3.7 Trends in seabird counts from the IPHC fishery-independent setline surveys (2002-2016)

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Abstract

Counts of live seabirds, taken immediately following gear retrieval, have been conducted during International Pacific Halibut Commission (IPHC) fishery-independent setline surveys since 2002. The Convention waters, extending from off Oregon northward to Alaska and the EEZ border with Russia, are surveyed annually between late May and early September. A total of 19,553 seabird counts have been conducted over the last 15 years, with 1,362 occurring in 2016. More than 859,000 observations of seabirds have been recorded since 2002.

Northern fulmars (*Fulmarus glacialis*), glaucous-winged gulls (*Larus glaucescens*), black-footed albatross (*Phoebastria nigripes*), and fork-tailed storm petrels (*Oceanodroma furcata*) represent the most commonly observed species. The observed number of unidentified gulls has decreased, inversely correlated with an increased number of observations of glaucous-winged gulls and herring gulls (*L. argentatus*). This shift was likely the result of increased emphasis on gull identification during annual IPHC field biologist training. A total of 334 endangered short-tailed albatross (*P. albatrus)* sightings have been recorded overall, with an average of 22 observed annually since 2002.

Introduction

In 2002, the International Pacific Halibut Commission (IPHC), in collaboration with Washington Sea Grant, developed a sampling protocol for collecting seabird occurrence data on the IPHC fishery-independent setline survey (setline survey). This was initially a collaborative project between the IPHC, Alaska Department of Fish and Game (ADF&G), and the National Marine Fisheries Service (NMFS) sablefish (*Anoplopoma fimbria*) survey group. The purpose of the project was not only to establish a seabird database for Alaska that could be analyzed for population purposes, but also to make recommendations for regulatory changes to the seabird avoidance requirements for commercial fishing vessels. Several reports that evaluated seabird occurrence using these data were published between 2002 and 2013 (Melvin et al. 2004, 2006; Piatt et al. 2006; Guy et al. 2013). Although the collaboration ended in 2004, the IPHC incorporated the seabird data collection protocols into its annual setline survey. Observations were conducted between the end of May and the beginning of September, on IPHC setline stations (Fig. 1). Field biologists aboard each survey vessel counted the number of seabirds in the vicinity of the vessel's stern immediately following gear retrieval / hauling. Sampling seabird occurrence after the haul addresses the question of where and when certain seabird species occur during hauling events. It also aids in the assessment of individual species at risk by providing information on their population trends over time.

Methods

A detailed description of the IPHC setline survey, including seabird observation protocols can be found in the IPHC Standardized Stock Assessment Survey Manual (IPHC 2016). Briefly, seabird counts have been conducted since 2002 at all IPHC setline survey stations, as well as experimental stations not used for assessment purposes (expansion survey stations were not included). After hauling operations were completed at each station, biologists recorded the abundance of seabirds by taking a snapshot estimate of seabirds within the count zone, which is a 50-meter radius hemisphere from the vessel's stern (Fig.2). The counts are similar in concept to performing a terrestrial bird feeder count. Counts are not conducted when poor visibility prohibits the accurate identification of the seabirds (i.e., in fog or darkness). Binoculars and field guides are provided on all vessels, and the IPHC conducts annual training in seabird identification with slide presentations and field guide reviews. Seabird counts were recorded on forms and entered into the setline survey database, along with the other data collected. Seabird count data examined in this report are from grid and experimental stations fished on the annual IPHC setline survey only, and do not include other agency data, or records from winter surveys, special projects conducted by the IPHC, or seabirds caught on setline gear.

Results

A total of 19,553 counts have been conducted on the IPHC setline survey over the last fifteen years (2002-2016). Seabird counts were taken at 99% of the IPHC setline stations during this time period; 146 sets were not observed because of poor visibility. The average number of seabird counts conducted each year was 1,304 (Table 1). More than 859,000 seabird sightings (composed of 36 unique species) were recorded. The average number of unique species observed annually is 20 and the percentage of the times the species appeared each year ranges from 7-100% (Table 1). Start dates for each year's survey ranged from May 25 to June 7 and the end dates from August 27 to September 14, but the bulk of the surveys took place from June to August (Fig. 3) and most of the counts took place in the Gulf of Alaska (Fig. 4).

The most common species observed in the counts during all years is the northern fulmar (*Fulmarus glacialis*), making up 71% of the cumulative sightings. Glaucous-winged gulls (*Larus glaucescens*) and black-footed albatross (*Phoebastria nigripes*) made up ten and eight percent of the overall sightings, respectively (Fig. 5). Fork-tailed storm petrels (*Oceanodroma furcata*), and mixed shearwater species each represented two percent of all sightings where Laysan albatross (*P. immutabilis*) sightings made up one percent (Fig. 5). Counts per year have remained relatively consistent since 2002 with the average at 1,304 (Table 1). The relative abundance of four of the top five most frequently observed seabirds, northern fulmars, black-footed and Laysan albatross and fork-tailed storm petrels, are plotted over the 15-year period (Fig. 6). Northern fulmar numbers dropped slightly in 2016 to 37,462 from last year's high of 46,383. Laysan albatross numbers increased to an all-time high of 1,397 in 2016. Fork-tailed petrel numbers remained nearly unchanged from 2016 with only a slight increase to 663 from 649. A total of 334 sightings of the endangered short-tailed albatross (*P. albatrus)* were recorded during the counts over the 15-year period (Table 1) with the average of 22 seen annually.

The number of glaucous-winged gull sightings has decreased slightly this year while the unidentified gull numbers increased by a factor of 2.5 from last year (Fig. 7). The ratio of unidentified seabirds to total number of individual seabirds (Fig. 8) has decreased over the time

series but increased over the last two years. When the various unidentified species are examined (excluding unidentified gulls), we see that the unidentified shearwaters make up a large component of the unidentified seabirds (Fig. 9).

Discussion

The number of unidentified seabirds within the survey count zones has decreased since the start of the seabird data collection program in 2002, indicating that the IPHC biologists have improved their identification skills. The change in glaucous-winged gull numbers over time demonstrates this learning curve. Observation rates of glaucous-winged gulls were inversely correlated with observation rates of unidentified gulls such that, as glaucous-winged gull sightings increased, unidentified gull sightings decreased (Fig. 7). This is likely an artifact of increased emphasis on gull field characteristics during annual field staff training. The field biologists have become more skilled at identification over this time period. We did see a slight increase in the unidentified seabirds in the last two years, however 95% of the unidentified seabirds were shearwater species and the increase in the total number of unidentified seabirds coincided with a large increase in shearwater numbers (Fig. 9). The apparent increase in unidentified shearwater species in the last two years was not an increase in the actual numbers of shearwaters observed, but because of the field biologists' improved ability to distinguish shearwaters as a group from other unidentified seabirds (but not to the species level). The result was a much higher proportion of unidentified shearwaters within the unidentified seabird category. This information will be incorporated into the survey field staff training program by focusing on improving identification to the species level among shearwaters and gulls.

Population sizes of many seabirds species vary from year to year, and trends up or down can be indicative of a change in diet, weather, and/or timing of chicks fledging from the nest. Though the setline survey offers only a window in time of seabird occurrence, they are broad in geographic scope (conducted coastwide) and are repeated in the same spatial pattern annually. By continuing to accumulate data, it is hoped to eventually determine how observations relate to actual abundance levels; specifically, for seabirds of concern such as the albatrosses. The endangered short-tailed albatross have been seen in increasing numbers since 2002 with 27 recorded this year. These data are of particular importance because the short-tailed albatross is a rare species and one of considerable interest to management agencies. Their populations have rebounded and the increase we are seeing in our counts helps substantiate the recovery reported in the literature (Deguchi et al. 2014).

With continued, consistent gathering of these data for all species seen, trends in abundance may be determined that will help predict a species' decline or recovery.

References

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Table 1. Number of seabirds in 2016; average, total since 2002; and percent presence since 2002.

Species	2016	Average 2002-16	Total	Percent presence
Northern fulmar	37,462	40,838	612,574	100%
Black-footed albatross	4,475	4,366	65,483	100%
Laysan albatross	1,397	821	12,314	100%
Short-tailed albatross	27	22	334	100%
Glaucous-winged gull	7,093	5,452	81,787	100%
Herring gull	284	305	4,272	93%
Western gull	-	345	1,035	23%
Mew gull	-	29	115	21%
Glaucous gull	54	25	201	50%
Heermann's gull	-	16	93	43%
Sabine's gull	-	3	19	43%
Slaty-backed gull	-	4	7	7%
Ring-billed gull	12	5	18	21%
Bonaparte's gull	-	2	6	14%
Unidentified gull	1,519	2,322	34,828	100%
Arctic tern	-	1	3	14%
Unidentified tern	-	5	30	36%
Ruddy turnstone	-	4	8	7%
Pomarine jaeger	3	4	50	86%
Parasitic jaeger	2	3	37	79%
Long-tailed jaeger	-	5	21	29%
Unidentified jaeger	-	5	41	57%
South polar skua	2	1	3	14%
Fork-tailed storm petrel	663	1,166	17,490	100%
Leach's storm petrel	27	52	777	100%
Unidentified storm petrel	32	339	5,086	100%
Black-legged kittiwake	483	404	6,066	100%
Red-legged kittiwake	12	11	158	100%
Unidentifed kittiwake	28	65	971	100%
Short-tailed shearwater	199	165	2,304	93%
Sooty shearwater	29	231	3,460	100%
Pink-footed shearwater	7	55	493	64%
Flesh-footed shearwater	-	1	2	7%
Unidentified shearwater	758	546	8,194	100%
Common murre	6	7	48	50%
Thick-billed murre	-	15	30	7%
Unidentified murre	50	20	306	100%
Rhinoceros auklet	-	1	2	14%
Parakeet auklet	-	1	2	7%
Tufted puffin	13	7	101	93%
Horned puffin	-	1	8	36%
Unidentified puffin	1	12	173	100%
Unidentified alcid	-	16	79	29%
Bald eagle	-	1	2	14%
Unidentified cormorant	-	2	11	43%
Unidentified bird	-	17	135	57%
Grand total	**63,600**	**65,568**	**859,177**	
Number of counts	1,362	1,304	**19,553**	
Number of unique species	20	20	**36**	

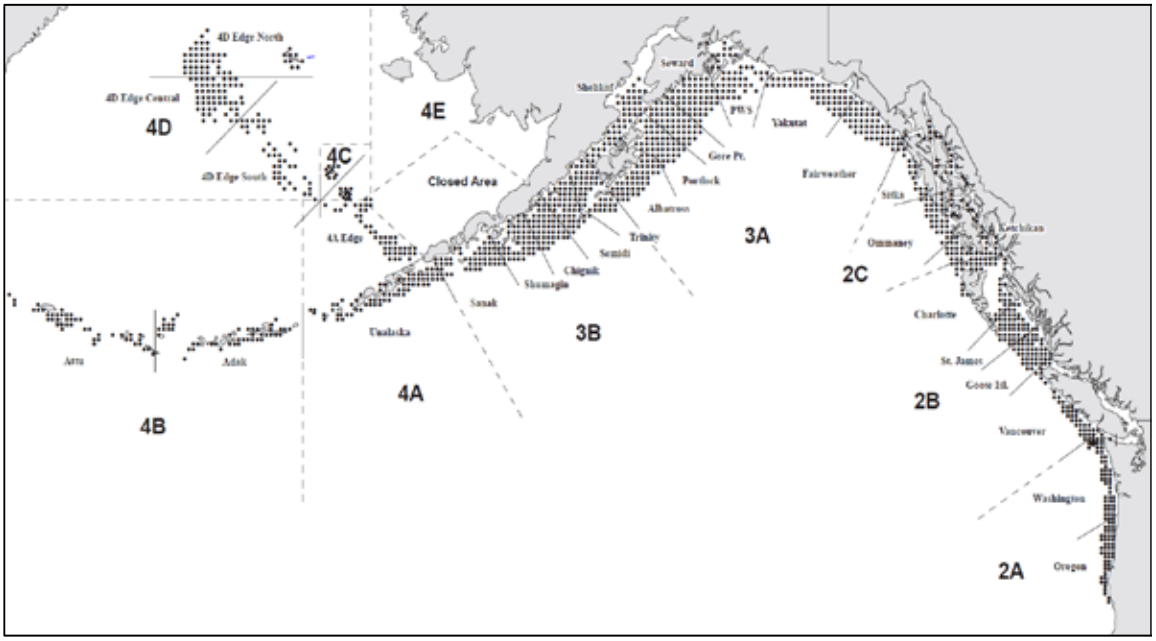

Figure 1. 2016 IPHC fishery-independent setline survey stations with regulatory area (two-character codes) and charter region (formal names) divisions.

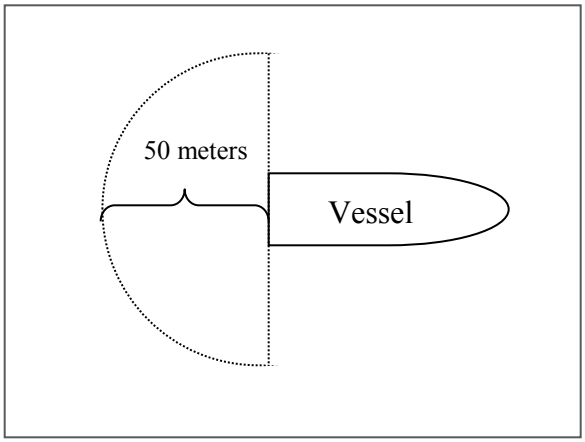

Figure 2. Diagram of the seabird 50-meter hemisphere (count zone) at the stern of the vessel where seabird counts were conducted.

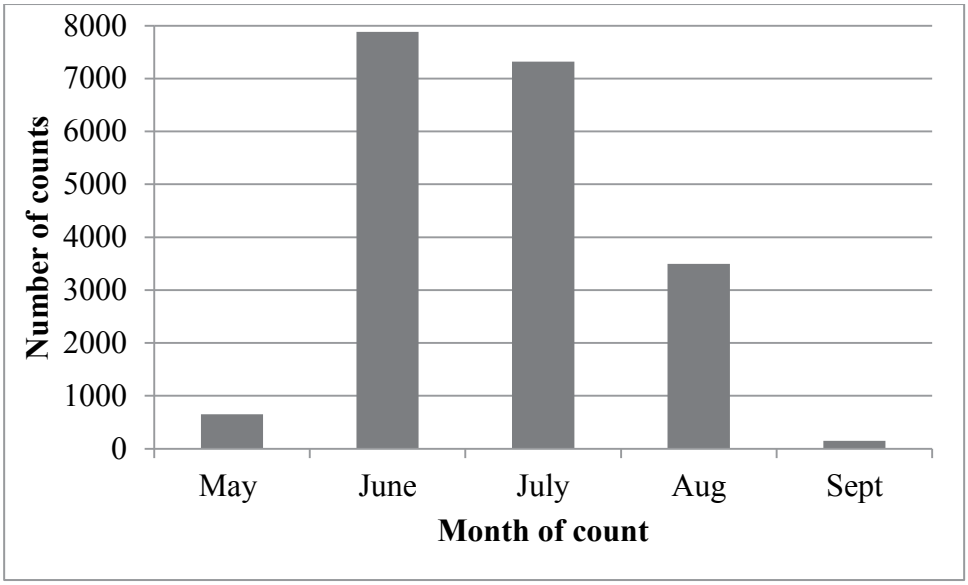

Figure 3. Overall seabird counts conducted on IPHC fishery-independent setline surveys by month, 2002-2016.

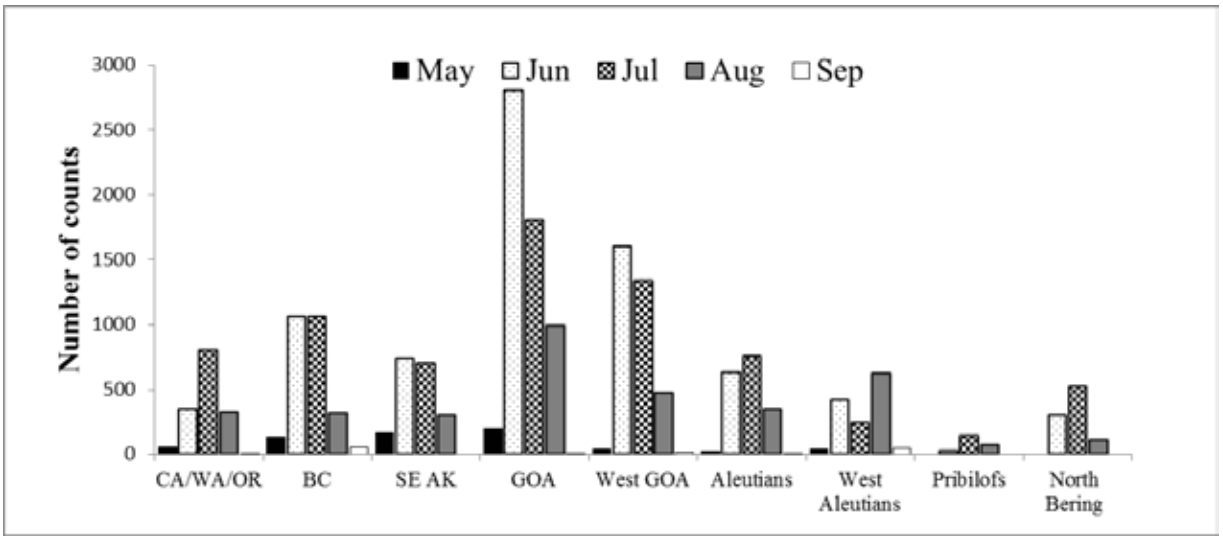

Figure 4. Total number of seabird counts conducted on IPHC fishery-independent setline surveys, by area and month, 2002-2016. Abbreviated locations are as follows: CA/WA/OR = California, Oregon, and Washington; BC = British Columbia; SE AK = southeast Alaska; GOA = central Gulf of Alaska; West GOA = western Gulf of Alaska.

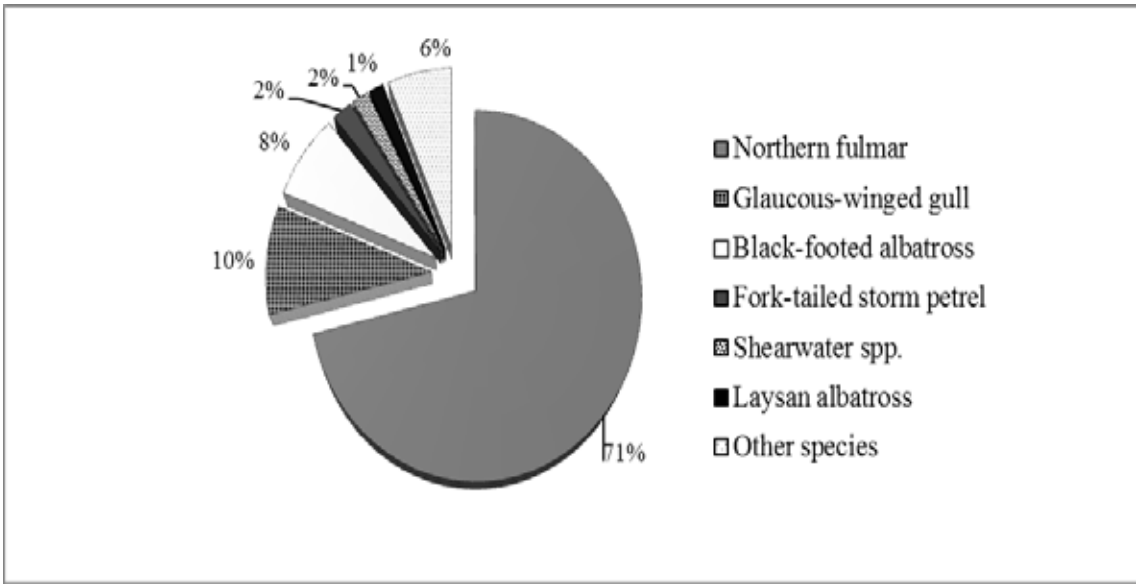

Figure 5. Most common seabird species by overall percentage occurence in counts on IPHC fishery-independent setline surveys, 2002-2016.

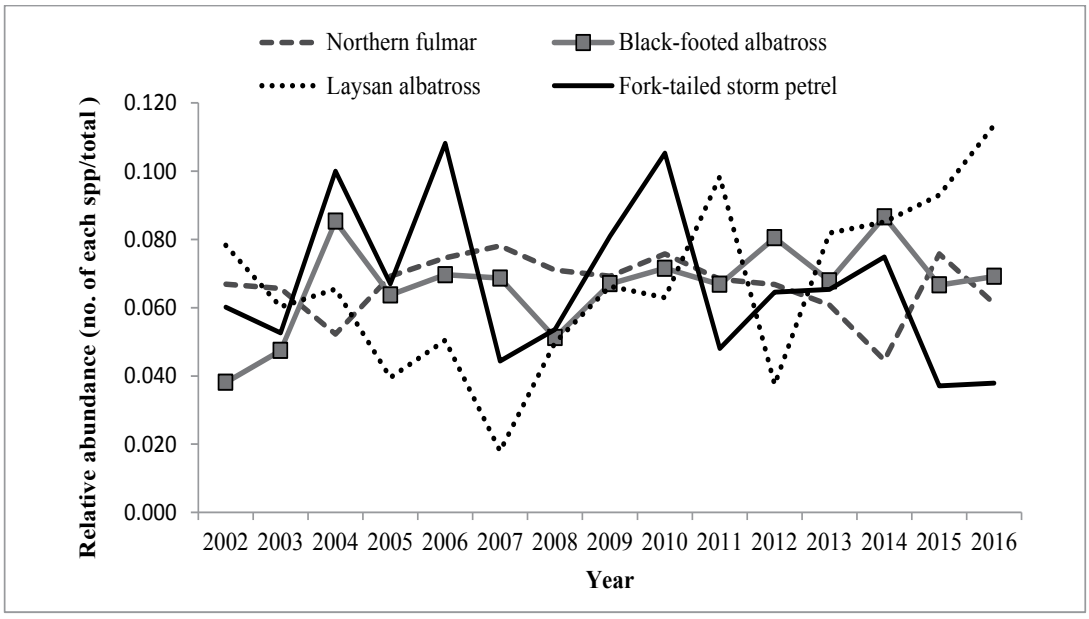

Figure 6. Relative abundance of the four most common seabird species observed on IPHC fishery-independent setline surveys, 2002-2016.

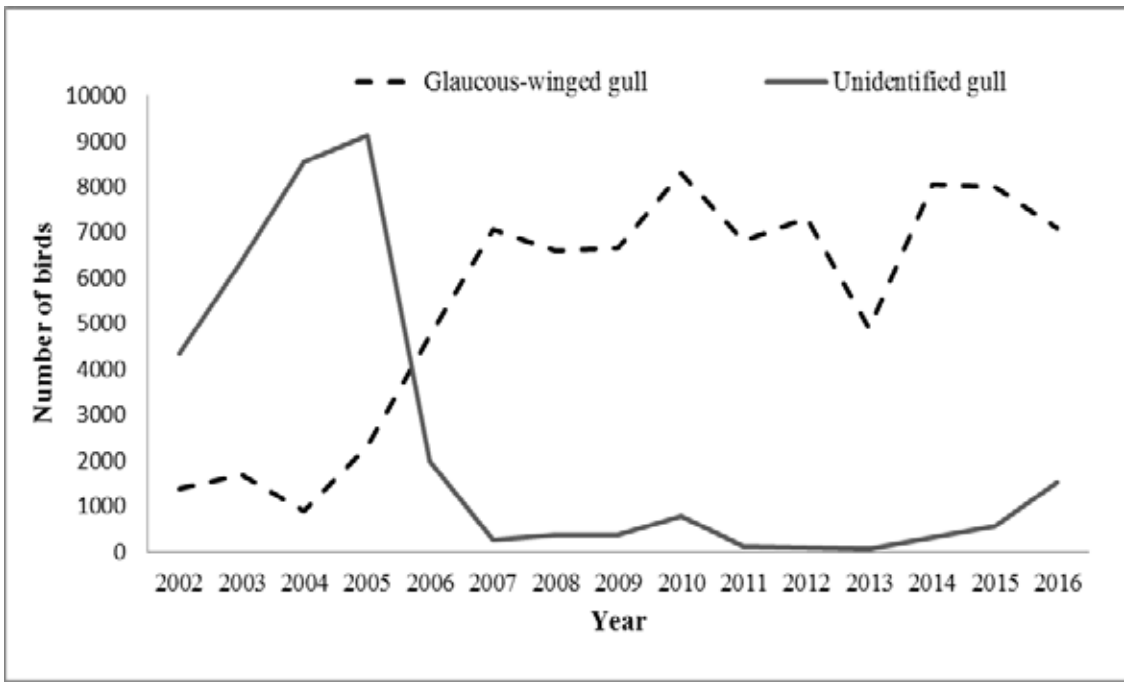

Figure 7. Glaucous-winged gull numbers versus unidentified gull numbers observed on IPHC fishery-independent setline surveys, 2002-2016.

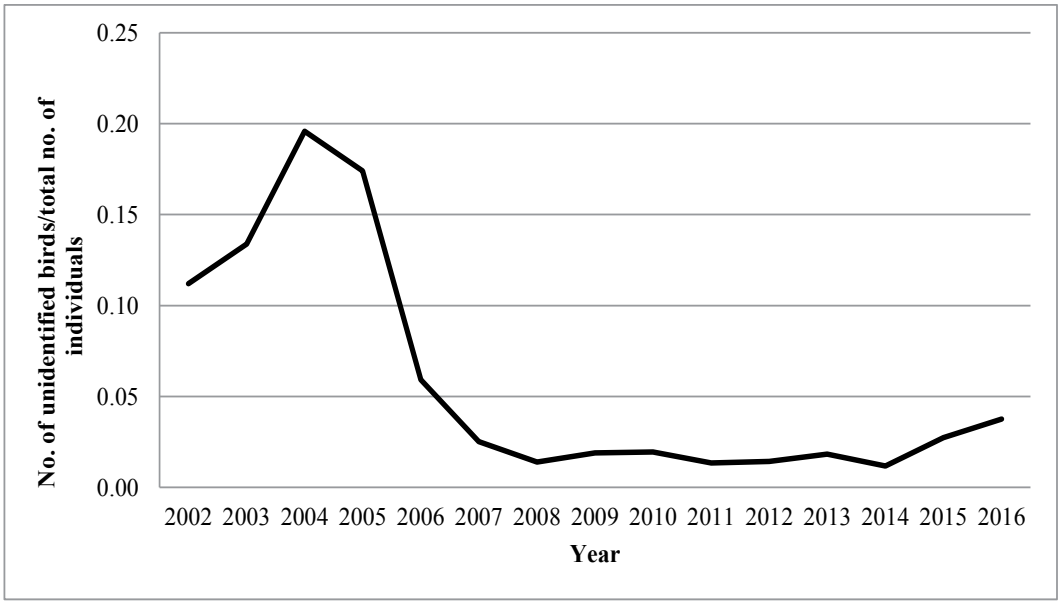

Figure 8. The ratio of number of unidentified seabirds to total individuals observed on IPHC fishery-independent setline surveys, 2002-2016.

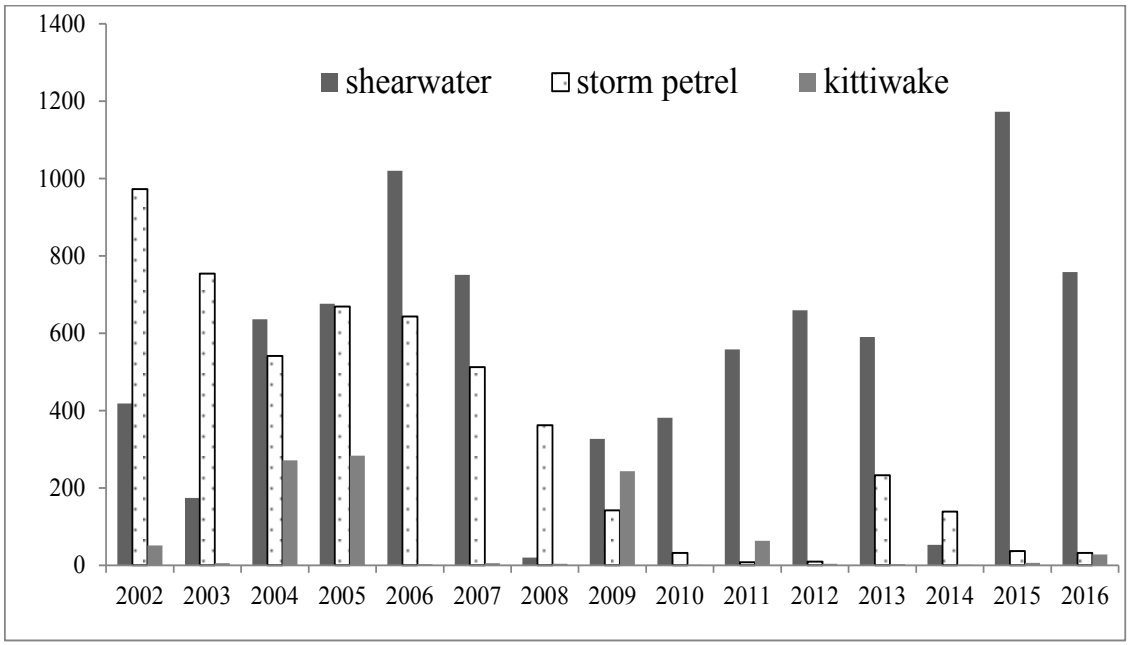

Figure 9. The most common unidentified seabird species by year, 2002-2016.