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Distribution of Vertical Lines from the Maine Lobster Fishery

**Maine Department of Marine Resources
Cindy Smith
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Distribution of Vertical Lines from the Maine Lobster Fishery

Project Goal

In response to the need for information regarding the potential entanglement risk due to vertical lines off Maine's coast required by the Atlantic Large Whale Take Reduction Team (ALWTRT), the Maine Department of Marine Resources (DMR) will collaborate with the Maine lobster industry as well as NOAA Fisheries to establish baseline information on the spatial and temporal patterns of vertical lines and gear configurations throughout Maine's coastal waters.

Summary

The main goal of this project was to determine the spatial and temporal patterns of vertical lines and gear configurations in Maine coastal waters. This baseline information will be used to identify levels and areas of entanglement risks to large whales in the Northern Gulf of Maine, and to inform industry, managers and scientists in the ALWTRT process. The University of Maine undertook a similar endeavor in 2004. However, this survey was limited in scope and missed segments of the lobster fishery in near and offshore waters. In an effort to improve on these results and to get a better overall picture of the Maine lobster industry effort and gear configuration by region throughout the year, DMR initiated an additional survey in the summer of 2006 to all federally permitted lobster fishermen who also held Maine state licenses. The results of this survey were used to assess the density of vertical lines seasonally and gear configurations in three different distances from shore, 0-3 miles, 3-12 miles, and greater than 12 miles. Figure 1 shows the average density of vertical lines per kilometer at each of the three distance ranges.

Background

The Gulf of Maine is home to a diverse commercial fishing industry. The lobster industry is the largest fishery in the Gulf of Maine in terms of numbers of participants. In 2006 Maine issued around 7,000 state licenses, although not all are actively fished. Out of this population there were 1,245 fishermen who were also issued a federal permit. While DMR maintains complete records on the number of licenses and tags issued each year, (Maine lobstermen are required to have a lobster tag on every trap they fish), DMR has very little information on how many of those fishermen are actively fishing and what that level of activity and fishing pattern may be (full time, part time or occasional, how many traps and in what gear configuration). Most fishermen purchase the maximum number of trap tags they are allowed each year regardless of whether they intend to use them all.

DMR is committed to developing a Take Reduction Plan that will equally protect the Atlantic large whales and the state's commercial fishing industries. Much time and effort has been spent

developing and testing operationally viable groundline gear modifications and strategies, and DMR recognizes the need to develop baseline data on vertical lines and trap configurations in the Northern Gulf of Maine prior to addressing entanglement risk reduction issues posed by vertical lines in the water column.

Methodology

For the purposes of this survey the terms “vertical lines” and “endlines” are used interchangeably. A vertical line is defined as the line that extends from the trap or traps on the ocean floor to the buoy at the surface. The concept of trap configurations is defined as the pattern of lobster traps in a set. These patterns can range from singles (a single trap on a vertical line), pairs (two traps on a vertical line), triples (three traps on a vertical line), or trawls (greater than three traps with either a single vertical line or multiple vertical lines). During the analysis of this survey any trawl with six or more traps was assumed to have two vertical lines unless otherwise stated by the respondent.

The 2006 survey was based on the 2004 surveys issued by the University of Maine but was modified following discussions with the DMR gear specialist and the DMR lobster biologist. The focus of this survey centered on the following questions: how many traps are fished, how many vertical lines are there, and what gear configuration is used by zone and distance from shore. The survey asked fishermen to identify their primary and secondary fishing zones (figure 2) and to provide the number of traps per vertical line they fish in each month for each of three distance ranges. The three distance ranges presented in the survey were zero to three miles, three to twelve miles and outside twelve miles from shore. See Appendix A for a copy of the 2006 survey distributed by DMR.

Surveys were sent in early July 2006 to all of the 1,245 Maine lobstermen who were issued both a state lobster license and a federal lobster permit in 2006. Recipients were asked to fill out the survey and return it to the Department by the end of August. Table 1 shows the number of surveys sent, the number of respondents and the response rate.

Zone	Number of federal lobster permit holders	Number of Surveys Returned	Return Rate By Zone
A	268	40	14.9%
B	154	29	18.8%
C	155	37	23.9%
D	192	39	20.3%
E	132	22	16.7%
F	194	26	13.4%
G	150	23	15.3%
Total	1,245	216	17.3%

Results were entered into a database and analyzed by zone and distance from shore. The data was extrapolated to provide an overall estimate of vertical lines and trap configurations used for

all federally permitted Maine lobstermen. The question of how many traps per vertical line in the survey elicited two types of responses. One provided information on the number of traps per vertical line and the other provided the number of vertical lines. All respondents provided the total number of traps they fished by month and zone. For those who provided total number of vertical lines instead of traps per line, the number of vertical lines was used to calculate the trap configuration that would use the vertical lines indicated. For the other responses, the number of traps per vertical line was used to calculate trap configuration and the number of vertical lines in the water.

Results

By combining the results from each zone one can get an overview of the number of vertical lines and trap configurations used at each of the three distance ranges from shore. The density of vertical lines coast wide can be seen in figure 2. It is important to note that there are additional fishermen who can only fish in state waters (inside 3 miles) who were not polled in this study. Therefore all results presented for the inshore range reflect only a portion of the existing effort.

The results of this study confirm anecdotal information on the temporal and spatial variation in fishing patterns along the coast as well as support the near shore results seen in Brooke (2005). **Figure 3** shows the extrapolated number of vertical lines reported by survey respondents coast wide. There are more vertical lines in the water in the summer months than in the winter, and most are inside three miles from shore. There is variability in the number of vertical lines inside three miles over the course of the year showing seasonal fishing patterns with fewer occurring in the winter and more in the summer. Alternatively, there is less variability within 3-12 miles for most of the year with vertical lines increasing slightly in the fall months. Lastly, there are even fewer vertical lines outside of 12 miles throughout the year than in the previously discussed ranges close to shore.

Figures 4, 5 and 6 show the various trap configurations used along the coast at each of the three distance ranges. The inshore range, 0-3 miles, yields a high number of traps being fished as pairs, though there are some triples and a few ten trap trawls (**figure 4**). In comparison, at 3-12 miles there is more variability in the configuration of traps, although there are still a substantial number of traps set as pairs (**figure 5**). In the offshore waters outside 12 miles, traps are primarily fished as long trawls with two vertical lines per trawl (**figure 6**). However, there are a number of fishermen who fish their gear as pairs in this offshore range.

Vertical lines by Zone

Zone A

Zone A respondents reported very few vertical lines inside 3 miles in January and February, totaling less than 1,000. There follows a steady increase in the number of vertical lines from March through August, until it peaks at nearly 70,000 vertical lines. After August the number of vertical lines inside 3 miles declines steadily, ending the year with about 11,000 vertical lines in the water (**figure 7**).

At 3-12 miles, respondents reported fewer than 10,000 vertical lines for January, February and March, increasing to roughly 20,000 vertical lines in the summer months before increasing again to over 30,000 vertical lines in October and November. A decline results in December and dips to about 27,000.

Outside of 12 miles there is a low number of vertical lines (below 6,000) throughout the year.

Zone B

Zone B respondents also reported few vertical lines inside 3 miles in January and February relative to the rest of the year. Similar to Zone A, results show a steady increase in the number of vertical lines starting in March, at about 4,000 vertical lines to a peak of roughly 40,000 in August before declining to about 11,000 in December (**figure 8**).

At 3-12 miles for the majority of the year there are between 5,000 and 10,000 vertical lines in the water. However, in September the number of vertical lines increases from about 14,000 to its peak in October at nearly 26,000. December declines slightly to about 23,000 vertical lines.

Outside 12 miles there is much less variation over the course of the year. There are less than 6,000 vertical lines in the water January through April. This is followed by a sharp decline to about 675 in August before increasing back to about 6,000 in December.

Zone C

Inside 3 miles 5,000 or less vertical lines were reported for January, February and March. There is a subsequent increase to about 24,000 vertical lines in April. This increase continues through July and August until the number of vertical lines peaks at about 55,000. October yields a decrease by almost half, to about 30,000, which continues down to about 11,000 in December (**figure 9**).

At 3-12 miles there is again much less variation in the number of vertical lines than inshore. There are 10,000 or fewer vertical lines in January, February and March. There is a brief peak in April with about 11,000 before the long decline to about 3,000 vertical lines in August. In the fall the number of vertical lines starts increasing again and data indicates that we end the year with about 20,000 vertical lines in December.

Outside 12 miles, Zone C respondents report using fewer than 4,000 vertical lines throughout the year. That number shrinks to less than 3,000 for March through October.

Zone D

At 0-3 miles respondents reported less than 5,000 vertical lines in January, February and March. As in other zones there is an increase in April to roughly 32,000 vertical lines, which then continues to increase steadily to the coast wide peak of nearly 95,000 vertical lines in July. The number of vertical lines then declines steadily through the rest of the year to end in December with approximately 21,000 vertical lines in the water (**figure 10**).

At 3-12 miles there is less variability through the year. The year starts with about 15,000 vertical lines in January and then declines to about 10,000 in February and March. There is a

brief peak at 21,000 in April but then a drop to a low of about 5,500 vertical lines in July. This number edges up again through the fall months with respondents reporting about 14,000 in September, 21,000 in October, 31,000 in November and a peak of 32,000 in December.

Outside of 12 miles there are relatively few vertical lines. The months of January through April have the most vertical lines of the year, at between 5,000 and 10,000. From May through September it drops to a low of 1,000 vertical lines in September before increasing again to 3,500 in October, November and December.

Zone E

Inside of 3 miles respondents' reports indicated that there are fewer than 4,000 vertical lines January through March, but that number increases in April to about 15,000 and continues to increase to peak in July at roughly 52,000 vertical lines. After this peak, the number of vertical lines declines steadily through the following months and the year ends with about 15,000 in the water (**figure 11**).

From 3-12 miles there are fewer vertical lines than in the inshore zone. Results indicate that there are approximately 12,000 vertical lines in the water in January, which then decreases to about 5,500 in March. In April and May there is an increase to about 10,000 and a subsequent decline to less than 1,200 throughout the summer months. However, September sees a rise in the number of vertical lines and peaks at about 20,000 in December.

Outside of 12 miles there is less fishing effort and correspondingly fewer vertical lines throughout the year. There are fewer than 5,000 vertical lines in the water in January and February, declining to below 2,000 for March and April and all the way to zero by June. There continues to be no fishing pressure recorded by this survey until November and December. The year ends with about 2,000 vertical lines in the water beyond 12 miles.

Zone F

Inside 3 miles data indicates that there are fewer than 4,000 vertical lines in January, February and March. The number doubles to roughly 8,400 by May and subsequently jumps to nearly 30,000 vertical lines in June with a peak in July of 42,000. A decline begins through the fall months and by the end of the year results indicate nearly 14,000 vertical lines are still in the water (**figure 12**).

From 3-12 miles the increase in the number of vertical lines is less dramatic with about 3,000 - 4,000 in the water from February through July and then increasing gradually, with a peak in November of about 9,600 vertical lines.

Outside 12 Miles it appears there is very little lobster fishing. Extrapolated data indicates that there are fewer than 1,000 vertical lines beyond 12 miles most of the year and fewer than 1,500 in the highest months of December, January and February.

Zone G

Zone G shows patterns in all three distance ranges that are very similar to the results from Zone F. The inshore zone yields 1,000 to 1,500 vertical lines in the water in January, February and

March, but there is a sharp increase to about 18,000 in April. This number continues to increase steadily and peaks in July at about 42,000 vertical lines before declining steadily to about 18,000 in November. The decline in vertical lines continues through December and only about 1,400 vertical lines are estimated to be in the water in January (**figure 13**).

At 3-12 miles the numbers of vertical lines is again similar to Zone F. In January there are about 12,600 in this range but the number declines and remains steady at 7-8,000 through May. In June the number of vertical lines drops to about 4500 for the months of June and July before starting to increase. By October vertical lines have peaked at about 18,000 before a subsequent decline to about 16,000 in December.

Outside 12 miles there are relatively few vertical lines reported. In January data indicates roughly 3,600 vertical lines, which eventually declines to zero in June. It stays at zero through August and then the extrapolated data indicates only a few hundred vertical lines in September and October, increasing to about 3,000 in December.

Trap Configurations

Zone A

Figure x indicates that in January nearly 60% of traps are fished as triples and 4 trap trawls but in March through November more than 50% of traps are fished as pairs. The majority of the rest of the traps during this time are fished as triples. A small percentage of traps are fished as four to eight trap trawls and there are no configurations inside 0-3 miles longer than a 12 trap trawl (**figure 14**).

At 3-12 miles for most of the year about 50% of traps are fished as pairs and triples, with the other half being fished as 10, 12 and 15 trap trawls. The exception is in January and February when roughly 40-50% of traps in this range are fished as triples, and four, five and six trap trawls, while the other 50% are fished as 10, 12 or 15 trap trawls (**figure 15**).

Outside 12 miles 50% or more of the traps are set in trawls with at least 10 traps with less than 10% fished as pairs. Again the exception to this is in January, February and March when about 20% of traps are fished as pairs (**figure 16**).

Zone B

In Zone B inside 3 miles at least 90% of the traps are fished as pairs. June and July are an exception to that trend. During this time roughly 25% of traps are fished as singles and almost 20% are fished as triples. In August and September the results show about 30% of traps are fished as singles and triples, while 70% are fished as pairs (**figure 17**).

At 3-12 miles there is more variability in the trap configuration. At least 50% of traps fished in this range are fished as pairs in every month. About 30% are set as triples in January, February and March and about 20% of traps are set this way in October, November and December. The data indicates that fishermen do use 10 trap trawls throughout the year. Roughly 10-15% of traps are set as 10 trap trawls in October through February and about 25-30% of traps are set this way in the spring months of April, May and June (**figure 18**).

Outside of 12 miles there is a dramatic difference in the trap configuration used from those used in the waters closer to shore. Beyond 12 miles 50% of the traps are rigged as 10 or 20 trap trawls, while pairs and triples represent less than 30% in January through June, 20% in the summer months, 35 to 50% in October, November and December (**figure 19**).

Zone C

At 0-3 miles respondents reported fishing traps set as pairs 100% of the time in January, February, March and December. During the busier fishing months of April through October, most of the traps are still set as pairs but roughly 15% of traps are fished as singles. In April, May and June 10-20% of traps are set as 20 trap trawls (**figure 20**).

At 3-12 miles more than 50% of all traps are set as pairs in every month of the year, and in August and September that percentage rises to 100%. 10 trap trawls are used in all months except August and September; roughly 35% of all traps are set as 10 trap trawls in January and February, 25% in December, only about 20% in March and April and about 12-15% in May, June, October and November. In April, May, October and November 5% to 15% of traps are set as 20 trap trawls and in June they account for 25% of all traps (**figure 21**).

Outside 12 miles variation exists in traps set throughout the year. In January through May up to 30% of traps are set as pairs, 20 to 30% are set as 10 trap trawls, 5 to 15% are set as 15 trap trawls and 30-40% are set as 20 trap trawls. In June, all traps are set as 10 trap trawls. There are no reports of effort in July and in August and September all traps in this range are set as pairs. In the fall there is a return of 15 and 20 trap trawls in addition to the pairs. About 40% of the traps set in October are pairs, about 25% of traps set in November are pairs and less than 20% of traps are set as pairs in December. 60% of traps are set as 15 and 20 trap trawls in October; roughly 80% are 10, 15 or 20 trap trawls in November and December (**figure 22**).

Zone D

Fishermen report fishing 100% of their traps at 0-3 miles as singles or pairs in all months except May, October, November and December. During these four months between 5 and 10% of traps are set as triples (**figure 23**).

At 3-12 miles fishermen report setting at least 80% of their traps as singles, pairs or triples with singles representing less than 10% of the traps in any month. 25 to 50% of traps are set as triples in January, February, March, and roughly 20 to 25% of traps are set as triples in April, May, October, November and December. The preferred configuration of traps in this zone and range is clearly pairs and triples, with pairs accounting for over 80% of traps set in June, July, August and September (**figure 24**).

Outside 12 miles, from October through June 15% to 30% of traps are set as 8, 10 and 20 trap trawls. In most months the other 70-85% of traps are set as pairs or triples. In July and August all traps in this range are set as pairs (**figure 25**).

Zone E

At 0-3 miles fishermen still prefer to fish at least 50% of their traps as singles, pairs or triples in January, and it is only in February and March when roughly 65% of traps are set as 6 trap trawls. From April through the end of the year more than 75% of traps are set as singles, pairs or triples. Traps set as 6 and 8 trap trawls account for the remaining percentage of traps in April, September, October, November and December. Similar to patterns in other zones, 100% of traps fished in June and July are fished as singles, pairs or triples (**figure 26**).

At 3-12 miles the pattern is very similar to the inshore. Generally speaking, except in October, November and December more than 70% of all traps set are fished as singles, pairs or triples. The remaining traps are set as 6, 8 and 10 trap trawls. Again, in June and July 100% of traps in this range are fished as pairs (**figure 27**).

Outside 12 miles fishermen are setting roughly 50% of their traps as pairs and triples for the months of January through April. The other 50% of traps in those months are set as 6, 8 and 10 trap trawls, with 8 trap trawls being preferred. No reports were made of effort from July through November. In November and December there is a return of 6 and 8 trap trawls mixed with about 30% set as pairs and triples (**figure 28**).

Zone F

In Zone F at 0-3 miles a complicated patchwork of trap configurations exists. In the months of January, February, March and April at least 40% of traps are fished as singles, pairs or trawls. In May and June only about 10% of traps are fished as triples, with most being fished as 10 or 12 trap trawls. In July through the end of the year traps are set primarily in trawls with at least 5 traps, with the data indicating they are set as 6, 8, 10, 12, and 20 trap trawls (**figure 29**).

At 3-12 miles in July and August 50-60% of traps are set as pairs, though the percentage declines significantly to less than 10% in September, October, November and December. Except for July and August, over 90% of traps are set in trawls ranging in length from 6 to 20 traps (**figure 30**).

Outside of 12 miles 100% of traps are set as 10 trap trawls in January through April, and in May 100% are set as 20 trap trawls. No fishing was reported outside 12 miles in June, July and August and fishermen rig 100% of their gear in 10 and 12 trap trawls in September through the rest of the year (**figure 31**).

Zone G

At 0-3 miles in all months of the year at least 60% of traps are fished as singles, pairs and triples. In February, June and July 100% of traps are fished in one of those three configurations. For the remaining months, 30 to 40% of the traps are rigged as 8 or 10 trap trawls (**figure 32**).

At 3-12 miles, less than 25% of traps are fished as singles, pairs or triples through the course of the year. In June, July and August roughly 60% of traps are fished as 8, 10, 12 or 20 trap trawls. Throughout the year about 5-10% of traps are fished as 6 trap trawls and from August through December there are about 5-10% of traps being fished as 4 trap trawls (**figure 33**).

Outside 12 miles fishing patterns are also varied. Traps are set as pairs at least 20 – 30% of the time in January, February and April. In May 100% of traps set are fished as pairs, but only 10-

15% of traps are set as pairs in November and December. In January, February, March, April, September, October, November and December at least 75% of traps are fished as trawls, generally over 10 traps long. Similar to results found in other zones, in June, July and August the data indicates that there is no fishing beyond 12 miles (**figure 34**).

Discussion

The major overriding patterns elucidated by this survey are ones that have been anecdotally known but not confirmed until the University of Maine survey and the one presented here. The combination of data documented in the two studies underlines the seasonal and temporal predictability of the Maine lobster fishery. Fishing largely occurs in the summer months and the vast majority of vertical lines are found inside of three miles from shore. Although this survey targeted only federally permitted fishermen, it becomes clear that even given the option to fish outside of 3 miles, many prefer to fish within state waters for much of the year. This choice is driven in large part by where the target species is found. The seasonal migration of lobsters moves inshore in the spring and summer and subsequently returns to deeper waters offshore in the fall.

The seasonal nature of the lobster fishery is demonstrated across all zones through the state. Results show that lobstermen begin setting traps in the spring, (defined in this survey as April, May and June) and most are finished by the end of December. This is confirmed by the increase in the number of vertical lines that occurs in April across all zones. In Zones D to the west, the number of vertical lines peak in July, and in Zones C to the east, the peak occurs in August. Following this peak in mid-summer, the number of vertical lines declines slowly through the months of October, November and December. Inside 3 miles, the presence of vertical lines in January, February and March demonstrates that there are indeed people fishing, however, there are far fewer than in the summer. Over the course of the year, the number of vertical lines recorded gives a reliable idea of how much fishing is occurring. Data reported here suggests that many fishermen are setting their gear in the spring, fishing hard through the summer and fall and subsequently moving their gear offshore or taking it in altogether in winter.

This idea of a seasonal spatial migration of both lobsters and thus lobster gear is seen in the patterns of vertical lines set greater than 3 miles from shore. For instance, although the number of vertical lines fished at the 3-12 mile range is generally lower than the inshore zone, the number does peak in November in Zones A, B, C, F and G and in December for Zone D and E. This indicates that fishing in that 3-12 mile range occurs later in the year than its inshore counterpart. The same occurs in the range including areas greater than 12 miles from shore. In Zones C, E, F and G there are zero vertical lines reported outside 12 miles in July, and in Zones F and G there are no vertical lines reported for August and September. This absence of effort suggests that not much fishing occurs beyond 12 miles in the summer months. This coincides with the peaks in the number of vertical lines inshore, further supporting the seasonal shift of gear. Additionally, traps in the ranges greater than 3 miles offshore are more likely to be fished in longer trawls, resulting in fewer vertical lines reported for these areas.

The number of vertical lines in the water is determined by the trap configuration, which in certain areas of the coast, is mandated by state law and/or regulation (**figure 2**). Many of the

patterns illustrated in this survey are a direct result of these laws and regulations. For instance, Zones B, C, D, and G show all traps inside 3 miles being fished as singles, pairs or triples. State rules require in these areas that all traps be fished with no more than three traps on a single vertical line. Any risk reduction measures involving vertical lines should take into consideration these restraints on the way gear is set in certain areas of the state. Requiring fishermen to set more traps on a single vertical line in order to reduce the number of lines in the water column would also take an act of legislation to change state laws. However, even in zones that do not have regulations limiting the number of traps per vertical line fishermen are choosing to fish a large part of their gear as singles, pairs, and triples during the most lucrative fishing months.

Next Steps

This survey was conducted in an effort to fill in gaps left by the survey completed in 2004 by the University of Maine. Because most of those gaps were left due to the lack of offshore data, polling fishermen holding federal permits largely filled those holes. These results combined show a comprehensive portrait of the seasonal and spatial patterns of fishing pressure in Maine coastal waters. Although this survey under reports the amount of vertical lines in the near shore areas (0-3 miles), it is reasonable to point out that this area is not where the overlap of sightings of the highly endangered North Atlantic right whale occurs (**figure 35**). However, DMR remains committed to protecting all endangered and threatened species in Maine waters while maintaining that an efficient lobster industry can coexist. To this end DMR plans to carry out intensive outreach with the results of this survey to invested industry members, scientists, managers and conservationists in an effort to open the door to an informed discussion of risk reduction measures. Workshops will be held to discuss the findings and brainstorm methods in which either the number of vertical lines can be reduced or those lines can be made less of an entanglement risk. Analysis will be done that will include documenting areas of high fishing pressure and therefore, density of vertical lines and overlaying those areas with historic whale sightings. Hot spots for entanglement risk can then be identified and used to concentrate discussion of risk reduction measures. The involvement of the industry as well as scientists and managers in this endeavor will be of vital importance towards reaching a solution that is viable for all parties. Additionally, this information can be used to identify areas where large whale foraging studies should be directed. Understanding the nature of the risk will be of vital importance in determining risk reduction measures that will achieve the desired results.

Works cited

Brooke, Samantha. 2005. Lobstermen, Lines, and Endangered Whales: Risk Reduction Measures for Coastal Maine. Master's thesis, University of Maine.

FIGURES

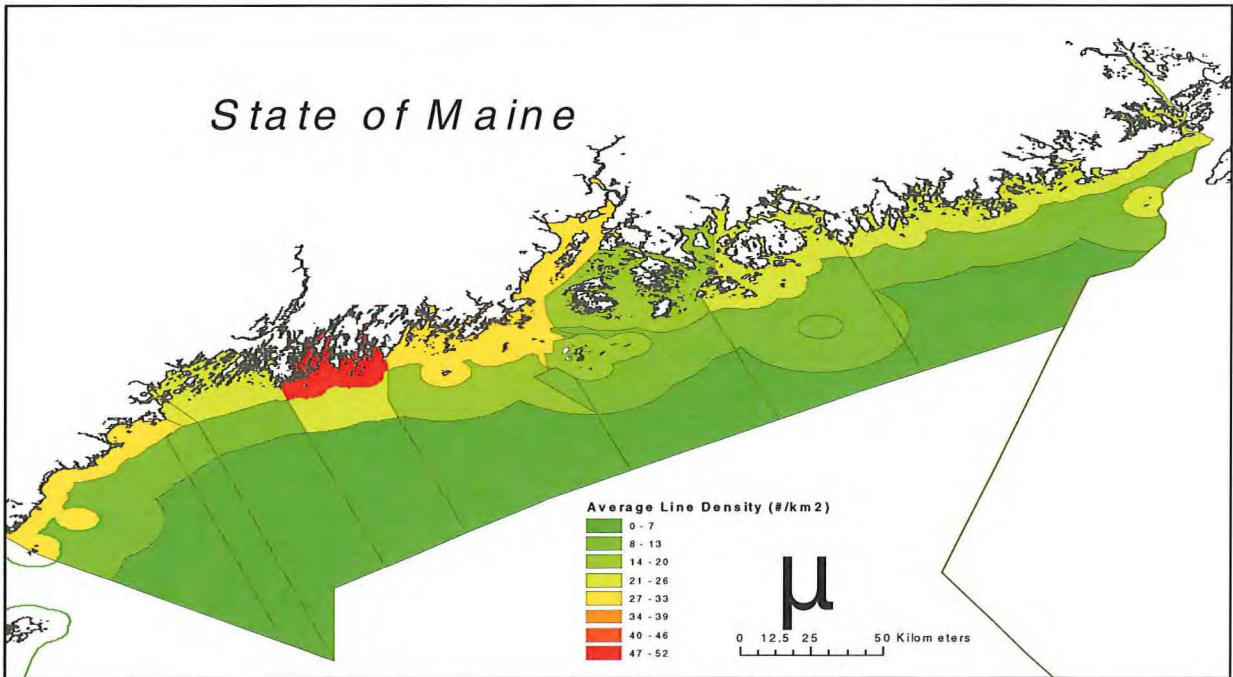


Figure 1. Density of Vertical Lines per Square Kilometer. Data extrapolated to represent all federally permitted lobstermen.

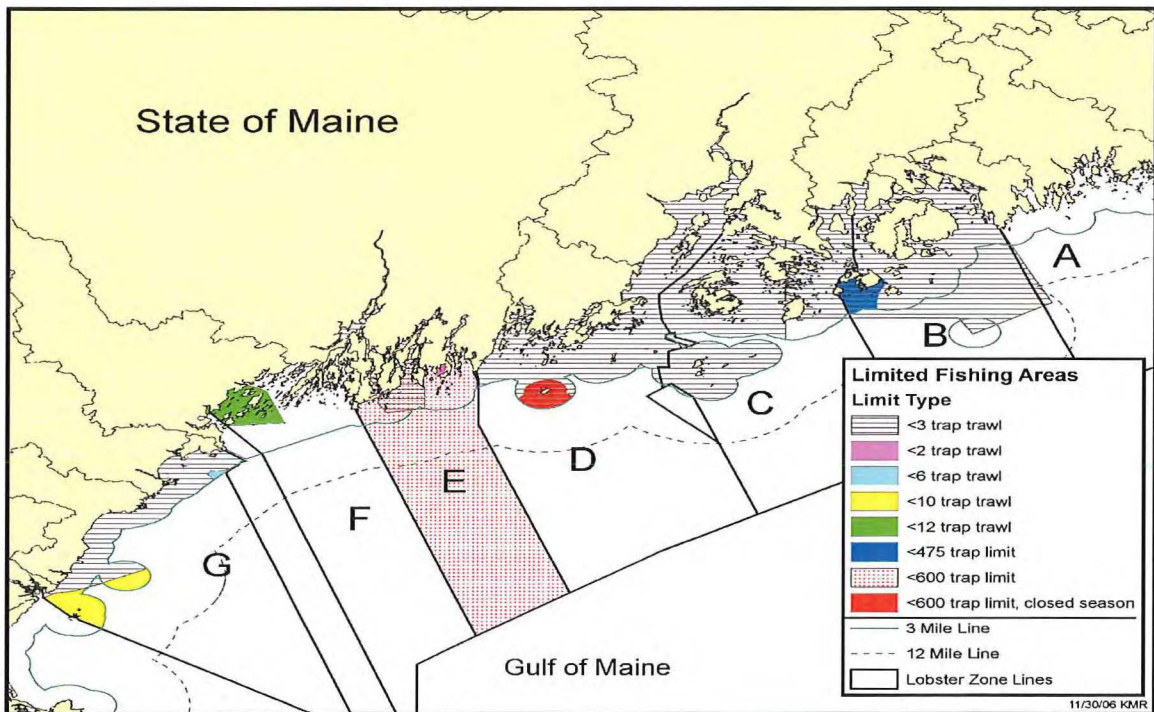


Figure 2. Map of the coast of Maine with lobster management zones and areas impacted by state regulation.

Number of Vertical Lines Coastwide Extrapolated to Represent All Federally Permitted Lobstermen

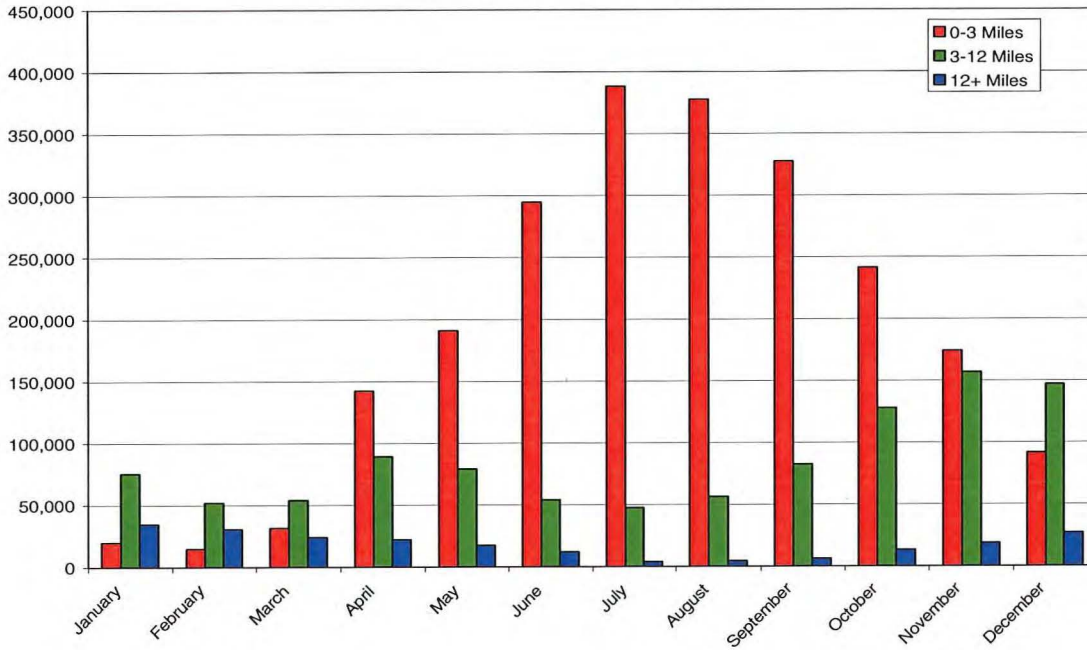


Figure 3. Number of Endlines Coastwide at each of three distance ranges.

Coastwide configuration Percentage Extrapolated to Represent All Federal Permit Holders Fishing at 0-3 Miles

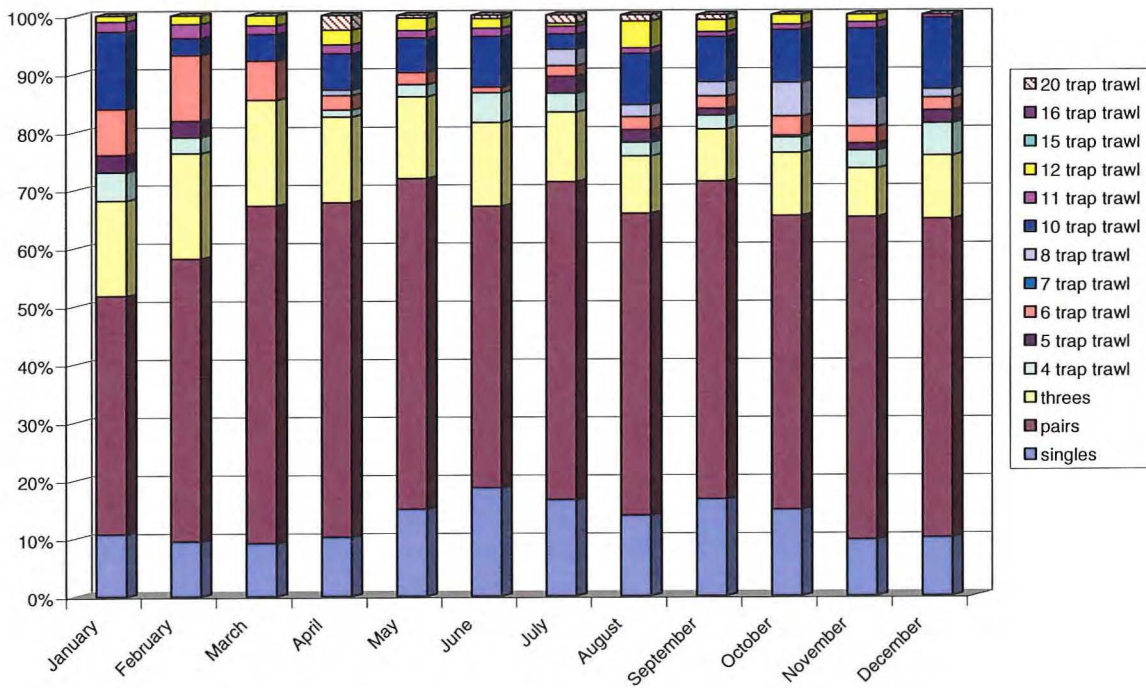


Figure 4. Trap Configurations Coastwide at 0-3 miles.

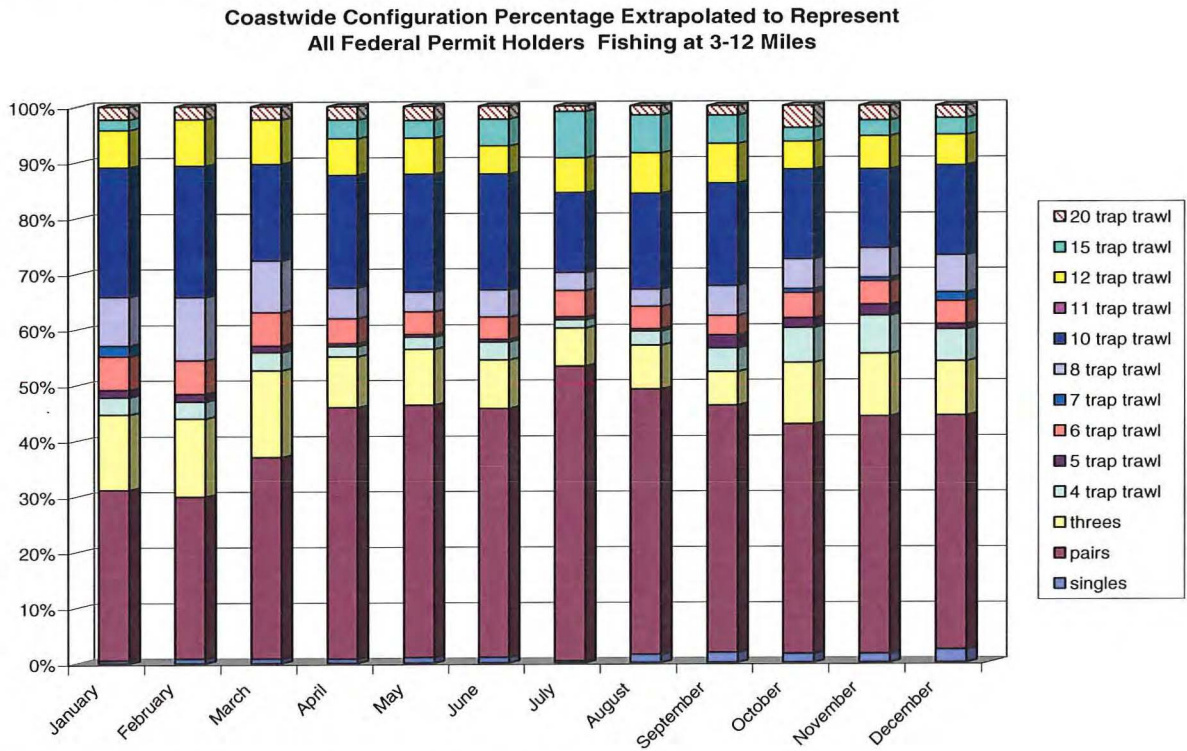


Figure 5. Trap Configurations Coastwide at 3-12 miles.

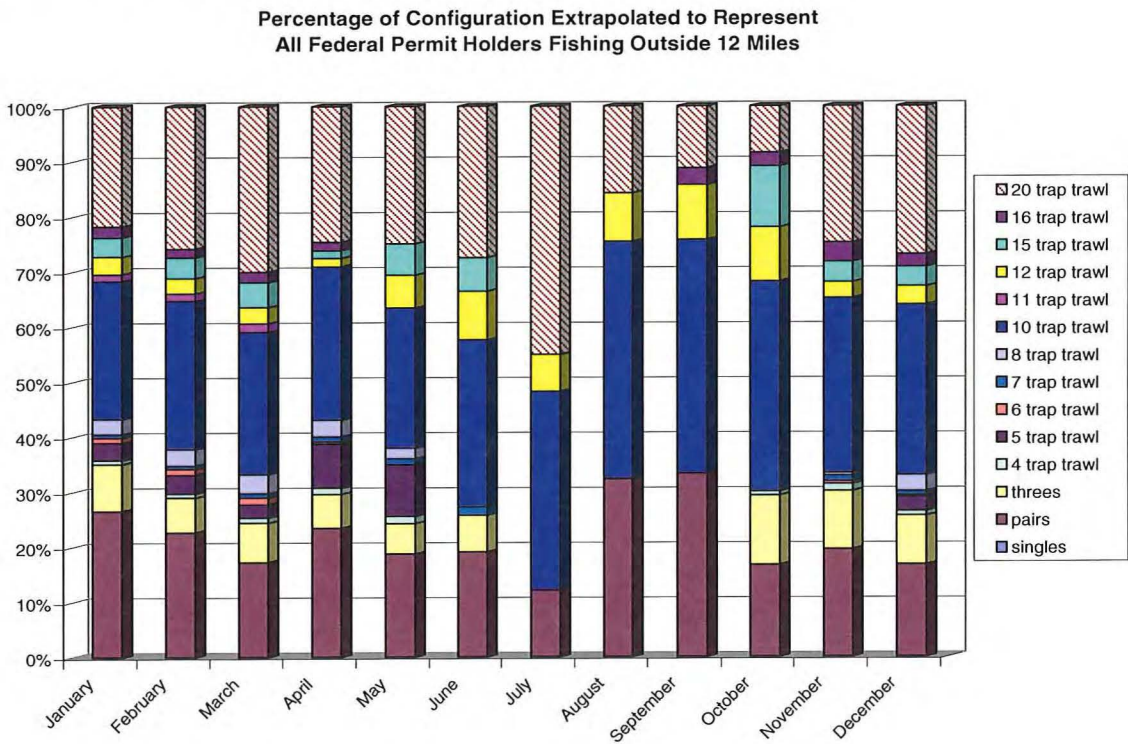


Figure 6. Trap Configuration Coastwide outside 12 miles.

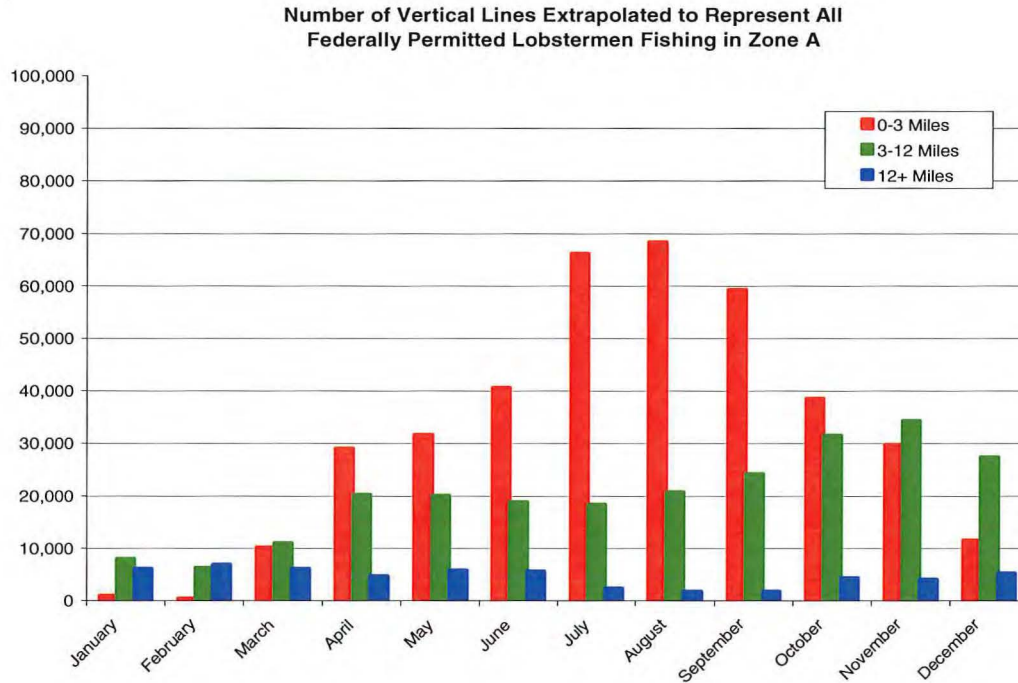


Figure 7. Vertical Lines in Zone A at all three distance ranges.

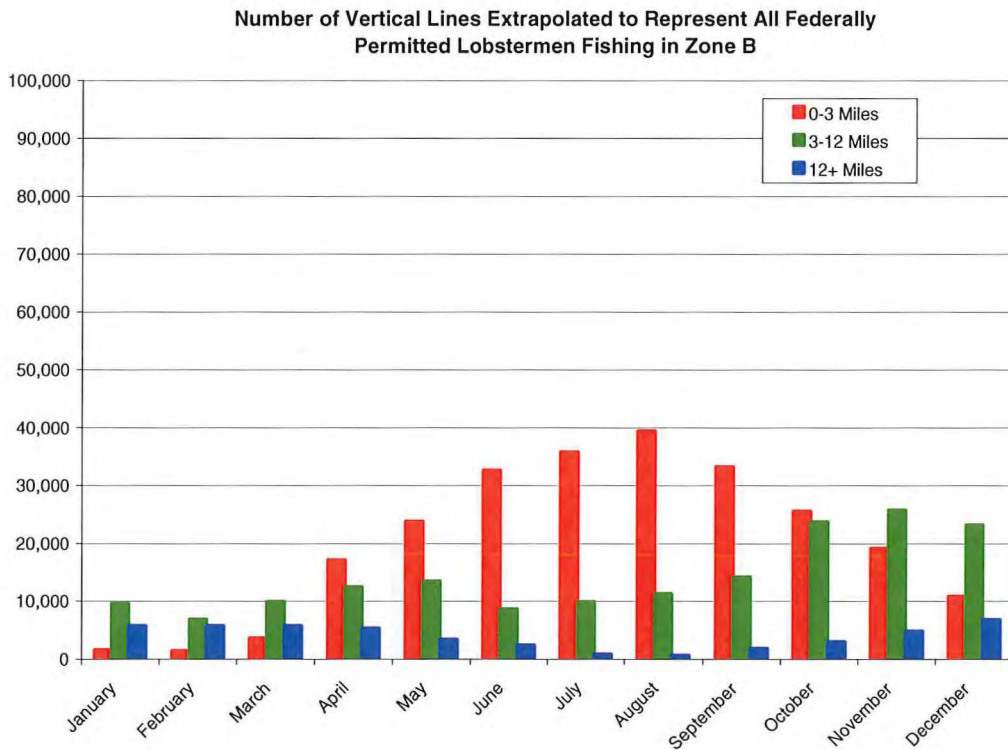


Figure 8. Vertical Lines in Zone B at all three distance ranges.

Number of Vertical Lines Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone C

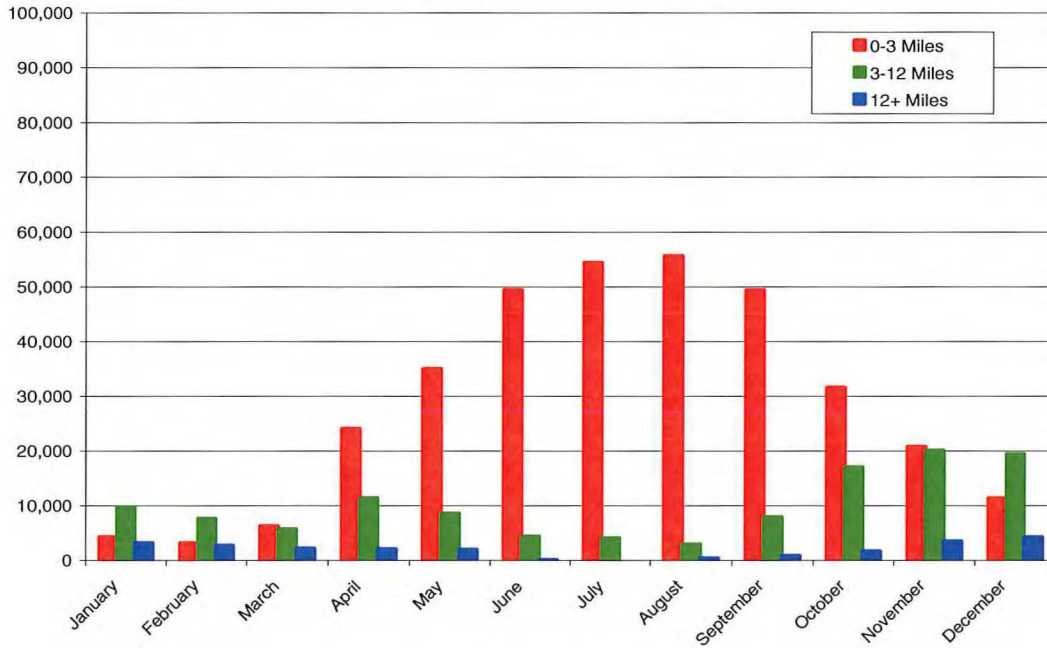


Figure 9. Vertical Lines in Zone C at all three distance ranges.

Number of Vertical Lines Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone D

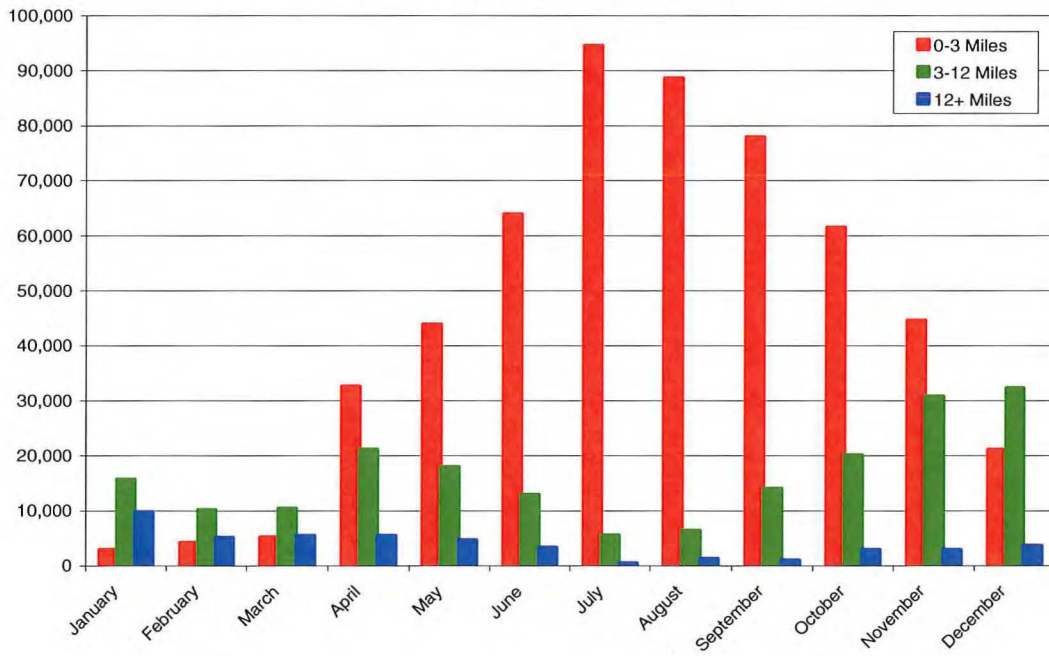


Figure 10. Vertical Lines in Zone D at all three distance ranges

Number of Vertical Lines Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone E

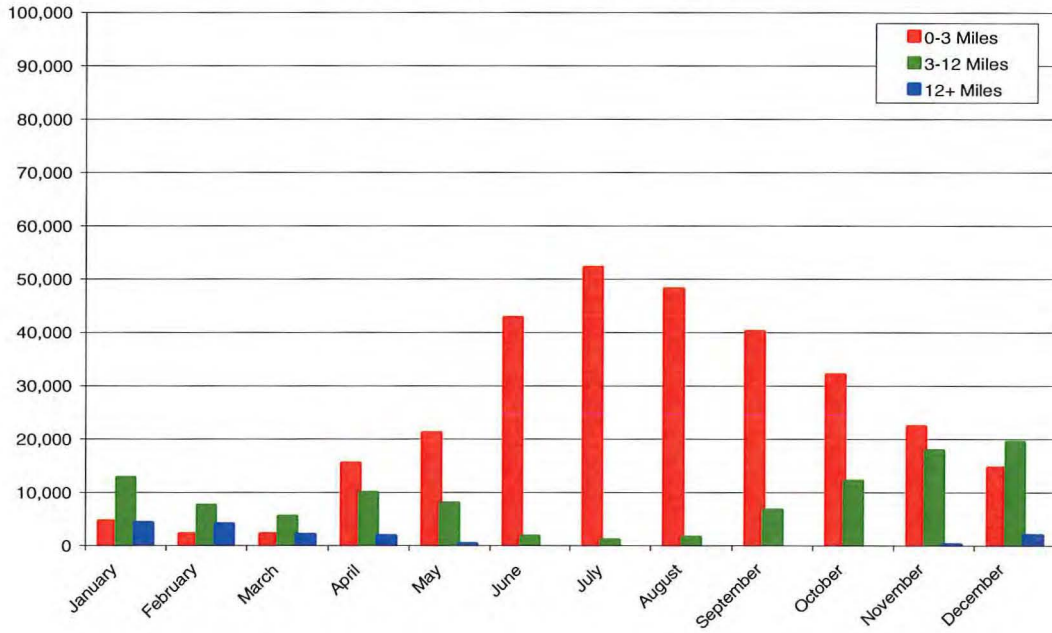


Figure 11. Vertical Lines at Zone E at all three distance ranges.

Number of Vertical Lines Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone F

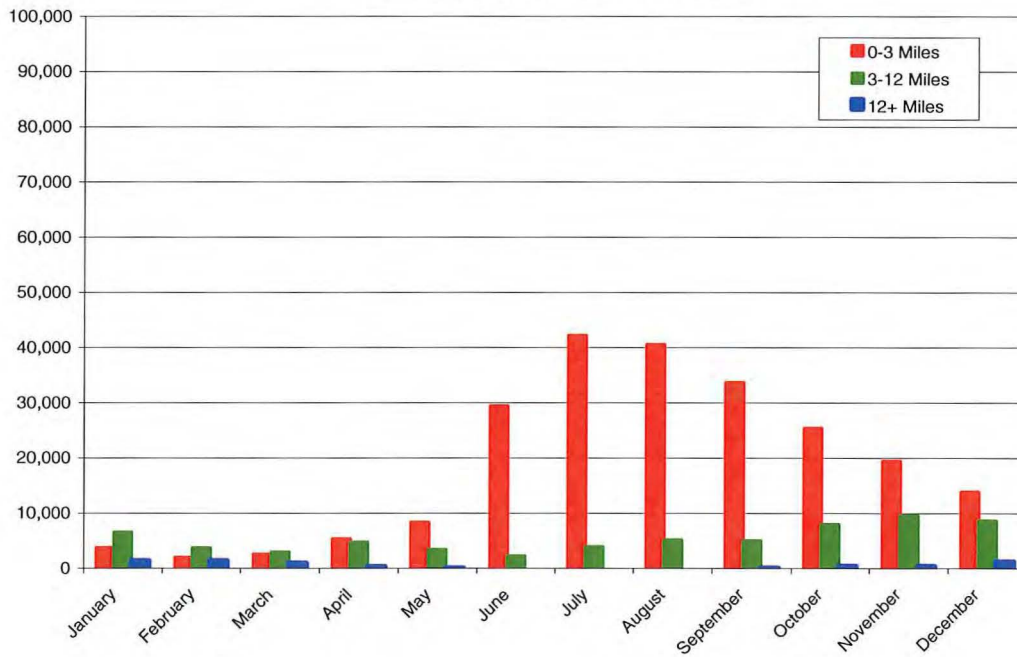


Figure 12. Vertical Lines in Zone F at all three distance ranges.

Number of Vertical Lines Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone G

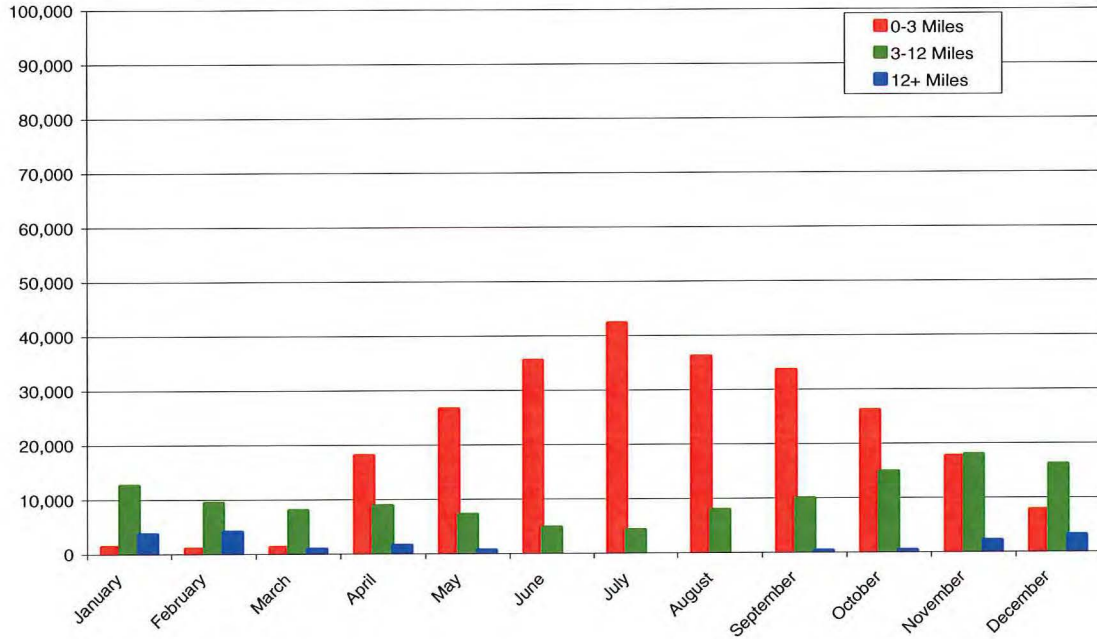


Figure 13. Vertical Lines in Zone G at all three distance ranges.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone A at 0-3 Miles

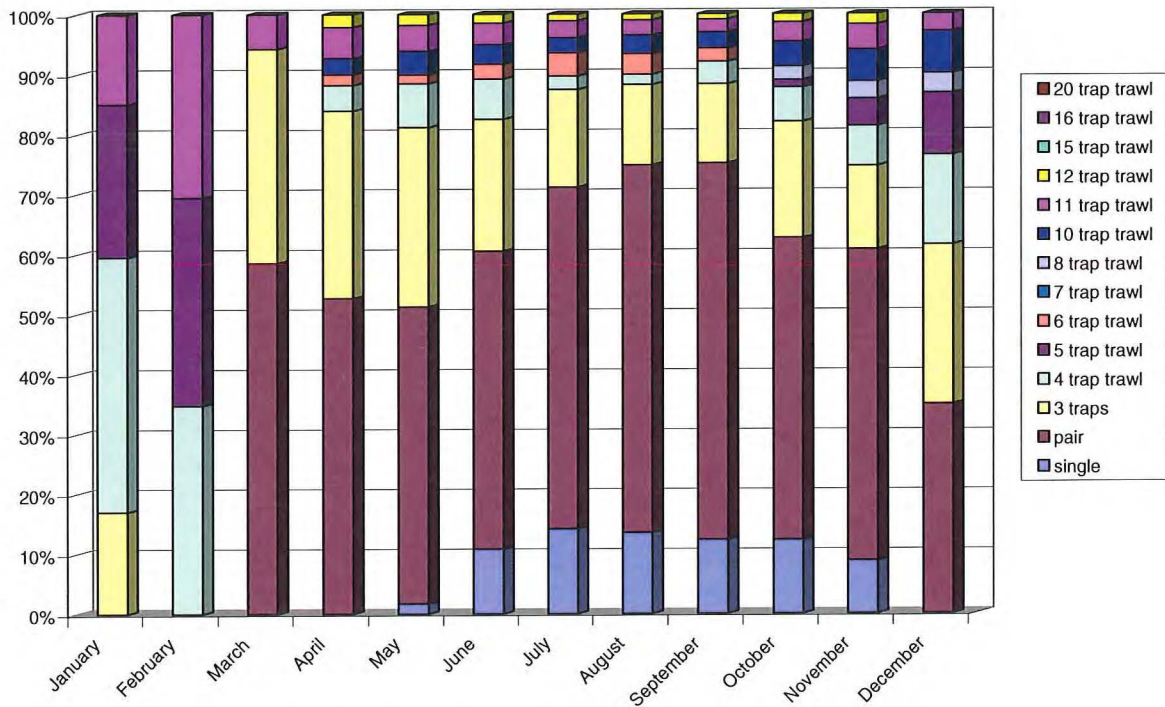


Figure 14. Trap Configurations in Zone A at 0-3 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone A at 3-12 Miles

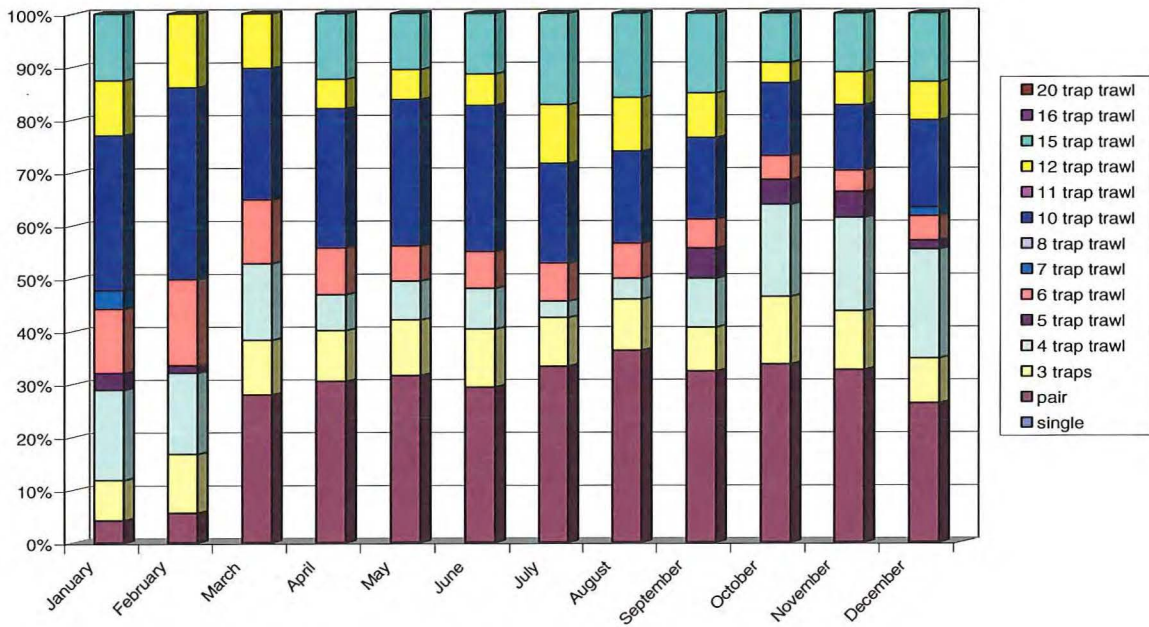


Figure 15. Trap Configurations in Zone A at 3-12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone A Outside 12 Miles

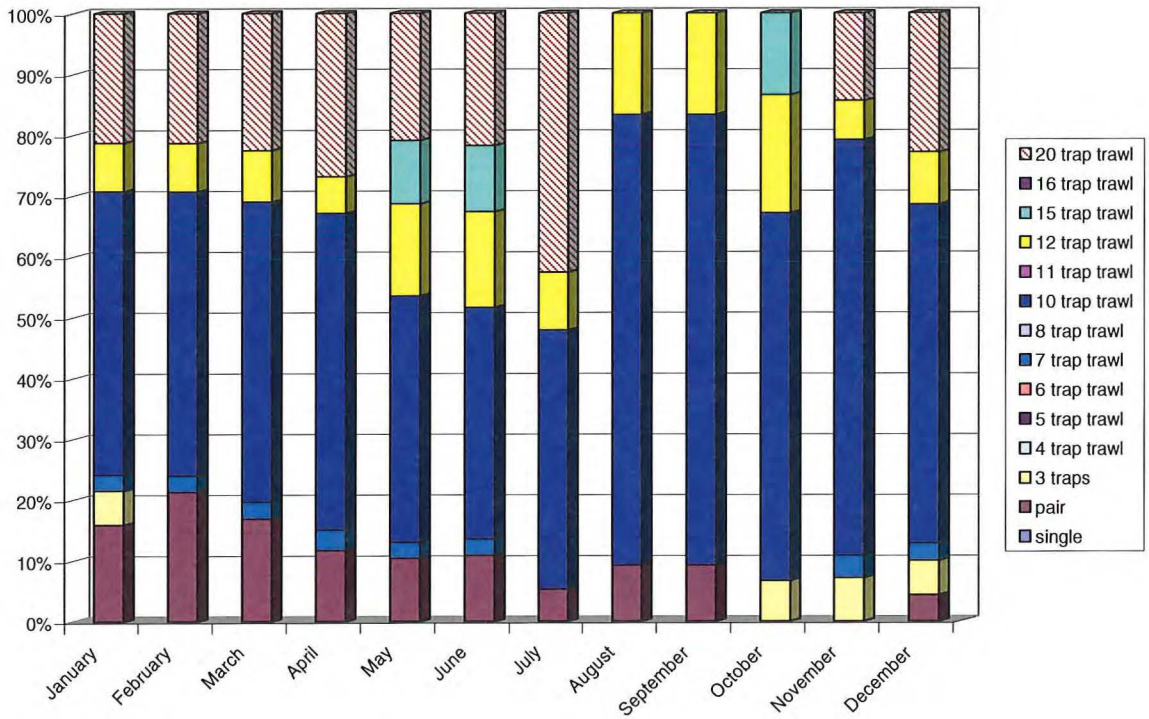


Figure 16. Trap Configurations in Zone A outside 12 miles.

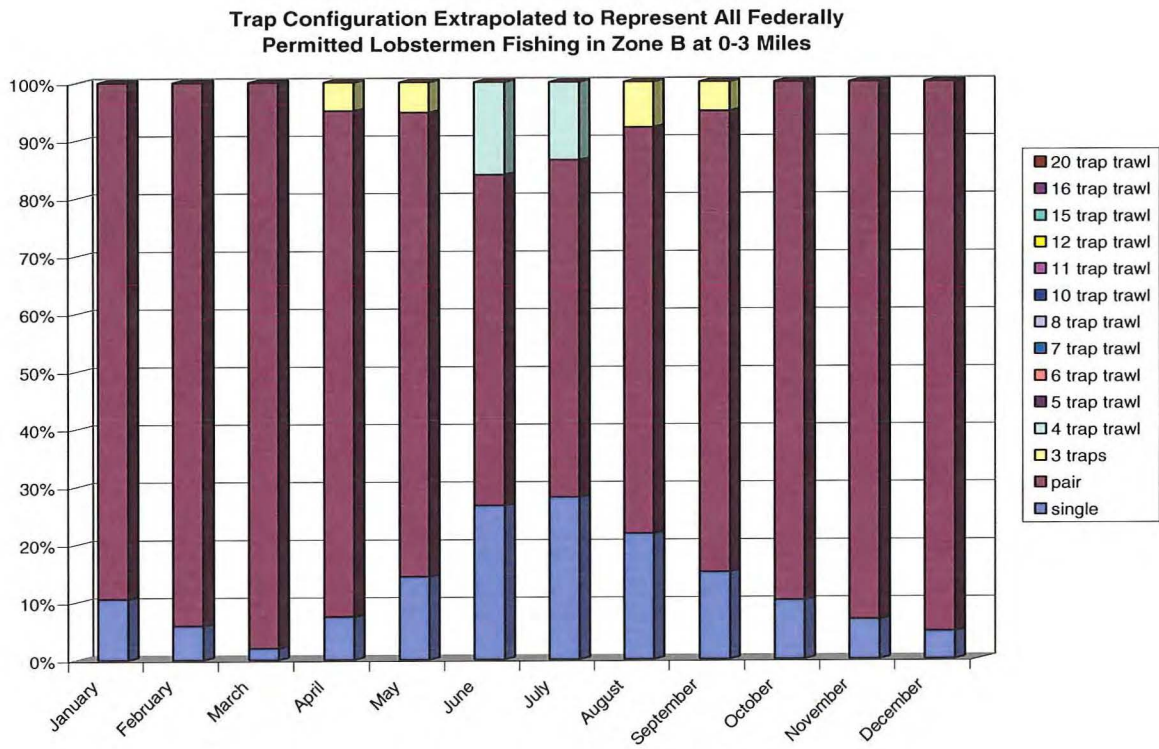


Figure 17. Trap Configurations in Zone B at 0-3 Miles.

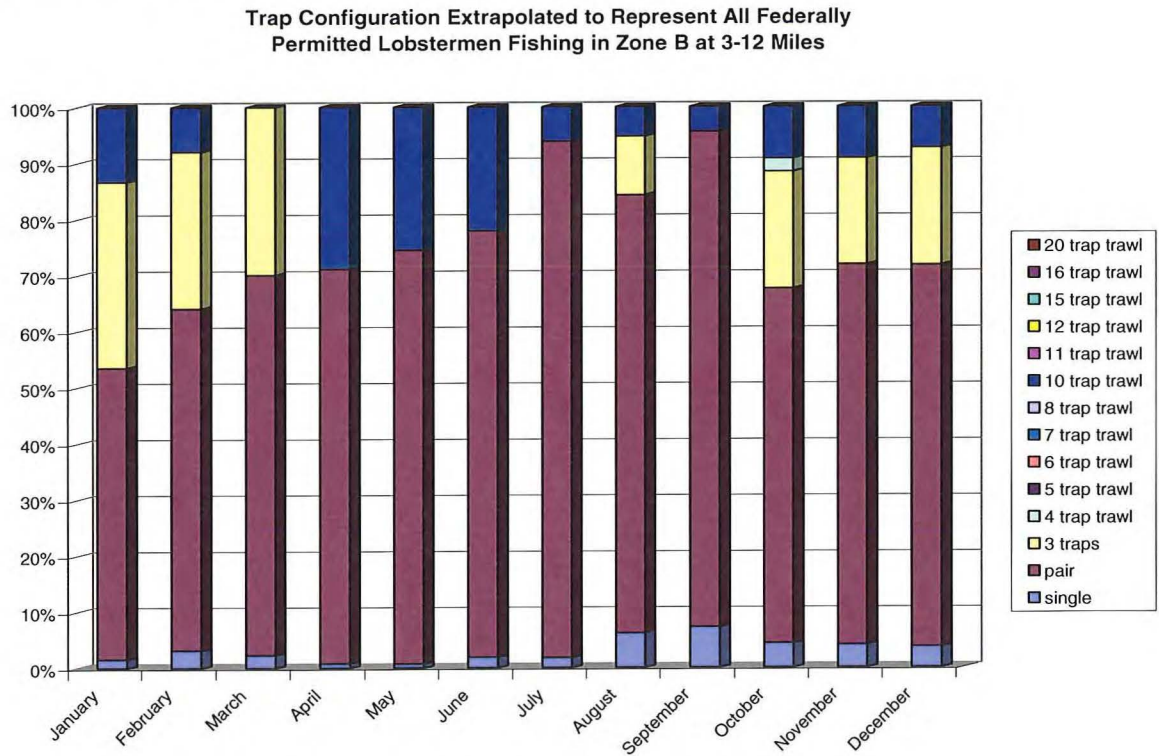


Figure 18. Trap Configurations in Zone B at 3-12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone B Outside 12 Miles

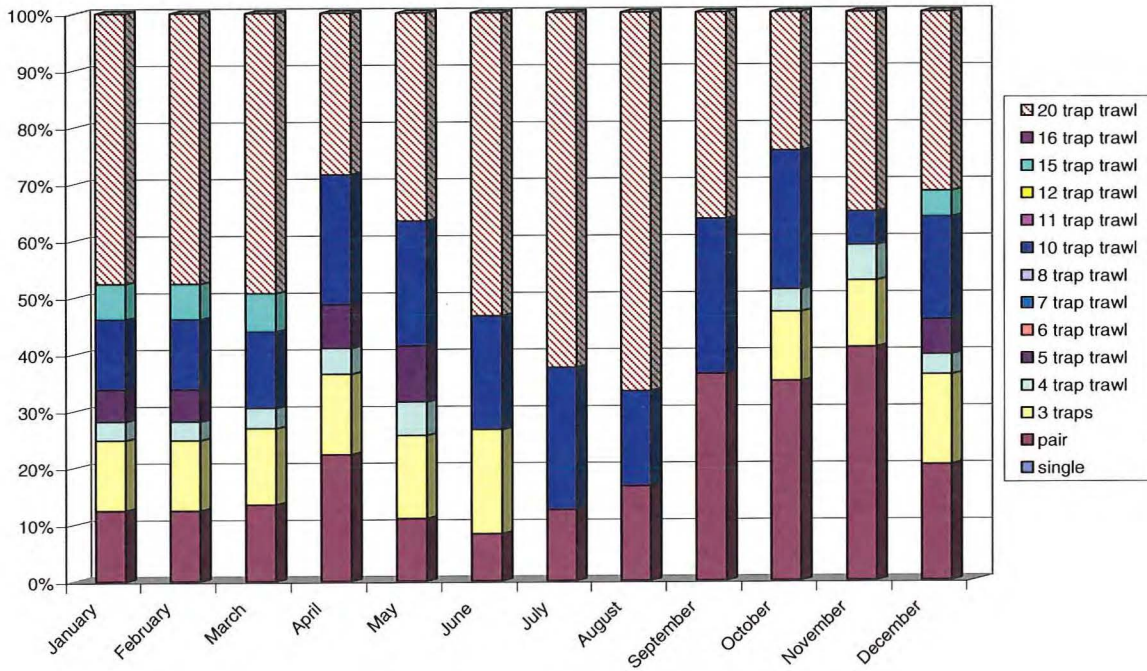


Figure 19. Trap Configurations in Zone B outside 12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone C at 0-3 Miles

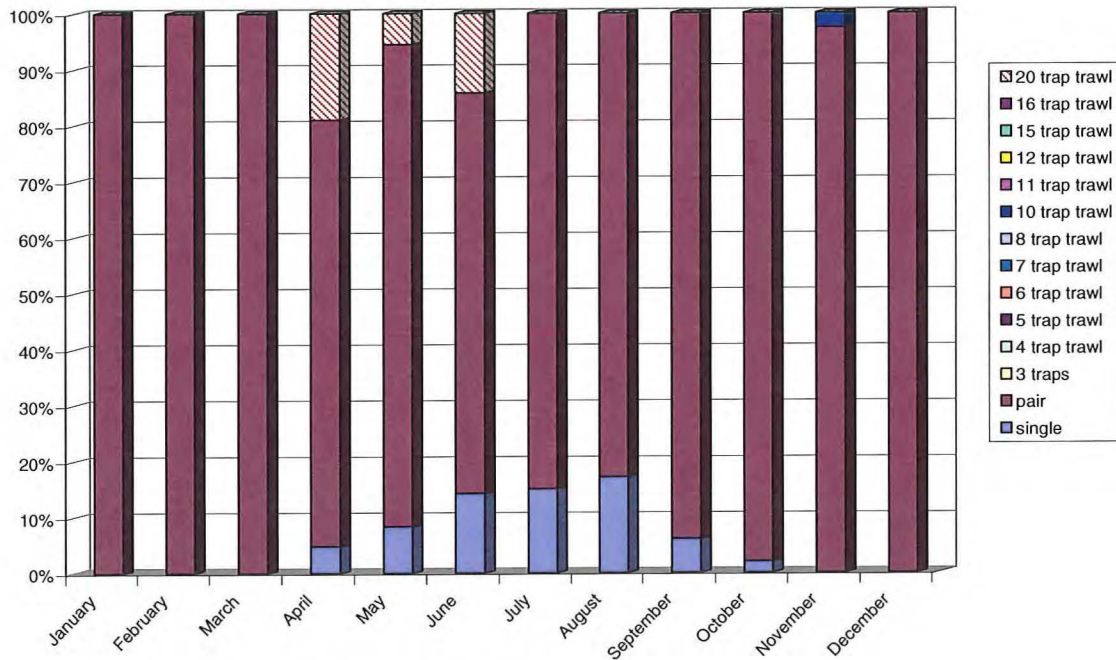


Figure 20. Trap Configurations in Zone C at 0-3 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone A at 3-12 Miles

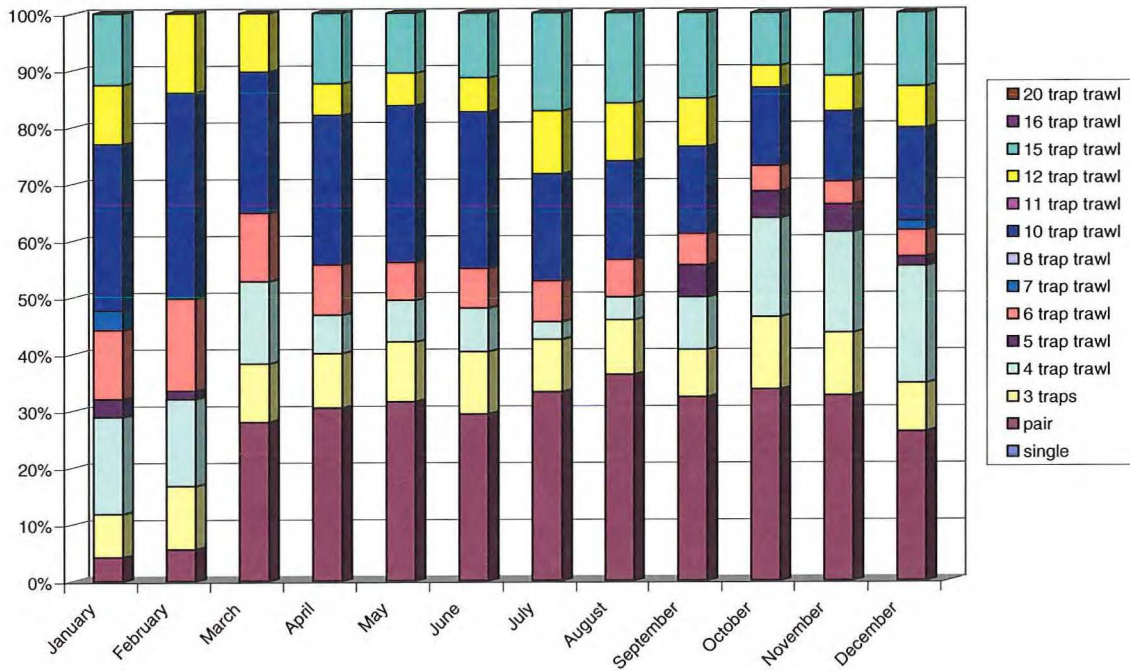


Figure 21. Trap Configurations in Zone C at 3-12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone C Outside 12 Miles

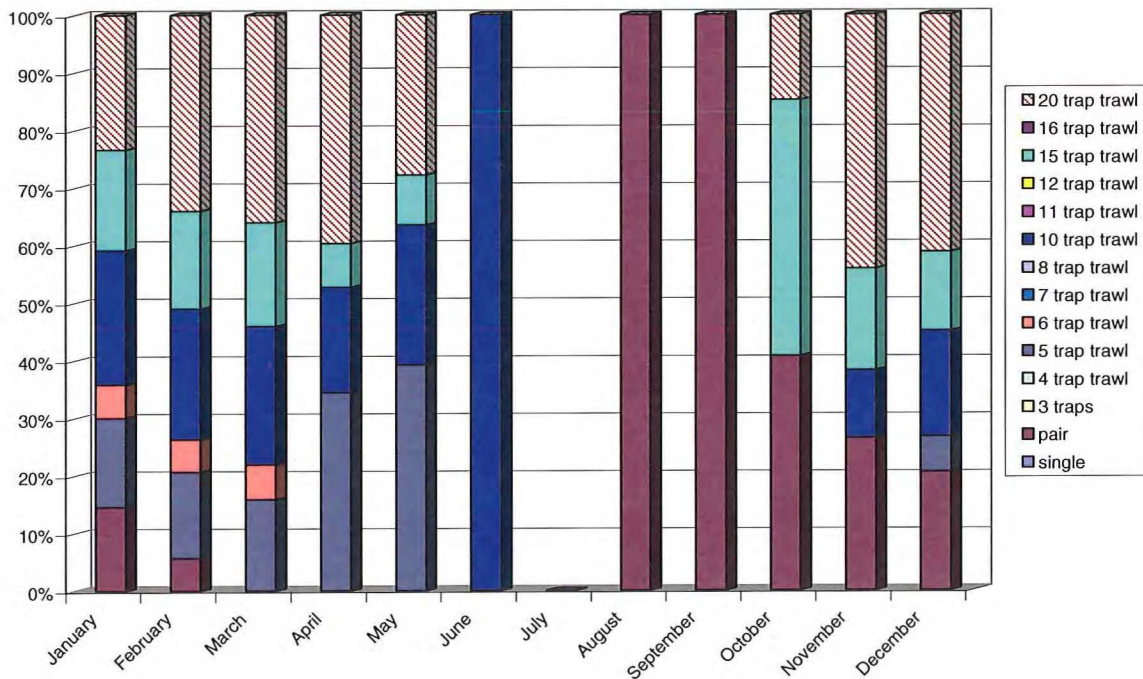


Figure 22. Trap Configurations in Zone C outside 12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone D at 0-3 Miles

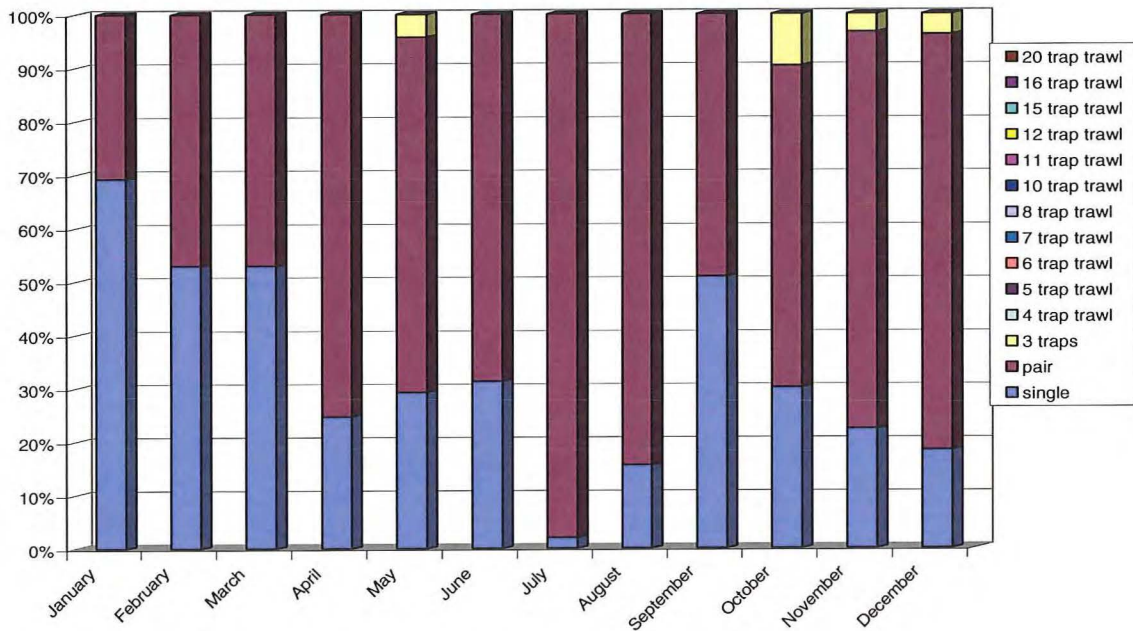


Figure 23. Trap Configuration in Zone D at 0-3 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone D at 3-12 Miles

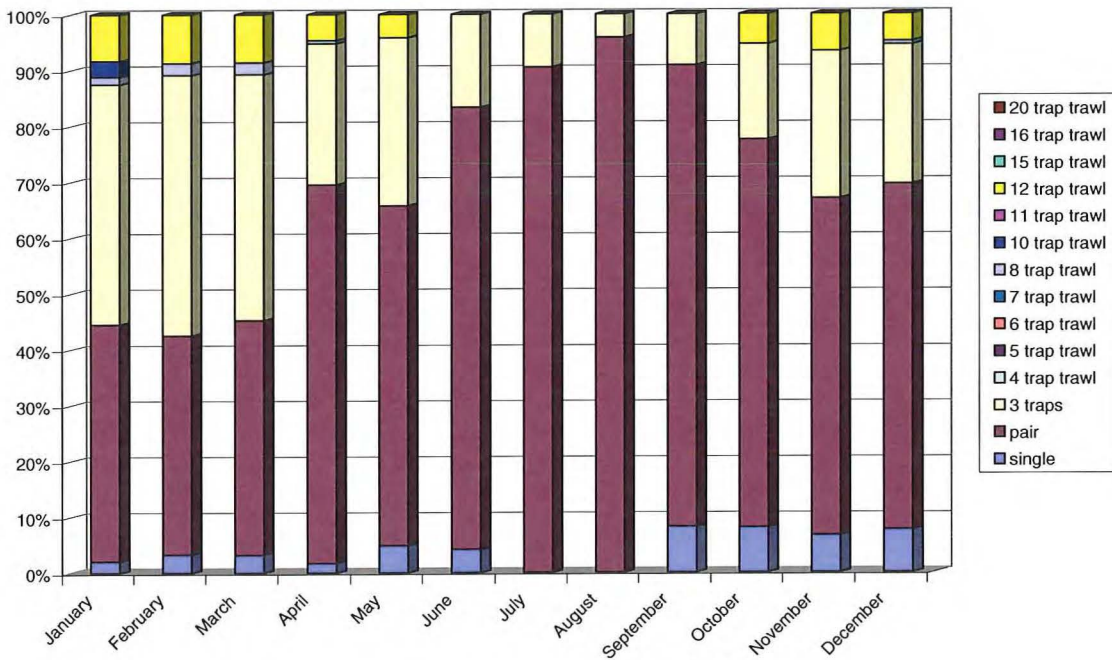


Figure 24. Trap Configurations in Zone D at 3-12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone D Outside 12 Miles

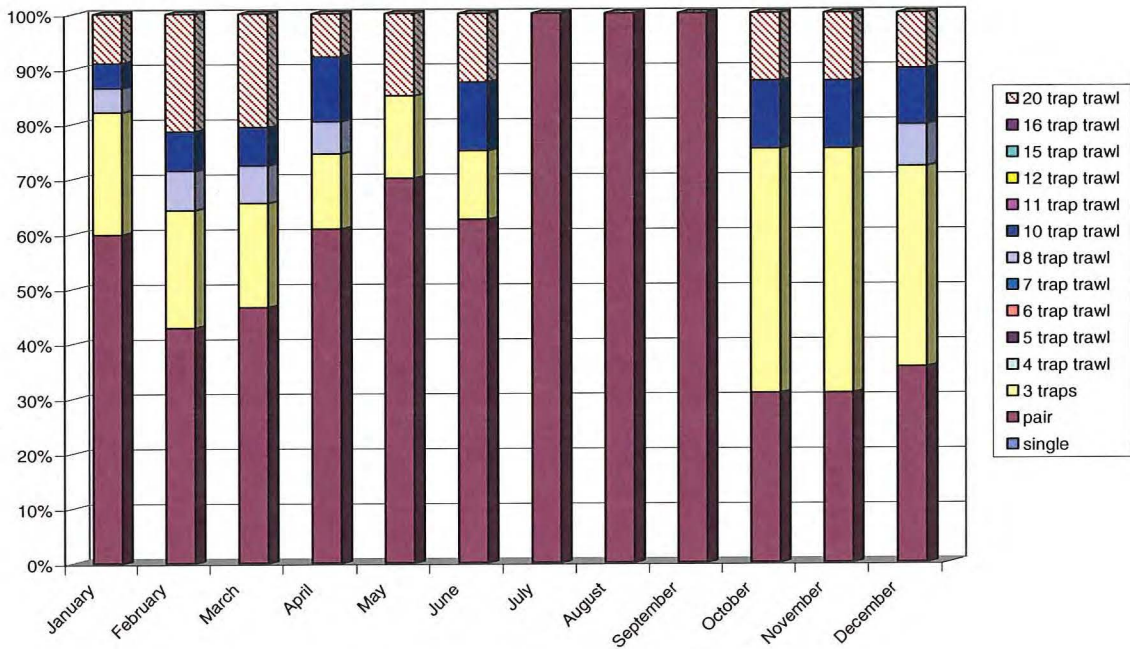


Figure 25. Trap Configurations in Zone D outside 12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone E at 0-3 Miles

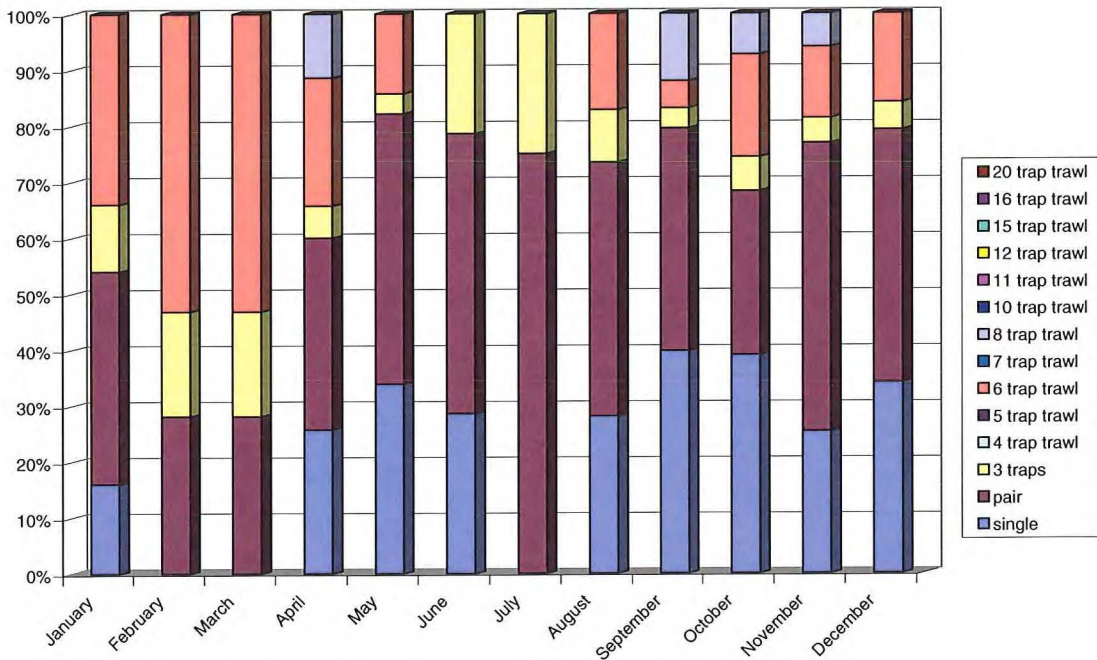


Figure 26. Trap Configuration in Zone E at 0-3 miles.

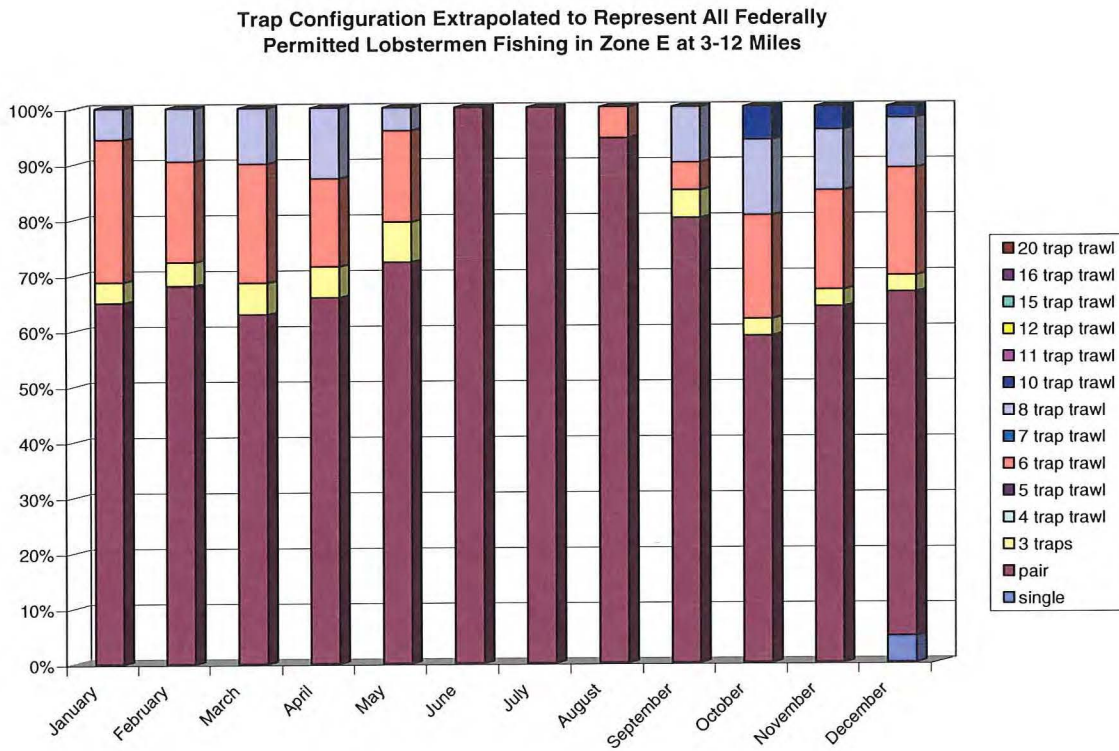


Figure 27. Trap Configuration in Zone E at 3-12 miles.

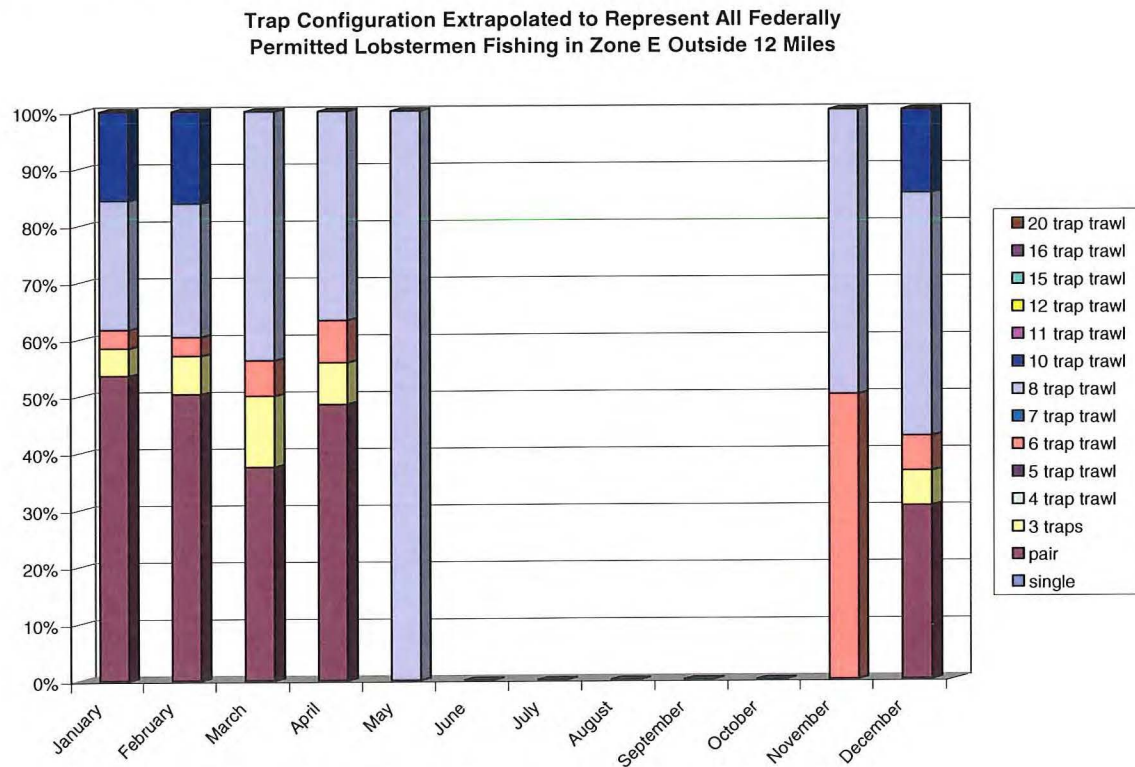


Figure 28. Trap Configuration in Zone E outside 12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone F at 0-3 Miles

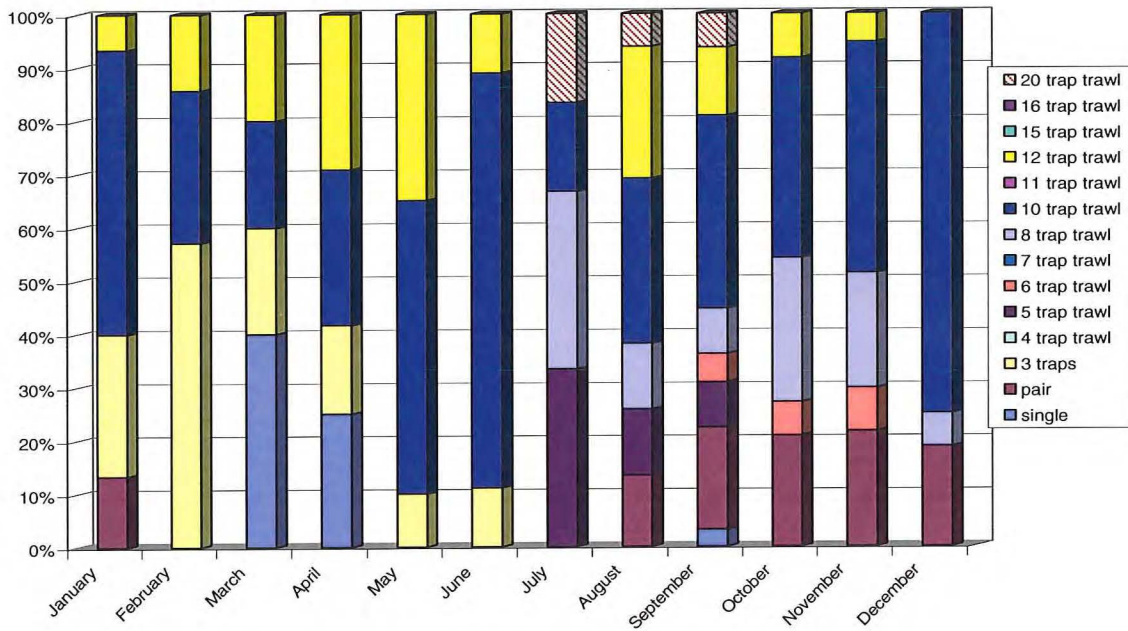


Figure 29. Trap Configuration in Zone F at 0-3 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone F at 3-12 Miles

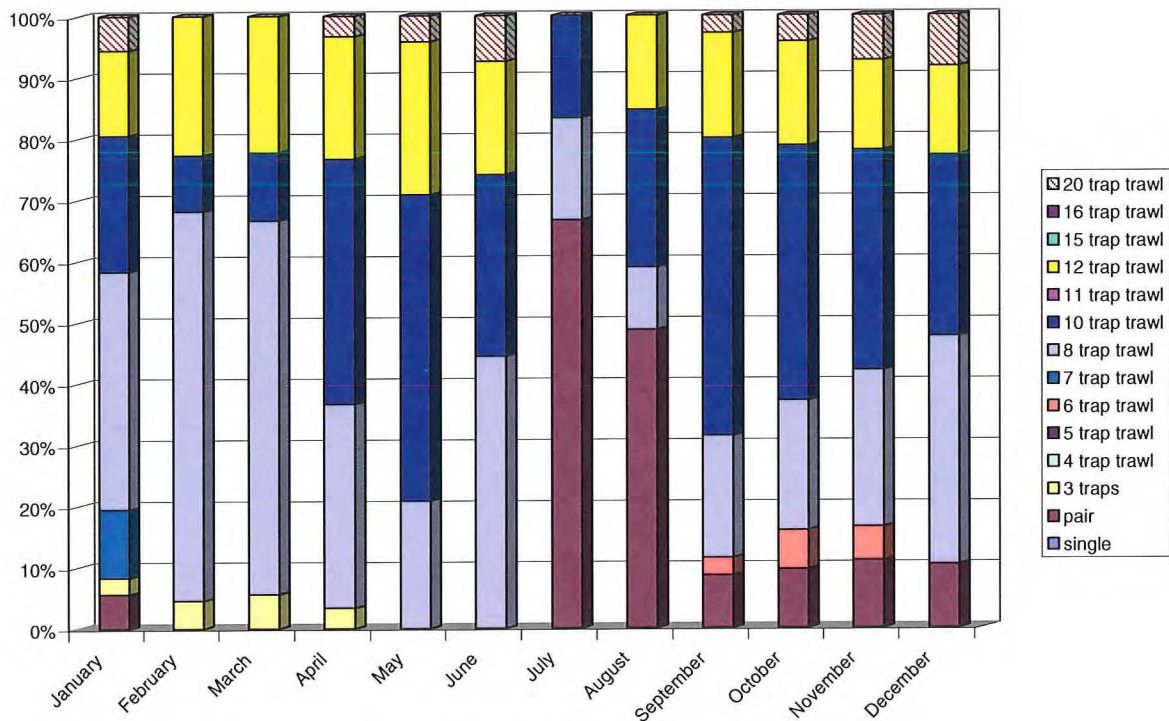


Figure 30. Trap Configuration in Zone F at 3-12 miles

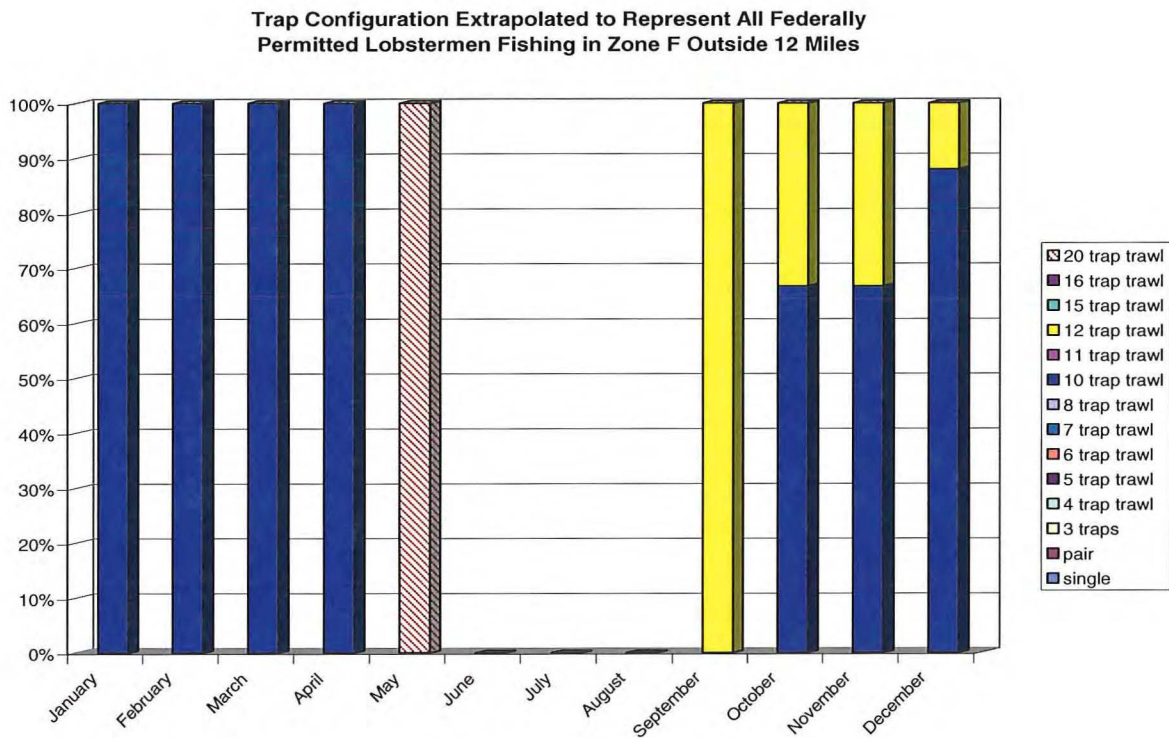


Figure 31. Trap Configuration in Zone F outside 12 miles.

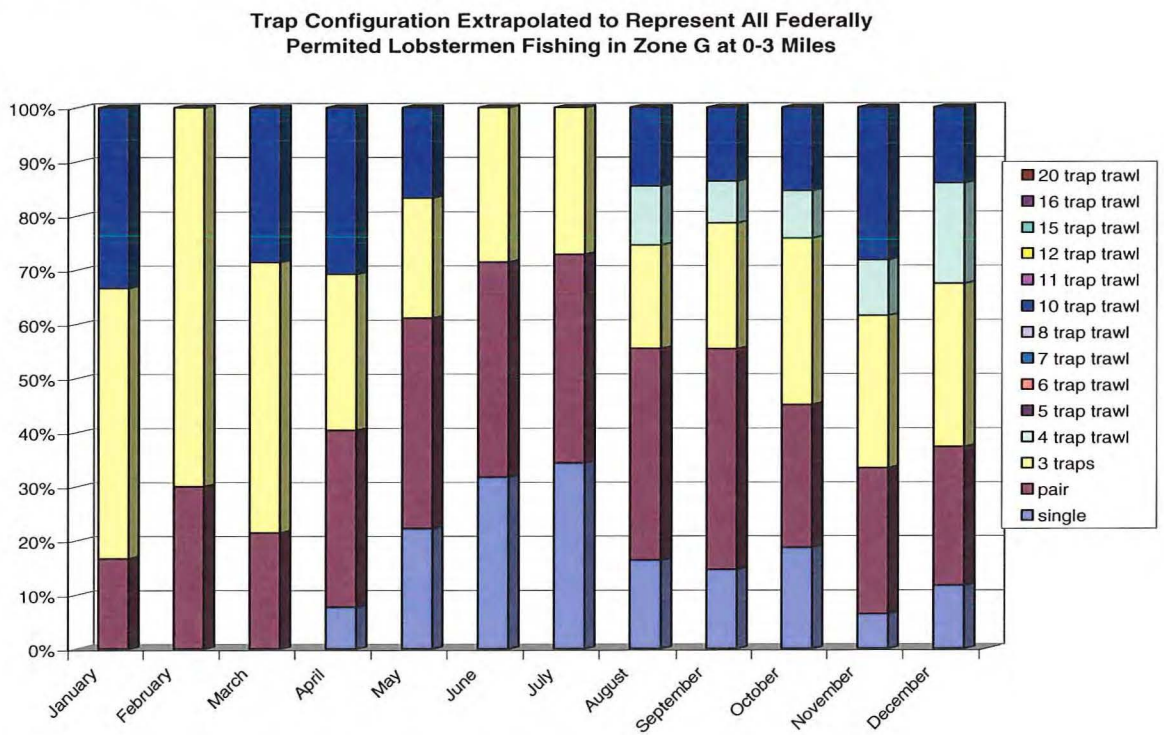


Figure 32. Trap Configuration in Zone G at 0-3 miles.

Trap Configuration Extrapolated to represent All Federally Permitted Lobstermen Fishing in Zone G at 3-12 Miles

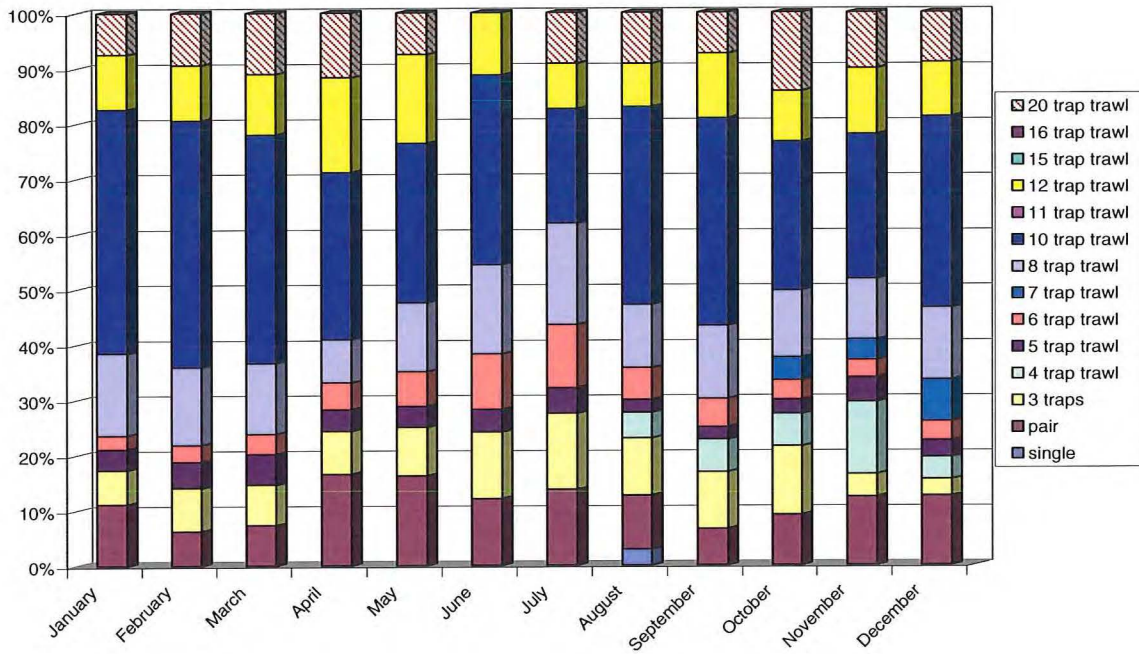


Figure 33. Trap Configuration in Zone G at 3-12 miles.

Trap Configuration Extrapolated to Represent All Federally Permitted Lobstermen Fishing in Zone G Outside 12 Miles

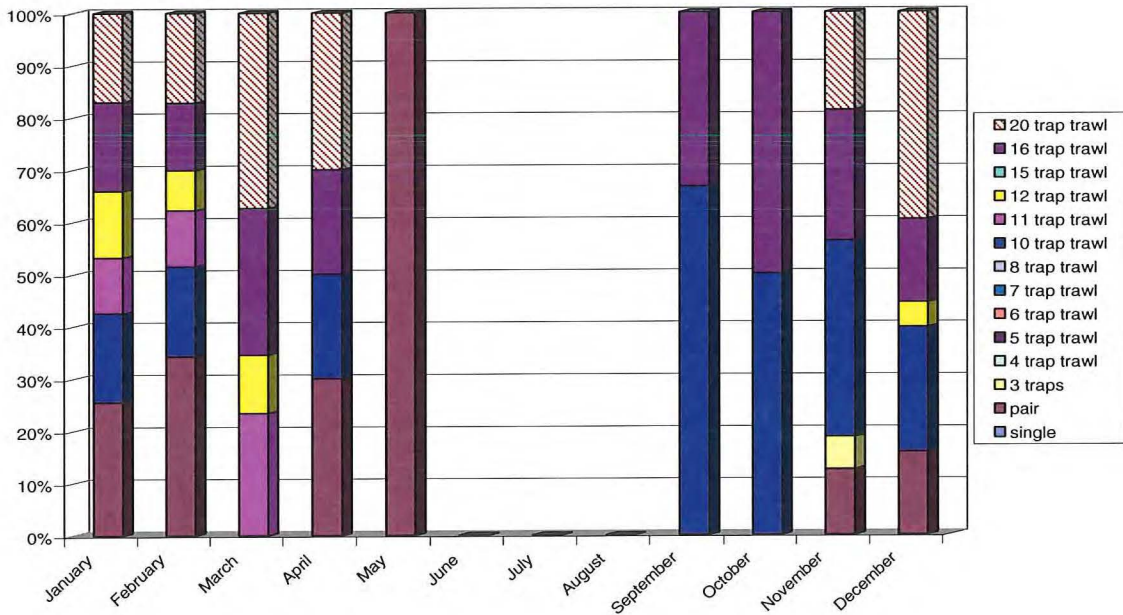
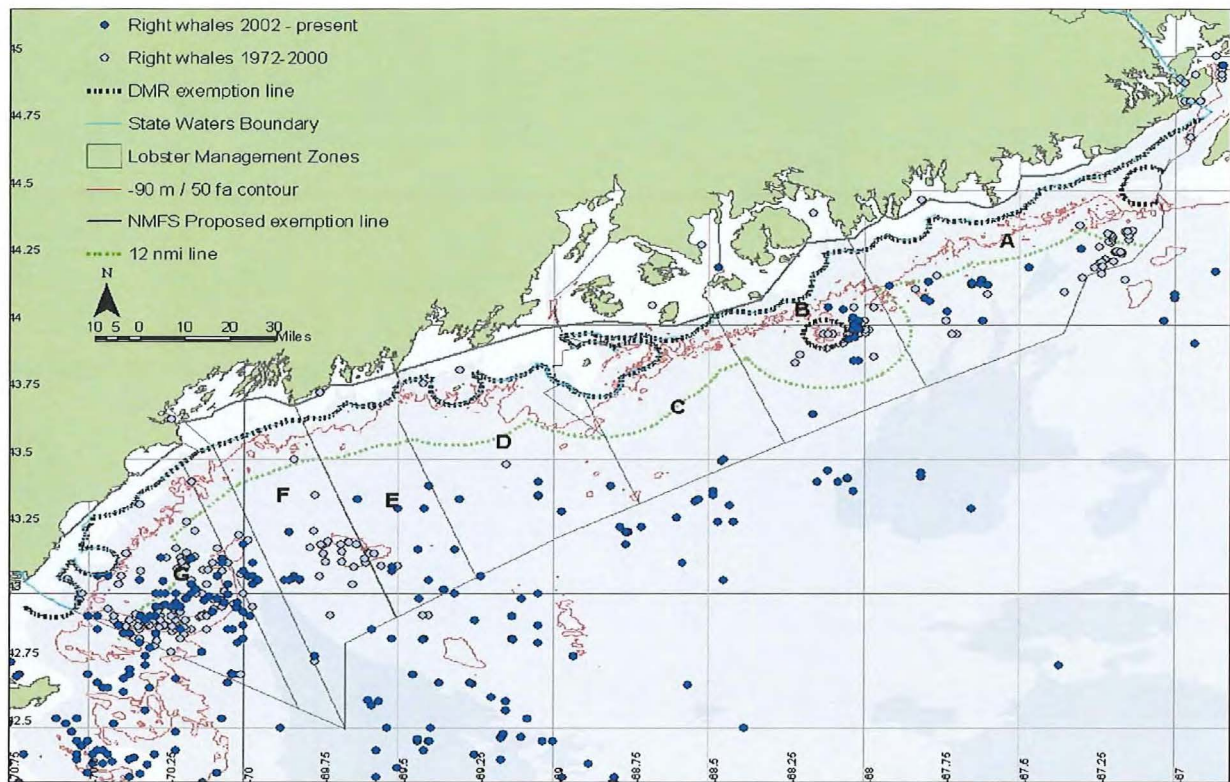


Figure 34. Trap Configuration in Zone G outside 12 miles.



C. Rubicam, 8/9/02, DMR Maine Whale Plan

Figure 35. Map of whales sightings historical and 2002-present

APPENDIX A

Survey sent to all federally permitted lobstermen in Maine

DMR ENDLINE RISK ANALYSIS SURVEY

ATTENTION MAINE LOBSTERMEN

PLEASE READ THIS MEMO

NMFS WILL BE PUBLISHING THE FINAL RULE AMENDING THE ATLANTIC LARGE WHALE TAKE REDUCTION PLAN LATER THIS SUMMER OR EARLY FALL.

This Amended Final Rule may impact the way you fish – it will likely prohibit the use of float rope in groundlines for some areas in the Gulf of Maine. DMR fought hard for an exemption line and for “emerging technology” groundlines, and we’re hoping that these proposed alternatives will be included in the Final Rule.

As soon as the Final Rule is published in the Federal Register, the Atlantic Large Whale Take Reduction Team will be meeting and they will focus their efforts on reducing the risk of entanglements caused by endlines.

WE NEED YOUR HELP!!

You may remember that there was an endline survey conducted by a UMO intern a couple years ago. Unfortunately, this survey was incomplete and we have no definitive data on the number of endlines, different gear configurations and approximate seasonal locations of this gear along the coast of Maine. We’re sending you this survey hoping that you will help us develop baseline information on the amount and distribution of endlines coast wide. This information is necessary in order to develop operationally viable endline risk reduction measures that overlap known presence of Maine fishing gear with known whale sightings and forage patterns.

We’re relying on you to help us by filling out this brief survey.

Thank you in advance for taking the time to help us protect both your fishing business and the whales.

Maine DMR Endline Survey July 2006

1. Home Zone _____ Additional Zones Fished _____ Homeport _____
2. How many trap tags do you buy each year? _____ 3. We are trying to get an idea of how many traps people are fishing, the number of endlines in the water and distance from shore for each month. Recognizing that you may fish in two zones, there are two tables for each season, one for your home zone, and one for you secondary zone.

For Example:

	APRIL			MAY			JUNE		
Distance from shore	0 - 3 miles	3 - 12	12 +	0-3 miles	3 - 12	12 +	0-3 miles	3 - 12	12 +
Number of traps	200		600	200		600	400		400
Number of traps / endline	2		10+	2		10+	2		10+

SPRING

Home Zone

	APRIL			MAY			JUNE		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

Secondary Zone

	APRIL			MAY			JUNE		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

SUMMER

Home Zone

	JULY			AUGUST			SEPTEMBER		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

Secondary Zone

	JULY			AUGUST			SEPTEMBER		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

FALL

Home Zone

	OCTOBER			NOVEMBER			DECEMBER		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

FALL

Secondary Zone

	OCTOBER			NOVEMBER			DECEMBER		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

WINTER

Home Zone

	JANUARY			FEBRUARY			MARCH		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

Secondary Zone

	JANUARY			FEBRUARY			MARCH		
Distance from shore	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +	0 - 3 miles	3 - 12	12 +
Number of traps									
Number of traps / endline									

4. Do you use float rope (poly) in your endlines? Yes No If yes, what percent of your endline is float rope? _____
5. Do you use toggles (second float) in your endlines? Yes No If yes, how many? _____
6. Do you use any other surface system attachments (i.e. polyballs, weights, highfliers, etc.)? Yes No If yes, please describe:
7. Do you ever use more than two endlines per trawl? Yes No If yes, for how many traps and why?

Please complete this survey and mail it back AS SOON AS POSSIBLE, but not later than Friday, August 25.

Please mail this survey back by folding and stapling it closed, so the postage-paid DMR address is on the outside.

Thank you for your help!

**Cindy Smith
Dept. of Marine Resources
21 State House Station
Augusta, ME 04333**

APPENDIX B

Trap Configuration - Percentage Tables

Percentage of Traps Set in Each Trap Configuration by Month, Zone, and Distance

Month	Trap configuration	A	B	C	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E	F	G
		0-3	0-3	0-3	0-3	0-3	0-3	0-3	3-12	3-12	3-12	3-12	3-12	3-12	3-12	12+	12+	12+	12+	12+	12+	12+
January	single		11%		59%	16%				2%		2%										
January	pair		89%	100%	31%	38%	13%	17%	4%	52%	55%	42%	65%	6%	11%	16%	12%	15%	60%	54%		26%
January	3 traps	17%				12%	27%	50%	8%	33%		43%	4%	3%	6%	6%	12%		22%	5%		
January	4 trap trawl	43%							17%		4%						3%					
January	5 trap trawl	26%							3%						4%		6%	15%				
January	6 trap trawl					34%			12%		4%		26%		2%			6%		3%		
January	7 trap trawl							3%						11%		3%						
January	8 trap trawl											1%	6%	39%	15%				4%	23%		
January	10 trap trawl						53%	33%	29%	13%	37%	3%		22%	44%	47%	12%	23%	4%	16%	100%	17%
January	11 trap trawl	15%																				11%
January	12 trap trawl						7%		10%			8%		14%	10%	8%						13%
January	15 trap trawl								13%								6%	17%				
January	16 trap trawl																					17%
January	20 trap trawl													6%	7%	21%	48%	23%	9%			17%
February	single		6%		53%					3%		3%			6%	7%	21%	48%	23%	9%		
February	pair		94%	100%	47%	28%		30%	6%	61%	57%	39%	68%		6%	21%	12%	6%	43%	50%		34%
February	3 traps					19%	57%	70%	11%	28%		47%	4%	5%	8%			12%		21%	7%	
February	4 trap trawl	35%							15%		4%							3%				
February	5 trap trawl	35%							1%						5%		6%	15%				
February	6 trap trawl					53%			16%		6%		18%		3%			6%		3%		
February	7 trap trawl															3%						
February	8 trap trawl											2%	10%	64%	14%					7%	23%	
February	10 trap trawl						29%		36%	8%	34%			9%	45%	47%	12%	23%	7%	16%	100%	17%
February	11 trap trawl	31%																				11%
February	12 trap trawl						14%		14%			9%		23%	10%	8%						8%
February	15 trap trawl																6%	17%				
February	16 trap trawl																					13%
February	20 trap trawl														9%	21%	48%	34%	21%			17%
March	single		2%		53%		40%															
March	pair	59%	98%	100%	47%	28%		21%	28%	68%	75%	42%	63%		7%	17%	13%		47%	38%		
March	3 traps	36%				19%	20%	50%	10%	30%		44%	6%	6%	7%			13%		19%	13%	
March	4 trap trawl								14%									4%				
March	5 trap trawl														6%				16%			
March	6 trap trawl					53%			12%		8%		21%		4%			6%		6%		6%
March	7 trap trawl															3%						
March	8 trap trawl											2%	10%	61%	13%					7%	44%	
March	10 trap trawl						20%	29%	25%		17%			11%	41%	49%	13%	24%	7%		100%	
March	11 trap trawl	6%																				23%
March	12 trap trawl						20%		10%			9%		22%	11%	8%						11%
March	15 trap trawl																7%	18%				
March	16 trap trawl																					28%
March	20 trap trawl														11%	23%	49%	36%	21%			37%
April	single		7%	5%	25%	26%	25%	8%		1%	3%	2%										
April	pair	53%	88%	76%	75%	34%		33%	30%	70%	74%	68%	66%		17%	12%	22%		61%	49%		30%
April	3 traps	31%	5%			6%	17%	29%	10%			25%	6%	3%	8%		14%					
April	4 trap trawl	4%							7%								5%					
April	5 trap trawl														4%		8%	34%				
April	6 trap trawl	2%				23%			9%				16%		5%						7%	
April	7 trap trawl															3%						
April	8 trap trawl					11%							1%	13%	33%	8%				6%	37%	
April	10 trap trawl	3%					29%	31%	26%	29%	18%			40%	30%	52%	23%	18%	12%		100%	20%
April	11 trap trawl	5%																				
April	12 trap trawl	2%					29%		6%			5%		20%	17%	6%						
April	15 trap trawl								12%									8%				
April	16 trap trawl																					20%
April	20 trap trawl			19%							5%			3%	12%	27%	28%	40%	8%			30%

Red blocks = 75% - 100%
 Orange blocks = 50% - 75%
 Yellow blocks = 25% - 50%
 White blocks = 0% - 25%

Red blocks = 75% - 100%
 Orange blocks = 50% - 75%
 Yellow blocks = 25% - 50%
 White blocks = 0% - 25%

Percentage of Traps Set in Each Trap Configuration by Month, Zone, and Distance

Month	Trap configuration	A	B	C	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E	F	G
		0-3	0-3	0-3	0-3	0-3	0-3	0-3	3-12	3-12	3-12	3-12	3-12	3-12	3-12	12+	12+	12+	12+	12+	12+	12+
May	single	2%	14%	8%	29%	34%		22%		1%		5%										
May	pair	50%	80%	88%	66%	48%		39%	32%	74%	72%	61%	72%		16%	10%	11%		70%			100%
May	3 traps	30%	5%		4%	4%	10%	22%	11%			30%	7%		9%		15%		15%			
May	4 trap trawl	7%							7%								6%					
May	5 trap trawl														4%		10%	39%				
May	6 trap trawl	2%				14%			7%				16%		6%							
May	7 trap trawl															3%						
May	8 trap trawl											4%	21%	13%							100%	
May	10 trap trawl	4%					55%	17%	28%	25%	15%			50%	29%	40%	22%	24%				
May	11 trap trawl	4%																				
May	12 trap trawl	2%					35%		6%			4%		25%	16%	15%						
May	15 trap trawl								11%							10%		9%				
May	16 trap trawl																					
May	20 trap trawl			6%										4%	8%	21%	37%	28%	15%			100%
June	single	11%	27%	14%	31%	29%		32%		2%		4%										
June	pair	50%	57%	72%	69%	50%		40%	29%	76%	68%	79%	100%		12%	11%	8%		63%			
June	3 traps	22%				21%	11%	29%	11%			17%			12%		18%		13%			
June	4 trap trawl	7%	16%						8%													
June	5 trap trawl														4%							
June	6 trap trawl	3%							7%						10%							
June	7 trap trawl															3%						
June	8 trap trawl													44%	16%							
June	10 trap trawl	3%					78%		28%	22%	8%			30%	34%	38%	20%	100%	13%			
June	11 trap trawl	4%																				
June	12 trap trawl	2%					11%		6%					19%	11%	16%						
June	15 trap trawl								11%							11%						
June	16 trap trawl																					
June	20 trap trawl			14%								24%		7%		22%	53%		13%			
July	single	14%	26%	15%	2%			34%		2%												
July	pair	57%	58%	85%	98%	75%		39%	33%	92%	89%	90%	100%	67%	14%	5%	13%		100%			
July	3 traps	16%				25%		27%	9%			10%			14%							
July	4 trap trawl	2%	13%						3%													
July	5 trap trawl						33%								5%							
July	6 trap trawl	4%							7%						11%							
July	7 trap trawl																					
July	8 trap trawl							33%						17%	18%							
July	10 trap trawl	3%					17%		19%	6%	11%			17%	21%	43%	25%					
July	11 trap trawl	3%																				
July	12 trap trawl	1%							11%						8%	10%						
July	15 trap trawl								17%													
July	16 trap trawl																					
July	20 trap trawl						17%								9%	43%	63%					
August	single	13%	22%	17%	16%	28%		16%		6%					3%							
August	pair	61%	70%	83%	84%	45%	13%	39%	36%	78%	100%	96%	94%	49%	10%	9%	17%	100%	100%			
August	3 traps	13%	8%			9%		19%	10%	10%		4%			10%							
August	4 trap trawl	2%						11%	4%						5%							
August	5 trap trawl						12%								2%							
August	6 trap trawl	3%				17%			7%				6%		8%							
August	7 trap trawl																					
August	8 trap trawl						12%							10%	12%							
August	10 trap trawl	3%					31%	15%	17%	5%				26%	36%	74%	17%					
August	11 trap trawl	2%																				
August	12 trap trawl	1%					25%		10%					15%	8%	17%						
August	15 trap trawl								16%													
August	16 trap trawl																					
August	20 trap trawl						6%								9%		67%					

Red blocks = 75% - 100%
 Orange blocks = 50% - 75%
 Yellow blocks = 25% - 50%
 White blocks = 0% - 25%

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Percentage of Traps Set in Each Trap Configuration by Month, Zone, and Distance

Month	Trap configuration	A	B	C	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E	F	G
		0-3	0-3	0-3	0-3	0-3	0-3	0-3	3-12	3-12	3-12	3-12	3-12	3-12	3-12	12+	12+	12+	12+	12+	12+	12+
September	single	12%	15%	6%	51%	40%	3%	15%		7%		8%										
September	pair	63%	89%	94%	49%	40%	19%	41%	32%	88%	100%	83%	80%	9%	7%	9%	36%	100%	100%			
September	3 traps	13%	5%			4%		23%	8%			9%	5%		10%							
September	4 trap trawl	4%						8%	9%						6%							
September	5 trap trawl							9%	6%						2%							
September	6 trap trawl	2%				5%	5%	5%	5%				5%	3%	5%							
September	7 trap trawl																					
September	8 trap trawl					12%	9%						10%	20%	13%							
September	10 trap trawl	3%					36%	14%	15%	4%				49%	38%	74%	27%					67%
September	11 trap trawl	2%																				
September	12 trap trawl	1%					13%		8%					17%	12%	17%						100%
September	15 trap trawl								15%													
September	16 trap trawl																					33%
September	20 trap trawl						6%							3%	7%		36%					
October	single	12%	10%	2%	30%	39%		19%		4%		8%										
October	pair	50%	90%	98%	60%	29%	21%	26%	34%	63%	69%	68%	59%	10%	9%		35%	41%	31%			
October	3 traps	19%			10%	6%		31%	13%	21%	2%	17%	3%		12%	7%	12%		44%			
October	4 trap trawl	6%						9%	17%	2%	2%				6%		4%					
October	5 trap trawl	1%							5%						3%							
October	6 trap trawl					18%	6%		5%		4%		19%	6%	4%							
October	7 trap trawl														4%							
October	8 trap trawl	2%				7%		27%					14%	21%	12%							
October	10 trap trawl	4%					33%	15%	14%	9%	13%		6%	42%	27%	80%	24%		12%		67%	50%
October	11 trap trawl	3%																				
October	12 trap trawl	1%					8%		4%			5%		17%	9%	19%					33%	
October	15 trap trawl								9%							13%		44%				
October	16 trap trawl																					50%
October	20 trap trawl										9%			4%	14%		24%	15%	12%			
November	single	9%	7%		22%	25%		6%		4%		7%										
November	pair	52%	93%	97%	74%	51%	22%	27%	33%	68%	66%	60%	64%	11%	12%		41%	26%	31%			13%
November	3 traps	14%			3%	4%		28%	11%	19%	10%	26%	3%		4%	7%	12%		44%			6%
November	4 trap trawl	7%						10%	18%		3%				13%		6%					
November	5 trap trawl	5%							5%						4%							
November	6 trap trawl					13%	8%		4%		4%		18%	5%	3%						50%	
November	7 trap trawl														4%	4%						
November	8 trap trawl	3%				6%		22%						11%	26%	11%					50%	
November	10 trap trawl	5%		3%			43%	28%	12%	9%	14%		4%	36%	26%	68%	6%	12%	12%		67%	38%
November	11 trap trawl	4%																				
November	12 trap trawl	2%						5%	6%			7%		15%	12%	6%						33%
November	15 trap trawl								11%									18%				
November	16 trap trawl																					25%
November	20 trap trawl										3%			7%	10%	14%	35%	44%	12%			19%
December	single		5%		18%	34%		12%		4%		8%	5%									
December	pair	35%	95%	100%	78%	45%	19%	26%	26%	88%	67%	62%	62%	10%	13%	4%	20%	21%	36%	30%		16%
December	3 traps	27%			4%	5%		30%	8%	21%	2%	25%	3%		3%	6%	16%		37%	6%		
December	4 trap trawl	15%						19%	21%		3%				4%		4%					
December	5 trap trawl	10%							2%						3%		6%	6%				
December	6 trap trawl					16%			5%		4%		19%		4%						6%	
December	7 trap trawl								2%						8%	3%						
December	8 trap trawl	3%						6%				1%	9%	37%	13%					8%	43%	
December	10 trap trawl	7%						75%	14%	16%	7%	24%		2%	30%	35%	56%	18%	18%	10%	15%	88%
December	11 trap trawl	3%																				
December	12 trap trawl								7%			5%		14%	10%	9%					12%	5%
December	15 trap trawl								13%								5%	14%				
December	16 trap trawl																					16%
December	20 trap trawl													8%	9%	23%	32%	41%	10%			40%

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