

# Western Alaska Yellow-billed Loon Survey - 2005

Natural Resources Report NPS/AKRARC/NRTR-2006/04



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**Abstract:** An aerial breeding loon survey was conducted on the Seward Peninsula and Cape Krusenstern area on 14-21 June 2005. The survey consisted of 31 12km x 12km plots. All lakes larger than 7 hectares were surveyed for loons and loon nests. A total of 121 yellow-billed loons and 25 yellow-billed loon nests were observed within the sample area. The yellow-billed loon population and nest estimates for the entire survey area were 418 (90% confidence range = 314-521) and 85 (90% confidence range = 56-115), respectively. Pacific loon and red-throated loon population estimates were 1,348 (90% confidence range = 920-1,775) and 83 (90% confidence range = 42-124), respectively.

## INTRODUCTION

This report summarizes results from an aerial breeding yellow-billed loon (*Gavia adamsii*) survey conducted in and around Bering Land Bridge National Preserve (BELA) and Cape Krusenstern National Monument (CAKR). Yellow-billed loons are a species of concern, with a global population estimated at 16,650–21,000 (Fair 2002, Earnst 2004). Yellow-billed loon breeding range consists of arctic and near arctic habitats in Russia, Canada, and the United States of America (Alaska). The breeding range in Alaska is restricted to the Arctic Coastal Plain of Alaska (north of the Brooks Range) and western Alaska in the vicinity of the Seward Peninsula. The population on the Arctic Coastal Plain of Alaska has been estimated at 3,369 (Earnst 2004), while the population in the vicinity of the Seward Peninsula had not been well documented prior to this survey.

## STUDY AREA AND METHODS

### Study Area and Survey Design

The survey area (18,819.6 km<sup>2</sup>) consisted of primary breeding yellow-billed loon habitat in western Alaska as determined from previous general waterfowl surveys conducted in the area in 1992-1993 (U.S. Fish and Wildlife Service, unpublished data). Three distinct areas (strata) were sampled which included the northern Seward Peninsula, central Seward Peninsula, and Cape Krusenstern (Figure 1). Stratum boundaries encompassed all wetland habitats in the areas of interest and non-wetland mountainous habitats were not sampled. The sample consisted of 31 12km x 12km plots each with a unique plot number. Plots were generated around randomly selected points with the constraints that plot centers had to be within the survey area and that plots had to be at least 2km from each other. All water bodies (lakes) greater than 7 hectares were identified within the

plots prior to the survey and were assigned a unique number. A lake was considered within the plot if the centroid of the lake was within the plot boundary. All identified lakes (greater than 7 hectares) within the plots were surveyed. The minimum size of 7 hectares was based on information from North and Ryan (1989), which found that the smallest yellow-billed loon brood rearing lake on the Colville Delta to be 13.4 hectares. Furthermore, spring yellow-billed loon surveys conducted on the Arctic Coastal Plain of Alaska in 2003 and 2004 by the authors indicate that of 479 yellow-billed loon observations, 2% were on lakes from 7-10 hectares in size and 98% were on lakes larger than 10 hectares.

A Cessna 206 aircraft was flown at a height of 45 to 60 meters (150 to 200 feet) above ground level and at airspeeds of 150 to 175 km/hr (80 to 95 knots). Aircraft navigation to sample plots was accomplished by the aircraft Global Positioning System (GPS). Navigation within the plot was accomplished by paper maps. The paper maps consisted of a spiral bound map booklet containing one plot per page. The shorelines of all sampled lakes were flown so the aircraft was approximately 50 meters shoreward of the lake edge. That provided a clear and unobstructed view of the shoreline for observing nesting loons. Many of the lakes contained multiple bays and peninsulas which required multiple aircraft passes and turns to ensure complete coverage of the shoreline. The surfaces of lakes were also flown in a systematic manner to ensure thorough coverage of the lake surface. Significant surface ice was present on many of the lakes which limited over water search time of some lake surfaces. Figure 2 illustrates the flight path from one of the sample plots.

All loons within the sample area were identified to species (when possible) and were recorded as singles, pairs, flocks, and nests. A diving loon that was difficult to identify to species was often circled at greater altitude (100 to 150 meters) to provide a better opportunity to identify the loon. If a loon could not be identified to species it was recorded as an unidentified loon. Observations were marked on paper maps and were voice recorded to a laptop computer with a GPS interface.

### **Statistical Procedures**

Population estimates and variances were based on expanded density estimates from the sample plots using standard statistical techniques for strip/plot survey analysis (Cochran 1977, Smith 1995). Only the portion of a plot within the stratum or area of interest (political boundary) was included in the density estimate. Similarly, observations were included in the density estimate if the centroid of the lake was within the stratum or area of interest. Visibility correction factors were not included in the population estimates as we assumed near 100% detection.

### **RESULTS**

This survey was conducted from 14-21 June 2005. A total of 31 plots were surveyed, which required 44 flight hours including ferry time to and from Kotzebue and between plots. Weather conditions were good and only one day was not flown due to wind and

low ceilings (18 July). Temperatures ranged between 7 to 13 degrees Celsius (45 to 55 degrees Fahrenheit) every day except for 17 July when temperatures ranged between 13 to 24 degrees Celsius (55 to 75 degrees Fahrenheit). Surface winds in the survey area ranged from 5 to 24 km/hr (3 to 15 knots) and sky conditions were primarily clear with a few periods of scattered clouds. Population estimates for all loon species are listed in Table 1. Figure 3 illustrates the number of yellow-billed loons observed in each plot.

We observed a total of 121 yellow-billed loons and 25 yellow-billed loon nests. The total estimates for yellow-billed loons and nests were 418 (90% confidence range = 314-521) and 85 (90% confidence range = 56-115), respectively. The northern Seward Peninsula stratum accounted for 94% (391) of the yellow-billed loon population estimate, and 96% (82) of the yellow-billed loon nest estimate. The central Seward Peninsula stratum accounted for 1% (5) and 0% of the yellow-billed loon population and nest estimates, respectively. BELA, portions of which are in the northern and central Seward Peninsula strata, accounted for 76% (319) and 76% (65) of the total yellow-billed loon population and nest estimates, respectively. The Cape Krusenstern stratum accounted for 5% (22) and 4% (4) of the yellow-billed loon population and nest estimates, respectively.

The Pacific loon (*Gavia pacifica*) and red-throated loon (*Gavia stellata*) estimates provided in this report are underestimates (biased low) because only lakes greater than 7 hectares were sampled. While yellow-billed loons are rarely observed on lakes smaller than 7 hectares, Pacific loons and particularly nesting red-throated loons are often observed on lakes smaller than 7 hectares. Data for these species are provided for comparison purposes among the loon species for lakes greater than 7 hectares. The Pacific loon population estimate was 1,348 (90% confidence range = 920-1,775) and the nest estimate was 220 (90% confidence range = 103-337). Red-throated loon population and nest estimates were 83 (90% confidence range = 42-124) and 4 (90% confidence range = 0-10), respectively. Two unidentified loons were observed during the survey and provided a population estimate of 7 (90% confidence range = 0-14). No unidentified loons on nests were observed on the survey.

## **ACKNOWLEDGEMENTS**

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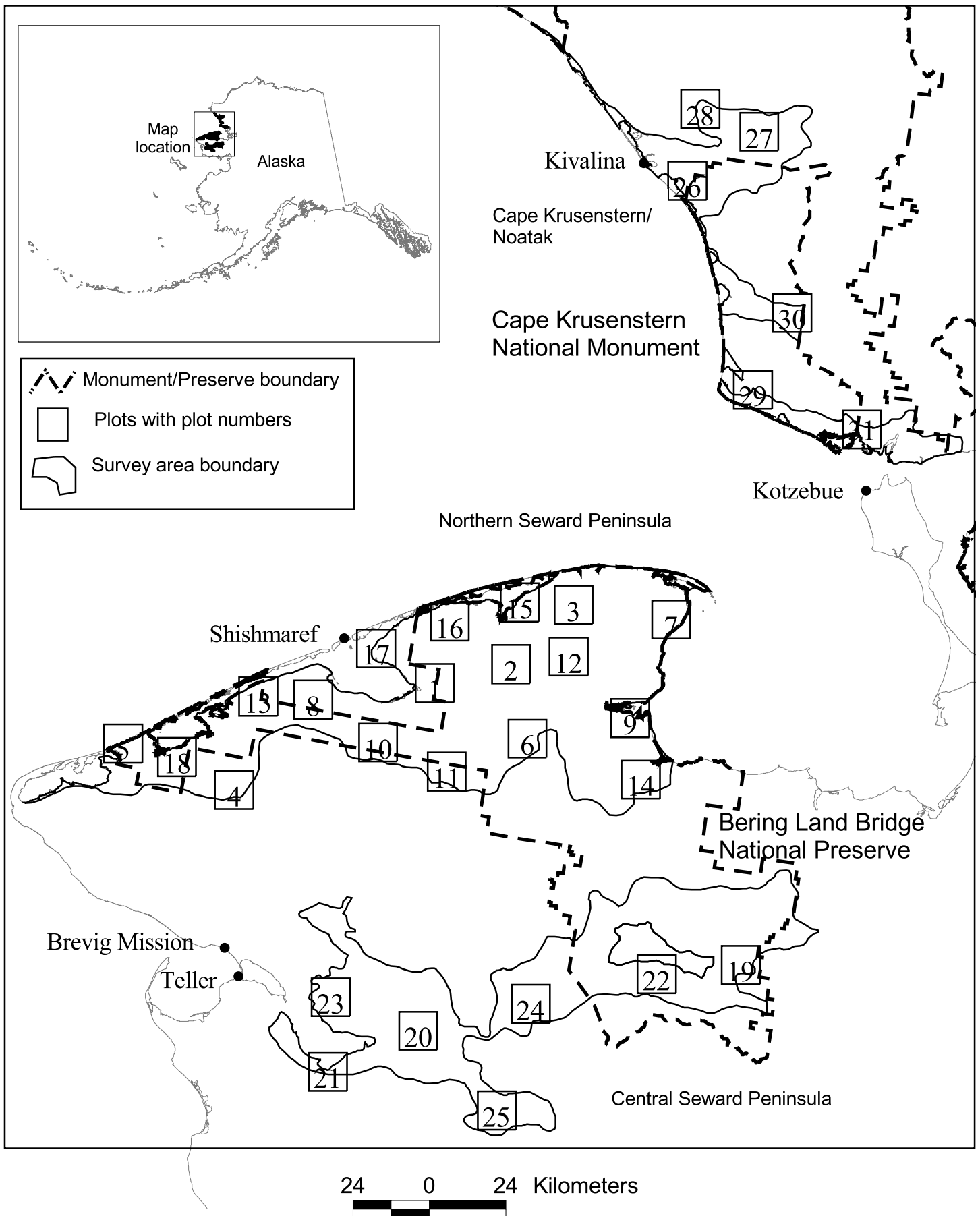


Fig. 1. Plots containing lakes aerially searched for loons from June 14-21, 2005 on 3 survey areas in the vicinity of Bering Land Bridge National Preserve and Cape Krusenstern National Monument, Alaska.

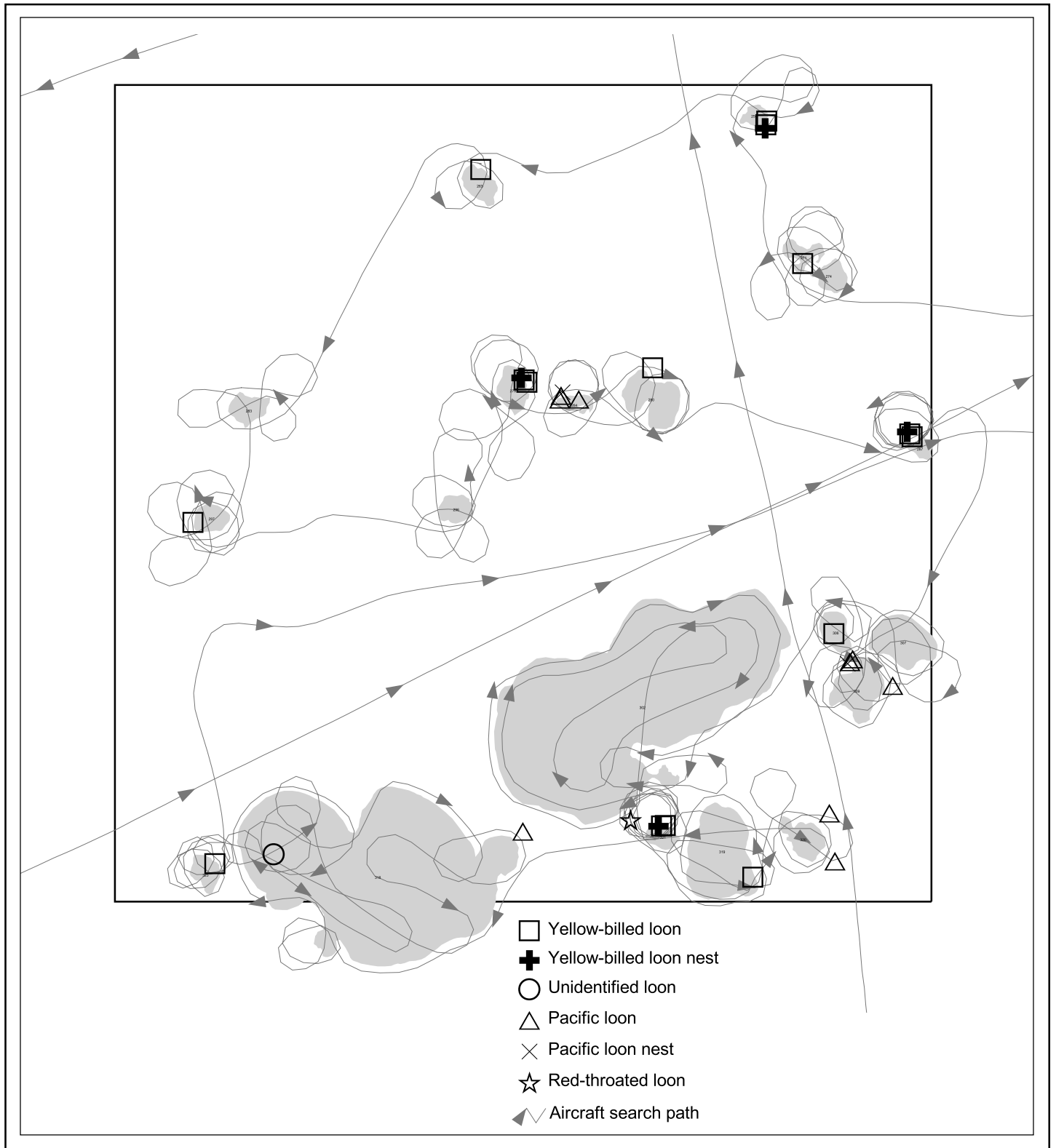


Fig. 2. Example of loon sightings on lakes >7ha on a 12km x 12km plot searched by a 2-person aerial crew on the Seward Peninsula, Alaska, in June 2005. Sighting locations were captured by laptop computer linked to aircraft GPS.

Table 1. Number of loons observed, estimated population sizes, and 90% confidence intervals based on June 2005 aerial search of large lakes 12 x 12 km sample plots in Western Alaska. Sampled areas included National Park Service lands (BELA = Bering Land Bridge National Preserve, CAKR = Cape Krusenstern National Monument) and nearby wetlands on or near the Seward Peninsula. Species included were yellow-billed loons (YBLO), yellow-billed loon nests (YBLON), Pacific loons and nests (PALO, PALON), Red-throated loons and nests (RTLO, RTLON), and unidentified loons (UNLO, UNLON).

Species	Wetland Region	Northern Seward Peninsula	Northern Seward Peninsula	Northern Seward Pen. Non-Wetlands	Central Seward Peninsula	Central Seward Peninsula	Central Seward Pen. Non-Wetlands	Cape Krusenstern	Cape Krusenstern	Cape Krusenstern Non-Wetlands	TOTAL
	NPS unit	BELA	out		BELA	out		CAKR	out		
	Stratum km <sup>2</sup>	5552.1	1458.4	204.9	1895.6	2688.5	3250.1	826	1151.8	1792.2	<b>18819.6</b>
	Searched	1547.6	509.3		224.2	595.6		190.4	323.7		<b>3390.7</b>
<b>YBLO</b>	N observed	89	25		0	1		1	5		<b>121</b>
	Estimated	319.3	71.6		0	4.5		4.3	17.8		<b>417.5</b>
	90% C.I.	224 - 415	34 - 109		0	0 - 12		0 - 12	4 - 32		<b>314 - 521</b>
<b>YBLON</b>	N observed	18	6		0	0		0	1		<b>25</b>
	Estimated	64.6	17.2		0	0		0	3.6		<b>85.3</b>
	90% C.I.	38 - 92	7 - 28		0	0		0	0 - 10		<b>56 - 115</b>
<b>PALO</b>	N observed	136	28		3	75		63	40		<b>345</b>
	Estimated	487.9	80.2		25.4	338.6		273.3	142.3		<b>1347.7</b>
	90% C.I.	321 - 655	19 - 141		0 - 68	176 - 501		0 - 580	0 - 312		<b>920 - 1775</b>
<b>PALON</b>	N observed	28	2		1	4		16	5		<b>56</b>
	Estimated	100.5	5.7		8.5	18.1		69.4	17.8		<b>219.9</b>
	90% C.I.	58 - 143	0 - 12		0 - 23	0 - 39		0 - 169	0 - 52		<b>103 - 337</b>
<b>RTLO</b>	N observed	17	0		0	2		3	0		<b>22</b>
	Estimated	61.0	0		0	9.0		13.0	0		<b>83.0</b>
	90% C.I.	30 - 92	0		0	0 - 26		0 - 34	0		<b>42 - 124</b>
<b>RTLON</b>	N observed	1	0		0	0		0	0		<b>1</b>
	Estimated	3.6	0		0	0		0	0		<b>3.6</b>
	90% C.I.	0 - 10	0		0	0		0	0		<b>0 - 10</b>
<b>UNLO</b>	N observed	1	1		0	0		0	0		<b>2</b>
	Estimated	3.6	2.9		0	0		0	0		<b>6.5</b>
	90% C.I.	0 - 9	0 - 7		0	0		0	0		<b>0 - 14</b>
<b>UNLON</b>	N observed	0	0		0	0		0	0		<b>0</b>
	Estimated	0	0		0	0		0	0		<b>0</b>
	90% C.I.	0	0		0	0		0	0		<b>0</b>



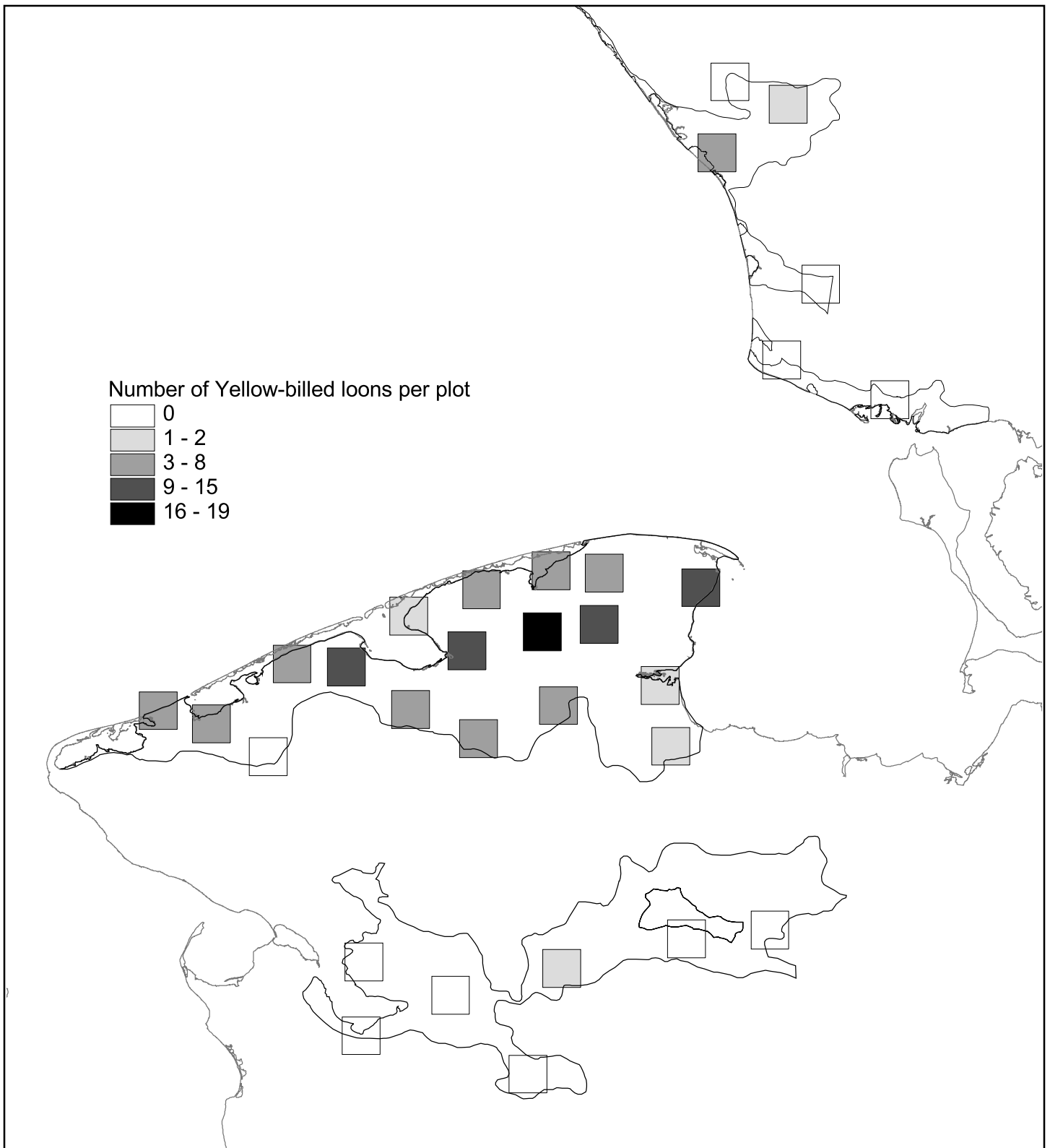


Fig. 3. Number of yellow-billed loons per plot from June 2005 aerial survey of the Seward Peninsula and Cape Krusenstern areas, Alaska.