

AERIAL SURVEY OF EMPEROR GEESE AND OTHER WATERBIRDS

IN

SOUTHWESTERN ALASKA,

FALL 2005

By

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Key Words: aerial survey, emperor geese, waterbirds, southwest Alaska.

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# AERIAL SURVEY OF EMPEROR GEESE AND OTHER WATERBIRDS IN SOUTHWESTERN ALASKA, FALL 2005

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**Abstract:** The fall aerial emperor goose survey was conducted in southwest Alaska for the 27<sup>th</sup> consecutive year in 2005. Emphasis was on emperor geese, Pacific brant, Canada geese, and Steller's eiders with populations estimated at 73,212, 127,163, 37,772 and 36,373, respectively. The survey was flown from 4-8 October 2005 from the Naknek River to Wide Bay, along the north and south sides of the Alaska Peninsula. An amphibious Cessna 206 (N234JB), with a left seat pilot/observer and right seat observer, was flown at 45m (150 feet) ASL and 200km/hr (110 kts) along the coastline and over estuaries to determine species composition and numbers of birds. Two additional replicate surveys of the Izembek NWR area were flown on 3 October and 5-6 October to estimate sizes of the Pacific brant and Canada goose populations. The averages of the three surveys were 134,189 Pacific brant and 32,508 Canada geese.

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## INTRODUCTION

This survey has annually monitored fall distribution, abundance, and population trends of emperor geese and other waterbirds at migratory staging areas throughout southwest Alaska since 1979. Data from this survey are used to expand photographic estimates of emperor goose productivity (i.e. percent juveniles) based on the proportional distribution of the population at various fall staging locations. The survey includes coastline and estuarine habitats from Kuskokwim Bay south and west along the north side of the Alaska Peninsula to Unimak Island, and the south side of the Alaska Peninsula east to Wide Bay.

## METHODS

The survey was flown using an amphibious Cessna 206 (N234JB) at a ground speed of approximately 200 km/hr (110 kts) and an altitude of 45m (150 feet) ASL. The 2005 survey route covered the Alaska Peninsula coastline from the mouth of the Naknek River to Wide Bay (along the north and south sides of the Alaska Peninsula). Observations were made from both sides of the aircraft and voice recorded into two laptop computers using remote microphones. Computers received input from the aircraft Global Positioning System (GPS) saving coordinates for each observation. Computer programs developed by Jack Hodges (USFWS-MBM, Juneau) were used to collect and process these data.

The coastal flight path was usually 100 meters offshore with deviations to confirm species identification and numbers, normally within 1.6 km (1 mile) of exposed shorelines. In estuaries, a systematic but meandering flight path was followed on a computer moving map program to ensure complete coverage. Whenever possible, flights were conducted with <20 knots of wind and primary staging areas were flown at or near high tide as this concentrated emperor geese near shorelines.

The greater survey area includes 143 shoreline/estuarine segments (Figures 1-2) which were previously described by Mallek and Dau (2000). Segments 34-59 were flown on 4 October; segment 83 was flown on 6 October, segments 60-68, 80, 81, 84, and 85 were flown on 7 October; and most of segments 86-137 were flown on 8 October. The south side of the Alaska Peninsula (segments 86-137) is filled with many deep rocky bays and rocky points which were not surveyed due to time and fuel constraints however previous complete surveys have indicated few if any emperor geese use these areas. Two additional surveys of Izembek Lagoon and other estuaries adjacent to Izembek NWR were flown on 3 October (Larned/Anderson) and 5-6 October (Mallek/Dau). General observations of habitat and survey conditions including wind speed and direction, temperature, sky condition, visibility, and tide stage were recorded en route.

## SURVEY CONDITIONS

4 October: Northeast winds of 9 knots increased to 15 knots from segments 34-43. Winds switched to east 15-20 knots from segments 44-53 and southeast 25 knots from segments 54-59. Overcast sky conditions lowered from 3,000 to 1,000 feet throughout the day with occasional light rain showers. Visibility and overall survey conditions were good. Mid to high tides occurred in all estuaries. Air temperatures ranged from 40-45°F.

5 October: West northwest winds of 10 to 25 knots persisted and 2,000 foot overcast sky condition lowered to 200-300 feet with rain. Survey conditions were acceptable over Izembek Lagoon but low weather precluded completion of segments to the west and south. Tides were mid to high on both the Bering and Pacific sides of the Alaska Peninsula. Air temperature was 40°F.

6 October: Winds were 5 knots from the northwest. Sky conditions were high and broken, visibility was good and air temperature was 45°F. Mid tides were present in Morzhovoi and Cold bays.

7 October: Winds were 15 to 25 knots from the west to southwest. Sky conditions were broken to overcast with good visibility. Air temperature was 40-45°F. Tides were mid to high on both the Bering and Pacific sides of the Alaska Peninsula.

8 October: Winds, initially 12 knots from the southwest, became light and variable throughout the day. Sky conditions were 5,000 feet broken to overcast and visibility was generally good with occasional glare. Air temperatures were 35-38°F throughout the day.

## RESULTS/DISCUSSION

The totals for all species observed during the survey are summarized in Table 1. Figure 3 depicts the 27-year population trend for fall staging emperor geese. Estimates of emperor goose population sizes (1979-2005) and corresponding 3-year averages are summarized in Table 2.

### Emperor Goose

We estimate the fall emperor goose population at 73,212. The 2005 population estimate is 22% below the 2004 estimate of 93,544 and the current 3-year average of 81,349 is 2% below the previous 3-year average (83,175). Despite mild climatic conditions in 2005 we believe most emperor geese were in Alaska Peninsula estuaries during the survey. This belief is substantiated by the low number of birds observed north of Bristol Bay in previous years. Based on those observations, segments north of the Alaska Peninsula were not flown in 2005. Numbers and proportions of emperor geese at primary staging sites were as follows: Egegik Bay 2,629 (4%, segments 36-37); Ugashik Bay 1,686 (2%, segment 38); Cinder River Estuary 17,332 (24%, segments 40-42); Port Heiden 7,896 (11%, segments 44-46); Seal Islands 18,524 (25%, segment 47); Nelson Lagoon and adjacent estuaries 17,533 (24%, segments 50-57, 551-552); Izembek Lagoon and adjacent estuaries 3,673 (5%, segments 60-65, 67-68, 79-81, 83-85); Canoe Bay 726 (<1%, segment 93); Chignik Lagoon 422 (<1%, segment 125); and Wide Bay 1,141 (2%, segment 136-137).

### Pacific Brant

A total of 127,163 Pacific brant was observed during the 4-8 October emperor goose survey of which >99% (127,133) were in Izembek Lagoon and adjacent estuaries. The replicate surveys of Izembek Lagoon and adjacent estuaries (3 October and 5-6 October) provided counts of 149,133 and 126,302. The average of the three surveys of the Izembek area was 134,189. This average is <1% below the 2004 fall average of 134,474 (n=3 surveys) and <1% above the 31-year average peak fall count of 133,951 (1975-2005, Izembek NWR files).

### Canada Goose

We observed 37,772 Canada geese during the 4-8 October emperor goose survey. Izembek Lagoon and adjacent estuaries accounted for 92% (34,807) of the survey total. Mild conditions resulted in increased observations of Canada geese farther north along the Alaska Peninsula. The low count of Canada geese around the Izembek area can be attributed to late arrival of some migrants and mid-high tides during that survey, which resulted in many birds feeding or roosting in adjacent uplands outside the survey area. Replicate surveys of Izembek Lagoon and adjacent estuaries (3 October and 5-6 October) provided counts of 37,835 and 24,883. The average of the three surveys of the Izembek area was 32,508 Canada geese. This average was 19% below the 2004 fall average (40,052, n=3 surveys) and 25% below the 31-year average peak fall count of 43,142 (1975-2005, Izembek NWR files).

### Steller's Eider

We observed a total of 36,373 Steller's eiders during the 4-8 October emperor goose survey. The over 50% decrease in Steller's eider numbers from fall 2004 may be partially the result of mild climatic conditions and a productive breeding season which could have resulted in delayed migration and lower numbers of failed and non-breeders. Numbers and proportions of Steller's eiders at primary staging sites were as follows: Egegik Bay 650 (2%, segments 36-37), Cinder River Estuary 750 (2%, segments 40-42); Port Heiden 4,725 (13%, segments 44-46); Seal Islands 7,000 (19%, segment 47); Nelson Lagoon and adjacent estuaries 18,343 (50%, segments 50-57, 551-552); and Izembek Lagoon and adjacent estuaries 4,905 (13%, segments (60-65, 67-68, 79-81, 83-85). Replicate surveys of Izembek Lagoon and adjacent estuaries (3 October and 5-6

October) provided counts of 6,156 and 2,820 Steller's eiders for an average of 4,627 (n=3). The 2005 counts averaged 42% below those from 2004 (7,974) and 81% below the long-term average of 23,737 (1975-2005, Izembek NWR files). Steller's eider numbers also declined by over 50% in the Nelson Lagoon complex in 2005 (44,080 in 2004) but long-term trends suggest a 4.7% annual increase in fall numbers there versus a 3.9% annual decline at Izembek Lagoon.

## ACKNOWLEDGMENTS

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Figure 1. Map of emperor goose aerial survey segments 1-36 in southwest Alaska, 1992-2005.

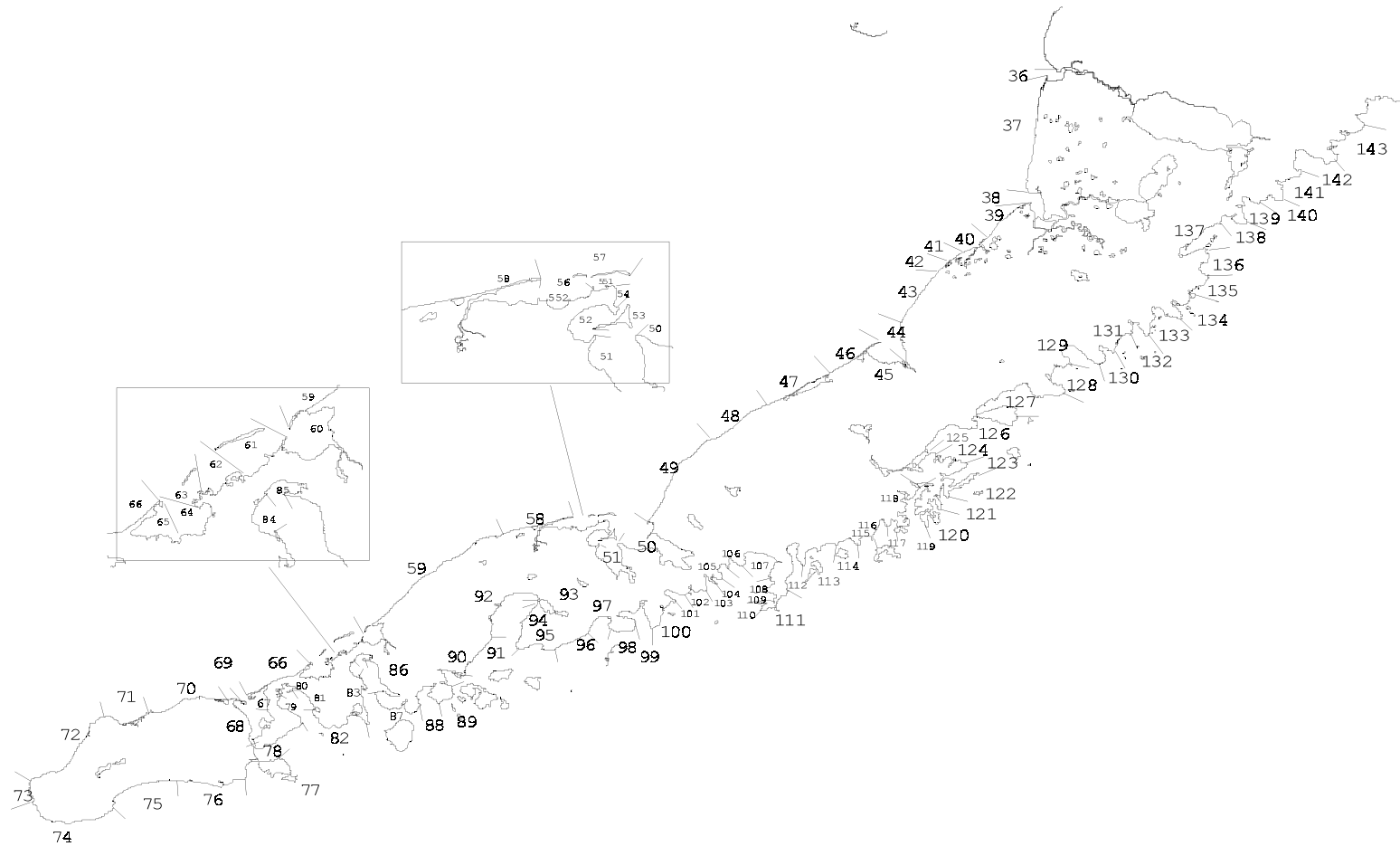


Figure 2. Map of emperor goose aerial survey segments 36-143 in southwest Alaska, 1992-2005.



Table 1. Waterbird and mammal observations by segment from southwest Alaska, 4 - 8 October 2005.

| SPECIES                    | 34  | 35   | 36    | 37   | 38   | 39   | 40    | 41 | 42   | 43  | 44   | 45    | 46   |
|----------------------------|-----|------|-------|------|------|------|-------|----|------|-----|------|-------|------|
| American Green-winged Teal |     |      | 500   |      | 340  |      |       |    |      |     |      |       |      |
| American Wigeon            |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Bald Eagle                 |     |      |       |      | 1    |      | 2     |    | 1    |     | 1    | 1     |      |
| Beluga Whale               |     | 1    |       |      |      |      |       |    |      |     |      |       |      |
| Black Oystercatcher        |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Black Scoter               |     | 2380 | 150   | 1055 | 1810 | 1705 |       |    |      | 466 | 638  | 30    | 2657 |
| Brown Bear                 |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Canada Goose               |     |      | 675   |      | 40   | 180  | 475   |    | 315  |     | 520  |       | 250  |
| Common Eider               |     |      |       | 125  | 1    |      |       |    |      |     |      |       | 35   |
| Common Loon                |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Common Merganser           | 2   |      |       |      |      |      |       |    |      |     |      |       |      |
| Common Raven               |     |      | 2     |      |      |      |       |    |      |     |      |       |      |
| Cormorant                  | 2   |      |       | 5    |      |      |       |    |      |     | 1    |       |      |
| Emperor Goose              |     | 4    | 2629  |      | 1686 | 130  | 15835 | 70 | 1427 | 78  | 1924 | 3753  | 2219 |
| Greater Scaup              | 10  | 1581 |       |      | 2    |      |       |    |      |     | 240  |       | 45   |
| Grey Wolf                  |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Gyrfalcon                  |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Harlequin Duck             |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Harbor Seal                |     | 2    | 200   | 1    | 1    |      |       |    |      |     |      | 180   | 1    |
| King Eider                 |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Large Gull                 | 93  | 100  | 712   | 53   | 691  | 3    | 789   |    | 50   | 140 | 60   | 30    | 64   |
| Large Shorebird            |     |      |       |      |      |      |       |    | 20   |     |      |       |      |
| Long-tailed Duck           |     | 50   |       | 3    |      |      |       |    |      |     |      |       |      |
| Mallard                    | 180 |      | 2413  |      | 530  |      | 840   |    | 312  |     | 125  |       |      |
| Medium Shorebird           |     |      |       |      | 1800 |      |       |    |      |     |      |       |      |
| Moose                      |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Murre                      |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Northern Pintail           | 35  |      | 19659 |      | 8128 |      | 1585  |    | 110  |     | 125  | 15700 |      |
| Pacific Brant              |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Pacific Loon               |     | 2    |       |      |      |      |       |    |      |     |      | 1     |      |
| Peregrine Falcon           |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Red-breasted Merganser     | 5   |      |       | 26   |      |      |       |    | 6    | 15  |      |       |      |
| Red-necked Grebe           |     |      |       | 2    |      | 2    |       |    | 3    |     |      |       |      |
| Red-throated Loon          |     |      |       |      |      |      |       |    |      | 1   |      |       |      |
| Sea Otter                  |     |      |       | 2    |      |      | 3     |    |      |     |      |       | 84   |
| Small Gull                 | 365 | 569  |       | 90   | 177  | 75   | 157   |    |      | 95  | 305  | 954   | 70   |
| Small Shorebird            |     |      |       |      | 638  |      | 140   |    | 1225 |     | 640  | 4720  |      |
| Steller's Eider            |     |      | 650   |      |      |      | 750   |    |      |     | 350  | 4350  | 25   |
| Steller's Sealion          |     |      |       |      |      |      |       |    |      |     |      |       |      |
| Surf Scoter                |     | 13   |       | 43   |      |      |       |    |      |     |      |       |      |
| Tundra Swan                | 115 |      |       |      |      |      | 4     |    |      |     |      |       |      |
| Walrus                     |     |      |       |      |      |      |       |    |      |     |      |       |      |
| White-winged Scoter        |     |      | 1     | 1109 | 15   | 43   |       | 2  |      | 622 | 435  |       | 46   |
| Yellow-billed Loon         |     |      |       |      |      |      |       |    |      |     |      |       |      |

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 4 - 8 October 2005.

| SPECIES                    | 47    | 48   | 49   | 50  | 51  | 52   | 53   | 54  | 551  | 552  | 56   | 57   | 58  |
|----------------------------|-------|------|------|-----|-----|------|------|-----|------|------|------|------|-----|
| American Green-winged Teal | 250   |      |      |     |     |      |      |     |      |      |      |      |     |
| American Wigeon            | 33    |      |      |     |     |      |      |     |      |      |      |      |     |
| Bald Eagle                 | 2     |      | 4    |     | 2   | 2    |      | 1   |      |      | 1    |      |     |
| Beluga Whale               |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Black Oystercatcher        |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Black Scoter               |       | 5545 | 546  |     | 614 | 5898 | 560  | 193 | 553  | 2    | 391  | 1042 | 10  |
| Brown Bear                 |       |      | 1    |     |     |      |      |     |      |      |      |      |     |
| Canada Goose               | 330   |      |      |     |     |      |      |     | 30   |      |      |      |     |
| Common Eider               |       |      |      |     |     |      |      |     |      | 125  | 83   | 925  |     |
| Common Loon                |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Common Merganser           |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Common Raven               |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Cormorant                  |       |      | 10   | 13  |     |      |      |     |      | 1    | 2    |      |     |
| Emperor Goose              | 18524 |      |      | 590 | 128 | 2043 | 25   |     | 3276 | 7224 | 3059 | 1188 |     |
| Greater Scaup              |       |      |      |     | 20  |      | 135  |     |      |      |      |      |     |
| Grey Wolf                  |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Gyrfalcon                  |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Harlequin Duck             |       |      |      |     |     |      | 3    |     |      |      |      |      |     |
| Harbor Seal                | 450   |      | 310  | 150 |     |      |      |     | 40   | 350  | 450  |      |     |
| King Eider                 |       |      |      |     |     |      | 350  |     |      |      |      | 300  |     |
| Large Gull                 | 2160  | 43   | 286  | 620 | 102 | 253  | 191  | 20  | 171  | 2081 | 938  | 70   | 252 |
| Large Shorebird            |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Long-tailed Duck           |       |      | 20   |     |     |      |      |     |      |      |      |      |     |
| Mallard                    | 28    |      |      |     |     |      |      |     | 5    | 290  |      |      |     |
| Medium Shorebird           |       |      |      |     |     |      |      |     |      | 5    |      |      |     |
| Moose                      |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Murre                      |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Northern Pintail           | 2755  |      |      |     |     | 357  |      |     | 3815 | 7405 |      |      |     |
| Pacific Brant              |       |      |      |     |     |      |      |     | 25   |      |      |      |     |
| Pacific Loon               |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Peregrine Falcon           |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Red-breasted Merganser     |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Red-necked Grebe           |       |      | 34   |     |     | 2    |      |     |      |      |      |      |     |
| Red-throated Loon          |       |      |      | 2   |     |      |      |     |      |      |      |      |     |
| Sea Otter                  |       |      | 3    | 940 | 197 | 42   | 401  | 269 |      | 1    | 281  | 6    |     |
| Small Gull                 |       | 10   | 1020 | 20  | 50  | 101  |      | 60  | 5    |      | 150  |      | 50  |
| Small Shorebird            | 1900  |      |      |     |     | 3250 | 125  |     | 7700 | 8540 | 920  |      |     |
| Steller's Eider            | 7000  |      |      | 163 | 40  |      | 1470 | 813 | 2175 | 5892 | 6915 | 875  |     |
| Steller's Sealion          |       |      |      |     |     |      | 1    |     |      |      |      |      |     |
| Surf Scoter                |       |      |      |     |     |      |      |     |      |      |      |      |     |
| Tundra Swan                | 2     |      | 14   |     |     |      |      |     |      |      |      |      |     |
| Walrus                     |       |      | 1250 |     |     |      |      |     |      |      |      |      |     |
| White-winged Scoter        |       |      | 50   | 36  | 6   | 8    |      | 5   |      |      |      |      |     |
| Yellow-billed Loon         |       |      |      |     |     |      |      |     |      |      |      |      |     |

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 4 - 8 October 2005.

| SPECIES                    | 59   | 60    | 61    | 62   | 63   | 64    | 65    | 66  | 67  | 68   | 80   | 81  | 83  |
|----------------------------|------|-------|-------|------|------|-------|-------|-----|-----|------|------|-----|-----|
| American Green-winged Teal |      |       |       |      |      |       |       |     |     |      |      |     |     |
| American Wigeon            |      |       |       |      |      |       |       |     |     |      |      |     | 100 |
| Bald Eagle                 |      | 5     |       |      |      | 1     |       |     | 1   |      | 2    | 2   | 27  |
| Beluga Whale               |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Black Oystercatcher        |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Black Scoter               | 3399 |       |       |      |      |       |       | 310 | 15  |      |      | 50  | 20  |
| Brown Bear                 |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Canada Goose               |      | 13554 | 6018  | 345  | 1350 | 4715  | 7025  |     |     | 1685 |      |     | 75  |
| Common Eider               |      |       |       |      |      |       |       | 1   |     |      |      |     |     |
| Common Loon                |      |       |       |      |      |       |       |     |     |      |      |     | 1   |
| Common Merganser           |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Common Raven               |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Cormorant                  | 1    |       |       | 0    | 166  | 2     |       | 11  | 6   |      |      | 20  | 120 |
| Emperor Goose              |      | 962   | 227   | 27   | 588  |       |       |     | 44  | 510  | 211  | 181 | 455 |
| Greater Scaup              |      | 10    |       |      |      |       |       |     |     |      |      |     |     |
| Grey Wolf                  |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Gyrfalcon                  |      |       |       |      |      |       |       |     |     | 1    |      |     |     |
| Harlequin Duck             |      |       | 5     |      |      |       |       | 26  |     |      |      |     | 28  |
| Harbor Seal                | 351  | 1     |       |      | 60   |       |       |     |     |      |      |     |     |
| King Eider                 |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Large Gull                 | 436  | 1731  | 3171  | 345  | 1785 | 500   | 1250  | 112 | 5   |      | 979  | 216 | 625 |
| Large Shorebird            |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Long-tailed Duck           |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Mallard                    |      | 265   |       |      |      |       |       |     |     |      |      |     | 100 |
| Medium Shorebird           |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Moose                      |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Murre                      |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Northern Pintail           |      | 2075  | 20    | 55   |      | 150   | 1900  |     |     |      |      |     | 360 |
| Pacific Brant              |      | 5042  | 43309 | 3971 | 4840 | 37950 | 26630 |     | 649 | 1835 | 1179 |     |     |
| Pacific Loon               |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Peregrine Falcon           |      | 1     |       |      |      |       |       |     |     |      |      |     |     |
| Red-breasted Merganser     |      |       |       |      |      |       |       |     | 8   |      | 55   |     | 971 |
| Red-necked Grebe           |      |       | 1     |      |      |       |       | 3   | 1   |      |      |     |     |
| Red-throated Loon          |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Sea Otter                  |      | 32    | 137   | 38   | 4    | 10    |       | 5   | 28  | 38   |      |     |     |
| Small Gull                 | 393  | 350   | 6     | 6    | 150  |       |       |     | 5   |      |      |     | 60  |
| Small Shorebird            |      |       | 2150  |      | 4000 |       | 575   |     |     |      |      |     | 45  |
| Steller's Eider            |      | 2125  | 480   | 775  | 900  | 100   | 500   |     |     |      |      |     |     |
| Steller's Sealion          |      |       |       |      |      |       |       |     |     |      |      |     | 2   |
| Surf Scoter                |      |       |       |      |      |       |       |     |     |      |      |     |     |
| Tundra Swan                | 2    |       |       |      |      |       |       |     |     |      | 3    |     | 7   |
| Walrus                     |      |       |       |      |      |       |       |     |     |      |      |     |     |
| White-winged Scoter        | 127  |       |       |      |      |       |       | 18  |     |      |      |     |     |
| Yellow-billed Loon         |      |       |       |      |      |       |       |     |     |      |      |     |     |

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 4 - 8 October 2005.

| SPECIES                    | 84  | 85   | 86  | 88  | 90   | 91  | 92   | 93   | 97 | 99  | 101 | 102 | 103 | 104 | 105 |
|----------------------------|-----|------|-----|-----|------|-----|------|------|----|-----|-----|-----|-----|-----|-----|
| American Green-winged Teal |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| American Wigeon            |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Bald Eagle                 | 1   | 1    | 1   |     |      | 1   | 2    | 2    |    | 1   |     |     |     |     |     |
| Beluga Whale               |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Black Oystercatcher        |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Black Scoter               | 3   | 8    | 13  | 33  | 24   | 62  | 1189 |      |    | 75  | 80  |     | 30  |     |     |
| Brown Bear                 |     |      |     | 2   |      |     |      |      |    |     |     |     |     |     |     |
| Canada Goose               |     | 40   |     |     |      |     |      | 150  |    |     |     |     |     |     |     |
| Common Eider               |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Common Loon                | 1   | 1    |     |     | 3    |     | 7    | 1    |    | 7   |     |     |     |     |     |
| Common Merganser           |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Common Raven               |     |      |     |     |      | 1   | 2    |      |    |     |     | 2   |     |     |     |
| Cormorant                  |     |      | 1   |     | 5    | 9   | 8    |      |    |     | 5   |     | 3   |     | 5   |
| Emperor Goose              | 25  | 443  |     |     | 8    |     | 492  | 726  | 48 |     |     |     |     |     |     |
| Greater Scaup              |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Grey Wolf                  |     |      |     |     |      |     |      | 3    |    |     |     |     |     |     |     |
| Gyr Falcon                 |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Harlequin Duck             | 5   | 10   | 54  | 5   | 38   | 4   | 22   | 163  |    | 144 | 45  | 13  |     |     | 24  |
| Harbor Seal                |     |      |     |     | 1    |     | 2    | 80   |    | 25  |     |     |     |     | 10  |
| King Eider                 |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Large Gull                 | 45  | 123  | 293 | 748 | 3113 | 815 | 621  | 2548 | 5  | 247 | 242 | 200 | 1   |     | 188 |
| Large Shorebird            |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Long-tailed Duck           |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Mallard                    |     |      |     |     |      | 45  |      | 200  |    | 5   |     |     |     |     |     |
| Medium Shorebird           |     |      |     |     |      | 2   |      |      |    |     |     |     |     |     |     |
| Moose                      |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Murre                      |     |      |     |     |      |     |      |      |    | 3   | 5   | 4   |     |     |     |
| Northern Pintail           | 6   | 450  |     |     |      |     | 50   | 50   |    | 133 |     |     |     |     |     |
| Pacific Brant              |     | 1728 |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Pacific Loon               |     |      |     |     |      | 16  | 1    | 3    |    |     |     |     |     |     |     |
| Peregrine Falcon           |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Red-breasted Merganser     |     | 20   | 4   | 63  | 363  |     | 493  | 568  |    | 323 |     | 10  |     |     |     |
| Red-necked Grebe           |     |      | 1   |     | 1    | 38  | 143  | 29   |    | 314 | 195 | 12  |     |     | 66  |
| Red-throated Loon          |     |      |     |     |      |     |      |      |    |     |     |     | 4   |     |     |
| Sea Otter                  |     | 1    | 4   |     |      |     | 23   | 22   |    | 2   |     |     |     |     |     |
| Small Gull                 | 15  |      | 254 | 200 | 300  | 100 | 20   | 85   | 20 | 112 | 103 | 65  | 53  | 18  | 40  |
| Small Shorebird            | 220 | 275  |     |     |      |     | 22   | 30   |    |     |     |     |     |     |     |
| Steller's Eider            | 25  |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Steller's Sealion          |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| Surf Scoter                |     |      |     |     |      |     | 71   |      |    | 5   | 30  |     |     |     | 55  |
| Tundra Swan                |     |      |     |     |      |     |      |      |    |     |     | 8   |     |     |     |
| Walrus                     |     |      |     |     |      |     |      |      |    |     |     |     |     |     |     |
| White-winged Scoter        |     |      |     |     |      |     | 337  |      |    |     |     |     |     |     | 40  |
| Yellow-billed Loon         |     |      |     |     |      |     | 2    |      |    |     |     |     |     |     |     |

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 4 - 8 October 2005.

| SPECIES                    | 106 | 107 | 112  | 113 | 114 | 115 | 116 | 117 | 118 | 125  | 126  | 127 | 128 | 129 | 130 |
|----------------------------|-----|-----|------|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|
| American Green-winged Teal |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| American Wigeon            |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Bald Eagle                 |     | 1   | 2    | 2   |     |     | 2   |     |     | 1    | 5    | 6   | 3   | 3   | 1   |
| Beluga Whale               |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Black Oystercatcher        |     |     |      |     |     |     |     |     |     |      |      |     | 40  |     |     |
| Black Scoter               |     | 70  | 10   |     |     |     |     |     |     |      |      | 50  | 54  |     |     |
| Brown Bear                 |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Canada Goose               |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Common Eider               |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Common Loon                |     |     | 4    |     |     |     | 1   | 3   |     |      |      | 1   |     | 5   | 1   |
| Common Merganser           |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Common Raven               |     |     |      | 3   |     |     |     |     |     |      |      |     |     | 2   |     |
| Cormorant                  |     |     |      | 17  |     | 1   |     | 21  | 1   |      |      | 46  | 60  | 41  | 64  |
| Emperor Goose              |     |     | 12   |     |     |     |     |     |     | 422  | 8    | 105 | 207 | 239 | 85  |
| Greater Scaup              |     |     |      |     |     |     |     |     |     | 525  |      |     |     |     |     |
| Grey Wolf                  |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Gyr Falcon                 |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Harlequin Duck             | 30  |     | 30   |     |     |     |     | 6   | 60  |      | 15   | 24  | 8   | 47  | 7   |
| Harbor Seal                |     | 80  |      |     |     |     |     |     |     | 37   |      |     | 33  | 1   |     |
| King Eider                 |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Large Gull                 | 372 | 271 | 1413 | 294 | 309 | 476 | 191 | 257 | 753 | 464  | 1972 | 408 | 489 | 503 | 42  |
| Large Shorebird            |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Long-tailed Duck           |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Mallard                    |     |     | 80   |     |     |     |     |     |     | 500  |      |     |     | 15  |     |
| Medium Shorebird           |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Moose                      |     |     |      |     |     |     | 1   |     |     |      |      |     |     |     |     |
| Murre                      | 40  |     | 2    |     |     |     | 24  |     | 108 |      |      | 5   | 11  |     |     |
| Northern Pintail           |     |     |      |     |     |     |     |     |     | 1185 |      | 45  | 8   |     |     |
| Pacific Brant              |     |     |      |     |     |     |     |     |     | 4    |      |     |     |     |     |
| Pacific Loon               |     |     | 10   |     |     |     | 2   |     |     |      |      | 3   |     |     |     |
| Peregrine Falcon           |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Red-breasted Merganser     |     | 380 | 10   |     |     |     |     |     | 57  |      |      | 105 | 40  | 10  |     |
| Red-necked Grebe           | 1   | 2   |      |     | 3   |     | 1   |     | 6   |      | 2    | 61  | 7   | 5   |     |
| Red-throated Loon          |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Sea Otter                  |     |     |      | 12  |     |     |     | 1   |     | 14   | 66   | 62  | 7   | 133 | 20  |
| Small Gull                 | 1   | 182 | 55   | 42  | 195 | 5   | 69  | 130 | 559 | 604  | 708  | 266 | 430 | 74  | 35  |
| Small Shorebird            |     |     | 150  |     |     |     |     |     |     |      |      | 110 |     |     |     |
| Steller's Eider            |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Steller's Sealion          |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| Surf Scoter                |     |     | 5    |     |     |     |     | 18  |     |      |      | 61  | 25  | 5   |     |
| Tundra Swan                |     |     | 30   |     |     | 4   | 6   |     |     | 20   |      |     |     |     |     |
| Walrus                     |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |
| White-winged Scoter        |     | 5   |      | 5   |     |     |     |     |     |      | 142  | 90  | 36  | 25  |     |
| Yellow-billed Loon         |     |     |      |     |     |     |     |     |     |      |      |     |     |     |     |

Table 1 (continued). Waterbird and mammal observations by segment from southwest Alaska, 4 - 8 October 2005.

| <b>SPECIES</b>             | <b>131</b> | <b>132</b> | <b>133</b> | <b>134</b> | <b>135</b> | <b>136</b> | <b>137</b> | <b>Grand Total</b> |
|----------------------------|------------|------------|------------|------------|------------|------------|------------|--------------------|
| American Green-winged Teal |            |            |            |            |            |            |            | 1090               |
| American Wigeon            |            |            |            |            |            |            |            | 133                |
| Bald Eagle                 |            | 1          | 1          |            |            |            | 8          | 101                |
| Beluga Whale               |            |            |            |            |            |            |            | 1                  |
| Black Oystercatcher        |            |            |            |            |            | 3          |            | 43                 |
| Black Scoter               |            |            | 30         | 10         |            | 105        | 291        | 32176              |
| Brown Bear                 |            |            |            |            |            |            | 5          | 8                  |
| Canada Goose               |            |            |            |            |            |            |            | 37772              |
| Common Eider               |            |            |            |            |            |            |            | 1295               |
| Common Loon                |            |            | 2          | 2          |            | 3          |            | 43                 |
| Common Merganser           |            |            |            |            |            |            |            | 2                  |
| Common Raven               | 1          |            |            |            |            |            |            | 13                 |
| Cormorant                  | 1          |            | 129        | 40         | 20         | 176        | 43         | 1056               |
| Emperor Goose              | 8          |            | 49         | 10         | 167        | 560        | 581        | 73212              |
| Greater Scaup              |            |            |            |            |            |            |            | 2568               |
| Grey Wolf                  |            |            |            |            |            |            | 3          | 6                  |
| Gyr Falcon                 |            |            |            |            |            |            |            | 1                  |
| Harlequin Duck             |            |            |            |            |            | 20         | 226        | 1062               |
| Harbor Seal                |            |            |            | 60         |            | 1          | 14         | 2891               |
| King Eider                 |            |            |            |            |            |            |            | 650                |
| Large Gull                 | 779        | 136        | 206        | 39         | 1118       | 709        | 775        | 42292              |
| Large Shorebird            |            |            |            |            |            |            |            | 20                 |
| Long-tailed Duck           |            |            |            |            |            |            |            | 73                 |
| Mallard                    |            |            |            |            | 2          |            | 86         | 6021               |
| Medium Shorebird           |            |            |            |            |            |            |            | 1807               |
| Moose                      |            |            |            |            |            |            |            | 1                  |
| Murre                      |            |            |            |            | 1          |            |            | 203                |
| Northern Pintail           |            |            |            |            |            |            |            | 66161              |
| Pacific Brant              |            |            |            |            |            |            | 1          | 127163             |
| Pacific Loon               |            |            | 1          |            |            |            |            | 39                 |
| Peregrine Falcon           |            |            |            |            |            |            |            | 1                  |
| Red-breasted Merganser     | 6          |            |            |            |            |            | 1477       | 5015               |
| Red-necked Grebe           |            | 5          |            |            |            | 4          | 4          | 948                |
| Red-throated Loon          |            |            |            |            |            |            |            | 7                  |
| Sea Otter                  | 25         |            | 2          |            |            | 4          | 67         | 2986               |
| Small Gull                 | 81         |            | 410        | 190        | 422        | 182        | 285        | 11603              |
| Small Shorebird            |            |            |            |            |            |            |            | 37375              |
| Steller's Eider            |            |            |            |            |            |            |            | 36373              |
| Steller's Sealion          |            |            |            |            |            |            |            | 3                  |
| Surf Scoter                |            |            | 5          | 6          |            | 36         | 65         | 443                |
| Tundra Swan                |            |            |            |            |            |            |            | 215                |
| Walrus                     |            |            |            |            |            |            |            | 1250               |
| White-winged Scoter        |            |            |            |            |            | 75         | 58         | 3336               |
| Yellow-billed Loon         |            |            |            |            |            |            |            | 2                  |

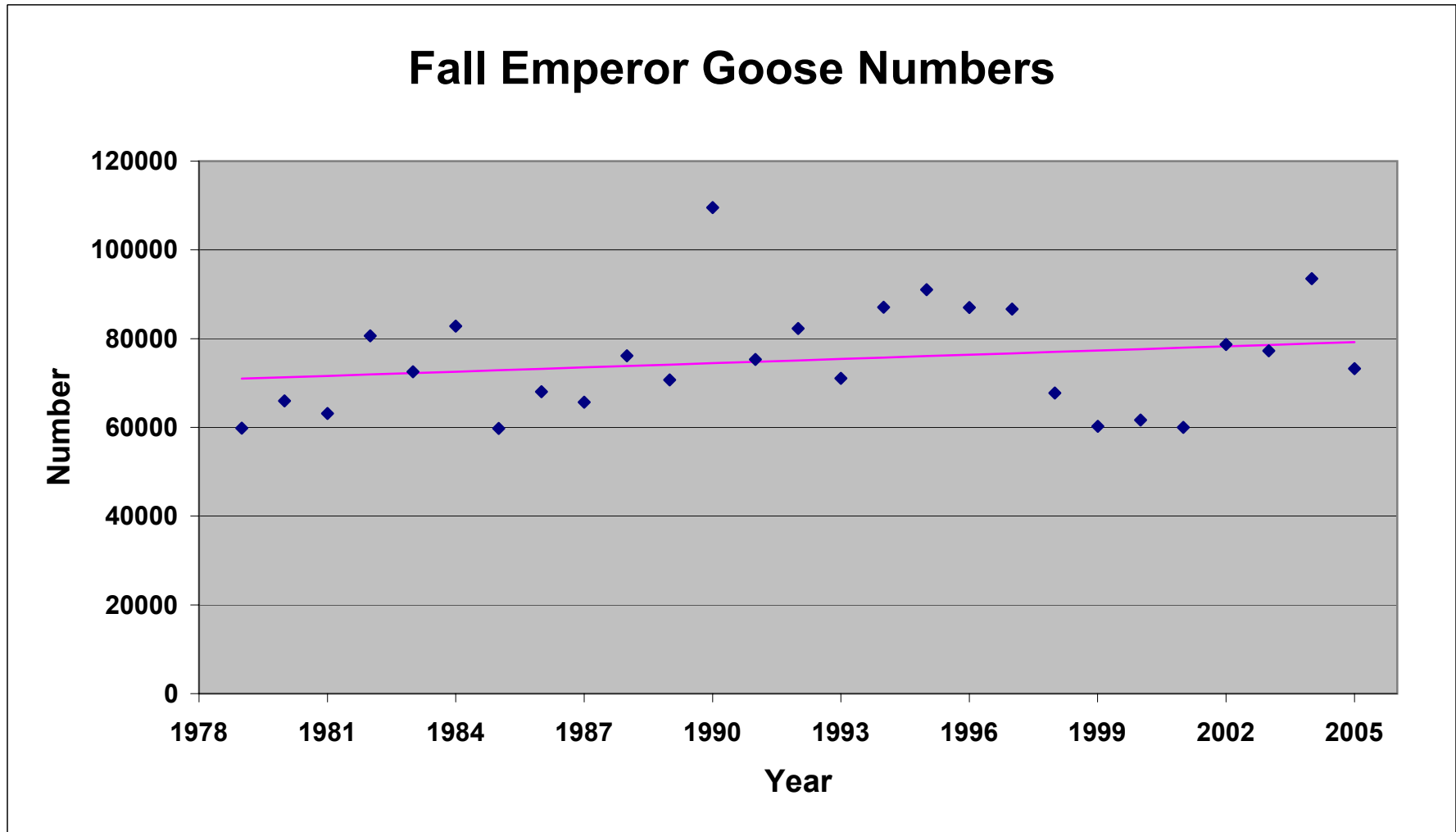


Figure 3. Twenty-seven year trend of fall staging emperor geese in southwest Alaska. Mean = 75,097, F = 0.305.

Table 2. Emperor goose fall survey data, southwest Alaska, 1979-2005.

| YEAR | TOTAL   | 3YR.<br>AVERAGE | SURVEY<br>DATES | OBSERVERS                                | SURVEY AREA                              |
|------|---------|-----------------|-----------------|--|--|
| 1979 | 59,808  | NA              | 10/1-4          | B. Conant/R.E. Gill, Jr.                 | South Alaska Peninsula<br>missing        |
| 1980 | 65,971  | NA              | 10/4-8          | R.J. King/R.E. Gill, Jr.                 | North Alaska Peninsula only              |
| 1981 | 63,156  | 62,978          | 10/3-8          | R.J. King/R.E. Gill, Jr./D.V.<br>Derksen | All                                      |
| 1982 | 80,608  | 69,912          | 10/6-10         | R.J. King/K.S. Bollinger                 | All                                      |
| 1983 | 72,551  | 72,105          | 10/10-16        | R.J. King/D.V. Derksen                   | All                                      |
| 1984 | 82,842  | 78,667          | 10/3-8          | R.J. King/D.V. Derksen                   | All                                      |
| 1985 | 59,790  | 71,728          | 10/10-14        | R.J. King/W.D. Eldridge                  | All                                      |
| 1986 | 68,051  | 70,228          | 10/5-11         | R.J. King/W.D. Eldridge                  | All                                      |
| 1987 | 65,663  | 64,501          | 10/2-5          | R.J. King/W.D. Eldridge                  | All                                      |
| 1988 | 76,165  | 69,960          | 10/7-12         | R.J. King/W.D. Eldridge                  | All                                      |
| 1989 | 70,729  | 70,852          | 10/7-12         | R.J. King/L. Denlinger                   | All                                      |
| 1990 | 109,531 | 85,475          | 10/17-19        | R.J. King/A.W. Brackney                  | All                                      |
| 1991 | 75,295  | 85,185          | 10/3-8          | R.J. King/A.W. Brackney                  | All                                      |
| 1992 | 82,295  | 89,040          | 10/10-17        | R.J. King/A.W. Brackney                  | All                                      |
| 1993 | 71,051  | 76,214          | 10/23-26        | R.J. King/D.A. Dewhurst                  | Alaska Peninsula only                    |
| 1994 | 87,086  | 80,144          | 10/8-14         | R.J. King/K. Laing                       | All                                      |
| 1995 | 91,009  | 83,049          | 10/14-20        | R.J. King/K.S. Bollinger                 | All                                      |
| 1996 | 87,018  | 88,371          | 9/28-29         | R.J. King/W.D. Eldridge                  | North Alaska Peninsula only <sup>#</sup> |
| 1997 | 86,669  | 88,232          | 10/3-5          | R.J. King/C.P. Dau                       | North Alaska Peninsula only <sup>#</sup> |
| 1998 | 67,744  | 80,477          | 10/7-9          | R.J. King/E.J. Mallek                    | Alaska Peninsula only                    |
| 1999 | 60,226  | 71,546          | 10/1-5          | E.J. Mallek/C.P. Dau                     | North Alaska Peninsula only <sup>#</sup> |
| 2000 | 61,626  | 63,199          | 10/1-5          | E.J. Mallek/C.P. Dau                     | Kuskokwim Bay south                      |
| 2001 | 59,987  | 60,613          | 9/26-10/1       | E.J. Mallek/C.P. Dau                     | Kuskokwim Bay south                      |
| 2002 | 78,692  | 66,768          | 9/29-10/2       | E.J. Mallek/C.P. Dau                     | Kuskokwim Bay south                      |
| 2003 | 77,290  | 71,990          | 9/27-10/2       | E.J. Mallek/C.P. Dau                     | Kuskokwim Bay south                      |
| 2004 | 93,544  | 83,175          | 9/30-10/3       | E.J. Mallek/C.P. Dau                     | Kuskokwim Bay south                      |
| 2005 | 73,212  | 81,349          | 10/4-10/8       | E.J. Mallek/C.P. Dau                     | Alaska Peninsula only                    |

<sup>#</sup> Previous south side of the Alaska Peninsula used in estimate.