

**DISTRIBUTION AND ABUNDANCE OF
STELLER'S EIDERS (*Polysticta stelleri*)
IN THE KODIAK ARCHIPELAGO, ALASKA
JAN.-FEB., 2001**

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STELLER'S EIDERS (*Polysticta stelleri*)
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WINTER 2001**

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Abstract.

The fourth Kodiak aerial Steller's eider winter survey was flown from 29 January to 2 February 2001, covering most of the eastern coastal portion of the Kodiak Archipelago. The survey design consisted of a single flight parallel to the shoreline between 200 and 400 meters offshore, with s-turn patterns as necessary to cover all shoals shallower than 20 meters providing known or potential habitat for Steller's eiders. Coverage is comparable to that of the 1994 survey, with the same observers. All groups of eiders and other waterbirds and marine mammals were identified and counted or estimated by the pilot and the starboard observer. Observations were dictated into GPS-linked laptop computers, providing electronic records of the location of each observation, and the flight path of the survey aircraft. 4,196 Steller's eiders were recorded for the survey, compared with 5,349 in early March, 1994. We provide an adjusted estimate of 5,341 Steller's eiders in 2001, which includes two portions of the Trinity Islands area where we extrapolated data from systematic samples because total coverage was not feasible. Comparisons of area totals between 1994 and 2001 showed some extreme disparities in distribution among years. Partial shoreline coverage of Afognak and Shuyak Islands failed to produce any sightings of Steller's eiders. We recommend replicate surveys and/or Satellite telemetry to determine the fidelity of wintering Steller's eiders to wintering habitats within the Kodiak Archipelago and in other portions of Southwest Alaska.

Key Words: Waterfowl, Steller's eider, *Polysticta stelleri*, aerial, sea duck, Kodiak, Alaska

INTRODUCTION

Concerns about apparent declines in Steller's eider (Kertell 1991) and other sea duck populations prompted personnel of the Kodiak National Wildlife Refuge to initiate an annual winter aerial survey to assess and monitor sea duck populations. The first survey was conducted in March and April 1992, covering most of the primary Kodiak Steller's eider wintering area, as determined by years of incidental aerial and shipboard observations by refuge personnel (Zwiefelhofer 1992). Estimates for all waterfowl and marine mammals were reported for 4 survey zones. A total of 2,892 Steller's eiders were tallied during the 1992 survey. The survey was repeated in 1993, with 4,032 Steller's eiders estimated. Problems relating to weather and aircraft availability in 1993 resulted in the deletion of Chiniak Bay and Ugak Island, which had accounted for 2,120 Steller's eiders in 1992. The survey was repeated again in 1994, with the same study area divided into 88 segments for more precise distributional information. That year refuge funding was not available for the project, so Pilot/Biologist Bill Larned (Waterfowl Management, Soldotna), completed the survey with regional eider funds, using an aircraft and observer (Denny Zwiefelhofer) provided by Kodiak National Wildlife Refuge (Larned and Zwiefelhofer 1995). Attempts to repeat the survey and expand coverage in subsequent years were unsuccessful, due to scheduling and funding problems. This report describes results of a survey that was successfully completed in late January and early February, 2001.

METHODS

The survey was flown in a Cessna 206 equipped with amphibious floats, with a crew consisting of pilot/observer Bill Larned and forward right observer Denny Zwiefelhofer. We conducted a standard shoreline survey, remaining 200 to 400 m offshore, at an altitude of 50 m, and an airspeed of 100 kts. A moving-map system, developed by John Hodges (USFWS Waterfowl Management, Juneau, Alaska) was used to aid in navigation and record waterfowl and marine mammal observations. The survey area included all habitats known to host significant numbers of wintering Steller's eiders (Fig. 1). This year we also added a portion of the shoreline of Afognak and Shuyak Islands (survey area 10, Fig. 1), which Larned surveyed alone enroute to Anchorage. Steller's eiders prefer shallow protected marine habitats, especially those containing eelgrass beds (Metzner 1993). We therefore digitized the 20m isobath within the survey areas, and displayed this in the moving map, limiting our survey generally to the area between that line and the shoreline. In most cases this included only a narrow survey corridor, allowing us to see and record all Steller's eiders on a single transect parallel to the shoreline (Figs. 2-5). We covered broader corridors using an S-turn pattern. For analysis we treated all these areas as a complete census, though there is undoubtedly a small, unknown number of birds that escaped detection due to rough surface conditions, diving behavior, etc. Two areas in the southern portion of the survey area were not practical to cover completely, and these were sampled with a systematic pattern of transects (Fig. 5). We standardized coverage width within the latter areas by using calibrated wing-strut marks to estimate 300 meters either side of the aircraft. We then extrapolated the densities within the sample to the unsampled portion of the survey areas to estimate totals. These adjusted totals are reported in the results section, but not in Table 2. All observations were recorded using the laptop moving map program, which was linked to the on-board GPS receiver to provide a precise location on the flight path from which each observation was made. The program also provided a real-time display and recording of the flight path. We also recorded estimated tide state (low, medium, high), sky condition (clear, scattered, broken, overcast), wind direction and wind speed whenever any of these parameters changed. Data were summarized by geographical areas for comparison with 1994 data.

RESULTS AND CONCLUSIONS

Flight time for the survey included 4 hrs. on 29 January, 6.0 hrs. on 1 February, and 1 hour on 2 February.

Steller's eider

On 29 January we successfully surveyed the Akhiok/Cape Alitak/Moser Bay area (areas 7,8,9, Fig. 1), which had a total of 172 Steller's eiders. We also completed an abbreviated coverage of Sitkinak Strait (area 5), where we recorded 1,368 Steller's eiders. Snow squalls precluded further surveys that day. Two days of bad weather followed, when we could not fly at all. After that, however, conditions were excellent, with generally very light winds, little water surface chop, and good visibility. On 1 February we resurveyed Sitkinak Strait, and surveyed Tugidak and Sitkinak Islands, the Aliulik Peninsula, Old Harbor, Ugak Bay and most of Chiniak Bay. On 2 February we completed Chiniak Bay and the shoreline to Ouzinkie. Then Larned (alone) flew a survey along the coast of Afognak and Shuyak Islands enroute to Anchorage.

Steller's eider flocks were rather small, ranging from 1 to 250 individuals per observation, with a mean of 19 birds ($n=223$). Figures 2-5 show the distribution of observations of Steller's eiders. The highest concentrations were in Sitkinak Strait, The passage between Tugidak and Sitkinak Islands, Chiniak Bay and Narrow Cape. They were most abundant in lagoons and extensive eelgrass shoals. Differences in distribution between March 1994 and the present survey included: there were far fewer eiders in the Akhiok area this year (172 compared to 640); there were no eiders in Sitkinak Island Lagoon this year (compared to 764 in 1994), there were 729 eiders in the pass between Sitkinak and Tugidak Islands this year (compared to 105 in 1994), and there were far fewer eiders this year in the immediate vicinity of the city of Kodiak (Women's Bay to Long Island) (187 compared to 866 in 1994) (Figs. 2-5). We found no Steller's eiders at all in the Afognak/Shuyak Island area. The overall estimate this year was 4196 without extrapolation, which is a 27 percent decrease from the comparable 1994 estimate of 5349. A more accurate estimate may be obtained by adding the additional birds from extrapolation in the two sampled areas (Table 1). This adds 1145 birds for a total of 5,341.

Table 1. Calculations for extrapolation of sample Steller's eider densities within sampled survey areas in the Kodiak Archipelago, Jan. and Feb., 2001.

	SURVEY AREA	
	Sitkinak Strait	Tugida/Sitkinak
Survey area (A) (km ²)	114	67
Transect total length (L) (km)	117	35.4
Sample area ($L * 0.6 = A_s$) (km ²)	70	21.2
Expansion Factor ($A/A_s = EF$)	1.63	3.16
Sample total birds (ST)	1598	64
Expanded total ($ST * EF$)	2605	202

Other Species

Totals for other species are listed in Table 2 with 1994 totals for comparison. Distribution maps

for selected species are included in the appendix to this report. Since the survey was designed to cover Steller's eider distribution, results for other species are less comprehensive. As such these data may find use primarily in indicating some important habitats, as well as for long term tracking of wintering distribution and relative abundance.

RECOMMENDATIONS

We would like to see this survey continued, at least on a periodic basis to monitor this important and possibly discrete wintering Steller's eider population. Since we noted some pronounced differences in distribution between 1994 and 2001, we recommend two or more surveys within a single late winter period separated by a month or more to determine the degree of fidelity of Steller's eiders to specific wintering areas within the archipelago. We also recommend including Kodiak in the capture area locations for a pending winter satellite telemetry study, to determine the relationship of these birds to those wintering elsewhere in SW Alaska.

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Table 2. Estimates by species for each major geographic area surveyed, Winter Steller's eider aerial survey, Kodiak Archipelago, Alaska, 29 January to 2 February, 2001.

Species	1		2		3		4		5	
	1994	2001	1994	2001	1994	2001	1994	2001	1994	2001
Red-necked grebe		1	1	2	N		N			2
Loons	20	28	11	18	O	10	O	7	7	73
Murres	1	219		402	T	26	T	51	400	27
Pigeon guillemot	20	20		13		1		2		16
Large gulls	2654	1916	1	168	S	2	S	3		105
Mew gull	298	1225		37	U		U	4		22
Cormorants	3	159	227	48	R	10	R	12	25	154
Common merganser	20	14	22	7	V	4	V	14		
Red-breasted merganser	110	61	254	80	E	5	E	6	68	29
Mallard	144	75	100	50	Y		Y	3	60	12
Northern pintail			16		E		E			
Scaups	121	84	360	30	D	160	D			
Goldeneyes	36	67	90	143		8		30		
Bufflehead	6	13	16	8				8		16
Harlequin duck	237	251	174	251		4			38	93
Long-tailed duck	387	410	361	451		24		111	63	470
Common eider	58	12	6							
King eider	39	89	50	75				7	87	423
Steller's eider	2024	823	390	641				9	1302	1598
Black scoter	400	318	838	859		3			29	460
White-winged scoter	242	115	228	135				9		69
Surf scoter	75	182	156	147		110		4	37	4
Unident. scoters		20		5						14
Emperor goose	195	340	65	99					304	136
Bald eagle	23	6	19	2					5	3
Sea otter	15	23	2						3	32
Harbor seal	8	25	24							8
Steller's sea lion	85	1								

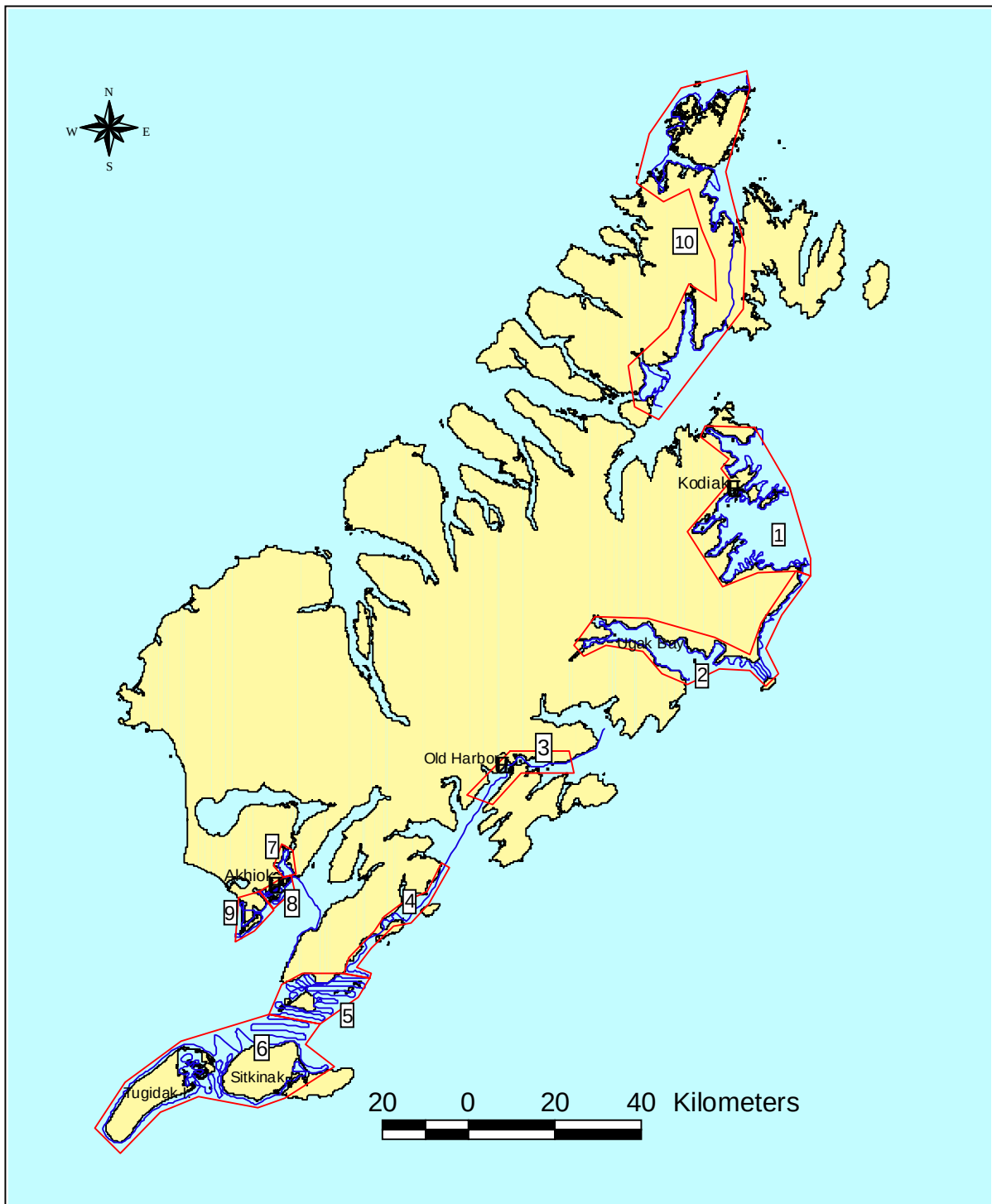


Figure 1. Kodiak Archipelago showing areas surveyed and flightpaths flown during an aerial wintering waterfowl survey, 29 Jan. - 2 Feb., 2001.

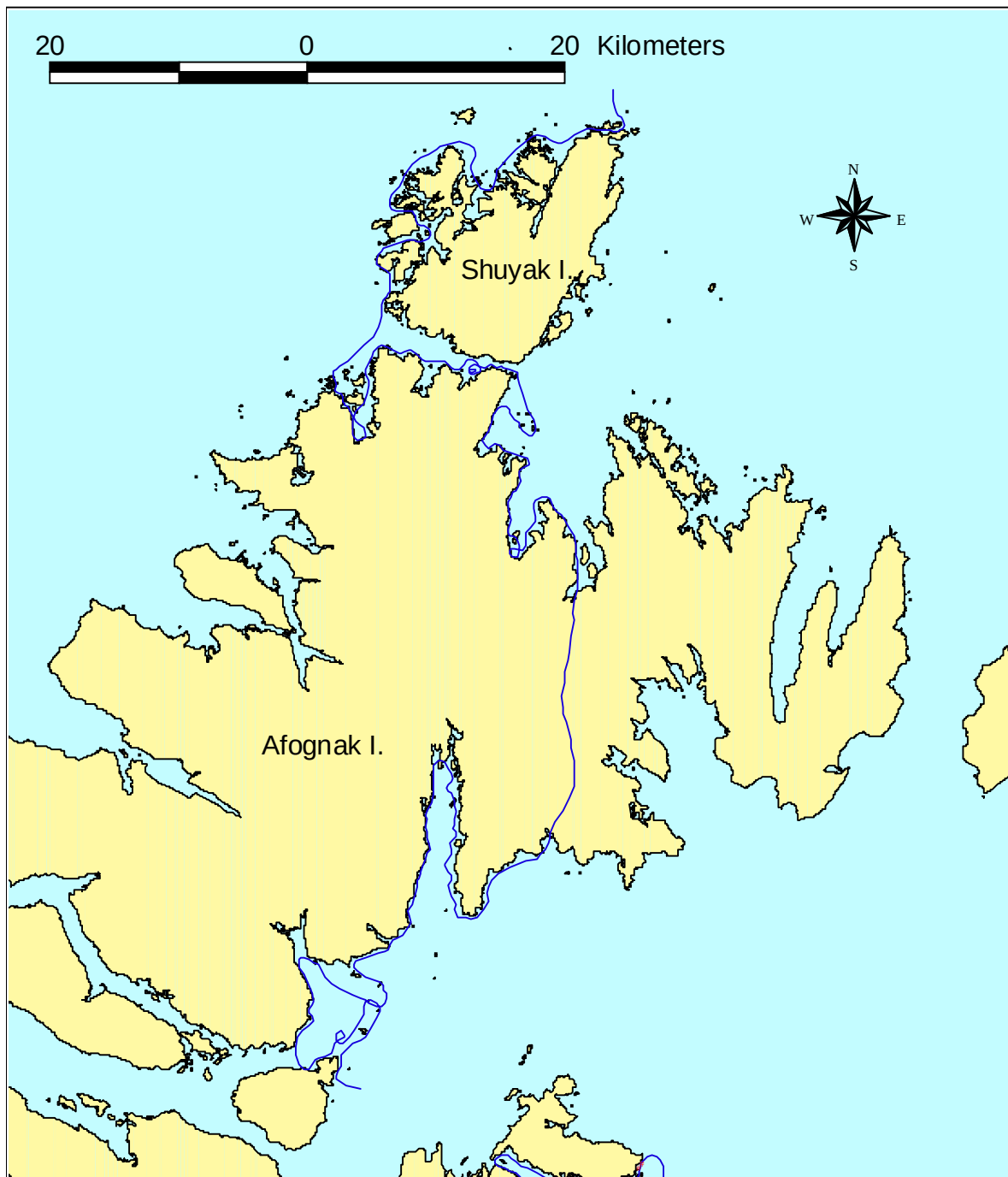


Figure 2. Location and numbers of Steller's eiders recorded during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb., 2001. Dark blue lines = flight paths; red dots = Steller's eider observations.

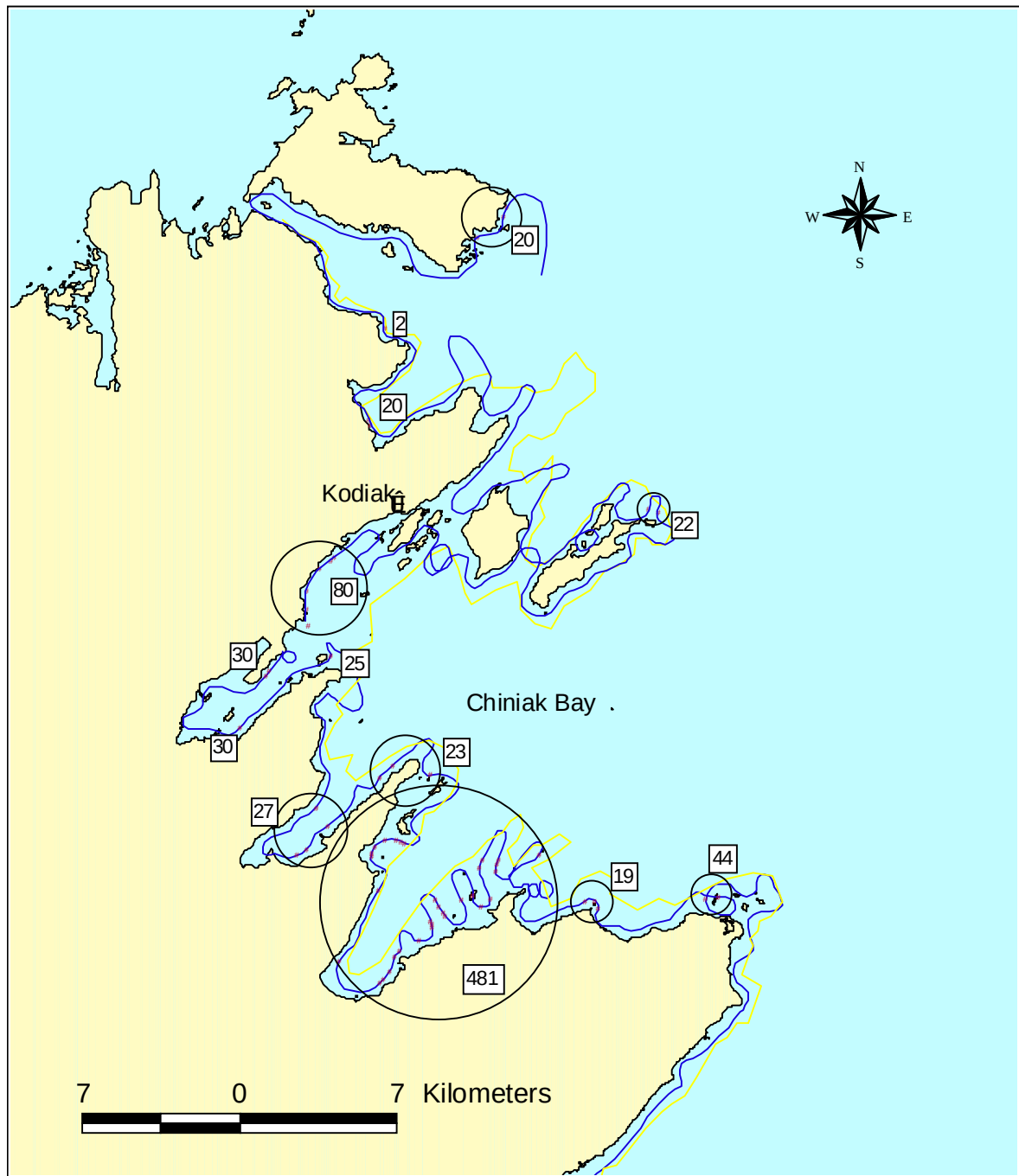


Figure 3. Locations and numbers of Steller's eiders recorded during an aerial survey, Kodiak Archipelago, Alaska 29 Jan. -2 Feb., 2001. Dark blue lines = flight paths; yellow lines show location of 20 m. isobaths; number labels indicate total Steller's eiders for the associated observations (red dots).

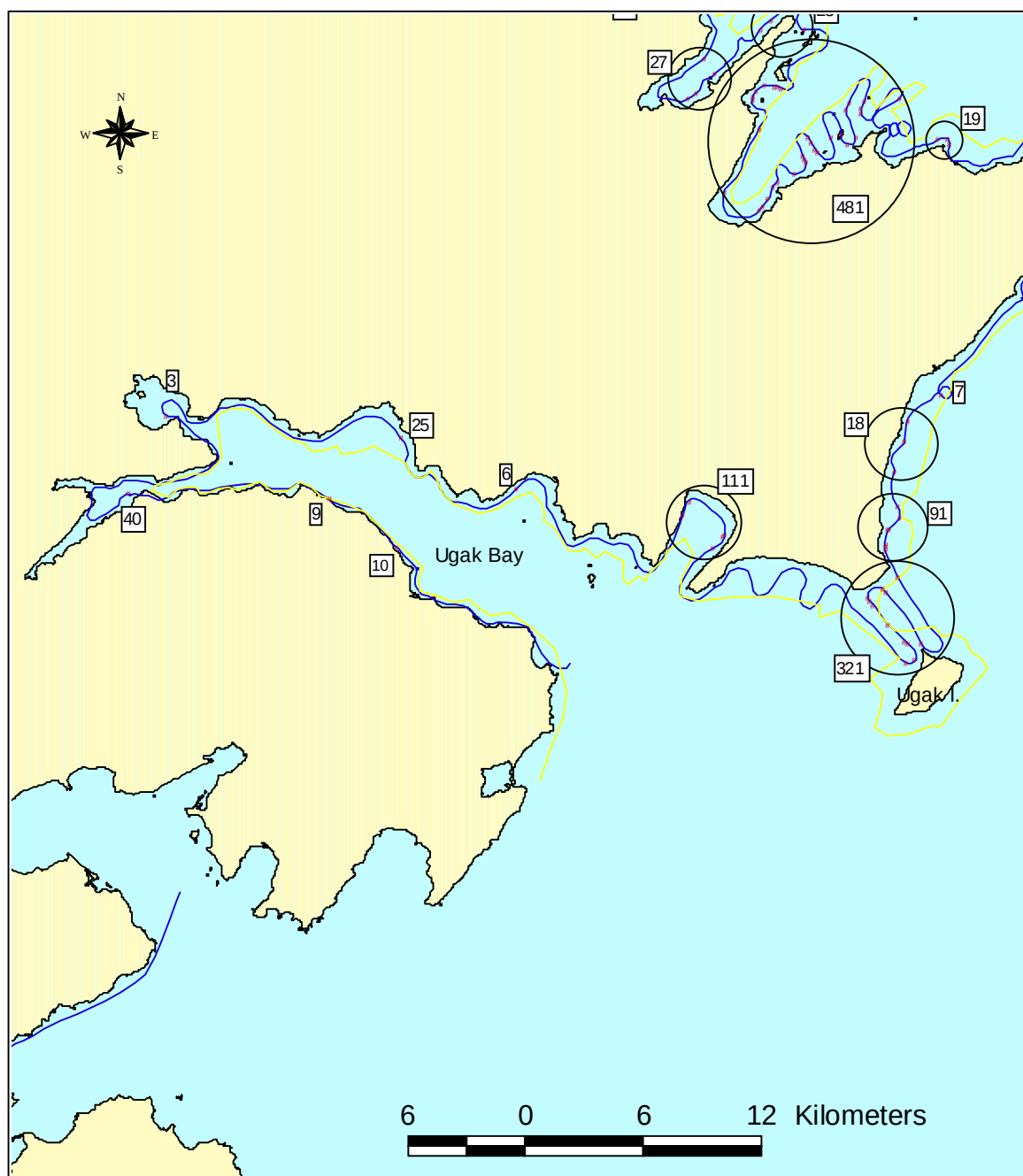


Figure 4. Locations and numbers of Steller's eiders recorded during an aerial survey, Kodiak Archipelago, Alaska 29 Jan. -2 Feb., 2001. Dark blue lines = flight paths; yellow lines show location of 20 m. isobaths; number labels indicate total Steller's eiders for the associated observations (red dots).

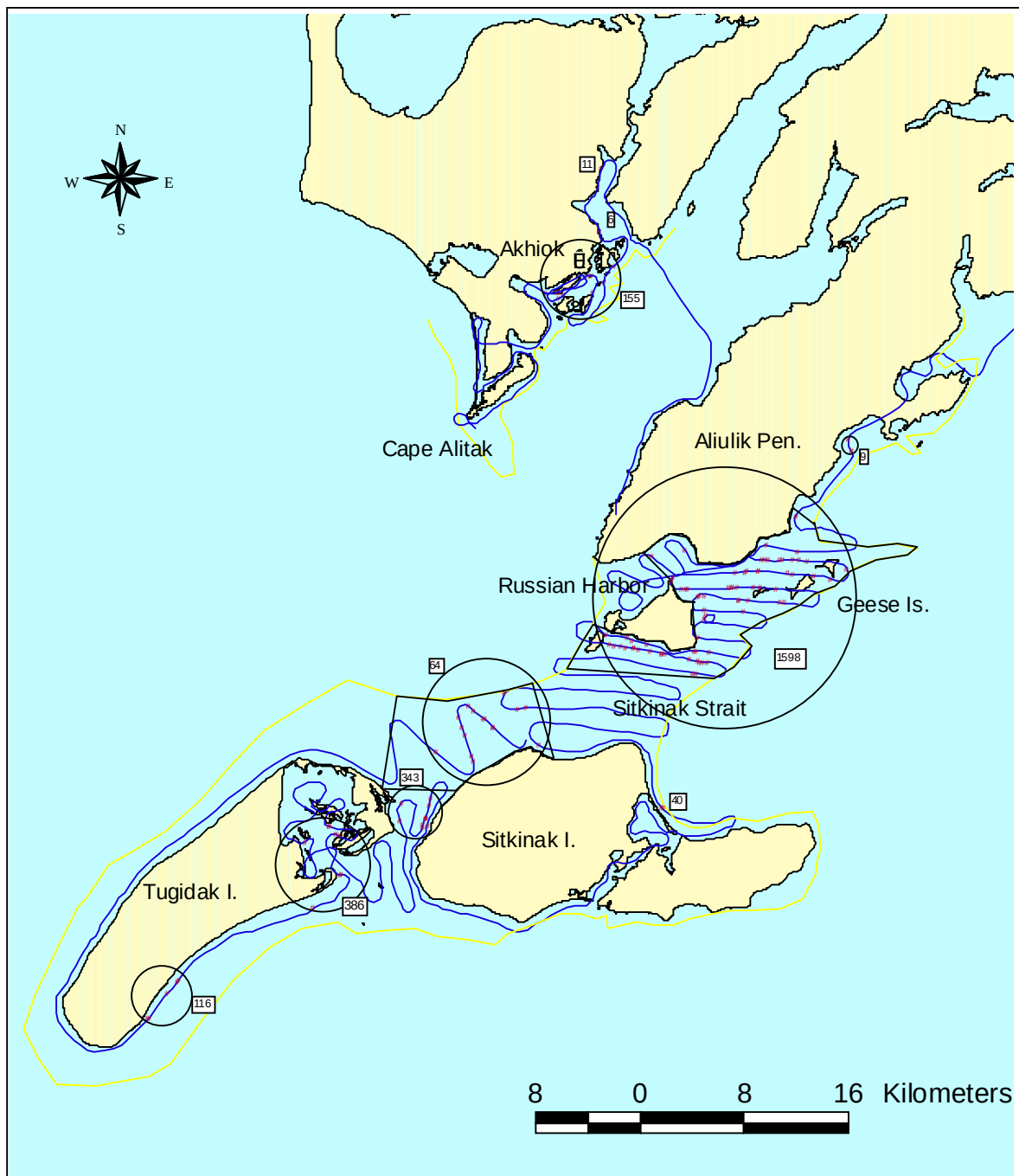


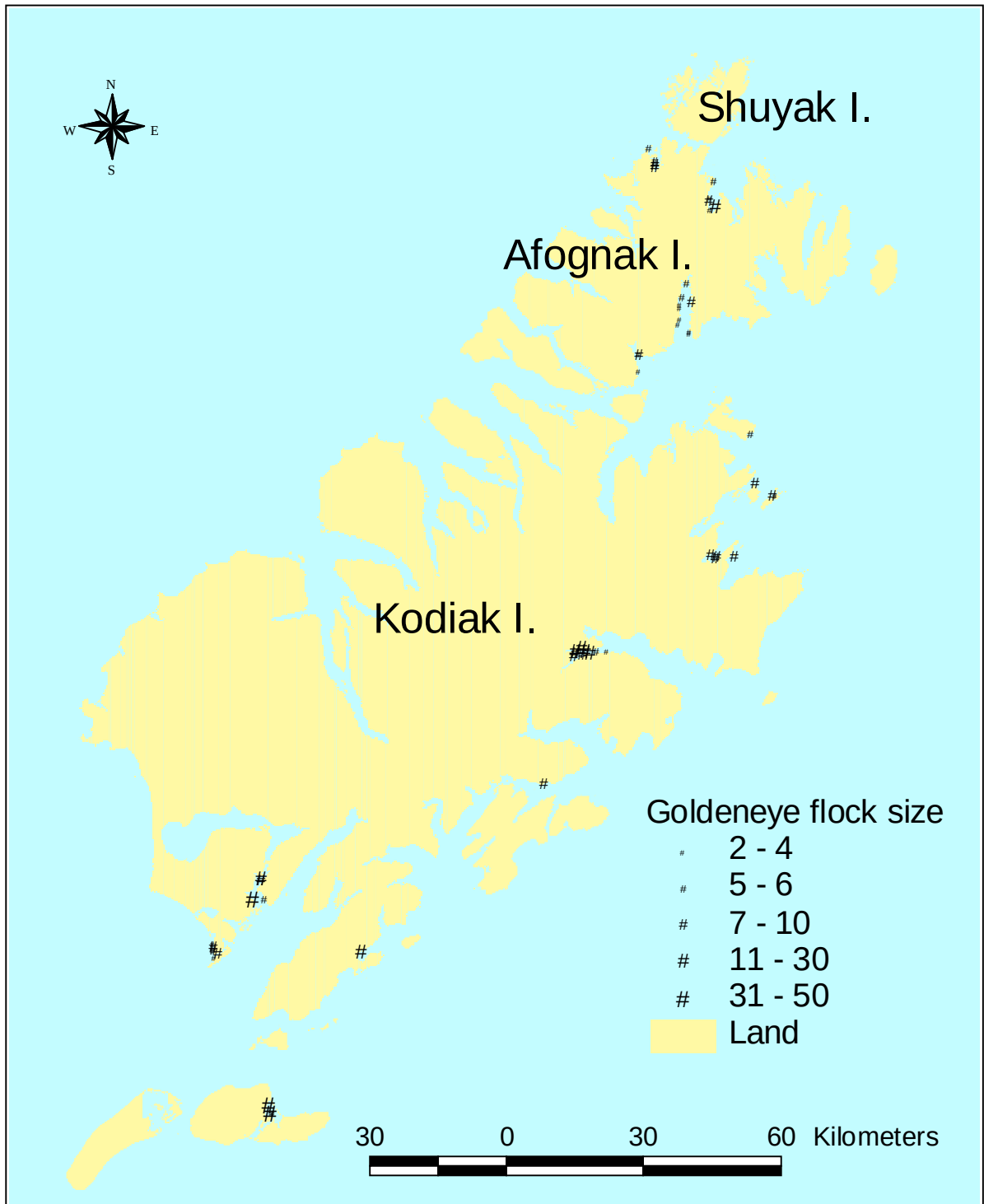
Figure 5. Locations and numbers of Steller's eiders recorded during an aerial survey, Kodiak Archipelago, Alaska 29 Jan. -2 Feb., 2001. Dark blue lines = flight paths; yellow lines show location of 20 m. isobaths; number labels indicate total Steller's eiders for the associated observations (red dots). Heavy black lines enclose sample area polygons for extrapolation.

APPENDIX 1. Common and scientific names of species mentioned in the text and tables.

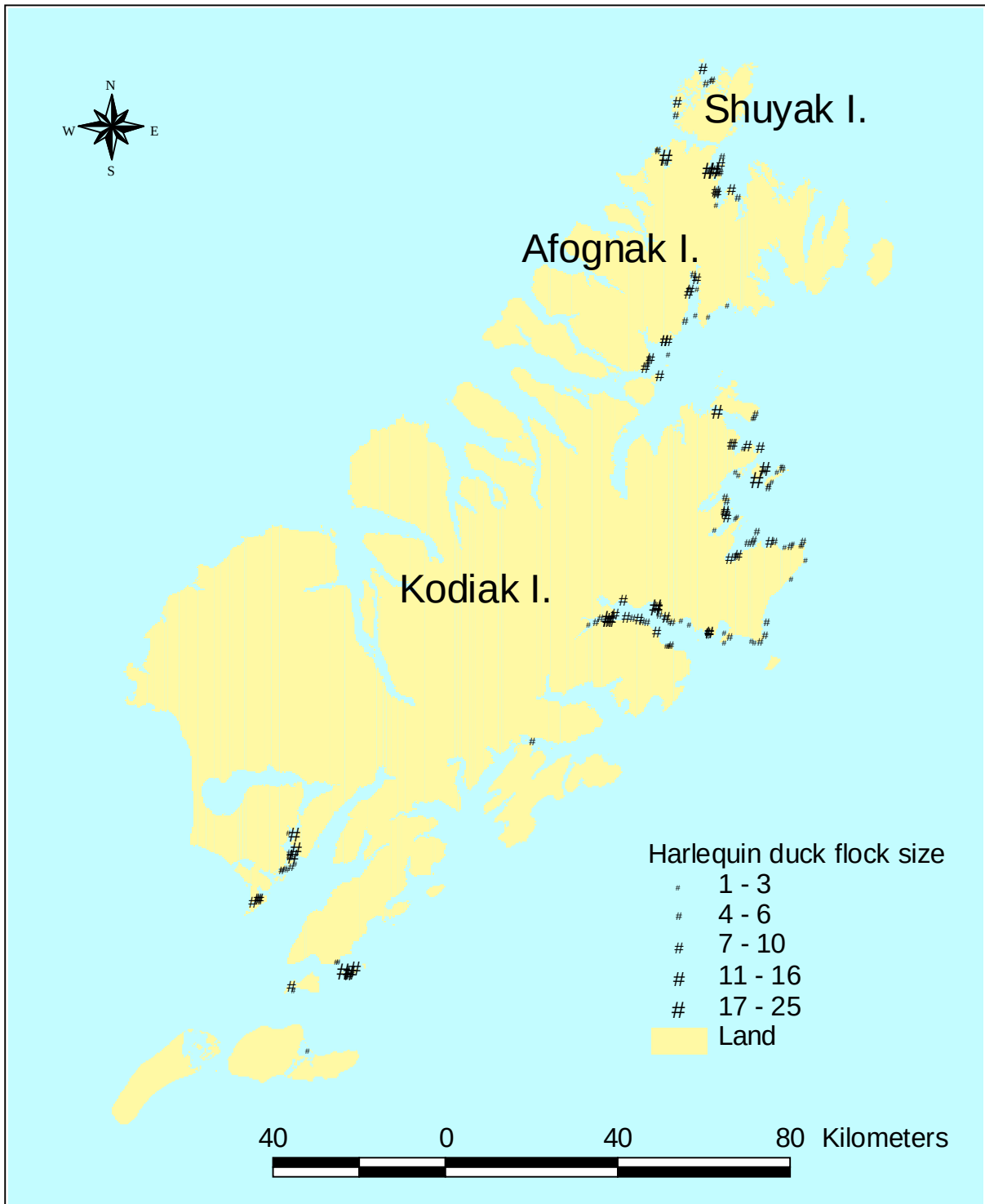
Common Name	Scientific Name
<u>Birds:</u>	
Red-necked grebe	<i>Podiceps grisegena</i>
Loon spp.	<i>Gavia immer</i> , <i>G. pacifica</i> , <i>G. adamsii</i> , <i>G. stellata</i>
Murre spp.	<i>Uria</i> spp.
Pigeon guillemot	<i>Cepphus columba</i>
Large gull	<i>Larus argentatus</i> , <i>L. hyperboreus</i> , <i>L. glaucescens</i> .
Mew gull	<i>Larus canus</i>
Cormorant spp.	<i>Phalacrocorax auritus</i> , <i>P. pelagicus</i>
Common merganser	<i>Mergus merganser</i>
Red-breasted merganser	<i>Mergus serrator</i>
Mallard	<i>Anas platyrhynchos</i>
Northern pintail	<i>Anas acuta</i>
Greater scaup	<i>Aythya marila</i>
Goldeneye spp.	<i>Bucephala clangula</i> , <i>B. islandica</i>
Bufflehead	<i>Bucephala albeola</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Long-tailed duck	<i>Clangula hyemalis</i>
Common eider	<i>Somateria mollissima</i>
King eider	<i>Somateria spectabilis</i>
Steller's eider	<i>Polysticta stelleri</i>
Black scoter	<i>Melanitta nigra</i>
White-winged scoter	<i>Melanitta deglandi</i>
Surf scoter	<i>Melanitta perspicillata</i>
Emperor goose	<i>Chen canagica</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
<u>Marine mammals:</u>	
Sea otter	<i>Enhydra lutris</i>
Harbor seal	<i>Phoca vitulina richardsi</i>
Steller's sea lion	<i>Eumetopias jubatus</i>

APPENDIX

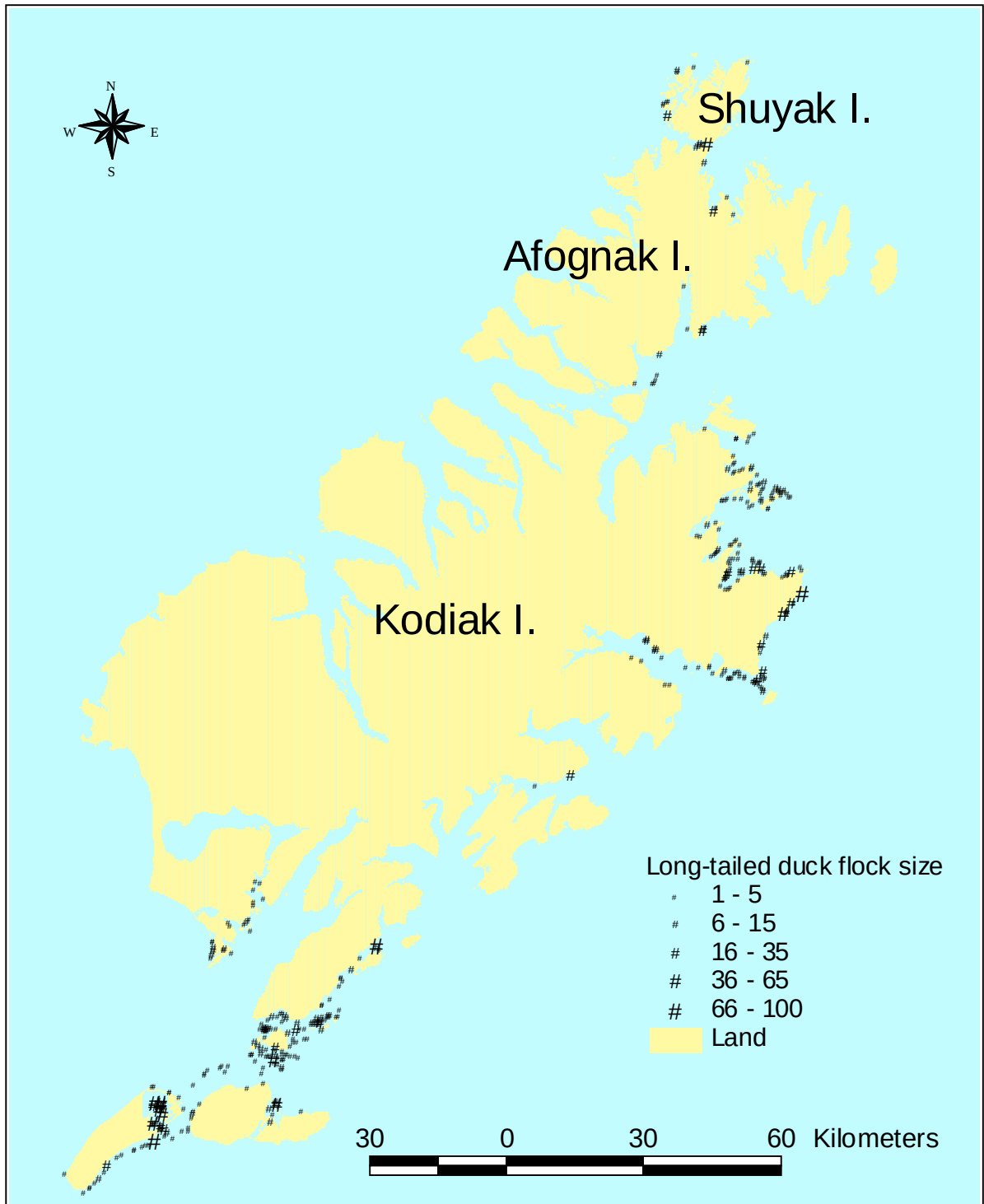
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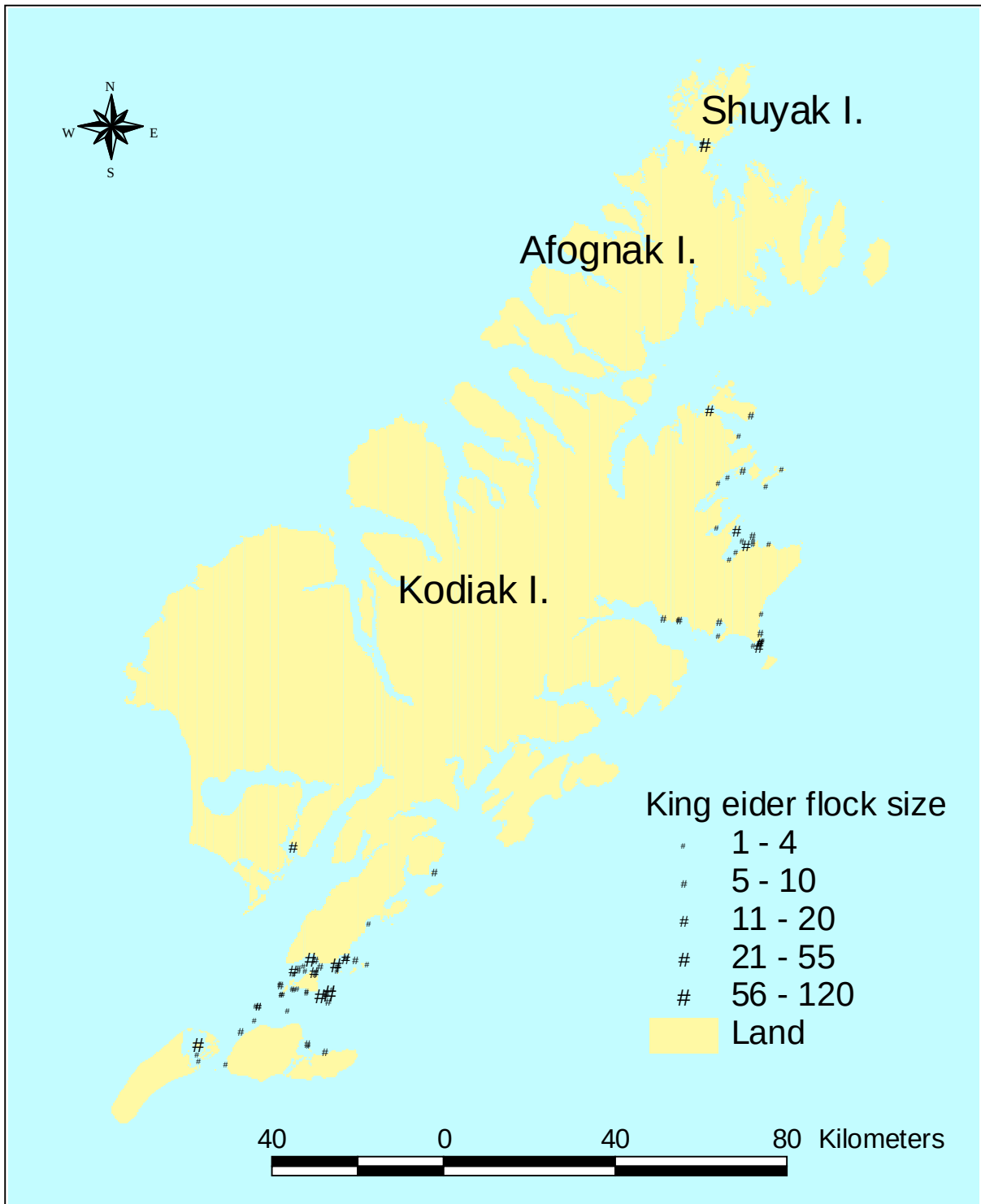
Appendix 1. Distribution and relative size of Goldeneye flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



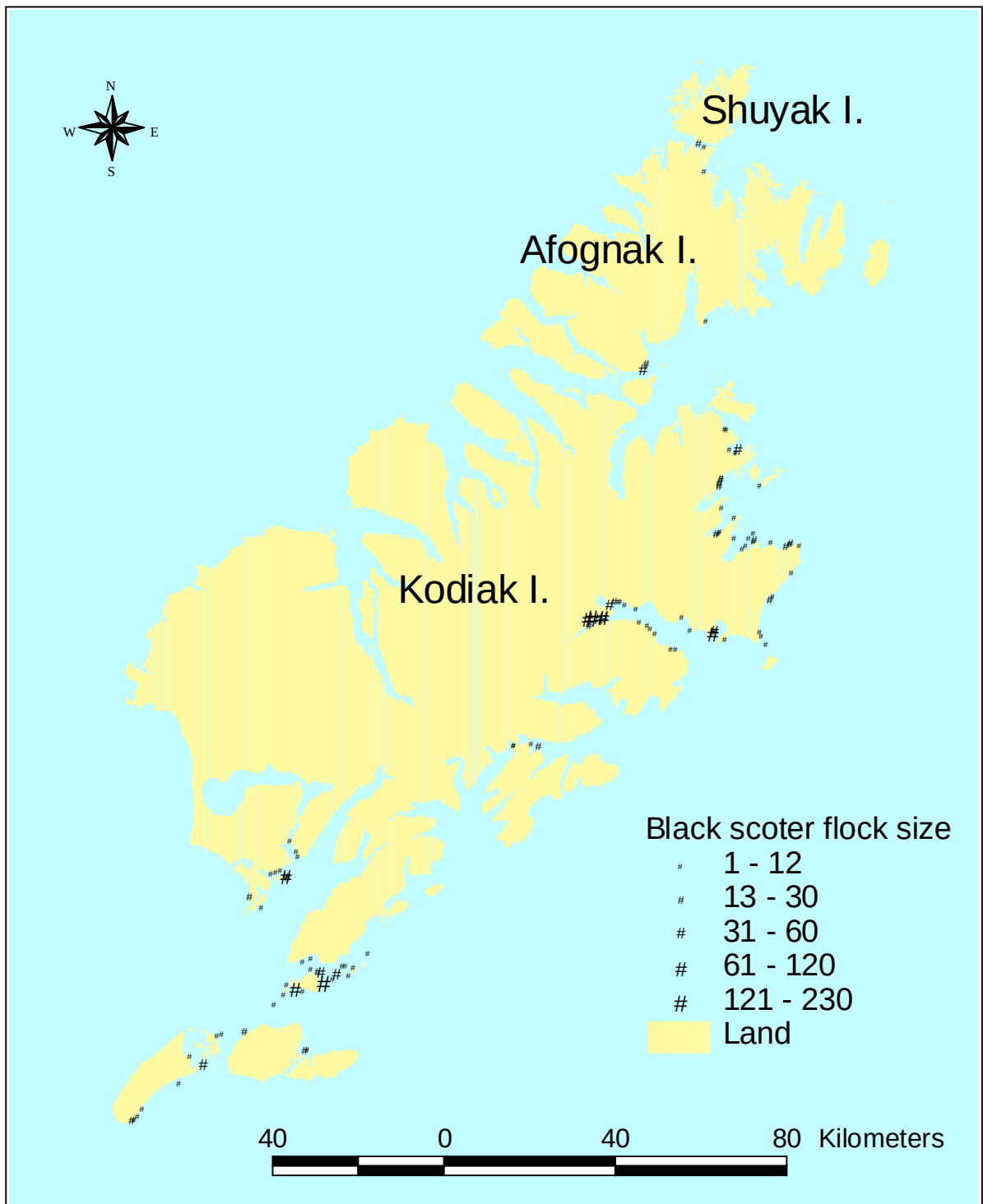
Appendix 2. Distribution and relative size of harlequin duck flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



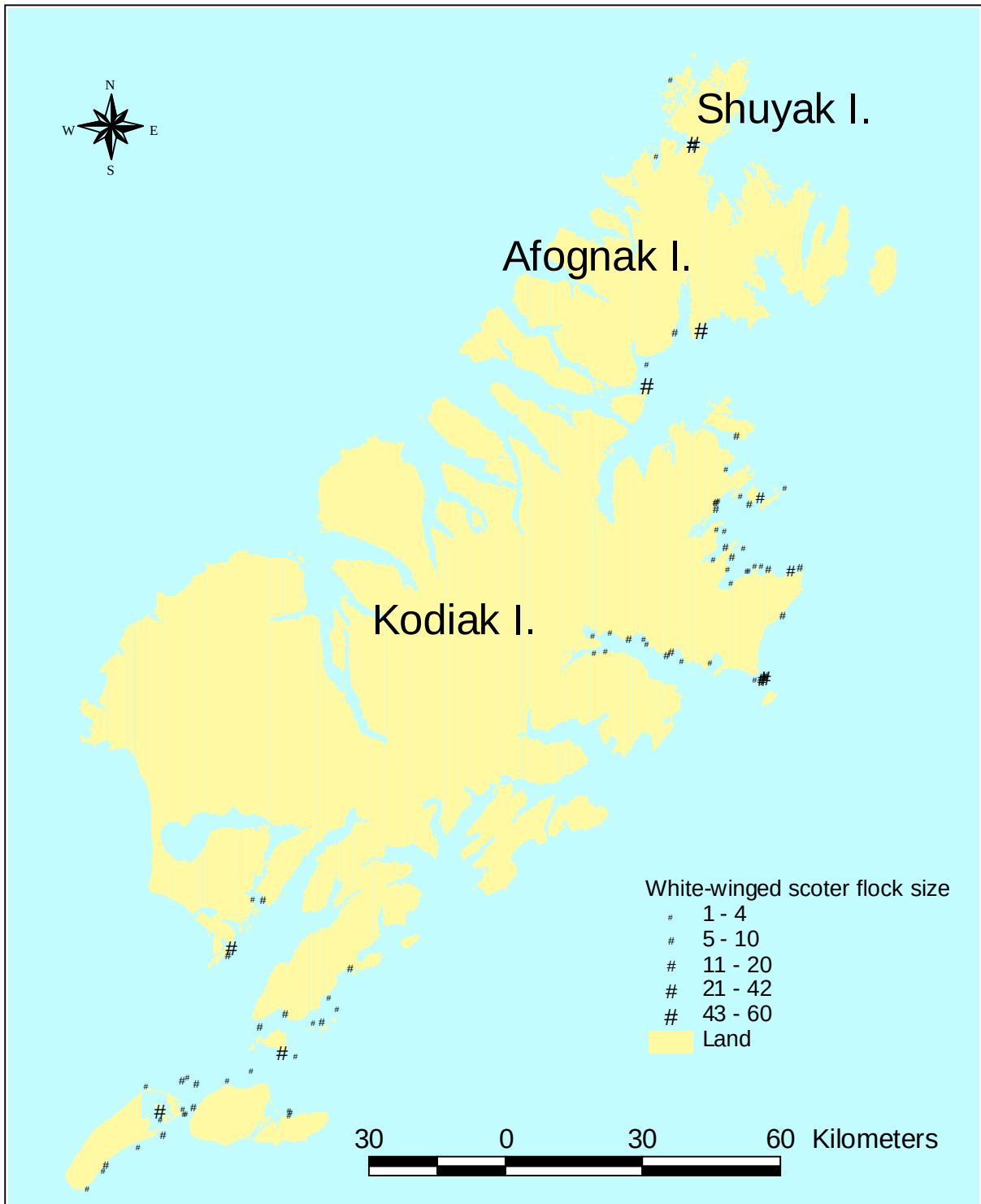
Appendix 3. Distribution and relative size of long-tailed duck flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



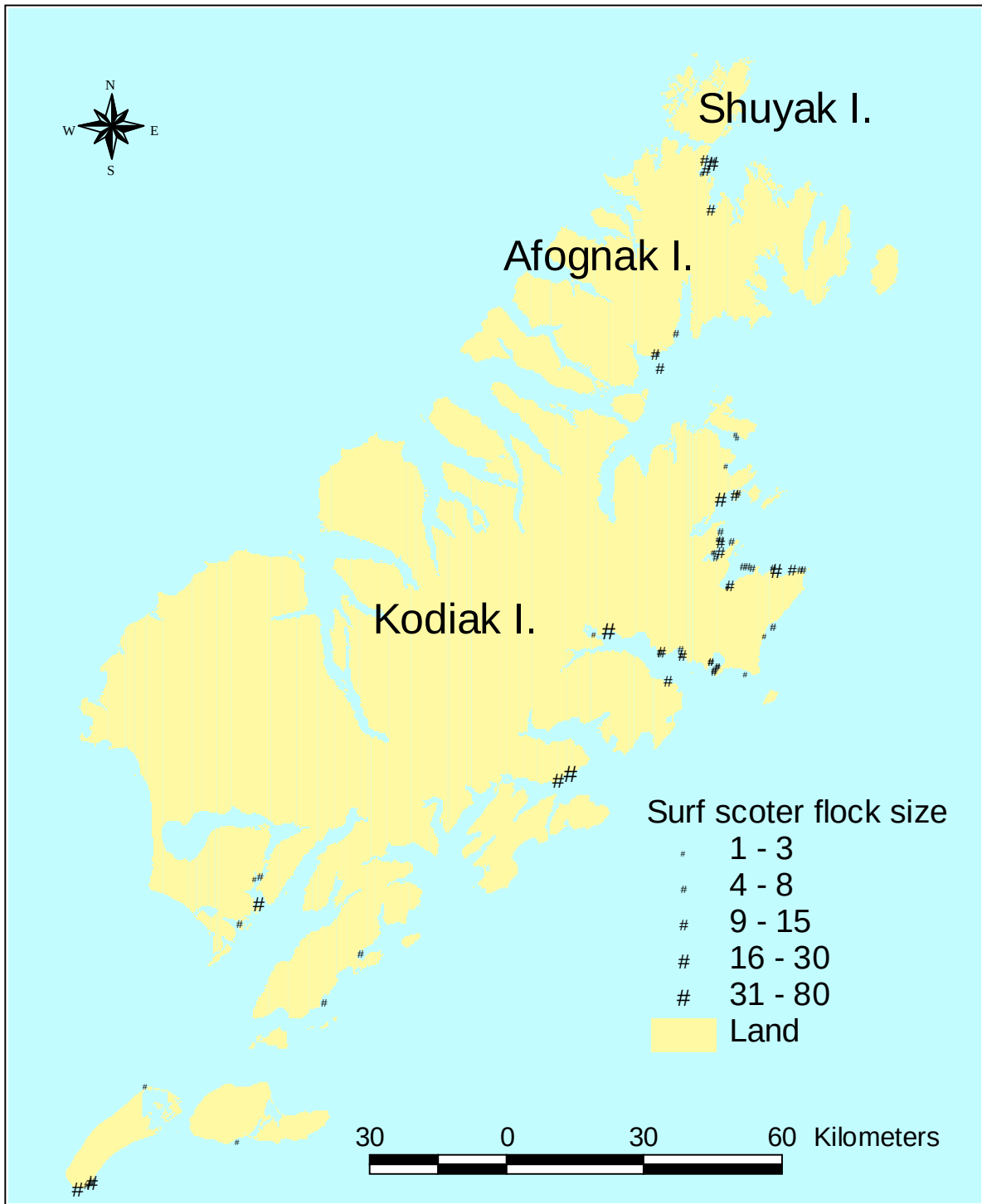
Appendix 4. Distribution and relative size of king eider flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



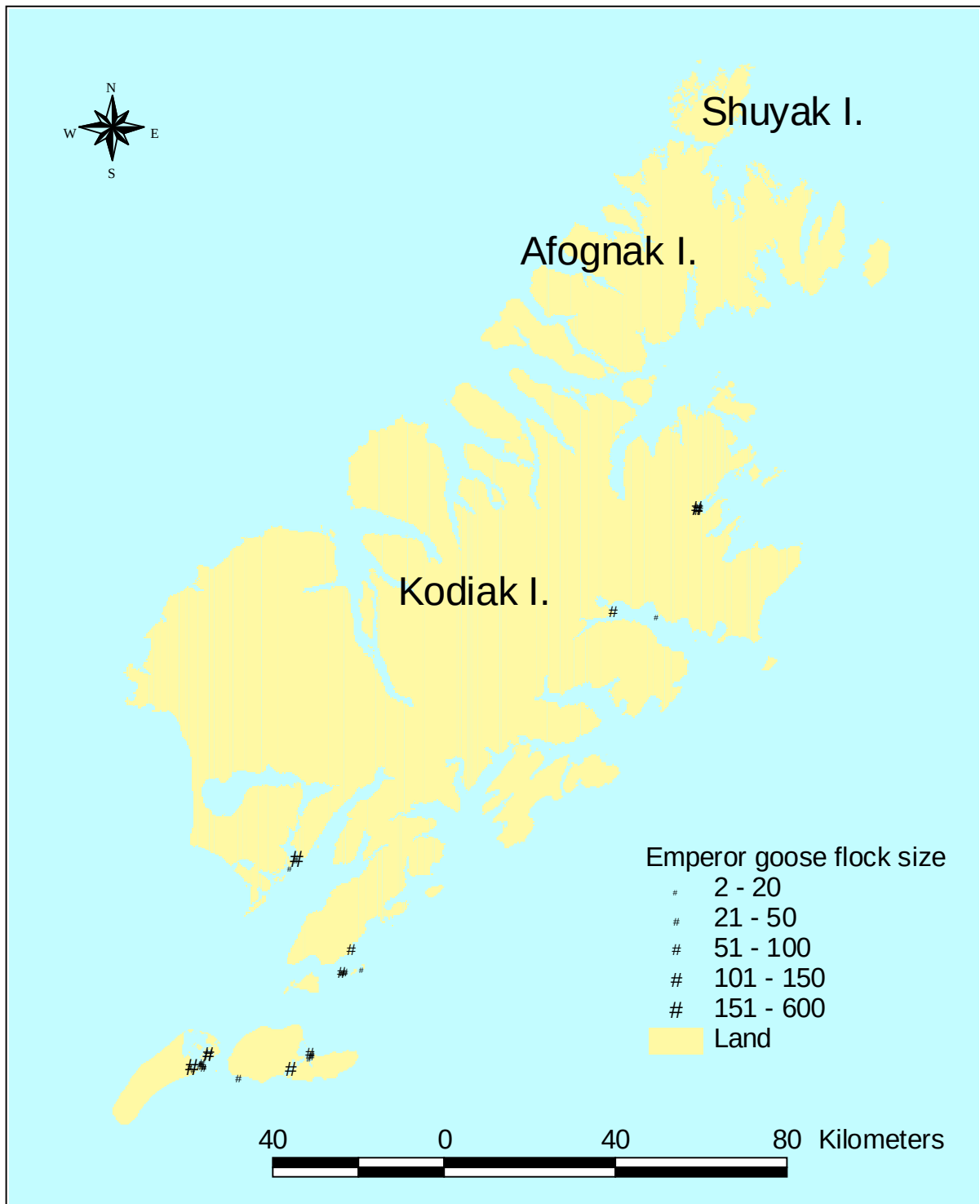
Appendix 5. Distribution and relative size of black scoter flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



Appendix 6. Distribution and relative size of white-winged scoter flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



Appendix 7. Distribution and relative size of surf scoter flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.



Appendix 8. Distribution and relative size of emperor goose flocks observed during an aerial survey, Kodiak Archipelago, Alaska, 29 Jan. to 2 Feb. 2001.