Annual Seabird Bycatch Estimates for 2005
Alaska Fisheries Science Center Seabird Program

BACKGROUND: This document reports the seabird bycatch that occurred in the Alaskan groundfish fisheries during 2005. Gear types included are demersal longline, groundfish trawl, and groundfish pot. Estimates do not include the directed Pacific Halibut demersal longline fishery, crab pot, salmon fisheries (gillnet, purse seine, troll), herring fisheries, and other non-groundfish or state-managed fisheries that operate in Alaskan Waters. A more extensive report that shows seabird bycatch from 1993 to 2004 by gear type and region and also provides other information is available on the Alaska Fisheries Science Center (AFSC) website seabird information page (http://www.afsc.noaa.gov/refm/reem/Seabirds/Default.php). That information will be updated through 2005 later this spring.

METHODS: Seabird and catch data are collected by NMFS-Certified observers who are trained and debriefed by the Fisheries Monitoring and Assessment (FMA) Division, AFSC. Sampling protocols are described in the Observer Program Manual (available at http://www.afsc.noaa.gov/FMA/default.htm). Observers serve aboard vessels 60 ft length overall and larger, with 30% coverage of fishing days by calendar quarter for vessels 60 to 124 ft (and all groundfish pot vessels) and 100% coverage of fishing days for vessels greater than 125 ft. Fishing is round the clock in many cases, so when single observers are on board they often cannot sample every haul. Those vessels participating in specific programs such as the Community Development Program (some trawl and longline vessels) or American Fisheries Act (pollock catcher processors) have 2 observers onboard at all times so that each haul is sampled. Observer Data are managed by the FMA Division of the Alaska Fisheries Science Center.

Vessels or plants that process fish are required to submit weekly processing reports. These weekly reports are used to monitor fisheries for quota, and are accessed by scientists who conduct bycatch or stock assessment analysis. Catch reporting information is managed by the Sustainable Fisheries Division (http://www.fakr.noaa.gov/sustainablefisheries/default.htm) of the Alaska Regional Office.

Observer sampling on demersal longline and groundfish trawl vessels could be subjected to potential biases. On demersal longline vessels, seabirds are caught during the set process and pulled to the bottom where the gear soaks, and is then hauled back. Observers sample longlines during the haul. Counts of bycaught seabirds do include those that drop off the gear alongside the vessel during the haulback but do not include those that fall off or are somehow removed from the gear prior to the hooks reaching the surface. On trawl vessels, birds may interact with gear in several ways that could cause mortality. These include being caught while the net is being deployed or retrieved, caught while the net is actively being fished (not likely for surface-feeding birds such as fulmars and albatross), collisions with heavy trawl door cables, or in some fisheries (such as midwater trawl) colliding with the trawl sonar cable. Observers stationed on trawl vessels work below decks, sampling the catch as it is moved from the fish bins to the fish processing area. Seabird mortalities have been documented from these other sources where the

birds were not part of the actual catch (i.e., not included in the codend and therefore not dumped into the fish bins).

National Marine Mammal Laboratory staff (http://nmml.afsc.noaa.gov/) generate seabird bycatch estimates by accessing both the AFSC observer sampling and the Alaska Regional Office catch reporting databases. Estimates are completed using a stratified ratio estimator based on each available strata. A strata includes a NMFS statistical area, weekly reporting period, and vessel category (e.g., catcher processor or shoreside delivery). All data within a stratum are pooled. Seabird estimates are based on the following decision matrix for strata with or without observer samples, and with or without observed seabird takes:

Case 1) Strata where observers existed on some or all vessels in the strata, and at least one bird was observed on at least one vessel. A minimum estimate of 1 bird results. The calculated estimate represents 100% of the fishery in such strata.

Case 2) Strata where observers existed on some or all vessels in the strata, and no birds were observed on any vessel. Zero (not Null) estimates result. Zero is the true estimate for the observed sample size and Null is the estimate for the unobserved sample size

Case 3) Strata where fisheries occurred but no observers existed. Null estimates result.

REGIONS: Seabird bycatch are summed by NMFS statistical area and reported here by the broad geographical regions that constitute Alaskan waters where the groundfish fisheries operate. The regions reported for demersal longline (Table 1) and groundfish trawl (Table 3) fisheries are the Aleutian Islands, Bering Sea, and Gulf of Alaska. In the Fishery Management Plans (FMP's) the Gulf of Alaska is managed as one FMP while the Bering Sea and Aleutian Islands are managed together in an FMP. These regions align closely with the distinct large marine ecosystems of Alaskan waters. Maps of these Regions and NMFS statistical areas can be found at http://www.fakr.noaa.gov/rr/figures.htm .

TARGET: To provide a better idea of differences between fisheries, seabird bycatch is also reported here by fishery target for the demersal longline (Table 2) and the groundfish trawl (Table 4). Species scientific names are listed in Table 5. For this report, targets are calculated by the predominate species in the fishing operation as sampled by the observer or reported by a processor. The demersal longline table includes the target Pacific Halibut. These are hauls that were predominately halibut from cruises where the observer was stationed on board because the vessel had both sablefish and halibut Individual Fishing Quota. No directed halibut cruises are represented here and the numbers do not represent actual seabird bycatch in the halibut fishery.

ANNUAL ESTIMATES: Data are expanded from observer samples to the unobserved portion using the cases noted above. Estimates are then summed across strata to report overall estimates by Region. Case 1 for the longline fleet accounts for 84.13% of the effort. Cases 2 and 3 account for 11.31% and 4.56% of the longline effort respectively. In the trawl fleet the case 1 estimates

account for 83.73% of the total groundfish catch while Case 2 and 3 represent 15.74% and 0.53% of the catch respectively. Regardless of there being some seabird takes or zero observed take, the estimate is based on observer sampling. Therefore, for that portion of a fleet where there is zero take (Case 2) the overall estimate is zero. The estimates reported for the Alaskan demersal longline (Tables 1 and 2) and groundfish trawl (Tables 3 and 4) therefore actually account for 95.44 and 99.47% of the longline effort or trawl catch respectively. These numbers should not be extrapolated up to a full 100% of the fishery, as the strata not observed may have very different bycatch rates than those strata that are observed.

In the demersal longline fishery, 43.7% of the take was Northern fulmars, followed by gull species (39.7%), shearwater species (8.8%), and unidentified birds (5.3%). The 126 albatrosses estimated taken accounted for 2.0% of the overall seabird bycatch. The pacific cod fleet accounted for 88.9% of the overall seabird take and 29.4% of the estimated albatross take. The IFQ sablefish fishery, while only accounting for 6.0% of the overall seabird bycatch, accounted for 49.2% of the total albatross bycatch. The total combined (all Alaska) estimated seabird take in the 2005 longline fishery (6,370 birds) was about 28% greater than the 2004 estimated take (4,979) and similar to the 5-year average of 2001 through 2005 (6,342). These years bracket the time the fleet moved from very few paired streamer lines being used (2001) to when paired streamer lines were required for all vessels over 58 feet (February 2004). The 2005 estimate is below the overall 1993 through 2005 average of 13,647. Albatross bycatch in 2005 demersal longline fleet (126 birds) was lower than 2004 (158 birds estimated).

These estimates include data collected during an integrated weight study conducted by Washington Sea Grant (http://www.wsg.washington.edu/index.html) in collaboration with NOAA Fisheries, Industry, and the US Fish and Wildlife Service. As is the usual custom when conducting seabird avoidance gear studies for the Alaskan demersal longline fleet, a major portion of the work was conducted during the open access fishery. The study included a control of no mitigation gear (where birds were at higher risk) and experimental treatments of paired streamer lines and integrated weight mainlines. Seabirds caught during the control and experimental sets during this study, which lasted from August to November on 2 freezer longliners, accounted for an estimated 435 seabirds.

In the trawl fishery, 2005 was an unusual year with an abnormally high estimated take of 833 alcids as compared to an overall annual average of 212 from 1993 thorugh 2005. Alcids accounted for 53.3% of the seabird take in 2005, followed by Northern fulmars (29.3%) and shearwaters (13.6%). There were few unidentified birds, and the 56 Laysan albatross estimated (based on a single albatross take) accounted for 3.6% of the seabird bycatch. While the pollock fishery accounted for 61.7% of the seabird take, the cod fishery (which had the single albatross observed taken) accounted for 8.9% of the total. There were no observed takes of albatross in 2004. The estimated take of 1,562 birds in 2005 was more than double that of 2004 (714). The trawl 5-year average is 1,127 birds. Due to changes in observer data collection protocols we cannot apply a comparable estimation procedure to the overall 1993 through 2005 average. Two alternate estimation procedures for this time period provide annual average estimates of either 851 or 1,096 birds per year.

Groundfish pot fisheries in Alaska take very few birds. In 2005 there were an estimated 102 Northern fulmars and 13 unidentified shearwaters taken in this fishery. These may well represent cases where birds collided with pots on deck, somehow got inside, and were subsequently set with the pot. The 2001 through 2005 average is 65 birds, while the overall 1993 to 2005 average is 73 birds per year.

Although the demersal longline fishery bycatch of Laysan albatross decreased from 120 in 2004 to 83 in 2005, the overall combined take of Laysan albatross increased to 139 in 2005, as compared to 120 in 2004 (no albatross were observed taken in the 2004 trawl fishery). There were 43 black-footed albatross estimated taken in 2005, up from 35 in 2004. In 2005 there were no unidentified albatross, compared to an estimated 3 in 2004.

ACKNOWLEDGEMENTS: Many thanks go to the groundfish observers who collected this data, to the observer trainers at the University of Alaska Anchorage Observer Training Center who trained many of the observers, and to the trainers, debriefers, data editors, and other staff at the North Pacific Groundfish Observer Program, FMA Division, Alaska Fisheries Science Center. Staff at the Alaska Regional Office work diligently to process weekly processing reports and maintain the fishery catch database which is crucial to bycatch assessment. Industry host's observers on their vessels and cover all observer deployment costs. Michael Perez of the National Marine Mammal Laboratory completed the seabird bycatch estimates.

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Table 1. Seabird bycatch estimates for the 2005 Alaskan groundfish demersal longline fishery[1] by Region. Estimates are based on data provided by North Pacific Groundfish Observers[2] while monitoring vessels ≥ 60 feet length overall. Numbers in parentheses are the 95% confidence intervals. The total effort in 2005 was 320,874,400 hooks resulting in a catch rate of 0.02 birds per 1,000 hooks.

Species/ Species Group	Region						Total (All Alaska Combined)	
	Aleutian Islands		Bering Sea		Gulf Of Alaska			
Short-tailed Albatross	0		0		0		0	
Laysan Albatross	50	(29 – 87)	18	(7-44)	15	(6-38)	83	(54-127)
Black-footed Albatross	0		5	(1-23)	38	(9-150)	43	(12-150)
Unidentified Albatross	0		0		0		0	
Northern Fulmar	32	(13 – 77)	2,596	(2,288 – 2,945)	156	(95-256)	2,784	(2,465-3,144)
Shearwater spp.	16	(6 – 43)	511	(422 – 619)	33	(15-76)	560	(467 - 674)
Unidentified Procellarids	0		0		0		0	
Gull spp.	85	(48 – 151)	2,283	(1,958 – 2,663)	160	(107-239)	2,528	(2,192 – 2,915)
Alcid spp.	0		16	(6 – 41)	0		16	(6 – 41)
Other Species	0		19	(9 – 40)	0		19	(9 – 40)
Unidentified Seabirds	0		314	(221 – 445)	23	(5-113)	337	(237 – 477)
Total Birds	183	(129 – 262)	5,762	(5,288 – 6,278)	425	(314-573)	6,370	(5,875 – 6,906)

[1] Estimates include birds taken in the course of a controlled study of seabird mitigation alternatives (integrated weight longlines and paired streamer lines) by two freezer longline vessels from August to December 2005 in the open access fishery. Estimates include extrapolations of birds taken in control sets, where no mitigation was used, and therefore may be inflated.

[2] Observers record all birds hooked on gear within the sample regardless of whether the bird was landed or fell off the gear alongside the vessel (dropoff).

Table 2. Seabird bycatch estimates for the 2005 Alaskan groundfish demersal longline fishery by target fishery. Estimates are based on data provided by North Pacific Groundfish Observers while monitoring vessels ≥ 60 feet length overall. Numbers in parentheses are the 95% confidence intervals. Targets are based on the predominate species in the catch.

Species/ Species Group	Target Fishery										All Targets Combined	
	Pacific Cod		Pacific Halibut		Rockfish	Sablefish		Greenland Turbot		Misc. Targets		
Short-tailed Albatross	0		0		0	0		0		0	0	
Laysan Albatross	32	(17 – 32)	16	(6 – 47)	0	24	(11 – 50)	8	(2 – 35)	4 (1 – 16)	83	(54 – 127)
Black-footed Albatross	5	(1 – 23)	0		0	38	(9 – 150)	0		0	43	(12 – 150)
Unidentified Albatross	0		0		0	0		0		0	0	
Northern Fulmar	2,491	(2,189 – 2,836)	27	(14 – 52)	0	133	(75 – 233)	134	(83 – 214)	0	2,784	(2,465 – 3,144)
Shearwater species	453	(369 – 556)	0		0	33	(15 – 76)	74	(48 – 116)	0	561	(467 – 674)
Unidentified Procellarids	0		0		0	0		0		0	0	
Gull Species	2,341	(2,012 – 2,723)	55	(35 – 87)	0	133	(83 – 212)	0		0	2,528	(2,192 – 2,915)
Alcid Species	16	(6 – 41)	0		0	0		0		0	16	(6 – 41)
Other Species	9	(3 – 29)	0		0	0		10	(4 – 24)	0	19	(9 – 40)
Unidentifid Seabirds	314	(221 – 445)	0		0	23	(5 – 113)	0		0	336	(237 – 477)
Total	5,660	(5,188 – 6,175)	98	(68 – 140)	0	382	(275 – 532)	226	(164 – 309)	4 (1 – 16)	6,370	(5,875 – 6,906)

Table 3. Seabird bycatch estimates for the 2005 Alaskan groundfish trawl fisheries by region. Estimates are based on data provided by North Pacific Groundfish Observers while monitoring vessels ≥ 60 feet length overall[1]. Numbers in parentheses are the 95% confidence intervals. The total groundfish catch in 2005 was 2,001,102.7 mt. The overall catch rate was 0.78 birds per 1,000 mt.

Species/ Species Group	Region						Total (All Alaska Combined)	
	Aleutian Islands		Bering Sea		Gulf Of Alaska			
Short-tailed Albatross	0		0		0		0	
Laysan Albatross	56	(9 – 357)	0		0		56	(9 – 357)
Black-footed Albatross	0		0		0		0	
Unidentified Albatross	0		0		0		0	
Northern Fulmar	191	(52 – 701)	266	(183 – 387)	0		457	(243 – 859)
Shearwater spp.	0		213	(11 – 4,190)	0		213	(11 – 4,190)
Unidentified Procellarids	0		0		0		0	
Gull spp.	0		0		0		0	
Alcid spp.	0		830	(160 – 4,307)	3	(1 – 6)	833	(161 – 4,313)
Other Species	0		0		0		0	
Unidentified Seabirds	0		3	(1 – 11)	0		3	(1 – 11)
Total Birds	247	(79 – 774)	1,312	(327 – 5,257)	3	(1 – 6)	1,562	(462 – 5,270)

[1] Estimates are derived from observer sampling of landed catch and do not include seabird mortalities from other sources such as interactions or entanglements with trawl cables or third wires.

Table 4. Seabird bycatch estimates for the 2005 Alaskan groundfish trawl fisheries by target fishery. Estimates are based on data provided by North Pacific Groundfish Observers while monitoring vessels ≥ 60 feet length overall[1]. Numbers in parentheses are the 95% confidence intervals.

Species/ Species Group	Target Fishery										All Targets Combined	
	Atka Mackerel		Pacific Cod		Flatfish		Rockfish	Pollock		Miscellaneous Targets		
Short-tailed Albatross	0		0		0		0	0		0	0	
Laysan Albatross	0		56	(9 – 357)	0		0	0		0	56	(9 – 357)
Black-footed Albatross	0		0		0		0	0		0	0	
Unidentified Albatross	0		0		0		0	0		0	0	
Northern Fulmar	142	(30 – 682)	83	(21 – 322)	0		0	232	(195 – 276)	0	457	(243 – 859)
Shearwater species	0		0		68	(17 – 343)	0	145	(5 – 4,358)	0	213	(11 – 4,190)
Unidentified Procellarids	0		0		0		0	0		0	0	
Gull Species	0		0		0		0	0		0	0	
Alcid Species	0		0		250	(72 – 864)	0	583	(75 – 4,532)	0	833	(161 – 4,304)
Other Species	0		0		0		0	0		0	0	
Unidentifid Seabirds	0		0		0		0	3	(1 – 11)	0	3	(1 – 11)
Total	142	(30 – 682)	139	(42 – 461)	318	(109 – 930)	0	963	(171 – 5,402)	0	1,562	(462 – 5,270)

[1] Estimates are derived from observer sampling of landed catch and do not include seabird mortalities from other sources such as interactions or entanglements with trawl cables or third wires.

Table 5. Species names and species group categories used in the text and Tables 1 through 4.

Species/species Group	Includes	Scientific Name
Seabirds		
Short-tailed Albatross	n/a	*Phoebastria albatrus*
Laysan Albatross	n/a	*Diomedea immutabilis*
Black-footed Albatross	n/a	*Diomedea nigripes*
Unidentified Albatross	Short-tailed, Laysan, or black-footed.	n/a
Northern Fulmar	n/a	*Fulmarus glacialis*
Shearwaters	Unidentified Shearwater	*Puffinus* spp
	Sooty Shearwater	*Puffinus griseus*
	Short-tailed shearwater	*Puffinus tenuirostris*
Unidentified Procellarid	All of the above	Procellariiformes
Gull	Unidentified gulls	*Laridae*
	Herring gulls	*Larus argentatus*
	Glaucous gulls	*Larus hyperboreus*
	Glaucous-winged gulls	*Larus glaucescens*
Alcid	Unidentified alcids,	*Alcidae*
	Guillemots	*Cepphus* spp.
	Murres	*Uria* spp.
	Puffins	*Fraturcula* spp.
	Murrelets and auklets	Several genera
Other Seabird	Miscellaneous birds – could include:	
	Loons	*Gaviidae*
	Grebes	*Podicipededae*
	Cormorants	*Phalocrocoracidae*
	Seaducks	*Anatidae*
	Jaeger/skuas	*Stercorariidae*
	Kittiwakes	*L. tridactyla, L. brevirostris*
	Terns	*Sternidae*
	Storm petrels	*Oceanitidae*
Unidentifid Seabird	All of the above	
Fish		
Pacific Cod	n/a	*Gadus macrocephalus*
Pacific Halibut	n/a	*Hippoglossus stenolepis*
Rockfish	Several species, primarily	*Sebastes* spp.
	Pacific Ocean Perch	*Sebastes alutus*
	Northern Rockfish	*Sebastes polyspinis*
Sablefish	n/a	*Anoplopoma fimbria*
Greenland Turbot	n/a	*Reinhardtius hippoclossoides*
Atka Mackerel	n/a	*Pleurogrammus monopterygius*
Flatfish	Several species and species complexes (i.e., deep water flatfish)	Pleuronectiformes
	including: Yellowfin Sole	*Limanda aspera*
	Rock Sole (Northern and Southern)	*Lepidopsetta polyxystra* and *L. bilineata*
Walleye Pollock	n/a	*Theragra chalcogramma*