Chapter V : NORTH CAROLINA RECREATIONAL SALTWATER ACTIVITY MAIL SURVEYS

TABLE OF CONTENTS

PROGRAM NARRATIVE V-1
SURVEY METHODOLOGY V-3
Participation Estimates V-4
Effort Estimates V-4
Catch Estimates V-4
Precision of Estimates V-5
SURVEY LIMITATIONS V-5
Non-Response Bias V-5
Recall Bias V-5
Rare Events V-5
CONTACTS V-16

LIST OF TABLES

Table 125. Response rates for recreational flounder gigging mail survey by year, 2010-2012. ..... V-6
Table 126. Recreational flounder gigging effort and catch estimates based on mail survey, 2012. .. V-7
Table 127. Recreational flounder gigging effort and catch estimates based on mail survey, 2011. .. V-7
Table 128. Recreational flounder gigging effort and catch estimates based on mail survey, 2010. .. V-7
Table 129. Response rates for recreational cast net and seine mail surveys by year, 2011- 2012... V-8
Table 130. Recreational catch and effort estimates for cast net mullet, 2012. ..... V-9
Table 131. Recreational catch and effort estimates for cast net mullet, 2011. ..... V-9
Table 132. Recreational catch and effort estimates for cast net menhaden, 2012. ..... V-9
Table 133. Recreational catch and effort estimates for cast net menhaden, 2011. ..... V-10
Table 134. Recreational catch and effort estimates for cast net shrimp, 2012. ..... V-10
Table 135. Recreational catch and effort estimates for cast net shrimp, 2011. ..... V-10
Table 136. Recreational estimates of catch and effort for cast net minnows, 2012. ..... V-11
Table 137. Recreational estimates of catch and effort for cast net minnows, 2011. ..... V-11
Table 138. Response rates for recreational shellfish and crab harvest by year, 2010-2012. ..... V-12
Table 139. Recreational crab harvesting effort and catch estimates based on mail survey, 2012. . V-13
Table 140. Recreational crab harvesting effort and catch estimates based on mail survey, 2011. . V-13
Table 141. Recreational crab harvesting effort and catch estimates based on mail survey, 2010. . V-13
Table 142. Number and percent of recreational shellfish surveys reporting clam activity by year, 2010-2012. ..... V-15
Table 143. Number and percent of recreational shellfish surveys reporting oyster activity by year, 2010-2012. ..... V-15

LIST OF FIGURES

Figure 83. Response rate for recreational flounder gigging mail survey by year, 2010 - 2012. ..... V-6
Figure 84. Responses for recreational castnet and seine mail surveys by year, 2011 - 2012. ..... V-8
Figure 85. Response rates for recreational shellfish and crab harvest by year, 2010 - 2012..... V-12

PROGRAM NARRATIVE

Broad-based intercept surveys are developed to produce estimates of recreational finfish harvest by hook and line activity among anglers. Saltwater related recreational fishing activities typically overlooked include use of alternative gear(s) such as gigging, castnet, and seine use as well as harvest of species other than finfish (eg. crabs, clams, oysters, and scallops). In an effort to develop catch and effort estimates of these activities DMF designed and implemented mail surveys to capture this data in 2010.

Currently three mail surveys are being conducted in North Carolina. They include:

1) flounder gigging,
2) harvest of crabs, clams, oysters, and scallops, and
3) castnets and seines use.

These new surveys are similar in design, methodology, and estimate computations.

SURVEY METHODOLOGY

Coastal Recreational Fishing License (CRFL) holders who purchase their license online or at the Division of Marine Fisheries and Wildlife Resources Commission office are asked four questions regarding their participation in additional saltwater recreational fishing activities. In addition, lifetime license holders who have purchased a hunting and or inland fishing license prior to the implementation of the CRFL are asked the same questions when updating their contact information. These questions are:

- Do you founder gig,
- Do you use castnets or seines,
- Do you harvest crabs, and
- Do you harvest oysters, clams, or scallops?

For each survey activity a subsample of approximately 650 anglers are chosen among those who answered affirmatively to the respective saltwater activity question and whose license was valid at least one day during the prior month. Each member of the sample is sent a pre-notice letter at the beginning of the month. The purpose of this letter is to inform

license holders that he or she has been chosen to participate in the survey, the purpose of the survey, and to allow them the opportunity to complete the survey online through the NCDMF web-based survey site. Approximately 10-14 days later sample members who have not completed the online survey are sent a second letter which includes a hard copy of the survey to complete. These individuals are asked to return the survey by the end of the month. The following estimates are produced independently for each survey.

Participation Estimates

Participation estimates are determined for each of the survey time periods considering the following parameters.

- The number of *potential* participants is a product of the number of valid recreational licenses for the survey period and the percent of those who answered affirmatively to the respective saltwater activity question at the time of license purchase (or while updating contact information).
- The ineligibility rate is the number of anglers reporting they do not participate in flounder gigging divided by the total number of responses received.
- The estimated participation is a product of the number of potential participants and one minus the ineligibility rate.

Effort Estimates

Effort estimates are determined for each of the survey time periods by the following method.

- Overall effort is determined by the number of trips reported for each survey respondent expanded to represent the entire population of license holders.

Catch Estimates

Catch estimates are determined for each of the survey time periods by the following method.

- Catch is the number of a species harvested by each angler expanded to represent the entire population of license holders.

Precision of Estimates

The numbers presented are estimates, not actual counts; therefore, the level of precision varies. Precision refers to the estimate's variability. Statistical comparison between numbers must include this variability.

Precision refers to the dispersion of the sample measurements used to calculate an estimate and the resultant variability in the estimate. The square root of the estimate of sampling variance is an estimate of the standard error of the estimate, and is almost universally used in sample surveys as a measure of precision.

The standard error is used to calculate the proportional standard error (PSE). The PSE expresses the standard error as a percentage of the estimate (standard error/estimate). It provides an alternative measure of precision and is useful in comparing the relative precision of two estimates.

- A small PSE indicates a more precise estimate than does a large PSE.
- A PSE of 20% or less is generally considered acceptable in fisheries data.
- An alternative way of expressing a 95% confidence interval, in terms of percentages, would be: estimate +/- (1.96 X PSE) percent.

SURVEY LIMITATIONS

Non-Response Bias

There is a potential risk that those anglers who do not respond to the mail survey(s) behave in a manner differing from those who do. This is referred to as non-response bias. Without a 100% response rate there is little that can be done to eliminate this possibility.

Recall Bias

Recall bias can occur when any length of time exists between the reporting of an event and the event itself. The longer the time between reporting and the occurrence, the more likely recall bias is likely to occur. Validity of reported data can be strengthened with an intercept survey.

Rare Events

Activities that seldom occur in recreational angling are referred to as rare events. In this particular instance, contacting someone participating in oyster and clam harvesting is rare. Despite a relatively high response rate, the number of responses with reported oyster harvesting or clam harvesting activity is too low to produce precise estimates of catch.

Table 125. Response rates for recreational flounder gigging mail survey by year, 2010-2012.

	2012			2011			2010		
Wave	Total Deliverable* Surveys	Number Responses	Percent Responses	Total Deliverable* Surveys	Number Responses	Percent Responses	Total Deliverable* Surveys	Number Responses	Percent Responses
Jan/Feb	1,273	525	41.2	1,254	635	50.6	---	---	---
Mar/Apr	1,287	494	38.4	1,272	576	45.3	---	---	---
May/Jun	1,271	444	34.9	1,267	504	39.8	1,285	610	47.5
Jul/Aug	1,284	504	39.3	1,308	504	38.5	1,258	568	45.2
Sep/Oct	1,278	484	37.9	1,278	548	42.9	1,267	610	48.1
Nov/Dec	1,288	472	36.6	1,263	517	40.9	1,259	685	54.4
Total	7,681	2,923	38.1	7,642	3,284	43.0	5,069	2,473	48.8

*Does not include deceased license holders or invalid addresses.

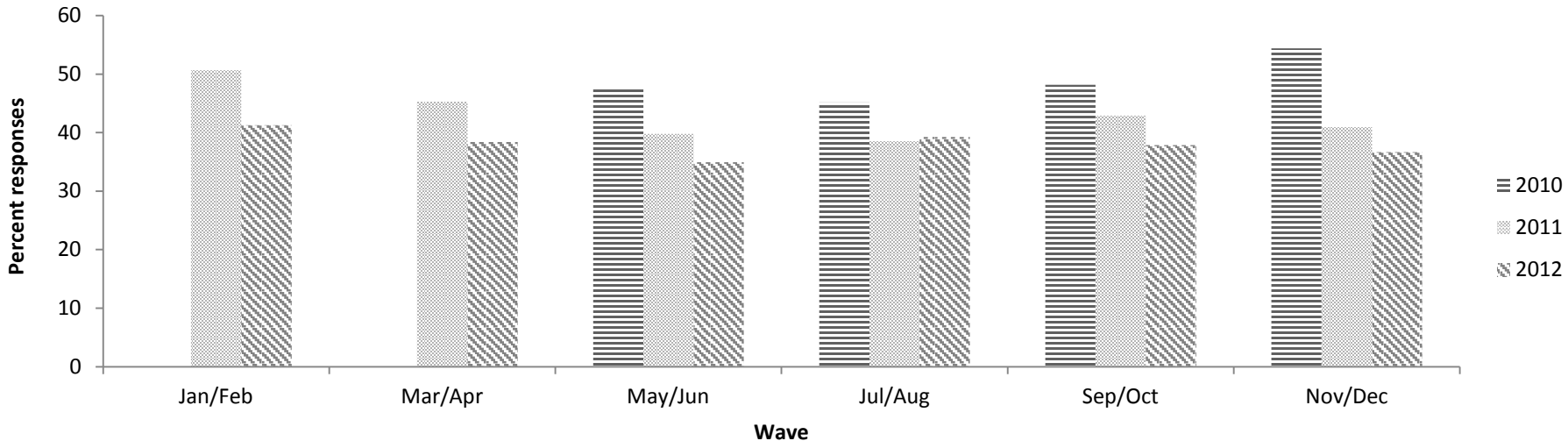

Figure 83. Response rate for recreational flounder gigging mail survey by year, 2010 - 2012.

Table 126. Recreational flounder gigging effort and catch (in numbers of fish), estimates based on mail survey, 2012.

Wave	Total Effort	PSE for Effort	Total Flounder Harvest	PSE for Harvest	Total Flounder Release	PSE for Release	Total Flounder Gig	PSE for Gig
Jan/Feb	976	62.0	69	100.0	0	0.0	69	100.0
Mar/Apr	623	48.3	1,539	48.2	99	80.8	1,638	47.5
May/Jun	5,851	27.4	13,101	44.0	977	95.0	14,079	45.6
Jul/Aug	5,411	23.3	10,741	30.9	577	78.0	11,318	30.4
Sep/Oct	7,483	22.3	16,601	24.2	775	97.9	17,376	23.5
Nov/Dec	1,602	32.4	4,287	42.8	246	100.0	4,533	42.2
Total	21,946	12.9	46,338	17.5	2,674	48.8	49,013	17.7

Table 127. Recreational flounder gigging effort and catch (in numbers of fish), estimates based on mail survey, 2011.

Wave	Total Effort	PSE for Effort	Total Flounder Harvest	PSE for Harvest	Total Flounder Release	PSE for Release	Total Flounder Gig	PSE for Gig
Jan/Feb	325	45.3	746	61.0	91	59.7	838	56.0
Mar/Apr	425	41.1	431	38.0	0	0.0	431	38.0
May/Jun	4,687	28.7	8,341	30.1	514	55.3	8,855	29.7
Jul/Aug	9,723	27.2	18,090	30.3	4,549	83.7	22,639	30.9
Sep/Oct	4,502	27.8	9,270	40.7	1,521	93.4	10,791	46.6
Nov/Dec	6,004	33.5	15,076	40.0	3,051	64.0	18,127	41.1
Total	25,666	15.4	51,954	18.4	9,726	46.5	61,680	19.5

Table 128. Recreational flounder gigging effort and catch (in numbers of fish), stimates based on mail survey, 2010.

Wave	Total Effort	PSE for Effort	Total Flounder Harvest	PSE for Harvest	Total Flounder Release	PSE for Release	Total Flounder Gig	PSE for Gig
Jan/Feb	---	---	---	---	---	---	---	---
Mar/Apr	---	---	---	---	---	---	---	---
May/Jun	2,168	24.2	4,138	28.1	977	39.1	5,116	27.6
Jul/Aug	5,427	18.8	8,438	19.1	1,308	30.7	9,746	18.2
Sep/Oct	2,385	21.5	3,932	25.0	338	42.5	4,270	24.1
Nov/Dec	802	25.7	1,571	28.6	428	46.9	1,999	28.3
Total	10,783	12.0	18,079	12.6	3,051	19.9	21,131	12.2

Table 129. Response rates for recreational cast net and seine mail surveys by year, 2011- 2012.

	2012			2011		
Wave	Total Deliverable* Surveys	Number Responses	Percent Responses	Total Deliverable* Surveys	Number Responses	Percent Responses
Jan/Feb	1,271	537	42.3	---	---	---
Mar/Apr	1,282	523	40.8	---	---	---
May/Jun	1,281	470	36.7	---	---	---
Jul/Aug	1,288	470	36.5	---	---	---
Sep/Oct	1,288	505	39.2	641	283	44.1
Nov/Dec	1,297	543	41.9	1,279	530	41.4
Total	7,707	3,048	39.5	1,920	813	42.3

*Does not include deceased license holders or invalid addresses.

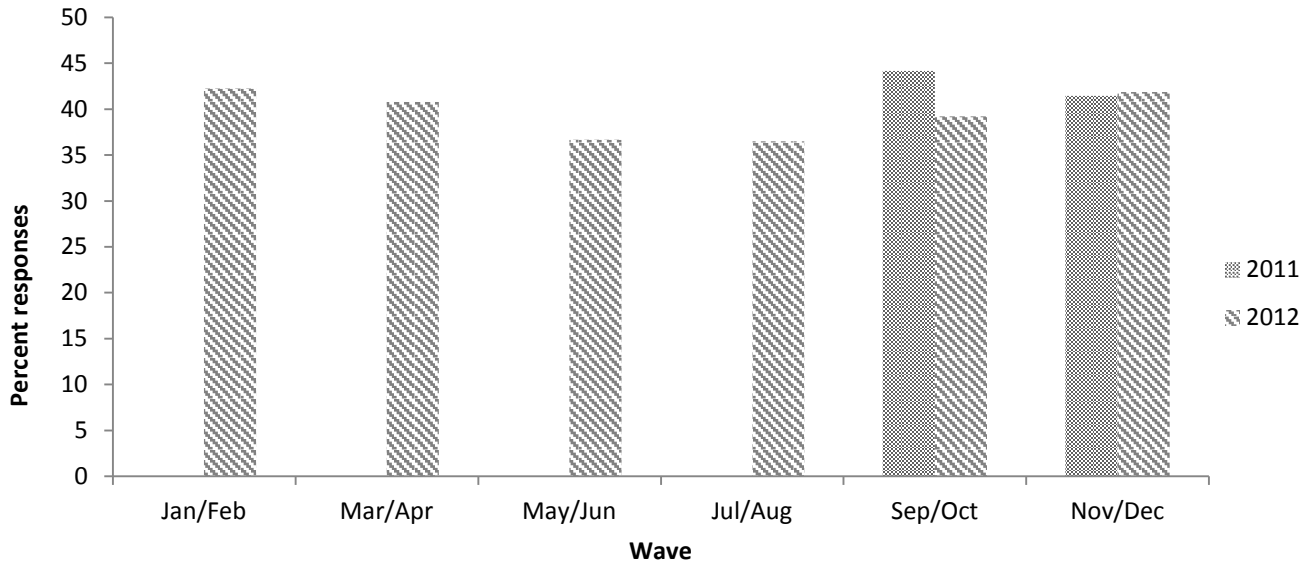

Figure 84. Responses for recreational castnet and seine mail surveys by year, 2011 - 2012.

Table 130. Recreational effort and catch (in numbers of fish), estimates for cast net mullet, 2012.

Wave	Total Effort	PSE for Effort	Total Mullet Harvest	PSE for Harvest	Total Mullet Release	PSE for Release	Total Mullet Catch	PSE for Catch
Jan/Feb	10,474	24.5	41,714	39.4	14,041	41.4	55,755	37.7
Mar/Apr	7,438	30.9	41,892	36.5	10,104	63.4	51,996	35.7
May/Jun	23,424	17.6	180,915	24.3	50,532	28.7	231,446	22.4
Jul/Aug	41,521	17.1	263,406	22.0	201,708	30.9	465,114	20.3
Sep/Oct	41,832	17.7	246,316	25.8	182,844	20.6	429,159	19.3
Nov/Dec	17,246	19.7	73,531	38.5	93,591	29.7	167,121	28.8
Total	141,935	8.7	847,774	12.4	552,820	14.7	1,400,591	10.7

Table 131. Recreational effort and catch (in numbers of fish), estimates for cast net mullet, 2011.

Wave	Total Effort	PSE for Effort	Total Mullet Harvest	PSE for Harvest	Total Mullet Release	PSE for Release	Total Mullet Catch	PSE for Catch
Jan/Feb	---	---	---	---	---	---	---	---
Mar/Apr	---	---	---	---	---	---	---	---
May/Jun	---	---	---	---	---	---	---	---
Jul/Aug	---	---	---	---	---	---	---	---
Sep/Oct	30,475	17.8	241,371	20.7	42,918	26.0	284,288	19.9
Nov/Dec	13,097	23.2	132,723	29.7	46,972	45.0	179,695	29.2
Total	43,573	14.8	374,094	17.5	89,890	26.5	463,983	17.0

Table 132. Recreational effort and catch (in numbers of fish), estimates for cast net menhaden, 2012.

Wave	Total Effort	PSE for Effort	Total Menhaden Harvest	PSE for Harvest	Total Menhaden Release	PSE for Release	Total Menhaden Catch	PSE for Catch
Jan/Feb	2,478	37.4	17,404	61.8	7,475	70.5	24,879	64.1
Mar/Apr	1,081	41.9	3,698	70.9	8,815	71.0	12,513	70.8
May/Jun	9,203	15.2	87,073	37.2	41,151	42.8	128,224	35.0
Jul/Aug	8,751	42.0	13,321	63.3	27,116	65.7	40,436	48.1
Sep/Oct	5,758	19.0	89,744	47.5	42,607	42.4	132,352	39.4
Nov/Dec	9,958	21.6	23,969	74.2	3,184	68.2	27,153	66.9
Total	37,229	12.9	235,209	24.8	130,348	24.6	365,557	20.9

Table 133. Recreational effort and catch (in numbers of fish), estimates for cast net menhaden, 2011.

Wave	Total Effort	PSE for Effort	Total Menhaden Harvest	PSE for Harvest	Total Menhaden Release	PSE for Release	Total Menhaden Catch	PSE for Catch
Jan/Feb	---	---	---	---	---	---	---	---
Mar/Apr	---	---	---	---	---	---	---	---
May/Jun	---	---	---	---	---	---	---	---
Jul/Aug	---	---	---	---	---	---	---	---
Sep/Oct	6,629	25.6	39,436	67.5	7,580	87.8	47,016	70.4
Nov/Dec	13,946	24.9	88,325	38.9	24,983	40.9	113,308	35.4
Total	20,574	18.7	127,761	33.9	32,563	37.4	160,324	32.4

Table 134. Recreational effort and catch (in numbers of shrimp), estimates for cast net shrimp, 2012.

Wave	Total Effort	PSE for Effort	Total Shrimp Harvest	PSE for Harvest	Total Shrimp Release	PSE for Release	Total shrimp Catch	PSE for Catch
Jan/Feb	2,276	42.1	5,161	71.1	686	100.0	5,847	63.8
Mar/Apr	0	0.0	0	0.0	0	0.0	0	0.0
May/Jun	6,146	17.4	29,674	48.4	20,300	52.7	49,974	36.3
Jul/Aug	9,106	27.5	33,065	61.6	4,359	57.1	37,424	58.9
Sep/Oct	7,296	17.0	73,423	59.7	48,435	63.8	121,858	49.4
Nov/Dec	6,091	22.1	43,503	62.3	0	0.0	43,503	62.3
Total	30,915	11.3	184,826	31.1	73,780	44.6	258,606	27.9

Table 135. Recreational effort and catch (in numbers of shrimp), estimates for cast net shrimp, 2011.

Wave	Total Effort	PSE for Effort	Total Shrimp Harvest	PSE for Harvest	Total Shrimp Release	PSE for Release	Total shrimp Catch	PSE for Catch
Jan/Feb	---	---	---	---	---	---	---	---
Mar/Apr	---	---	---	---	---	---	---	---
May/Jun	---	---	---	---	---	---	---	---
Jul/Aug	---	---	---	---	---	---	---	---
Sep/Oct	9,839	20.1	86,768	41.8	14,099	42.6	100,868	41.2
Nov/Dec	3,168	35.5	30,679	52.2	16,027	74.3	46,706	57.7
Total	13,007	18.4	117,448	34.1	30,126	44.1	147,574	33.8

Table 136. Recreational effort and catch (in numbers of fish), estimates for cast net minnows, 2012.

Wave	Total Effort	PSE for Effort	Total Minnow Harvest	PSE for Harvest	Total Minnow Release	PSE for Release	Total Minnow Catch	PSE for Catch
Jan/Feb	0	0.0	0	0.0	0	0.0	0	0.0
Mar/Apr	0	0.0	0	0.0	0	0.0	0	0.0
May/Jun	248	22.6	2,484	100.0	621	100.0	3,105	100.0
Jul/Aug	2,496	26.1	21,585	62.7	0	0.0	21,585	62.7
Sep/Oct	411	39.4	1,646	100.0	0	0.0	1,646	100.0
Nov/Dec	0	0.0	0	0.0	0	0.0	0	0.0
Total	3,155	22.0	25,715	54.1	621	100.0	26,336	53.3

Table 137. Recreational effort and catch (in numbers of fish), estimates for cast net minnows, 2011.

Wave	Total Effort	PSE for Effort	Total Minnow Harvest	PSE for Harvest	Total Minnow Release	PSE for Release	Total Minnow Catch	PSE for Catch
Jan/Feb	---	---	---	---	---	---	---	---
Mar/Apr	---	---	---	---	---	---	---	---
May/Jun	---	---	---	---	---	---	---	---
Jul/Aug	---	---	---	---	---	---	---	---
Sep/Oct	1,509	100.0	5,030	100.0	0	0.0	5,030	100.0
Nov/Dec	0	0.0	0	0.0	0	0.0	0	0.0
Total	1,509	100.0	5,030	100.0	0	0.0	5,030	100.0

Table 138. Response rates for recreational shellfish and crab harvest by year, 2010-2012.

	2012			2011			2010		
Wave	Total Deliverable* Surveys	Number Responses	Percent Responses	Total Deliverable* Surveys	Number Responses	Percent Responses	Total Deliverable* Surveys	Number Responses	Percent Responses
Jan/Feb	1,283	593	46.2	1,259	660	52.4	---	---	---
Mar/Apr	1,284	545	42.4	1,275	592	46.4	---	---	---
May/Jun	1,291	492	38.1	1,272	561	44.1	---	---	---
Jul/Aug	1,276	515	40.4	1,276	588	46.1	---	---	---
Sep/Oct	1,294	499	38.6	1,276	592	46.4	---	---	---
Nov/Dec	1,285	547	42.6	1,288	598	46.4	1,257	662	52.7
Total	7,713	3,191	41.4	7,646	3,591	47.0	1,257	662	52.7

*Does not include deceased license holders or invalid addresses.

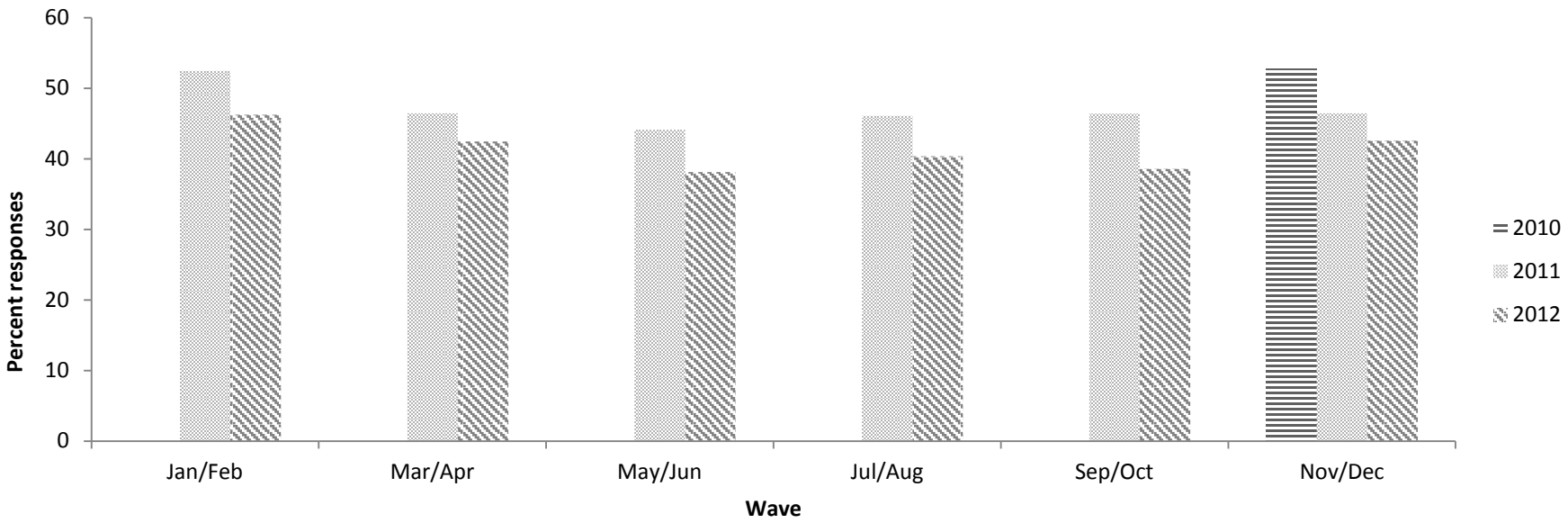

Figure 85. Response rates for recreational shellfish and crab harvest by year, 2010 - 2012.

Table 139. Recreational crab harvesting effort and catch (numbers of crabs) estimates based on mail survey, 2012.

Wave	Estimated Angler Trips	PSE for Angler Trips	Estimated Crab Harvest	PSE for Harvest	Estimated Crab Release	PSE for Release	Estimated Total Crab Catch	PSE of Total Catch
Jan/Feb	82	100.0	820	100.0	328	100.0	1,148	100.0
Mar/Apr	4,918	31.6	24,429	38.7	17,513	45.5	41,943	37.4
May/Jun	9,322	25.1	44,896	26.9	22,915	26.3	67,811	25.6
Jul/Aug	25,972	18.0	171,036	20.0	95,227	20.3	266,263	19.2
Sep/Oct	7,723	28.3	60,781	35.0	43,986	41.5	104,766	35.2
Nov/Dec	4,563	39.7	29,275	46.0	20,885	39.9	50,160	42.2
Total	52,580	12.0	331,237	14.0	200,854	14.9	532,091	13.6

Table 140. Recreational crab harvesting effort and catch (numbers of crabs) estimates based on mail survey, 2011.

Wave	Estimated Angler Trips	PSE for Angler Trips	Estimated Crab Harvest	PSE for Harvest	Estimated Crab Release	PSE for Release	Estimated Total Crab Catch	PSE of Total Catch
Jan/Feb	0	0.0	0	0.0	0	0.0	0	0.0
Mar/Apr	713	52.3	2,270	63.4	1,746	40.2	4,016	49.1
May/Jun	8,978	22.9	81,730	30.6	37,585	29.1	119,315	29.2
Jul/Aug	14,097	17.2	62,575	23.3	61,950	23.3	124,525	20.0
Sep/Oct	11,783	29.3	61,009	33.5	41,199	25.4	102,207	28.9
Nov/Dec	1,536	40.8	3,976	50.8	1,906	51.7	5,881	49.7
Total	37,105	13.0	211,559	17.0	144,385	14.7	355,944	14.9

Table 141. Recreational crab harvesting effort and catch (numbers of crabs) estimates based on mail survey, 2010.

Wave	Estimated Angler Trips	PSE for Angler Trips	Estimated Crab Harvest	PSE for Harvest	Estimated Crab Release	PSE for Release	Estimated Total Crab Catch	PSE of Total Catch
Jan/Feb	---	---	---	---	---	---	---	---
Mar/Apr	---	---	---	---	---	---	---	---
May/Jun	---	---	---	---	---	---	---	---
Jul/Aug	---	---	---	---	---	---	---	---
Sep/Oct	---	---	---	---	---	---	---	---
Nov/Dec	2,317	46.6	13,575	55.4	5,850	61.8	19,425	56.1
Total	2,317	46.6	13,575	55.4	5,850	61.8	19,425	56.1

Table 142. Number and percent of recreational shellfish surveys reporting clam activity by year, 2010-2012.

	2012			2011			2010		
Wave	Number Responses	Number Reporting Clam Activity	Percent Reporting Clam Activity	Number Responses	Number Reporting Clam Activity	Percent Reporting Clam Activity	Number Responses	Number Reporting Clam Activity	Percent Reporting Clam Activity
Jan/Feb	593	10	1.7	660	20	3.0	---	---	---
Mar/Apr	545	8	1.5	592	17	2.9	---	---	---
May/Jun	492	29	5.9	561	20	3.6	---	---	---
Jul/Aug	515	40	7.8	588	28	4.8	---	---	---
Sep/Oct	499	24	4.8	592	28	4.7	---	---	---
Nov/Dec	547	17	3.1	598	20	3.3	662	21	3.2
Total	3,191	128	4.0	3,591	133	3.7	662	21	3.2

Table 143. Number and percent of recreational shellfish surveys reporting oyster activity by year, 2010-2012.

	2012			2011			2010		
Wave	Number Responses	Number Reporting Oyster Activity	Percent Reporting Oyster Activity	Number Responses	Number Reporting Oyster Activity	Percent Reporting Oyster Activity	Number Responses	Number Reporting Oyster Activity	Percent Reporting Oyster Activity
Jan/Feb	593	11	1.9	660	5	0.8	---	---	---
Mar/Apr	545	4	0.7	592	1	0.2	---	---	---
May/Jun	492	4	0.8	561	0	0.0	---	---	---
Jul/Aug	515	4	0.8	588	1	0.2	---	---	---
Sep/Oct	499	5	1.0	592	5	0.8	---	---	---
Nov/Dec	547	25	4.6	598	8	1.3	662	12	1.8
Total	3,191	53	1.7	3,591	20	0.6	662	12	1.8

CONTACTS

The recreational mail surveys are administered by the North Carolina Division of Marine Fisheries, Washington Regional Office. For additional information regarding the survey, please consider the list below.

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