

INCIDENTAL CATCH OF SEABIRDS IN THE SET-GILLNET FISHERY OF KODIAK, ALASKA RELATIVE TO SEABIRD ABUNDANCE

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METHODS

USFWS assisted NMFS in the Alaska Marine Mammal Observer Program study of incidental take in the Kodiak Island set-gillnet salmon fishery (Fig. 1).

The study occurred June 9 - Aug 29, 2002 (most of fishery). About 100 fishers, each with up to 2 nets totaling 150 fathoms, fished the area monitored.

11 NMFS and 3 USFWS observers were randomly distributed, proportional to fishing effort, covering 6% of fishery. Seabird colonies were censused (Fig. 2, Table 1).

Observers monitored set-gillnets from separate boats. Nets were observed while soaking and while being hauled or picked.

Observers made systematic 'scans' along the net, and recorded birds < 300m and < 10m from the net. Entangled birds were 'incidental takes'. Alive birds were released (n=3), and dead birds (n=32) were kept and processed in a lab.

Table 1. Kodiak Island seabird populations. No. of sightings/100 scans within 300 m of the net (in air & water), and estimated incidental take.

Colonial Species	Population at Colonies	% of Colony Birds	% of Birds <300m from Nets	Number of Birds Entangled	Estimated Take & (Standard Error)	
					PECO	RFCO
Colonial Species <i>(Highlights indicate entangled species)</i>						
Storm Petrel (Fork-tailed, Leach's)	38,900	15	0			
Cormorant (Double-crested, Pelagic, Red-faced)	1600	<1	1	3	PECO 14 (13.4)	RFCO 28 (18.9)
Black-legged Kittiwakes	75,178	29	62			
Gulls (Glaucous-winged, Mew)	12,446	5	19			
Tern (Arctic, Aleutian)	468	<1	4			
Murre (Common, Thick-billed)	814	<1	<1	12	COMU 185 (63.3)	TBMU 14 (13.9)
Pigeon Guillemot	1,960	<1	3	5		76 (32.5)
Parakeet Auklet, Rhinoceros Auklet, Ancient Murrelet	715	<1	<1			
Least Auklet	0	0	0	1		18 (17.7)
Tufted Puffin	121,225	47	3	7		110 (78.0)
Horned Puffin	2,035	<1	<1	1		14 (13.3)
Non-colonial Species						
Marbled Murrelet	-	-	3	4		56 (26.9)
Harlequin Duck	-	-	<1	1		16 (14.9)
Ducks & Scoters	-	-	<1			
Sooty Shearwater	-	-	<1	1		14 (13.5)
Jaeger (Parasitic, Pomarine)	-	-	<1			



Nets soak for variable lengths of time, day and night, as determined by Alaska State Fish & Game to manage salmon runs.

Harlequin ducks and other marine ducks were present, but rarely occurred near nets.

Black-legged kittiwakes and Glaucous-winged gulls were abundant and occurred at nets, but had no entanglements.

Abstract: In 2002 the National Marine Fisheries Service (NMFS) studied incidental take in the Kodiak Island (KI) set-gillnet salmon fishery. In cooperation, the U.S. Fish & Wildlife Service monitored bird abundance and proximity to gear. Observers covered 6% of the KI fishery. KI has 256,000 colonially-nesting seabirds in 192 colonies. Of 18 colonial species, 50% of total numbers were alcids, mainly tufted puffins. Total mortality in 2002 was estimated to be 546 (SE=111) birds of 10 species. Take of non-colonial birds included marbled murrelet (11%), harlequin duck (3%), and sooty shearwater (3%). Alcids were 86% of bird take, and 23% of those were tufted puffins. Cormorants and pigeon guillemots were each < 1% of colony birds, but 9% and 14% of bird take, respectively. Common and thick-billed murres, <1% of colonial birds on KI, were 34% of bird take; they may come from large colonies ~ 100 km from KI. Pigeon guillemots forage near colonies and might show local impacts; their estimated mortality in 2002 was 4% of the KI population. Of 15 factors, 4 had significant effects; bycatch was higher in shallow water, during ebb tides, on rocky reefs, and with use of pingers on nets.

Primary Bycatch Species

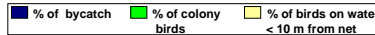


Fig. 3. Most entangled birds were alcids. Only tufted puffins were abundant at colonies. Observed occurrence <10m from the nets was low for all entangled species. Larids (gulls, terns, and kittiwakes), which were 87 % of birds on the water < 10 m from the nets, were not entangled.

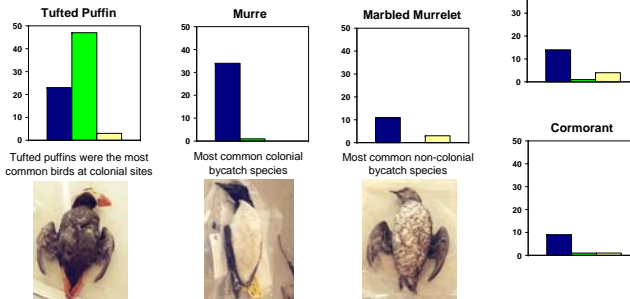


Table 2. Analysis of factors affecting bycatch

Bycatch Factors

Factors tested for effect on bird bycatch: Effort, Day, Time, Water temperature, Tide, Depth, Water body type, Land type, Net shape, Mesh size, Net material, Net color, use of Pingers, Lights, Floatline.

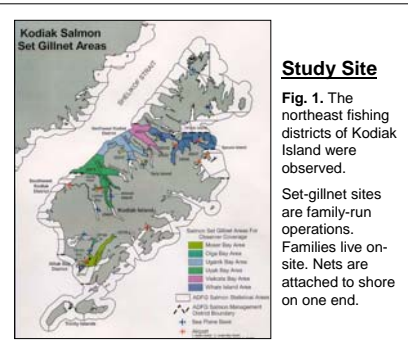
Statistical Tests: observed vs expected - Chi-square & randomization tests. Or - t-test on means & subsequent modified t-test.

Potentially significant factors:

Factor	P-value	Effect on bycatch
Depth	0.093	higher in shallower water.
Tide	0.081	more on ebb tide
Pingers	0.007	more with pingers on nets
Land type	0.044	more on rocky reefs, less on islands & peninsulas



Sooty shearwaters breed in the southern hemisphere, but migrate through the Kodiak area in late summer/early fall. They may be subject to incidental take late in the season.



Study Site

Fig. 1. The northeast fishing districts of Kodiak Island were observed.

Set-gillnet sites are family-run operations. Families live on-site. Nets are attached to shore on one end.

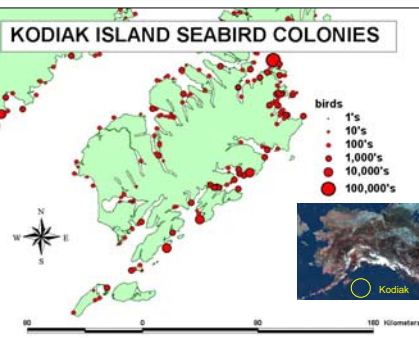


Fig. 2. Seabird colonies were recensused in 2000-2002. There were 192 colonies with over 256,000 birds. Large colonies were comprised mainly of tufted puffins and black-legged kittiwakes (See Table 1).

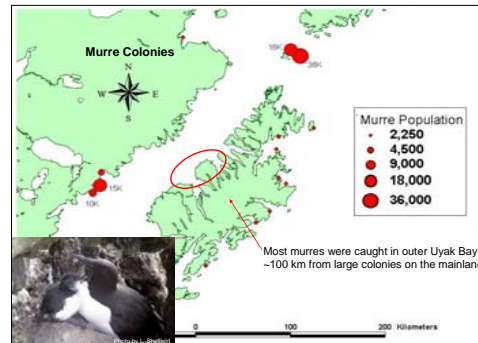


Fig. 4. There were 8 small common murre colonies on Kodiak Island, yet murres were, 34% of incidental take. Murres may forage 100+km from nests. About 70,000 murres of both species nest near Kodiak Island, and may have come from these colonies.

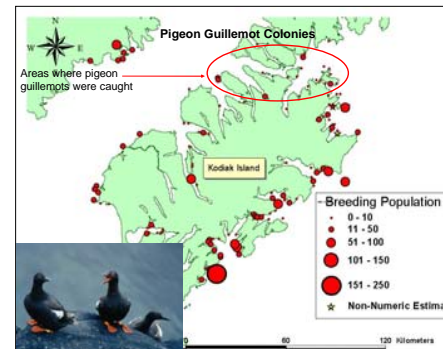


Fig. 5. Pigeon guillemot colonies were numerous, small, and scattered. Relatively few guillemots nest where we observed nets, but they were 11% of the bycatch. Guillemots forage <10 km from nests, so local colonies could be impacted.

Results & Discussion

- 35 birds (10 species) were entangled during 1421 observed net hauls (Table 1).
- Total estimated bird mortality was 546 (SE=111) birds.
- **Alcids** - the main birds entangled (86%).
- **Larids** - most abundant in area & near nets, but weren't entangled (Table 1).
- **Tufted puffins** - frequently entangled & abundant on Kodiak Is. (Fig. 3).
- **Murres** - most frequently entangled, though not abundant. Could have come from large mainland colonies (Fig. 4). Only 1 of 12 murres had brood patches; may be non-breeders.
- **Pigeon guillemots & cormorants** had small populations, but high incidental take. These forage near their colony & may be locally impacted (Fig. 5). Estimated mortality of guillemots in 2002 = 4% of Kodiak Is. population.
- **Harlequin ducks** - low bycatch; present, but not near nets.
- **Sooty shearwaters** - pass through area in late summer/fall. In 2002, this fishery wound down early & we didn't observe after August.
- **Tendency for more bird entanglement** in (Table 2):
a) shallow water, b) during ebb tide, c) near rocky reef, d) with 'pingers' on nets.

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