

Marine Mammals Reported under Catch Lost to Predators on Fishermen's Commercial Catch Reports to the State of Hawaii, 2003-2014¹

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Introduction

This report provides preliminary summaries of data on marine mammals named by fishers as predators responsible for reported losses of fish catch. The data were derived from a variety of Commercial Fish Catch Reports submitted by fishers to the State of Hawaii on forms in use after 2002. There is no assurance that the data are comprehensive, or that the types of mammals named by the fishers are always accurately identified. Further, in many cases only a broad category is specified, such as “dolphin” or “porpoise”. These are not observer data, but rather commercial fishermen’s self-reports, as required by State of Hawaii regulations. These data were requested by the Scientific Review Group (SRG) for Pacific Marine Mammals and by the Take Reduction Team for False Killer Whales. The treatment of the data here is cursory, and the authors and collaborators intend to complete a more comprehensive analysis for publication.

Methods

Only summaries that are an aggregation of data on a particular taxon of marine mammal predators from at least 3 Commercial Marine License (CML) holder reports are considered by the State of Hawaii to be non-confidential. No summary information is provided here that does not meet this criterion. To illustrate trends over time it was necessary to aggregate data over three-year periods for less common species to get a sufficient count of CMLs (here the term “CML” means a CML-holding fisher who filed reports). For summaries by season, gear, and area, data from 2003-2014 were combined. For seasonal summaries, too few CMLs reported by month for several taxa, which had to be summarized bimonthly (over all years combined) to achieve non-confidential results.

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The numbers of records (reports) pertinent to each predator were less ambiguous than the number of days. Records for monthly reports were enumerated as unique CML and day fished combinations for the last day in the month in which catch was reported lost, which was accurate at the monthly resolution used for this report. In other words no two dates in the same month were counted as a record for any given predator. Records more frequent than one per month (Trip Reports) were identified by trip begin and end dates and enumerated as unique CML and day fished combinations for the last day in the report in which catch was reported lost. Other days with losses in each report were summarized for the count of “days in record.”

Even when several predators were listed together in a report, that represented one record for each predator. Most often only one marine mammal was listed in records that included multiple predators, with the others most often being fish. In the cases when several mammals were included in a report, the report was counted as a record only for the least common predator as a shortcut around analytical complications, and in only one case were two infrequent mammal predators named in a single report. That report was counted as a record for both of the rare predators. However, when a report included more than one fishing method or area fished, it could not be assumed with assurance that either of the two methods or areas was pertinent to the mammal predator. So to be conservative, such reports were not counted as CMLs or records for the purposes of making non-confidential summaries, unless, in the case of areas, both areas were part of a larger, composite area for summary purposes.

Results

Six marine mammal predator taxa were named by at least 4 CMLs. From least to most common these were: pigmy killer whale, false killer whale, pilot whale, monk seal, dolphin, and porpoise. No further information can be revealed about the least common species, but data and illustrations are provided on the other five taxa with respect to trends in numbers of records over time, seasonality of records, fishing methods, and areas of occurrence. Interestingly, no particular species of dolphin or porpoise was named. Porpoises and Dolphins were reported with enough frequency that non-confidential summaries could be provided at the annual and monthly (all years combined) resolution (Figure 2) and maps for these taxa do not resort to use of composite areas to achieve non-confidential summaries. They provide the full resolution possible from the State of Hawaii Statistical Fisheries Chart except that some areas show no data due to confidentiality (Figures 3-7). For the other species three-year and bimonthly summaries, as well as composite areas, were required to achieve a non-confidential degree of aggregation. For all taxa, the number of records by fishing method could be provided for all years combined (Figure 8). Nonconfidential classification at lower levels of detail, for example area by month or area by gear, was not attempted and is not possible for the infrequent species.

Discussion

The patterns revealed are based on occurrence, and the influence of the frequency of the different methods of fishing remains to be shown by further analysis, which would provide the ratio of records with mammals to all records for a given time, gear, or area.

Caveat

The apparent distribution, time trends, seasonality, and prevalence of gears reflected in these summaries are nominal. The patterns observed have not been evaluated with respect to several important factors, such as: (1) the total number of reports or amount of fishing effort that depredation reports are a subset of (the total sample size); (2) the reliability of the marine mammal taxa named by fishermen in the reports; (3) the fraction of reporting fishermen who ever report depredation; (4) or other sources of bias in the data summaries. As such, the information in this report should be treated cautiously and should not be cited without permission of the authors.

Table 1. Depredation over time, by year or three-year intervals, where at least three State of Hawaii Commercial Marine Licensees (CML's) reported loss of catch to marine mammals. Records are commercial monthly or trip catch reports to the Hawaii Division of Aquatic Resources. Multiple days with loss to predators may be included without daily specification of the responsible predator, resulting in possible over-estimation of days.

Year	Porpoise			Dolphin			Three Year Period	Pilot Whale			False Killer Whale			Monk Seal		
	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's		No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's
2003	80	197	47	16	56	8	2003									
2004	70	201	39	6	15	4	to						5	22	3	
2005	52	118	35	7	19	5	2005									
2006	58	153	36	5	15	4	2006									
2007	47	92	35	12	31	12	to	7	8	6			6	11	6	
2008	63	156	51	13	37	7	2008									
2009	51	126	34	8	26	6	2009									
2010	52	117	40	16	28	12	to	10	13	10	14	26	11	20	35	15
2011	77	156	52	41	81	31	2011									
2012	75	135	49	59	79	45	2012									
2013	64	97	38	48	65	37	to	15	19	14	13	20	11	43	71	27
2014	61	88	35	73	95	47	2014									

Table 2. Depredation over annual cycle, by month or bimonth, where during 2003-2014 (combined), at least three State of Hawaii Commercial Marine Licensees (CML's) reported loss of catch to marine mammals. Records are commercial monthly or trip catch reports to the Hawaii Division of Aquatic Resources. Multiple days with loss to predators may be included without daily specification of the responsible predator, resulting in possible over-estimation of days.

Month	Porpoise			Dolphin			Bi-Month	Pilot Whale			False Killer Whale			Monk Seal		
	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's		No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's
Jan	80	180	57	22	36	19	Jan-Feb						16	30	14	
Feb	52	124	39	17	28	14										
Mar	68	161	54	17	32	15	Mar-Apr	3	6	3	10	15	7	10	18	9
Apr	70	153	60	36	58	35										
May	72	174	63	34	70	32	May-Jun	11	15	10	12	16	12	8	28	7
Jun	74	157	60	30	48	28										
Jul	70	131	63	40	75	37	Jul-Aug	14	17	14	6	13	6	7	8	7
Aug	52	93	48	28	44	26										
Sep	55	122	48	25	43	22	Sep-Oct	5	5	5				14	22	12
Oct	40	89	36	18	38	15										
Nov	59	110	48	14	20	14	Nov-Dec							19	29	14
Dec	58	142	40	23	55	20										

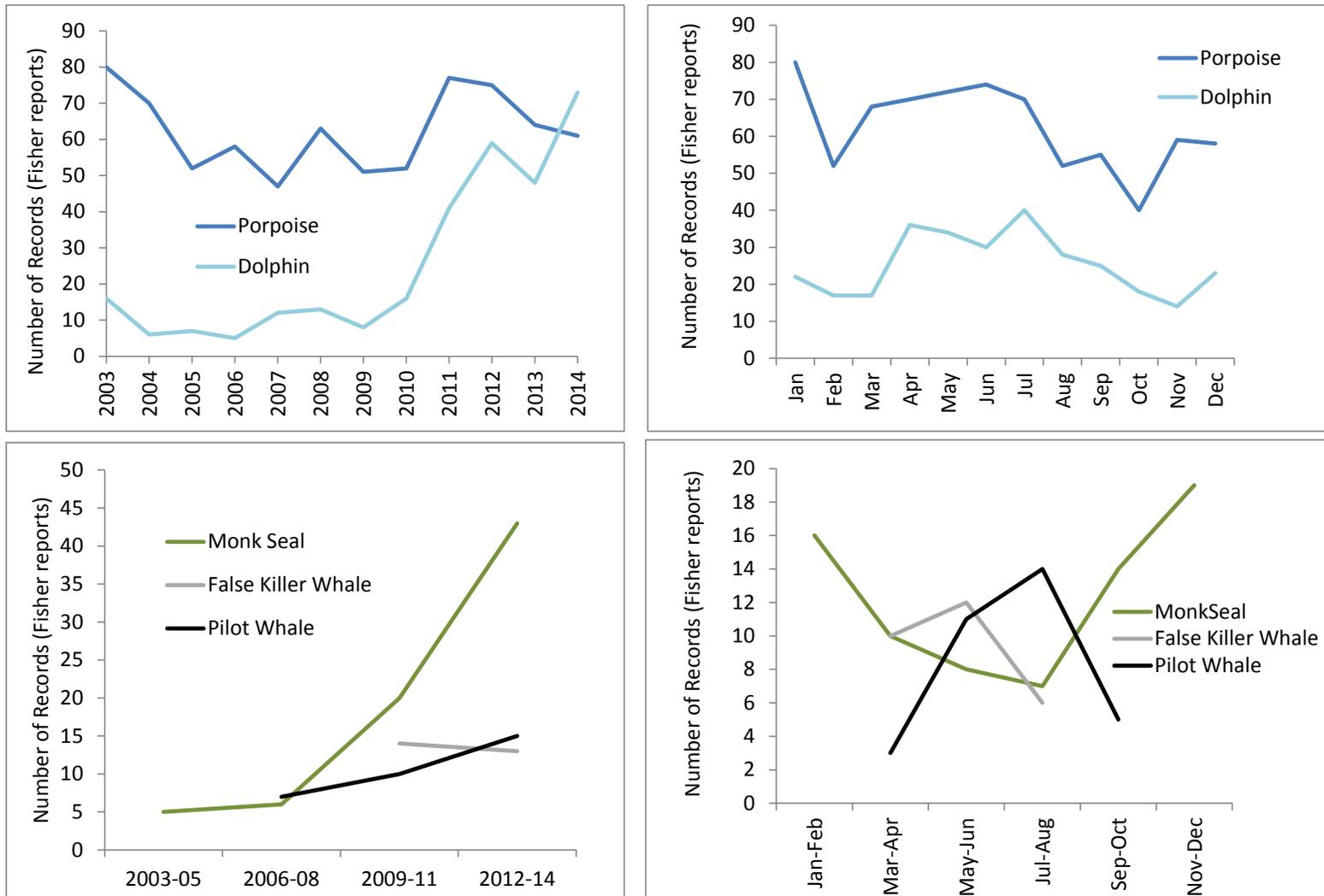


Figure 2. Number of records (fisher reports) during 2003-2014 providing information on loss of catch to predation by marine mammals for fisher-identified categories of marine mammals, all fishing methods combined. In each case, the number of records represents information from at least 3 CML holders.

Table 3. Depredation by fishing method, where, during 2003-2014 (combined), at least three State of Hawaii Commercial Marine Licensees (CML's) reported loss of catch to marine mammals. Records are commercial monthly or trip catch reports to the Hawaii Division of Aquatic Resources. Multiple days with loss to predators may be included without daily specification of the responsible predator, resulting in possible over-estimation of days. And if several methods were included in a report, then that report and the CML were not counted due to uncertainty about which method applied to a given predator in that report.

Fishing Method	Monk Seal			False Killer Whale			Pilot Whale			Dolphin			Porpoise		
	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's	No. of Records	Days in Records	No. of CML's
Trolling - Lures	3	6	3	15	18	15	27	33	27	119	164	78	230	363	146
Deep-Sea Handline, Bottom Handline	39	63	28							41	85	22	206	392	62
Palu Ahi, Drop Stone, Make Dog				6	6	6				55	78	26	96	150	66
Inshore Handline	12	27	8							21	68	11	57	218	20
Casting. Light Tackle, Spinner, Whipp.										16	18	10	24	38	19
Trolling - Bait										9	10	9	20	54	14
Ika-Shibi										9	10	4	8	14	8
Trolling (Misc.)													3	3	3
Kona Crab Net, Loops	3	5	3												
All Trolling, Summed	3	6		15	18		27	33		128	174		253	420	
All Handlining, Summed	51	90		6	6		0	0		126	241		367	774	

Records of Porpoise Depredation in Hawaii State Fishery Data
 by Individual State Statistical Areas where there were at least 3 Commercial Marine Licenses (CMLs)
 reporting depredation by porpoise from 2013-2014. When reports were from <3 CML's, no data are shown.

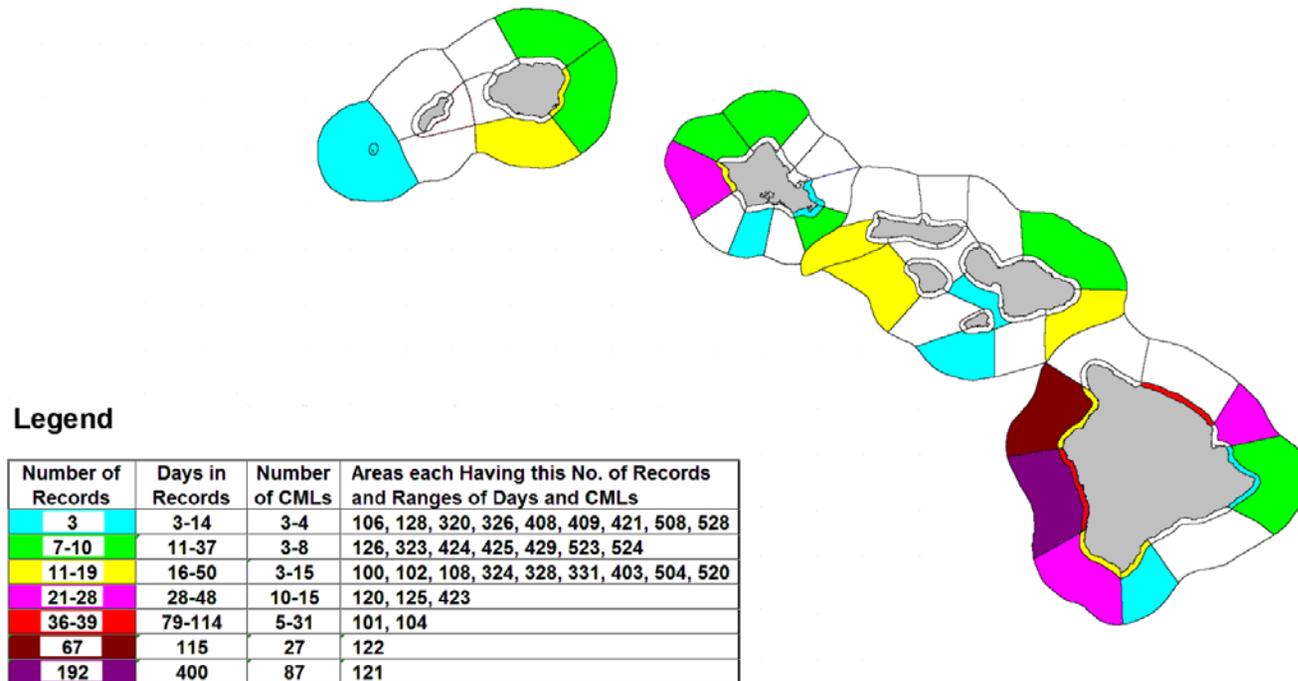


Figure 3

Records of Dolphin Depredation in Hawaii State Fishery Data

by Individual State Statistical Areas where there were at least 3 Commercial Marine Licenses (CMLs) reporting depredation by dolphin from 2003-2014. When reports were from <3 CML's no data are shown.

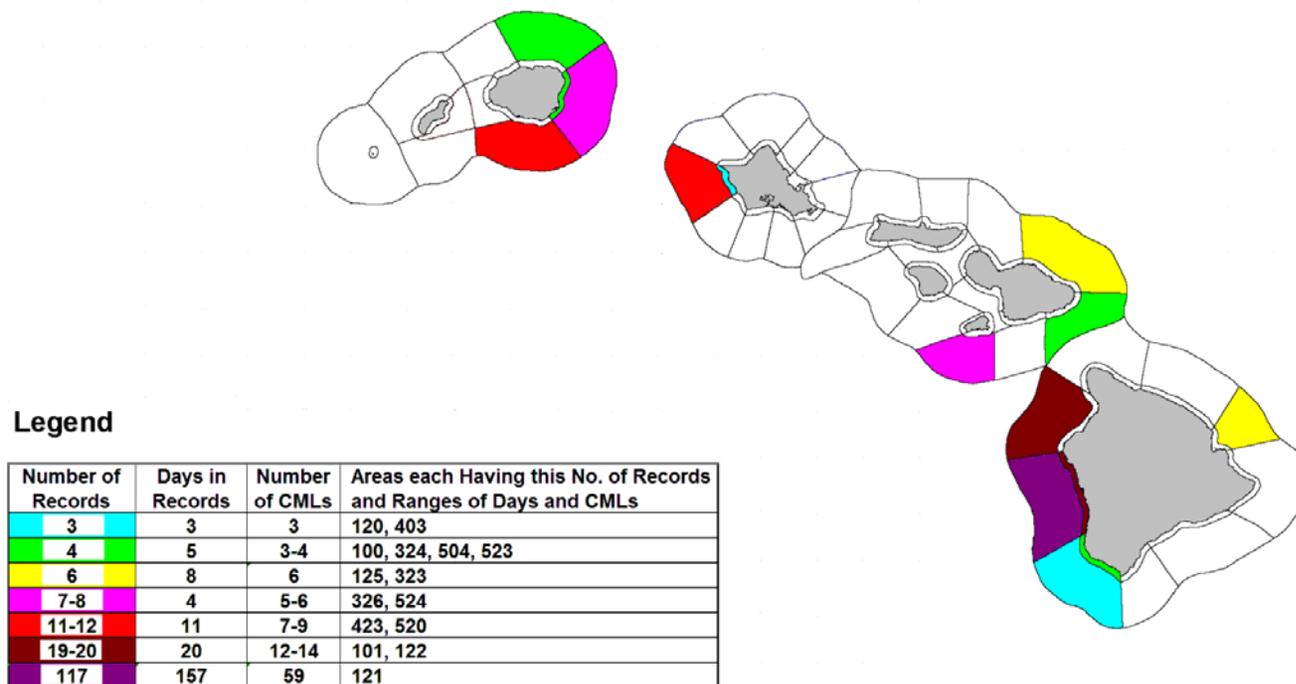


Figure 4

Records of False Killer Whale Depredation in Hawaii State Fishery Data
 by County and by Inshore Areas (~2 nautical miles from shore) or Offshore Areas (~2 to ~20 nautical miles from shore). When reports of killer whales were from <3 Commercial Marine Licences, no data are shown.

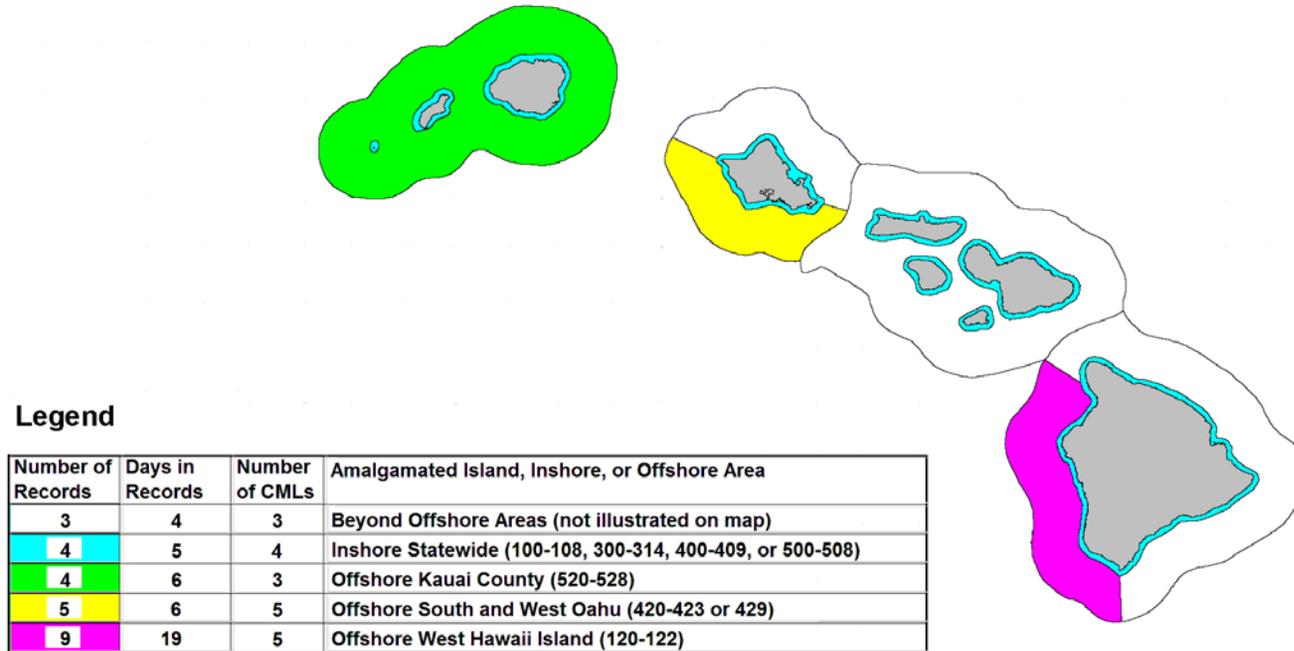


Figure 5

Records of Pilot Whale Depredation in Hawaii State Fishery Data

by County and by Inshore Areas (~2 nautical miles from shore) or Offshore Areas (~2 to ~20 nautical miles from shore). When reports of whales were from <3 Commercial Marine Licenceses, no data are shown.

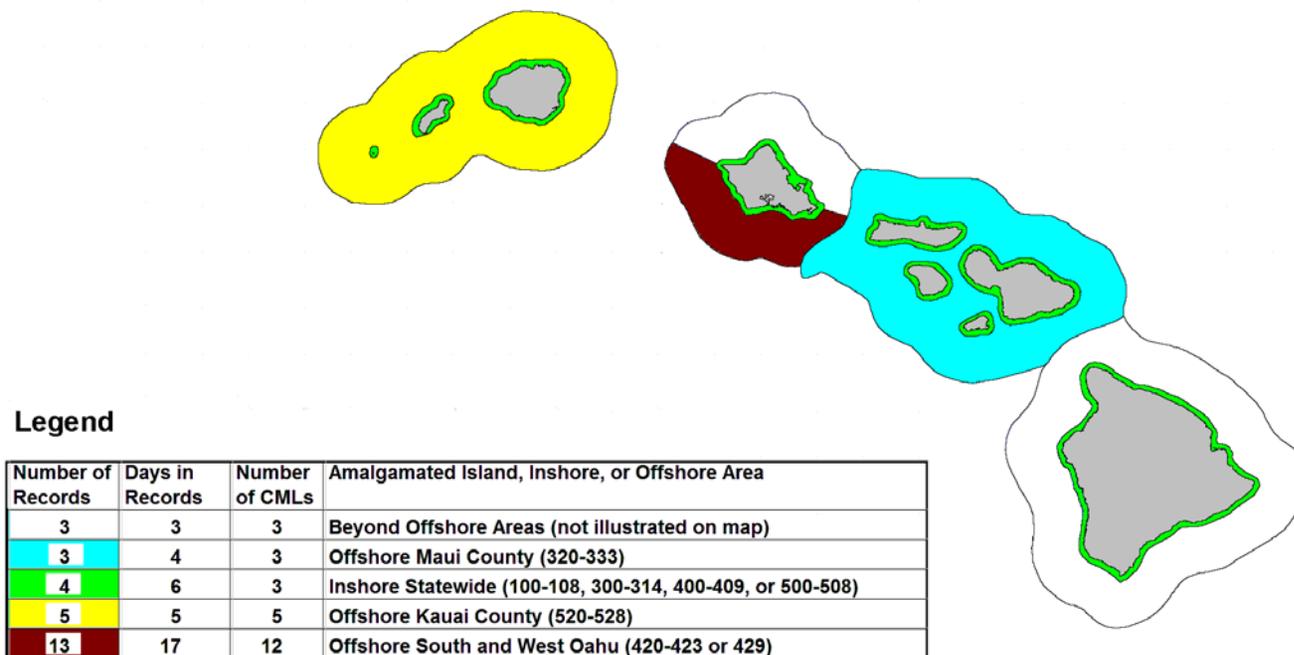


Figure 6

Records of Monk Seal Depredation on Catch in Hawaii State Fishery Data
 by County and by Inshore Areas (~2 nautical miles from shore) or Offshore Areas (~2 to ~20 nautical miles from shore). When reports of monk seals were from <3 Commercial Marine Licences, no data are shown.

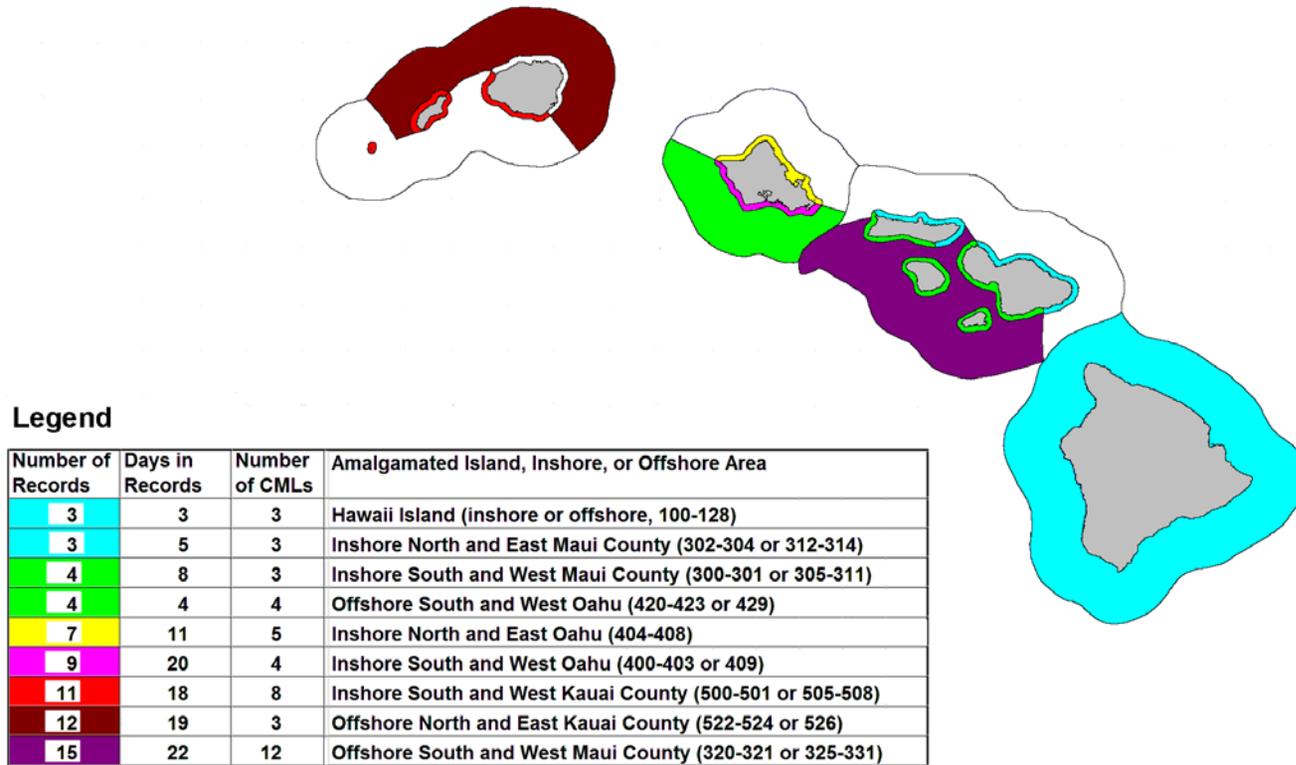


Figure 7

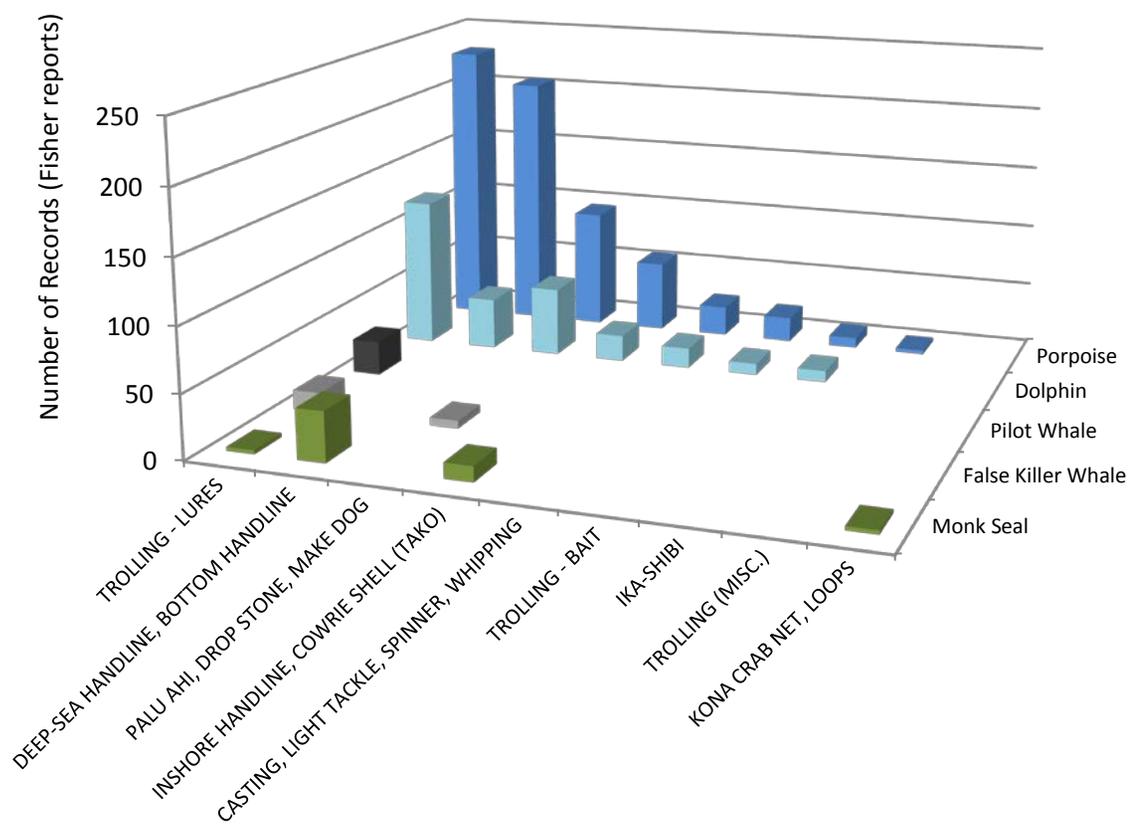


Figure 8. Number of records (fisher reports) during 2003-2014 providing information on loss of catch to predation by marine mammals for fisher-identified categories of marine mammals, by fishing method. In each case, the number of records represents information from at least 3 CML holders.