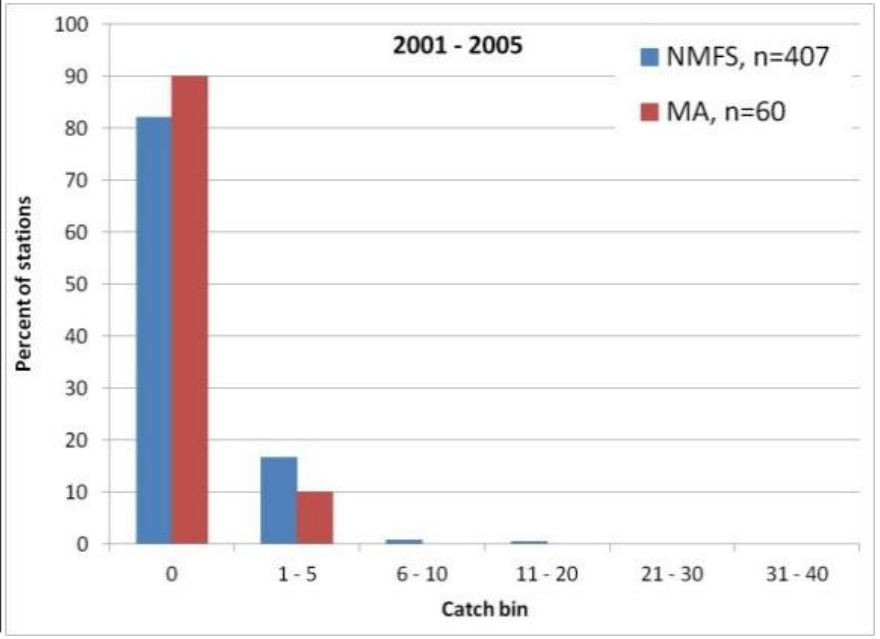


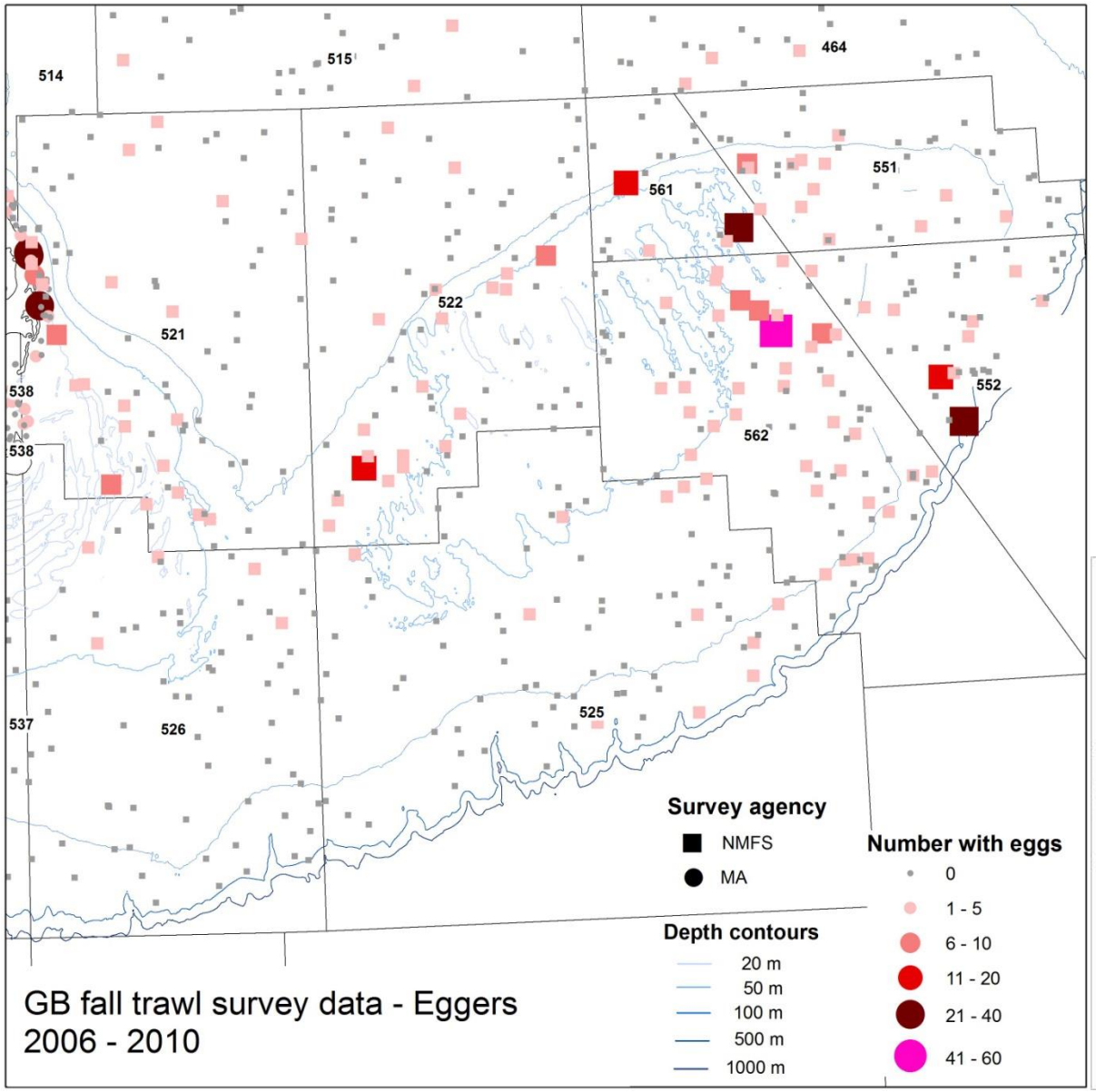
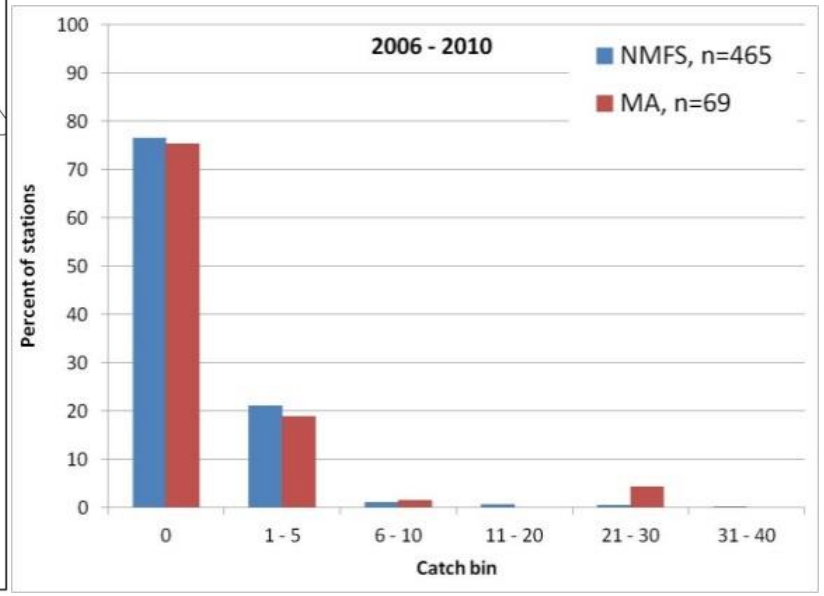


Figure 4.2.1.3.2.3 D



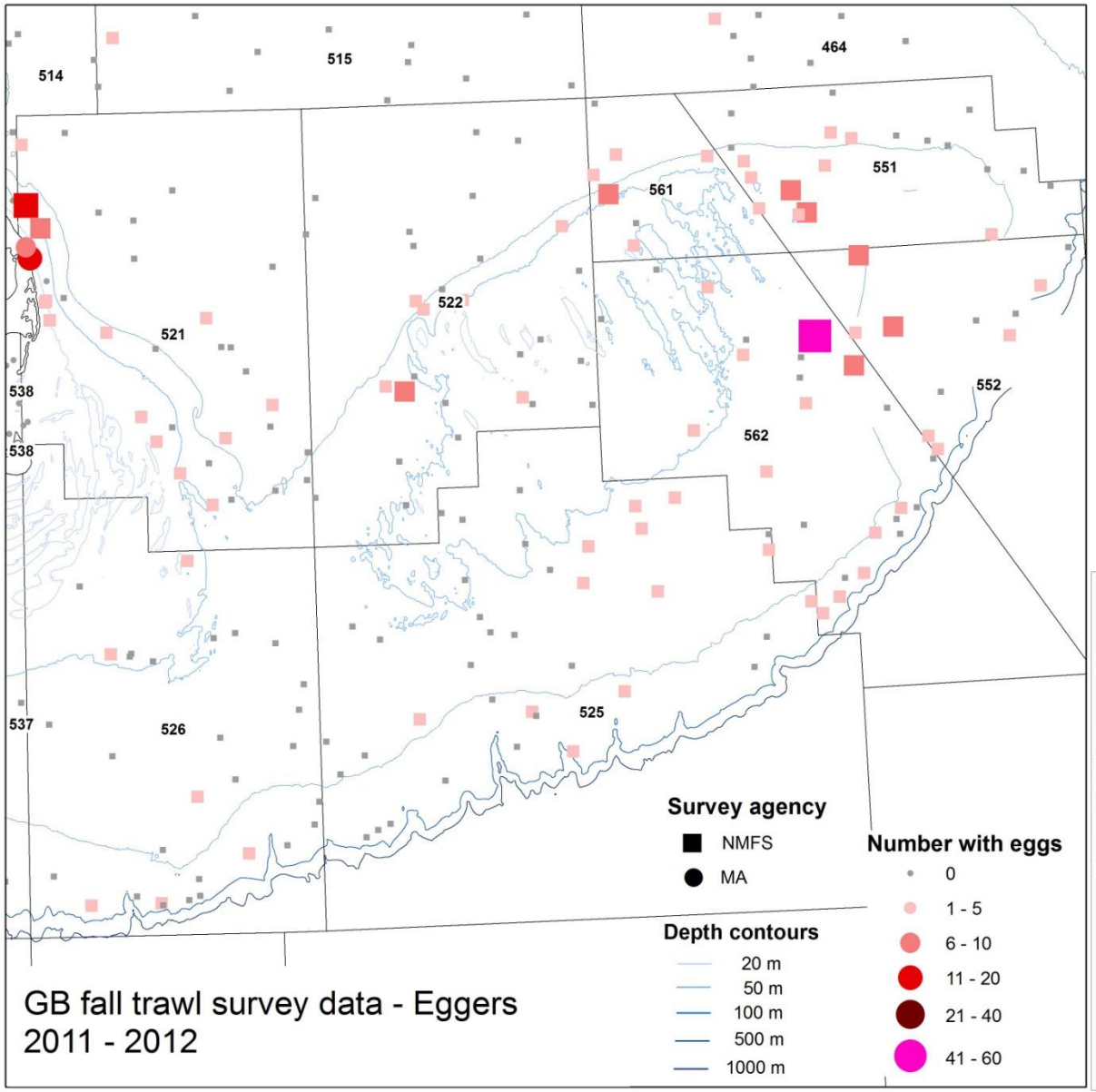
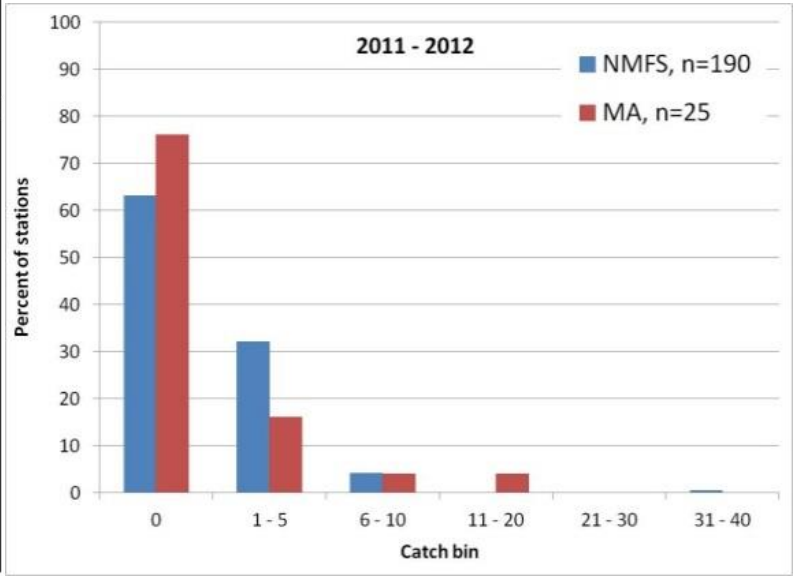


Figure 4.2.1.3.2.3 E



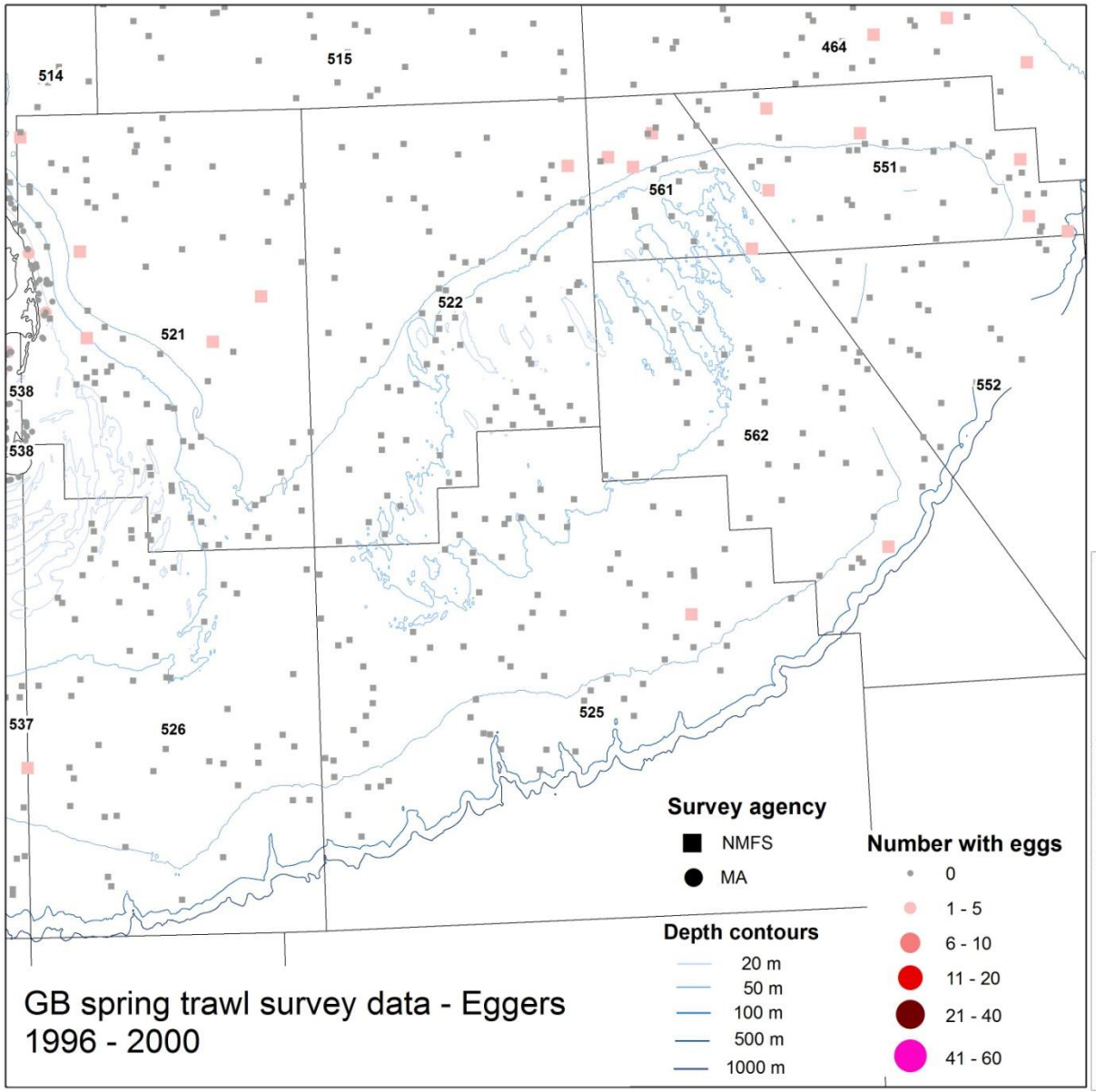
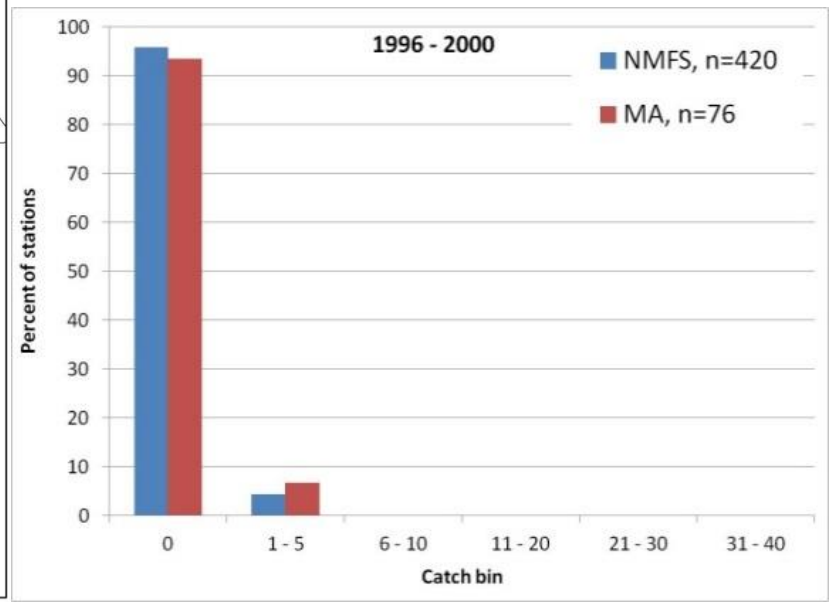


Figure 4.2.1.3.2.4 A – D. Mean catch per tow of ovigerous females (all sizes) at each spring sampling location from all GBK bottom trawl surveys (NMFS and MA), shown in 5 year time periods. Histograms show the percent of stations that fell within each catch bin by survey agency for each 5 year time period.

Figure 4.2.1.3.2.4 A



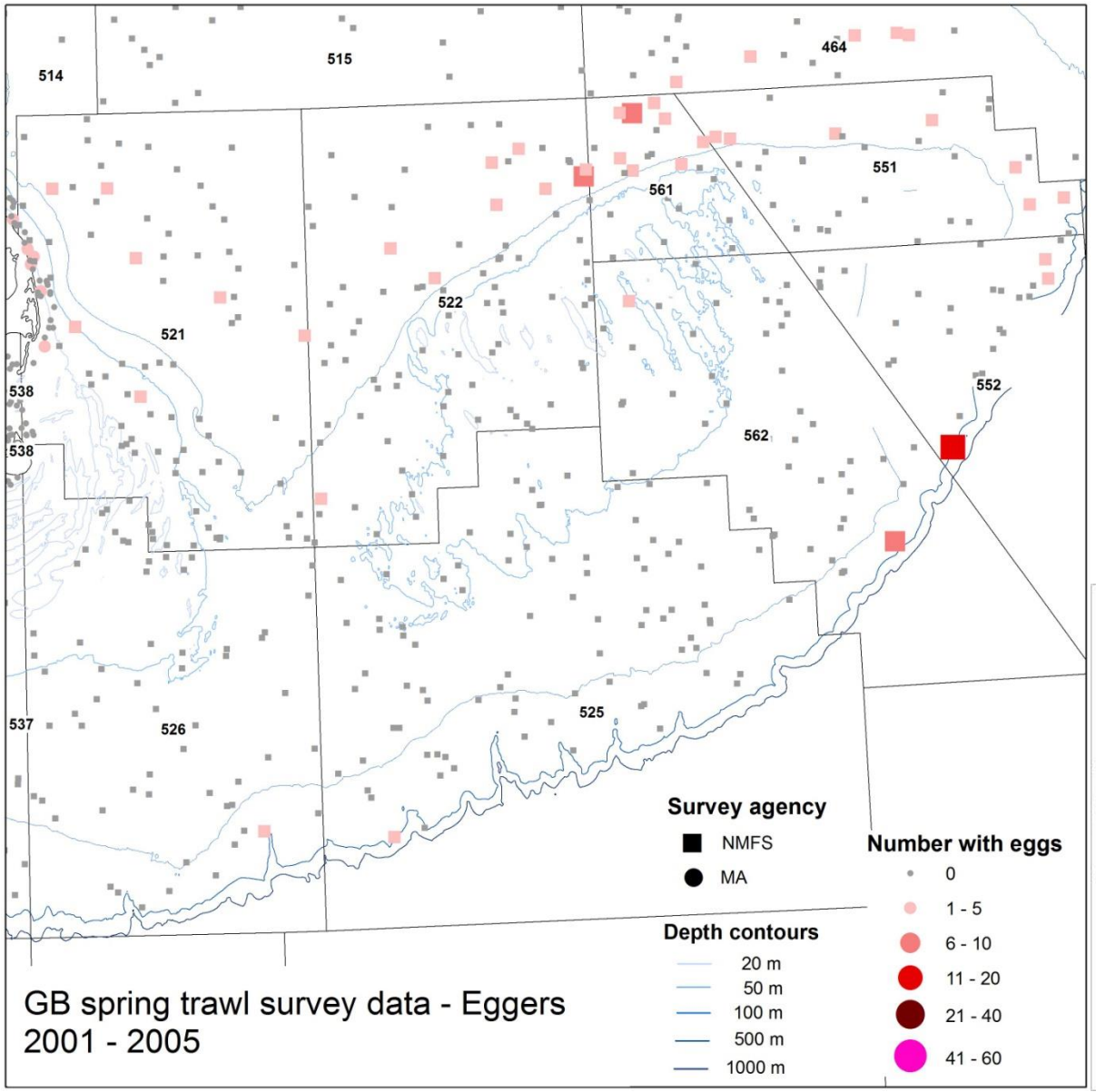
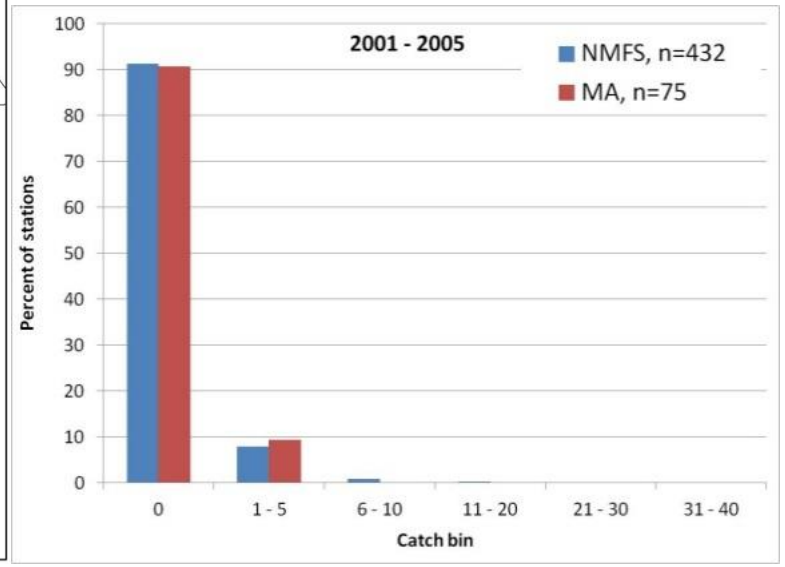


Figure 4.2.1.3.2.4 B



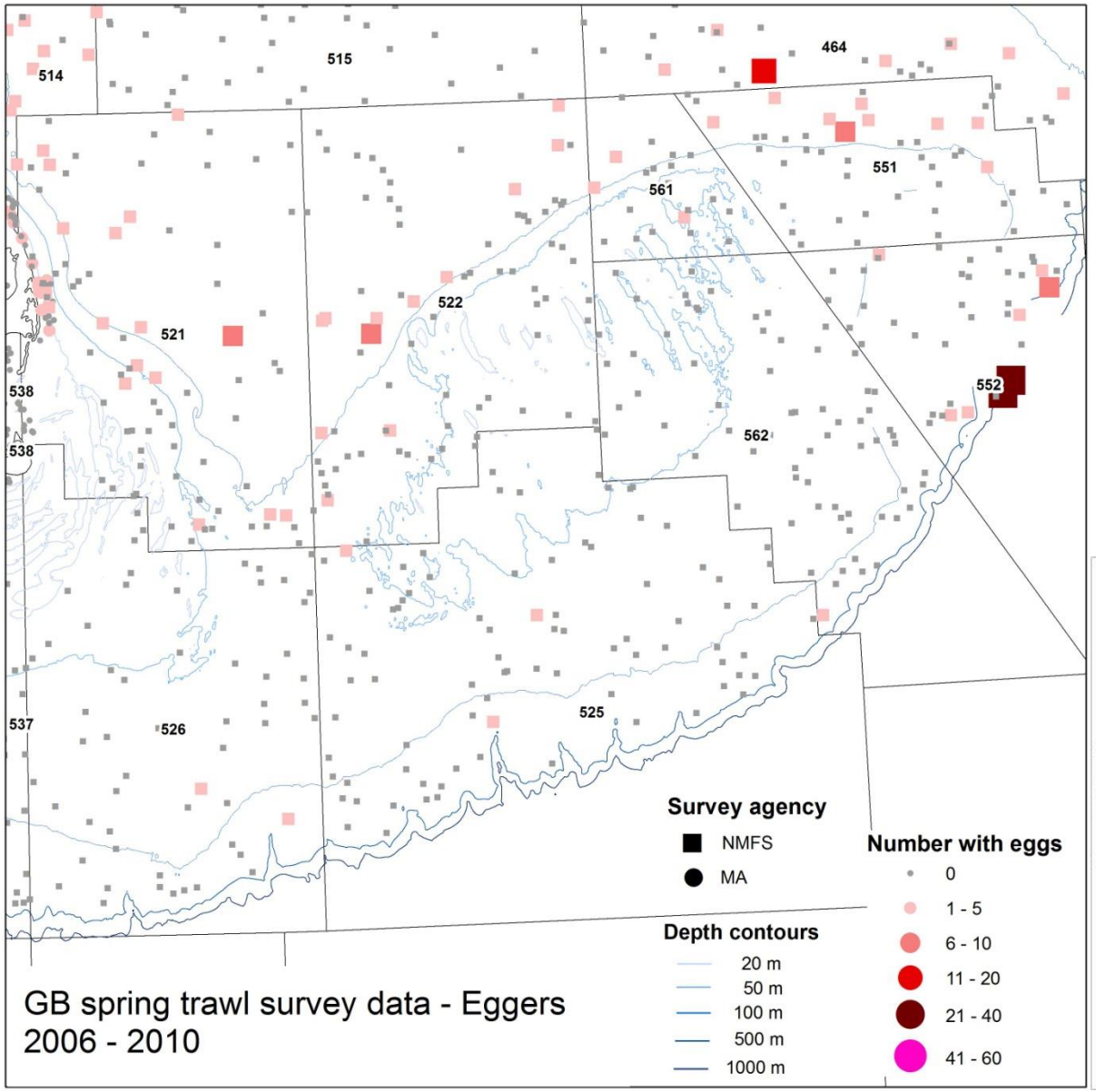
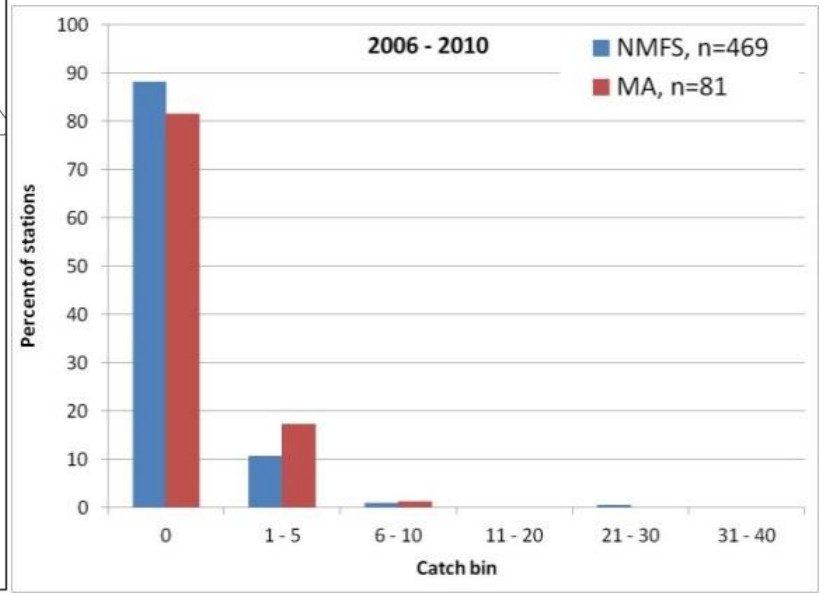


Figure 4.2.1.3.2.4 C



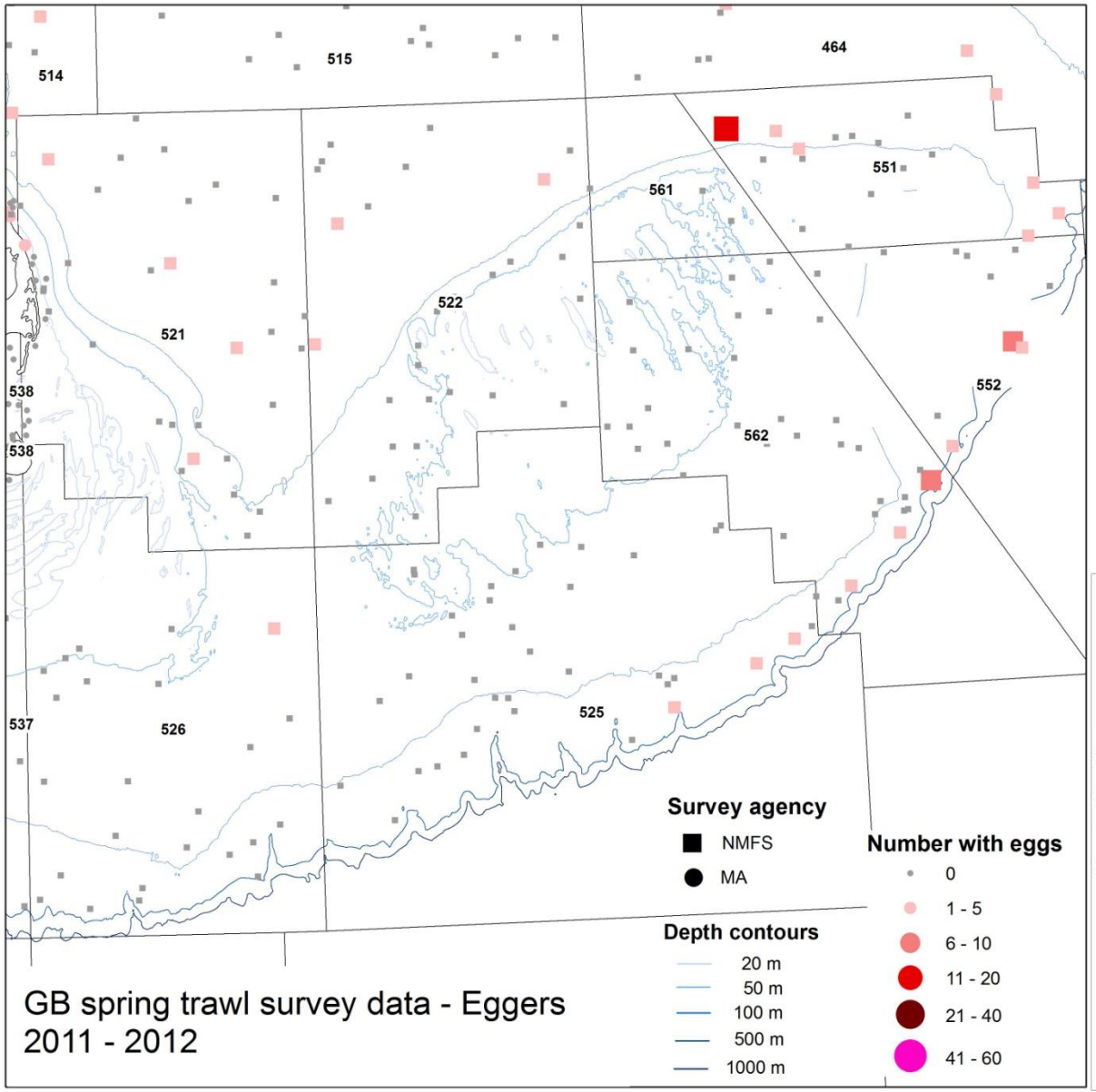
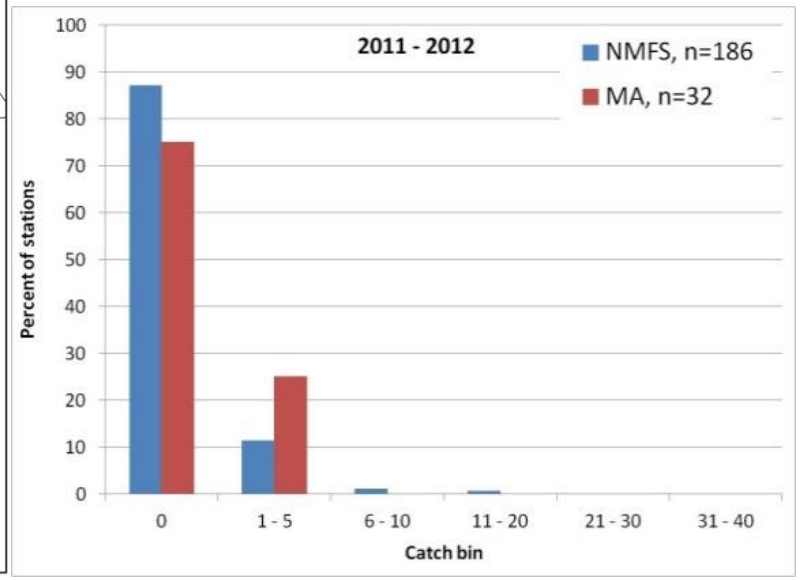


Figure 4.2.1.3.2.4 D



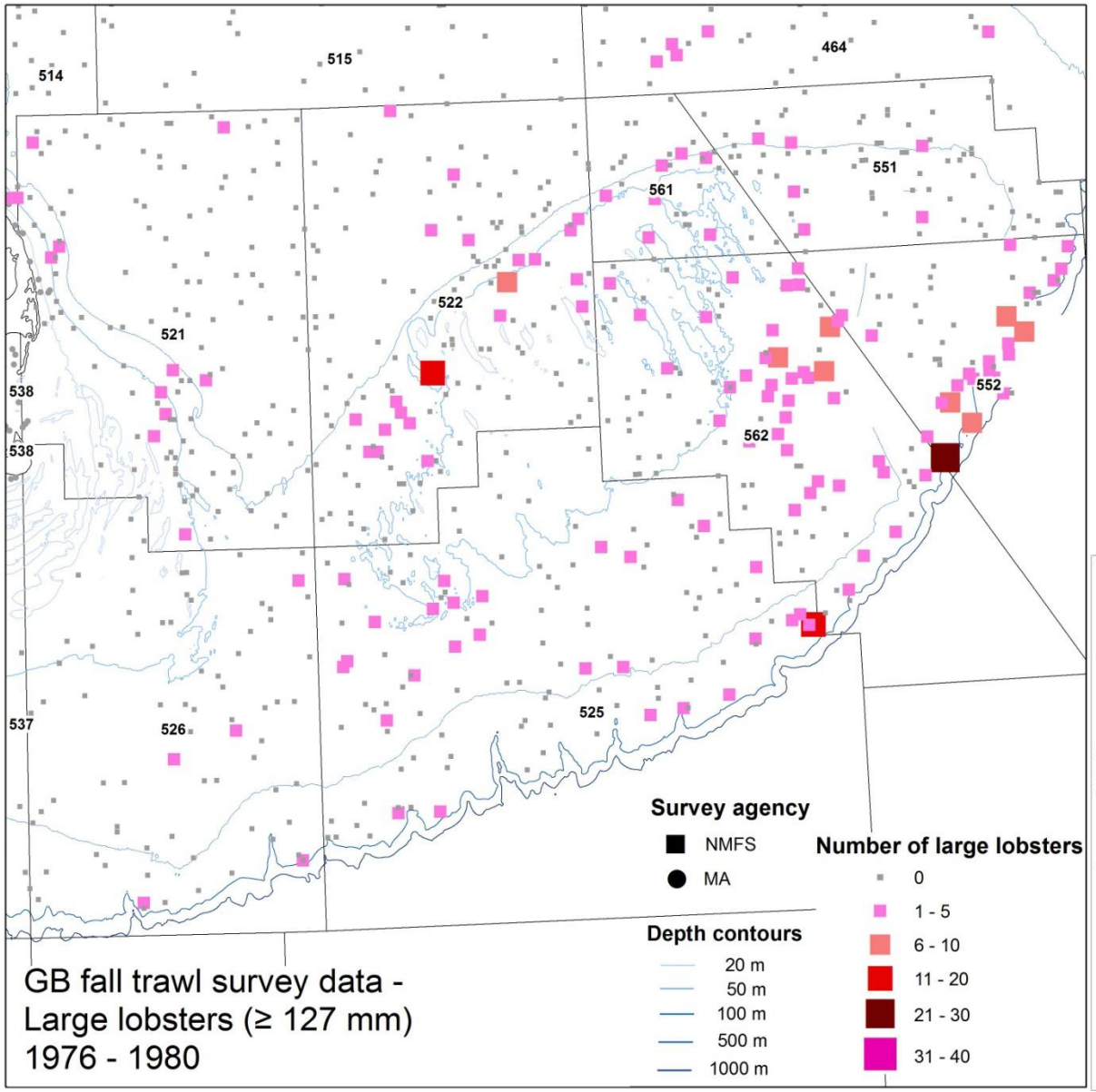
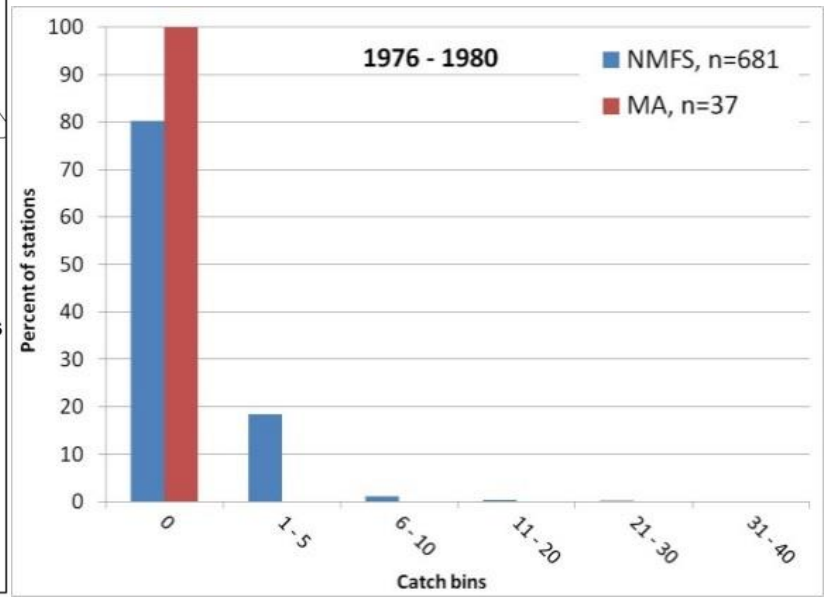


Figure 4.2.1.3.2.5 A – H. Mean catch per tow of "large" lobsters (≥ 127 mm CL) at each fall sampling location from all GBK bottom trawl surveys (NMFS and MA), shown in 5 year time periods. Histograms show the percent of stations that fell within each catch bin by survey agency for each 5 year time period.

Figure 4.2.1.3.2.5 A



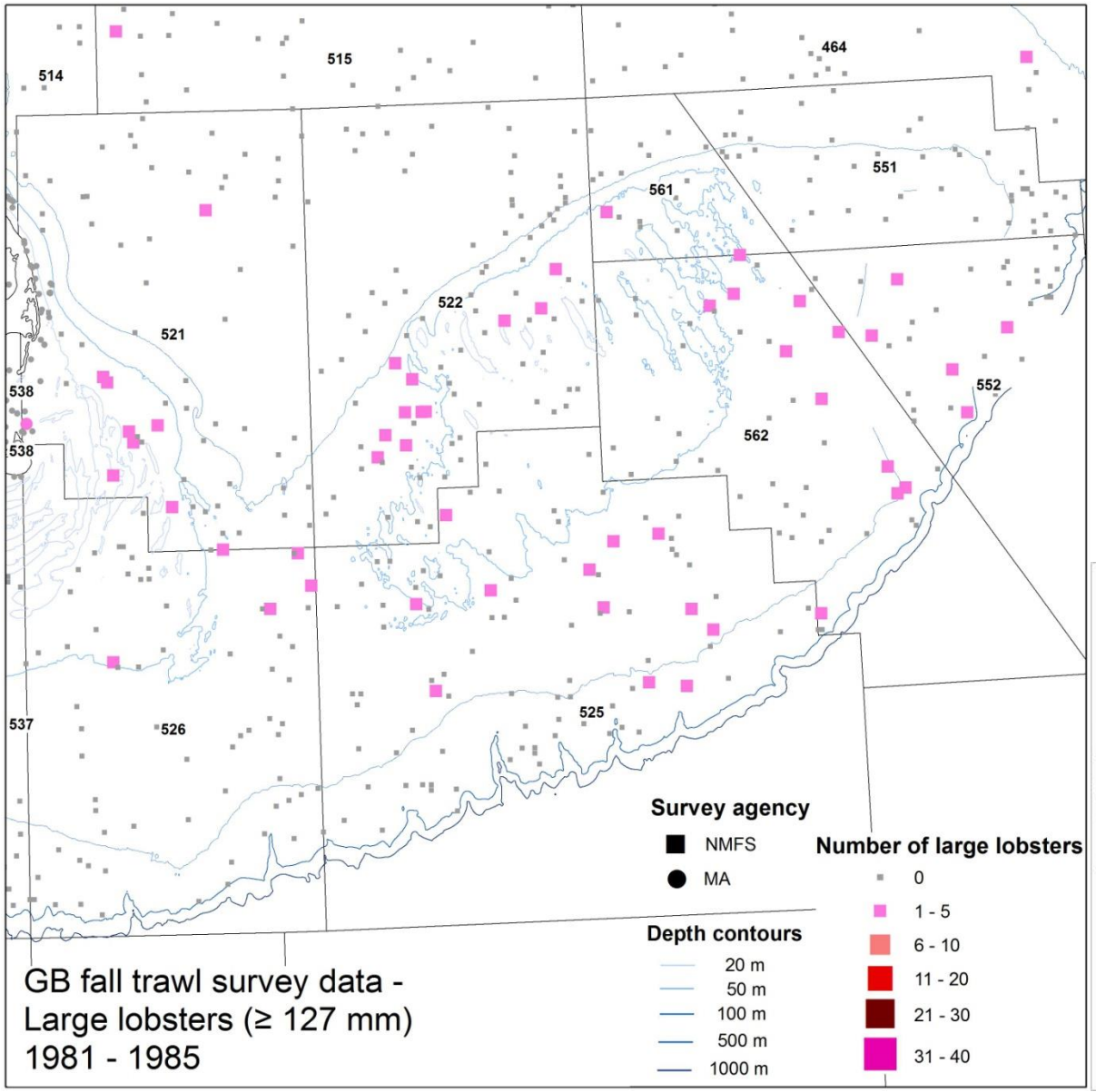
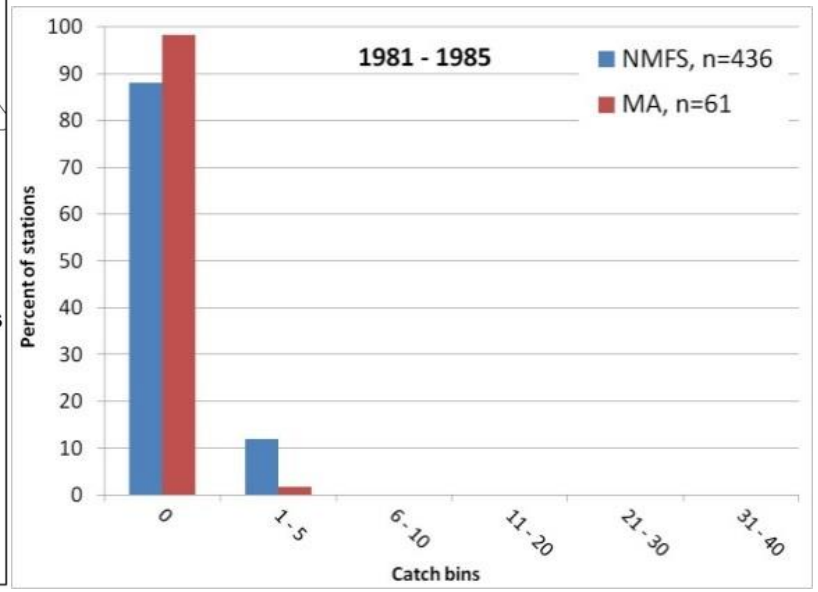


Figure 4.2.1.3.2.5 B



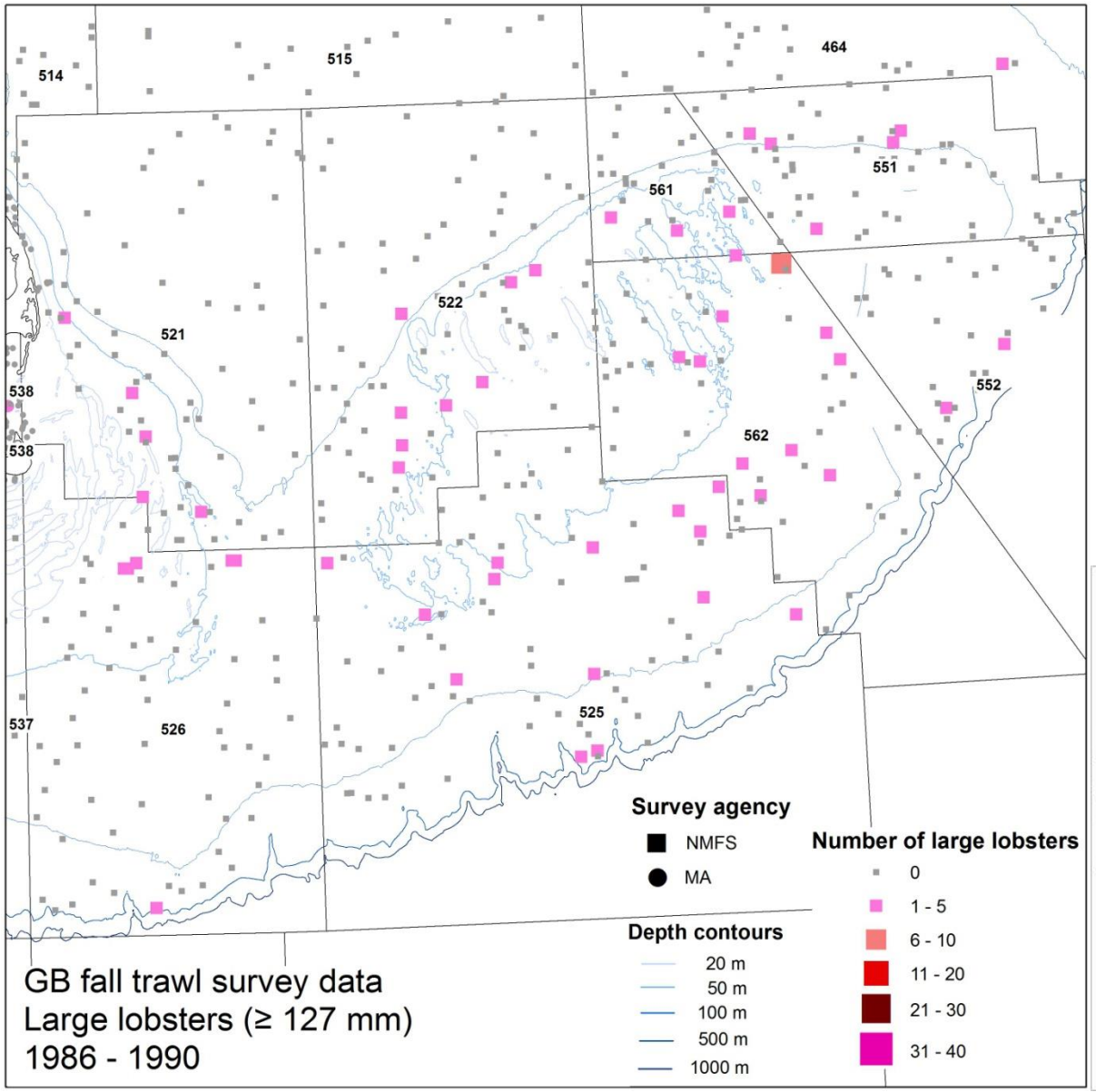
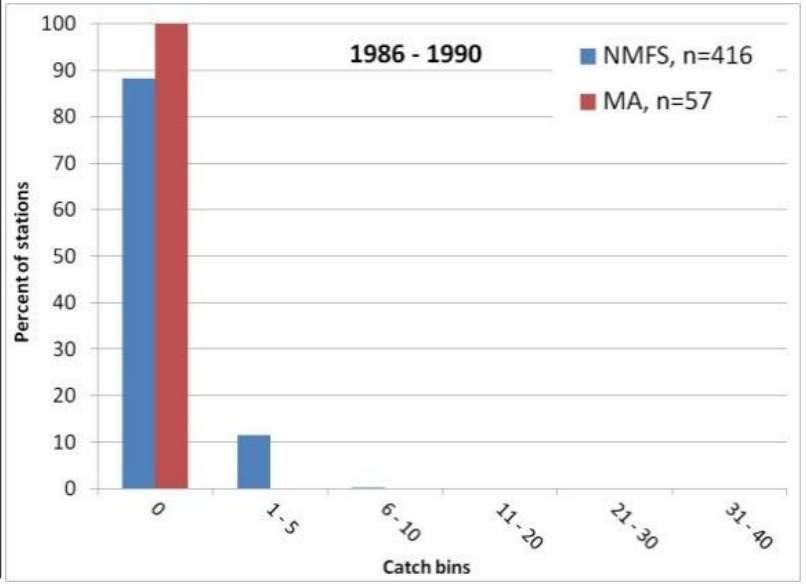


Figure 4.2.1.3.2.5 C



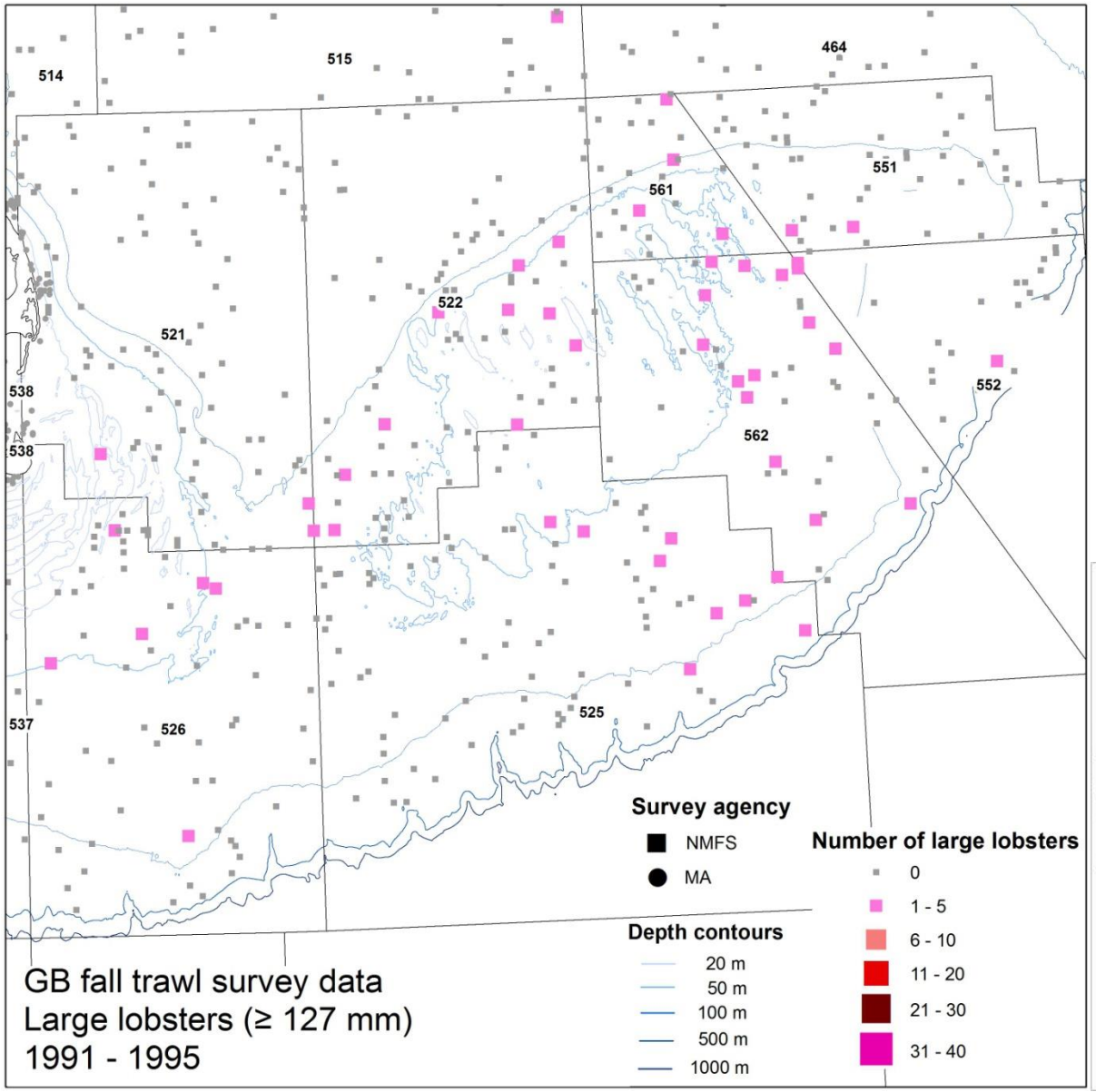
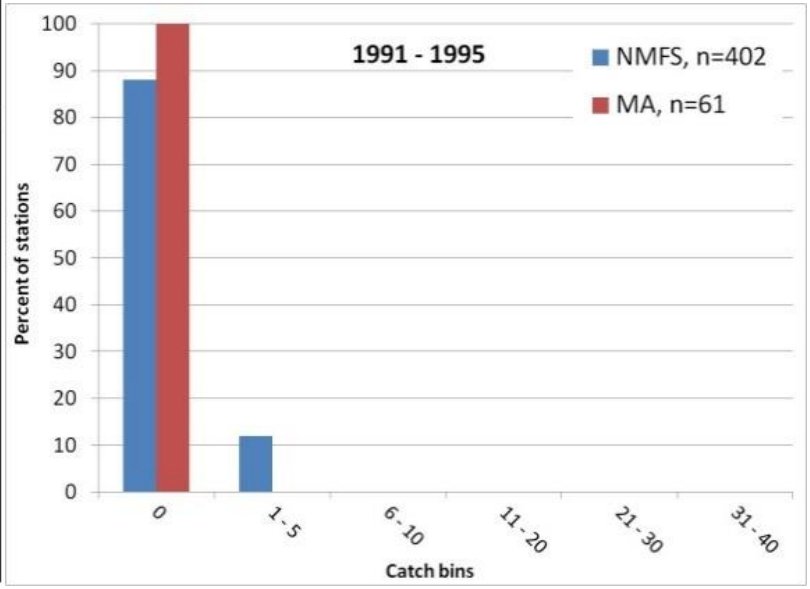


Figure 4.2.1.3.2.5 D



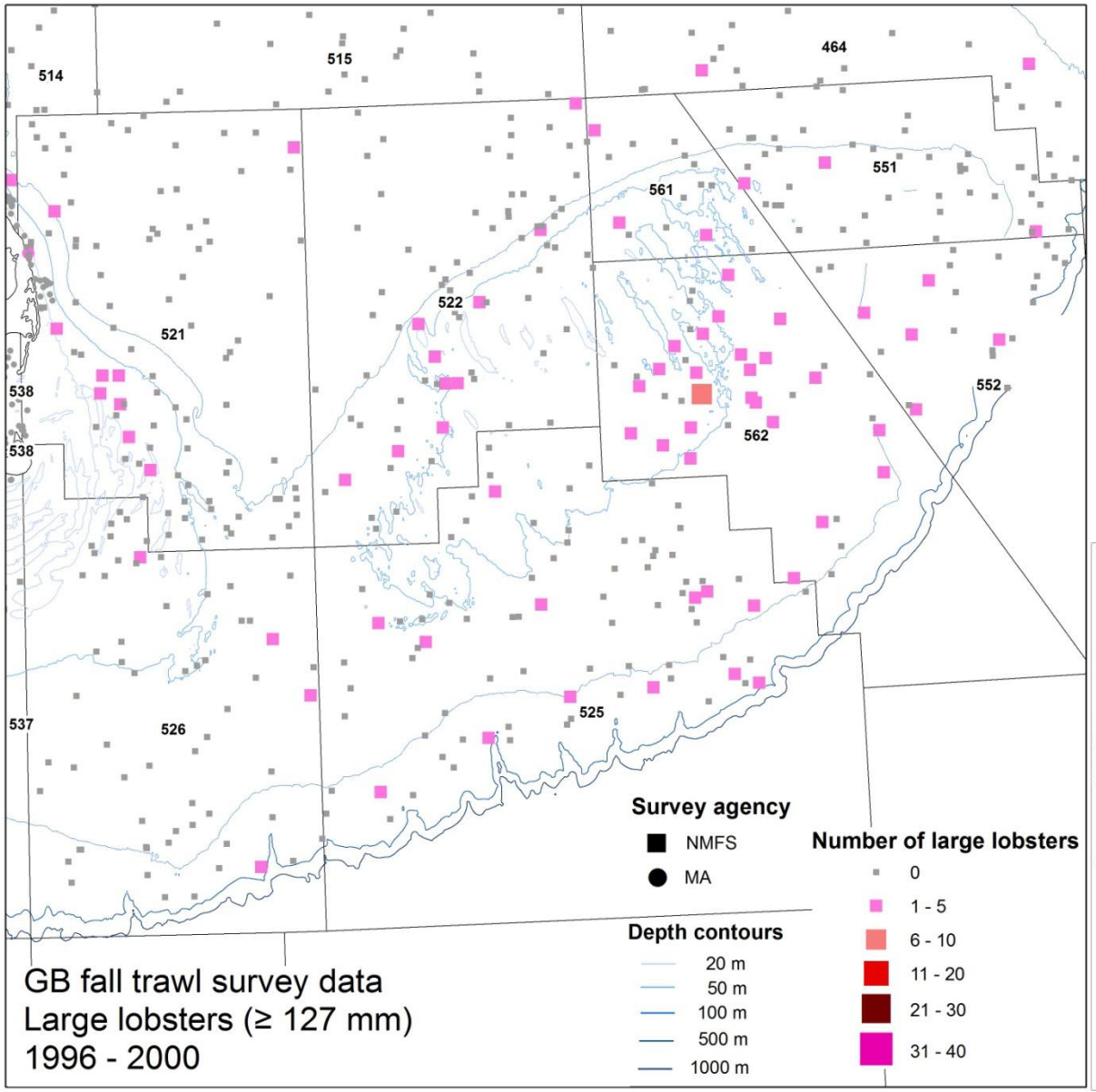
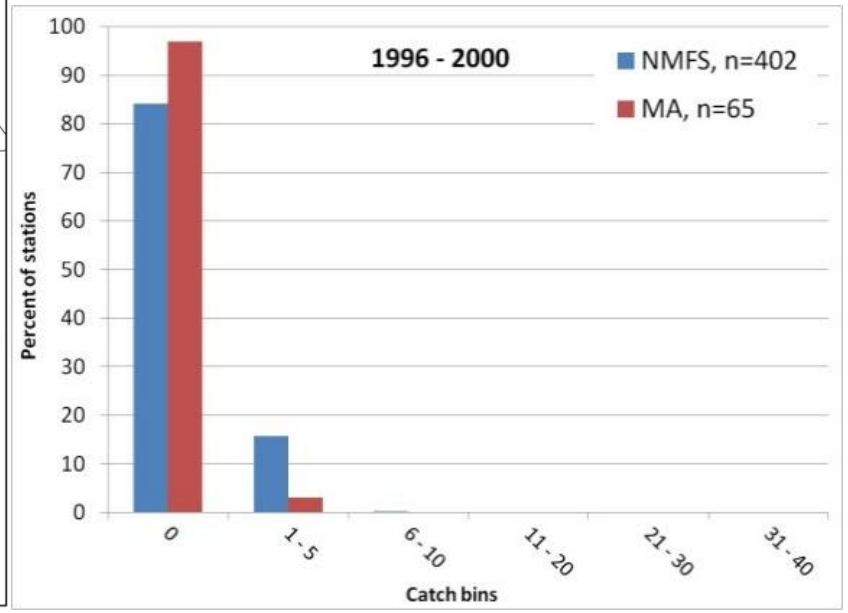


Figure 4.2.1.3.2.5 E



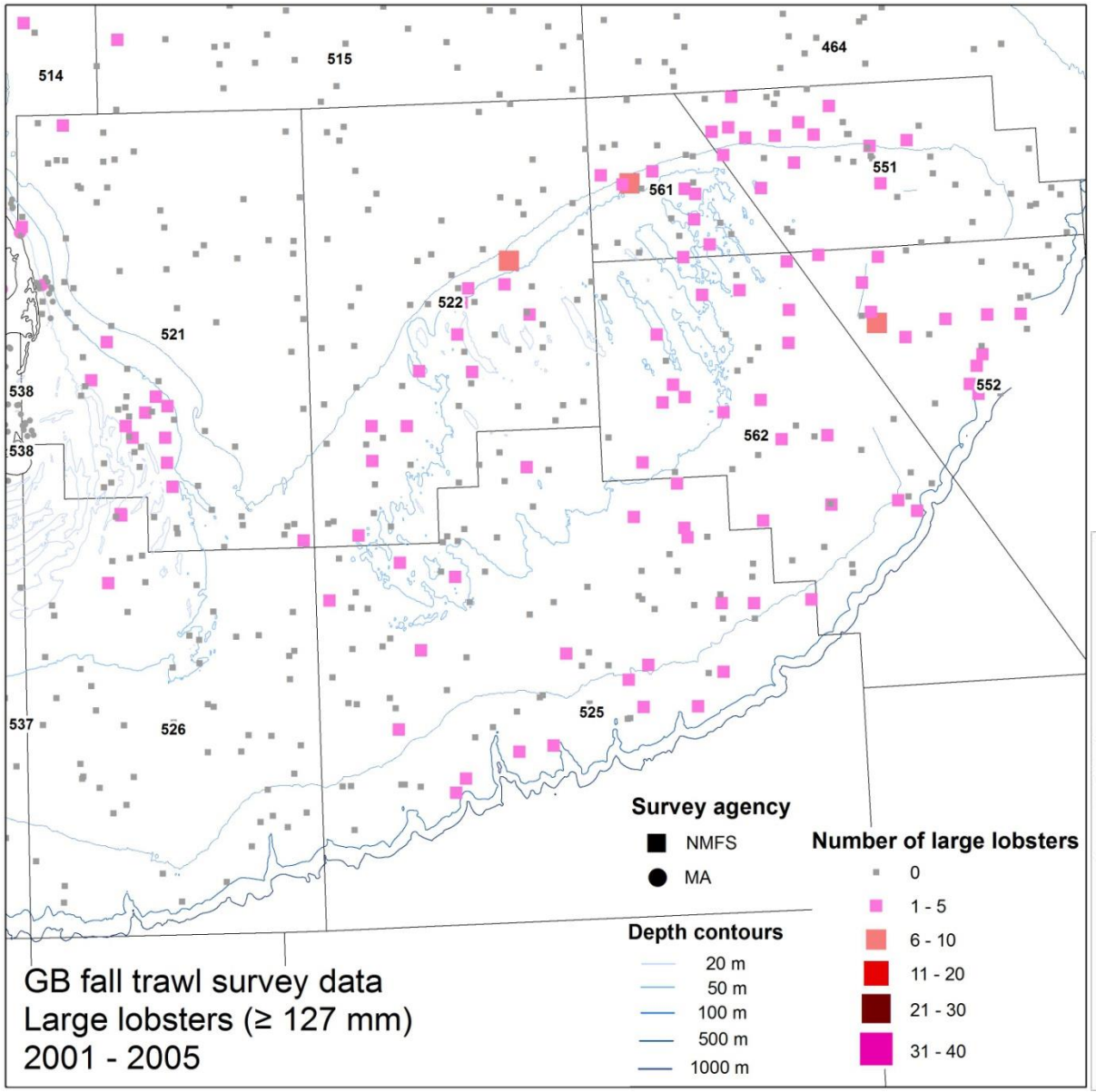
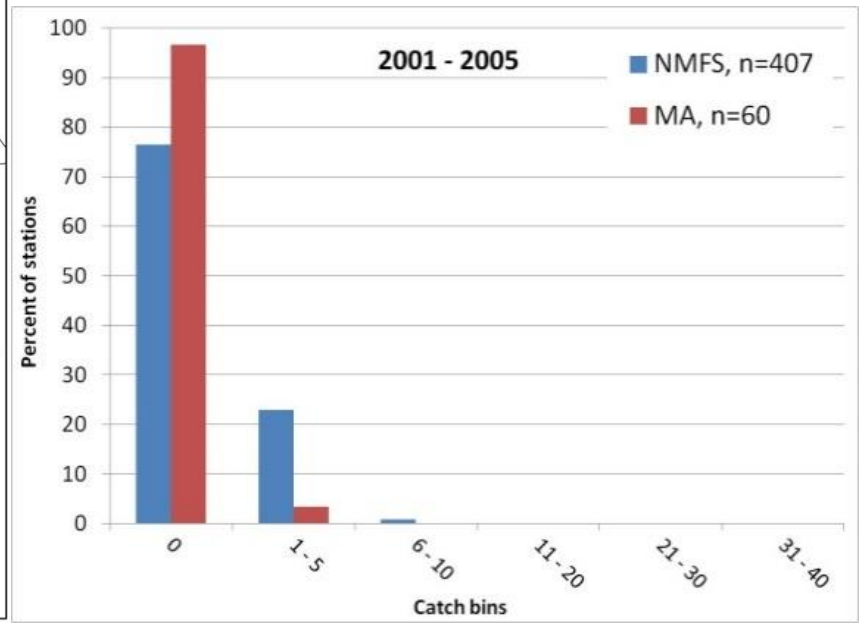


Figure 4.2.1.3.2.5 F



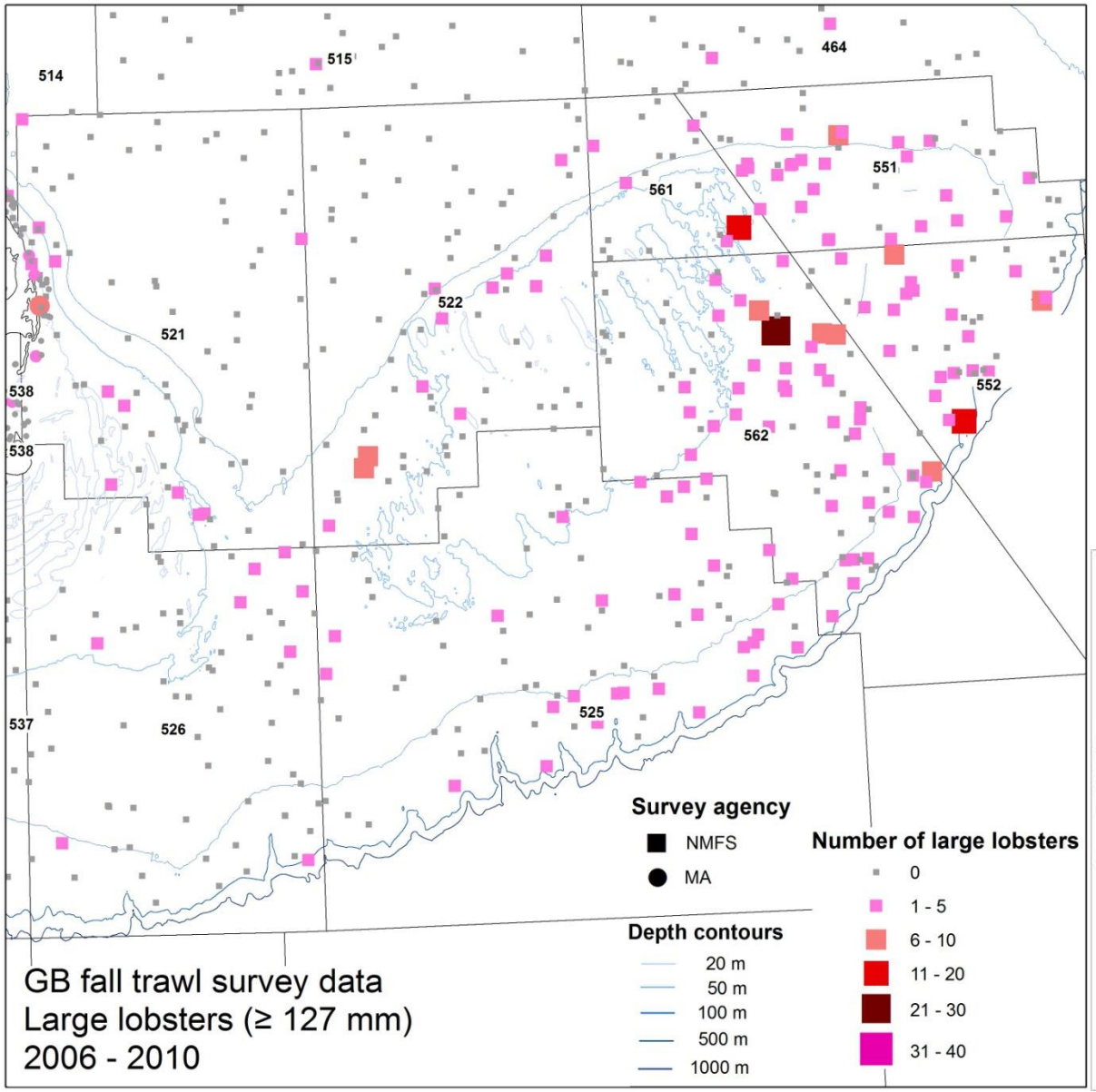
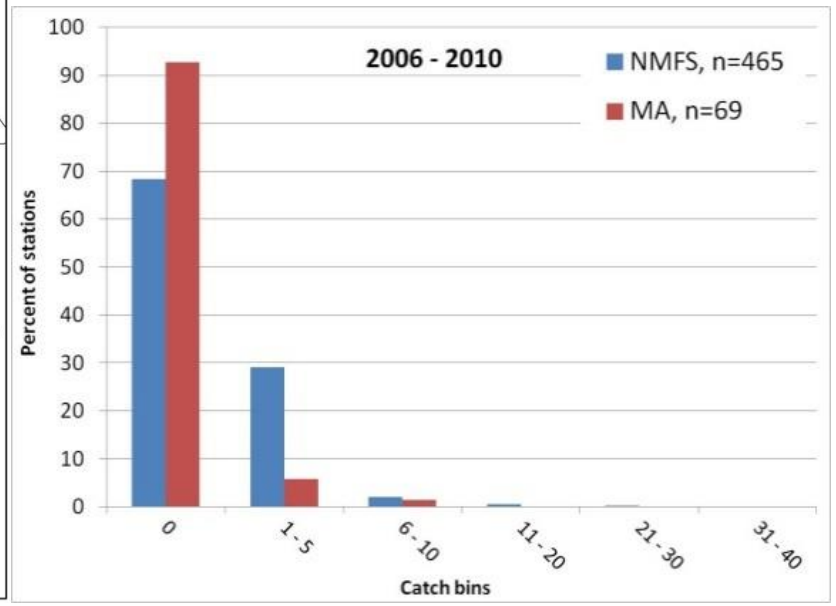


Figure 4.2.1.3.2.5 G



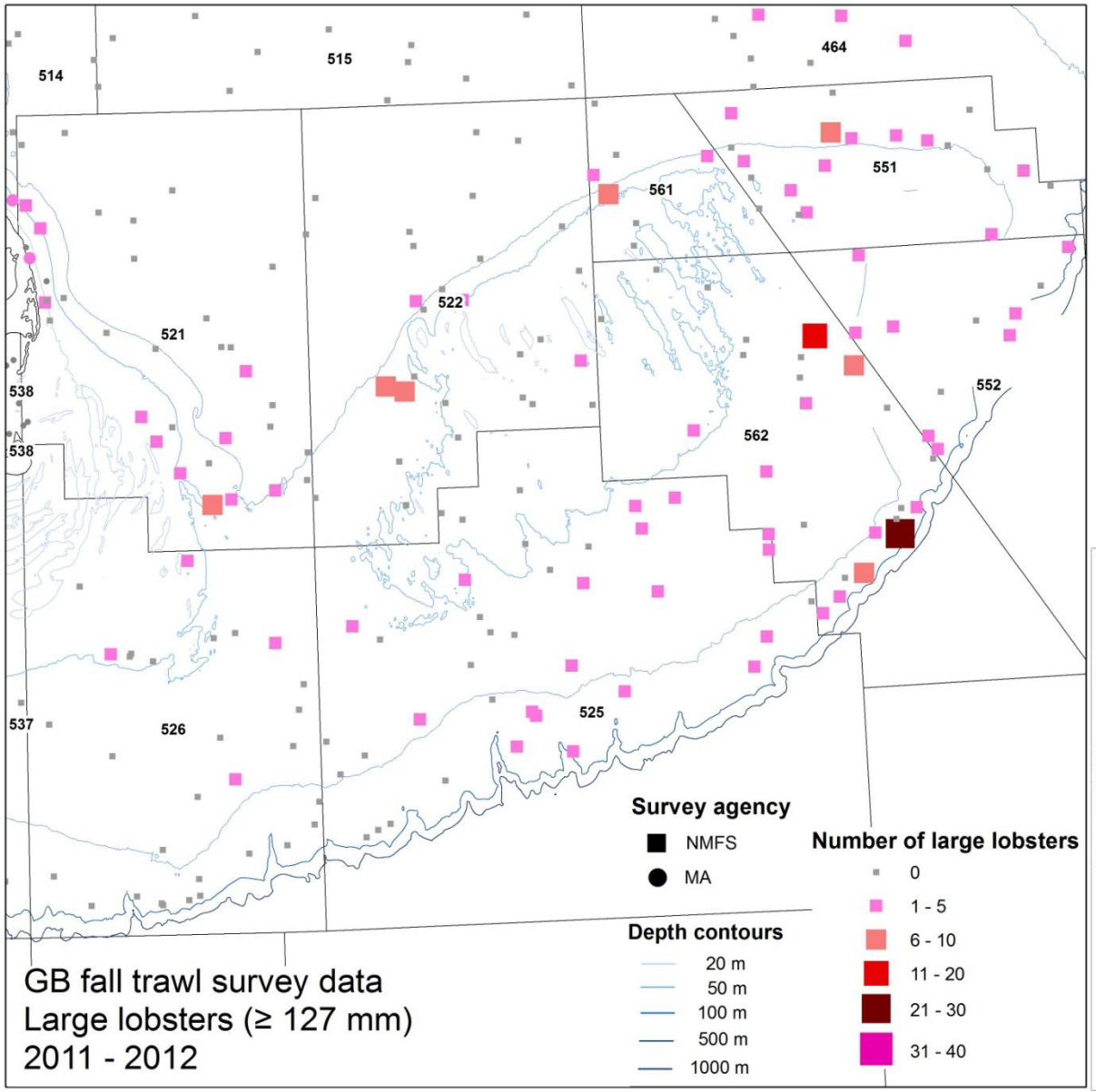
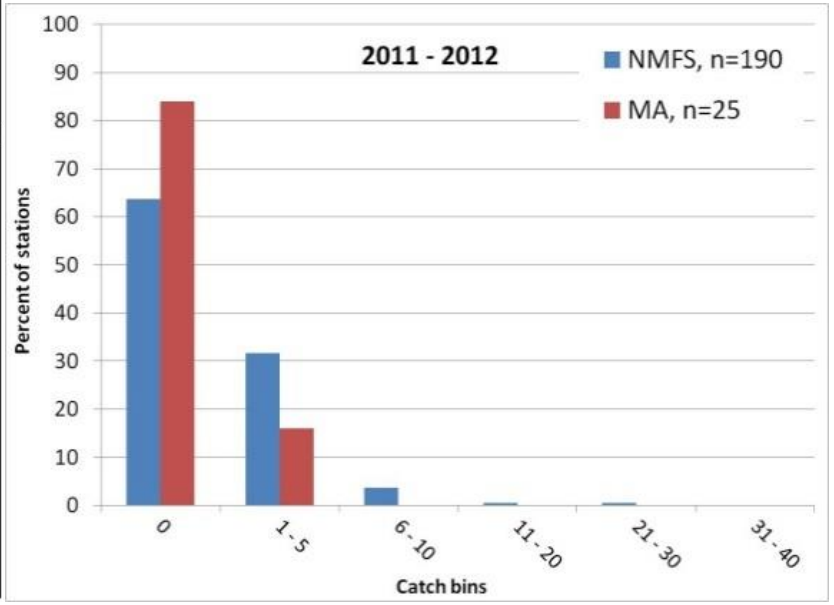


Figure 4.2.1.3.2.5 H



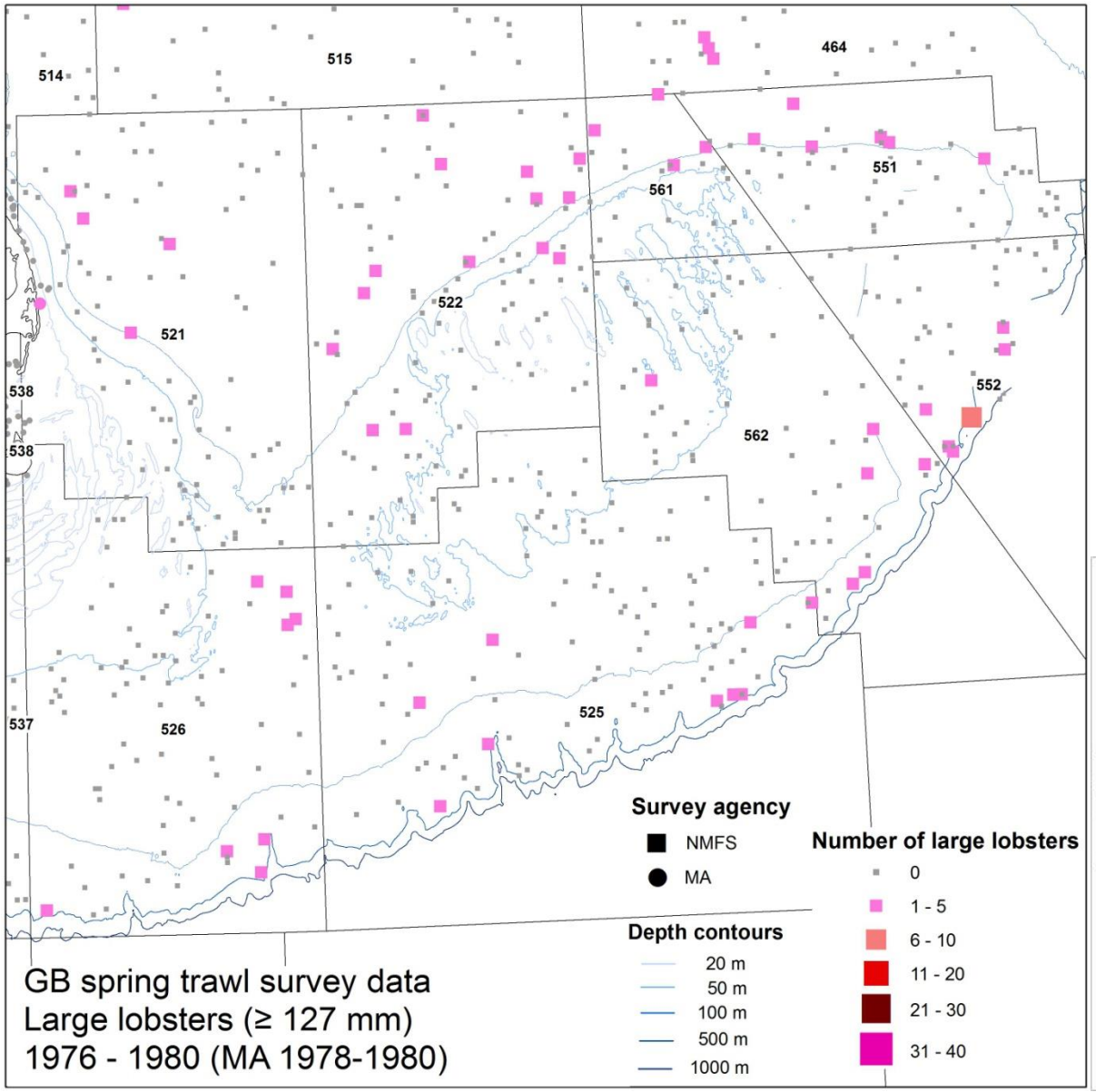
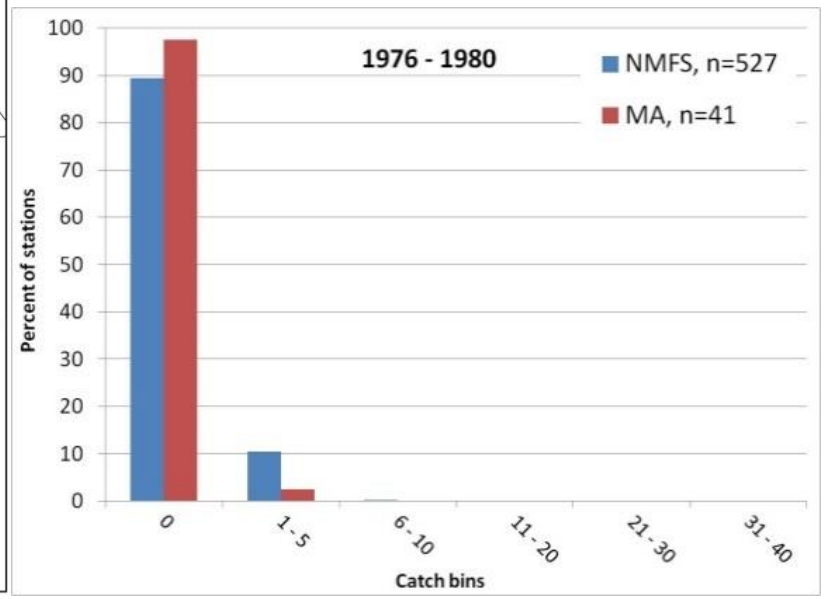


Figure 4.2.1.3.2.6 A – H. Mean catch per tow of "large" lobsters (≥ 127 mm CL) at each spring sampling location from all GBK bottom trawl surveys (NMFS and MA), shown in 5 year time periods. Histograms show the percent of stations that fell within each catch bin by survey agency for each 5 year time period.

Figure 4.2.1.3.2.6 A



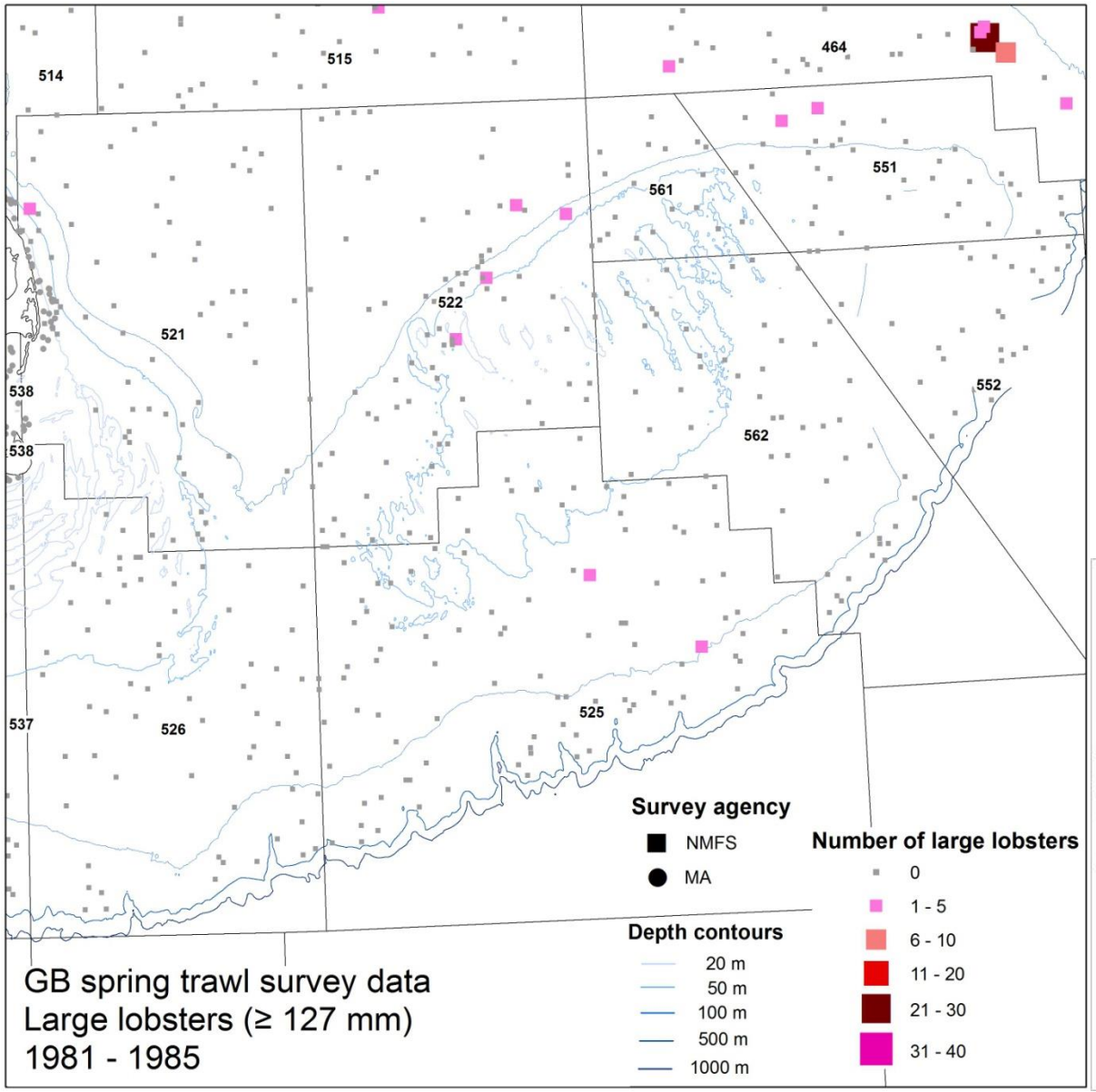
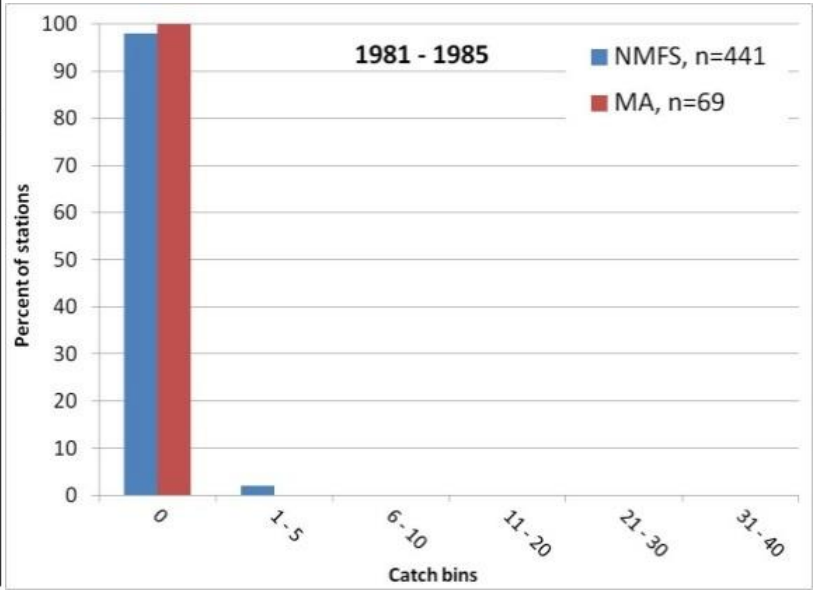


Figure 4.2.1.3.2.6 B



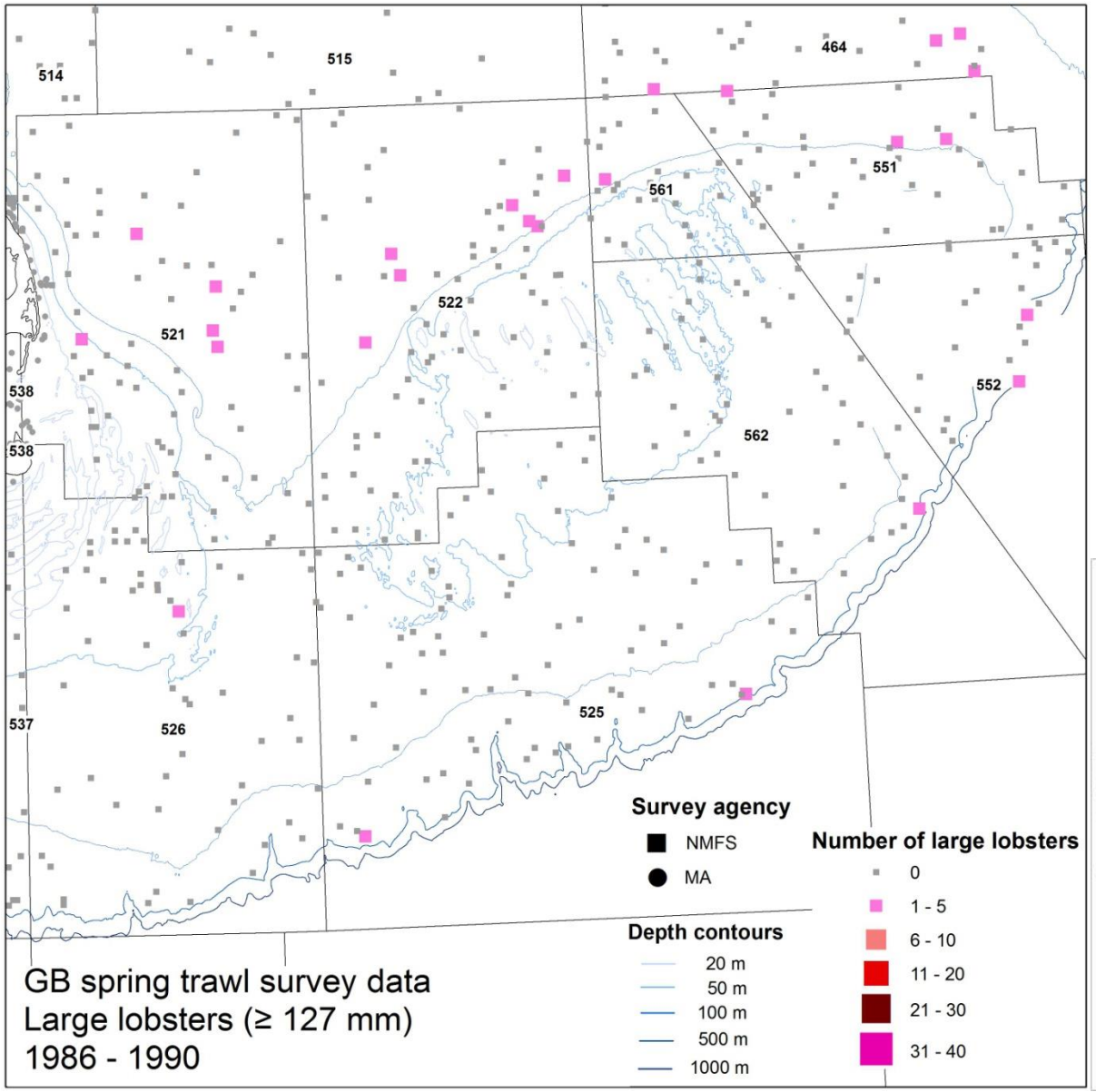
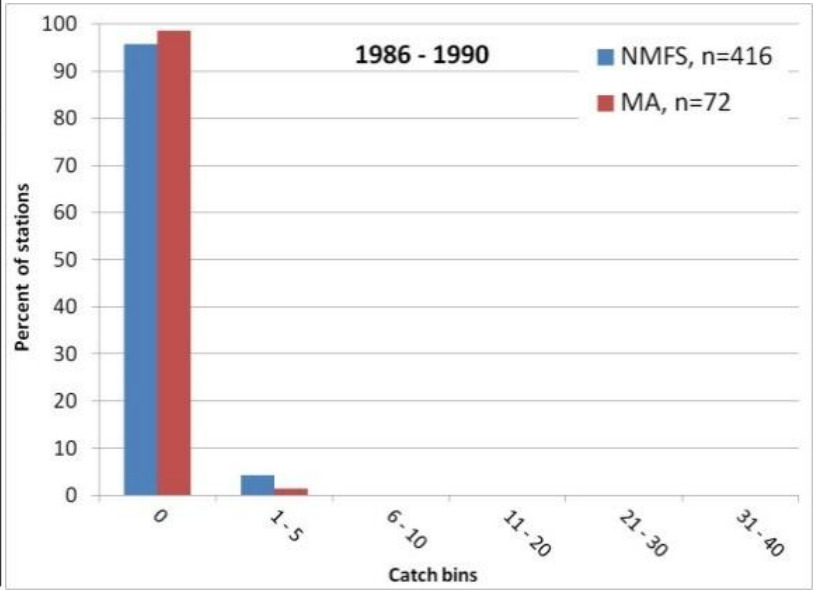


Figure 4.2.1.3.2.6 C



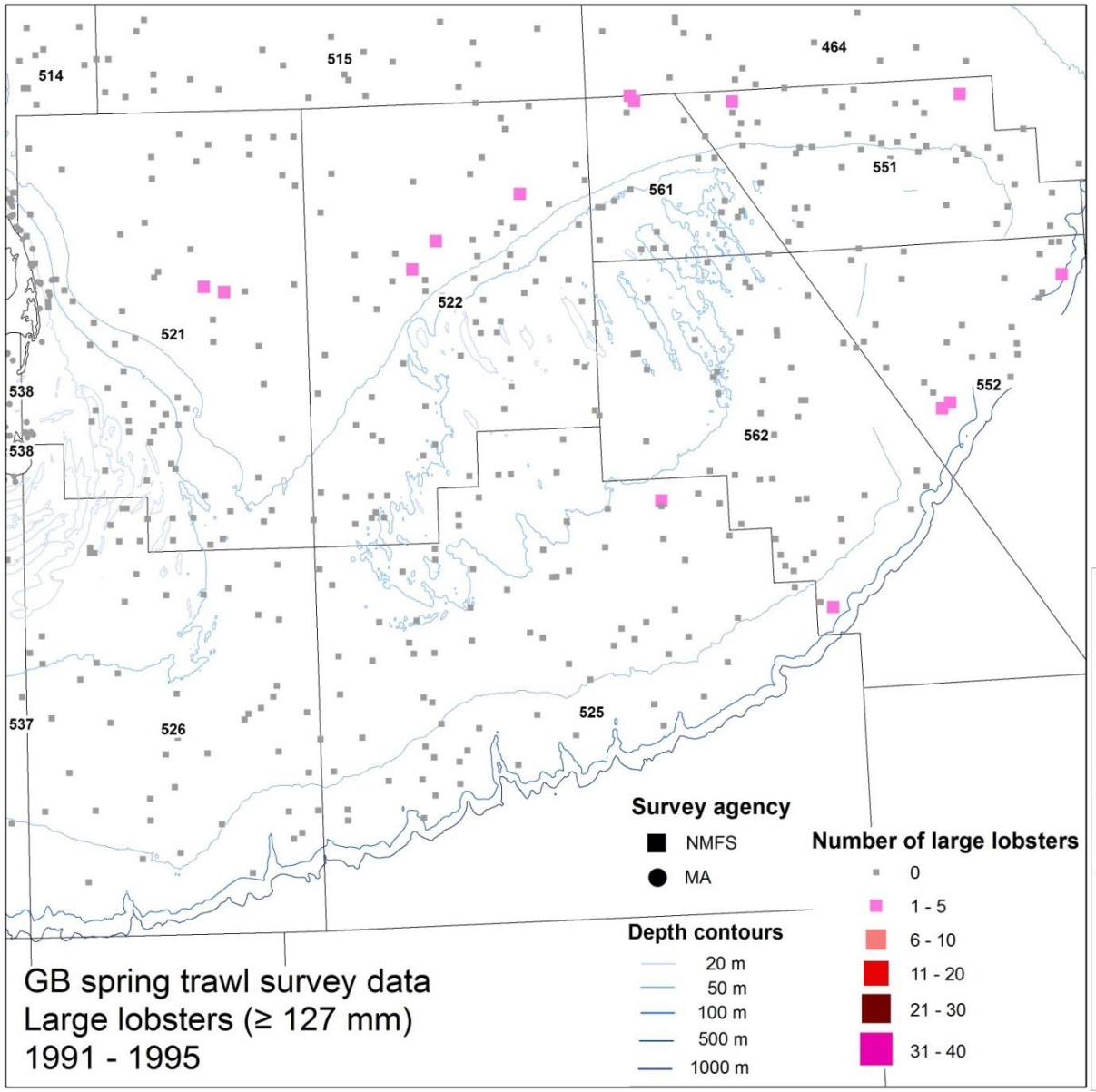
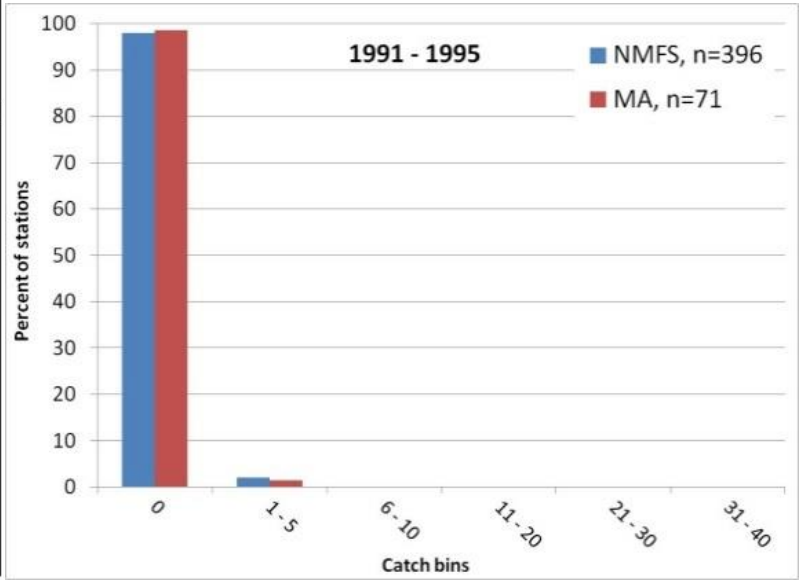


Figure 4.2.1.3.2.6 D



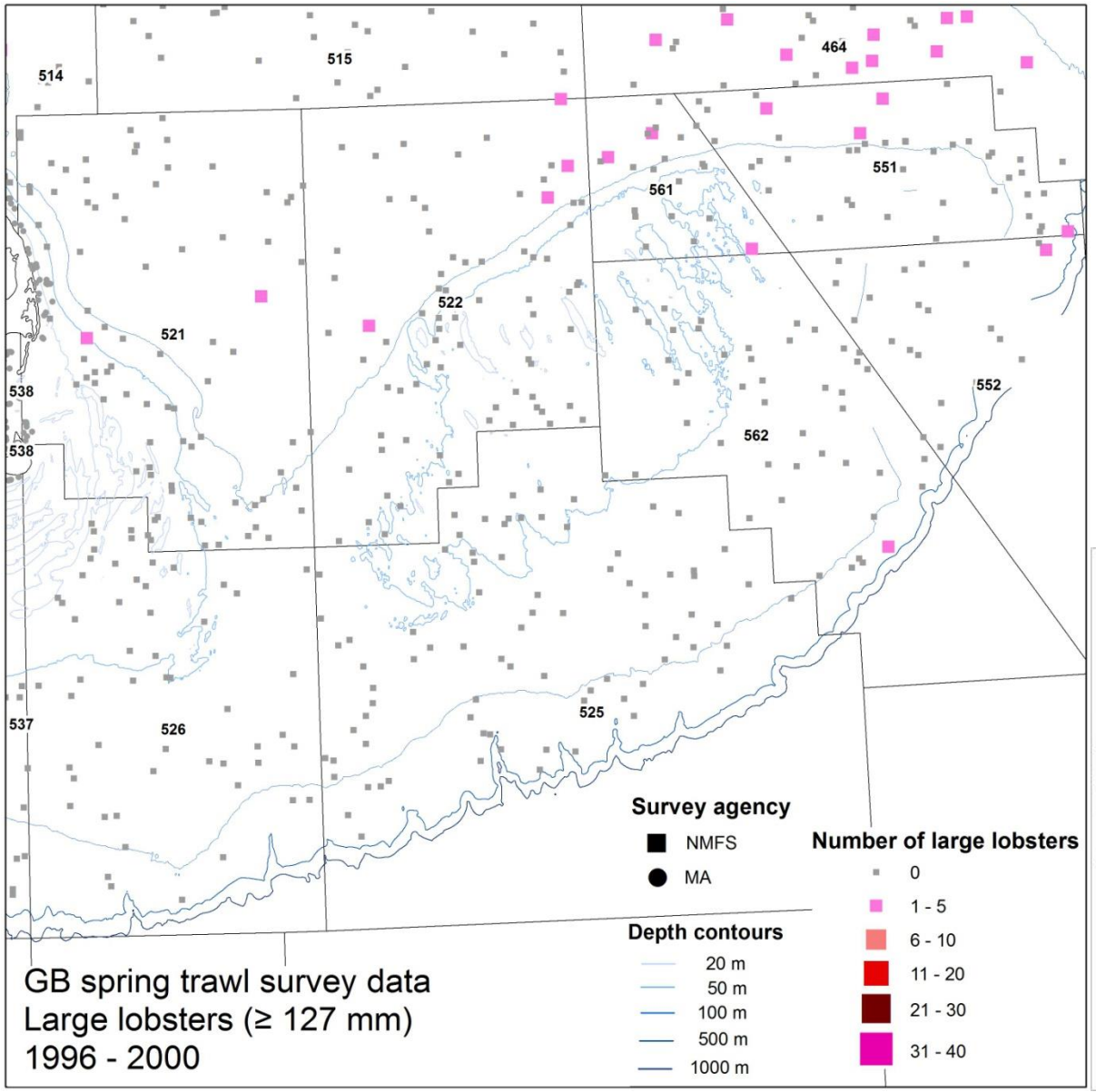
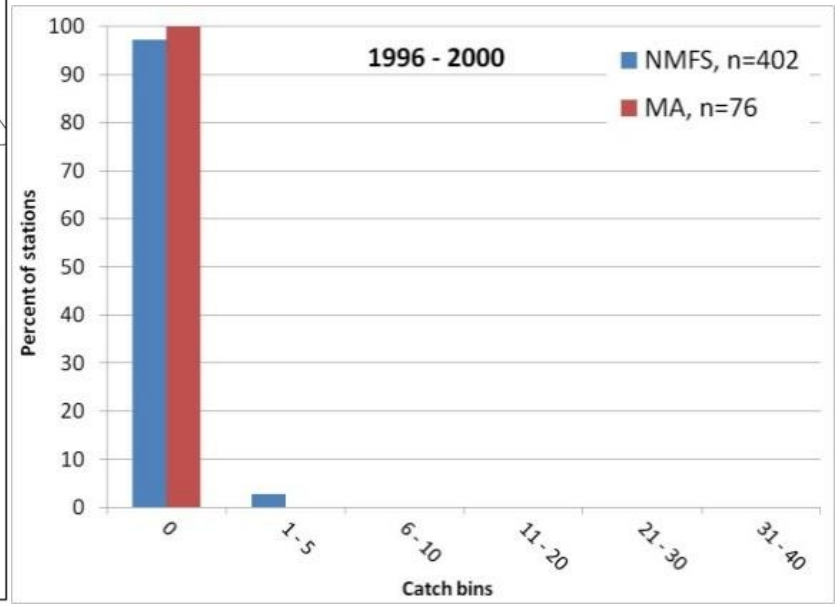


Figure 4.2.1.3.2.6 E



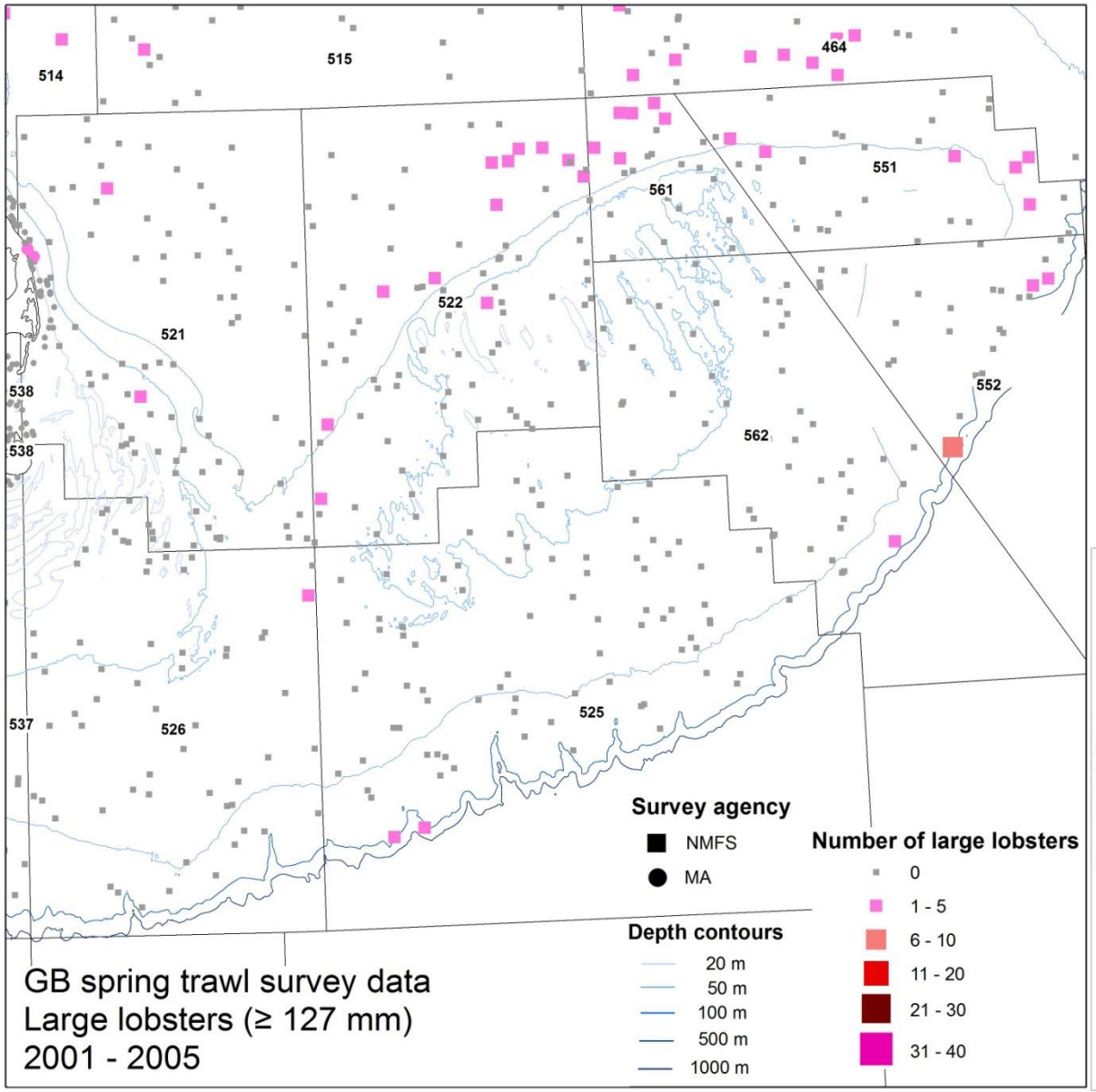
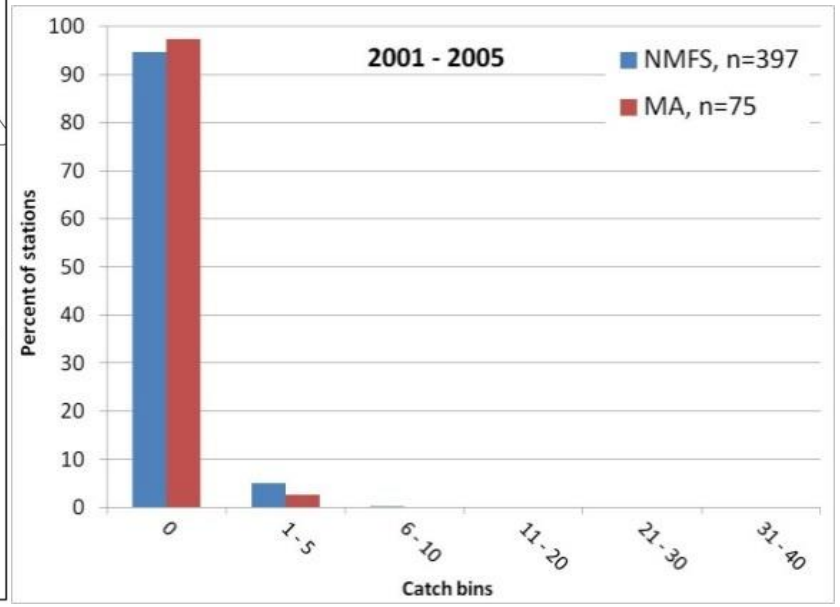
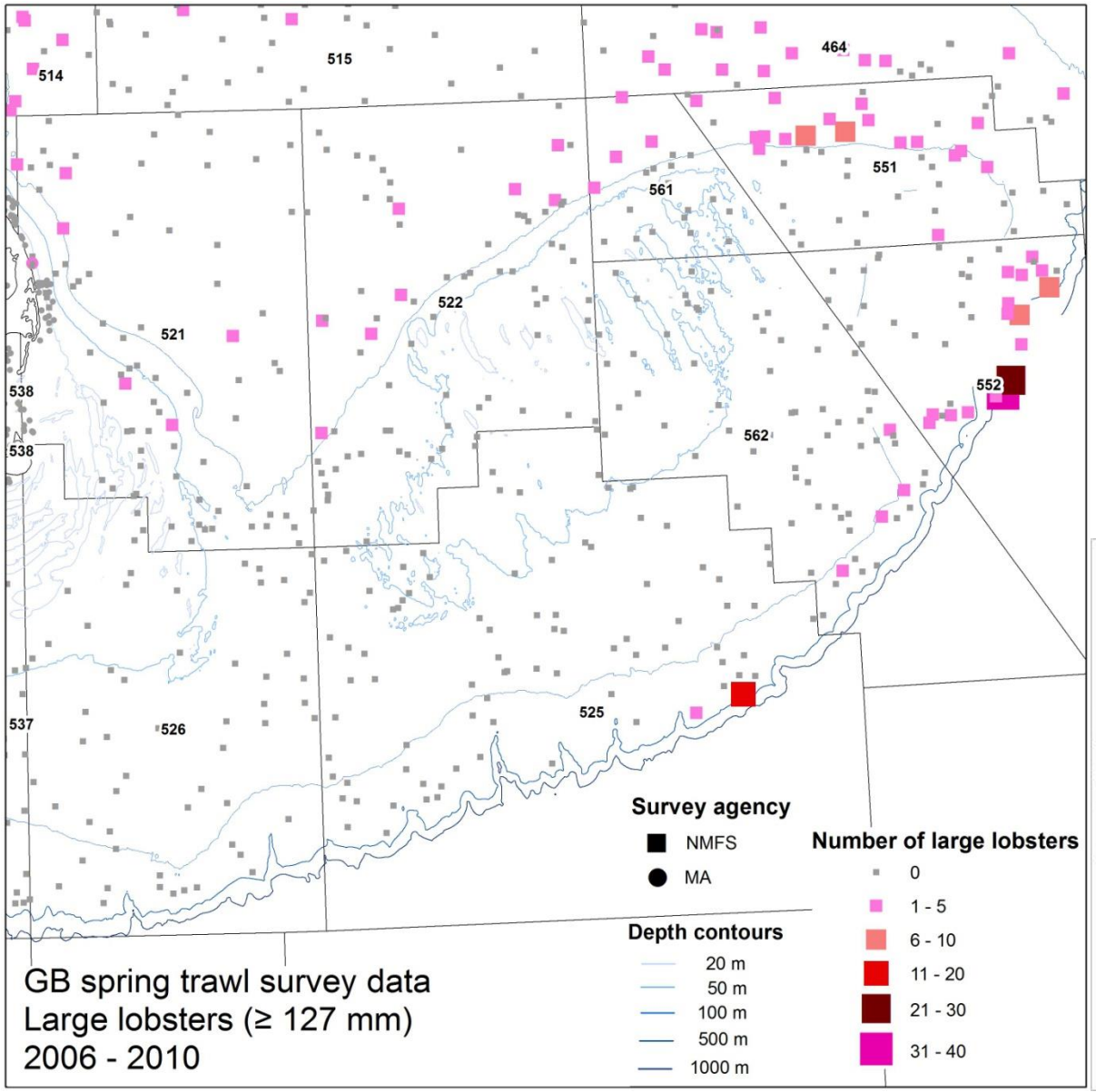


Figure 4.2.1.3.2.6 F





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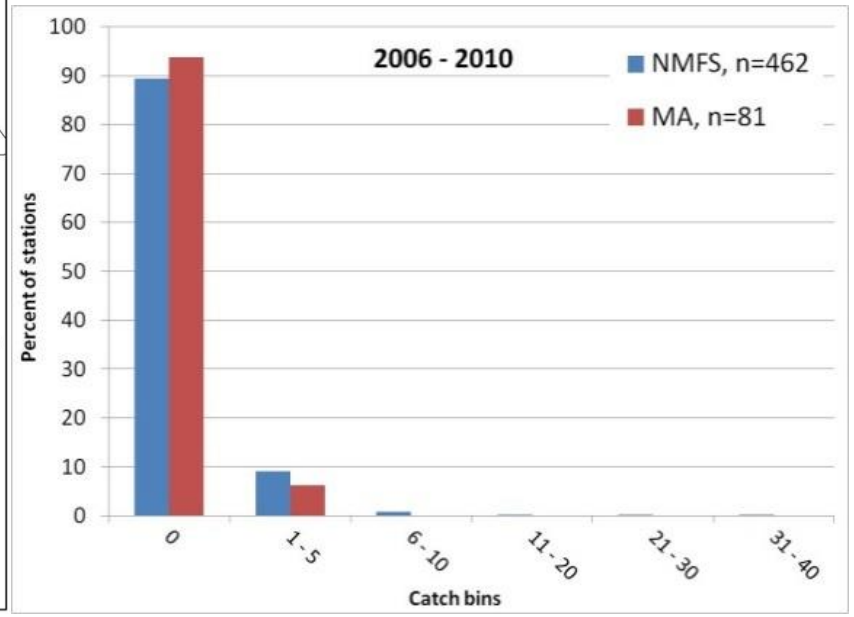


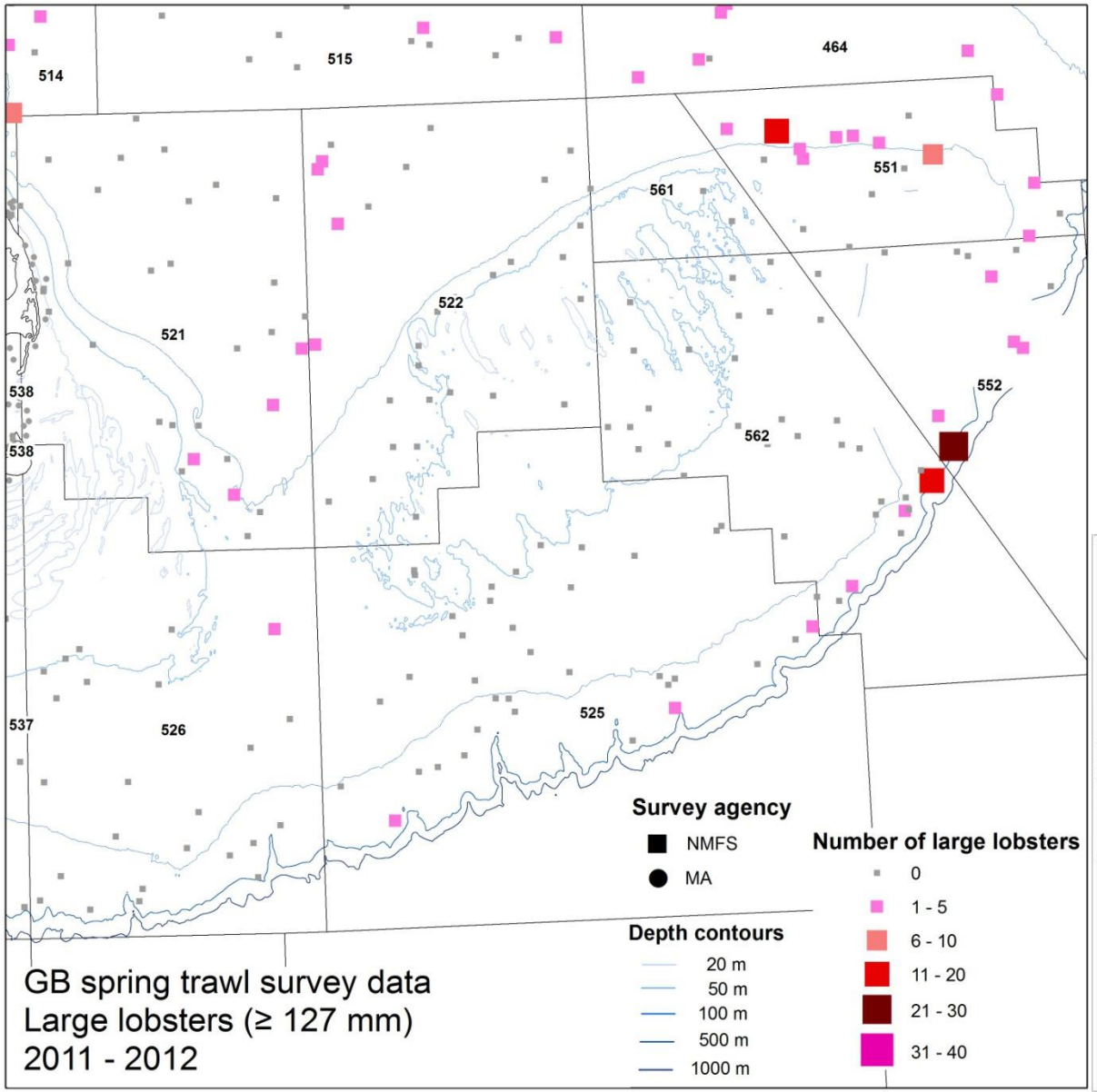
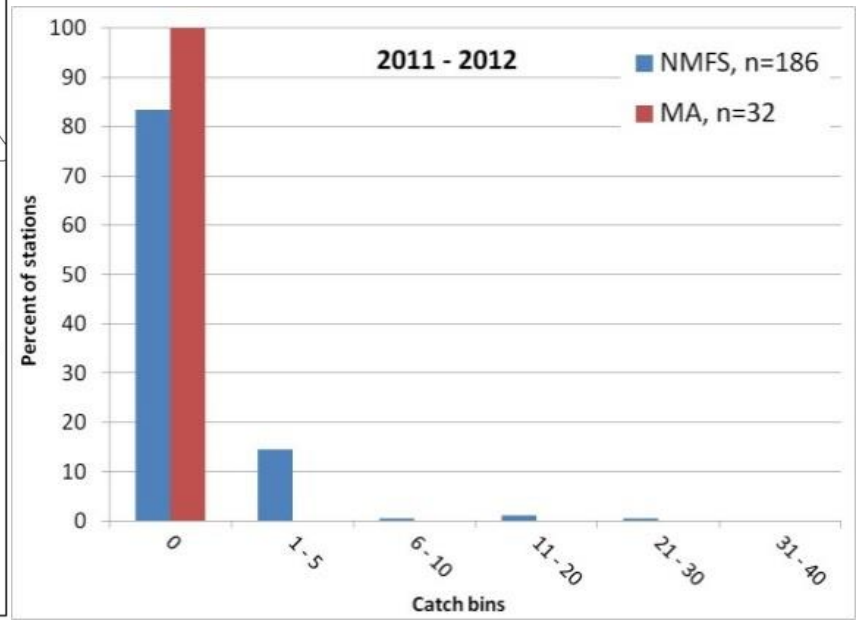


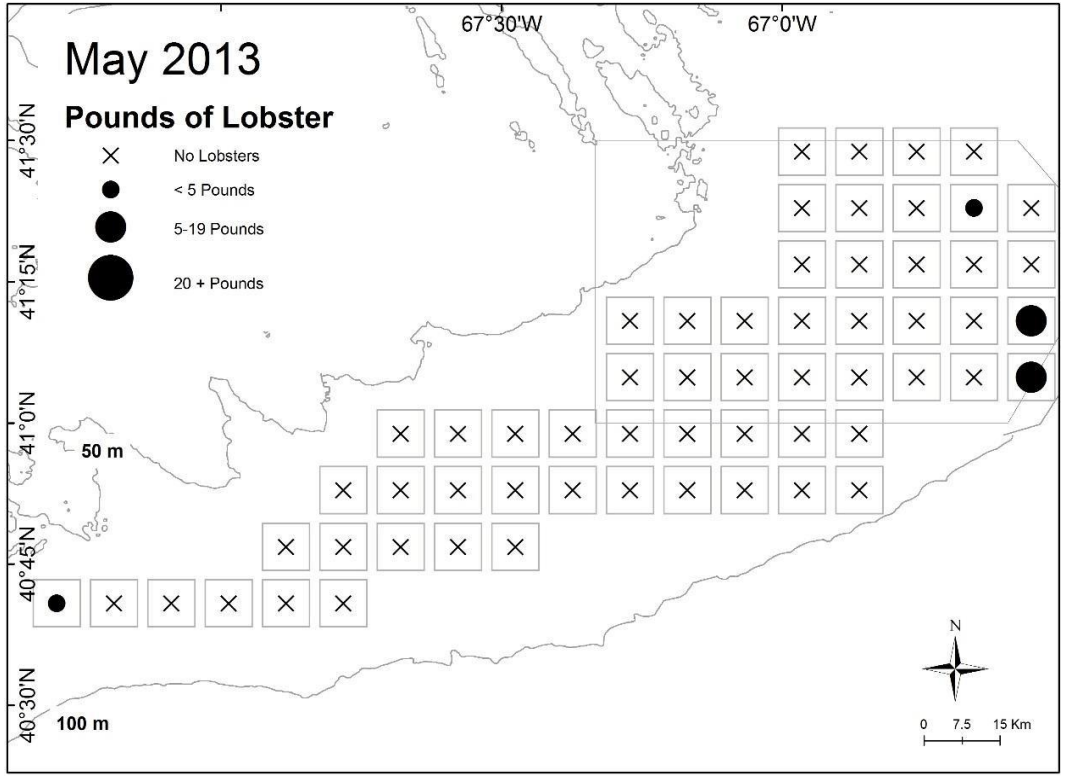
Figure 4.2.1.3.2.6 H

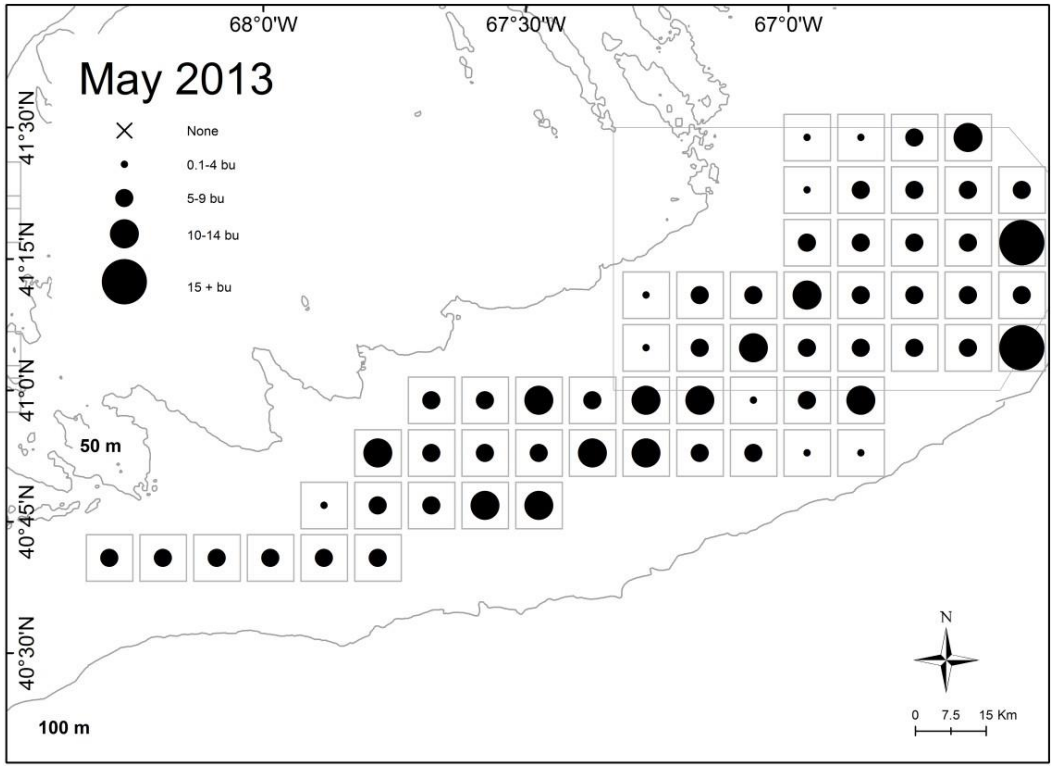


Scallop Catch

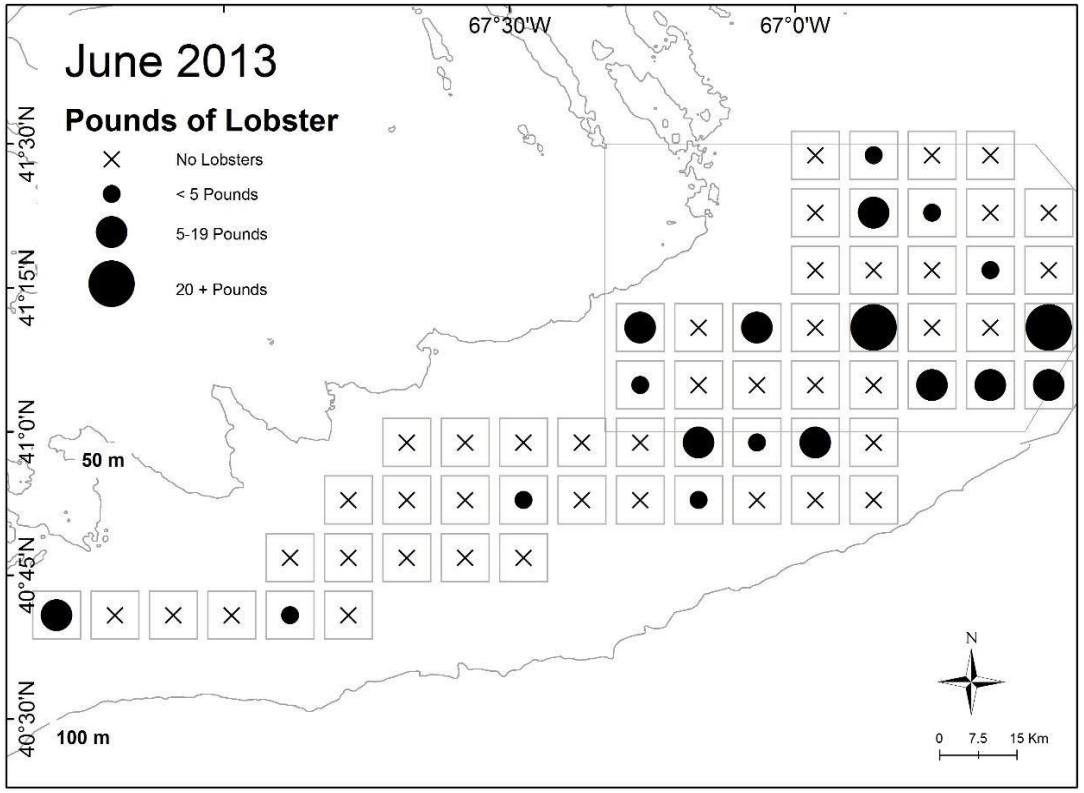
Spatial Distribution of Scallop and Lobster Catch, November 2012-March 2014 (Source: Coonamesset Farm Foundation).

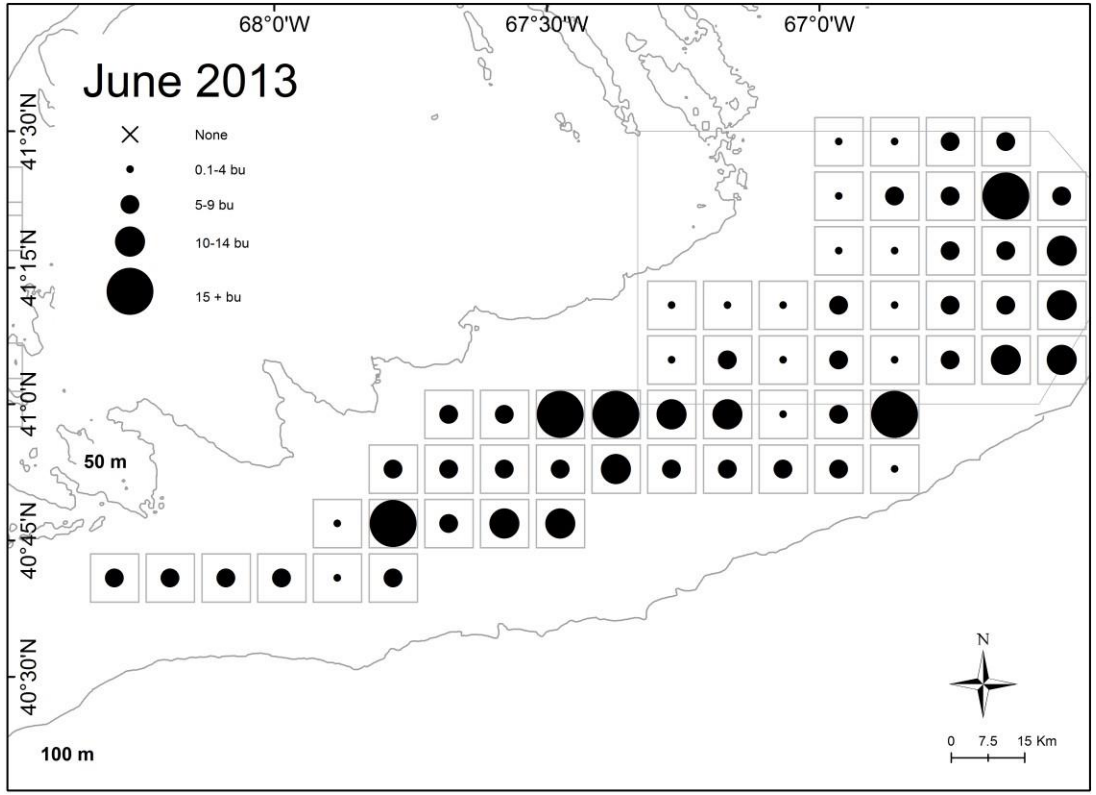
Included with special permission from Carl Huntsberger. Contact Carl Huntsberger – chuntsberger@cfarm.org
Lobsters are recorded as pounds. Scallops are recorded as a bushel count, not weight.



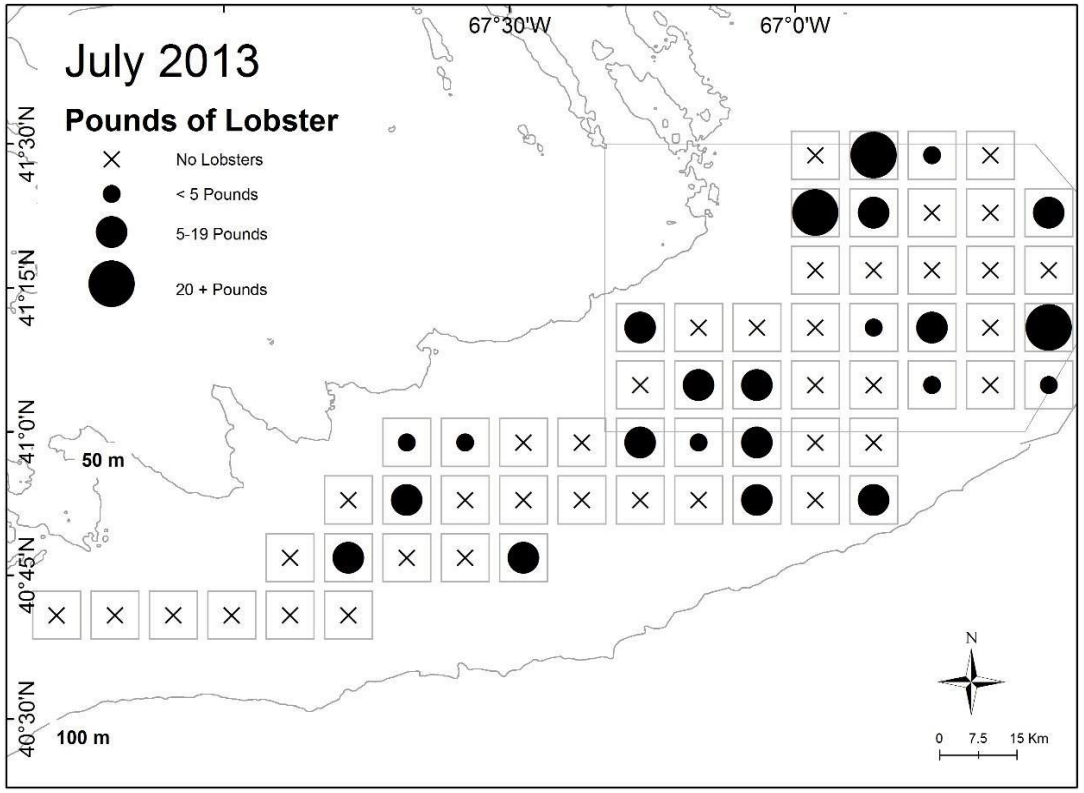


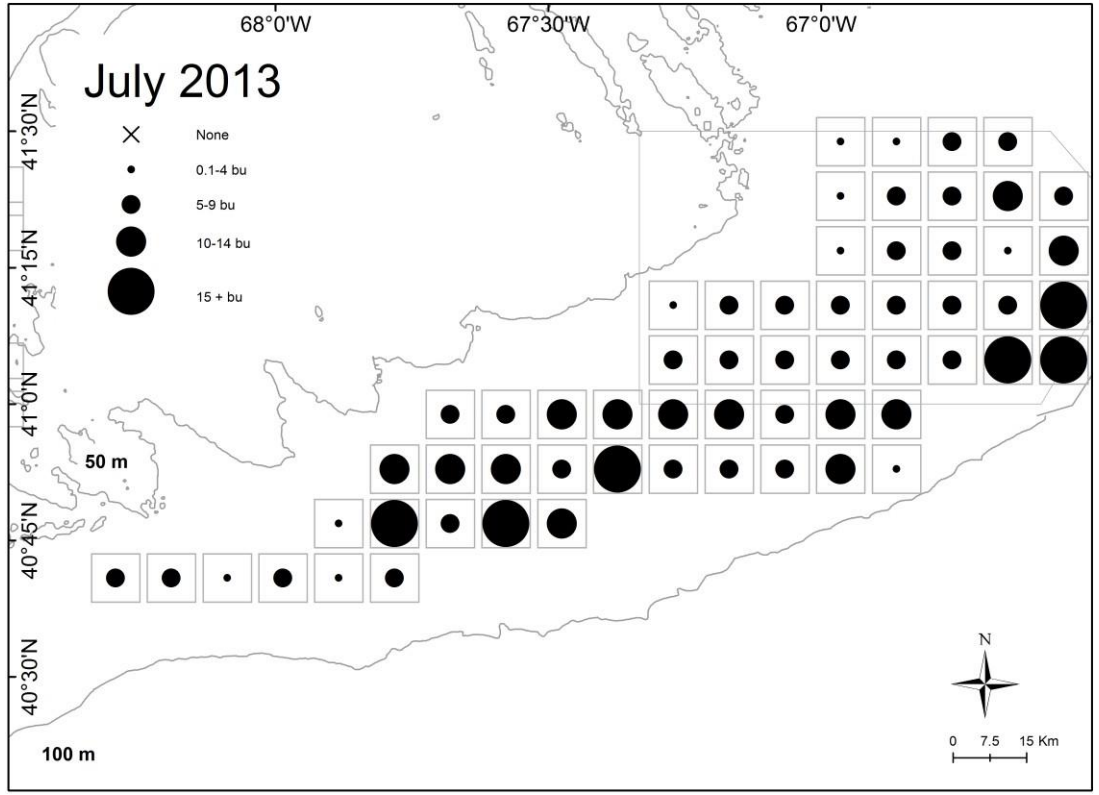
Scallop Catch





Scallop Catch





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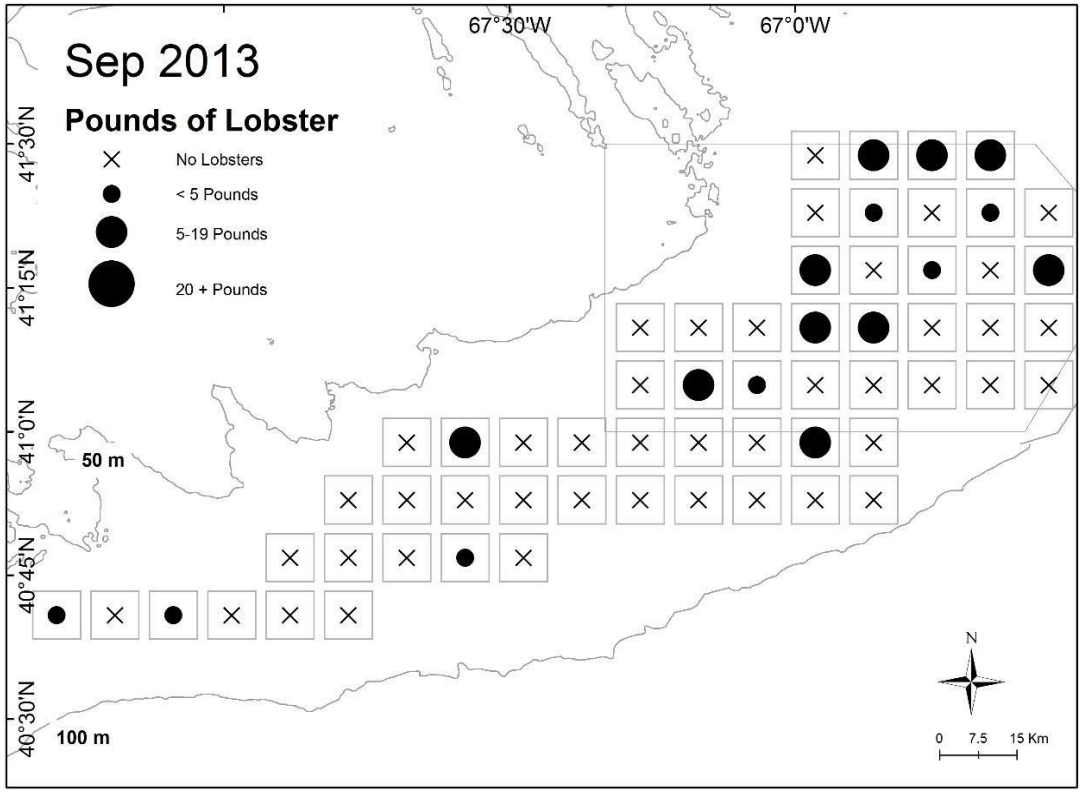
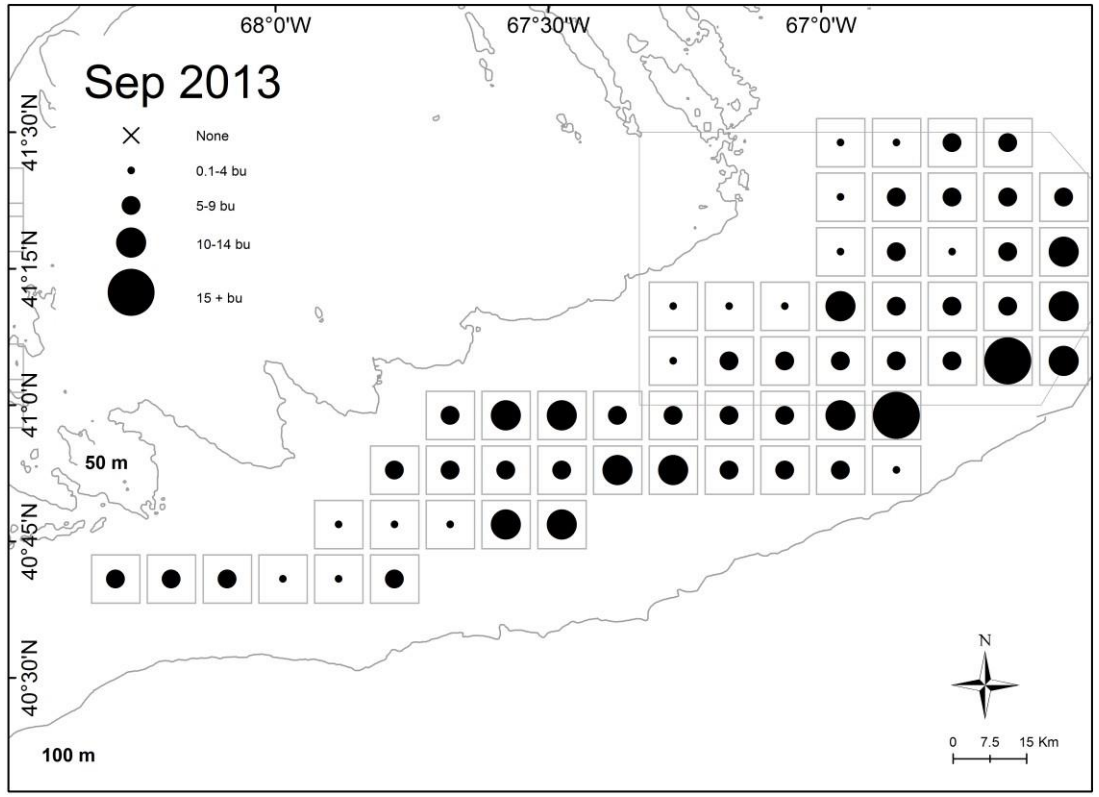
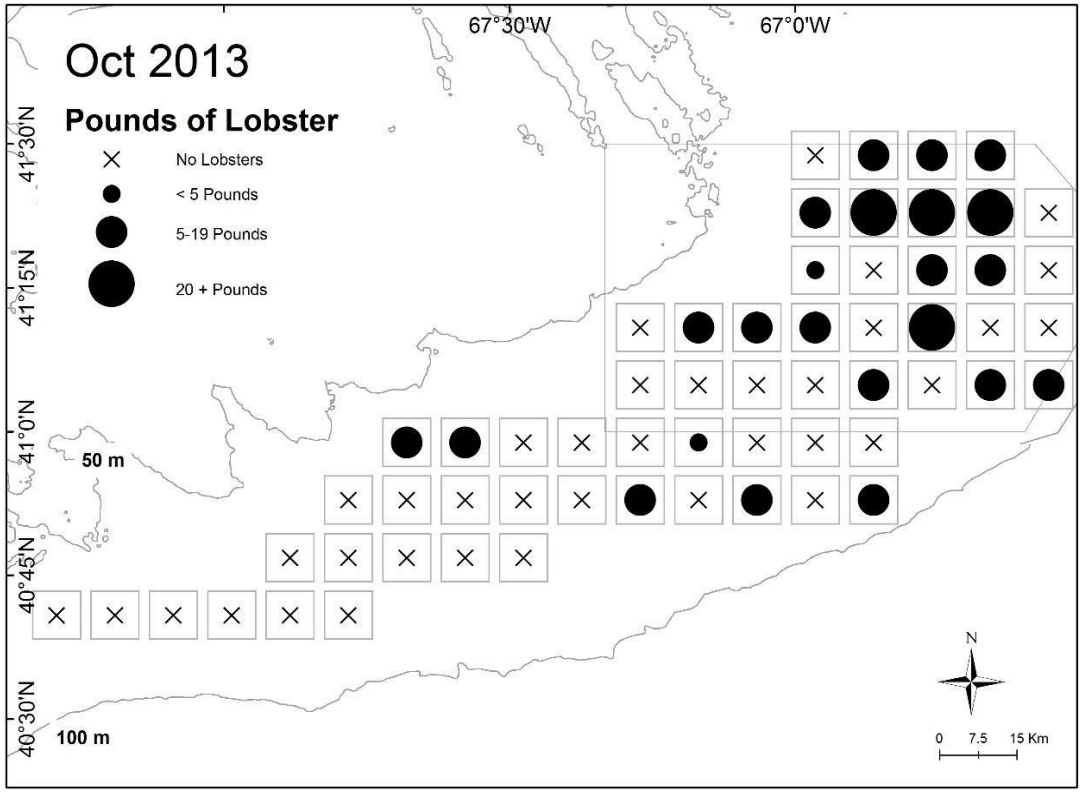
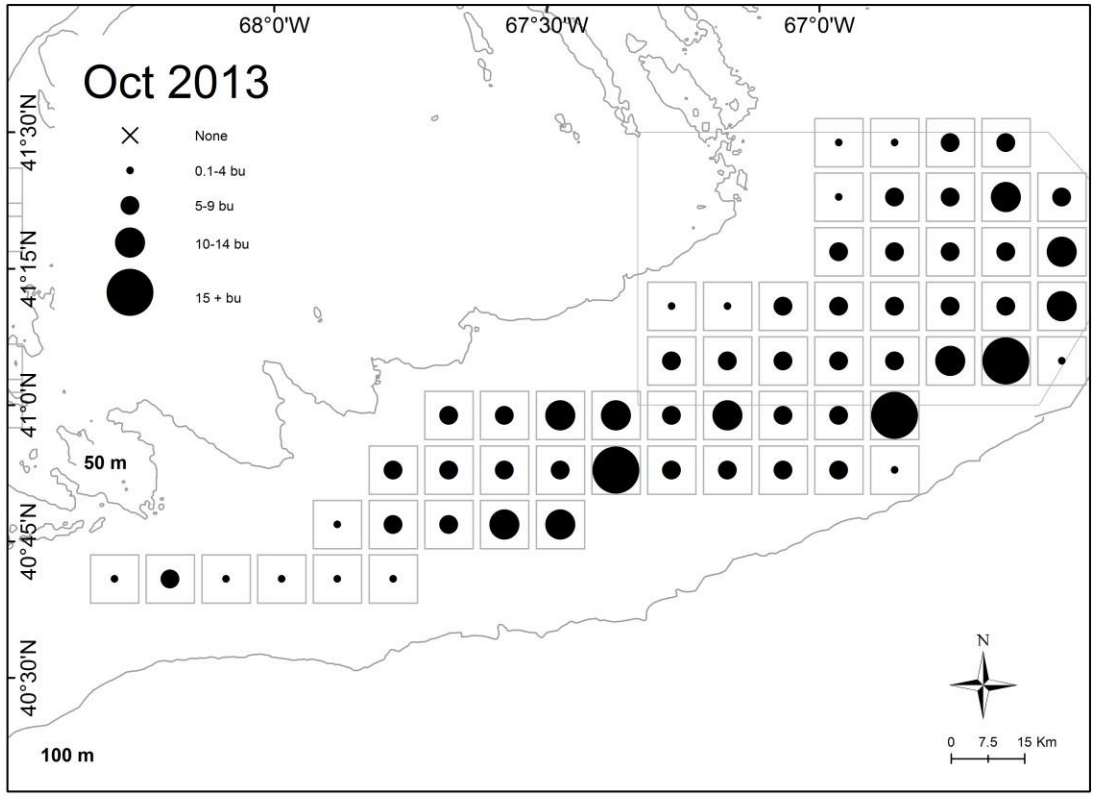


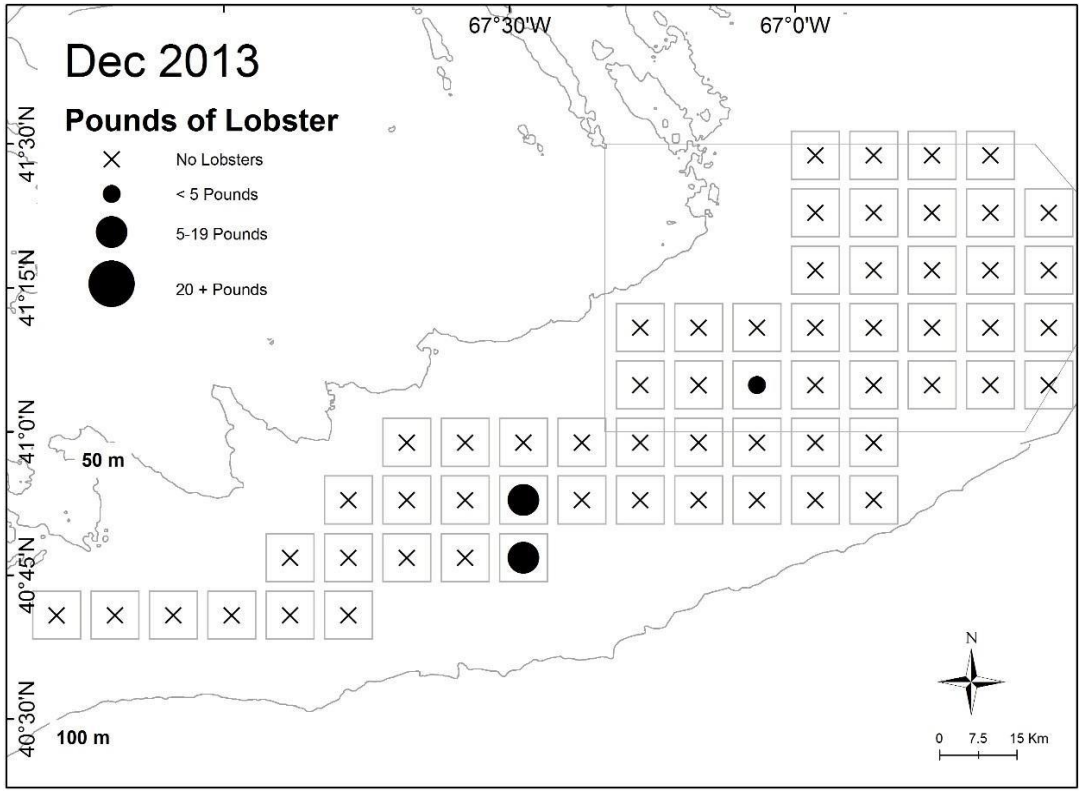


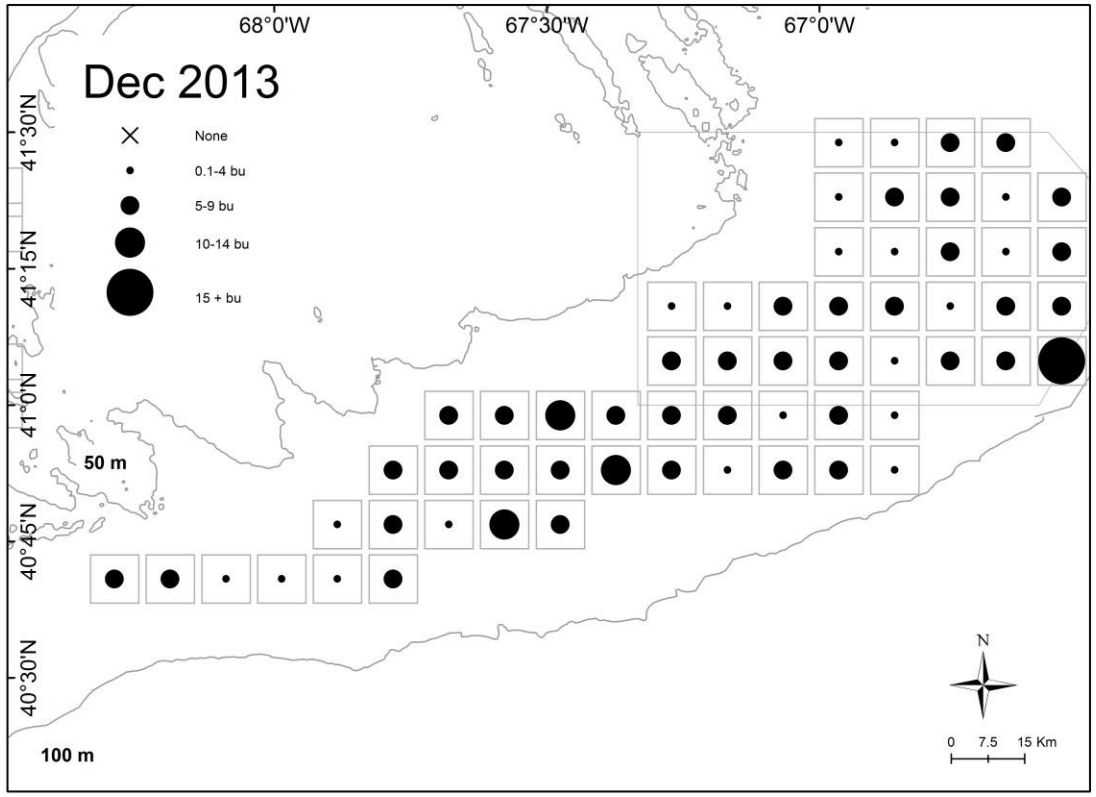
Scallop Catch



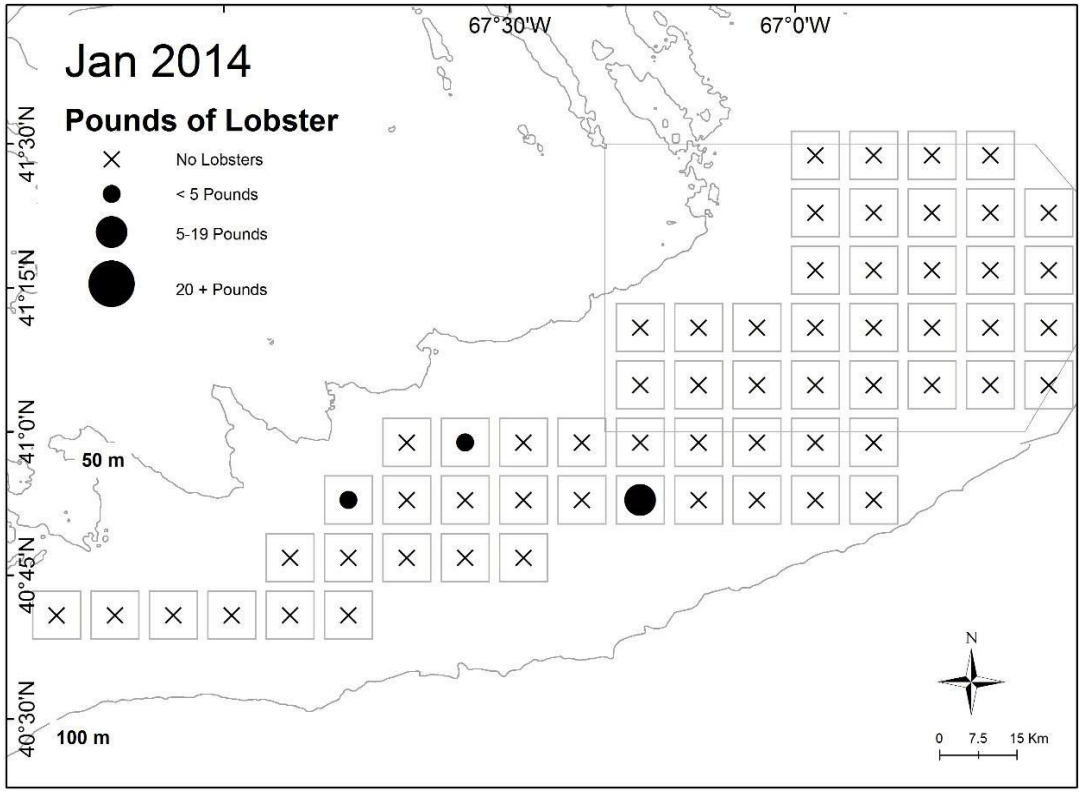


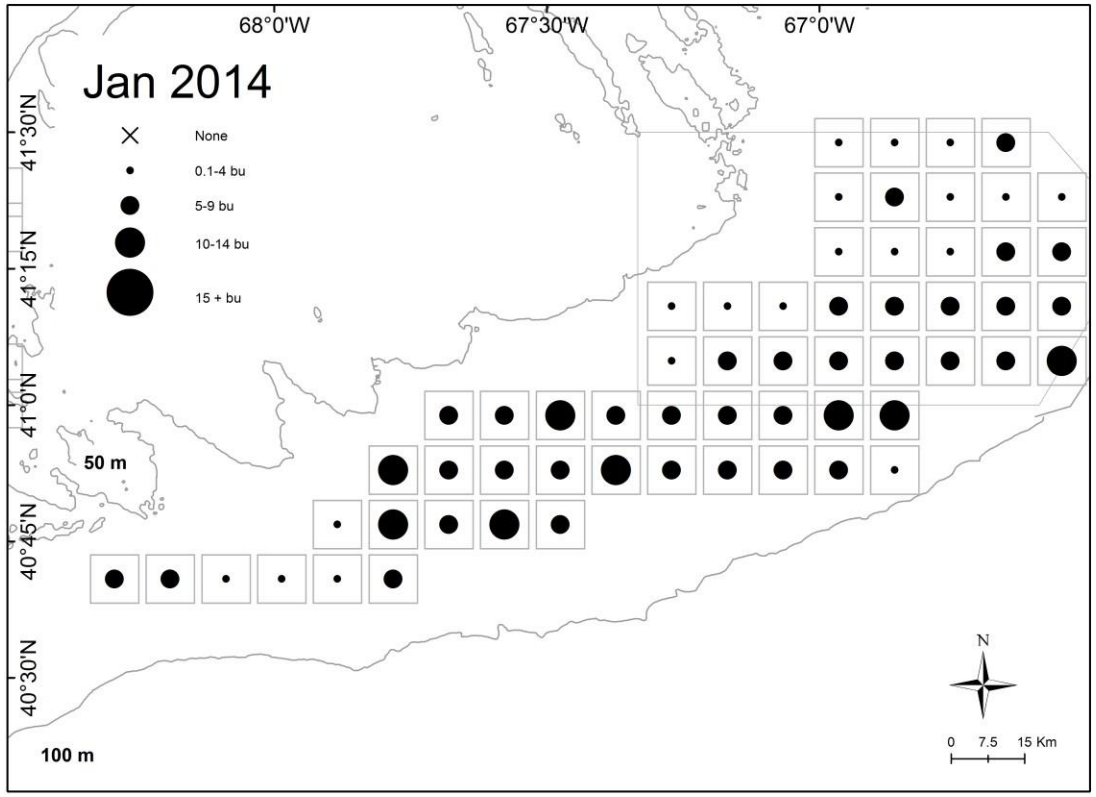
Scallop Catch





Scallop Catch





Scallop Catch