National Park Service
U. S. Department of the Interior

Alaska Region

BIOGEOGRAPHY OF SELECT AVIAN SPECIES IN ALASKA'S NATIONAL PARKS



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September 2009



U.S. Department of the Interior
National Park Service
Alaska Region
Anchorage, Alaska

File Name

Biogeography_of_birds_AK_NPS.pdf

ABSTRACT

In response to the detection of the highly pathogenic Asian H5N1 avian influenza (HPAI) in wild birds in Asia, the U.S. Interagency Strategic Plan for early detection of HPAI recommended that monitoring efforts focus on cross-over routes of birds from Asia to North America. Understanding migration strategies is essential in examining the role of wild birds in the spread of avian influenza and in predicting transmission routes within and across continents. The migratory connection between Alaska and Asia and the avian data available in National Parks makes Alaska's National Parks a logical target for data summarization efforts. The objective of this project was to collect and summarize occurrence information to display seasonal distribution and potential migratory patterns for 36 avian species within and adjacent to Alaska's 16 National Parks. Target taxa were selected because they were recognized by the Alaska Interagency HPAI Bird Surveillance Working Group as having the highest potential of contacting the H5N1 virus and bringing it to Alaska. Information on the occurrence and seasonal distribution of the 36 avian target species was collected from numerous and disparate data sources and summarized in a relational/spatial (Access/ArcGIS) linked geodatabase. In total, we summarized 11,042 observations for this project from 319 unique data sources which spanned the time period 1881 to 2008. Observation data for individual species varied by total number, observation type (e.g., breeding, migration, stopover, wintering), season and presence within the four park networks. To assist managers with identification of seasonal distribution patterns or avian concentration areas, we designed the geodatabase to allow for easy viewing by number of birds observed, observation type, and season for each species. This report summarizes information housed within the database for the 36 target taxa on a species by species basis. Within each "species account" we included information from the literature about the range of the species as well as information on migration and mobility. We then summarized our findings on the distribution and seasonal occurrence of each species within Alaska's National Parks, provided specific dates on the timing of spring and fall migration, first breeding, molting and staging, and provided a seasonal distribution map that included all location information gathered during this project.

Recommended Citation

T.A. Gotthardt, T.L. Fields and J.G. McClory. 2009. Biogeography of select avian species in Alaska's National Parks. Prepared for the National Park Service, Alaska Region. Alaska Natural Heritage Program, ENRI, University of Alaska Anchorage, Anchorage, Alaska. 154 pp.

Keywords

Alaska, birds, avian influenza, H5N1, observations, seasonal distribution, National Parks, Aleutian Cackling Goose, *Branta hutchinsii leucopareia*, Aleutian Tern, *Sterna aleutica*, Arctic Warbler, *Phylloscopus borealis*, Buff-breasted Sandpiper, *Tryngites subruficollis*, Blackpoll Warbler, *Dendroica striata*, Brant, *Branta bernicla*, Bar-tailed Godwit, *Limosa*

lapponica, Common Eider, *Somateria mollissima*, Dunlin, *Calidris alpina*, Emperor Goose, *Chen canagica*, Eastern Yellow Wagtail, *Motacilla tschutschensis*, Gray-cheeked Thrush, *Catharus minimus*, Glaucous Gull, *Larus hyperboreus*, Glaucous-winged Gull, *Larus glaucescens*, Gyrfalcon, *Falco rusticolus*, King Eider, *Somateria spectabilis*, Kittlitz's Murrelet, *Brachyramphus brevirostris*, Long-billed Dowitcher, *Limnodromus scolopaceus*, Sandhill Crane, *Grus Canadensis*, Lesser Snow Goose, *Chen caerulescens*, Long-tailed Duck, *Clangula hyemalis*, Northern Pintail, *Anas acuta*, Olive-sided Flycatcher, *Contopus cooperi*, Pectoral Sandpiper, *Calidris melanotos*, Pacific Golden-Plover, *Pluvialis fulva*, Red Knot, *Calidris canutus*, Rock Sandpiper, *Calidris ptilocnemis*, Rusty Blackbird, *Euphagus carolinus*, Ruddy Turnstone, *Arenaria interpres*, Smith's Longspur, *Calcarius pictus*, Spectacled Eider, *Somateria fischeri*, Steller's Eider, *Polysticta stelleri*, Sharp-tailed Sandpiper, *Calidris acuminata*, Taverner's Cackling Goose, *Branta hutchinsii taverneri*, Tundra Swan, *Cygnus columbianus*, Yellow-billed Loon, *Gavia adamsii*

Acronyms

ALAG	Alagnak Wild River
ANIA	Aniakchak National Monument and Preserve
BELA	Bering Land Bridge National Preserve
CAKR	Cape Krusenstern National Monument
DENA	Denali National Park and Preserve
GAAR	Gates of the Arctic Park and Preserve
GLBA	Glacier Bay Park and Preserve
KATM	Katmai National Park and Preserve
KEFJ	Kenai Fjords National Park
KLGO	Klondike Gold Rush National Historical Park
KOVA	Kobuk Valley National Park
LACL	Lake Clark National Park and Preserve
NOAT	Noatak National Preserve
SITK	Sitka National Historical Park
WRST	Wrangell-St. Elias National Park and Preserve
YUCH	Yukon-Charley Rivers National Preserve
ARCN	Arctic Network
CAKN	Central Alaska Network
SEAN	Southeast Alaska Network
SWAN	Southwest Alaska Network
AKNHP	Alaska Natural Heritage Program
NPS	National Park Service
USGS	US Geologic Survey

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INTRODUCTION

Recent data indicate that wild birds can be carriers of the highly pathogenic Asian H5N1 avian influenza (HPAI), substantiating concerns that migratory birds may distribute the virus around the globe (Chen et al. 2006). The U.S. Interagency Strategic Plan (2006) for early detection of HPAI targets bird species in North America that have the highest risk of being exposed to or infected with the H5N1 avian influenza subtype because of their migratory movement patterns. Currently, these include birds that migrate directly between Asia and North America, birds that may be in contact with species from areas in Asia with reported outbreaks, or birds that are known to be reservoirs of AI.

Alaska represents a unique crossroads where four major flyway systems—East Asia/Australasia, Central Pacific, Pacific Americas, and Mississippi Americas overlap, and was identified as the most likely location that HPAI would first occur in North America if introduced by wild birds (Interagency Working Group 2005). Such a scenario is reasonable, as the contribution of Eurasian AI viruses to the genetic composition of viruses in North American migratory birds has already been demonstrated (U.S. Interagency Strategic Plan 2006).

The ability to efficiently control the spread of such a highly infectious, exotic disease is dependent upon the capacity to rapidly detect the pathogen if introduced. Thus, understanding migration strategies is essential in examining the role of wild birds in the spread of avian influenza and in predicting transmission routes within and across continents. The U.S. Interagency Strategic Plan (2006) for early detection of HPAI suggests that efforts to detect the H5N1 avian influenza virus should focus on likely cross-over routes of birds from Asia to North America (i.e., Alaska). Specifically, efforts should focus on areas of high aggregations of waterfowl intersecting with logistical sampling support such as the National Wildlife Refuge System, National Parks and Monuments, and state waterfowl management areas.

If the highly pathogenic H5N1 avian influenza virus does gain a foothold in Alaska, the Alaska Interagency HPAI Bird Surveillance Working Group (2006) suggests that a surveillance network should be placed along known migratory bird pathways from the point of origin (i.e., point of detection). Unfortunately, even the basic movement patterns of bird migration routes within Alaska are not well understood for many species. Thus, a basic yet important step that may aid with the identification or prediction of areas where H5N1 birds may arrive in Alaska National Parklands is to assess the types and amount of avian seasonal distribution information already in existence. Unfortunately, collection and analysis of such information is difficult because it is geographically dispersed and not shared among parks in the region.

The objective of this project was to collect and summarize historic occurrence information for select avian species to provide resource managers with detailed information on the seasonal distribution and potential migration routes for specific species within Alaska's National Parks and adjacent areas. This information was summarized in a relational/spatial (Access/ArcGIS) linked geodatabase and was designed to help managers identify seasonal concentrations or aggregation areas of avian species. This information could be used to identify potential transmission routes of introduction for H5N1 virus, and ultimately, to enable rapid deployment of personnel and resources to take action in the event of a known infection.

METHODS

Species List

Alaska Natural Heritage Program (AKNHP) and National Park Service staff selected a total 36 avian species to be included in the project (Table 1). Twenty-eight of the 36 target species were selected because they were recognized by the Alaska Interagency HPAI Bird Surveillance Working Group (2006) as having the highest potential of contacting the H5N1 virus and bringing it to Alaska. The additional 8 avian species were selected because they were of specific interest to Park Service researchers and managers.

Once the target species list was complete, we obtained bird checklists for each of Alaska's 16 National Parks and preserves from the NPSpecies on-line database (the National Park Service's Inventory and Monitoring Database, http://science.nature.nps.gov/im/apps/npspp). Each park checklist identified species that were present or predicted present within the park. We summarized bird by park information to help refine our data and literature search, as not all the 36 target species were expected present in each of Alaska's 16 parks and preserves (Table 2).

Data Synthesis

Information on the occurrence and seasonal distribution of the 36 target species was collected from numerous and disparate data sources. These included the NPSpecies database, museum collections, and gray literature and published peer-reviewed articles. Once we conducted a thorough review of the literature locally, AKNHP staff visited park offices in Anchorage, Copper Center, Fairbanks, Gustavus, Kotzebue, Port Alsworth, Seward, Sitka, and Skagway to meet with park researchers, resource managers and archival specialists to obtain additional sources of data. These included species observations and survey forms, avian and wildlife observation databases, camp journals, field notes, ranger trip reports, and unpublished and published reports.

Database Development

AKNHP worked in cooperation with National Park Service staff to develop an Access/ArcGIS linked database (personal geodatabase) for this project. When the project began, we initially planned to use the Park Service's Avian Observation Database (akro_avian.mdb) to enter data into. This database was developed by the Park Service to house information on birds that were phoned in/reported over the AI recovery hotline. However, the existing database was more suited for documenting dead birds and bird recoveries and did not provide sufficient fields to capture life history information or to categorize data by seasonal occurrence. As a result, we designed a new archival database to encompass a variety of avian observation data entry fields and spatial viewing needs, including those potentially important to the identification of important avian concentration areas such as breeding, staging and migration stopover areas.

The geodatabase developed for this project, the Alaska National Park Service Avian Observation Database (NPS_Birdobs.mdb), uses Access (2007) for entry and storage of the relational data and ArcMAP (version 9.3) for the spatial component. The Access interface was designed to be user-friendly with a links to the following features: 1) a list of the 36 avian species included in the project, 2) a built in user guide is provided which contains instructions on how to use the database, 3) a data dictionary that displays detailed information on the tables in the Access database and the spatial layers in the ArcMAP project, 4) automatically generated reports that

Table 1. Thirty-six avian species included in the Alaska National Park Service Avian Observation Database project. Species highlighted in **bold** were recognized by the Alaska Interagency HPAI Bird Surveillance Working Group (2006) as having the highest potential of contacting the H5N1 virus and bringing it to Alaska. The remaining eight species were of specific interest to the National Park Service.

	COMMON NAME	SCIENTIFIC NAME
1	**Emperor Goose**	***Chen canagica***
2	**Lesser Snow Goose**	***Chen caerulescens***
3	**Brant**	***Branta bernicla***
4	Taverner's Cackling Geese	*Branta hutchinsii taverneri*
5	**Aleutian Cackling Goose**	***Branta hutchinsii leucopareia***
6	**Tundra Swan**	***Cygnus columbianus***
7	**Northern Pintail**	***Anas acuta***
8	**Steller's Eider**	***Polysticta stelleri***
9	**Spectacled Eider**	***Somateria fischeri***
10	**King Eider**	***Somateria spectabilis***
11	**Pacific Common Eider**	***Somateria mollissima***
12	**Long-tailed Duck**	***Clangula hyemalis***
13	Yellow-billed Loon	*Gavia adamsii*
14	**Sandhill Crane**	***Grus canadensis***
15	Gyrfalcon	*Falco rusticolus*
16	**Pacific Golden-Plover**	***Pluvialis fulva***
17	**Bar-tailed Godwit**	***Limosa lapponica***
18	**Ruddy Turnstone**	***Arenaria interpres***
19	**Red Knot**	***Calidris canutus***
20	**Pectoral Sandpiper**	***Calidris melanotos***
21	**Sharp-tailed Sandpiper**	***Calidris acuminata***
22	**Rock Sandpiper**	***Calidris ptilocnemis***
23	**Dunlin**	***Calidris alpina***
24	**Buff-breasted Sandpiper**	***Tryngites subruficollis***
25	**Long-billed Dowitcher**	***Limnodromus scolopaceus***
26	**Glaucous-winged Gull**	***Larus glaucescens***
27	**Glaucous Gull**	***Larus hyperboreus***
28	**Aleutian Tern**	***Sterna aleutica***
29	Kittlitz's Murrelet	*Brachyramphus brevirostris*
30	Olive-sided Flycatcher	*Contopus cooperi*
31	**Arctic Warbler**	***Phylloscopus borealis***
32	**Gray-cheeked Thrush**	***Catharus minimus***
33	**Eastern Yellow Wagtail**	***Motacilla tschutschensis***
34	Blackpoll Warbler	*Dendroica striata*
35	Smith's Longspur	*Calcarius pictus*
36	Rusty Blackbird	*Euphagus carolinus*

Table 2. Avian species known or expected to occur within Alaska's 16 National Parks based on NPSpecies park bird checklists. An X indicates documented presence within the park, X** denotes breeding within the park, "PP" indicates probably present, "Un" denotes unconfirmed status and "En" indicates the species may be encroaching into the area.

NETWORK	Arctic Network (ARCN)					Southwest Area Network (SWAN)					Southeast Area Network (SEAN)			Central Area Network (CAKN)		
PARK	BELA	CAKR	GAAR	KOVA	NOAT	ALAG	ANIA	KATM	KEFJ	LACL	GLBA	KLGO	SITK	DENA	WRST	YUCH
COMMON NAME																
Emperor Goose	X**						X	En	PP	X			PP		X	
Lesser Snow Goose	X	X	X	X	PP			PP	Un	X	X	X		X	X	
Brant	X	X**			PP	X	X	X	X**	X	X	X	X	X	X	X
Taverner's Cackling Goose	X	X			X**											
Aleutian Cackling Goose																
Tundra Swan	X**	X**	X	X	X**	X**	X**	X**	X	X	X	X		X	X	X
Northern Pintail	X**	X**	X	X**	X**	X	X**	X**	X**	X**	X**	X	X	X**	X	X**
Steller's Eider	PP	X					X	X	En				X			
Spectacled Eider	X	X														
King Eider	X	X					PP	X**	En	PP	X				X	
Common Eider	X**	X**					X	X	En	X	X**				X	
Long-tailed Duck	X**	X**	X	X	X**	X	X	X**	X**	X**	X**	X	X	X**	X	X
Yellow-billed Loon	X**	X**	X		X**		PP	En	En		X**		X	X	X	
Lesser Sandhill Crane	X	X**	X	X	X**	X	X**	X**		X	X	X	X	X	X	X
Gyrfalcon	X**	X**	X**	X**	X**	PP	X**	X**	X	X**	X	X		X**	X**	X**
Pacific Golden Plover	PP					PP	X**	X**	Un	X	X		PP		PP	
Bar-tailed Godwit	x**	X**			X		Un	En	Un	X	X					
Ruddy Turnstone	X**	X			X	X	X	X	X	PP	X**		X	X		X
Red Knot	X**	X			PP			En		X	X		X		X	
Pectoral Sandpiper	X	X**	X	X	X			X	X	X	X	X	X	X	X	X
Sharp-tailed Sandpiper	PP	X						En	PP							
Rock Sandpiper	X**	Un					X**	X**	X	X**	X**	X	X			
Dunlin	x**	X**	PP	PP	PP		X**	X	X	X	X**	X	X	X	X	
Buff-breasted Sandpiper			PP		X			En			X				PP	X
Long-billed Dowitcher	X**	X**	PP	X	X**			En	PP	X	X	X	PP	X	X	X
Glaucous-winged Gull	X**	Un				X	X**	X**	X**	X**	X**	X	X**	X	X	
Glaucous Gull	X	X**	X	X**	X**	PP		X	X	PP	X	X	X	Un	X	X
Aleutian Tern	X**	x**							X						X	
Kittlitz's Murrelet	PP	X					X	X	X**	X	X**				X	
Olive-sided Flycatcher			X	X	X**	X		X**	X**	X**	X	X		X**		X
Arctic Warbler	X	X**	PP	X	X**			X**		En				X**	X	X
Gray-cheeked Thrush	X**	X**	X**	X**	X**	X	X	X**	X**	X**	X**	PP		X**	X	X
Eastern Yellow Wagtail	X**	X**	X	X	X**			PP						Un		PP
Blackpoll Warbler	X**	X	X	X**	X**	X		X**	X**	X**	X	X		X**	X	X
Smith's Longspur			X**		X						X			Un	X**	PP
Rusty Blackbird	X**	X	X	X	X	PP		X**	X**	X**	X	X	X	X**	X	X**

allow the user to query data by species, park, network, observation type, season, or combinations of these variables, 5) an ArcMAP interface (project) that allows the user to view spatial data for individual species by count, observation type or season, 6) a complete list of literature citations used to compile the data, 7) the final project report, and 8) a data entry form for the addition of new observations.

Database Fields

For each species, we summarized information on the type of observation, the date it was recorded, the observer name, the number of birds present, any behaviors observed and other life stage comments, and location information. Observation data were categorized by observation type, season, and park to allow for a consistent and systematic approach to data entry and also to provide greater querying power in the database. A comprehensive list of the database fields that were populated for this project is provided in Appendix I. Here, we describe specific database fields that were included to help the end-user better assess distribution patterns and seasonal use by individual avian species within Alaska's National Parks.

'Observation type' was broken down into eight possible categories based on the observed behavior, including: breeding, foraging, migration, molting, probable breeding, staging or wintering. When a specific behavior was not associated with an observation, the default classification was simply 'observation'. We included as many life stage comments as possible to help with these designations. 'Probable breeding' was designated as the 'observation type' when no direct evidence of breeding was observed, but behaviors observed (such as singing during breeding bird surveys) were indicative of breeding. We also included the number of birds recorded at each location when available; however, availability of this information and varying survey techniques makes this field highly inconsistent across datasets.

Whenever possible, we included the date ('month', 'day', 'year') that the observation was collected. If the author indicated a season of data collection, this was used to populate the 'season' field. If there was no seasonal designation, the 'season' field was calculated based on date, so the database could be queried by 'day', 'month', 'year' or 'season'. 'Season' was separated into: spring (March through May), summer (June and July), fall (August through October) and winter (November through February), following the seasonal designations utilized by Armstrong (2008).

We recorded the name of the park that an observation was from as well as the network that the park occurred in. Many observations were from areas adjacent to parks. In such cases, we included a field that allowed entry of the park name that was closest to the observation. Marine observations adjacent to park coasts/boundaries were designated as within parks. Whenever available, we also included the specific site location name as well as directions to the location.

Spatial Data

Spatial data housed within the database consists of points (Decimal degrees NAD83) and polygons (Alaska Albers NAD83). Points indicate individual species location records while polygons signify general survey areas or concentration areas for individual species. When coordinates (UTM or latitude and longitude) for point or polygon locations were not available from the original data source they were assigned based on: 1) the site name, which was

georeferenced using the Alaska places names dataset (DNR/LRIS 1:250,000), 2) a description of the location, which was georeferenced using TopoZone (http://www.topozone.com), or 3) a map provided in the source, which was hand digitized. When accuracy of the recorded location was not provided by the original data source, it was assigned for each point based on the potential error associated with the site name, description, or map source. Metadata was developed for the points and polygons following FGDC Standards.

RESULTS

We summarized a total of 11,042 observations for this project from 319 unique data sources. Of the 11,042 total records, 7694 records were within park boundaries and 3348 were adjacent to parks. Occurrence records covered the time period from 1881 to 2008.

Observation data for individual species varied by total number, observation type, season and presence within the four park networks (Table 3). The total number of observations was highly variable among species, ranging from 2,786 records for the Glaucous-winged Gull to 3 records for the Aleutian Cackling Goose. Although we tried to document and categorize data based on observation type, the default 'observation' accounted for the majority (59%) of the observations, followed by probable breeding (24%) and breeding (11%). Not surprisingly, most observations were recorded during summer (80%). Avian observations during winter (4%) were from the more southerly SEAN and SWAN network parks.

Spatial data consisted 10,495 point and 547 polygon features. Many of the polygons represent survey areas within which a species was observed; this more general type of location information was used only when more specific point location information was lacking. We also developed polygons to represent concentration areas for individual species, if the designation was provided by the observer. Thus, we would like to emphasize that polygon representations do not necessarily signify important bird concentration areas and encourage users of the database to examine the life stage and mapping comments prior to drawing conclusions regarding the significance of polygons.

While we attempted to be comprehensive in our literature and data review and the subsequent digitizing of information, the nature of the available data led to obvious imbalances in the quality and quantity of information that was available on a park by park and species by species basis. Much of the occurrence data within parks was biased towards easily accessible locations and standard survey routes and areas. As a result, general areas of high individual avian occurrence and species richness are mentioned in this report, but not emphasized. Some parks had rigorous avian monitoring programs in place (e.g., KEFJ seabird colony surveys; Hahr 2008, Hahr 2009) or had recently completed avian inventories (e.g., ANIA in 2008, KEFJ in 2007), while others had never been surveyed completely or information was quite out-dated (e.g., ALAG). Similarly, some species, such as the Yellow-billed Loon or the Tundra Swan, had species specific comprehensive statewide datasets which were prepared by the U.S. Fish and Wildlife Service (USFWS), while other species, such as the Sharp-tailed Sandpiper or Buff-breasted Sandpiper, had relatively few data points which came from multiple and disparate datasets or research reports.

Table 3. Summary of occurrence data by individual species including total number of observations, observation type (Br = breeding, Fo = foraging, Mi = migration, Mo = molting, Ob = observation, PBr = probable breeder, St = staging, Wi = wintering), season of occurrence (Sp = spring, Su = summer, Fa = fall, Wi = winter) and network where observations were recorded.

COMMON NAME	TOTAL OBS	OBSERVATION TYPE								SEASON				NETWORK			
		Br	Fo	Mi	Mo	Ob	PBr	St	Wi	Sp	Su	Fa	Wi	ARCN	CAKN	SEAN	SWAN
Emperor Goose	52	x		x	x	x	x	x		x	x	x	x	x		x	x
Lesser Snow Goose	59	x		x	x	x		x	x	x	x	x	x	x	x	x	
Brant	131	x	x	x	x	x		x	x	x	x	x	x	x		x	x
Taverner's Cackling Goose	6			x		x		x		x	x						x
Aleutian Cackling Goose	3	x	x			x	x			x		x				x	
Tundra Swan	955	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Northern Pintail	858	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Steller's Eider	27	x		x	x	x			x	x	x	x	x	x		x	x
Spectacled Eider	12	x				x				x	x	x		x		x	
King Eider	36	x		x		x	x	x	x	x	x	x	x	x			x
Common Eider	153	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Long-tailed Duck	449	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Yellow-billed Loon	268	x		x		x	x		x	x	x	x	x	x		x	x
Lesser Sandhill Crane	395	x		x		x	x	x	x	x	x	x	x	x	x	x	x
Gyrfalcon	205	x	x	x		x	x		x	x	x	x	x	x	x	x	x
Pacific Golden Plover	57	x	x	x		x	x			x	x	x		x		x	x
Bar-tailed Godwit	33	x		x		x	x	x		x	x	x		x			x
Ruddy Turnstone	46	x	x	x		x	x		x	x	x	x	x	x		x	x
Red Knot	23	x	x	x		x	x			x	x	x		x		x	
Pectoral Sandpiper	66	x	x	x		x	x	x		x	x	x		x	x	x	x
Sharp-tailed Sandpiper	6					x						x			x		
Rock Sandpiper	175		x	x		x	x		x	x	x	x	x	x		x	x
Dunlin	124	x	x	x		x	x	x	x	x	x	x	x	x		x	x
Buff-breasted Sandpiper	20				x	x					x	x		x			
Long-billed Dowitcher	66	x	x	x		x	x			x	x	x	x	x	x	x	x
Glaucous-winged Gull	2786	x	x			x	x	x	x	x	x	x	x	x	x	x	x
Glaucous Gull	306	x				x	x	x	x	x	x	x	x	x	x	x	x
Aleutian Tern	82	x	x			x	x			x	x	x		x	x	x	x
Kittlitz's Murrelet	327	x	x			x	x			x	x	x	x		x	x	x
Olive-sided Flycatcher	590	x	x	x		x	x			x	x	x		x	x	x	x
Arctic Warbler	213	x	x	x		x	x			x	x	x		x	x		x
Gray-cheeked Thrush	1607	x		x		x	x			x	x	x		x	x	x	x
Eastern Yellow Wagtail	53					x	x			x	x			x	x		
Blackpoll Warbler	410	x		x		x	x			x	x	x		x	x	x	x
Smith's Longspur	83	x				x	x			x	x	x		x	x	x	
Rusty Blackbird	247	x	x	x		x	x		x	x	x	x	x	x	x	x	x

SPECIES ACCOUNTS

Occurrence data collected for this project were summarized in the Alaska National Park Service Avian Observation Database to provide park personnel with tool to better assess the seasonal distribution and potential migration routes of select bird species within and adjacent to Alaska's National Park lands. To better assess timing of movements of birds within and between parks we also captured as much additional information on phenology and behavior as was available from the source data. Here, we present a summary of our results as individual "species accounts".

Within each species account we include information from the literature about the range of the species, both statewide and globally, as well as general information on migration and mobility. We then summarize our findings on the distribution and seasonal occurrence for each species within each of Alaska's 16 National Parks, provide specific dates on the timing of spring and fall migration, breeding, molting and staging, and identify areas important to individual species during different times of the year. Lastly, we produced maps for individual species of all point and polygon location information that was summarized for this project and overlaid them with seasonal range maps developed by AKNHP and NatureServe (http://www.natureserve.org/getData/birdMaps.jsp) to provide context to their overall distribution within Alaska.

Emperor Goose (*Chen canagica)*

Range:

BREEDING: More than 90 percent of the total breeding population is concentrated in western Alaska on the Yukon-Kuskokwim Delta, with additional nesting on St. Lawrence and Nunivak islands, and small numbers in eastern Siberia, principally in the Anaydr lowlands and southern Chukotka (Eisenhauer and Kirkpatrick 1977).

NON-BREEDING: In winter, most of the population is in the Aleutian Islands, but the range extends eastward along the southern side of the Alaskan Peninsula and to the Kodiak Island Archipelago, and small numbers winter in eastern Asia, primarily in the Commander Islands. The species winters irregularly southward along the North American Pacific coast to California and in eastern Asia to Kamchatka, casually in Hawaii. Geese breeding in Siberia evidently winter and migrate with Alaskan breeding birds (Schmutz and Kondratyev 1995).

Most of the global population spends spring and fall staging periods on the Alaska Peninsula, with Nelson Lagoon having the greatest number. Major staging areas include the northern sides of the Alaska Peninsula and Bristol Bay, and shallow bays and lagoons near Cape Newenham and Kuskokwim Bay (AOU 1983, Eisenhauer and Kirkpatrick 1977). See Fig 1.

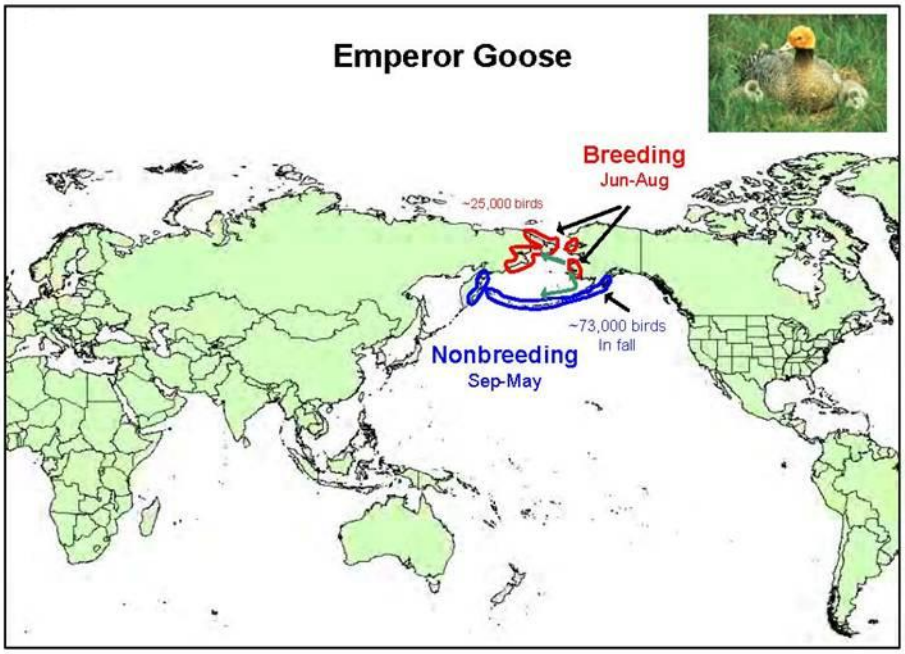


Figure 1. Emperor Goose breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Birds that winter in the western Aleutians commence spring migration in early March; most arrive at the northern side of the Alaska Peninsula about one month later; typically arrive at breeding grounds on the Yukon-Kuskokwim Delta in early- and mid-May. Birds may not arrive at nesting areas on the Seward Peninsula and in Siberia until late May or early June (NatureServe 2009).

A substantial portion of this population, mainly subadults and failed breeders, migrate to the northern Chukotka Peninsula in eastern Russia, where they then molt their flight feathers (AIHPAIBSWG 2006). The number of geese undergoing this migration may exceed 50,000 in some years, and perhaps substantially more. The flight trajectory of geese migrating to Chukotka is directly through or over St. Lawrence Island (AIHPAIBSWG 2006), which is the principal molting area in Alaska (Petersen et al. 1994).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 52 individual location records for the Emperor Goose from 23 unique data sources. Of the 52 total records, 26 records were within park boundaries and 26 were adjacent to parks (Fig. 2). Occurrence records covered the time period from 1898 to 2008. Emperor Geese were detected in three of the four Alaska National Park networks, with the majority of observations from parks in the SWAN (52%) and ARCN (44%) networks (Fig. 2).

Emperor Geese were detected in Alaska's National Parks from May through October, except for one observation in SITK in December (Table 4). Spring migration was recorded on 10 and 28 April in areas adjacent to ANIA and spring staging was reported on 7 and 14 May from ANIA and KATM. The earliest nest was recorded on 16 July in CAKR. Fall staging was reported on 8 and 25 August from BELA, 12 and 19 October from KATM, and 19 October from ANIA. Molting was observed on 20 to 22 July at Good Hope Bay in BELA.

Emperor Geese were only observed breeding in ARCN network parks, within BELA and CAKR (Table 4). Breeding records for this species spanned the time period 16 July to 22 July and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Notable breeding concentration areas were identified in BELA (see Fig. 2). Breeding was not documented in ANIA or KATM, but it appears that Emperor Geese stage at these parks and adjacent areas on the Alaska Peninsula during both spring and fall migration.

Table 4. Monthly occurrence of Emperor Goose in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA						X	X**	X*				
CAKR							X**					
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												X
Southwest Alaska Network (SWAN)												
ALAG												
ANIA					X			X		X		
KATM					X			X	X	X		
KEFJ												
LACL												

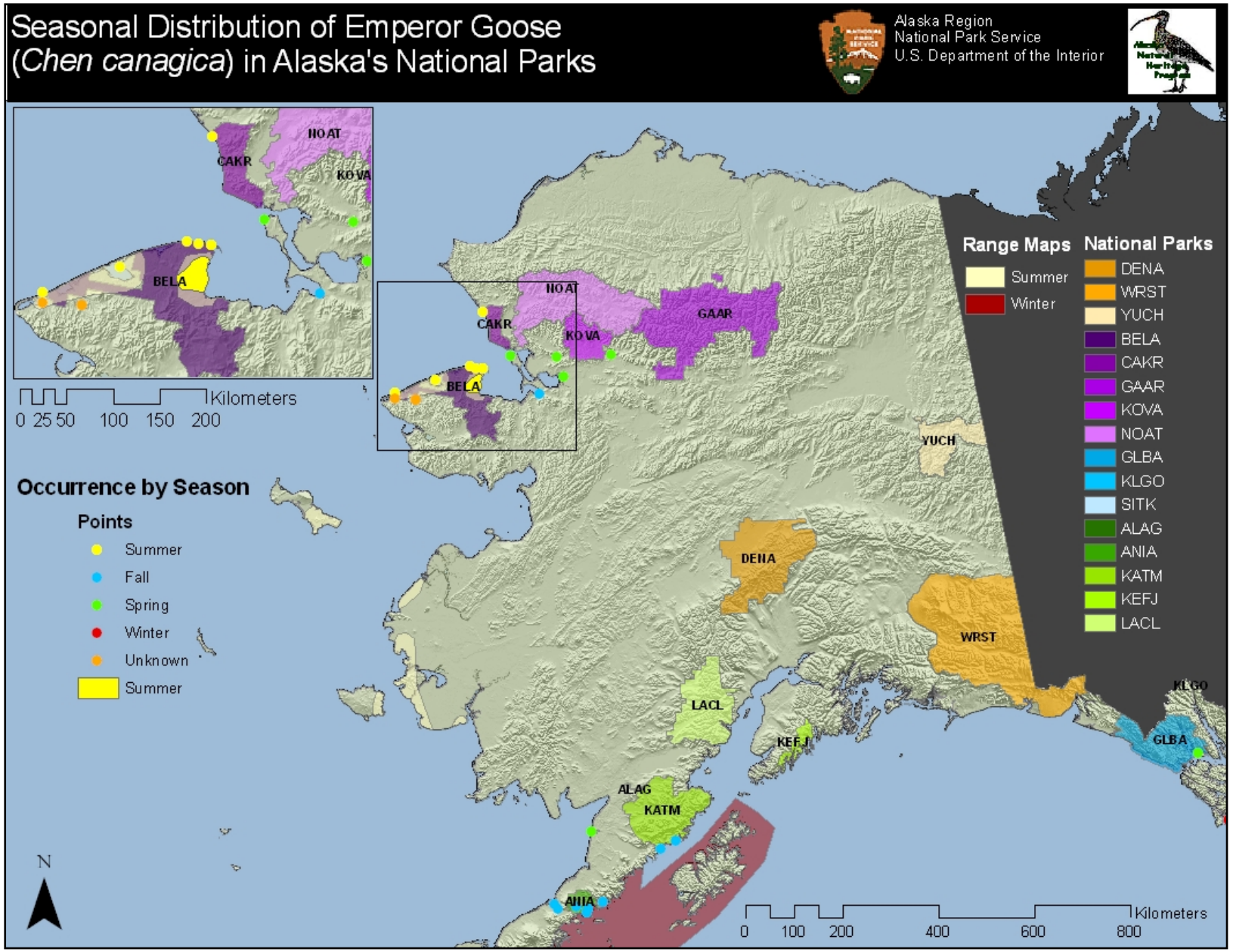


Figure 2. Seasonal distribution of Emperor Goose in and adjacent to Alaska's National Parks.

Lesser Snow Goose (*Chen caerulescens)*

Range:

BREEDING: On high arctic tundra from northeastern Siberia (Wrangel Island), northern Alaska, Arctic Canada, and northwestern Greenland, and south along both coasts of Hudson Bay (Campbell et al. 1990, Sinclair et al 2003).

NON-BREEDING: Winters mainly from southwestern British Columbia south to California; also in New Mexico and Mexico in the west. In the Midwest, winters from coastal Texas to western Florida; and on the Atlantic coast from New Jersey to South Carolina; casual in Hawaii (Godfrey 1966, Pratt et al. 1987, Campbell et al. 1990). See Fig 3.



Figure 3. Wrangel Island Lesser Snow Goose breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Concern associated with transmission pathways for H5N1 are in regards to the breeding population of Lesser Snow Geese from Wrangel Island, Russia, that migrates through Alaska and through the southern Pacific Flyway (AIHPAIBSWG 2006). The entire breeding population of Wrangel Island Snow Geese migrates through Alaska to wintering areas in and around Fraser and Skagit river deltas in British Columbia and Washington, respectively, and also in valleys of California (Johnson and Herter 1989). During autumn migration, this population uses St. Lawrence Island and the Yukon-Kuskokwim Delta in western Alaska as stopover areas (Ely et al. 1993 in AIHPAIBSWG 2006). Part of the population also stops on the Stikine River Delta in southeast Alaska in fall. In spring, the population uses stopover areas in southeast Alaska, Cook Inlet, and the Yukon-Kuskokwim Delta (AIHPAIBSWG 2006).

The Arctic coastal plain of northeastern Alaska and Yukon is an important staging (feeding) area for most of the western arctic population. Most depart northern staging areas in the Beaufort Sea area by October. Males pair with females on mixed wintering grounds and accompany females to their natal or previous nesting area (NatureServe 2009).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 59 individual location records for the Snow Goose from 21 unique data sources. Of the 59 total records, 27 records were within park boundaries and 32 were adjacent to parks (Fig.4). Occurrence records covered the time period from 1899 to 2007. The Snow Goose was detected in three of the four Alaska National Park networks, with the majority of observations in the ARCN (41%) and SEAN (41%) network parks (Fig. 4).

Snow Geese were detected in Alaska's National Parks sporadically from May through December, with the majority of observations (56%) recorded during the May migration period (Table 5). The earliest spring migration record was for 2 May in GLBA. Breeding concentrations were first documented on 20-22 July in BELA. Spring staging was first noted from 12-19 May in areas adjacent to CAKR and BELA. Fall staging was reported from areas adjacent to WRST on 10 October and from GLBA on 14 October.

Snow Geese were only observed breeding in BELA (Table 5). An apparent important breeding concentration area was in the northwestern corner of BELA south of Cape Espenberg along Kotzebue Sound. Numerous spring staging areas were identified in and around BELA and CAKR. One notable staging area was along the north coast of BELA, from Shishmaref to Cape Espenberg. Numerous areas within Selawik National Wildlife Refuge were also mapped as staging concentration areas (Fig. 4).

Table 5. Monthly occurrence of Lesser Snow Goose in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA										X		
WRST					X							
YUCH												
Arctic Network (ARCN)												
BELA					X		X**					
CAKR					X							
GAAR												
KOVA					X							
NOAT												
Southeast Alaska Network (SEAN)												
GLBA					X	X				X		X
KLGO					X							
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

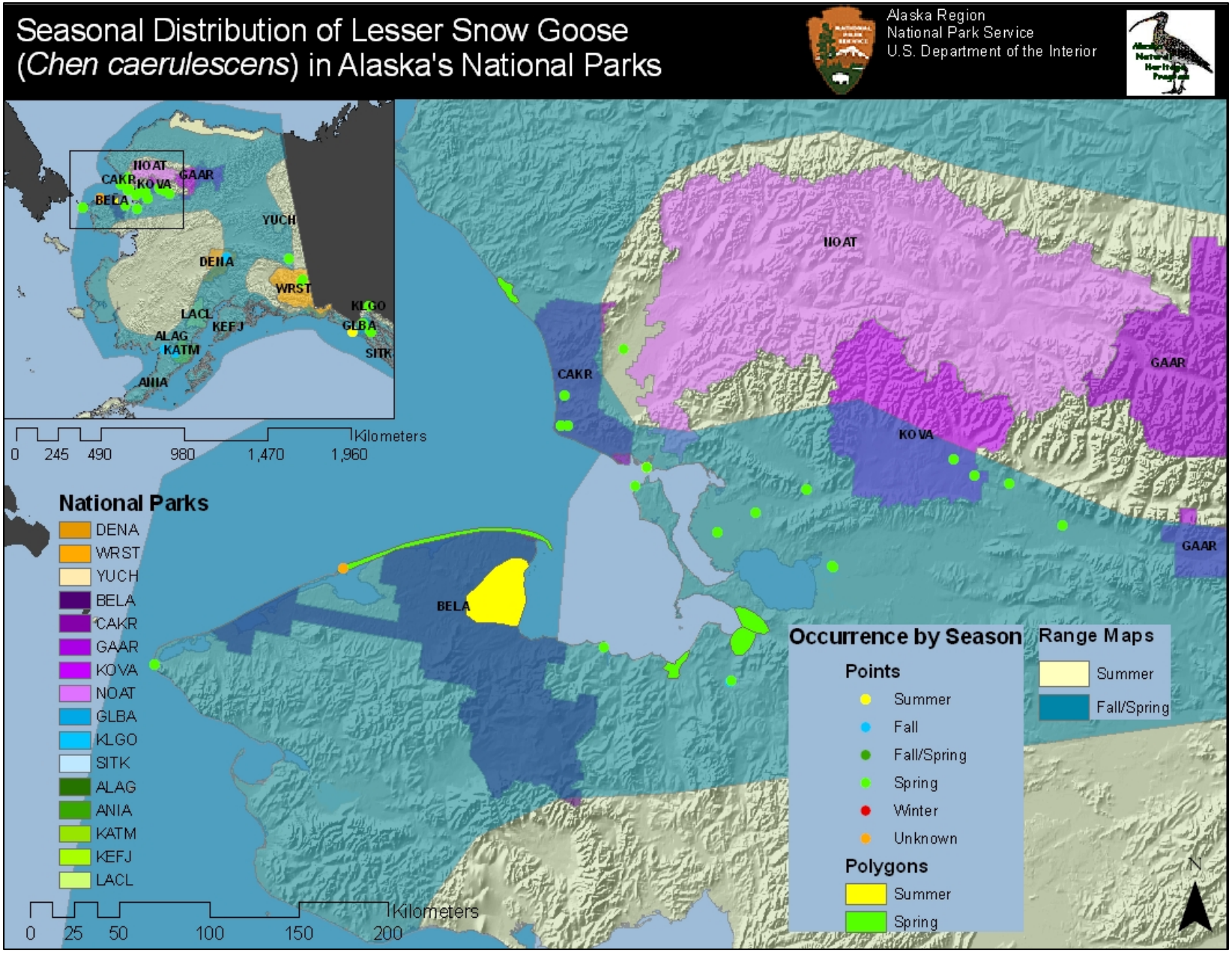


Figure 4. Seasonal distribution of Lesser Snow Goose in and adjacent to Alaska's National Parks.

Range:

BREEDING: Circumpolar across arctic North America and Russia: Prince Patrick and Melville islands in the western Canadian high arctic and the Beaufort Sea islands to the coastal plain of Canada and Alaska, with small colonies on the north side of the Chukotka Peninsula in Russia and on Wrangel Island (NatureServe 2009). In western North America, about 80% of the total Black Brant (*Branta bernicula nigricans)* population nests in four major colonies on the Yukon-Kuskokwim Delta in western Alaska (Derkson and Ward 1993 in NatureServe 2009).

NON-BREEDING: In North America, winters along the Pacific coast from Alaska to Baja California and mainland Mexico, and along the Atlantic from Massachusetts to North Carolina (mainly New Jersey to North Carolina; NatureServe 2009). Since the mid-1960s, more than 80% of the population winters in Mexico (Derksen and Ward 1993). In the 1980s, an average of several thousand wintered in Izembek Lagoon on the Alaska Peninsula (Derksen and Ward 1993). See Fig 5.

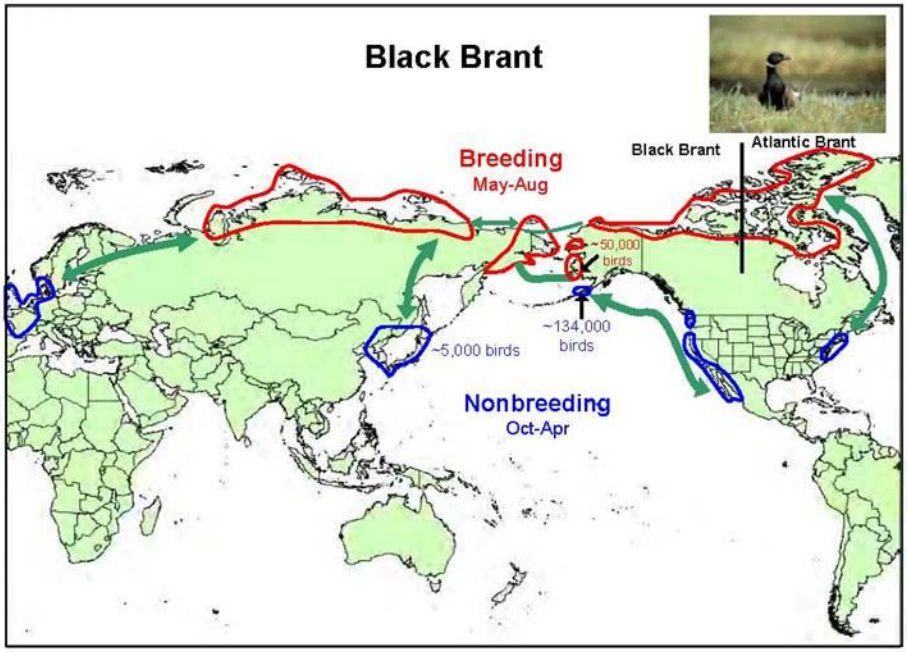


Figure 5. Brant breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Spring migration in western North America occurs during a four month period starting in mid-February (Derksen and Ward 1993). Birds arrive at nesting areas between late May and early June (NatureServe 2009).

Southward migration begins mid-August in the west, late August to early September in the east. Adults with fledged young follow traditional routes from breeding areas to fall migration staging sites; in western North America to Asia, along the Siberian, Beaufort, Chukchi, and Bering seas (Derksen and Ward 1993).

Kasegaluk Lagoon on the Chukchi Sea in northwestern Alaska is an important stop during southward migration; as much as 49% of the entire Pacific flyway population may use the lagoon (Johnson 1993). Izembek Lagoon on the Alaska Peninsula is a critically important stop in spring and late summer, hosting at least the majority of the eastern Pacific population (Johnson and Herter 1989); nearly the entire Black Brant population spends as long as nine weeks there before departing for wintering areas to the south (Derksen and Ward 1993). Important summer molting areas occur on Alaska's north slope and on Wrangel Island (Derksen and Ward 1993). Molt migrants from Russia may come to the arctic coast of Alaska and conversely, molt migrants from Alaska may migrate to Russia (AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 131 individual observation records for Brant from 40 unique data sources. Of the 131 total records, 83 records were within park boundaries and 48 were adjacent to parks (Fig. 6). Occurrence records covered the time period from 1899 to 2008. Brant were detected in all three parks in the SEAN network, and at various parks within the ARCN and SWAN networks (Table 6).

Brant were reported to occur in Alaska's National Parks from April through December with the exception of October (Table 6). Within SWAN network parks, Brant occurred from April through September; in the ARCN network, birds were documented from May through August; and in SEAN, birds were observed from April through June and November through December (Table 6).

The earliest spring migration date recorded was 14 May from GLBA. Spring staging was reported from BELA as early as 19 May; fall staging was first reported on 16 September from the ARCN and adjacent areas. Numerous birds were recorded during migration along the coasts of GLBA and WRST (Fig. 6). Evidence of breeding was observed in BELA and KEFJ. Breeding records for this species spanned the time period 7 June to 22 July, with the earliest nest recorded on 7 June from the Good Hope Bay area in BELA. Although Brant were present in CAKR, KOVA, GLBA, ANIA, KATM and LACL during the June breeding period, data did not indicate if breeding was observed. An apparent important breeding concentration area for Brant was in the northwestern corner of BELA south of Cape Espenberg along Kotzebue Sound (Fig. 6).

Table 6. Monthly occurrence of Brant in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within this park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA					X	X**	X**	X				
CAKR					X	X	X					
GAAR												
KOVA					X	X						
NOAT												
Southeast Alaska Network (SEAN)												
GLBA					X	X					X	X
KLGO					X							
SITK				X	X							
Southwest Alaska Network (SWAN)												
ALAG												
ANIA						X	X					
KATM					X	X	X		X			
KEFJ					X	X**	X	X				
LACL				X	X	X		X	X			

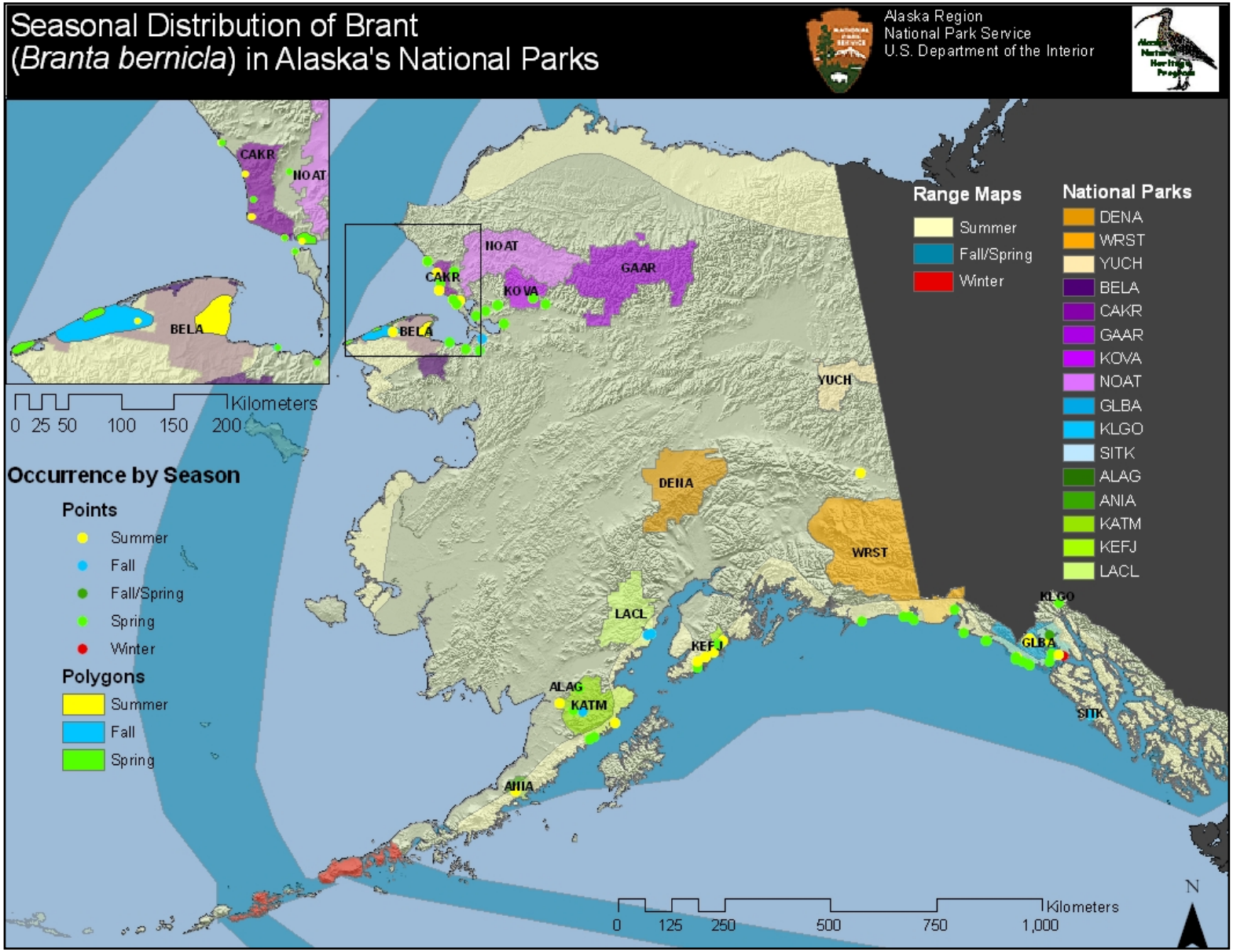


Figure 6. Seasonal distribution of Brant in and adjacent to Alaska's National Parks.

Taverner's Cackling Goose (*Branta hutchinsii taverneri*)

Range:

BREEDING: Breeds mostly on low tundra vegetation along Alaska's coastal areas north of the Alaska Peninsula and east along the Beaufort Sea coast into the Arctic National Wildlife Refuge (Armstrong 2008).

NON-BREEDING: Winters primarily in Willamette River valley of western Oregon and lower Columbia River Valley of north-central Oregon and southcentral Washington (Mowbray et al. 2002). See Fig. 7.

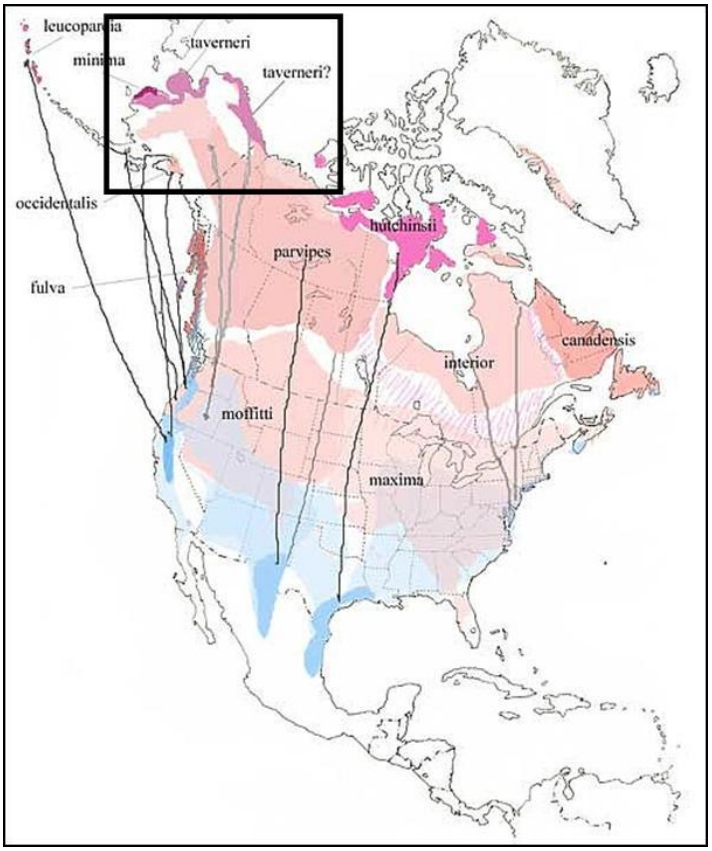


Figure 7. Breeding and non-breeding range of Cackling Goose subspecies. Alaska breeding range for Taverner's Cackling Goose is shown in dark pink within the black outline (map courtesy of www.sibleyguides.com/canada_cackling.htm).

Mobility and Migration:

In fall, migrates from coastal staging areas on the Alaska Peninsula, mainly at Izembek Lagoon, south to Oregon and Washington for a direct trans-Pacific flight. Northward return in spring occurs through interior valleys of British Columbia and Yukon Basin (Mowbray et al. 2002).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of six individual location records for the Taverner's Cackling Goose from four unique data sources. Of the six total records, only one record was within park boundaries (Fig. 8). Occurrence records covered the time period from 1956 to 1989. Taverner's were only detected in the SWAN network, in LACL during May (Table 7). One observation was also recorded near KATM. These observations were of birds during spring migration. Further north in the ARCN network, Taverner's were reported to occur adjacent to KOVA in the Tagagawik River area, where they presumably breed (Fig. 8).

Table 7. Monthly occurrence of Taverner's Cackling Goose in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL					X							

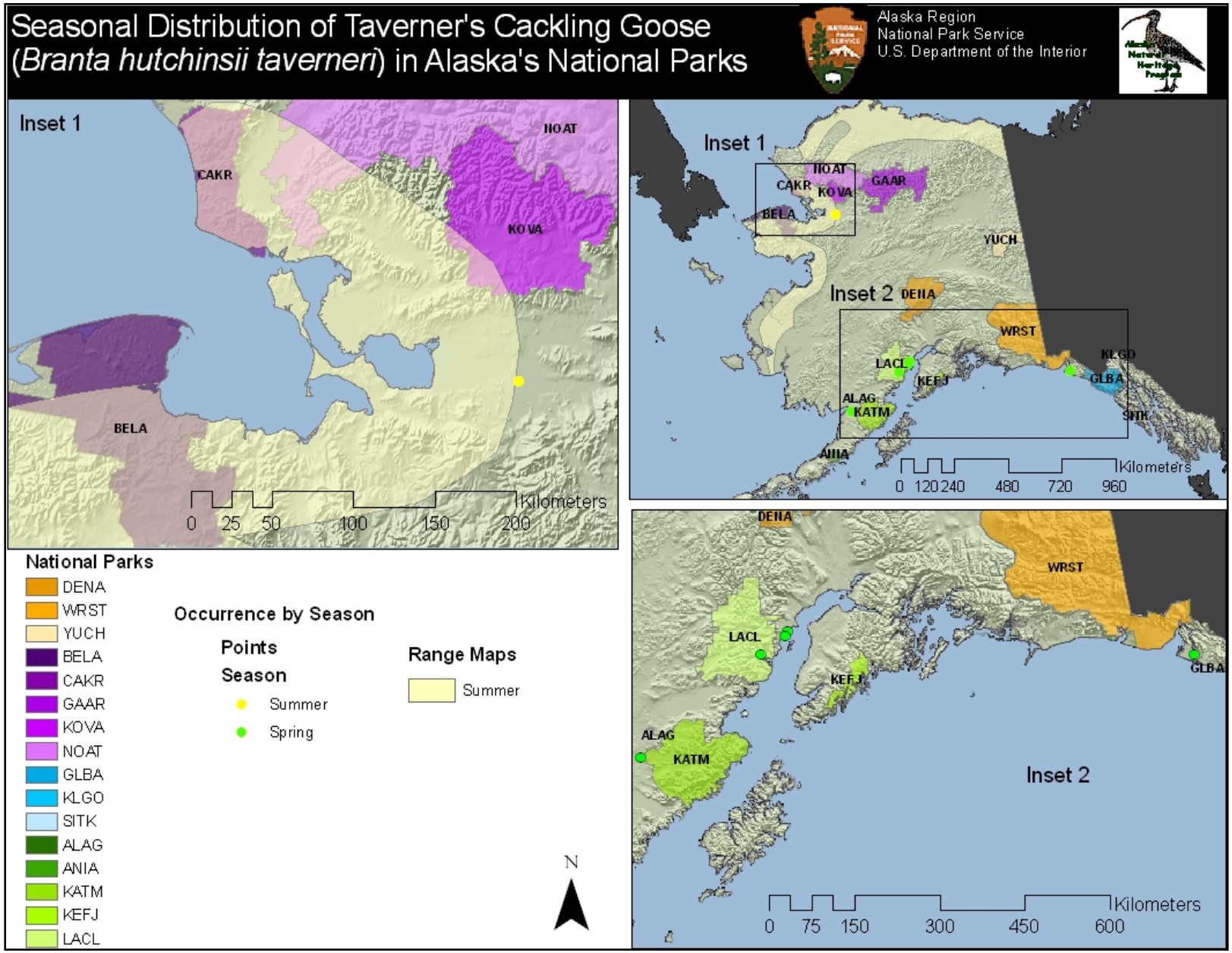


Figure 8. Seasonal distribution of Taverner's Cackling Goose in Alaska's National Parks.

Aleutian Cackling Goose (*Branta hutchinsii leucopareia*)

Range:

BREEDING: Historic breeding range believed to have extended from Geese Islands near Kodiak, Alaska, westward through Aleutian and Commander Islands (Russia) to the central Kuril Islands of Japan (U.S. Fish and Wildlife Service 1980, 1991). Present breeding range includes eight islands in the Western Aleutians: Buldir Island supports the largest remnant population (80%) of this subspecies, with other remnant populations occurring on Chagulak Island (central Aleutians) and Kiliktagik Island (Semidi Islands); reintroduced populations also occur on Nizki-Alaid, Agattu, Little Kiska and Amchitka Islands. At least one pair is known to have nested on Amukta Island (East Andreanof Islands), and geese have recently begun nesting on Anowik Island (Jones 1963, Hatch and Hatch 1983, Bailey and Trapp 1984, Beyersdorf and Pfaff 1995, Williams 1995, Williams et al. 1995, Byrd 1998, U.S. Fish and Wildlife Service 2001a).

NON-BREEDING: Historic winter range extended from British Columbia to northern Mexico and also included islands of Japan (Delacour 1954). Banding studies and annual winter surveys indicate there are at least two distinct breeding groups of this subspecies (Pierson et al. 2000, U.S. Fish and Wildlife Service 2001a): the Aleutian Islands segment (including birds from the western Aleutians and Chagulak Island in the central Aleutians) and the Semidi Islands segment appear to utilize different wintering areas. The Aleutian segment stages in fall and spring in northern coastal California, concentrates in fall in the Sacramento Valley, and spends the winter in the northern San Joaquin Valley; since 1996, a small number of Aleutian segment geese have also been observed wintering with the Semidi Islands segment (U.S. Fish and Wildlife Service 2001). Birds from the Semidi Islands winter in north coastal Oregon. Aleutian Cackling Geese have been reintroduced to the Kuril Islands since 1995, and have been seen wintering in Japan since 1997 (U.S. Fish and Wildlife Service 2001). See Fig. 9.

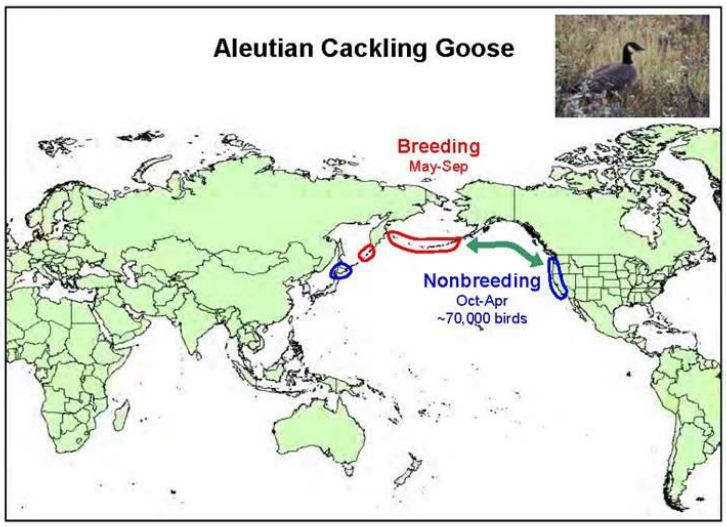


Figure 9. Aleutian Cackling Goose breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Precise spring and fall migration routes through Alaska are unknown (U.S. Fish and Wildlife Service 1991). Some birds are thought to migrate along the Aleutian chain at least as far east as Unimak Island on their fall migration southward (Woolington et al. 1979); most are assumed to make a direct migration across the North Pacific to Washington, Oregon and California. During the return spring migration, there are records of marked Aleutian geese stopping on Kodiak Island, and there are scattered records along the Gulf Coast and Cook Inlet.

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of three individual location records for the Aleutian Cackling Goose from two unique data sources. Of the three records, two were within park boundaries (Fig. 10). Occurrence records were from 1996 and 2007. Aleutian Cackling Geese were only detected in the SEAN network in SITK during spring (May) and fall (September) migration (Table 8). The third detection was near KATM in the SWAN network in May.

Table 8. Monthly occurrence of Aleutian Cackling Goose in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK					X				X			
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

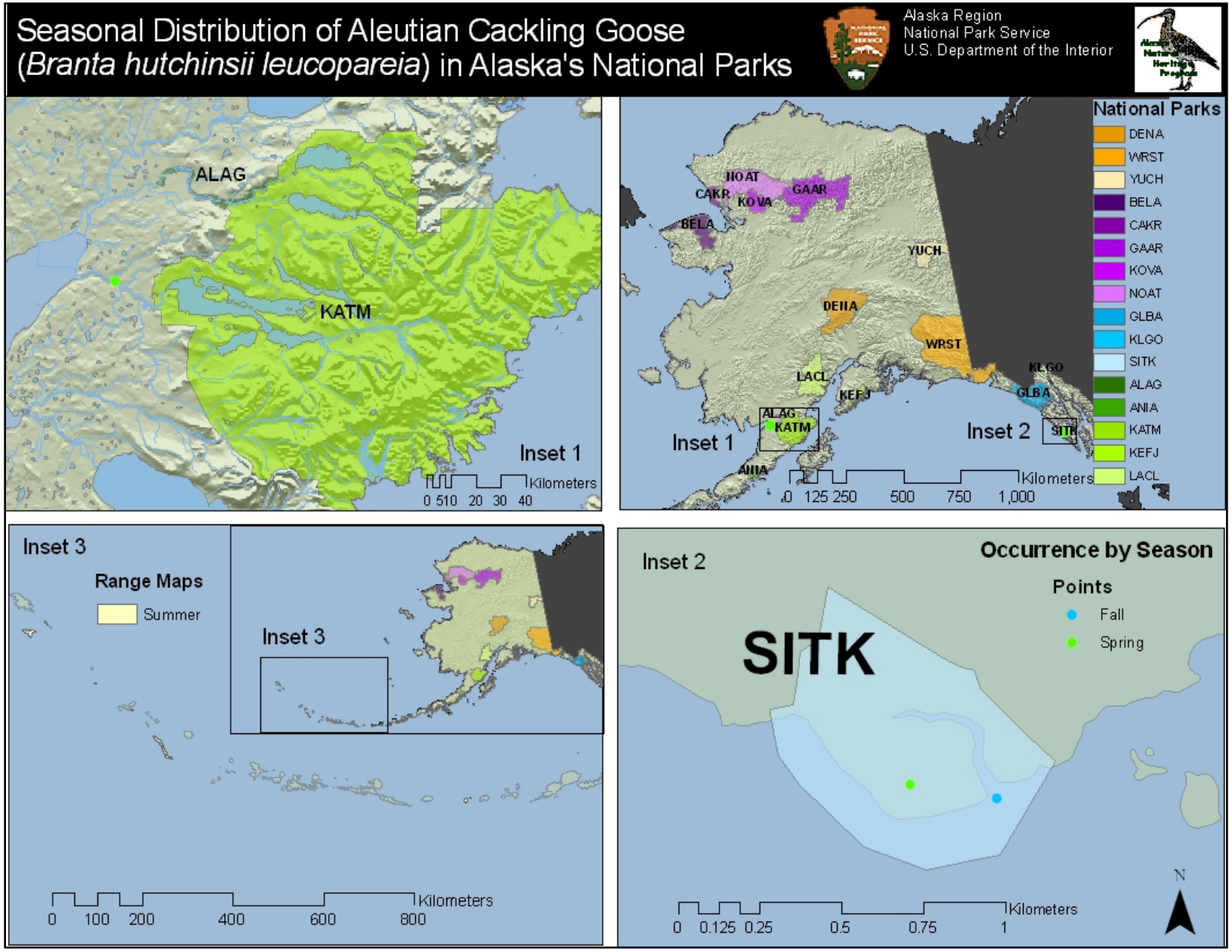


Figure 10. Seasonal distribution of Aleutian Cackling Goose in and adjacent to Alaska's National Parks.

Range:

BREEDING: Coastal areas from the Alaska Peninsula north through western Alaska and across the Arctic Coastal Plain and Canadian low Arctic; northern Russia east along Arctic coast to northern Siberia (NatureServe 2009).

NON-BREEDING: Winters mainly on Pacific and Atlantic coasts of North America from southern British Columbia to California and from New Jersey to South Carolina; Eurasia south to British Isles, northern Europe, southeastern Asia. Accidental in Hawaii. In the U.S., primary wintering areas include the Atlantic coast from northern South Carolina to southern New Jersey, the vicinity of the Great Salt Lake, and central and northern California (Root 1988). See Fig 11.

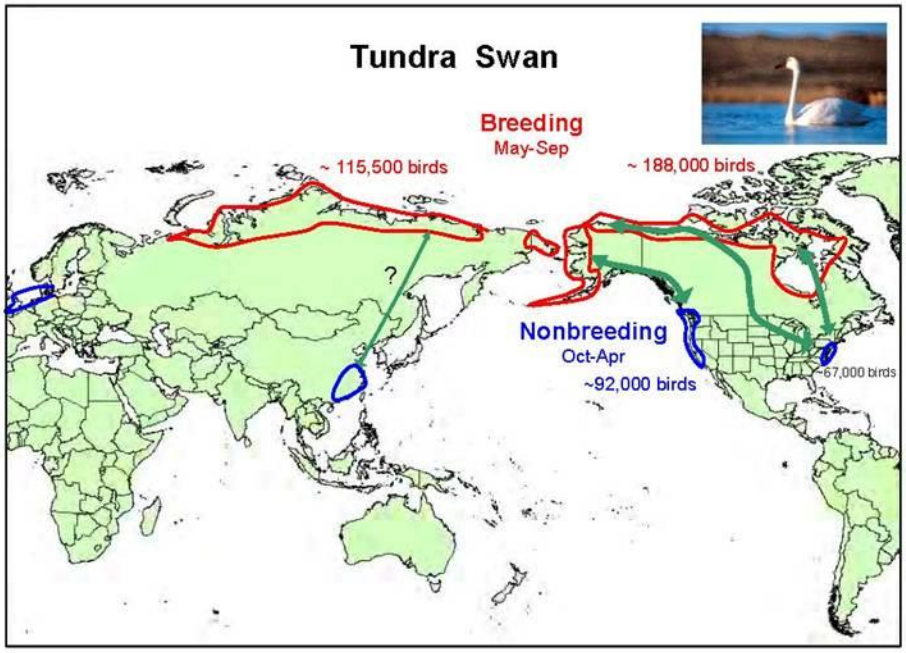


Figure 11. Tundra swan breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Tundra Swans are polytypic, with three recognized subspecies: the nominate form, *C. c. columbianus* (Whistling Swan) in North America, *C. c. bewickii* in Western Eurasia and *C. c. jankowski* in Europe (AIHPAIBSWG 2006). North American Tundra Swans occur as two distinct populations. Eastern Tundra Swans breed from northwest Alaska through the Canadian arctic (about 10,000 are from Alaska) and migrate across the continent to winter on the Atlantic coast. The western population of Tundra Swans nests along the west coast of Alaska from Kotzebue Sound to the Alaska Peninsula. Major breeding concentrations are found on the Yukon-Kuskokwim Delta and in the Bristol Bay region. This population migrates both coastally through Cook Inlet and through the Interior (via Alberta, Montana, and Utah) to wintering

grounds from southern British Columbia to central California (ADFG 2005). *C. c. columbianus* has also been reported to breed across the Bering Straits into eastern Chukotka, where they may overlap in breeding range with *C. c. bewickii* (AIHPAIBSWG 2006).

Tundra Swans arrive on the breeding grounds from early-May to late-June, where they breed well-dispersed in single pairs, occasionally nesting semi-colonially in optimum habitats. After breeding, they undergo a flightless molt which lasts about 30 days (late-June to early-September). During this period they gather in flocks on open waters. Family groups leave the breeding grounds from early-September to late-October and arrive on the wintering grounds from mid-October onwards. During autumn migration some groups may remain at stop-over sites until moved on by cold weather. Northward migration commences in early-March, with the species traveling in small parties that disperse once they arrive in the Arctic. Tundra Swans are gregarious outside of the breeding season, often gathering in flocks of hundreds or thousands of individuals on the wintering grounds (BirdLife International 2008).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 955 individual location records for Tundra Swans from 56 unique data sources. Of the 955 total records, 849 records were within park boundaries and 106 were adjacent to parks (Fig. 12). Occurrence records spanned the time period from 1899 to 2008, with the majority of occurrences documented after 1987. Tundra Swans were detected in all four Alaska National Park networks, with the majority of observations in the ARCN (76%) and SWAN (22%) network parks (Fig. 12).

Tundra Swans were detected in Alaska's National Parks from April through October in addition to a single observation in December from GLBA (Table 9). The earliest nest was recorded on 17 May in ANIA. Fall staging was reported from CAKR as early as 2 September.

Tundra Swans were observed breeding in all five parks in the ARCN network except GAAR and in ANIA, KATM and LACL in the SWAN network (Table 9). A few breeding records and numerous probable breeders in NOAT and KOVA, one breeding record and numerous summer observations in LACL and numerous probable breeding records in GAAR are beyond the known summer range of the Tundra Swan. Breeding was not documented in either the CAKN or SEAN network parks, where most sightings were migratory. Breeding records for this species spanned the time period 17 May to 28 August and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). The majority of observations were recorded by USWFS during swan productivity surveys conducted in August. These surveys were designed to include cygnets that were at least four to six weeks old, to insure they were large enough to be counted (USFWS 2007). Large post-breeding concentrations of Tundra Swans were found along the western border of NOAT and in BELA and CAKR (Fig. 12). Other notable post-breeding observations were in and near KATM in the SWAN Network.

Table 9. Monthly occurrence of Tundra Swans in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X	X						
WRST				X		X						
YUCH												
Arctic Network (ARCN)												
BELA					X		X**	X**				
CAKR					X	X**	X**	X**	X			
GAAR						X*	X					
KOVA					X	X		X**				
NOAT						X		X**				
Southeast Alaska Network (SEAN)												
GLBA										X		X
KLGO						X						
SITK									X	X		
Southwest Alaska Network (SWAN)												
ALAG							X					
ANIA					X**	X**		X**				
KATM				X	X**	X**	X**	X**	X**	X		
KEFJ												
LACL					X			X**				

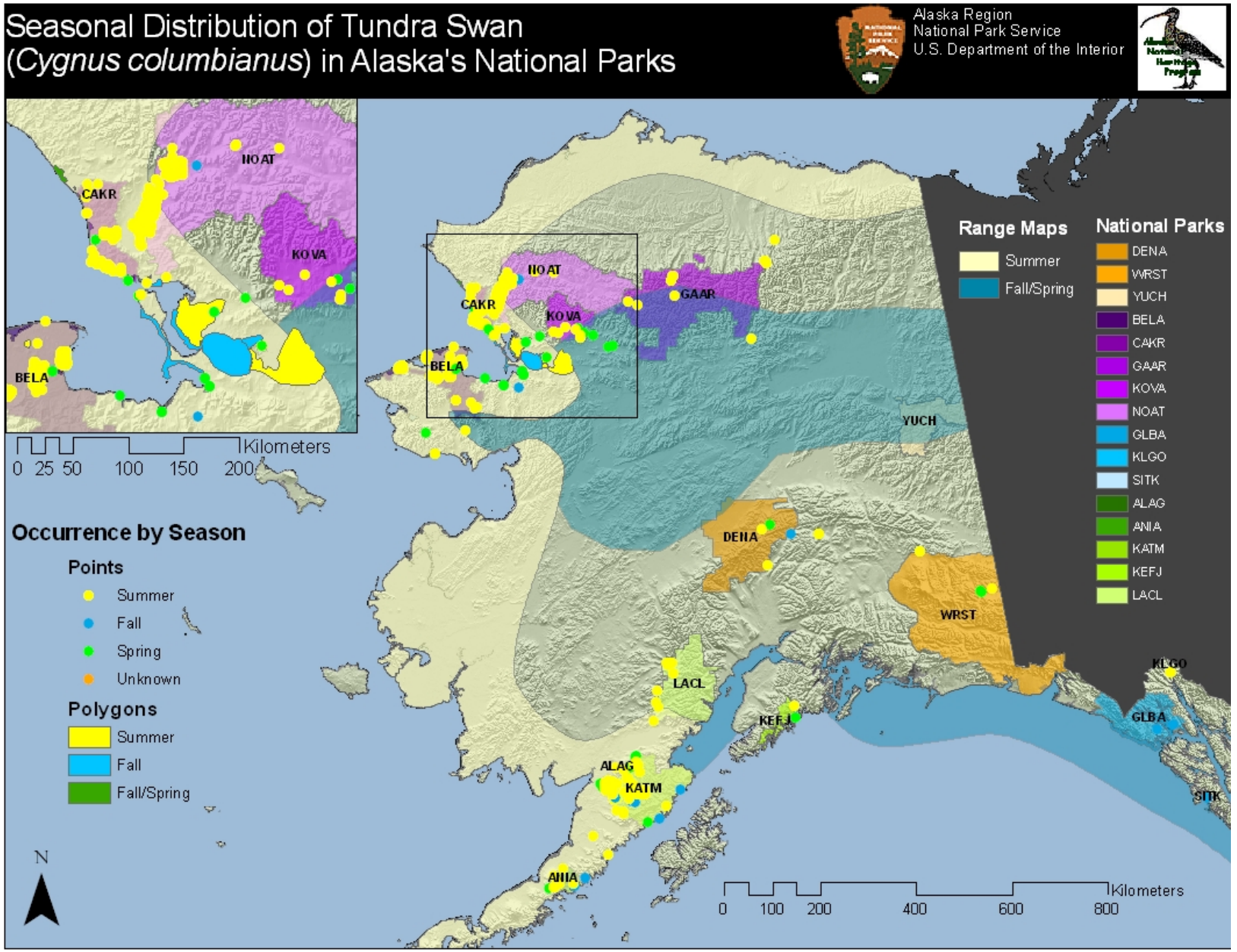


Figure 12. Seasonal distribution of Tundra Swan in and adjacent to Alaska's National Parks.

Range:

BREEDING: Holarctic distribution. In North America, from the tundra of Alaska, Canada, western Greenland, to western and central U.S.; also in Old World (NatureServe 2009).

NON-BREEDING: In the Western Hemisphere, winters from eastern and southeastern (coastal) U.S., Great Lakes, southeastern Alaska, southwestern British Columbia, western and southwestern U.S. south to northern Colombia and Venezuela, rarely to Surinam, including Puerto Rico, Virgin Islands, Hawaii; and Old World (Root 1988). See Fig. 13.

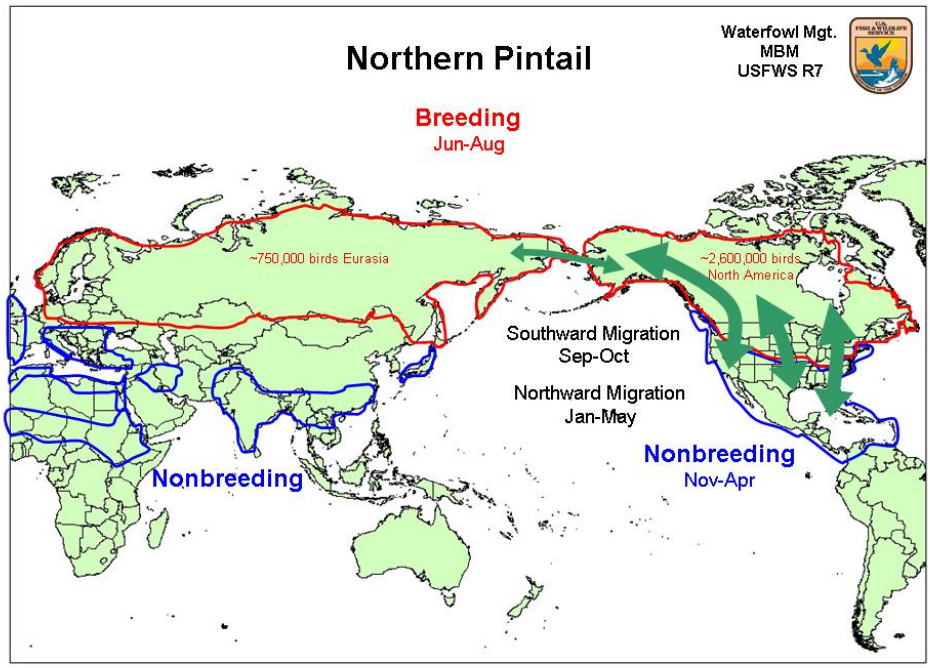


Figure 13. Northern Pintail breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

Begins northward migration from January to March; arrives in nesting areas in northern U.S. and Canada by early April, northern Alaska in mid- to late May. Many continue north to arctic wetlands. Migrates south beginning early August (Stiles and Skutch 1989). Males may engage in extensive migration to molting areas while females incubate (Johnson and Herter 1989).

Banding recovery and satellite telemetry data indicate that birds that winter in Asia are found in Alaska during the summer and birds that winter in North America cross to Asia in the summer (AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 858 individual location records for the Northern Pintail from 95 unique data sources. Of the 858 total records, 643 records were within park boundaries and 215 were adjacent to parks (Fig. 14). Occurrence records covered the time period from 1899 to 2008. Northern Pintails are known to be widely distributed throughout the state and were reported from all 16 of Alaska's National Parks, preserves and national historic monuments with the majority of observations in the ARCN (63%) network parks (Table 10).

Northern Pintails were present in the CAKN and ARCN network parks from May through September; present in SWAN network parks from April through September; and in SEAN network parks from February through December except March and November, where they likely overwinter (Table 10). The earliest spring migration record was for 22 April in GLBA and the earliest nest was recorded on 8 May from Turquoise Lake in LACL. Spring staging was reported as early as 3 April from GLBA and near WRST on the Situk, Ahrnklin and Italio Rivers. Important staging areas were recorded in BELA at the Nugnugaluktuk River Delta and nearby at the Kauk River Delta and in CAKR at Sheshalik Spit and the Buckland River Delta; and along the Noatak River Delta (Fig. 14). Fall staging was reported as early as 8 August and as late as 2 September from ARCN parks. Birds were observed during fall migration at Brooks Lake and the Savanoski River in KATM between 19 and 24 September (Fig. 14).

Northern Pintails were observed breeding in BELA, CAKR, KATM and LACL and are probable breeders in DENA, WRST, GAAR and GLBA (Table 10). Breeding records for this species spanned the time period 24 May to 9 August and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults).

Table 10. Monthly occurrence of Northern Pintail in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X	X*	X	X	X			
WRST					X	X*						
YUCH						X	X					
Arctic Network (ARCN)												
BELA					X	X**	X**	X**				
CAKR					X	X**	X**	X				
GAAR						X*		X	X			
KOVA					X	X						
NOAT						X		X				
Southeast Alaska Network (SEAN)												
GLBA		X		X	X	X*	X	X	X	X		X
KLGO					X							
SITK				X	X			X	X			
Southwest Alaska Network (SWAN)												
ALAG				X	X							
ANIA					X	X	X					
KATM				X	X**	X**	X**	X	X			
KEFJ					X	X		X				
LACL				X	X	X**	X**	X**	X			

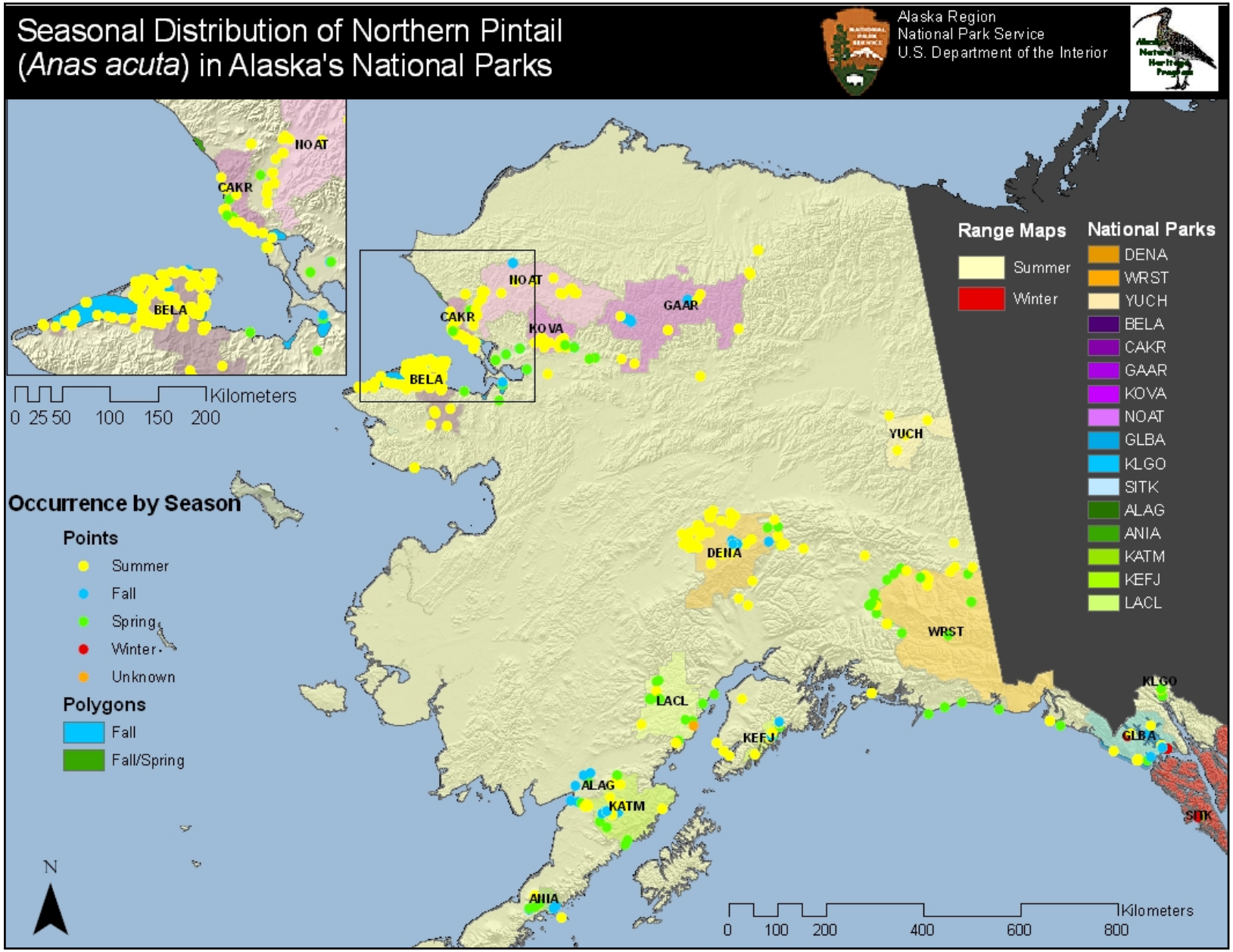


Figure 14. Seasonal distribution of Northern Pintail in and adjacent to Alaska's National Parks.

Steller's Eider (*Polysticta stelleri*)

Range:

BREEDING: The vast majority of Steller's Eiders breed in East Asia and return to Alaska each fall to molt and winter (AIHPAIBSWG 2006). The Alaska breeding population of Steller's Eiders comprises a small proportion of the Pacific population and includes subpopulations on the North Slope, from Demarcation Pont to Barrow and Barrow to Wainwright, and the Yukon-Kuskokwim Delta, where they are nearly extirpated (Swem and Matz 2008).

NON-BREEDING: Molts, winters and stages along the Alaska Peninsula and northern Bristol Bay (AIHPAIBSWG 2006). Small flocks also occur at St. Paul. Known molting and staging areas include Izembek Lagoon, Nelson Lagoon, Seal Islands and Kuskokwim Shoals (AIHPAIBSWG 2006). See Fig 15.

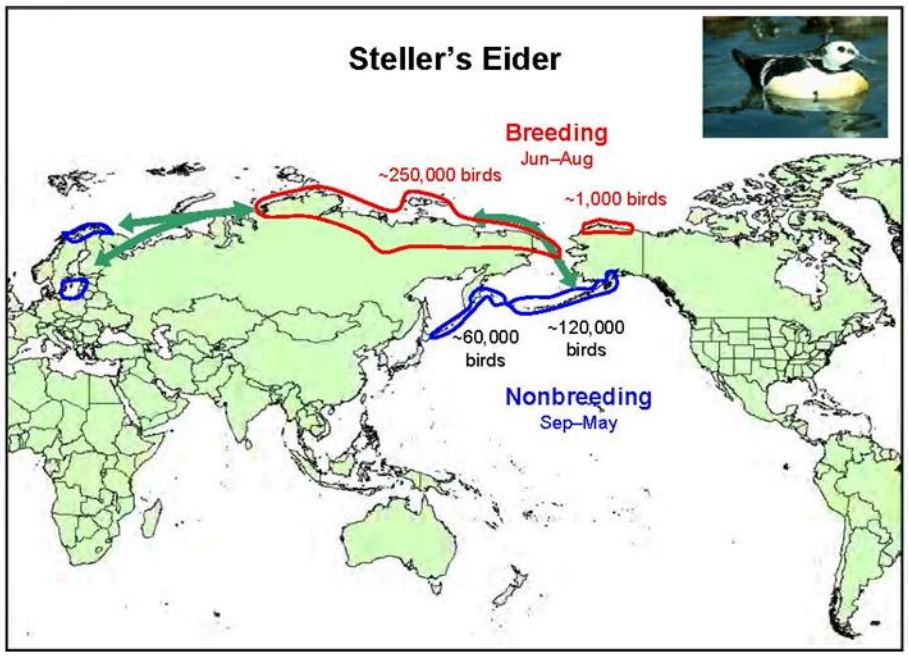


Figure 15. Steller's Eider breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Migration and Mobility:

All populations migrate due to presence of ice at breeding areas (Fredrickson 2001). During spring, large flocks form at migration staging areas (Johnson and Herter 1989). Large numbers concentrate in Bristol Bay, Alaska, before migration; in 1992 an estimated 138,000 gathered (Larned et al. 1994). Migration to breeding areas for the west Pacific population begins in early May (Kondratiev 1997); may be delayed in some years due to heavy sea ice (Quakenbush et al. 1995). Individuals arrive on Alaskan breeding grounds late May to early June. Subadults may remain on the wintering grounds, or may spend the summer along the adult's migration route (Henriksen and Lund 1994).

Males and nonbreeding females migrate to molting areas in mid-summer (Solovieva 1997b). In Alaska, large aggregations occur at Izembek and Nelson lagoons, Herendeen Bay, and Port Moller along north side of Alaska Peninsula, mid-July to mid-August; these aggregations include birds both from Alaska breeding populations and from the more numerous breeding populations in Russia (Johnson and Herter 1989, USFWS 2000). Molting aggregations occur at other sites along the northwestern Alaska coast, off the islands in the Bering Sea, and in Bristol Bay (USFWS 2001). Other populations molt in the Russian Far East, e.g. along the Chukotka Peninsula and Karaginski Island (Pihl 1997); their related breeding sites are undetermined (USFWS 2001b).

Fall migration begins in mid-July and is protracted (Kondratiev 1997). Individuals move south through the Bering Strait from late July through October (Kessel 1989). Arrival on wintering grounds is erratic and occurs over a long period of time (Fredrickson 2001).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 27 individual location records for the Steller's Eider from 13 unique data sources. Of the 27 total records, only 8 records were within park boundaries and 19 were adjacent to parks (Fig. 16). Occurrence records covered the time period from 1940 to 2008. The only confirmed observation of breeding was at Aniakchak Island in ANIA in July (Table 11). The earliest spring migration record was from 9 April in the Bristol Bay area. Molting was first recorded on 14 September at Kamishak Bay near KATM. Steller's Eiders were recorded in GAAR in June, SITK in July, and KATM in May and October (Table 11). Although no observations were made later in the year, Steller's Eiders are known to overwinter off the coast of KATM on the south side of the Alaska Peninsula.

Table 11. Monthly occurrence of Steller's Eider in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR						**X**						
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK							**X**					
Southwest Alaska Network (SWAN)												
ALAG												
ANIA							**X****					
KATM					**X**					**X**		
KEFJ												

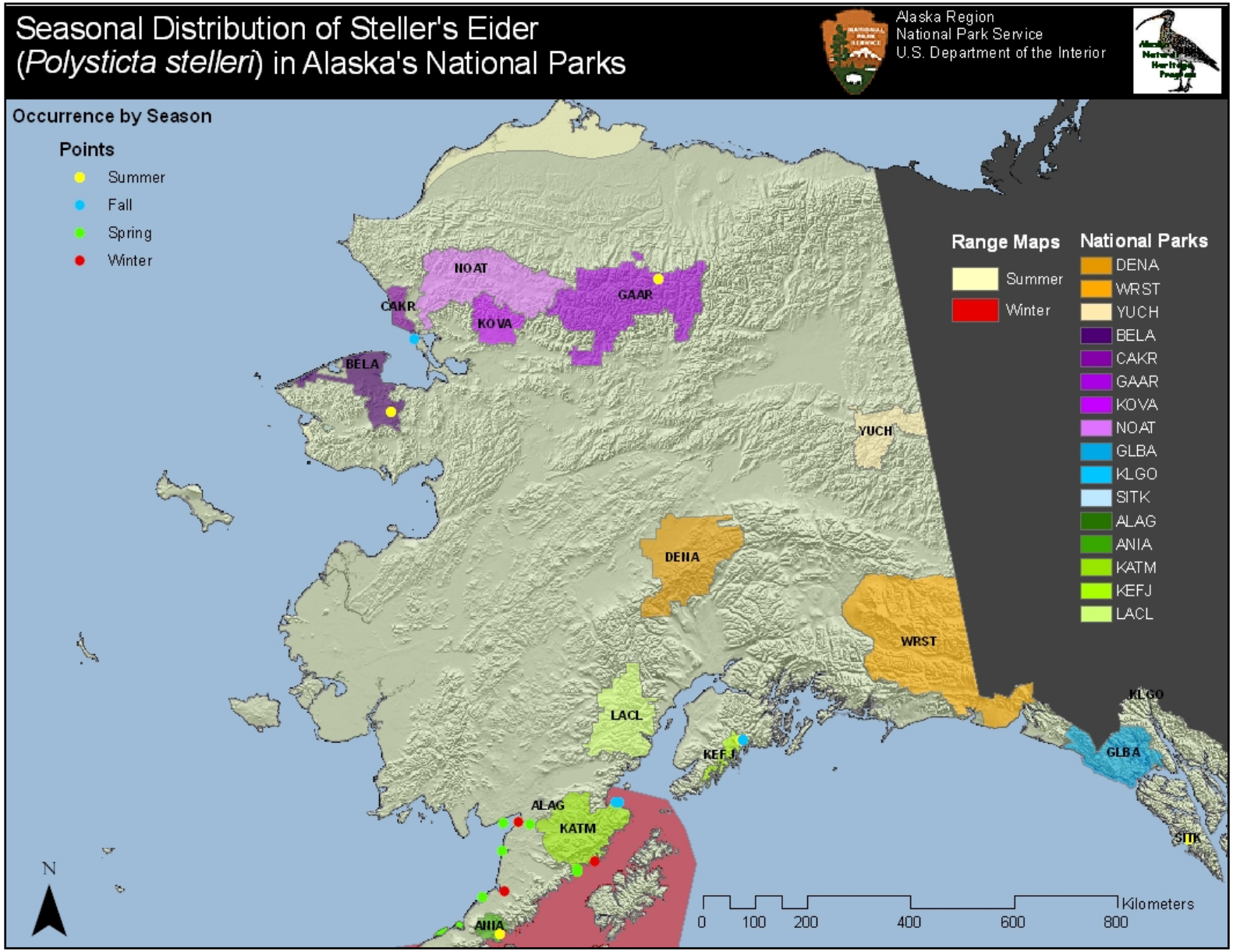


Figure 16. Seasonal distribution of Steller's Eider in and adjacent to Alaska's National Parks.

Spectacled Eider (*Somateria fischeri*)

Range:

BREEDING: Breeds in three geographically distinct areas: the Siberian Arctic from the Chukotka Peninsula west to the Yena Delta, and in Alaska along the Yukon-Kuskokwim Delta and the Alaskan Arctic Coastal Plain (Alison 1994, Petersen et al. 2000, AIHPAIBSWG 2006). There is also a recent record of a single nest on St. Lawrence Island (NatureServe 2009).

NON-BREEDING: All three breeding populations molt in four sites along the coasts of the Chukchi, Beaufort, and Bering Seas and winter in small openings in the Bering Sea pack ice south of St. Lawrence Island (Petersen et al. 1999, Petersen et al. 2000). See Fig 17.

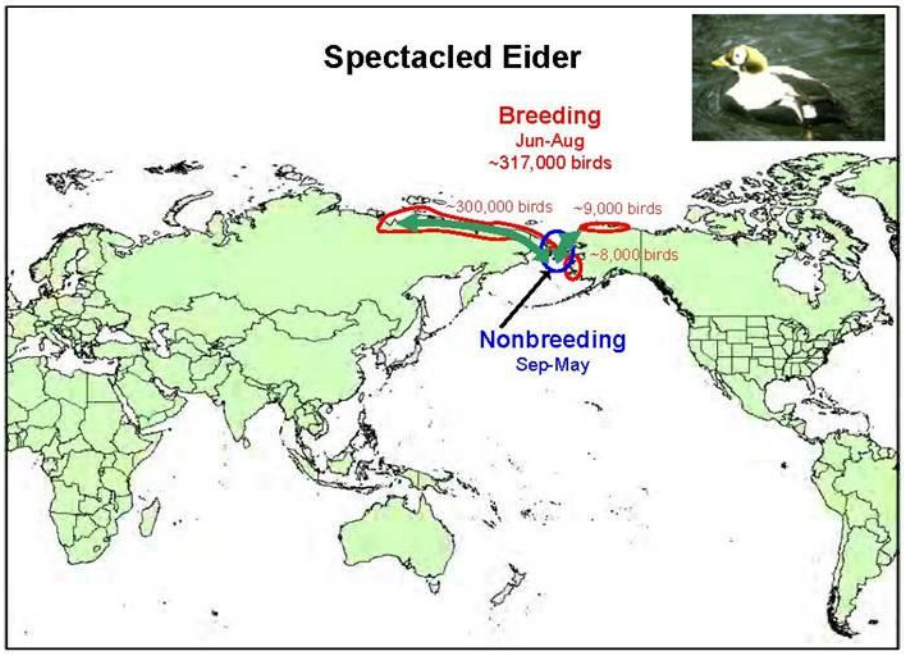


Figure 17. Spectacled Eider breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

The majority of Spectacled Eiders breed in east Asia and return to the Alaskan Bering Sea each fall to molt and winter (AIHPAIBSWG 2006). Spectacled Eiders migrate between breeding areas, where they arrive in late May or June, and wintering areas in the Bering Sea south of St. Lawrence Island (Petersen et al. 1999). Postbreeding migration corridors are offshore in the Bering, Chukchi, and Beaufort seas, with movement from inland areas to sheltered coastal waters in late August to early September prior to departure out to sea (Soothill and Whitehead 1978). Males depart nesting areas before females and young, which depart the Beaufort Sea coast mostly by 20 September (Johnson and Herter 1989 in NatureServe 2009).

Following breeding, males from all three breeding areas molt and stage at three different sites: in Mechigmenskiy Bay on the eastern Chukotka Peninsula; Ledyard Bay, Alaska; and the area

between the Indigirka and Kolyma deltas in the Republic of Sakha. Females nesting on the Yukon-Kuskokwim Delta molt and stage primarily in eastern Norton Sound whereas those nesting on the Alaskan North Slope molt and stage in Ledyard Bay and Mechigmenskiy Bay (Petersen et al. 1999 in NatureServe 2009).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 12 individual location records for the Spectacled Eider from 3 unique data sources. Of the 12 total records, only 4 records were within park boundaries (Fig. 18). Occurrence records covered the time period from 1922 to 2001. Spectacled Eiders were detected in the SEAN network in GLBA and SITK during July. Spectacled Eiders were also reported to breed during June in the ARCN network in BELA at Cape Espenberg and nearby in the Shishmaref Inlet (Table 12). Nest dates for Shishmaref Inlet were 24 and 26 June.

Table 12. Monthly occurrence of Spectacled Eider in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA						X**						
CAKR												
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA							X					
KLGO												
SITK							X					
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

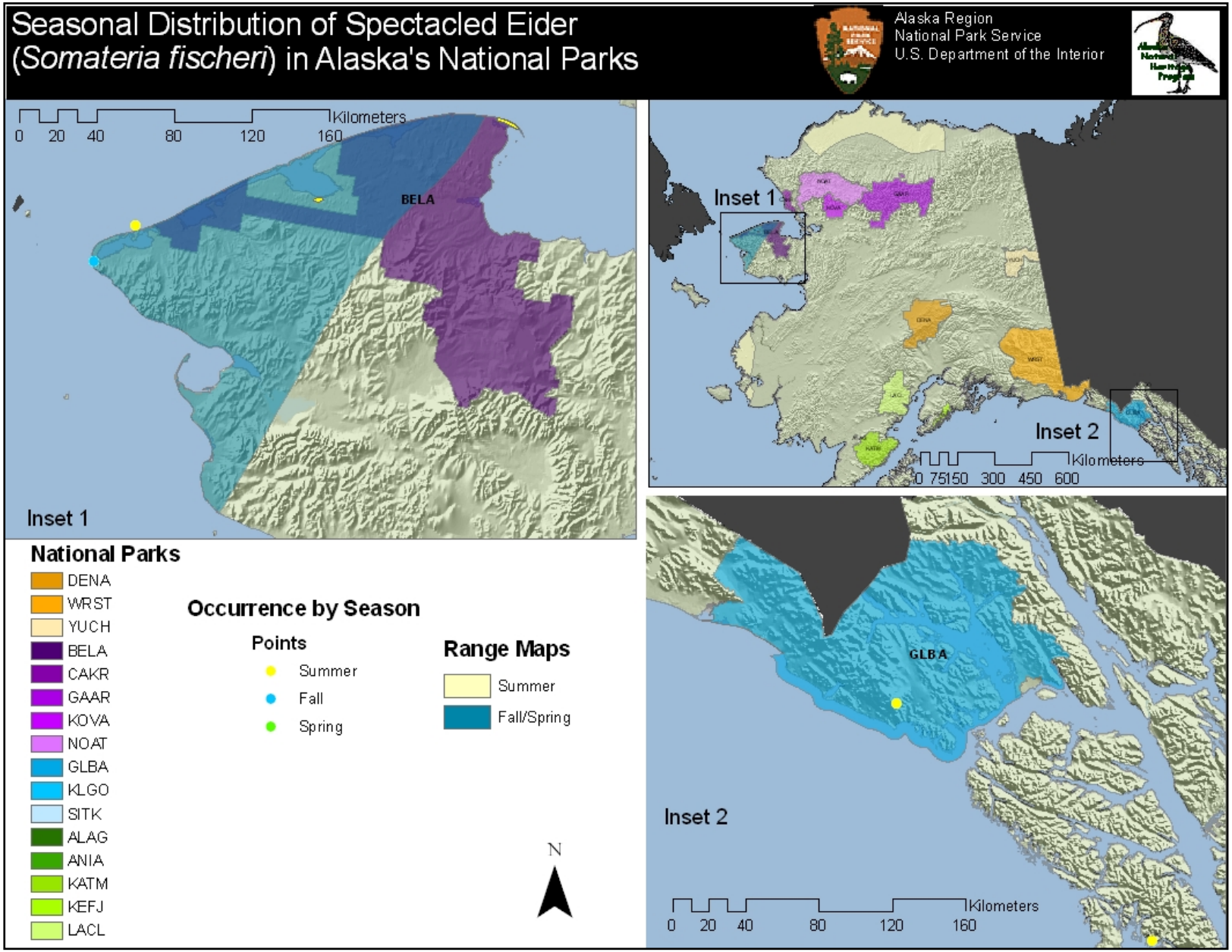


Figure 18. Seasonal distribution of Spectacled Eider in and adjacent to Alaska's National Parks.

King Eider (*Somateria spectabilis*)

Range:

BREEDING: Nests in high-latitude coastal tundra along Arctic coast and islands from northern Alaska east to Greenland, west coast of Hudson Bay, James Bay, and probably northern Labrador; Banks and Victoria islands are important nesting areas. In Eurasia along Arctic coast from northern Russia east to Chukotka Peninsula and St. Lawrence and St. Matthews Islands. Small numbers in northern Finland, Sweden, Norway, and in northern coastal Greenland (Suydam 2000).

In Alaska, occurs primarily along the Arctic Coastal Plain east from Cape Lisburne to Canada; also occasionally in the Bering Sea on St. Lawrence Island, Seward Peninsula and possibly St. Matthew Island (Suydam 2000). An uncommon summer resident in the Shumagin Islands (Day 1977).

NON-BREEDING: During the non-breeding season, birds rarely come to shore to forage in coastal marine waters throughout the Pacific Ocean; generally do not occur farther south than the Kamchatka Peninsula of Russia (AIHPAIBSWG 2006). In Alaska, winters in marine waters of the Bering Sea (St. Lawrence and Pribilof Island), Bristol Bay (Amak Island and lagoons and bays of the northern Alaska Peninsula), Aleutian Island chain (primarily the eastern islands), and southern Alaska Peninsula east to Kodiak Island Archipelago (Byrd et al. 1974, Palmer 1976, Gill et al. 1981, Sowls 1993). Open water leads may be used as far north as the Chukchi Sea offshore of Point Lay. See Fig. 19.

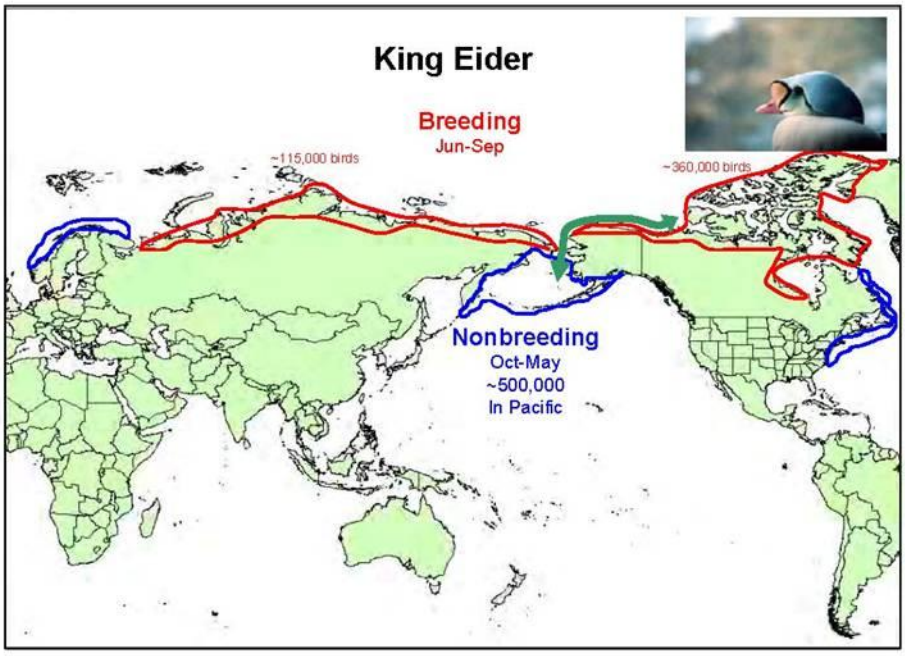


Figure 19. King Eider breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Nesters from the Beaufort Sea region winter in the Bering Sea and along southwestern Greenland. Migrates in large flocks (≥ 10,000 birds) over substantial distances (≥ 5000 km). First large pulse of migrants arrives in north-central Alaska around mid-May, and at the Canadian Beaufort Sea coast in early June (or late May in some areas). Hundreds of thousands may migrate past Point Barrow in a single day in late May (Alison 1994). Most reach breeding grounds mid-June (Sea Duck Joint Venture 2003). Development of offshore lead systems in pack ice is a major determinant of spring migration routing and timing (Johnson and Herter 1989).

Males make extensive migration to molting areas in early to mid-summer (Johnson and Herter 1989). Most have departed from the Beaufort Sea region by late September, though commonly observed there later. King Eiders arrive at the Bering Sea in September to October. A migration corridor runs from central and western Bering Sea molting areas east along the north side of Nunivak Island to wintering areas (King and Dau 1981).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 36 individual location records for the King Eider from 18 unique data sources. Of the 36 total records, 13 records were within park boundaries and 23 were in adjacent areas (Fig. 20). Occurrence records covered the time period from 1917 to 2008. King Eiders were detected in the SWAN network in KATM in May and June and again in August (Table 13). They were also detected in the ARCN network between May and July in BELA, CAKR, and KOVA (Table 13). Breeding was not observed in any parks. Birds were reported staging during spring in the Naknek River area near KATM from 15 April to May 21. During spring migration surveys, King Eiders were observed in Kvichak and Egegik Bays and around Port Heiden in upper Bristol Bay adjacent to KATM and ANIA (Larned 2008).

Table 13. Monthly occurrence of King Eider in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA						X						
CAKR					X		X					
GAAR												
KOVA						X						
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM					X	X		X				
KEFJ												
LACL												

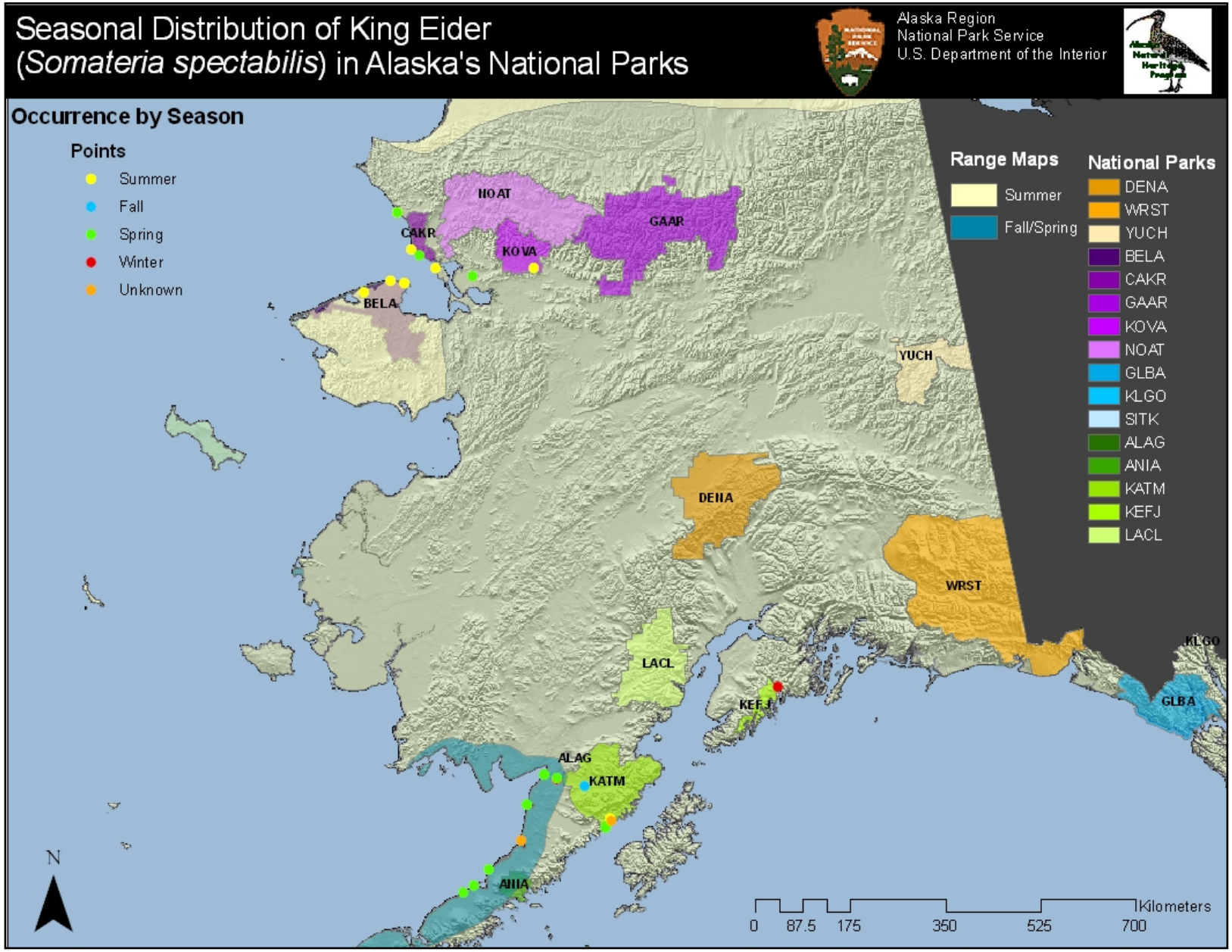


Figure 20. Seasonal distribution of King Eider in and adjacent to Alaska's National Parks.

Pacific Common Eider (*Somateria mollissima*)

Range:

BREEDING: From Alaska across the Arctic to Labrador and Greenland and south to Maine and New Hampshire; from Iceland, the Faroe Islands, Spitsbergen, and Franz Josef Land south to northern British Isles, northern Europe, and southern Scandinavia; and from Wrangel Island, New Siberian Islands, and northeastern Siberia south to Kamchatka and Commander Islands (NatureServe 2009).

The largest breeding aggregations in Alaska have been found along the coastlines of the Aleutian Islands, Yukon-Kuskokwim Delta, and barrier islands of the Chukchi and Beaufort seas. Smaller aggregations exist on Kodiak Island, Nunivak Island, St. Lawrence Island, and the northern Seward Peninsula/Kotzebue Sound region (Gabrielson and Lincoln 1959), and historical records note dispersed nesters along Cook Inlet and as far south as Southeast Alaska.

NON-BREEDING: About 95% of Pacific Common Eiders that nest on the north slope of Alaska and northwestern Canada winter in northeast Asia along the Chukotka Peninsula (including St. Lawrence Island), with a small percent wintering south along the Russian Far East coast (AIHPAIBSWG 2006). The small percent of birds that remain in Alaska during winter are found in the Bering Sea pack ice south to the Aleutian Islands and Cook Inlet (Johnson and Herter 1989). Elsewhere in North America, Common Eiders winter in Hudson and James Bays, in southern Ontario, and along the Atlantic coast, occasionally as far south as North Carolina (Johnson and Herter 1989). See Fig. 21.

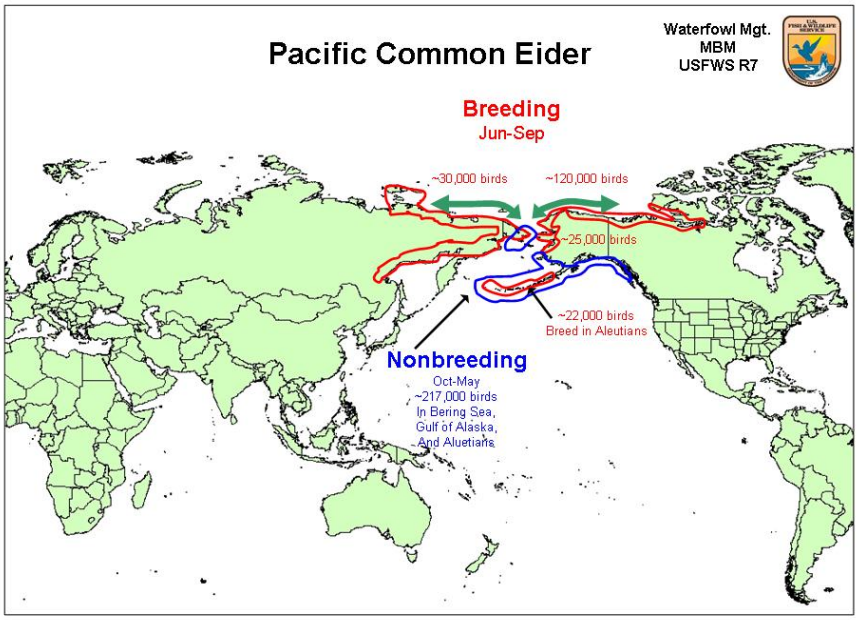


Figure 21. Pacific Common Eider breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Northward migration along the coast of western Alaska begins in early March; arrives along the arctic coast of northwestern Canada in early June (NatureServe 2009). Females and young begin moving toward wintering areas in late August to early September (Johnson and Herter 1989). In some areas, males make extensive migrations to molting areas in early summer (Johnson and Herter 1989). Most migration occurs along the coast. Populations that nest in different areas (e.g., St. Lawrence Estuary, Gulf of St. Lawrence, and Atlantic coast) share the same wintering range (Krohn et al. 1992).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 153 individual location records for the Pacific Common Eider from 36 unique data sources. Of the 153 total records, 115 records were within park boundaries and 38 were adjacent to parks (Fig. 22). Occurrence records covered the time period from 1926 to 2008. Common Eiders were detected in all four Alaska National Park networks, with the majority of observations in the ARCN (50%) and SWAN (38%) network parks (Fig. 22).

Pacific Common Eiders were present in Alaska's National Parks from April through October, and in GLBA in December, where the birds apparently overwintered near Gustavus (Table 14). Spring migration was recorded between 8-11 and 24-29 April from Egegik Bay and Port Heiden, adjacent to ANIA and KATM in the SWAN network. Murie (1959) reported Common Eiders breeding as early as 13 May in Icy Strait in 1937; the next earliest breeding record was from 6 June on Chisik Island in LACL. Spring staging was reported from the Nugnugaluktuk River Delta in BELA from 19 to 28 May (Fig. 22). Molting aggregations along the coast between LACL and KATM were reported on 14 September (Fig. 22).

Pacific Common Eiders were observed breeding in BELA, GLBA and in KATM, KEFJ and LACL in the SWAN network (Table14). Breeding records for this species spanned the time period 13 May to 3 August and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Common Eider breeding records in GLBA are beyond the known breeding range of this species.

Table 14. Monthly occurrence of Pacific Common Eider in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA							X					
WRST												
YUCH												
Arctic Network (ARCN)												
BELA					X	X	X**	X**				
CAKR						X						
GAAR												
KOVA												
NOAT						X						
Southeast Alaska Network (SEAN)												
GLBA					X**	X**	X**			X		X
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA						X	X					
KATM					X	X	X**					
KEFJ						X**	X**					
LACL				X	X**	X**	X**	X	X	X		

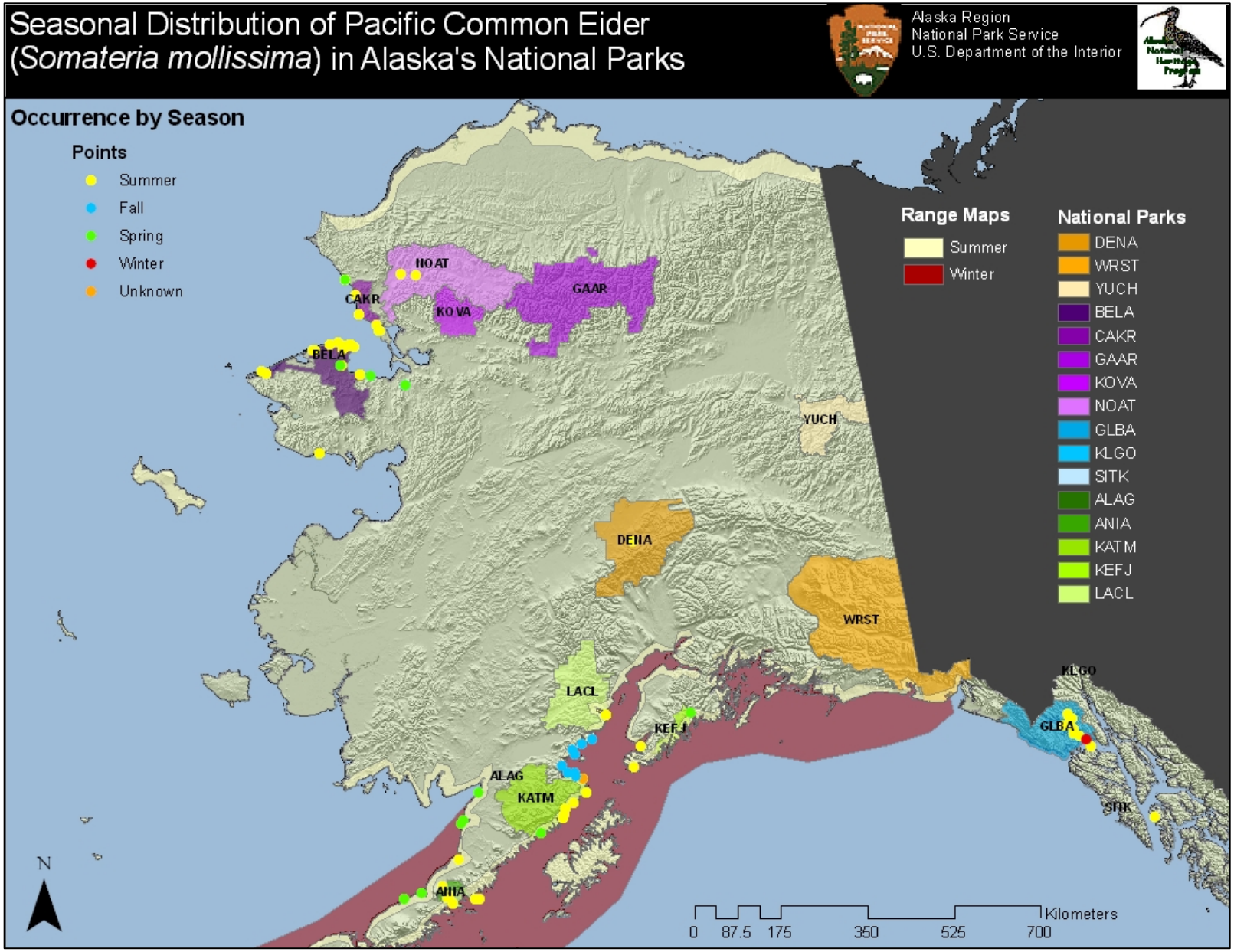


Fig. 22. Seasonal distribution of Pacific Common Eider in and adjacent to Alaska's National Parks.

Long-tailed Duck (*Clangula hyemalis*)

Range:

BREEDING: In North America, from the northern coast of Alaska east across Canada to Ellesmere and Baffin Islands and northern Labrador south to southern and central Alaska, northwestern British Columbia, eastern and south-central MacKenzie and Keewatin, and Hudson and James Bays. In Palearctic from Greenland, Iceland, Spitsbergen, and Scandinavia east across Russia to Chukotka Peninsula, Anadyr, Kamchatka, and the Commander Islands (NatureServe 2009).

Within Alaska, breeding densities are highest across the Arctic coastal plain; also breeds on the northwest coast, Kotzebue Sound, Seward Peninsula, Yukon Delta, Bristol Bay basin, Tanana-Kuskokwim basins, Yukon Flats, Nelchina basin, Koyukuk basin, and Innoko basin (Palmer 1976, Conant and Groves 1997, King and Brackney 1997). Also throughout the Bering Sea region, including on St. Lawrence, St. Matthew, Nunivak, and the Pribilof Islands (Fay and Cade 1959, Gabrielson and Lincoln 1959, Fay 1961).

NON-BREEDING: Alaskan breeding birds disperse widely throughout coastal waters of the North Pacific Ocean in the winter from the northern Bering Sea and St. Lawrence Island, along the Aleutian Island chain (most common in the eastern portion), Kodiak Island and the Alaska Peninsula, Cook Inlet, eastern Kenai Peninsula and Prince William Sound, the north Gulf of Alaska, and Southeast Alaska (Petersen et al. 2003, Palmer 1976). Highest densities occur in the Aleutian Island chain (Robertson and Savard 2002). A large proportion of the Alaskan breeding Long-tailed Ducks winter along the east coast of Asia (AIHPAIBSWG 2006).

Location of molting areas is not well known; small molting populations probably occur throughout most of breeding range. Large concentrations (tens of thousands) have been documented in coastal lagoons, especially those protected by barrier islands of the Beaufort and Chukchi Seas (Brackney et al. 1985, Johnson and Herter 1989, Noel et al. 2002, Robertson and Savard 2002, Fischer and Larned 2004). Along the Chukchi Sea coast, large numbers concentrate in northeastern Kasegaluk Lagoon and between Nokotlek and Pingorovok Passes (Johnson et al. 1993). On the Seward Peninsula, protected spits at Port Clarence and Breving Lagoon are used (Kessel 1989). See Fig 23.

Mobility and Migration:

Migration northward to breeding grounds occurs in March and April, with southward movement in October and November (Terres 1980). Some birds that summer in northwestern Alaska spend the winter in eastern Asia (NatureServe 2009). On northward migration, large numbers congregate in certain areas of southwestern Alaska (Herendeen Bay, Goose Point, Kvieliak Bay, and Kvichak Bay); also concentrate among ice leads in the Arctic before inland breeding areas are available for nesting (Robertson and Savard 2002, Meixell and Savage 2004).

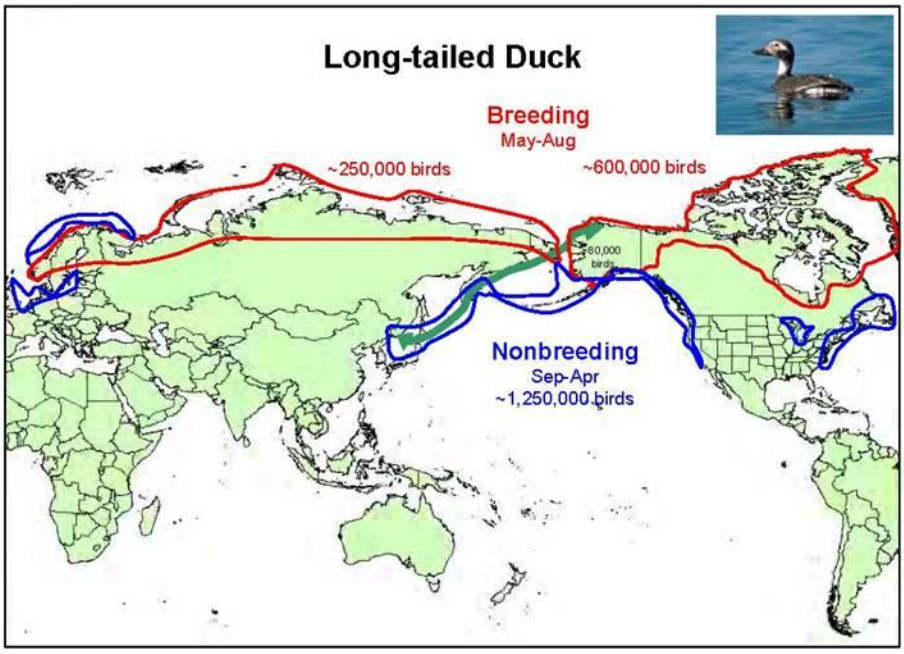


Figure 23. Long-tailed Duck breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 449 individual location records for the Long-tailed Duck from 77 unique data sources. Of the 449 total records, 274 records were within park boundaries and 175 were adjacent to parks (Fig. 24). Occurrence records covered the time period from 1899 to 2008. Long-tailed Ducks were detected in all four Alaska National Park networks, with the majority of observations from the ARCN (45%) and SEAN (31%) network parks (Fig. 24).

Long-tailed Ducks occurred in Alaska's National Parks year-round, but their seasonal distribution varied by park and by network. Birds were present May through August in CAKN network parks and May to September in ARCN parks (Table 15). Long-tailed Ducks were documented in SWAN network parks from April to July and also in September (LACL) and December (KEFJ). In the SEAN network, birds overwintered near SITK where they were present October through March with one sighting in the park in December; in GLBA they were recorded during December, February, and April through July; and in KLGO from May and June (Table 15).

The earliest spring migration records were for 9 and 10 April from Kvichak Bay, Egegik Bay, and Ugashik Bay, adjacent to ANIA and KATM. The earliest nest was recorded on 14 June from Krusenstern Lagoon, CAKR. Birds were observed staging during spring near KATM at the Naknek River (25 March to 19 May) and in fall in CAKR at Ipiavik Lagoon, Kotlik Lagoon, and Krusenstern Lagoon (2 September; Fig. 24). Molting birds were recorded at Kavrorak Lagoon near CAKR on 19 August.

Long-tailed Ducks were observed breeding in BELA, CAKR, GAAR and NOAT in the ARCN network and were probable breeders in DENA and KATM (Table 15). Breeding records for this species spanned the time period 14 June to 26 July and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Important breeding areas were Cape Espenberg in CAKR and in BELA at Krusenstern Lagoon, Kuzitrin Lake and Granite Bay (Fig. 24). Of note are the numerous summer records from KEFJ, GLBA and in and near KLGO that are outside the species known summer range.

Table 15. Monthly occurrence of Long-tailed Duck in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA						X*	X	X				
WRST					X	X						
YUCH												
Arctic Network (ARCN)												
BELA					X		X**	X				
CAKR					X	X**	X		X			
GAAR						X*	X**					
KOVA					X							
NOAT						X	X**					
Southeast Alaska Network (SEAN)												
GLBA		X		X	X	X	X					X
KLGO					X	X						
SITK												X
Southwest Alaska Network (SWAN)												
ALAG												
ANIA						X						
KATM					X*	X*	X					
KEFJ						X	X					X
LACL				X	X	X			X			

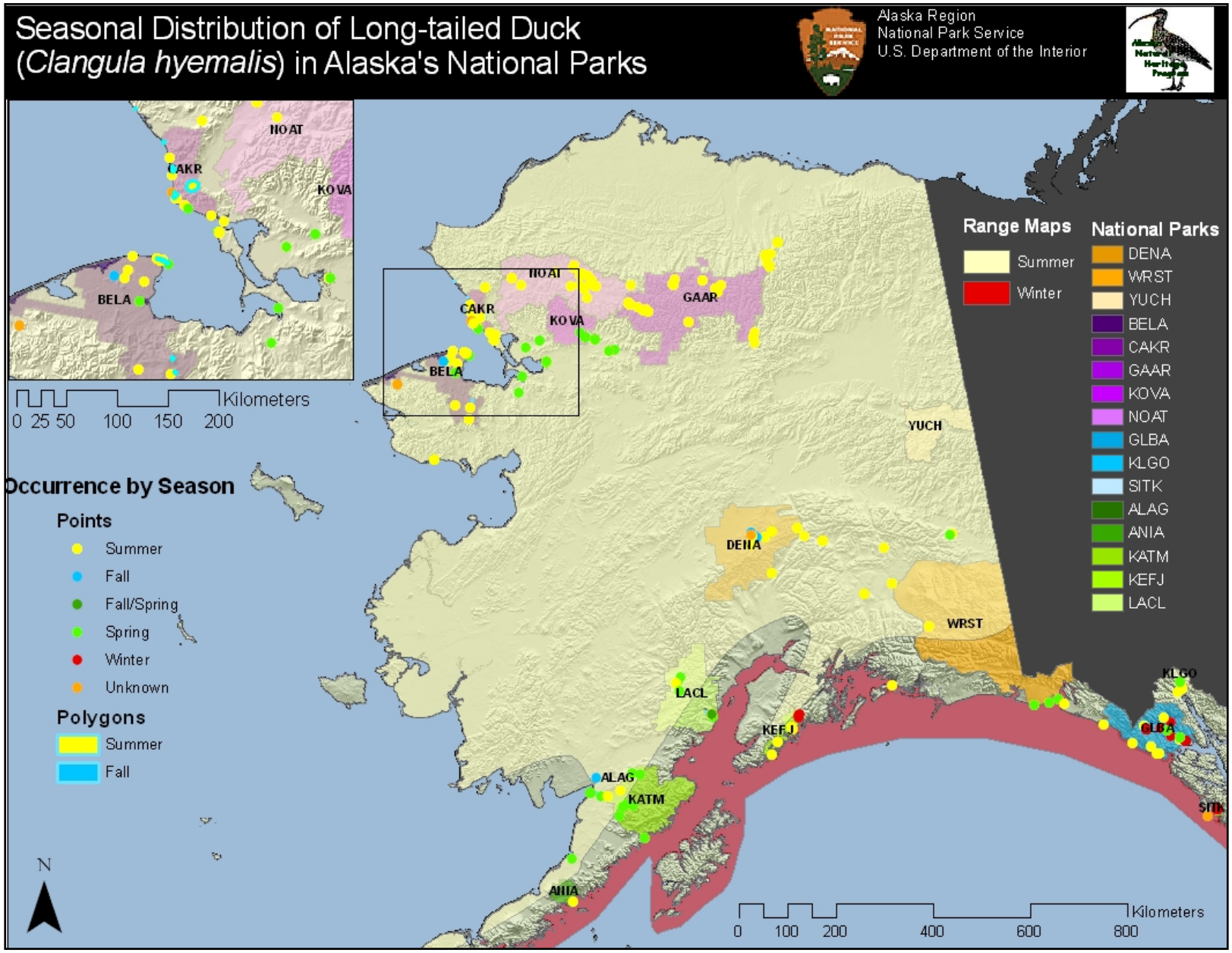


Figure 24. Seasonal distribution of Long-tailed Duck in and adjacent to Alaska's National Parks.

Range:

BREEDING: Breeds patchily throughout the subarctic and arctic tundra of northern Alaska, Canada, and Eurasia. In Alaska, from the Canning River westward to Point Lay and also includes St. Lawrence Island and coastal areas of the Seward Peninsula. In Canada, extends from just east of the MacKenzie River Delta to Hudson Bay, including northern islands. Most common on Banks and Victoria Islands and in the lake district from Great Slave Lake northeast to northern Hudson Bay, and breeds sparsely elsewhere. In Russia, occurs in narrow strip of coastal tundra from the Chukchi Peninsula in the east to the Taymyr Peninsula and the areas of the Novaya Zemlya River and Pechora River in the west. Small numbers have been reported breeding in Finland and Norway (Earnst 2004).

NON-BREEDING: Regularly but sparsely distributed in near shore marine waters from Kodiak Island though Prince William Sound, and throughout southeast Alaska and British Columbia. Irregular wintering occurs southwest of Kodiak Island along the Aleutian Islands and along the coast from Washington to Baja California. Several reliable inland sightings exist for migrating and wintering loons in western and central North America. Immatures and possibly some non-breeding adults remain on wintering grounds throughout the year. Eurasian population winters primarily around Scandinavia and along the Pacific Coast of Siberia, uncommon in northern Japan, and rare on China, Great Britain, and continental Europe (Earnst 2004). See Fig. 25.

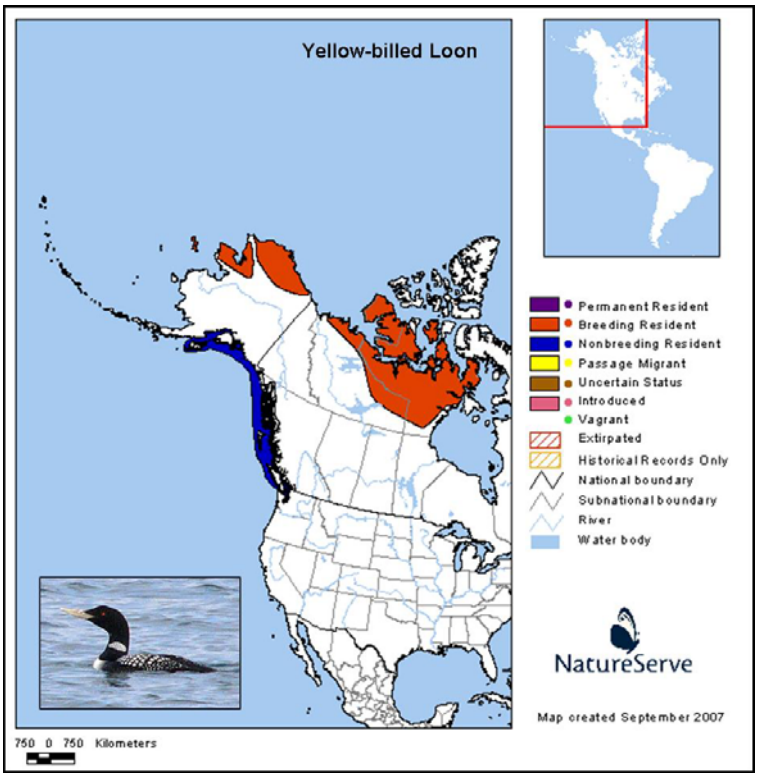


Figure 25. Yellow-billed Loon breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

Migrates between breeding range in arctic tundra regions and non-breeding areas farther south and east. Arrival dates along Alaska coast from St. Lawrence Island to Colville River Delta usually 15 May to 1 June; at Colville River Delta, usually 31 May to 3 June; east of Colville River and in Canada, usually 1 to 15 June (North 1994). Departure in fall generally occurs from late August to mid-September in Alaska, to October in Canada; closely associated with fledging of offspring (Earnst 2004). Migrates singly, in pairs or in loose flocks; occasionally stages in larger groups in the fall (North 1994).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 268 individual location records for the Yellow-billed Loon from 25 unique data sources. Of the 268 total records, 263 records were within park boundaries and 5 were adjacent to parks (Fig. 26). Occurrence records covered the time period from 1902 to 2007. Yellow-billed Loons were detected in the ARCN, SEAN and SWAN park networks, with the majority of observations from the ARCN (89%) network (Fig. 26).

Yellow-billed Loons were observed in ARCN parks during the breeding and post-breeding seasons (May to August); in SEAN, birds were detected in GLBA in May, October and December; and in SWAN parks, birds were observed in April, June, July, September and October (Table 16). Although present during summer months, birds were not noted to breed in SWAN parks. Observations recorded during June and July from KATM and KEFJ are well south of the known breeding range of this species; this species was listed as "encroaching" on both parks bird checklists (NPSpecies KEFJ and KATM Bird Checklists).

Yellow-billed Loons were observed breeding in BELA, NOAT and probably in GAAR (Table 16). Birds were present in CAKR during June and July, and although direct evidence of breeding was not observed, Yellow-billed Loons are known to be rare breeders in this park (NPSpecies CAKR Bird Checklist). Breeding records for this species spanned the time period 15 June to 18 August and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). The northern coast of the Seward Peninsula, from Cape Prince of Wales to Goodhope Bay, appears to provide excellent breeding habitat for Yellow-billed Loons (Fig. 26).

Table 16 . Monthly occurrence of Yellow-billed Loon in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA						X**	X**	X**				
CAKR						X	X					
GAAR					X	X*	X					
KOVA												
NOAT								X**				
Southeast Alaska Network (SEAN)												
GLBA					X					X		X
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM						X			X	X		
KEFJ				X		X	X					
LACL												

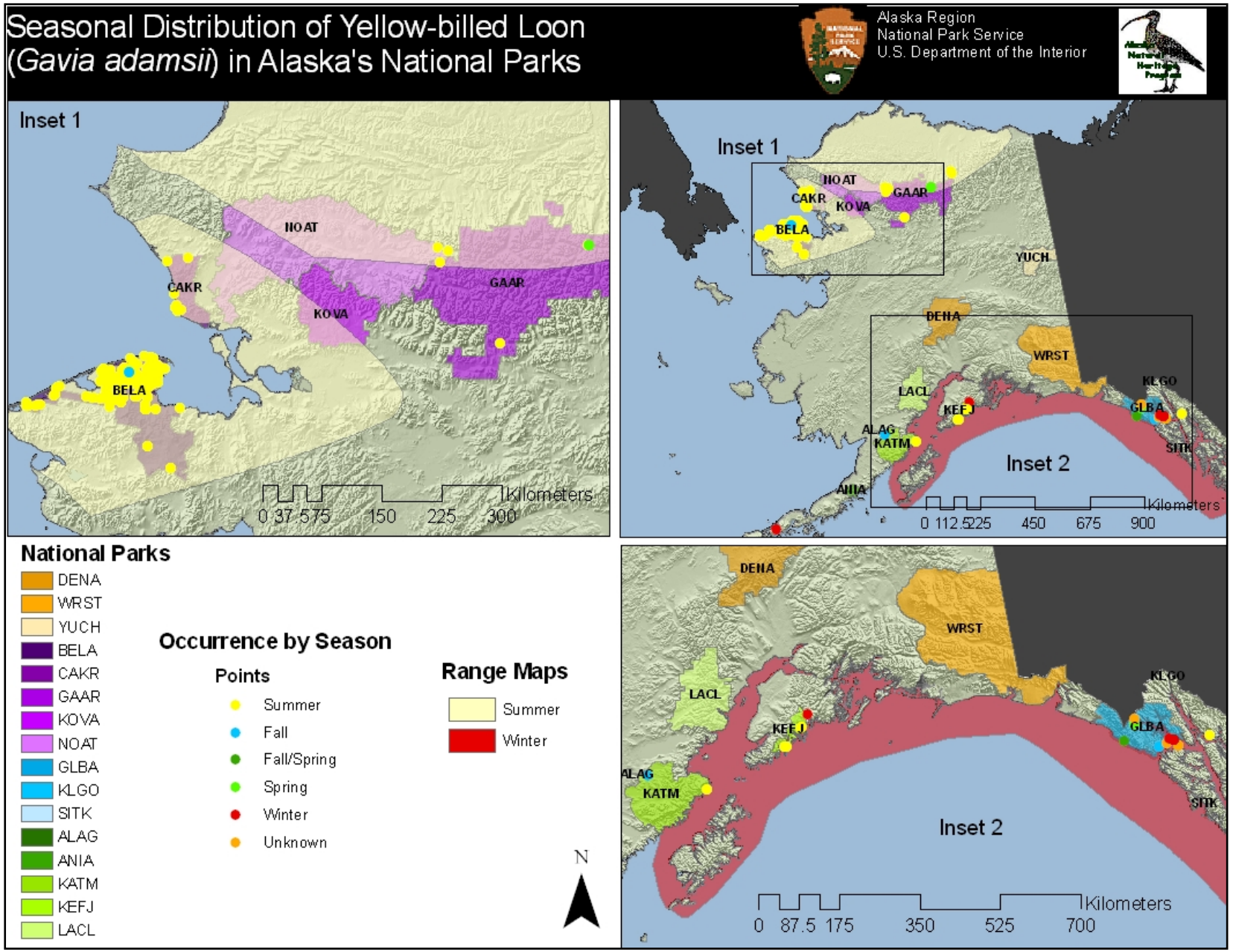


Figure 26. Seasonal distribution of Yellow-billed Loon in and adjacent to Alaska's National Parks.

Sandhill Crane (*Grus canadensis*)

Range:

BREEDING: From northeastern Siberia, northern Alaska, and middle arctic Canada (to Baffin Island) south locally to northeastern California, Nevada, Wyoming, Colorado, South Dakota, Illinois and Michigan, formerly south to Nebraska, Indiana and Ohio; also from southern Mississippi, Alabama and Georgia south through Florida to Cuba and Isles of Pines (NatureServe 2009).

The Lesser Sandhill Crane (*Grus canadensis canadensis*) in Alaska consists of two different populations: the Midcontinent Population and the Pacific Flyway Population, based on segregation during the breeding, migration and wintering periods (AIHPAIBSWG 2006)

NON-BREEDING: Winters in the southern U.S. south, primarily in Texas, to northern Mexico and Cuba (NatureServe 2009). See Fig. 27.

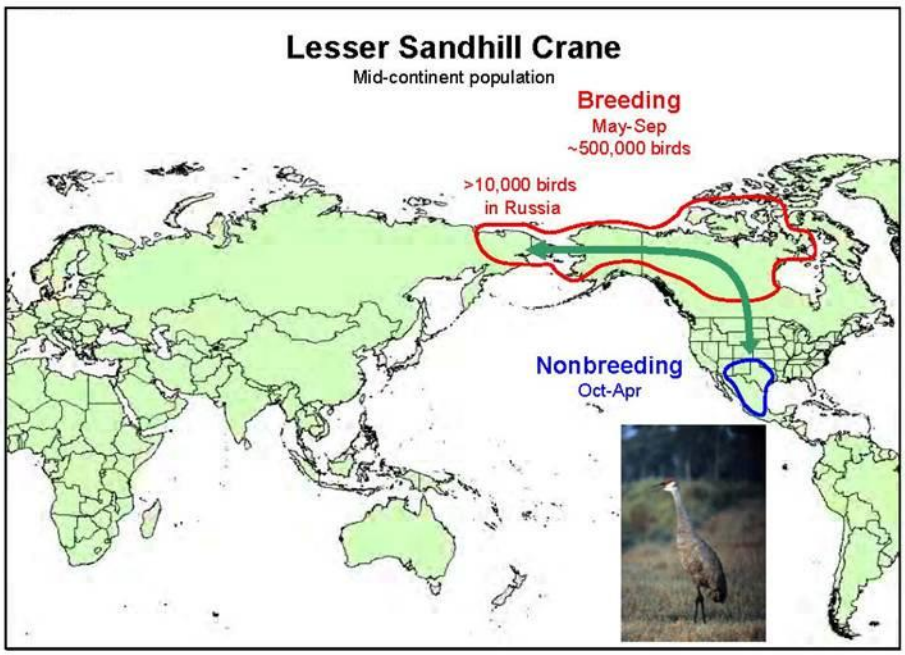


Figure 27. Lesser Sandhill Crane breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Recent results from satellite tracking studies indicate that the only Alaska population of Sandhill Crane that migrates to Asia is the mid-continent population. This population winters primarily in Texas and adjacent northern Mexico and migrates through Nebraska and the Canadian Prairies and nests from north central Canada, throughout northern, interior and western Alaska, and into northeastern Siberia (Kessel 1984, AIHPAIBSWG 2006).

About 150,000 to 200,000 of the mid-continent migrants move through upper Tanana River Valley in eastern Alaska, primarily from late April to mid-May and late August to early October (especially during the second half of September). Another 22,000 to 25,000 move north from central California through the interior of British Columbia and stage on the Copper River Delta, Alaska (Littlefield and Thompson 1982, Campbell et al. 1990). Arctic nesting populations arrive on breeding grounds early to mid-May (NatureServe 2009).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 395 individual location records for the Sandhill Crane from 68 unique data sources. Of the 395 total records, 198 records were within park boundaries and 197 were adjacent to parks (Fig. 28). Occurrence records covered the time period from 1898 to 2008. Sandhill Cranes were detected in all four Alaska National Park networks, with the majority of observations from the ARCN (57%) and SWAN (32%) network parks (Fig. 28).

Sandhill Cranes were detected in Alaska's National Parks from April through October, except for two observations in December from GLBA, near Gustavus (Table 17). The earliest spring migration record was for 28 April in GLBA and the earliest nest was recorded on 14 June on the Kobuk River Delta near KOVA. Birds sighted during fall migration were reported as early as 5 September from Brooks Lake in KATM and as late as 15 October in Bartlett Cove, GLBA.

Sandhill Cranes were observed breeding in BELA, CAKR and ANIA and were probable breeders in KOVA, NOAT and KATM (Table 17). Breeding records for this species spanned the time period 14 June to 10 July and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Important breeding areas included Krusenstern Lagoon in CAKR and Cape Espenberg in BELA (Fig. 28).

Table 17. Monthly occurrence of Sandhill Crane in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X		X	X	X			
WRST				X				X				
YUCH												
Arctic Network (ARCN)												
BELA					X	X**	X	X				
CAKR					X	X**	X**	X				
GAAR												
KOVA					X	X*	X					
NOAT						X*	X					
Southeast Alaska Network (SEAN)												
GLBA				X		X			X	X		X
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA					X	X						
KATM					X	X*			X			
KEFJ				X	X	X		X	X			
LACL					X							

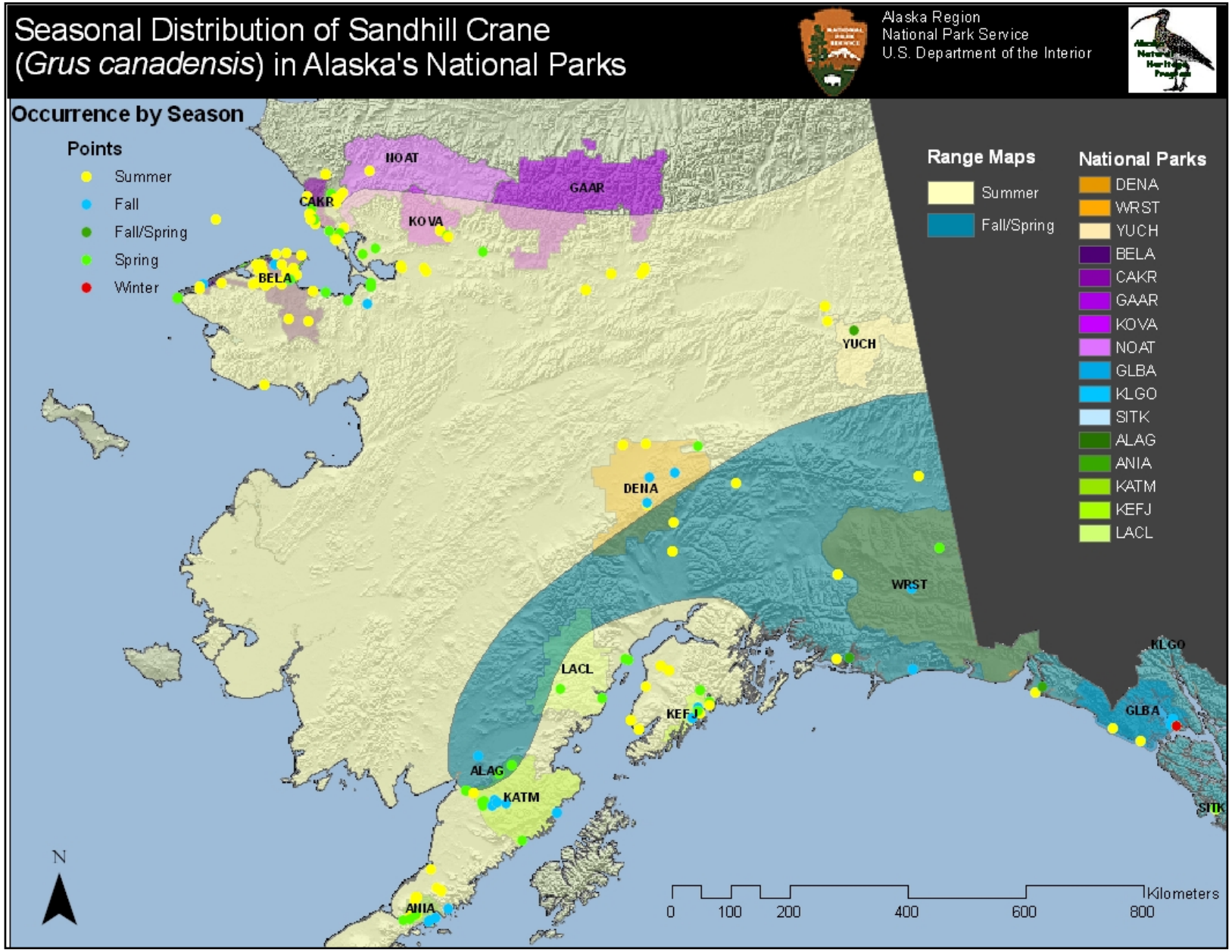


Figure 28. Seasonal distribution of Sandhill Crane in and adjacent to Alaska's National Parks.

Range:
BREEDING: Circumpolar breeding distribution; in arctic Alaska, northern Canada, Greenland, Iceland, northern Scandinavia, northern Russia, and northern Siberia (NatureServe 2009). In Alaska, Gyrfalcons are most common north of the Brooks Range, in parts of the Alaska Range, and on the Seward and Lisburne Peninsulas (Cade 1960, White and Cade 1971).

NON-BREEDING: Winter range includes much of its breeding range. Also includes the Bering and Chukchi seas, the Alaska Peninsula and Aleutian islands, much of southern Alaska and southern Canada, and the northern tier of the states (Johnson and Herter 2001). In the Old World, the Gyrfalcon winters throughout its breeding range and south to the British Isles, western Europe, southern Russia, Lake Baikal through Manchuria, Sakhalin Island and the Kurile Islands and Japan (Johnson and Herter 2001). See Fig. 29.

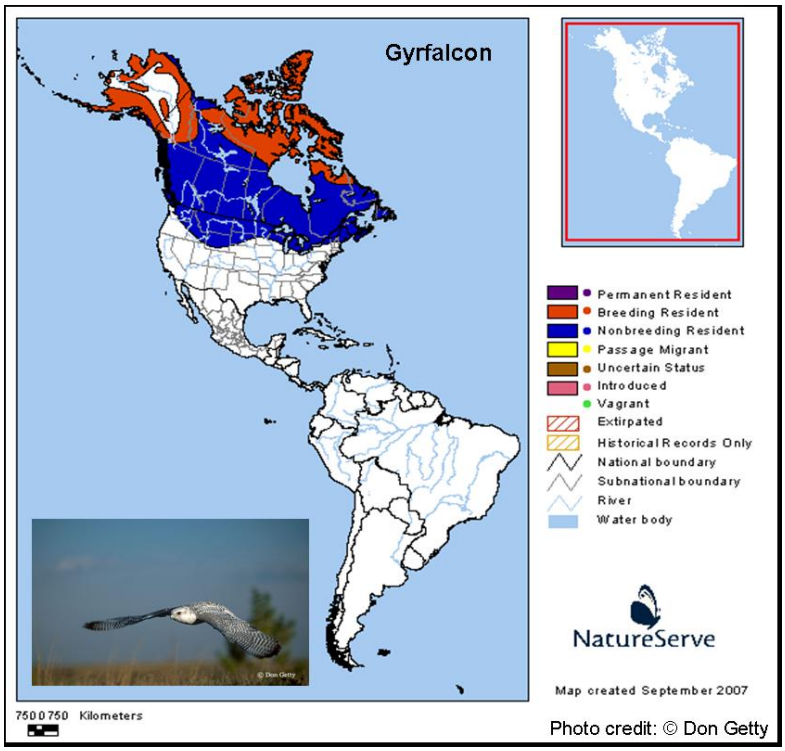


Figure 29. Gyrfalcon breeding and non-breeding range for North America (map courtesy of Ridgely et al. 2003).

Mobility and Migration:
Overwinters as far north as available prey allows. Many individuals, especially those from the high arctic, migrate south for the winter (especially juveniles and pre-breeders). Migrant females arrive on breeding areas mid-February to early March (Cade 1982). Satellite telemetry has documented migrations between Alaska and eastern Asia (Britten et al. 1995).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 205 individual location records for Gyrfalcon from 67 unique data sources. Of the 205 total records, 178 records were within park boundaries and 27 were adjacent to parks (Fig. 30). Occurrence records covered the time period from 1881 to 2008. Gyrfalcons were present during summer in all parks in the CAKN, ARCN and SWAN network parks, with the exception of ALAG, KLGO, and SITK (Table 18). The majority of observations were from the ARCN (36%) and CAKN (46%) network parks (Fig. 30).

Gyrfalcon were detected regularly in Alaska's National Parks from May through September, with occasional observations into late October, and a single observation in December from GLBA in the SEAN network (Table 18). The earliest nest was recorded on 3 May in WRST. Fall migration was reported from Cape Espenberg in BELA from 18 August to 21 September, when mostly juvenile birds were observed moving east and south.

Gyrfalcons were observed breeding in WRST, YUCH, BELA, GAAR, NOAT, DENA, KATM and LACL. The northern portion of WRST had the greatest number of breeding records, followed by central NOAT and northern GAAR, indicating these areas may provide important breeding habitat for Gyrfalcons. Based on their known range, presence during June, July and August, and documented presence as breeders in park checklists (Table 2), it is likely that Gyrfalcon also breed in CAKR and ANIA. Breeding records for this species spanned the time period 6 June to 3 August and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Of note are the numerous summer records reported from GAAR and the northern half of DENA which occur outside of the known summer range of this species (Fig. 30).

Table 18. Monthly occurrence of Gyrfalcon in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X**	X**	X**	X**				
WRST			X		X	X**	X**	X	X			
YUCH						X	X**					
Arctic Network (ARCN)												
BELA							X**	X	X			
CAKR					X		X	X				
GAAR						X**	X**	X**				
KOVA					X					X		
NOAT						X**	X**					
Southeast Alaska Network (SEAN)												
GLBA												X
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA						X	X	X				
KATM					X	X**	X	X	X	X		
KEFJ						X		X				
LACL						X**	X**	X				

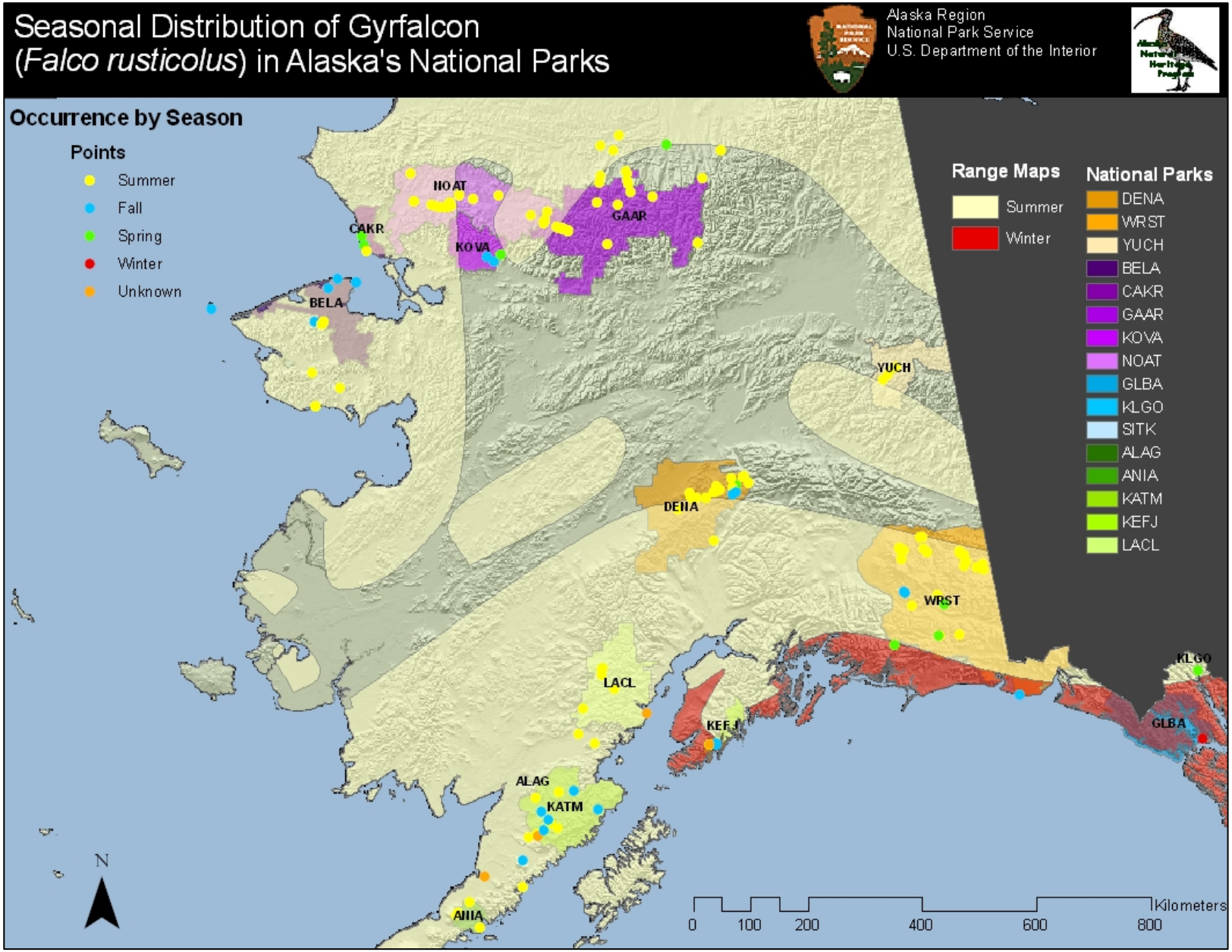


Figure 30. Seasonal distribution of Gyrfalcon in and adjacent to Alaska's National Parks.

Range:

BREEDING: Known breeding range from western Alaska east to Yamal Peninsula in Siberia (NatureServe 2009). Known nesting areas in Alaska include along the Chukchi and Bering Sea coasts from Cape Krusenstern south to Cape Peirce and the Ahklun Mountains and inland along the Seward Peninsula and much of Yukon-Kuskokwim region to Kisaralik Lake (Petersen et al. 1991, Connors et al. 1993, Johnson and Connors 1996). Breeding also reported at St. Lawrence, Nunivak, and Nelson Islands (Johnson and Connors 1996).

NON-BREEDING: Winters in India, southern China, and Hawaii (most abundant August to April, some present all year) south to Australia and New Zealand. Breeders from western Alaska and eastern Siberia occur mainly in the Indo-Pacific region during the northern winter (NatureServe 2009). See Fig. 31.

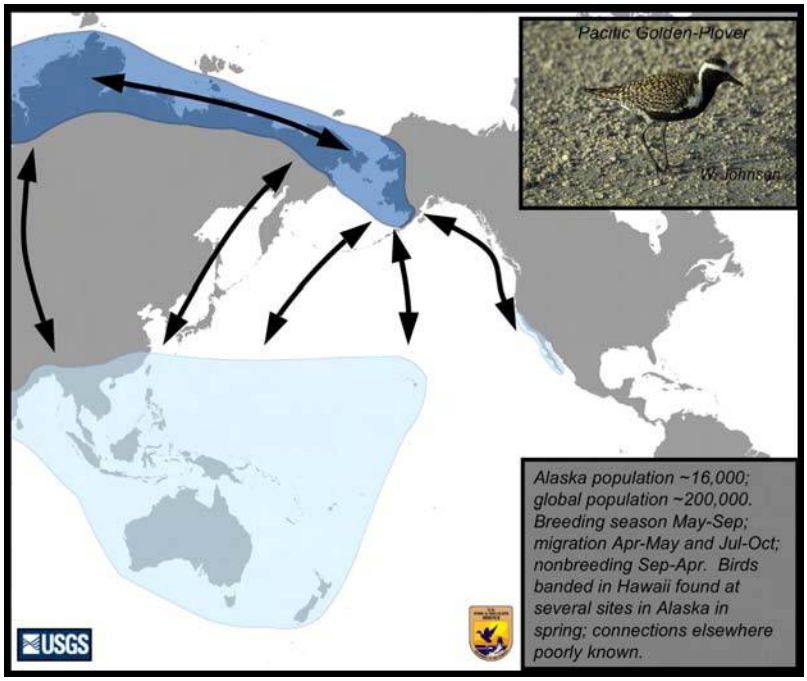


Figure 31. Pacific Golden-Plover breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Arrives in Hawaii by August, departs by late April; indirect and direct evidence indicate that birds in Hawaii during winter are from Alaskan breeding areas (Johnson et al. 1989, Johnson et al. 1997).

Occurs during spring migration in Bristol Bay (ADFG 2005) and south through Southeast Alaska. The Copper River Delta, Yukon-Kuskokwim Delta, Nushagak River area, and King Salmon region may be important staging areas (Johnson et al. 2004). Also found by the thousands in Kvichak Bay (Gill and Sarvis 1999).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 57 individual location records for the Pacific Golden-Plover from 18 unique data sources. Of the 57 total records, 31 records were within park boundaries and 26 were adjacent to parks (Fig. 32). Occurrence records covered the time period from 1919 to 2008, with the majority of occurrences documented after 1999. The Pacific Golden-Plover was detected in Alaska's National Parks mostly during spring and summer, with the majority of records (68%) from ANIA and KATM in the SWAN network (Table 19).

Pacific Golden-Plovers were observed breeding in ANIA near the Meshik River and Meshik Lake, nearby in Port Heiden, and near KATM along the King Salmon River, near King Salmon, and near the village of Naknek (Table 19, Fig. 32). These observations are beyond the documented breeding range of this species, which is known to extend as far south as the Kuskokwim River Delta (Fig. 32). A known nesting area was also documented in CAKR in the mountains northwest of Kasik Lagoon. Breeding records for this species spanned the time period 17 May to 7 June and included observations of nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Fall migrants were reported on 24 August from Kashvik Bay in KATM (Table 19).

Table 19. Monthly occurrence of Pacific Golden-Plover in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded on the checklist for/ within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR					X							
GAAR												
KOVA												
NOAT						X						
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK				X	X						X	
Southwest Alaska Network (SWAN)												
ALAG												
ANIA					X**	X*						
KATM					X	X*		X				
KEFJ												
LACL					X	X						

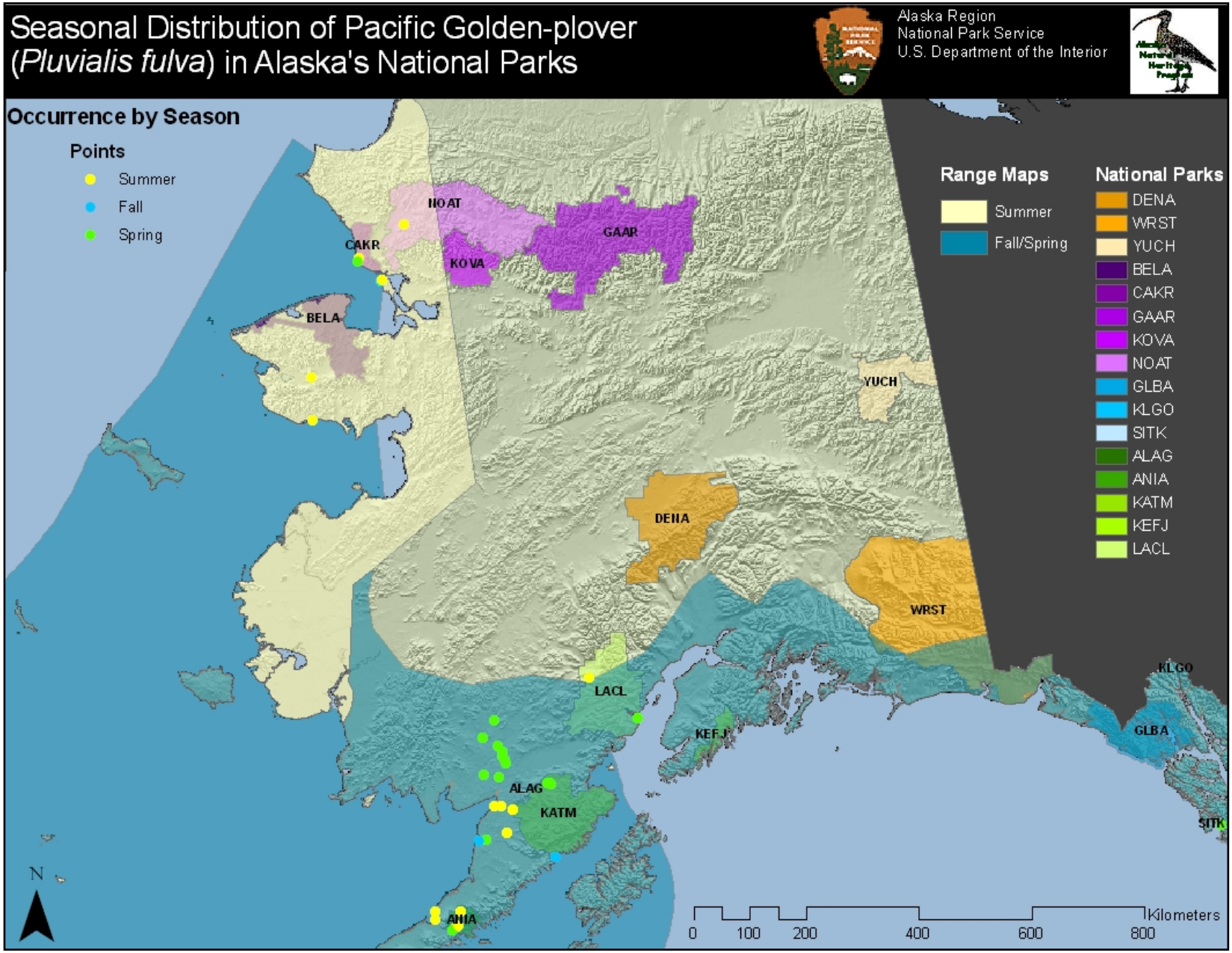


Figure 32. Seasonal distribution of Pacific Golden-Plover in and adjacent to Alaska's National Parks.

Bar-tailed Godwit (*Limosa lapponica*)

Range:

BREEDING: Just inland from the coasts across northern and western Alaska (east to Sagavanirktok River). Also in northern Scandinavia, across northern Russia and northern Siberia to Chukotka Peninsula and northern Anadyr (NatureServe 2009).

NON-BREEDING: Winters in southern Eurasia, west Africa, southeast Asia, Australia and New Zealand (AOU 1983, Johnson and Herter 1989). See Fig. 33.

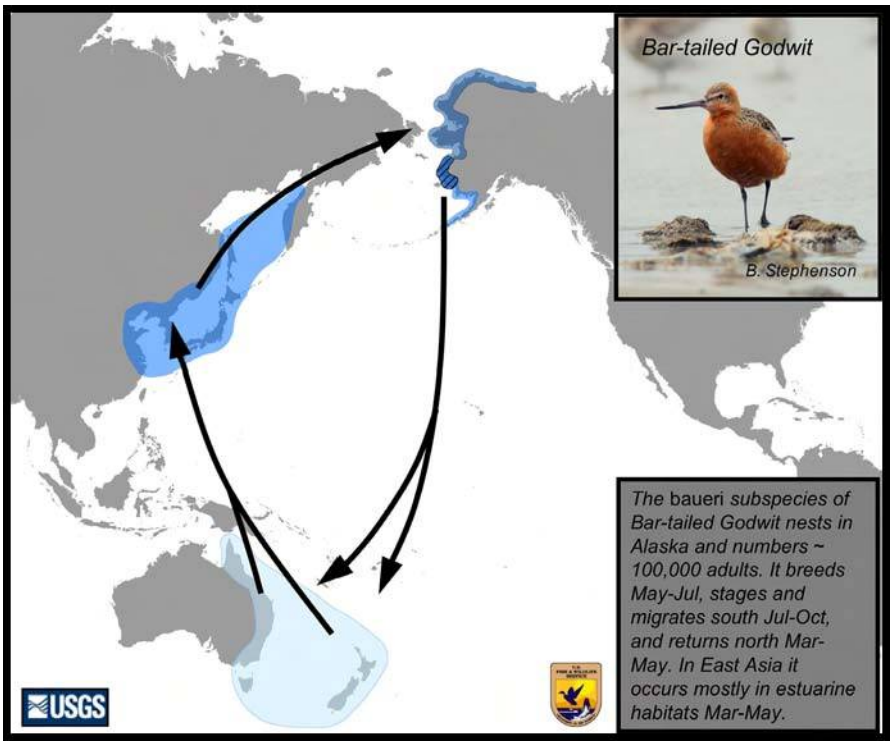


Figure 33. Bar-tailed Godwit breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

The entire Alaska-breeding race (*L. l. baueri*) migrates through the East Asian/Australasian flyway (McCaffery and Gill 2001). Each September, prior to southward migration, tens of thousands of Bar-tailed Godwits stage in western Alaska, primarily on the Yukon-Kuskokwim Delta and several estuaries located along the north shore of the Alaska Peninsula (Johnson and Herter 1989, McCaffery, USFWS, pers. comm.). Birds depart staging grounds on a non-stop over-water flight of up to 11,000 km to reach non-breeding range in Australia and New Zealand (Gill et al. 2005).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 33 individual location records for the Bar-tailed Godwit from 12 unique data sources. Of the 33 total records, 18 records were within park boundaries and 15 were adjacent to parks (Fig. 34). Occurrence records covered the time period from 1899 to 2006, with

the majority of occurrences documented after 1987. Bar-tailed Godwits were detected in BELA and CAKR in the ARCN network during the breeding season and in SWAN network parks during spring (LACL) and fall (ANIA) migration (Table 20).

Bar-tailed Godwits were observed breeding in CAKR and BELA. Date of first breeding was 13 July from the Situkuyok River in CAKR. Elsewhere in CAKR and BELA, reported breeding dates were general (i.e. June and July). The Tahinichok Mountain region in CAKR appeared to be an important rearing area, where aggregations of Bar-tailed Godwit broods were observed with several other species (Douglas 1991).

Bat-tailed Godwits were observed staging during spring from 10 to 19 May in and around LACL in Redoubt Bay, Tuxedni Bay and Trading Bay (Gill and Tibbitts 1999). One fall migration record was documented from Aniakchak Bay in ANIA on 30 August.

Table 20. Monthly occurrence of Bar-tailed Godwit in Alaska's National Parks. A single asterisk **) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA						X**	X**	X				
CAKR					X	X	X**					
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA								X				
KATM												
KEFJ												
LACL					X							

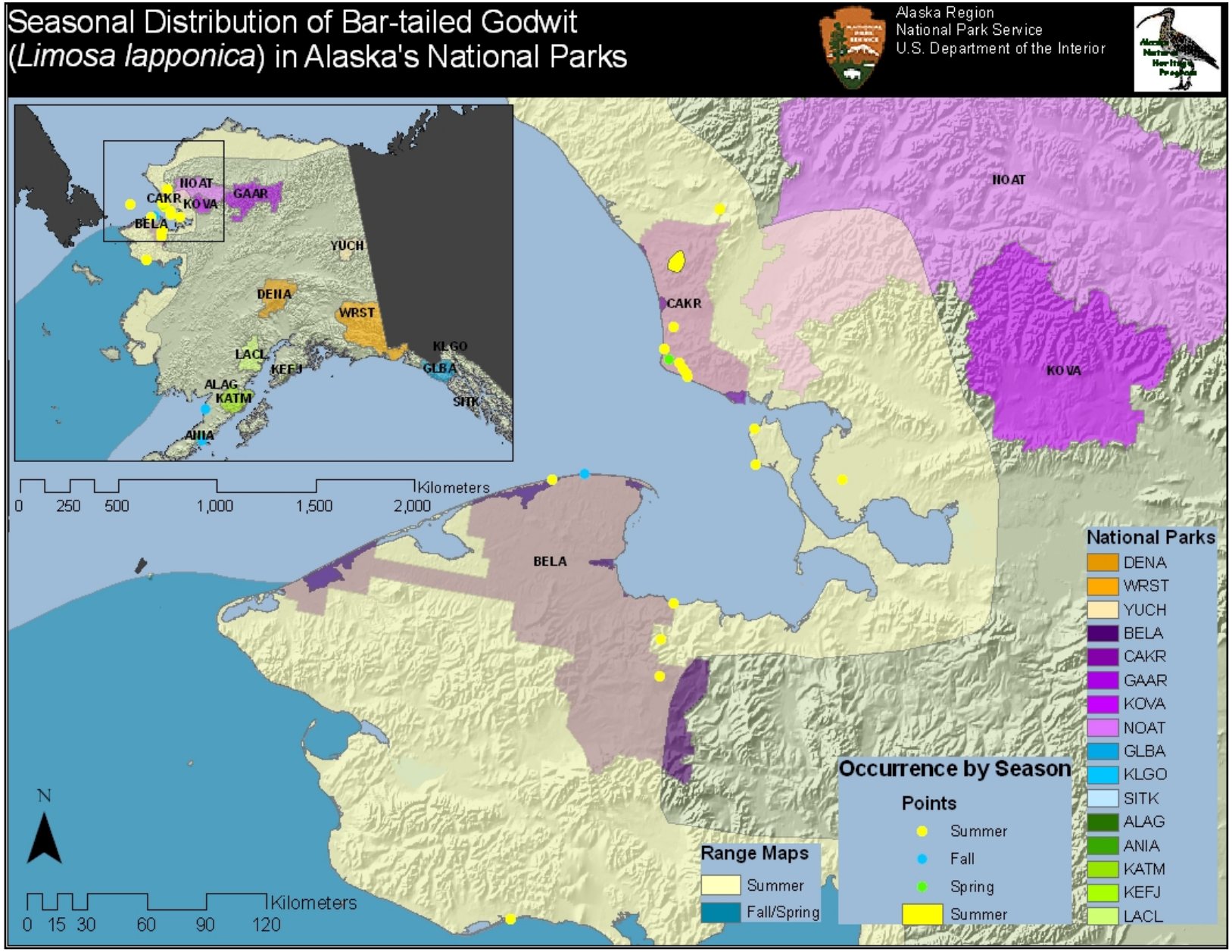


Figure 34. Seasonal distribution of Bar-tailed Godwit in and adjacent to Alaska's National Parks.

Range:

BREEDING: Circumpolar, mainly in the continental coastal fringes around the Arctic Ocean and on most high Arctic islands (Campbell et al. 1990). Specifically in northern Alaska and Canadian Arctic islands south to western Alaska, and Southhampton, Coats, and Mansel islands, probably also northern Mackenzie and northern Keewatin; also in Greenland, Iceland, Palearctic (NatureServe 2009).

NON-BREEDING: Winters along the coast from central California, Gulf Coast, and New York south through West Indies to southern South America and in the Pacific islands (common in Hawaii August-May, a few stay all year). In the Old World, winters in Australia and New Zealand (NatureServe 2009). See Fig. 35.

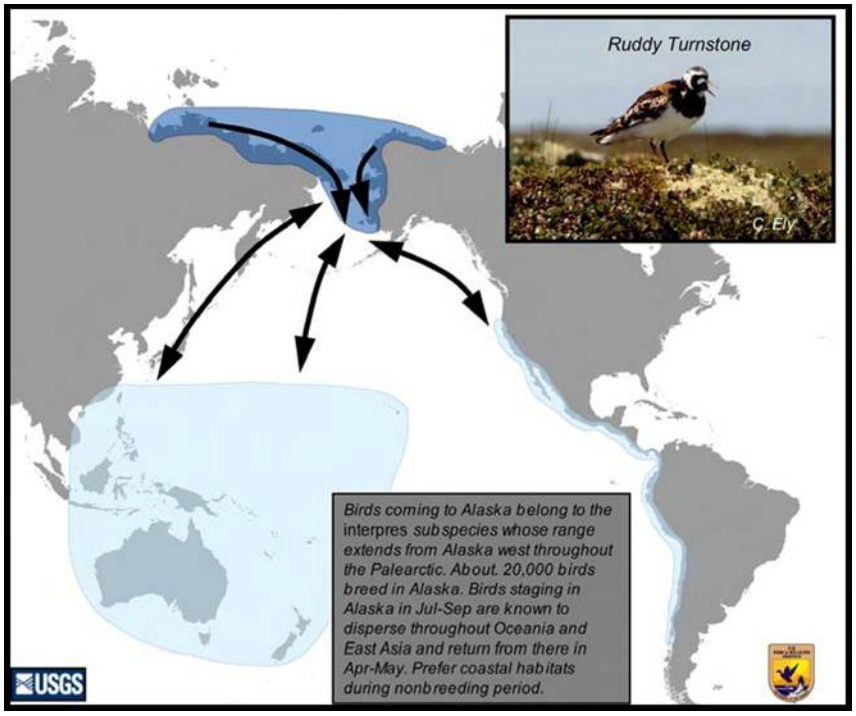


Figure 35. Ruddy Turnstone breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Approximately 40,000 Ruddy Turnstones use sites within Alaska each year. Half of these breed in upland habitats in the state while the other half breeds in Chukotka (AIHPAIBSWG 2006). During the non-breeding season, a portion of both the Alaska and Chukotka breeding groups migrate to sites in eastern and southeastern Asia (AIHPAIBSWG 2006). Additionally, during fall, Ruddy Turnstones that breed in Chukotka stage in western Alaska while en-route to their wintering range in Asia (Thompson 1974).

For the entire North American population, northward migration occurs mainly in May, along the Atlantic, Great Lakes, and Pacific coast; arrives in Beaufort Sea region beginning mid- to late May. In fall, juveniles are last to depart breeding areas; begin to migrate south during last half of August and early September; fall migrants common in southern Quebec, Newfoundland, and Maritime Provinces (Johnson and Herter 1989). Migrants common in Costa Rica late March to late May and August to October (Stiles and Skutch 1989). Arrives in northern South America by September, most depart by end of May (Hilty and Brown 1986).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 46 individual location records for the Ruddy Turnstone from 25 unique data sources. Of the 46 total records, 34 records were within park boundaries and 12 were adjacent to parks (Fig. 36). Occurrence records covered the time period from 1898 to 2008, with the majority of occurrences documented after 1948. Ruddy Turnstones were detected in three of the four Alaska National Park networks (Table 21). Observations from the ARCN and SWAN network parks were from May through August; in the SEAN network, Turnstones were observed in May and July through September with a single observation at Gustavus in GLBA during December (Table 21).

Spring migrants were observed as early as 8 May at Katmai Bay in KATM and on 24 May at Squab Island in KEFJ. Fall migration was noted on 23 August at Aniakchak Bay, ANIA, and on 30 August in Northwestern Lagoon in KEFJ (Fig. 36). Birds were observed breeding in and around BELA during July (no specific dates recorded). Important breeding areas were along sandy coastal barrier strips and included Cape Espenberg, Sarichef Island, Lopp Lagoon, Brevig Lagoon and Point Spencer spit (Fig. 36).

Table 21. Monthly occurrence of Ruddy Turnstone in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA							X*	X				
CAKR					X		X					
GAAR					X	X						
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA							X	X	X			X
KLGO												
SITK					X				X			
Southwest Alaska Network (SWAN)												
ALAG												
ANIA								X				
KATM					X		X					
KEFJ					X	X		X				
LACL												

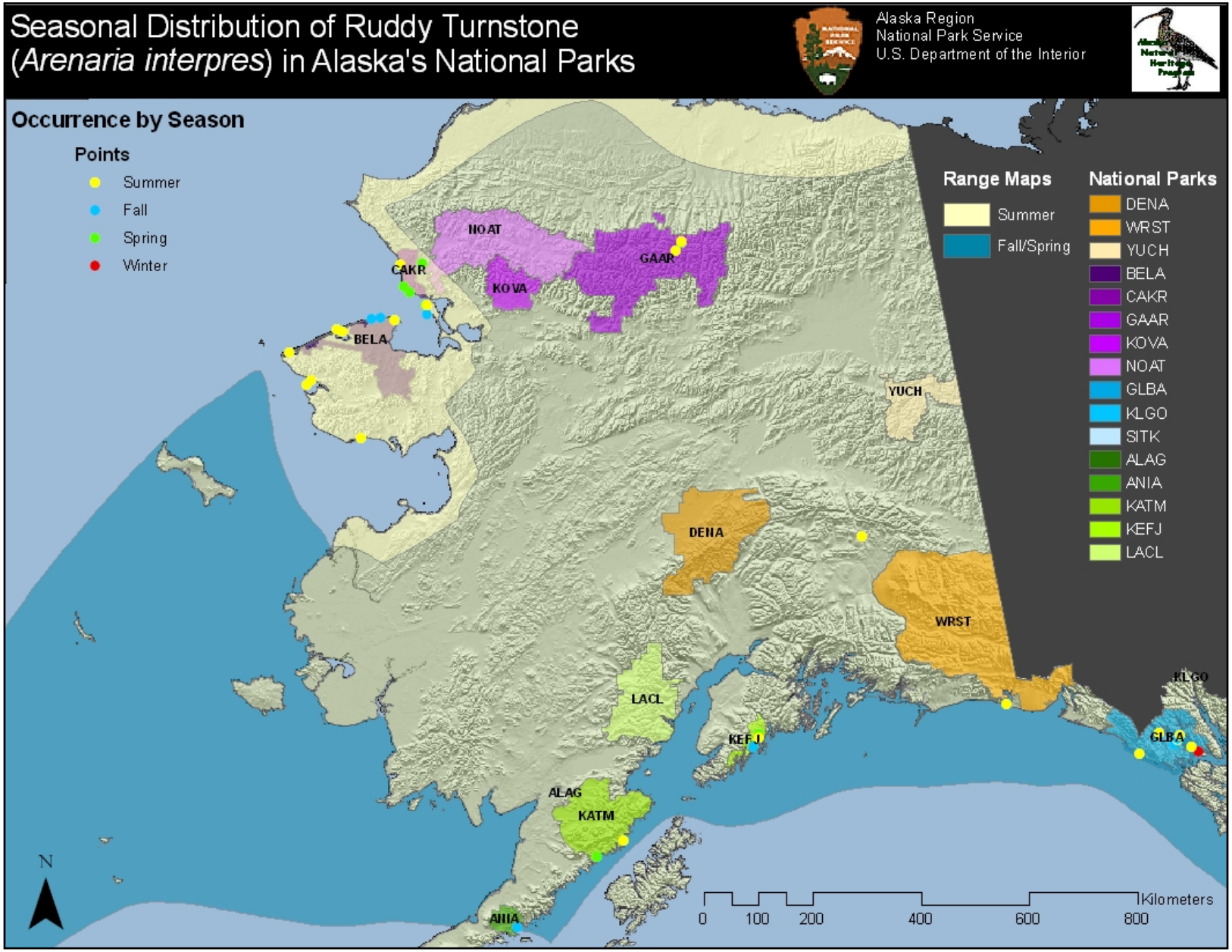


Figure 36. Seasonal distribution of Ruddy Turnstone in and adjacent to Alaska's National Parks.

Range:

BREEDING: Breeding distribution is cosmopolitan; in the high Arctic of the New and Old Worlds. In North America, breeds in northwestern and northern Alaska, and Canadian Arctic islands east to Ellesmere and south to southern Victoria and Southhampton islands, probably also on Adelaide Peninsula and Mansel Island.

The Alaska breeding population, *Calidris canutus roselaari*, is one of three recognized subspecies known to occur in the Australasian flyway (AIHPAIBSWG 2006). Known breeding areas in Alaska include the Seward Peninsula, De Long Mountains and rarely at Point Barrow and Cooper Island (Kessel 1989, AOU 1998).

NONBREEDING: Winters in widely scattered areas from coastal regions in southern California, the Gulf Coast and Massachusetts south to Tierra del Fuego; generally rare north of southern South America. Major South American nonbreeding areas are Tierra del Fuego and Patagonian coast of Argentina, especially Bahia Lomas (Morrison and Ross 1989). See Fig. 37.

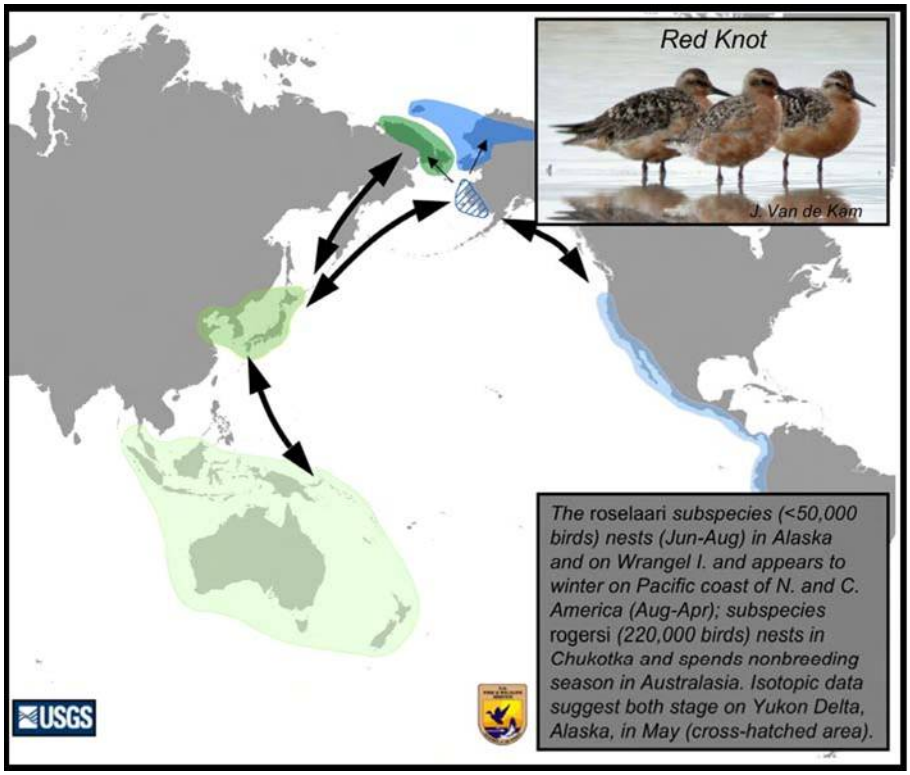


Figure 37. Red Knot breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Migrates in large flocks northward through contiguous U.S. mainly April to June, southward July to October (Bent 1927). Arrives in breeding areas late May or early June; most have departed

breeding areas by mid-August. More abundant in migration along U.S. Atlantic coast than on Pacific coast (NatureServe 2009).

Concentrates in large numbers during migration. Up to 100,000 Red Knots have been reported in the Copper River Delta, Bering River Delta, and the Yukon Kuskokwim Delta during spring migration (Isleib 1979, Gill and Handel 1990, Kessel and Gibson 1978). May co-occur with Siberian breeding subspecies, *C. a. rogersi*, on the Yukon Kuskokwim Delta in May (AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 23 individual location records for the Red Knot from 10 unique data sources. Of the 23 total records, 11 records were within park boundaries and 12 were adjacent to parks (Fig. 38). Occurrence records covered the time period from 1898 to 2008, with the majority of occurrences documented after 1991. The Red Knot was only detected in three parks: CAKR, where breeding behavior was documented in July; KATM during spring migration (no specific dates provided); and in SITK during May (Table 22).

The earliest spring migration record was from 5 May at the mouth of the Indian River in SITK. There were also reports of Red Knots sighted during "spring migration" along the Upper Naknek River. Birds were observed staging between 5 and 16 May at Redoubt Bay, Susitna Flats and Trading Bay, near LACL. Breeding was only reported for a single date, 18 July, from the Kakagrak Hills and Krusenstern Lagoon in CAKR. A single report of birds during fall migration was from Cape Blossom, near CAKR, on 6 August.

Table 22. Monthly occurrence of Red Knot in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR					X		X**					
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK					X							
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

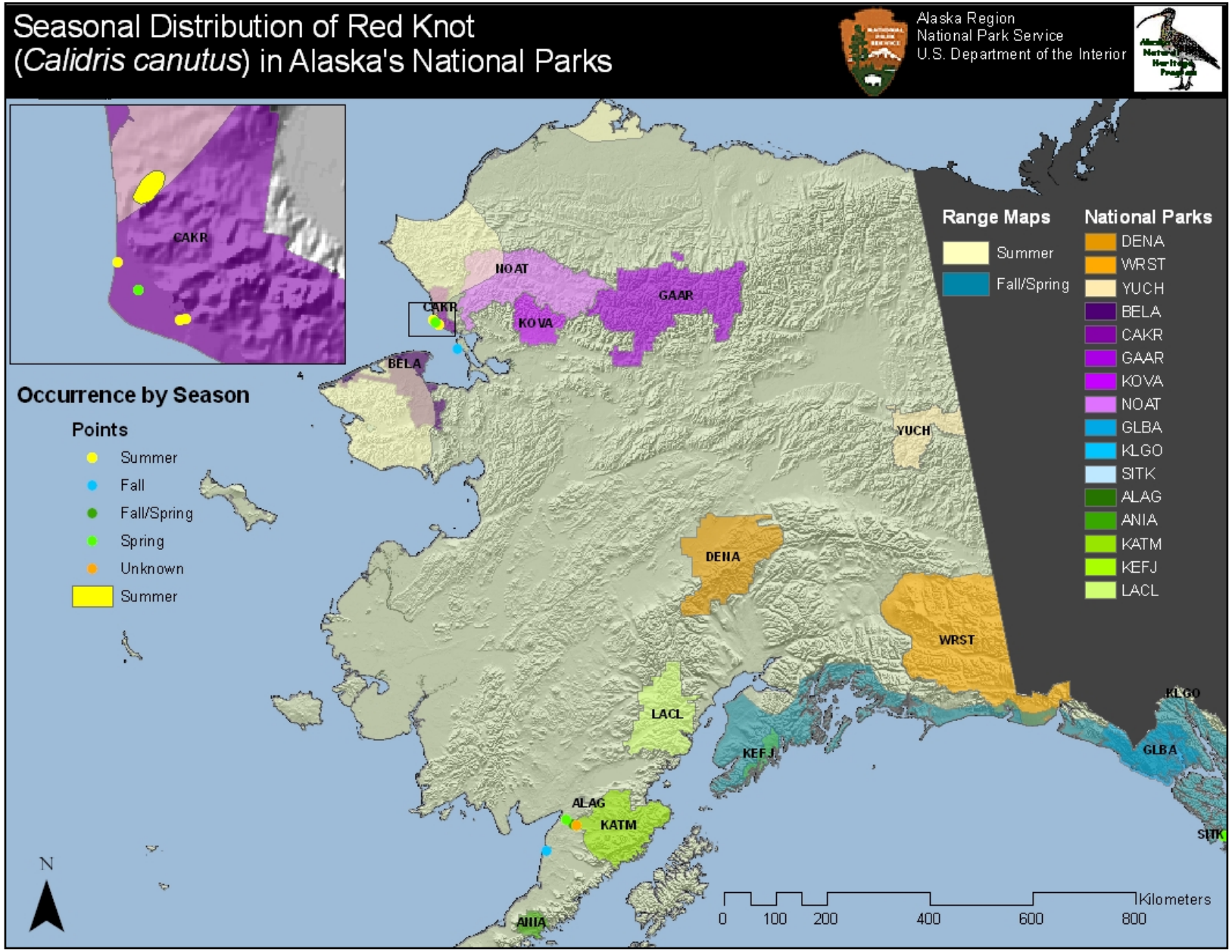


Figure 38. Seasonal distribution of Red Knot in and adjacent to Alaska's National Parks.

Range:

BREEDING: Breeds in northern Siberia and in North America from western and northern coastal Alaska, northern Yukon, northern Mackenzie, and Banks, Victoria, Bathurst, Devon, northern Baffin, and Southampton islands south to western Alaska, central Mackenzie, southeastern Keewatin, and east to the south coast of Hudson Bay (NatureServe 2009).

NON-BREEDING: Winters mainly in southern South America from Peru, Bolivia, and southern Brazil south to central Chile and southern Argentina (AOU 1983). A portion of the Siberian breeding population probably winters in southeastern Australia and New Zealand (NatureServe 2009). See Fig. 39.

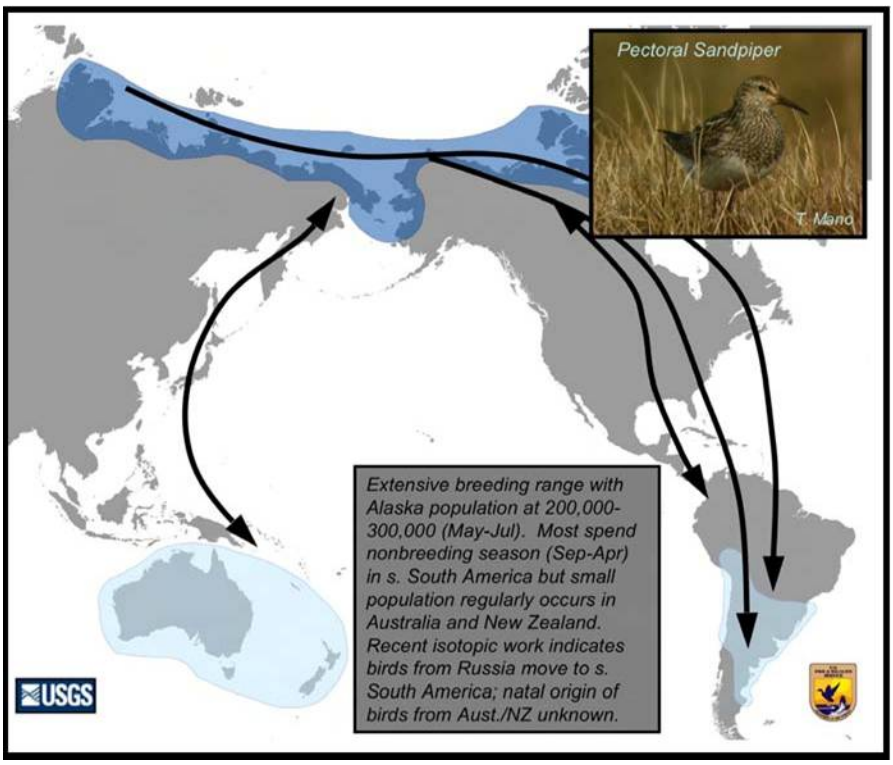


Figure 39. Pectoral Sandpiper breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Northward migration begins in late February, passing through U.S. and Canada in April and May; arrives in breeding areas in Beaufort Sea area in late May or early June. Migrates mainly through interior North America, Central America, and northern South America, and in fall (uncommon in spring) through eastern North America and West Indies (AOU 1983). In Alaska, Pectoral Sandpipers have been reported migrating through Cook Inlet and the Yukon-Kuskokwim Delta in mid-May, presumably on their way to Siberia (AIHPAIBSWG 2006). The majority of Pectoral Sandpipers begin their migration southward from their breeding areas in mid-summer, with males preceding females. They travel east and south through the Great Plains

and across the Gulf of Mexico to arrive at South American wintering grounds beginning late August and early September through mid-November (Hilty and Brown 1986). A small number of birds that breed in Siberia (possibly dispersing juveniles) migrate south to areas throughout Polynesia, Australia and New Zealand (AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 66 individual location records for the Pectoral Sandpiper from 34 unique data sources. Of the 66 total records, 48 records were within park boundaries and 18 were adjacent to parks (Fig. 40). Occurrence records covered the time period from 1899 to 2008, with the majority of occurrences documented after 1973. Pectoral Sandpipers were detected in all four Alaska National Park networks, with the majority of observations in the ARCN (56%) network parks (Table 23).

Pectoral Sandpipers were detected in Alaska's National Parks from May through September (Table 23). The earliest spring migration record was for 29 April from the Akwe River near GLBA and from the Italio River near WRST; the latest spring migration record was from the town of Kotzebue near CAKR on 27 May. Spring staging was observed from 16 to 30 May at Tuxedni Bay, Susitna Flats and Trading Bay near LACL. Fall migration was recorded from 11 August at the Brooks River in KATM to 14 October near WRST.

Pectoral Sandpipers breed along the coasts of western and northern Alaska. Evidence of direct breeding in parks is limited to two nest records in BELA, although the species is suspected to breed in CAKR based on probable breeding records, their known breeding range, presence during May and July, and presence as breeders in previous park checklists (Table 2). Pectoral Sandpipers are likely only present in SEAN and CAKN parks during migration.

Table 23. Monthly occurrence of Pectoral Sandpiper in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST					X		X					
YUCH												
Arctic Network (ARCN)												
BELA						X*	X*	X				
CAKR					X*		X*					
GAAR						X	X					
KOVA					X			X				
NOAT							X					
Southeast Alaska Network (SEAN)												
GLBA					X			X	X			
KLGO												
SITK					X			X	X			
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM								X				
KEFJ					X	X	X	X				
LACL					X							

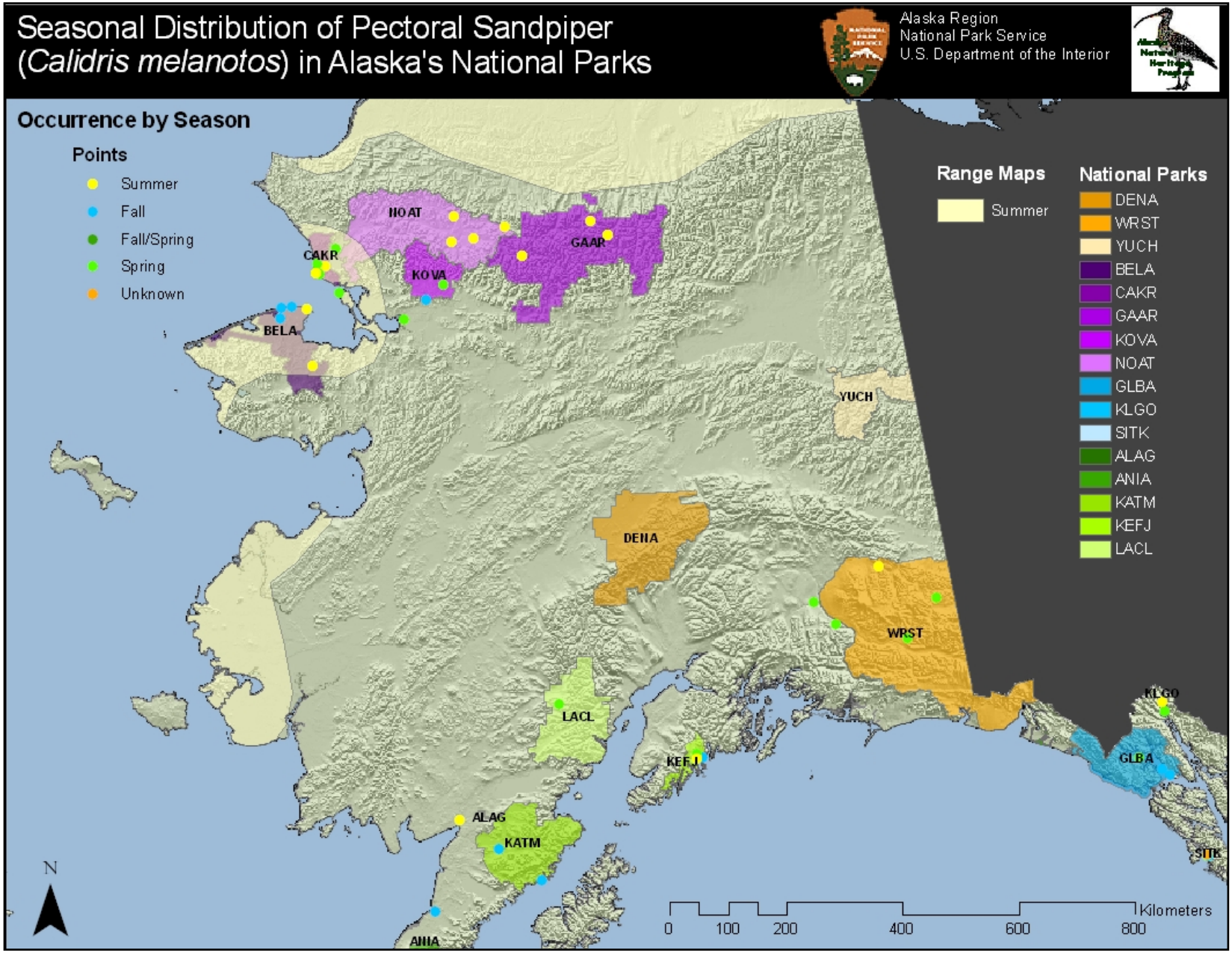


Figure 40. Seasonal distribution of Pectoral Sandpiper in and adjacent to Alaska's National Parks.

Sharp-tailed Sandpiper (*Calidris acuminata*)

Range:
BREEDING: Northeastern Siberia, possibly western Alaska (NatureServe 2009).

NON-BREEDING: Juvenile and rarely adult Sharp-tailed Sandpipers are observed annually in North America, most commonly in western Alaska during fall migration (Johnson and Herter 1989). Winters in East Indies, Australasia, Polynesia (NatureServe 2009). See Fig. 41.

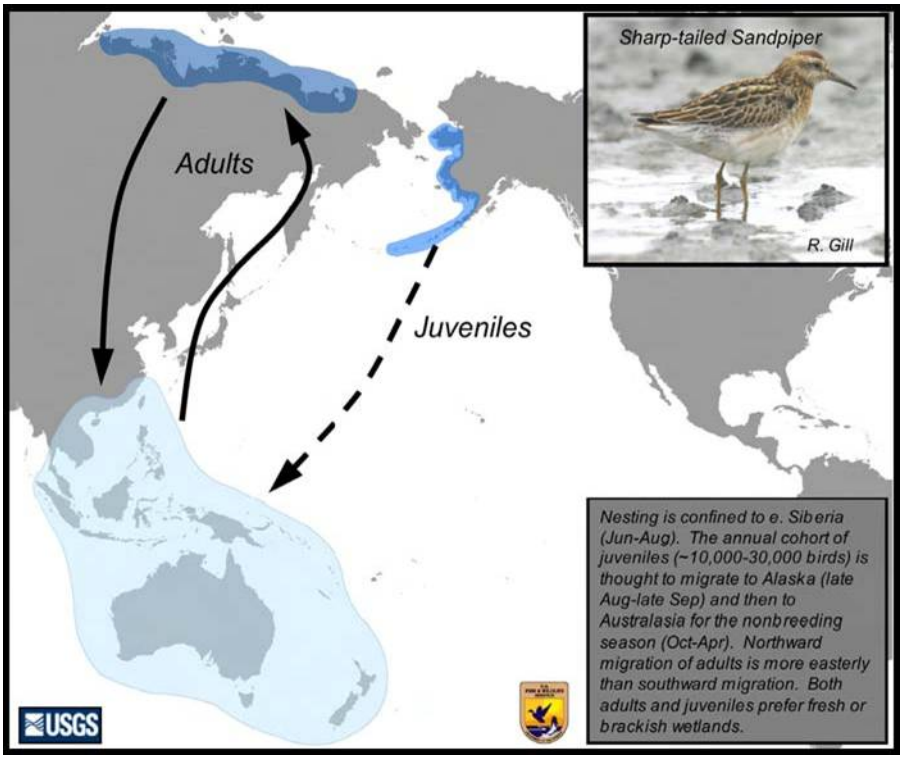


Figure 41. Sharp-tailed Sandpiper breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:
Migrates regularly through western Alaska and rarely (primarily in fall) from south-coastal and southeastern Alaska (AOU 1998). "They likely concentrate along the Yukon-Kuskokwim Delta, but occur from the North Slope throughout the Aleutians. Core staging area primarily at sites within approximately five miles of Yukon-Kuskokwim Delta coast" (Ruthrauff, USGS, pers. comm.).

Migrates regularly along the Pacific coast to southern California and through Pacific islands, including Hawaii (mostly in west, common in fall, rare in spring; AOU 1998). Casual elsewhere in North America, mostly in fall (recorded from northeastern British Columbia, Alberta, Saskatchewan, North Dakota, Ontario, New York, and New England south to Arizona, New Mexico, Texas, the Gulf coast and Florida; NatureServe 2009).

Distribution and Seasonal Occurrence in Alaska's National Parks:

Only six records were found for the Sharp-tailed Sandpiper, of which five fell within park boundaries. Sharp-tailed Sandpipers were detected in early September at Sheshalik, 14 km northwest of Kotzebue and at Cape Krusenstern in CAKR (Table 24) and at Ugashik Bay on the north side of the Alaska Peninsula near ANIA during late September to early October (Fig. 42).

Table 24. Monthly occurrence of Sharp-tailed Sandpiper in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR									X	X		
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

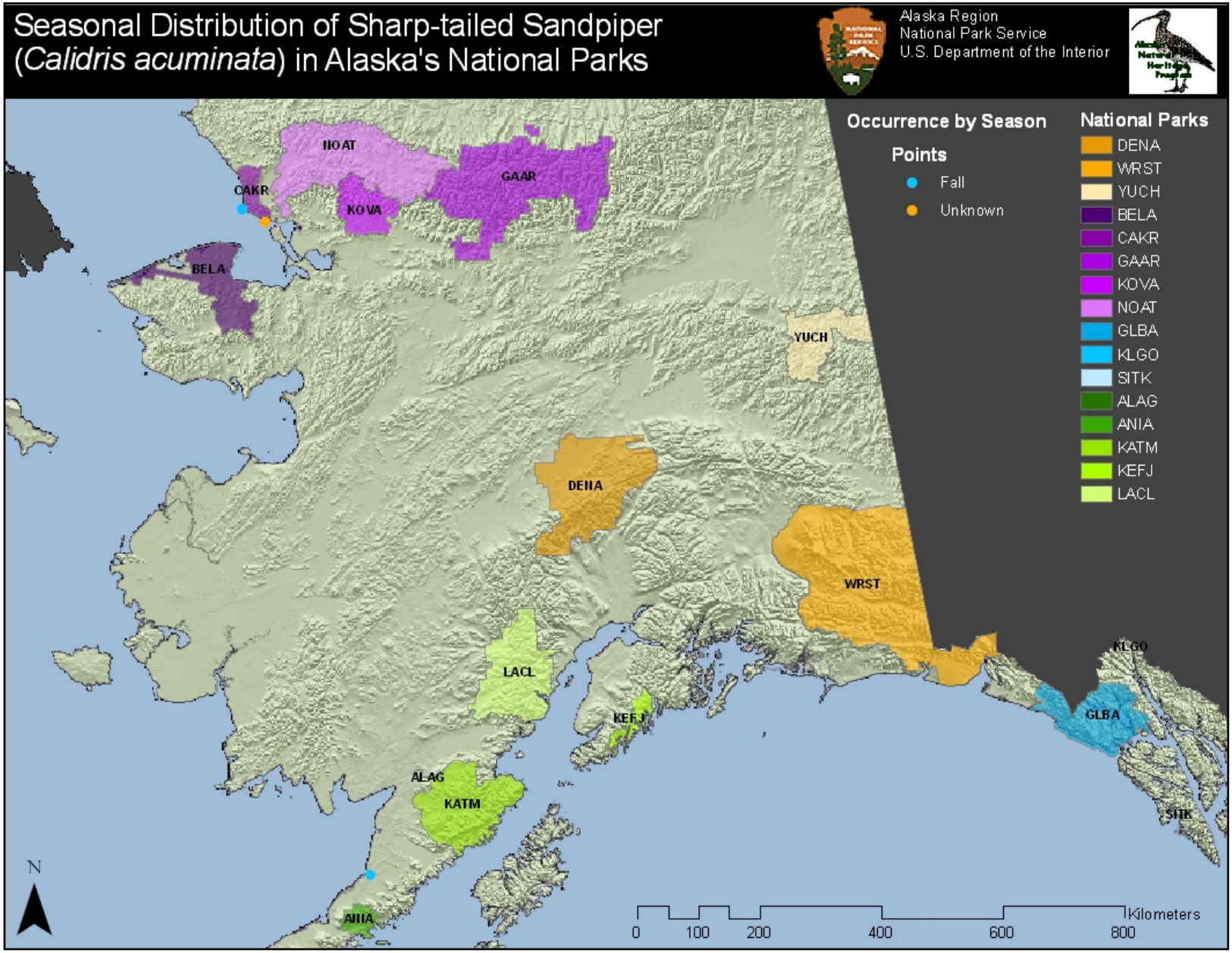


Figure 42. Seasonal distribution of Sharp-tailed Sandpiper in and adjacent to Alaska's National Parks.

Rock Sandpiper (*Calidris ptilocnemis*)

Range:

BREEDING: Breeds in west-central Alaska, on islands in the Bering Sea, in Aleutian and Shumagin Islands, and in eastern Siberia on Chukotka Peninsula and the Commander Islands (NatureServe 2009).

The Alaskan breeding population is comprised of three subspecies, *Calidris ptilocnemis ptilocnemis, C. p. couesi and C. p. tschuktschorum*. Subspecies *C. p. ptilocnemis* breeds on the Pribilof Islands and winters in Cook Inlet (Gill et al. 2002). *C. p. couesi* breeds throughout the Aleutian Islands and along Alaska Peninsula to at least Ugashik Bay; also breeds on Shumagin and Kodiak Archipelagos. Winters in the same areas (Gill et al. 2002). The Bering Sea Rock Sandpiper, *C. p. tschuktschorum,* breeds in western Alaska from the northern Seward Peninsula south to northern Bristol Bay, St. Lawrence and Nunivak Islands; also in eastern Russia. Migratory stopovers in the Yukon-Kuskokwim Delta and Bristol Bay. Winters in Southeast Alaska (Gill et al. 2002).

NON-BREEDING: Resident in the more southerly parts of its breeding range (Campbell et al. 1990). Winters from southcentral and southern Alaska south along Pacific coast to central California; in Eurasia from Commander Islands south to northern Kurile Islands (AOU 1983). See Fig. 43.

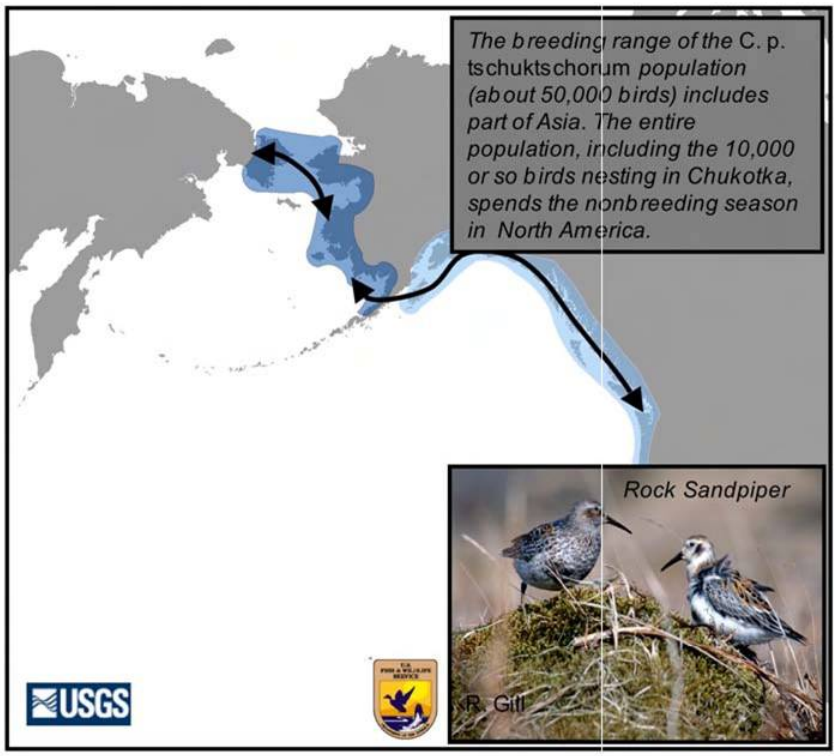


Figure 43. Rock Sandpiper breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:
Arrives on breeding grounds in May after northward migration. More northerly summer populations migrate farther south than do more southerly populations (NatureServe 2009).

During post-breeding (July to October), the entire population of subspecies *C. p. tschuktschorum* migrates to coastal staging areas in western Alaska (Yukon Delta and Bristol Bay) where they molt and associate closely with other shorebirds, including the two other Rock Sandpiper subspecies (Gill et al. 2002). *C. p. tschuktschorum* then spends November through April at coastal sites in the Pacific Northwest from southeast Alaska to northern California (AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:
We summarized a total of 175 individual location records for the Rock Sandpiper from 34 unique data sources. Of the 175 total records, 151 records were within park boundaries and 24 were adjacent to parks (Fig. 44). Occurrence records covered the time period from 1966 to 2008. Rock Sandpipers were reported from the ARCN, SEAN and SWAN networks, with the majority of observations (68%) within SWAN network parks (Table 25).

Rock Sandpipers were detected in Alaska's National Parks year-round, but their distribution varied by park and by network (Table 25). This species was detected within SWAN network parks every month except February and April. These birds are likely subspecies *C. p. couesi*, which breeds throughout the Aleutians and Alaska Peninsula and winters in the same area. Rock Sandpipers were present in BELA and CAKR in the ARCN network during July and August, where they are probable breeders and in SEAN network parks from December through May except March and again in August. It is likely that these birds are the subspecies *C. p. tschuktschorum*, which breeds in western Alaska from the Seward Peninsula south to Bristol Bay and winters in Southeast Alaska.

The earliest spring migration record was for 29 April near WRST from the Blacksand - Ahrnklin River area; the latest was 10 May from the Akwe River near GLBA. Fall migration was reported as early as 6 August from the Situk River near WRST; the latest was 25 august from the Italio River near WRST. Although evidence of breeding was not reported, adults in breeding plumage and/or singing during breeding bird surveys were observed in BELA, ANIA and LACL and indicating probable breeders (Table 25).

Table 25. Monthly occurrence of Rock Sandpiper in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA							X	X*				
CAKR							X					
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA	X	X			X			X				X
KLGO												
SITK				X								
Southwest Alaska Network (SWAN)												
ALAG												
ANIA						X*	X*	X	X			
KATM					X		X					
KEFJ										X		X
LACL	X		X		X*			X		X	X	

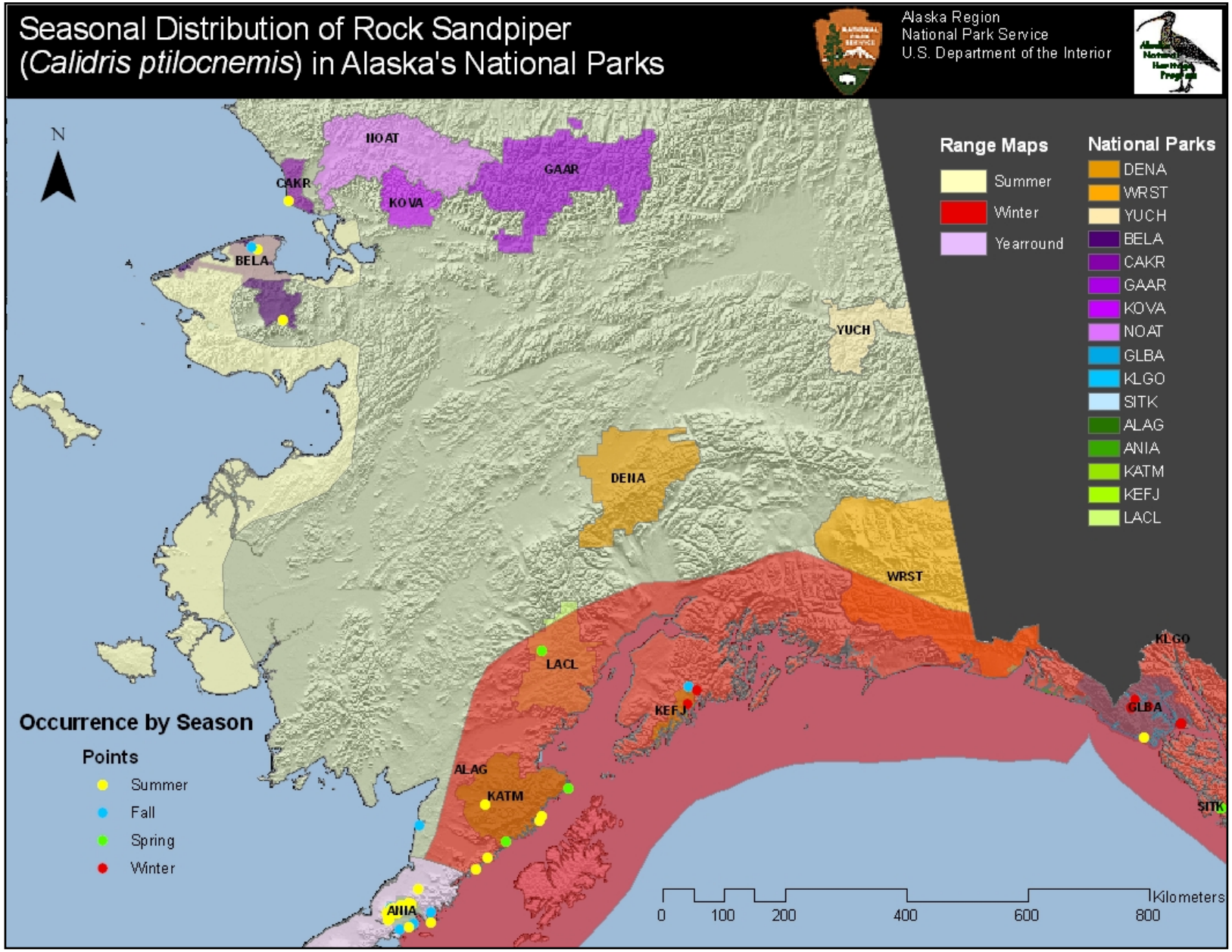


Figure 44. Seasonal distribution of Rock Sandpiper in and adjacent to Alaska's National Parks.

Dunlin (*Calidris alpina*)

Range:

BREEDING: Two subspecies of Dunlin (*Calidris alpina arcticola* and *C. a. pacifica*) nest in Alaska (Warnock and Gill 1996). The *arcticola* subspecies of Dunlin is a high priority taxon because the entire population (about 750,000 birds) nests on the North Slope of Alaska and spends the non-breeding season in South and East Asia where the H5N1 virus is prevalent (AIHPAIBSWG 2006).

Specifically, *C. a. arcticola* occurs in northern Alaska, north of Lisburne to Cape Bathurst, Northwest Territories. It is generally most common between Point Barrow and Prudhoe Bay, rare to Canadian Border (Johnson and Herter 1989).

C. a. pacifica occurs on coastal western Alaska on north side of Alaska Peninsula north to Point Hope (Gabrielson and Lincoln 1959). Somewhere in the vicinity of Point Hope it is suspected that the breeding ranges of *arcticola* and *pacifica* overlap, although no genetic studies have been conducted to support this claim (AIHPAIBSWG 2006)

NON-BREEDING: *C. a. arcticola* spend the winter in significant numbers in East Asia as far south as southern China. Distribution on the non-breeding grounds is unclear, although *arcticola* that were banded on the North Slope were later resighted in Japan, Taiwan and parts of China (AIHPAIBSWG 2006). *C. a. pacifica* winters in small numbers in coastal southern Alaska (Warnock and Gill 1996). See Fig. 45.

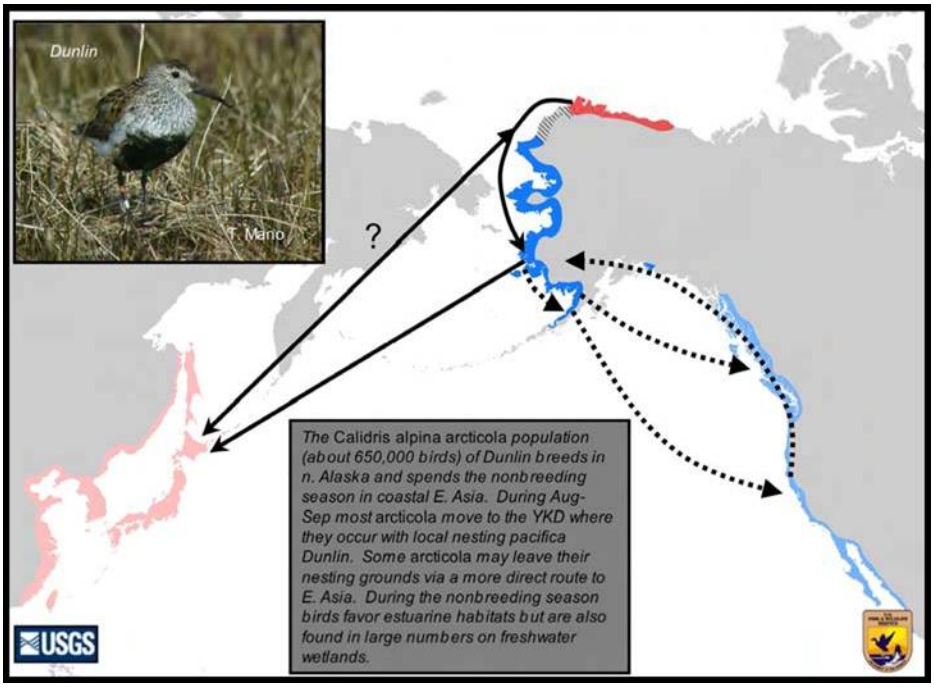


Figure 45. Dunlin breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Migrates mainly along coasts, smaller numbers in interior North America. Begins northward migration along Atlantic and Pacific coasts of North America in March and April, arrives in northern Alaska in late May. After fledging, juveniles move to coastal habitats in late July and early August in northern Alaska; adults move to upland areas. Departs breeding grounds late August or September. Breeders banded at Point Barrow, Alaska, were recaptured in October at Cape Lazarev, Siberia, and Sakhalin Island (NatureServe 2009).

The Yukon-Kuskokwim Delta, Alaska, is an important migration stop in western North America (Handel and Gill 1992). Postbreeders roost in large flocks and feed on the expansive intertidal mudflats here, from July until early October. Once on the Yukon-Kuskokwim Delta, *arcticola* mix with large numbers of the *pacifica* race before moving to southeastern Asia and California in September or October (Gill and Handel 1992, Warnock and Gill 1996, AIHPAIBSWG 2006). Southbound migrants reach central California coast by mid-October. Often migrates in large flocks (NatureServe 2009).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 124 individual location records for the Dunlin from 36 unique data sources. Of the 124 total records, 84 records were within park boundaries and 40 were adjacent to parks (Fig. 46). Occurrence records covered the time period from 1881 to 2008. Dunlin were detected in the ARCN and SWAN networks, where they were present only during the breeding and post-breeding season and in the SEAN network, where they were observed almost year-round. The majority of observations (49%) were within SEAN network parks (Table 26).

Radio-tagged birds were relocated during spring migration along the Yakutat Forelands and Copper River Delta (adjacent to WRST) as early as 26 and 27 April; they also staged at the Blacksand - Ahrnklin River, near WRST, April, May, August and October. Staging birds were also recorded near LACL in Trading Bay and Susitna Flats on19 May.

The earliest nest was recorded on 12 June at Krusenstern Lagoon, CAKR. Evidence of breeding was also reported at Cape Espenberg in BELA and at Cape Prince of Wales, but specific dates were not provided.

Fall migration was reported as early as 13 and 28 August from Lone Island, GLBA. Birds were reported staging at Redoubt Bay near LACL as late as 30 October (Fig. 46).

Table 26. Monthly occurrence of Dunlin in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA							X	X				
CAKR					X	X**	X					
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA	X	X			X	X*		X	X			X
KLGO												
SITK				X	X				X			
Southwest Alaska Network (SWAN)												
ALAG												
ANIA					X*	X*						
KATM					X			X	X			
KEFJ					X							
LACL					X							

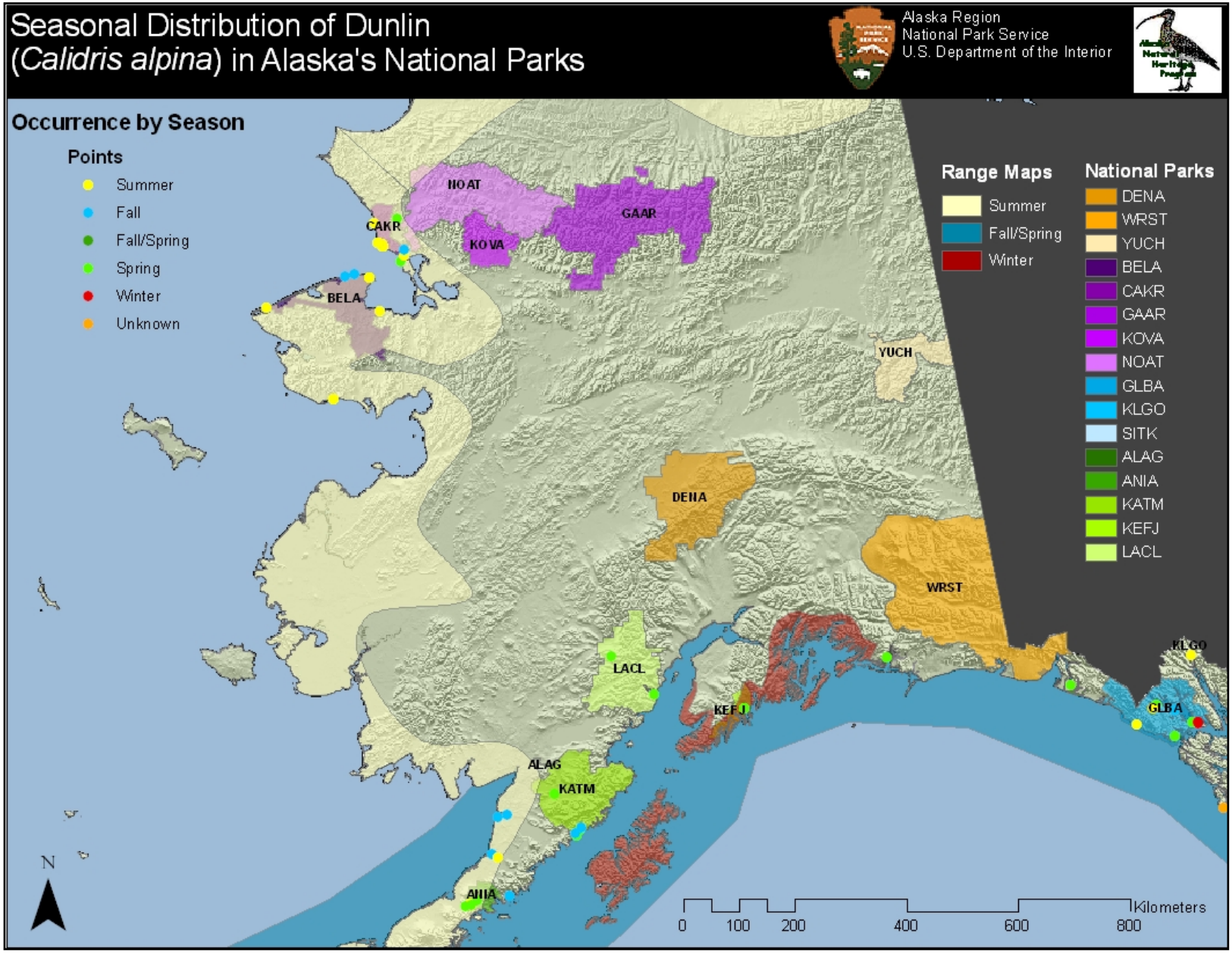


Figure 46. Seasonal distribution of Dunlin in and adjacent to Alaska's National Parks.

Buff-breasted Sandpiper (*Tryngites subruficollis*)

Range:

BREEDING: Breeding range encompasses the low and high Arctic in eastern Russia, northern Alaska, northern Yukon, northwestern Mackenzie, and the region from Banks, Melville, Bathurst, and Devon islands south to southern Victoria, Jenny Lind, and King William islands. The bulk of the breeding population appears to occupy coastal portions of the Yukon and Northwest Territories and most of the Queen Elizabeth Islands (Lanctot and Laredo 1994).

NON-BREEDING: During the nonbreeding season, this species occurs in South America, primarily in Brazil, Uruguay, and Argentina. Due to destruction of native grasslands by agriculture, most birds winter in coastal portions of the Río de La Plata grasslands where livestock grazing maintains suitable habitat (NatureServe 2009). See Fig.47.

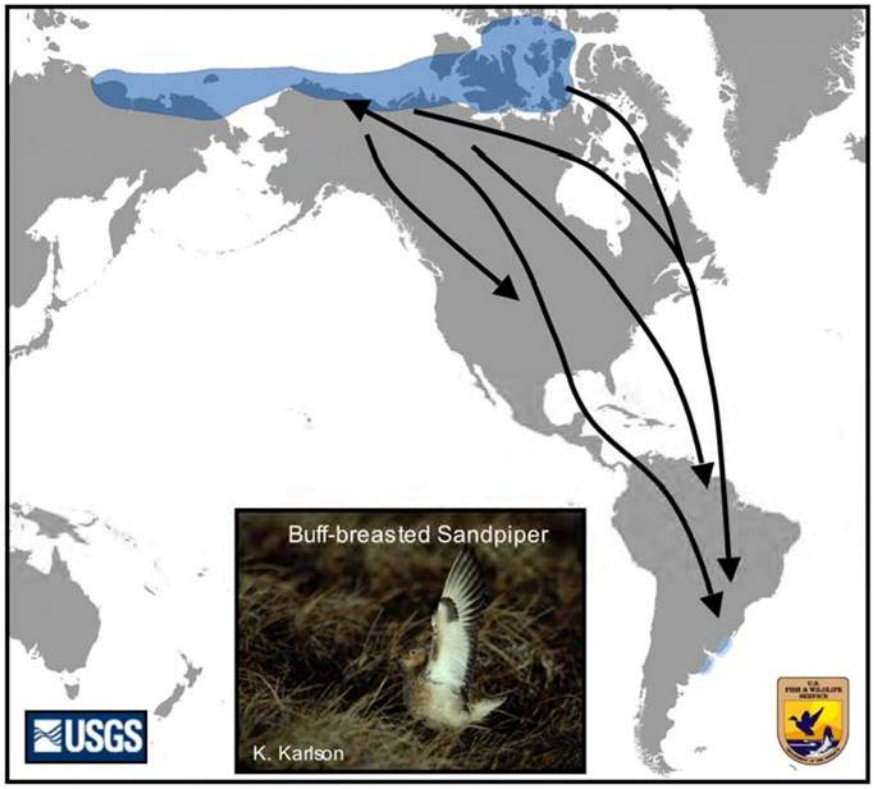


Figure 47. Buff-breasted Sandpiper breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Northward migration begins in early February to mid-March (Palmer 1967, Myers and Myers 1979). Migration is via central Amazonia/Pantanal flyway, over Brazil, Venezuela, Guyana, and Surinam (Haverschmidt 1972, Lanctot and Laredo 1994), across the Gulf of Mexico, and arriving in coastal Texas and Louisiana between mid-March and early April (Lanctot and Laredo 1994, Lanctot 1995). Passes through U.S. in May; arrives in breeding areas late May to early June (Palmer 1967, Johnson and Herter 1989). Birds that breed in Chukotka are thought

to migrate eastward through Alaska to join the common migration route used by the North American breeding birds (AIHPAIBSWG 2006).

Southward migration begins from mid-June to early July; most depart breeding areas by end of August. Females with broods may remain in the Arctic as late as early September; rare in fall on Pacific islands; arrives in northern South America between August and October; most arrive in Argentina in mid-September, many depart in late January, a few still present in March (Hayman et al. 1986).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 20 individual location records for the Buff-breasted Sandpiper from 11 unique data sources. Of the 20 total records, 5 records were within park boundaries and 15 were adjacent to parks (Fig. 48). Buff-breasted Sandpipers were observed in CAKR during June and BELA in August (Table 27); these sightings were likely during migration as this species is known to breed further north along the Arctic Coastal Plain. Additional migratory records were documented near BELA and single migratory observations were recorded near CAKR, WRST, ANIA and YUCH (Fig. 48). A single observation on 1 June near KLGO was also likely migratory. A specimen was collected near SITK in the early 1900s, but no date was specified.

Table 27. Monthly occurrence of Buff-breasted Sandpiper in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST												
YUCH												
Arctic Network (ARCN)												
BELA								X				
CAKR						X						
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

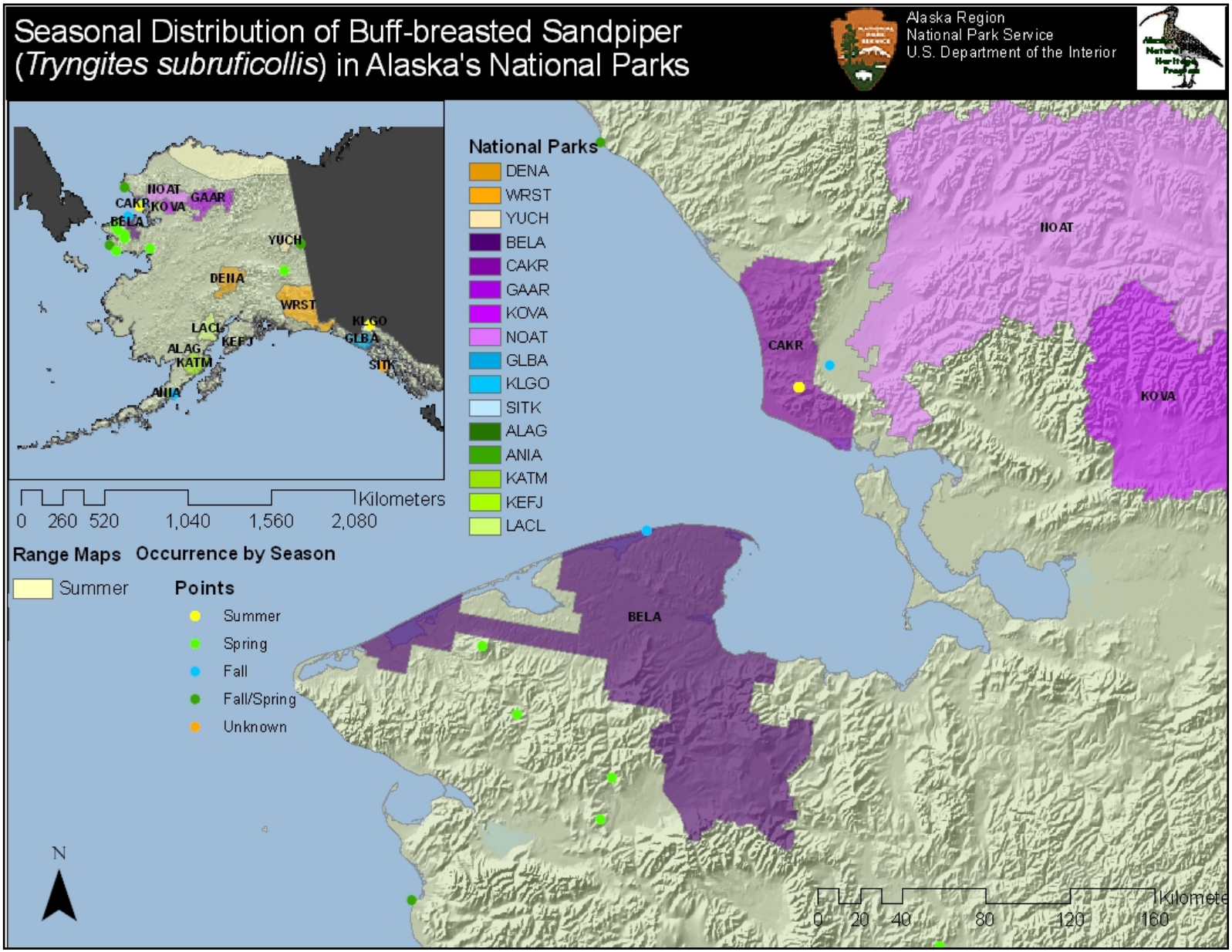


Figure 48. Seasonal distribution of the Buff-breasted Sandpiper in and adjacent to Alaska's National Parks.

Long-billed Dowitcher (*Limnodromus scolopaceus*)

Range:

BREEDING: Breeds in coastal northeastern Siberia, northwestern and northern Alaska, northern Yukon, and northwestern Mackenzie, east to Franklin Bay, Northwest Territories (NatureServe 2009).

NON-BREEDING: Nearly all Long-billed Dowitchers spend the non-breeding season in North America and Central America, with the remainder wintering in Japan (AIHPAIBSWG 2006). Wintering areas in the southern United States include central California, southern Arizona, southern New Mexico, central Texas, Gulf Coast, and southern Florida. Winters as far south in Central America as Guatemala, rarely to Costa Rica, casually to Panama (NatureServe 2009). See Fig 49.

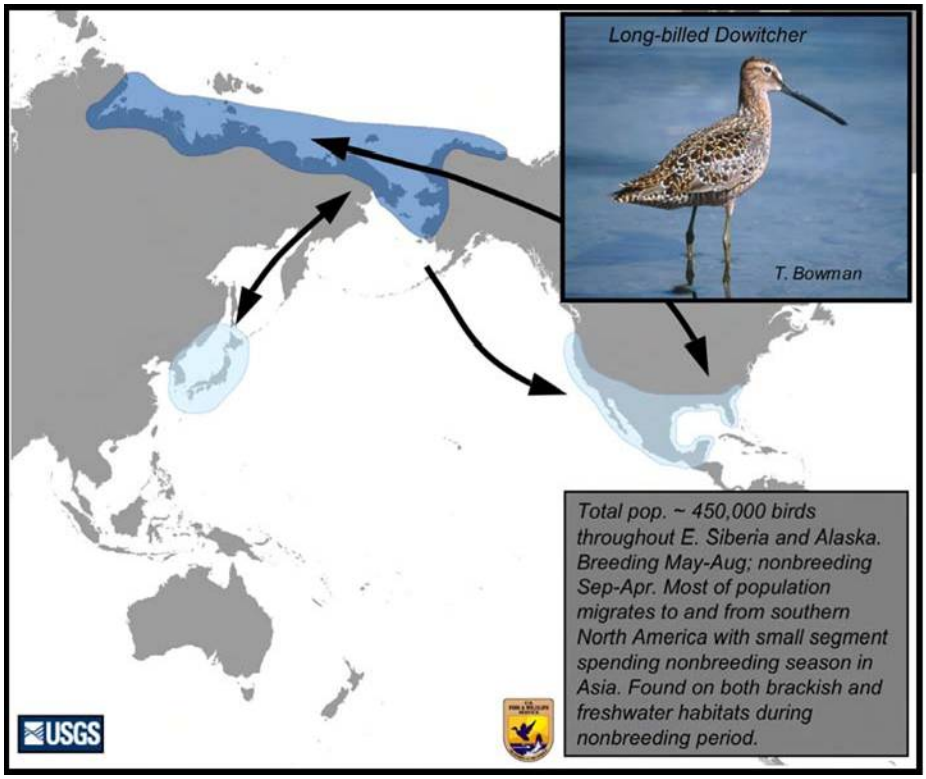


Figure 49. Long-billed Dowitcher breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Migrates primarily through western North America west of Rockies, less frequently (primarily in fall) east of Rockies (AOU 1983). Migrates northward to breeding areas, arriving late May to early June in northern Alaska. Southward migration usually begins in late July or early August, greatest numbers in August and September; juveniles begin migration after mid-August, rare before mid-September (Hayman et al. 1986).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 66 individual location records for the Long-billed Dowitcher from 33 unique data sources. Of the 66 total records, 46 records were within park boundaries and 20 were adjacent to parks (Fig. 50). Occurrence records covered the time period from 1929 to 2008. Long-billed Dowitchers were detected in all four Alaska National Park networks, mostly during spring and summer, with the majority of observations in the ARCN (76%) network parks (Fig. 50).

Long-billed Dowitchers were detected in Alaska's National Parks from April through August in addition to a single sighting during February in GLBA (Table 28). The earliest spring migration record was from 27 April on the Copper River Delta; other spring migration reports were from 25 May at the Kakagarak Hills, CAKR, and 30 May at Anaktuvuk Pass, GAAR. Breeding was only documented in ARCN network parks. The earliest nest record was from 25 June on the Eli River near NOAT. Other breeding observations were from Selawik, near KOVA; Krusenstern Lagoon, CAKR; Fenaik Lake, NOAT; and at Cape Espenberg, BELA (specific dates not provided). The breeding record from Feniak Lake in NOAT is slightly east of the expected breeding range of this species. Reports from YUCH during July were actually prey remains, which were found in a Peregrine Falcon eyrie (see Britten and McIntyre 1986).

Table 28. Monthly occurrence of Long-billed Dowitcher in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA												
WRST					X							
YUCH							X					
Arctic Network (ARCN)												
BELA							X	X				
CAKR					X	X**						
GAAR					X	X						
KOVA												
NOAT					X		X**					
Southeast Alaska Network (SEAN)												
GLBA		X										
KLGO												
SITK					X			X				
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL				X	X		X					

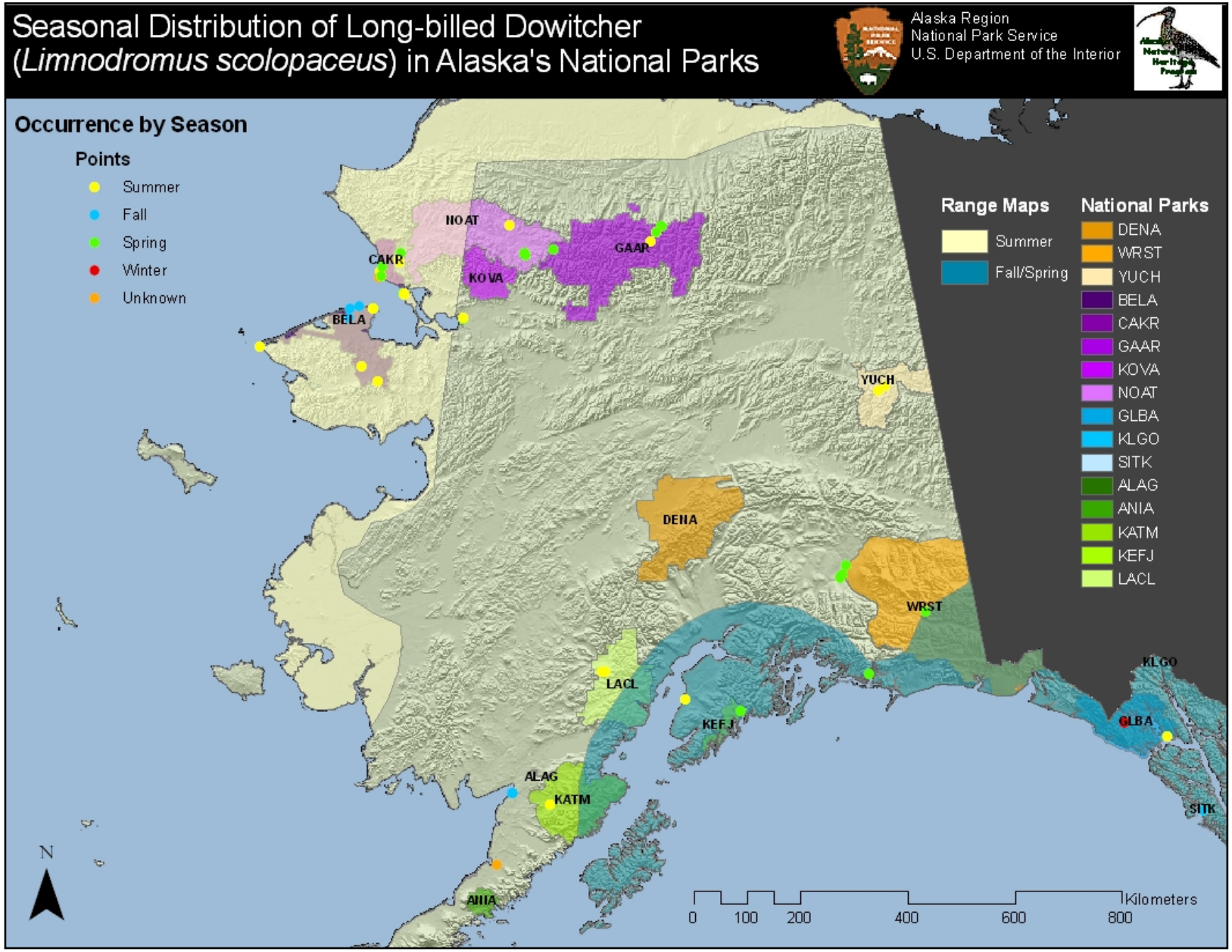


Figure 50. Seasonal distribution of the Long-billed Dowitcher in and adjacent to Alaska's National Parks.

Glaucous-winged Gull (*Larus glaucescens*)

Range:
BREEDING: Breeds from the southern Bering Sea and southern Alaska south along the Pacific coast to northwestern Oregon; also on the Commander Islands and on the Kamchatka Peninsula in Russia (Campbell et al. 1990, Sinclair et al. 2003, ASIS 2006, NatureServe 2009).

NON-BREEDING: Winters throughout the breeding range from southeastern Alaska south along Pacific coast to southern Baja California and on the Pacific coast of Asia south to Japan (ASIS 2006, NatureServe 2009). See Fig. 51.

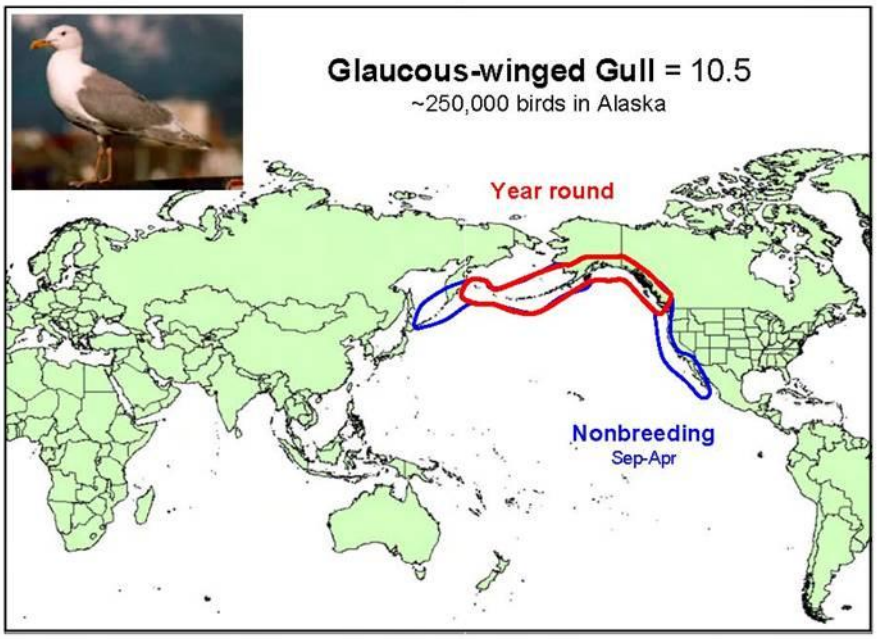


Figure 51. Glaucous-winged gull breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:
Summer and winter ranges overlap from Alaska to Oregon (NatureServe 2009). In winter, birds from the western edge of their range move south along the Pacific coast of Asia as far as Japan and birds in the eastern end of their range winter as far south as Baja California (Harrison 1983, ASIS 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:
We summarized a total of 2786 individual location records for the Glaucous-winged Gull from 121 unique data sources. Of the 2786 total records, 2310 records were within park boundaries and 476 were adjacent to parks (Fig. 52). Occurrence records covered the time period from 1896 to 2008. Glaucous-winged Gulls were detected in all four Alaska National Park networks, with the majority of observations (80%) in SWAN network parks (Fig. 52).

In SEAN network parks, Glaucous-winged Gulls were detected in GLBA year-round, while in SITK they were only documented during the summer. In SWAN network parks, birds were detected from April through September. Further north in the ARCN and CAKN parks, birds were present from May to August (Table 29, Fig. 52).

Birds staging during spring were observed at Cannery Creek near GLBA on 8, 24 and 29 April. Glaucous-winged Gulls were observed breeding primarily in coastal locations within all parks in the SWAN network, except for ALAG, and in GLBA within the SEAN network (Table 29). They also bred in WRST, where there is a colony on Malaspina Lake. Active colony records for this species spanned the time period 8 May to 12 August and included observations of nesting, presence at colonies during the breeding season, and eggs or post-breeding observations of chicks (with or without presence of adults). Recently fledged young were also observed during September in KATM. Birds were recorded in GAAR and BELA during the June and July breeding season, although breeding behavior was not observed (Table 29). All observations from the ARCN parks are well north of the known range of this species and may possibly be Glaucous Gulls that were misidentified; although breeding has been recorded from BELA and unconfirmed sightings have been reported in CAKR.

Fall staging was reported from Beauty Bay, KEFJ, as early as 15 August and as late as 4 October at the East Alsek River, near GLBA.

Table 29. Monthly occurrence of Glaucous-winged Gulls in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA						X		X				
WRST					X**	X**	X	X				
YUCH												
Arctic Network (ARCN)												
BELA							X	X				
CAKR					X							
GAAR						X	X					
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA		X	X		X**	X**	X**	X	X	X	X	X
KLGO		X										
SITK						X	X	X	X			
Southwest Alaska Network (SWAN)												
ALAG					X							
ANIA						X	X**	X	X			
KATM				X	X**	X**	X**	X**	X**			
KEFJ					X	X**	X**	X**	X			
LACL					X	X**	X**		X			

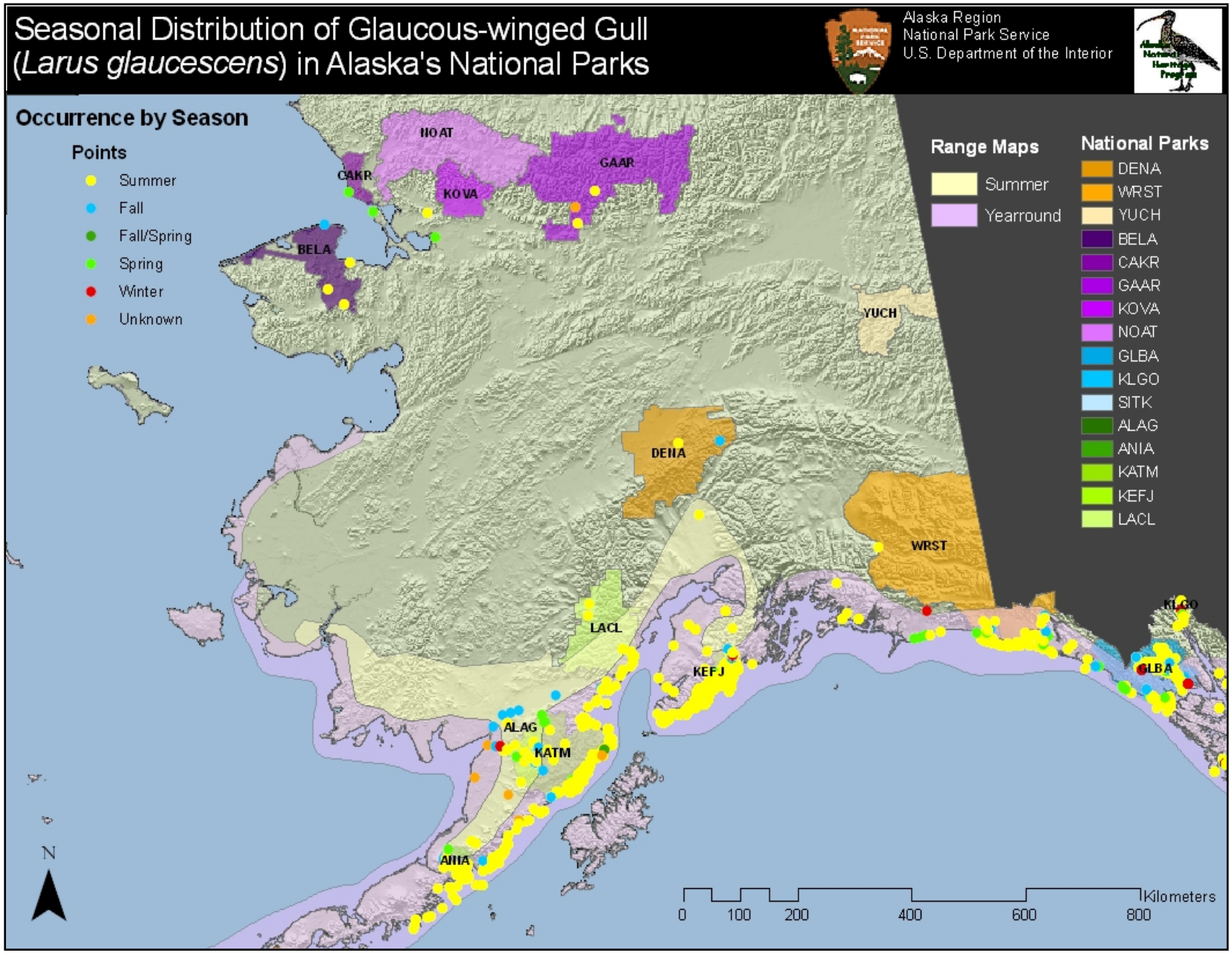


Figure 52. Seasonal distribution of Glaucous-winged Gull in and adjacent to Alaska's National Parks.

Glaucous Gull (*Larus hyperboreus*)

Range:

BREEDING: Breeds along the west and north coasts of Alaska and throughout most of low and high arctic in Canada. Breeding also occurs in Greenland, Iceland, northern Europe to the islands and coast of eastern Siberia (NatureServe 2009). The center of abundance of this species in Alaska is the Yukon-Kuskokwim Delta and the east side of the Bering Strait (ASIS 2006).

WINTERS: Glaucous Gulls winter primarily in coastal waters and their distribution is dependent on access to open water (ASIS 2006). The Alaskan breeding population winters on the Aleutian and Pribilof Islands, south to coastal Oregon and rarely as far south as California. In the Atlantic, the majority of birds winter in the Gulf of St. Lawrence and the Great Lakes; also winters from Labrador south to Virginia and North Carolina (ASIS 2006). See Fig. 53.

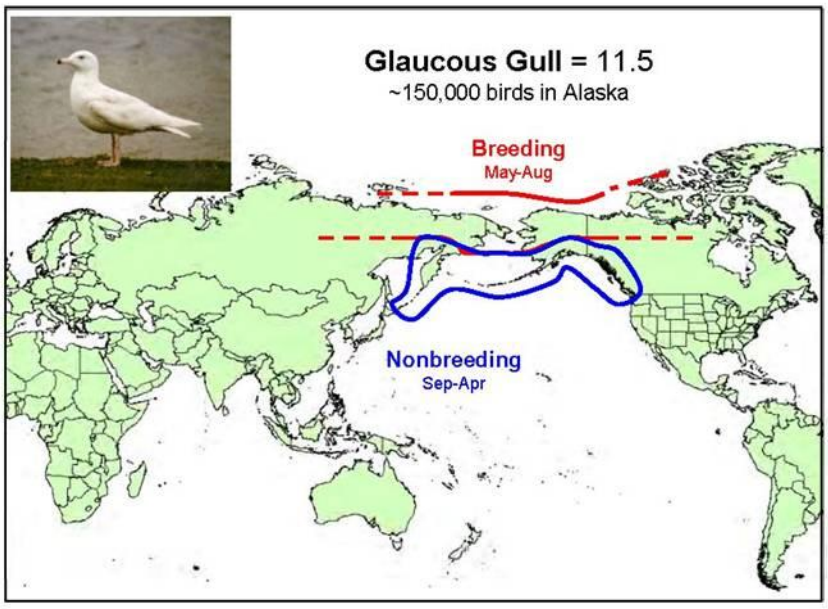


Figure 53. Glaucous Gull breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Summer and winter ranges partially overlap in some areas (NatureServe 2009). Arrives in breeding areas in Beaufort Sea area in May, most depart by mid-September, though some, especially juveniles, may remain into November (Johnson and Herter 1989).

Satellite telemetry has shown that birds breeding in Barrow spend much of the winter in coastal Russia, as far south as the Kamchatka Peninsula (AIHPAIBSWG 2006). It has been suggested that potentially 30 to 50% of the Alaska breeding population winters in Asia (AIHPAIBSWG 2006).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 306 individual location records for the Glaucous Gull from 16 unique data sources. Of the 306 total records, 183 records were within park boundaries and 123 were adjacent to parks (Fig. 54). Occurrence records covered the time period from 1956 to 2007. Glaucous Gulls were detected in all four Alaska National Park networks, with the majority of observations in the ARCN (90%) network parks (Fig. 54).

Seasonal distribution of Glaucous Gulls varied by network. In ARCN parks, Glaucous Gulls were present only during the breeding and post-breeding season; in the SEAN network, one observation in spring, a few in the fall and a single winter observation from GLBA; in SWAN parks, birds were recorded in April and June through September (Table 30). Observations documented in NOAT, KOVA, GAAR and KEFJ are beyond the known breeding range of this species, which is documented as Alaska's west and north coasts, and generally not inland. A pair of Glaucous Gulls on a nest and chicks were documented outside their breeding range in NOAT and KEFJ, respectively.

We were unable to determine spring migration dates from the data, although birds were observed staging as early as 8 April from the Akwe River and Cannery Creek near GLBA. Birds bred throughout the ARCN region, with numerous colonies in coastal areas reported from CAKR and BELA (Fig. 29). Breeding was also reported from KEFJ at Squab Island and in NOAT at Lake Tagakvik, Noatak River Delta, and Lake Narvakrak. The earliest nest was recorded in CAKR on 5 June; breeding colonies were still reported as active on 16 August at Toawlevic Point and Cape Deceit near BELA. Fall staging was reported at the East Alsek River near GLBA from 12 August to 14 October.

Table 29 . Monthly occurrence of Glaucous Gull in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X							
WRST												
YUCH												
Arctic Network (ARCN)												
BELA					X	X**	X**	X**				
CAKR					X	X**	X**					
GAAR					X	X*	X		X			
KOVA					X	X*				X		
NOAT					X	X	X**					
Southeast Alaska Network (SEAN)												
GLBA					X			X	X	X		X
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA									X			
KATM				X		X						
KEFJ						X**	X					
LACL				X		X		X				

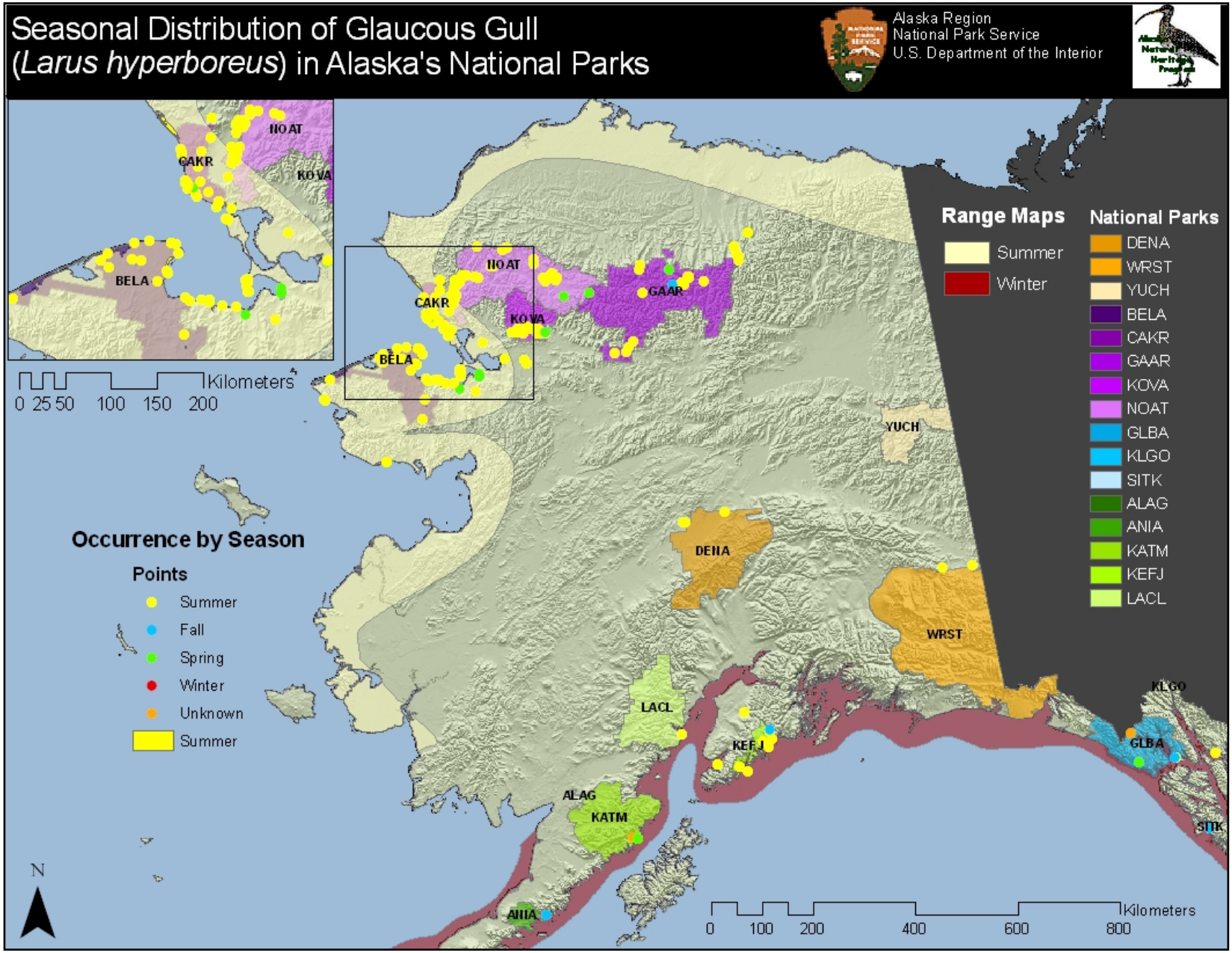


Figure 54. Seasonal distribution of Glaucous Gull in and adjacent to Alaska's National Parks.

Range:

BREEDING: Breeding range restricted to Alaska and eastern Siberia. Breeding occurs in coastal areas in Alaska throughout the Aleutian Islands as far west as Attu Island, north to the southeastern Chukchi Sea and east to the Alaska Peninsula, Yakutat, and Glacier Bay (Haney et al. 1991). Breeding in Asia is mostly confined to regions in or near the Sea of Okhotsk and western Bering Sea; recorded from the Commander Islands, Koraginsky (Karagin) Island, the Kamchatka Peninsula, and Sakhalin Island (Haney et al. 1991 in NatureServe 2009).

NON-BREEDING: The range during the nonbreeding season is not well known; the species is thought to be wide-ranging at sea (NatureServe 2009). In the winter all breeding birds appear to move southwest along the Pacific Coast of Asia to Japan and the Indonesian Islands as far as Java, Bali and Sulawesi (AIHPAIBSWG 2006). Recent observations in coastal waters around Hong Kong in spring and fall and Singapore and the Indonesian islands of Karimuna and Bintan between October and April indicate that at least part of the population migrates through and winters in these areas (NatureServe 2009). See Fig. 55.

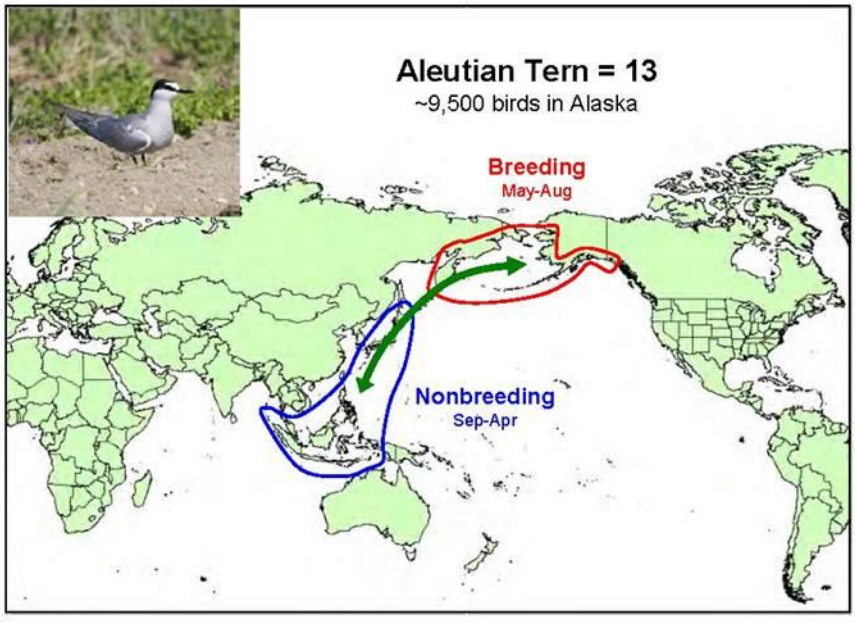


Figure 55. Aleutian Tern breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Arrives in eastern Alaska in late April, in western and northern Alaska from mid-May to early June. Flocks begin to form in staging areas from late July to early August, prior to departure for wintering areas (Haney et al. 1991).

Generally arrives in Gulf of Alaska about two weeks prior to arrival in Aleutian Islands. Arrives at Copper River Delta and Prince William Sound region 20 April through 7 May; at Kenai

Peninsula and Kodiak areas 4 to 16 May, one week later than Arctic Terns; in Homer around 11 May; and 18 May to 7 June on the Aleutian Islands, Bristol Bay, and Bering and Chukchi seas (North 1997).

Fall migration begins shortly after individuals abandon colonies, typically in August. Staging sometimes occurs in coastal areas, but birds usually depart directly for the sea. Staging flock observed at Safety Inlet, Seward Peninsula 11 August. Typical late dates are 7 to 28 August in the Gulf of Alaska, 12 August to 1 September in the Aleutian Islands and Bristol Bay, and 13 August to 19 September in the Bering and Chukchi Seas (North 1997).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 82 individual location records for the Aleutian Tern from 17 unique data sources. Of the 82 total records, only 34 were within park boundaries with the remainder adjacent to parks in coastal areas (Fig. 56). Occurrence records covered the time period from 1923 to 2008. Aleutian Terns were detected in five parks: WRST, CAKR, and GLBA where they were documented breeding during summer months; in KATM where they were classified as probable breeders in June; and in KEFJ where they were detected in May and August, likely during migration (Table 31). There were also numerous observations during summer in coastal areas adjacent to BELA (i.e. Shishmaref, Lopp Island) and near WRST (i.e. Yakutat) (Fig. 56).

The earliest breeding record was reported on 29 May from Lituya Bay in GLBA. The latest breeding observation was from CAKR at the Uhl-Williams camp on 4 August. Breeding observations included colonial nesting, eggs or post-breeding observations of chicks (with or without presence of adults). Dates were not available for staging, migration, or molting.

Table 31. Monthly occurrence of the Aleutian Tern in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAN)												
DENA												
WRST						X**	X					
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR						X	X	X**				
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA					X**	X**	X**					
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM						X*						
KEFJ					X			X				
LACL												

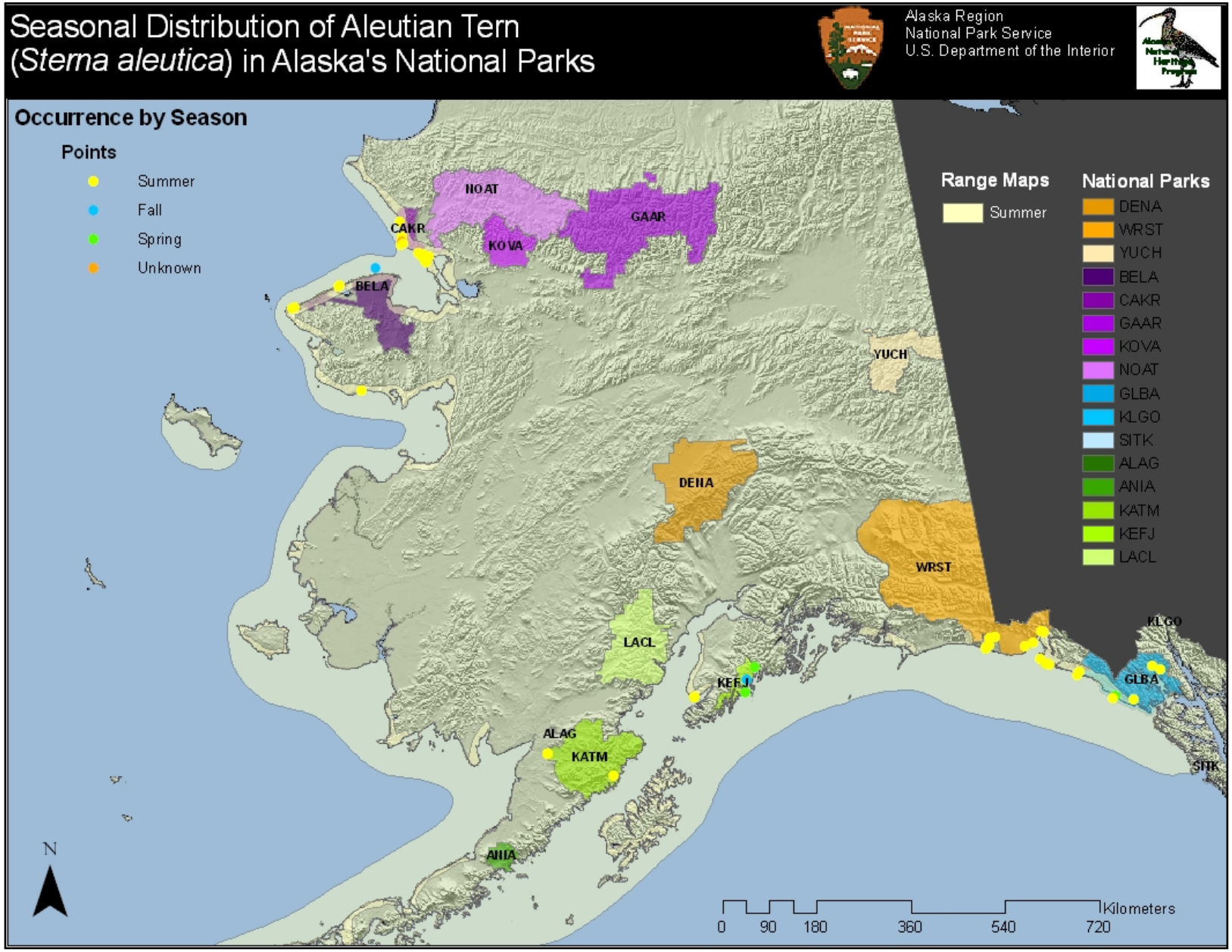


Figure 56. Seasonal distribution of Aleutian Tern in and adjacent to Alaska's National Parks.

Range:

BREEDING: The Kittlitz's Murrelet inhabits Alaskan coastal waters, discontinuously from Point Lay south to northern portions of Southeast Alaska. It is an uncommon and secretive breeder, with only about two dozen known nest records. All of the North American and most of the world population breed, molt and winter in Alaska; a small proportion of the world population breeds in the Russian Far East from the Okhotsk Sea to the Chukchi Sea (Day et al. 1999).

NON-BREEDING: The winter range is not well known, but the species is probably pelagic (Day et al. 1999). There are records of occasional winter sightings in southeast and western Alaska, and locally common sightings in a few locations in south-coastal Alaska (Kendall and Agler 1998, Day et al. 1999). Kittlitz's Murrelets also occur during winter in the mid-shelf regions of the northern Gulf of Alaska (Day and Prichard 2001). The winter range outside the Americas is largely unknown, but the species has been reported from the Kamchatka Peninsula and the Kuril Islands. See Fig. 57.

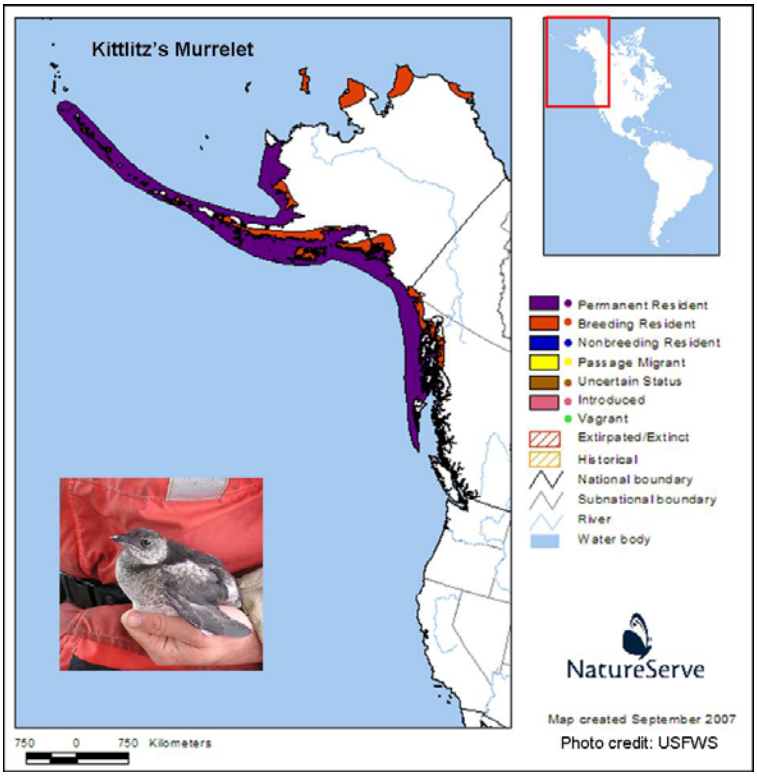


Figure 57. Kittlitz's Murrelet breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

Populations in the Bering and Chukchi Seas probably move south away from pack ice (Day et al. 1999). Other migration is apparently limited; mainly an ecological shift at least in the south.

Kittlitz's Murrelets breed in Prince William Sound; numbers peak in July but they begin to depart in August and by mid-August very few are left (Kuletz et al. 2003, Labunski et al. 2003).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 327 individual location records for the Kittlitz's Murrelet from 49 unique data sources. Of the 327 total records, 243 records were within park boundaries and 84 were adjacent to parks (Fig. 58). Occurrence records covered the time period from 1907 to 2008. The Kittlitz's Murrelet was only detected in parks with a coastal component, specifically in GLBA, KATM, KEFJ and WRST (Table 32). Kittlitz's were also detected in coastal areas adjacent to BELA in the ARCN network, near Cape Prince of Wales, Wales and Paulina Creek.

Kittlitz's were reported breeding in GLBA, KATM, KEFJ and WRST. Breeding records were highly variable. The earliest reported nest was documented on the 28 and 29 of April from Cape Prince of Wales near BELA. It should be noted that this record was from 1922 and is quite old. The next earliest nest date was for 1 June from the Malaspina Glacier near WRST. Female with young were also documented as late as 12 August in Glacier Bay in 1927 (Gabrielson and Lincoln 1959).

Table 32. Monthly occurrence of Kittlitz's Murrelet in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding. An underlined park name indicates that this species was not previously recorded within that park.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA						X						
WRST			X		X	X**	X*					
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR												
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA				X	X	X	X**	X**	X			
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM				X		X	X**					
KEFJ					X	X**	X	X				
LACL						X		X				

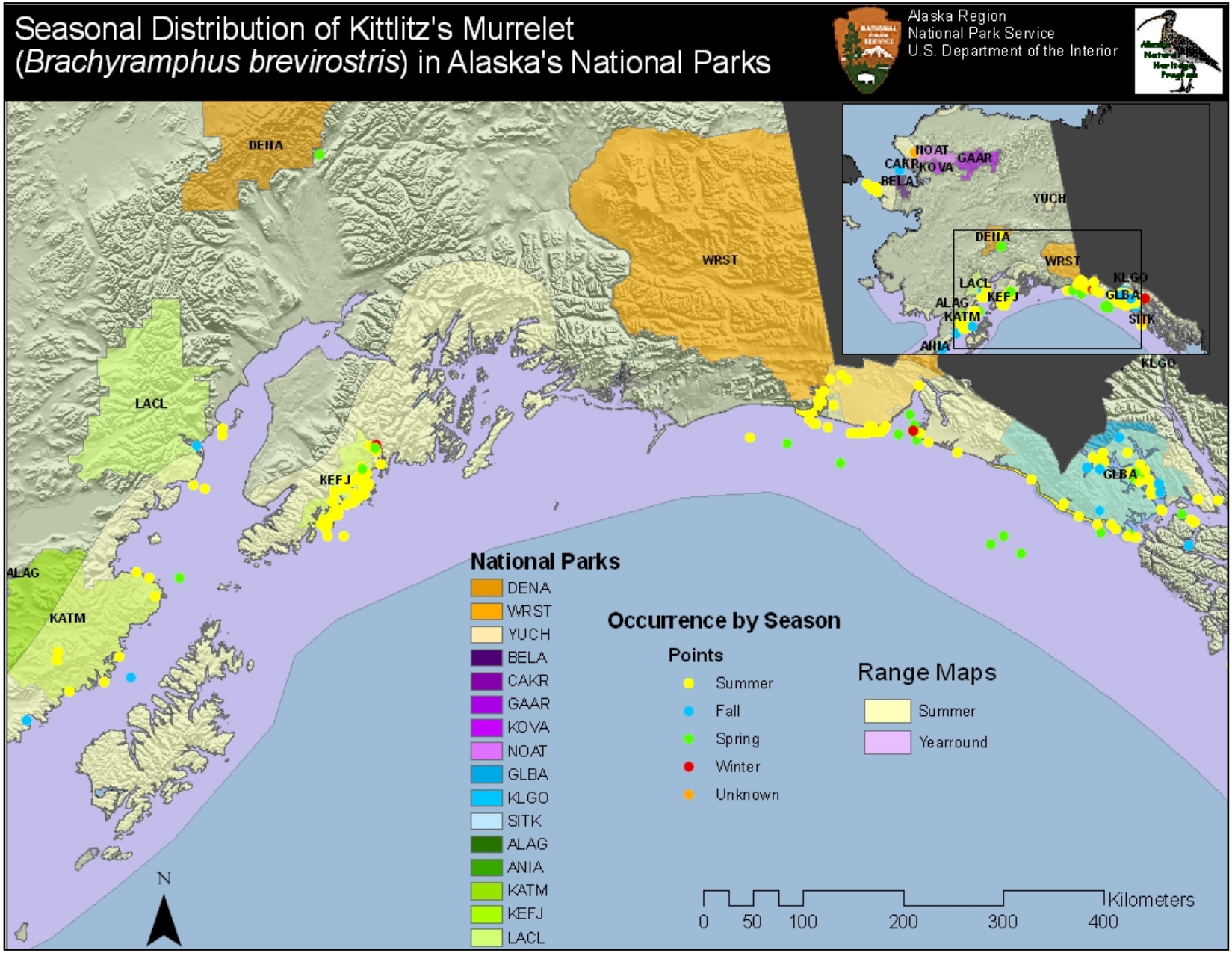


Figure 58. Seasonal distribution of the Kittlitz's Murrelet in and adjacent to Alaska's National Parks.

Range:

BREEDING: Western, south and central Alaska, southern Yukon to southern Labrador, south to northern Baja California, Arizona, New Mexico, the Guadalupe mountains of western Texas, and central Saskatchewan south through central Minnesota, northeastern Ohio, and Massachusetts, locally in Appalachians south to Tennessee and North Carolina (AOU 1983, Altman and Sallabanks 2000).

NON-BREEDING: Mountains of South America, mainly in the Andes from Colombia and Venezuela to southeastern Peru; in small numbers in Central America and southern Mexico (AOU 1983, Stiles and Skutch 1989); also in Amazonian and southeastern Brazil (Willis et al. 1993). See Fig. 59.

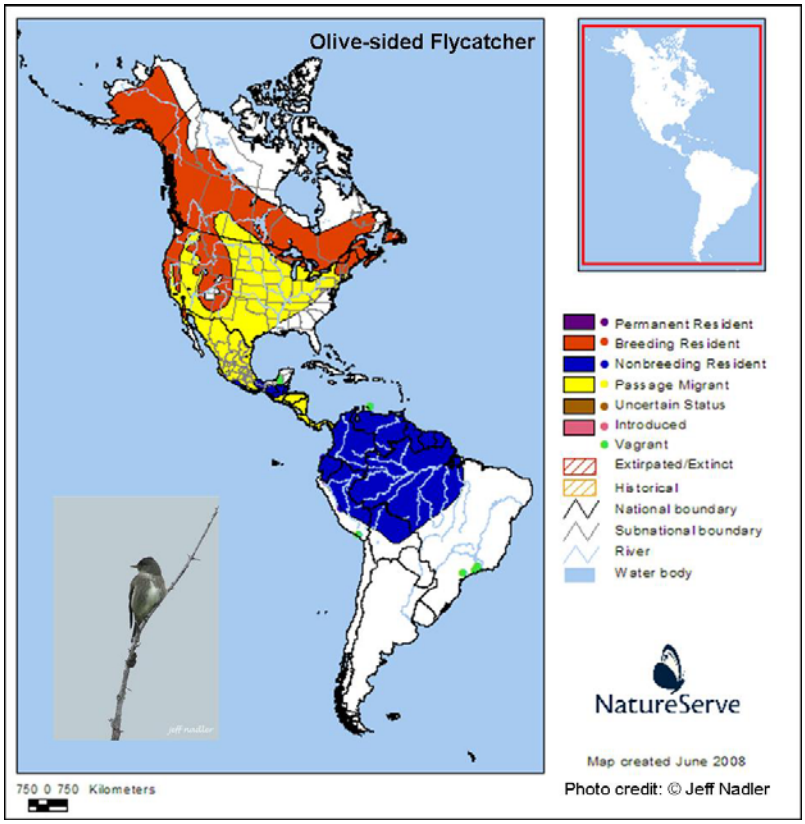


Figure 59. Olive-sided Flycatcher breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

Migrates regularly through most of the western U.S. and Middle America, less commonly in the eastern U.S., casually along the southern Atlantic coast and in peninsular Florida (AOU 1983), although Duncan (1988) found it to be a rare, but regular, fall migrant in extreme northwest Florida. Possibly because of their dependence upon flying insects as prey, these birds arrive rather late on their breeding grounds from South America. Spring arrivals appear during the second and third weeks of May in Vermont (Fichtel 1985) and even into June in neighboring

New York (Bull 1974, Peterson 1988). Olive-sided Flycatchers are early fall migrants, usually rare after mid-September in New York. Arrive in nesting areas usually in May (or sometimes as late as early June); most depart northeastern U.S. by mid-September. Migrates through Costa Rica late August to late October and mid-March to early June (Stiles and Skutch 1989). Individuals often return to same wintering area in successive years. Present in Alaska from the middle of May to early September (Kessel and Gibson 1978); mean arrival date for males in Fairbanks for 1995 and 1996 was 24 to 26 May (range 11 May to 8 June), with females arriving 7 to 9 days later (range 22 May to 10 June; Wright 1997).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 590 individual location records for the Olive-sided Flycatcher from 27 unique data sources. Of the 590 total records, 273 records were within park boundaries and 317 were adjacent to parks (Fig. 60). Occurrence records covered the time period from 1925 to 2008. Olive-sided Flycatchers were detected in all four Alaska National Park networks, with the majority of observations from the CAKN (72%) network parks (Table 33).

Olive-sided Flycatchers were detected in Alaska's National Parks between May and September (Table 33). The earliest spring migration record was for 31 May in Skagway. Most observations of Olive-sided Flycatchers were recorded during Breeding Bird Surveys. Detections during Breeding Bird Surveys for landbirds are commonly aural and the general assumption is that if males were heard singing in an area, then that species probably breeds within the area. In order to maintain consistency throughout this report, and as no nests or young were observed, we have categorized observations collected during Breeding Bird Surveys as "probable breeding".

Male Olive-sided Flycatchers were heard singing on territories as early as 4 June from White Pass Fork, KLGO and as late as 3 July near Somber Creek in DENA. Olive-sided Flycatchers were probable breeders in DENA, WRST, GAAR, KOVA, NOAT, KLGO and KATM (Table 33). Aggregated and more numerous detections were made in YUCH and GAAR, which is likely an artifact of survey effort, which was intensive in these two parks.

Table 33. Monthly occurrence of Olive-sided Flycatcher in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA						X*	X*					
WRST					X	X*	X	X				
YUCH						X						
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR						X*	X					
KOVA						X*		X				
NOAT					X	X*						
Southeast Alaska Network (SEAN)												
GLBA												
KLGO						X*						
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM						X*		X	X			
KEFJ												
LACL					X		X					

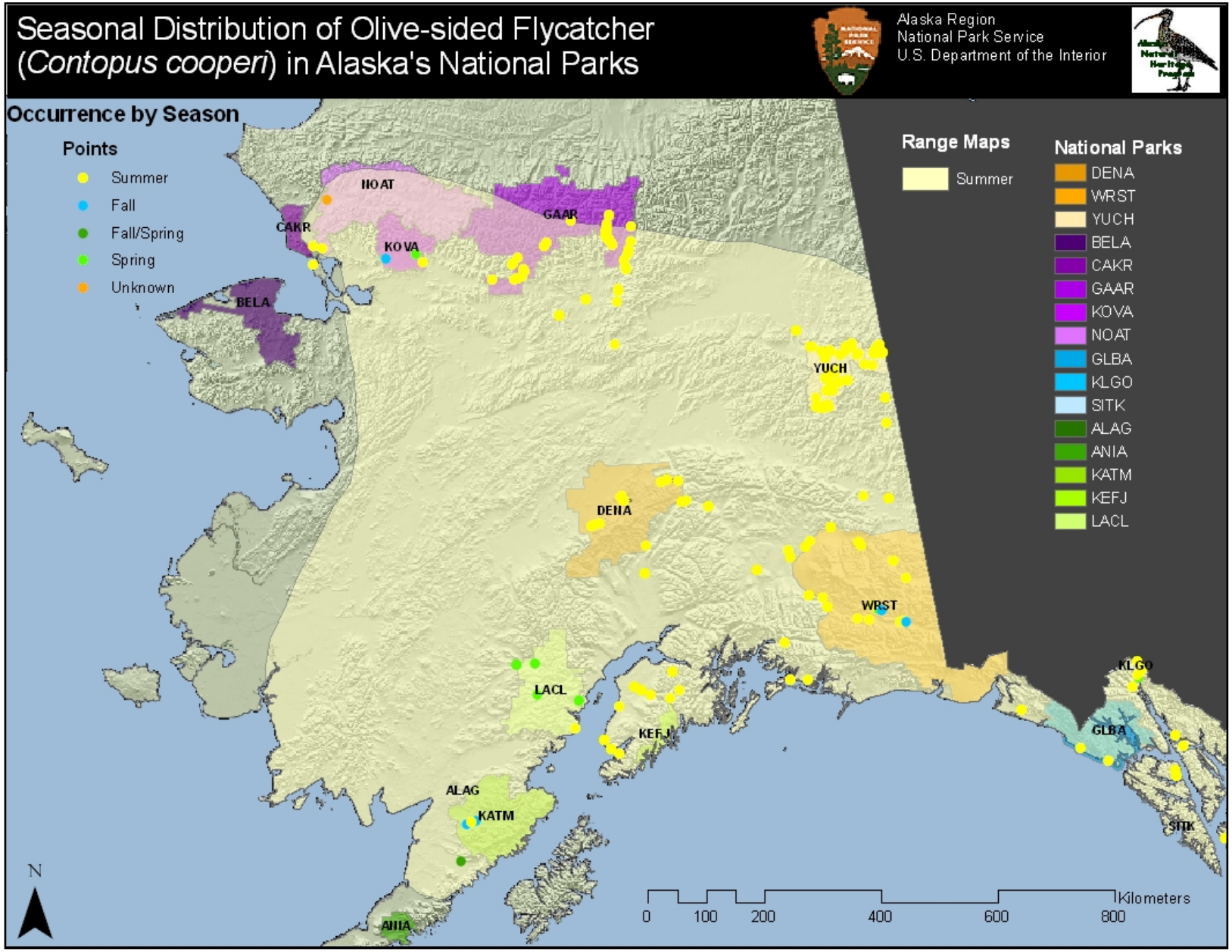


Figure 60. Seasonal distribution of the Olive-sided Flycatcher in and adjacent to Alaska's National Parks.

Range:

BREEDING: Occurs in western and central Alaska from the Noatak River and western and central Brooks Range south to southwestern Alaska, base of Alaska Peninsula, Alaska Range, and Susitna River highlands. Also breeds in Eurasia from northern Norway, Sweden, Finland, northern Russia and in northern Siberia south to central Russia, Kamchatka, Sakhalin, Japan, and Kuril and Komandorskiye islands (Lowther 2001).

NON-BREEDING: Winters in southeastern Asia, East Indies, Philippines, and Moluccas (NatureServe 2009). See Fig. 61.

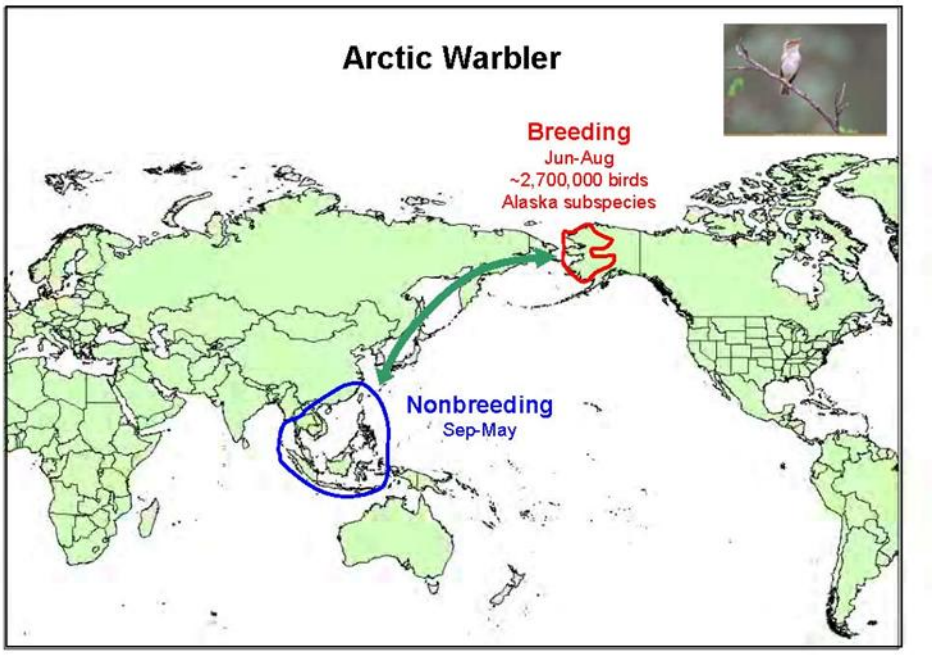


Figure 61. Arctic Warbler breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Northward migration begins mid-April; arrival in Alaska late May to early June. Departs for southward journey in mid-May to early September (Lowther 2001). Specimens representing Asiatic breeding populations have been taken in migration on the Aleutian Islands (NatureServe 2009).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 213 individual location records for the Arctic Warbler from 26 unique data sources. Of the 213 total records, 118 records were within park boundaries and 95 were adjacent to parks (Fig. 62). Occurrence records covered the time period from 1904 to 2008. Arctic Warblers were detected at all parks in the CAKN network; at BELA, CAKR, GAAR and

NOAT in the ARCN network; and in KATM in the SWAN network. The majority of observations were from the CAKN (68%) network parks (Table 34).

Arctic Warblers were observed in Alaska's National Parks between early-June and August (Table 34). The earliest spring migration record was on 31 May from Noatak Village along the Noatak River, near NOAT. The first nest was recorded on 3 July from near Anorat Creek in GAAR; adults with chicks were reported as late as 11 August from Wrench Creek in NOAT. Considered a rare breeder in KATM, in 2005 Arctic Warbler males were reported singing here and in 2008 an adult was observed feeding a fledgling at King Salmon Creek near KATM. At least 67 observations during the breeding season were documented from DENA, many collected during Breeding Bird Surveys (Fig. 62). We have classified these observations as "probable breeding" as no nests or young were observed, although it is assumed that if a male was heard singing then that species probably breeds within the vicinity. BELA and CAKR are within the known breeding range of this species. However, based on available data, we were not able to ascertain whether Arctic Warblers bred in these two parks.

Table 34. Monthly occurrence of Arctic Warbler in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA						X*	X*	X				
WRST						X						
YUCH						X						
Arctic Network (ARCN)												
BELA						X	X	X				
CAKR						X	X	X				
GAAR						X*	X**					
KOVA												
NOAT						X*	X**	X**				
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM						X*						
KEFJ												
LACL												

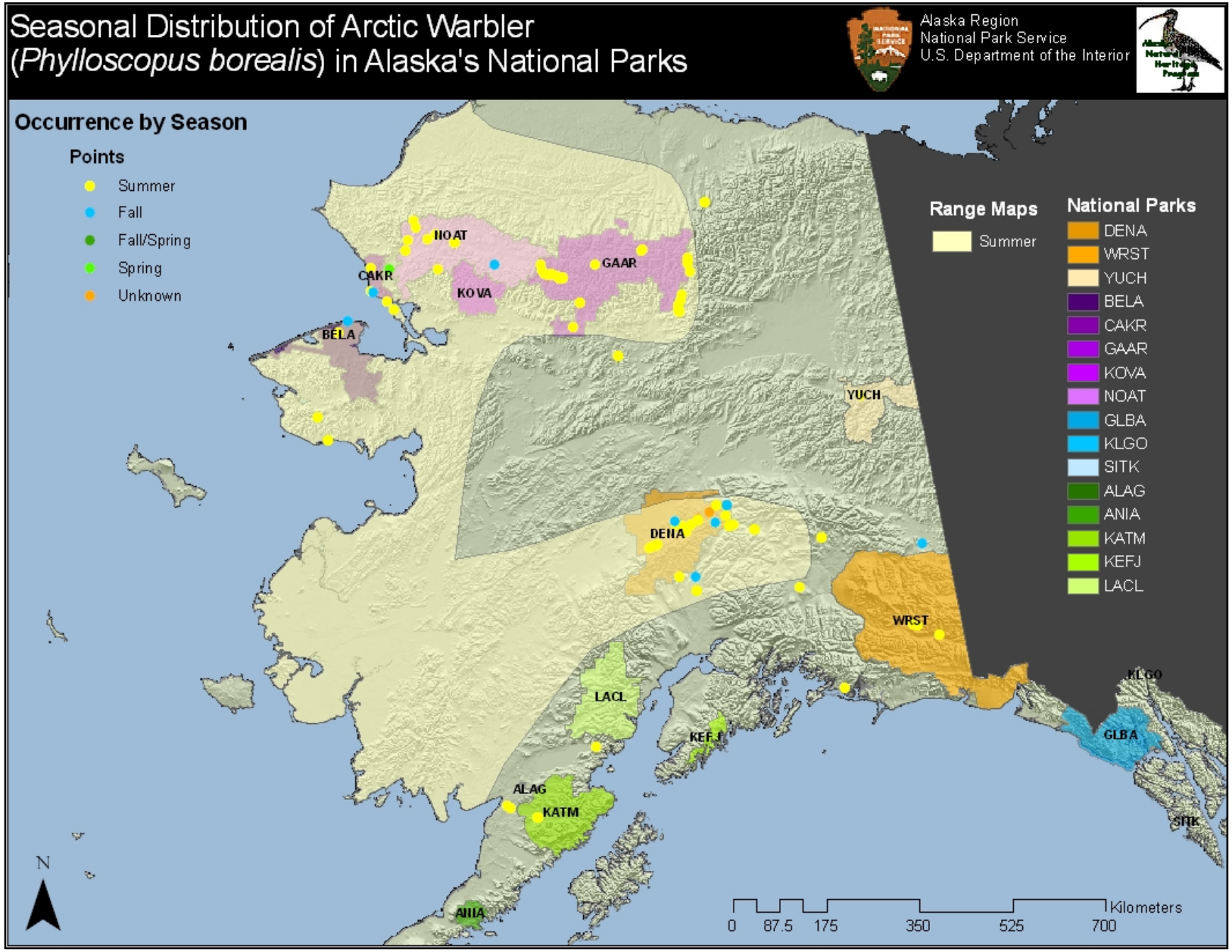


Figure 62. Seasonal distribution of the Arctic Warbler in and adjacent to Alaska's National Parks.

Range:

BREEDING: Breeding range extends from northeastern Siberia and northern Alaska across northern Canada to Labrador and Newfoundland, south to southern Alaska, northwestern British Columbia, southern Mackenzie, northern Alberta (probably), northeastern Saskatchewan, northern Manitoba, extreme northern Ontario, south-central Quebec, and St. Pierre Island and Miquelon Island (Ouellet 1993, NatureServe 2009). Also in northeastern Siberia (AIHPAIBSWG 2006).

NON-BREEDING: During the northern winter, the species occurs mostly in northern South America: Guyana, Venezuela, Colombia, eastern Ecuador, eastern Peru, and western Amazonian Brazil; perhaps mainly in southern Venezuela and western Amazon basin; Trinidad; rarely north to Panama, casually north to Costa Rica (Ouellet 1993, NatureServe 2009). See Fig. 63.

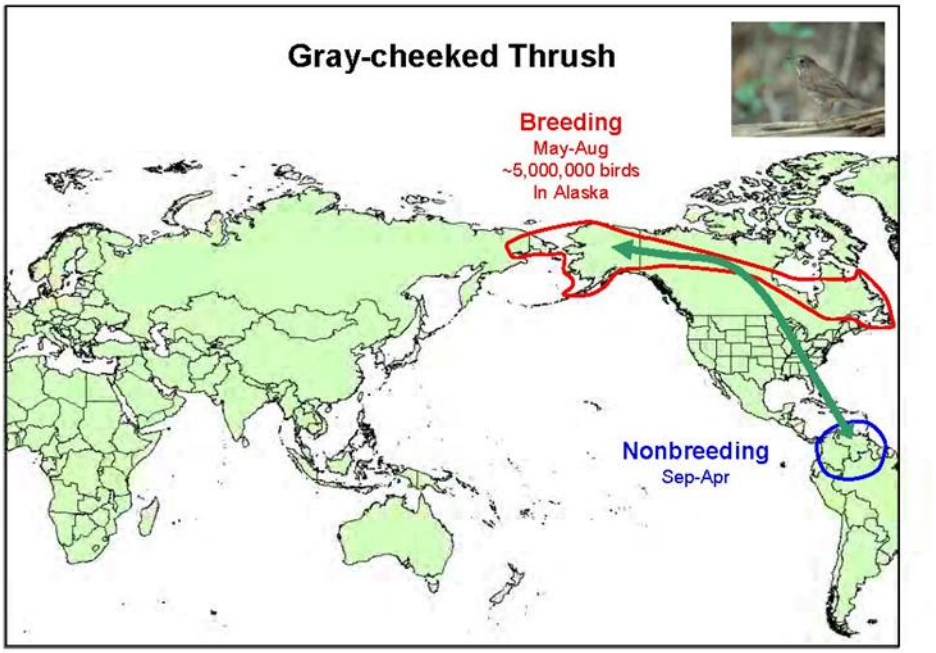


Figure 63. Gray-cheeked Thrush breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

Arrives Alaska late May and leaves in early September (Gabrielson and Lincoln 1959). At Fairbanks, earliest first arrival 12 May, latest 30 May, most (26 of 34 years) between 15 and 22 May; southcoastal Alaska arrives a few days later than Fairbanks; Kodiak Island by early June. Usual arrival in west and southwest Alaska during last week in May; earliest record on Seward Peninsula 18 May, peaks at Wales (westernmost tip) about 6 to 10 June; latest 14 June. Usual passage across St. Matthew and St. Lawrence islands in Bering Sea early June. In fall, migration underway by mid-August, peaks late August, latest recorded on Seward Peninsula 8 September, latest at Fairbanks, 29 September (Lowther et al. 2001).

Winters in South America and migrates through North America to Alaska in spring via the Mississippi Flyway (Kessel 1989). Spreads out over all of the eastern U.S. from the Atlantic Coast to the Mississippi Valley and only sparingly farther west; follows the Yukon and Mackenzie Rivers in Alaska (Bent 1949). Birds summering in Alaska are thought to migrate far to the east before flying south to their wintering grounds (Bent 1949, Kaufman 1996).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 1607 individual location records for the Gray-cheeked Thrush from 54 unique data sources. Of the 1607 total records, 1042 records were within park boundaries and 565 were adjacent to parks (Fig. 64). Occurrence records covered the time period from 1899 to 2008. Gray-cheeked Thrush were widely distributed throughout the state and were detected in all four Alaska National Park networks; the majority of observations were from the CAKN (59%) and ARCN (29%) network parks (Fig. 64).

Gray-cheeked Thrush were observed in Alaska's National Parks between May and September (Table 35). The earliest nest was recorded on 31 May at Turquoise Lake, LACL; chicks were reported as late as 1 September from Mother Goose Lake near ANIA. Breeding or probable breeding was reported in every park this species occurred in except BELA (Table 35). The only available fall migration dates for this species were a range of dates from 30 July to 8 September from the Denali Institute.

Table 35. Monthly occurrence of Gray-cheeked Thrush in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA						X*	X*	X	X			
WRST					X	X*	X**					
YUCH						X*						
Arctic Network (ARCN)												
BELA						X		X				
CAKR					X*	X		X				
GAAR					X	X*						
KOVA					X**	X**		X**				
NOAT						X**	X	X				
Southeast Alaska Network (SEAN)												
GLBA						X**						
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG						X*						
ANIA						X*						
KATM					X	X*	X*		X*			
KEFJ					X	X*	X*		X			
LACL					X**	X**	X**					

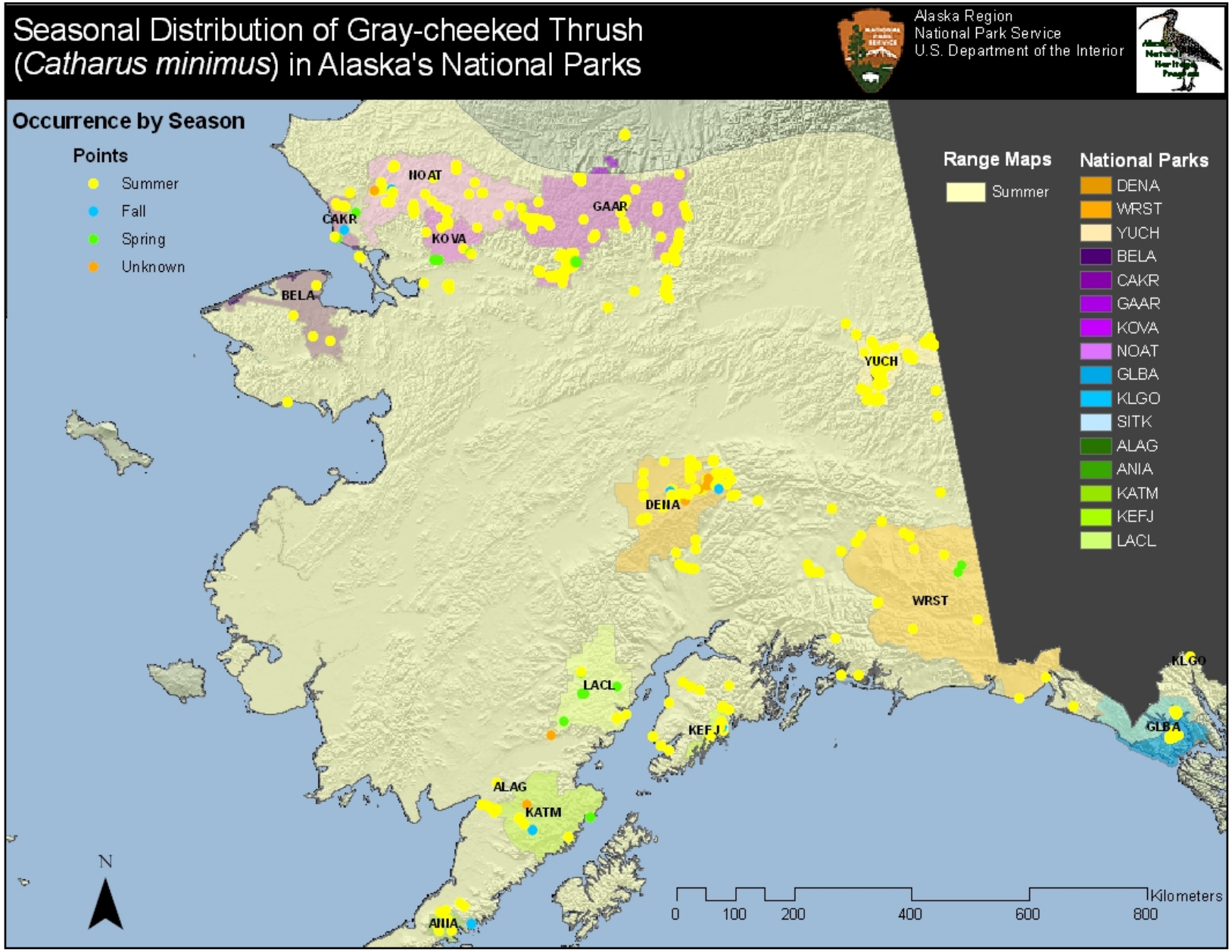


Figure 64. Seasonal distribution of Gray-cheeked Thrush in and adjacent to Alaska's National Parks.

Eastern Yellow Wagtail (*Motacilla tschutschensis*)

Range:

BREEDING: Breeds on coastal uplands of western Alaska, St. Lawrence Island, Punuk Island, and northwest Alaska in the northern foothills of the Brooks Range (Thompson 1967, Kessel and Gibson 1978). Less abundant in northern Alaska along the Beaufort Sea coast east to the Mackenzie River delta, Canada (Byrd et al. 1978, Kessel and Gibson 1978, Badyaev et al. 1998).

NON-BREEDING: Winters in Southeast Asia and Indonesia (AIHPAIBSWG 2006). See Fig. 65.

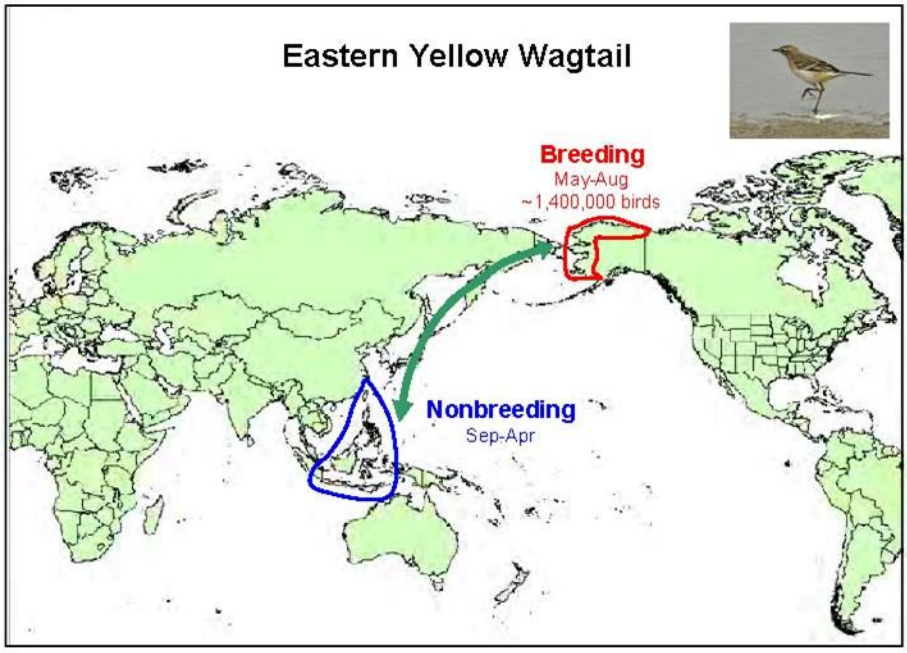


Figure 65. Eastern Yellow Wagtail breeding and non-breeding range (map courtesy of AIHPAIBSWG 2006).

Mobility and Migration:

In spring, begins arrival in western Alaska in late-May; migration peaks early June, continues to mid-June. Fall migration in northern Alaska begins in early August, lasts throughout the month, although late sightings have been made on the Seward Peninsula in late September and early October and on Nunivak Island in mid-October. In fall, individuals return to Asia across the southern Chukchi Sea and northern and central Bering Sea, then southward down the Asian coastline to wintering grounds somewhere in Southeast Asia and the East Indies (Badyaev et al. 1998).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 53 individual location records for the Eastern Yellow Wagtail from 4 unique data sources. Of the 53 total records, only 2 records were within park boundaries; the remainder were adjacent to parks (Fig. 66). Occurrence records covered the time period from

1956 to 2008. Eastern Yellow Wagtails were observed in DENA during May and GAAR in July (Table 36). The majority of observations were recorded northeast of GAAR and south of KOVA and CAKR and were categorized as probable breeders based on aural detections during Breeding Bird Surveys (Fig. 66).

Table 36. Monthly occurrence of Eastern Yellow Wagtail in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X							
WRST												
YUCH												
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR							X					
KOVA												
NOAT												
Southeast Alaska Network (SEAN)												
GLBA												
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

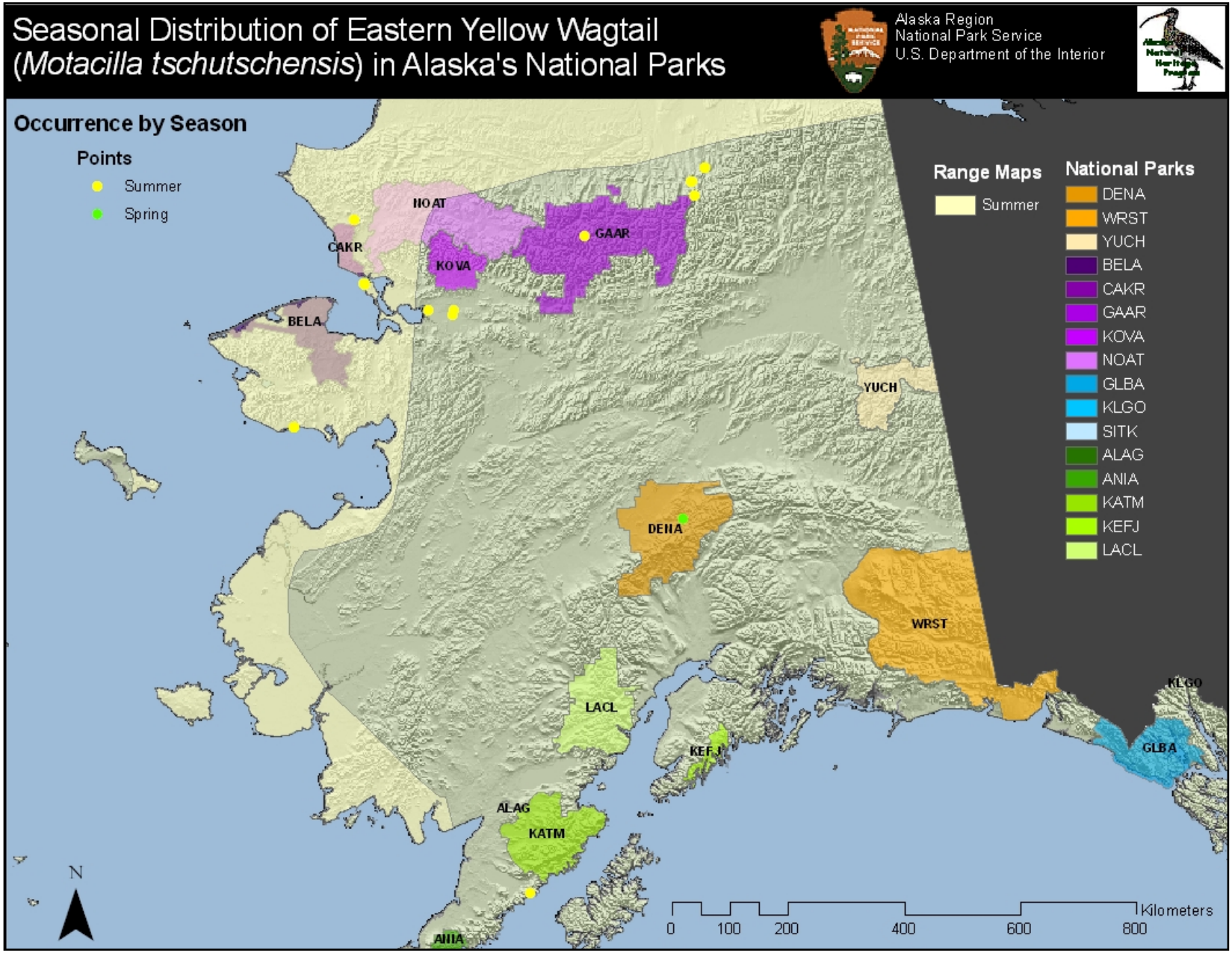


Figure 66. Seasonal distribution of the Eastern Yellow Wagtail in and adjacent to Alaska's National Parks.

Range:

BREEDING: Western Alaska as far north as the Kobuk and lower Noatak drainages, south to Katmai; common in central Alaska south to the Matanuska-Susitna Valley, less common in east-central Alaska and the Kenai Peninsula, a rare migrant in Southeast Alaska (Gabrielson and Lincoln 1959, Hines 1963, Isleib and Kessel 1973, Kessel and Gibson 1978, Kessel 1989, Petersen et al. 1991, BPIF Working Group 1999, Cotter and Andres 2000). Also in northwestern Canada (Mackenzie Delta) to northern Labrador and Newfoundland, south to southern Alaska, south-central British Columbia, northern Saskatchewan, eastern New York, northern New England, and Nova Scotia (NatureServe 2009).

NON-BREEDING: Primarily in Amazon basin in Colombia, Venezuela, Ecuador, Peru, Brazil, and Bolivia. Several records from southern South America (perhaps common locally in southeastern Brazil; Ridgely and Tudor 1989). Autumn transient in Bermuda, Bahamas, eastern Greater Antilles, and throughout Lesser Antilles. Spring transient in western Greater Antilles and Bahamas. Casual in Central America (Stiles and Skutch 1989). See Fig. 67.

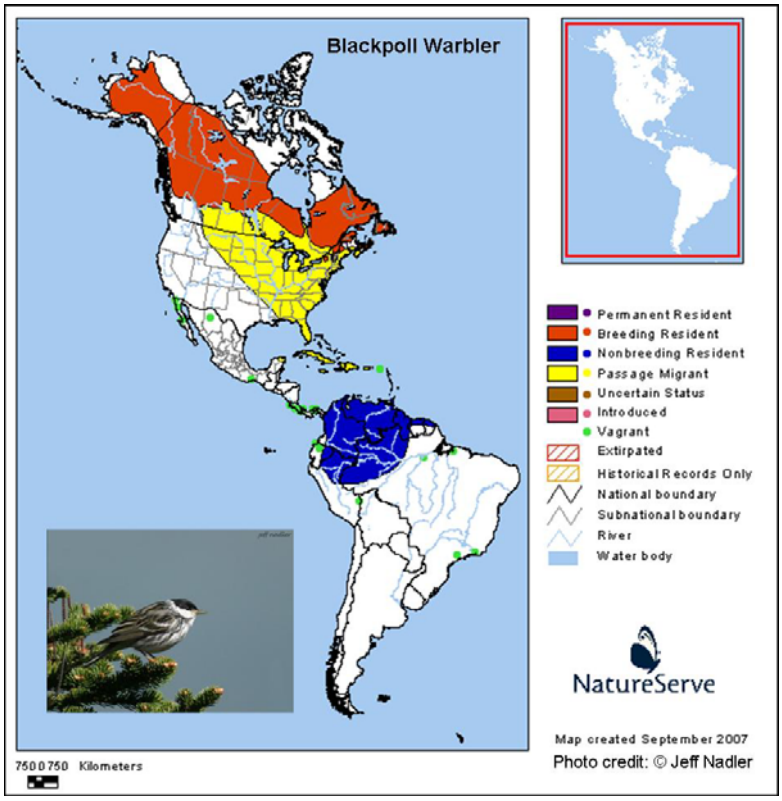


Figure 67. Blackpoll Warbler breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

Northward migration begins late spring (early to mid-April; Hunt and Eliason 1999). Migration occurs east of the western Great Plains; passage through areas west of the Rocky Mountains rare, but regular (Pogson et al. 1997). Also a late migrant in Atlantic states; moves through Northeast in May and June (Terres 1980). Arrives in Alaska late May to early June; thought to move through the Mackenzie Valley and down the Yukon and Kuskokwim Rivers to breeding grounds (Bent 1953, Gabrielson and Lincoln 1959, Kessel 1989, Nisbet et al. 1995, Hunt and Eliason 1999, Latta and Brown 1999, McNair et al. 2002).

Southward migration usually commences by late August in Alaska (Gabrielson and Lincoln 1959) and early October in Newfoundland (Peters and Burleigh 1951). Western breeding birds travel southeast across Canada and the northern U.S., assembling along the coastal plain between Nova Scotia and Cape Hatteras, N.C. and as far west to western Massachusetts and West Virginia, where they join migrants from the eastern breeding range (Hunt and Eliason 1999). Birds travel to northern South America nonstop or through the West Indies (McNair and Post 1993). Typically present in South America between September and April, occasionally not until May (Ridgely and Tudor 1989).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 410 individual location records for the Blackpoll Warbler from 46 unique data sources. Of the 410 total records, 144 records were within park boundaries and 266 were adjacent to parks (Fig. 68). Occurrence records covered the time period from 1899 to 2008. Blackpoll Warblers were detected in all four Alaska National Park networks (Table 37).

Blackpoll Warblers were detected in CAKN and ARCN networks during the breeding season, from May through August, SWAN May through July, and in SEAN parks during July (GLBA). Observations were also reported from KEFJ, but specific dates were not provided. The majority of observations were from the CAKN (40%) and SWAN (38%) network parks (Table 37).

The earliest spring migration record was for 3 June from the Toklat River, DENA. Adults with chicks were first reported on 26 June from Uvgoon Creek, NOAT; adults were sighted with chicks as late as 20 July in Noatak Village. Birds with nests or young were observed in NOAT and KATM. Breeding records and other summer observations from KATM are slightly beyond the known breeding range of this species. Probable breeding was recorded in DENA, WRST, GAAR, KOVA and LACL. These observations were classified as "probable breeding" based on detection during Breeding Bird Surveys. Probable breeding and summer observations in GAAR, GLBA, KEFJ, and WRST are also beyond the known breeding range of this species. Fall migration dates from the Denali Institute banding station spanned 1 August to 8 September.

Table 37. Monthly occurrence of Blackpoll Warbler in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAKN)												
DENA					X	X*	X*	X				
WRST					X*	X*		X				
YUCH						X						
Arctic Network (ARCN)												
BELA												
CAKR					X							
GAAR						X*						
KOVA						X*		X				
NOAT						X**	X					
Southeast Alaska Network (SEAN)												
GLBA							X					
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG						X						
ANIA												
KATM						X*	X**					
KEFJ												
LACL					X	X*						

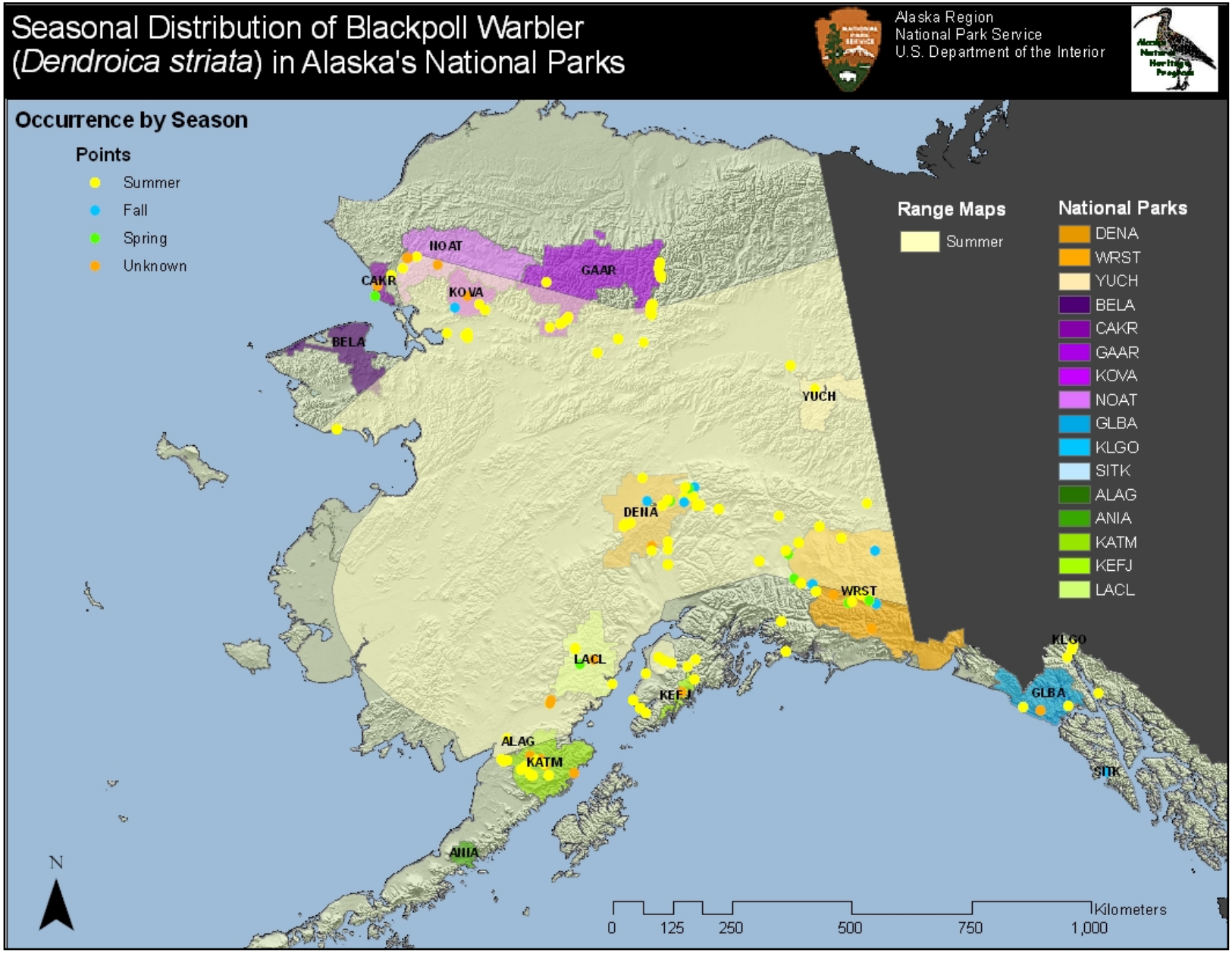


Figure 68. Seasonal distribution of Blackpoll Warbler in and adjacent to Alaska's National Parks.

Range:

BREEDING: Breeding range is divided into two geographically distinct regions in Alaska: the Brooks Range and northern foothills and uplands of southeastern central Alaska (Kessel and Gibson 1978). Range extends southward into adjacent northwestern British Columbia and northward across northern Yukon and Mackenzie to southern Keewatin, northeastern Manitoba and extreme northern Ontario (NatureServe 2009).

NON-BREEDING: Kansas and Iowa south to Oklahoma, east-central Texas, and northwestern Louisiana (NatureServe 2009). See Fig. 69.

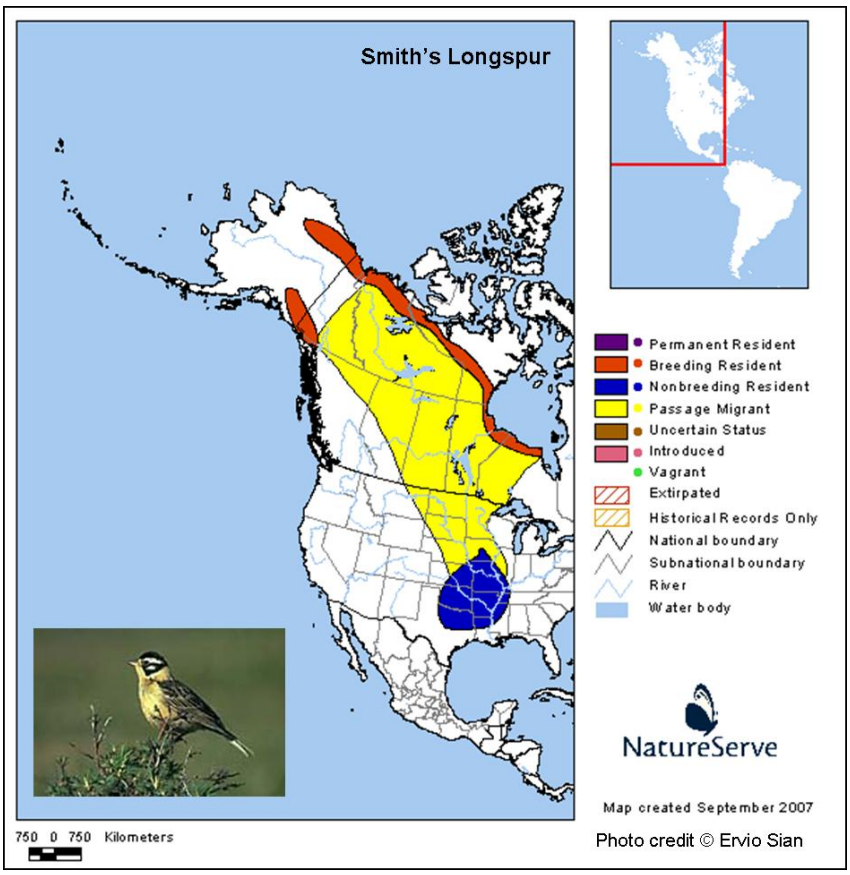


Figure 69. Smith's Longspur breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

A nearctic migrant, migrates in large loose flocks of between 22 and 250 conspecifics, but occasionally found with Lapland Longspurs (*Calcarius lapponicus*) and Snow Buntings (*Plectrophenax nivalis*) (Terres 1980, Briskie 1993). Begins northward migration between March and April, arrives in nesting areas in northern Alaska in late May and early June; departs northern Alaska by end of August (Terres 1980, Johnson and Herter 1989). Fall migration,

through Canadian prairies to wintering grounds in southcentral U.S., occurs from late August to mid September.

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 83 individual location records for the Smith's Longspur from 12 unique data sources. Of the 83 total records, 63 records were within park boundaries and 20 were adjacent to parks (Fig. 70). Occurrence records spanned the time period 1948 to 2008. Smith's Longspur were detected in CAKN and ARCN network parks, with a single observation during fall from GLBA (SEAN) (Table 38).

Smith's Longspur were documented breeding in GAAR in June and July and were probable breeders in WRST during June (Table 38). Adults with young were observed on Anaktuvuk Pass, GAAR, from 4 June to 24 July, which constitutes the earliest and latest documented breeding records. There was not sufficient documentation from the YUCH and NOAT observations from June to ascertain if birds were breeding in these areas. A few summer observations from NOAT and one breeding and numerous probable breeding records from GAAR are slightly beyond the known breeding range of this species.

Table 38. Monthly occurrence of Smith's Longspur in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAN)												
DENA												
WRST					X	X*	X					
YUCH						X						
Arctic Network (ARCN)												
BELA												
CAKR												
GAAR					X	X**	X**	X				
KOVA												
NOAT					X	X						
Southeast Alaska Network (SEAN)												
GLBA								X				
KLGO												
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM												
KEFJ												
LACL												

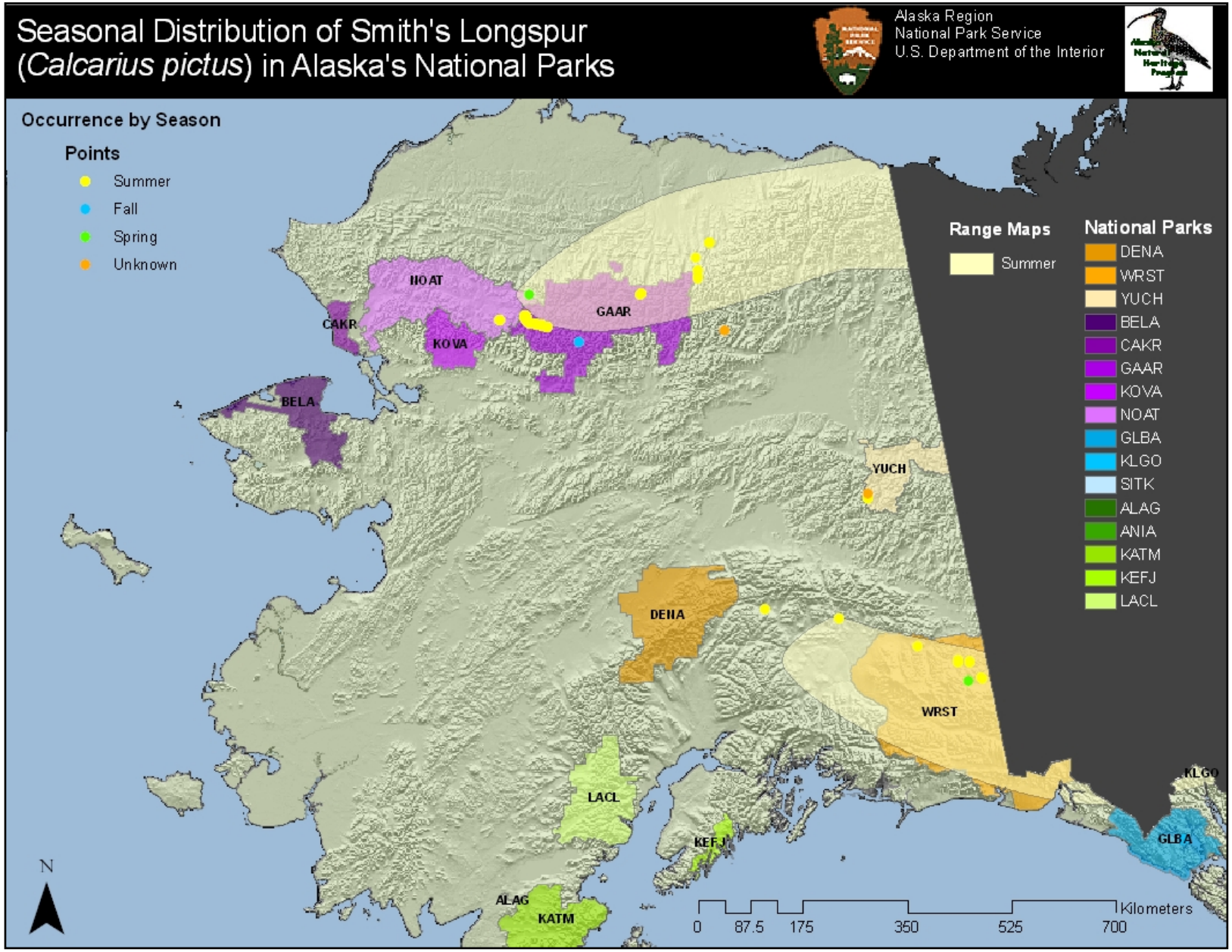


Figure 70. Seasonal distribution of Smith's Longspur in and adjacent to Alaska's National Parks.

Range:

BREEDING: Found throughout most of mainland Alaska south of the Brooks Range to southern Keewatin and Labrador, south to central British Columbia, central Saskatchewan, to the northern shores of Lake Superior and Lake Huron, through southeastern Ontario to Vermont, New Hampshire, Maine, northeastern New York, Massachusetts, and Nova Scotia (Johnson and Herter 1989, Avery 1995).

NON-BREEDING: Primarily in the southeastern U.S.: from southcoastal Alaska, southern Canada, and northern U.S. south to Texas, Gulf Coast, northern Florida (Avery 1995). See Fig. 71.

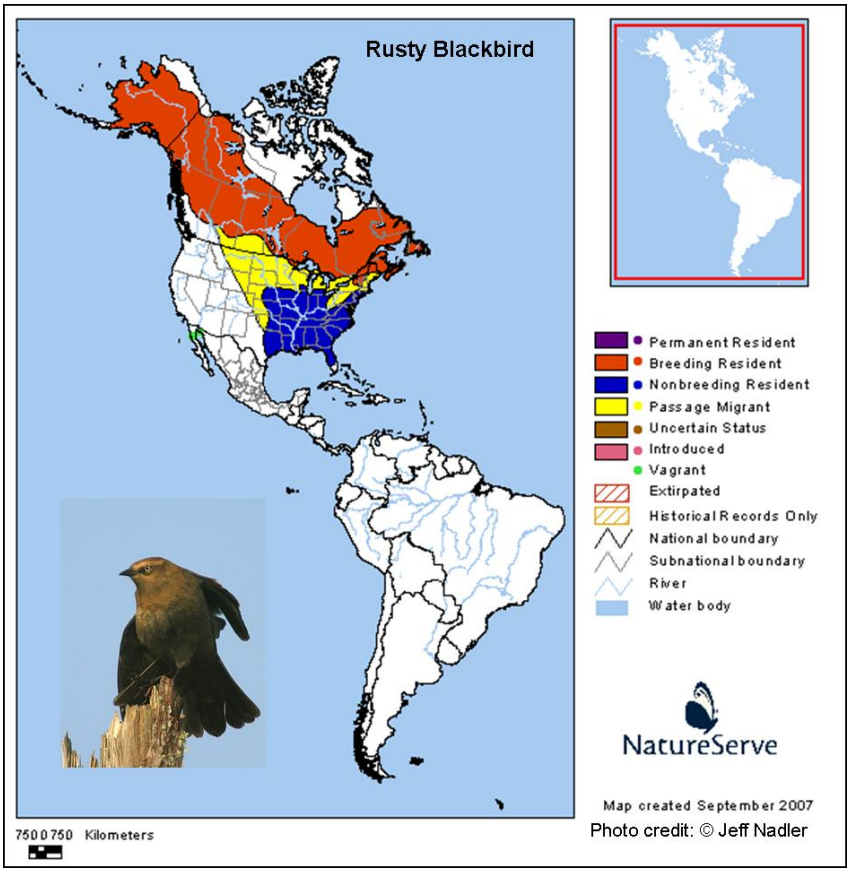


Figure 71. Rusty Blackbird breeding and non-breeding range (map courtesy of Ridgely et al. 2003).

Mobility and Migration:

Migrates diurnally in small flocks (Jaramillo and Burke 1999). Spring migrants leave wintering grounds as early as mid-February, peak migration occurs in late April to early May and arrival at breeding grounds is between March and early May. Fall migration begins in late August in Alaska and the northern Yukon, September elsewhere; peak southward migration throughout range is in October and peak arrival at wintering grounds in November (Avery 1995, Jaramillo and Burke 1999, Sinclair et al. 2003).

Distribution and Seasonal Occurrence in Alaska's National Parks:

We summarized a total of 247 individual location records for the Rusty Blackbird from 54 unique data sources. Of the 247 total records, 124 records were within park boundaries and 123 were adjacent to parks (Fig. 72). Occurrence records spanned the time period 1958 to 2008. Rusty Blackbirds were widely distributed throughout all four Alaska National Park network parks during summer, and were also present in GLBA during winter (Table 39).

Rusty Blackbirds were documented breeding in GLBA and NOAT in July and were probable breeders in DENA, WRST, GAAR, KOVA and KATM based on Breeding Bird Survey detections (Table 39). Adults with young were observed at the Noatak village dump on 6 July; adults were sighted with chicks as late as 20 July in Noatak village. Birds during fall migration were reported at Brooks Lake, KATM, on 22 August and at Mother Goose Lake near ANIA from 29 August to 1 September.

Table 39. Monthly occurrence of Rusty Blackbird in Alaska's National Parks. A single asterisk (*) denotes probable breeding; a double asterisk (**) denotes evidence of breeding.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Alaska Network (CAN)												
DENA					X	X*	X	X				
WRST				X	X	X*	X					
YUCH						X						
Arctic Network (ARCN)												
BELA							X					
CAKR					X							
GAAR					X	X*	X	X				
KOVA					X	X*		X				
NOAT							X**	X				
Southeast Alaska Network (SEAN)												
GLBA	X	X				X	X**		X			X
KLGO						X						
SITK												
Southwest Alaska Network (SWAN)												
ALAG												
ANIA												
KATM						X*	X	X	X			
KEFJ						X		X				
LACL					X	X	X	X	X			

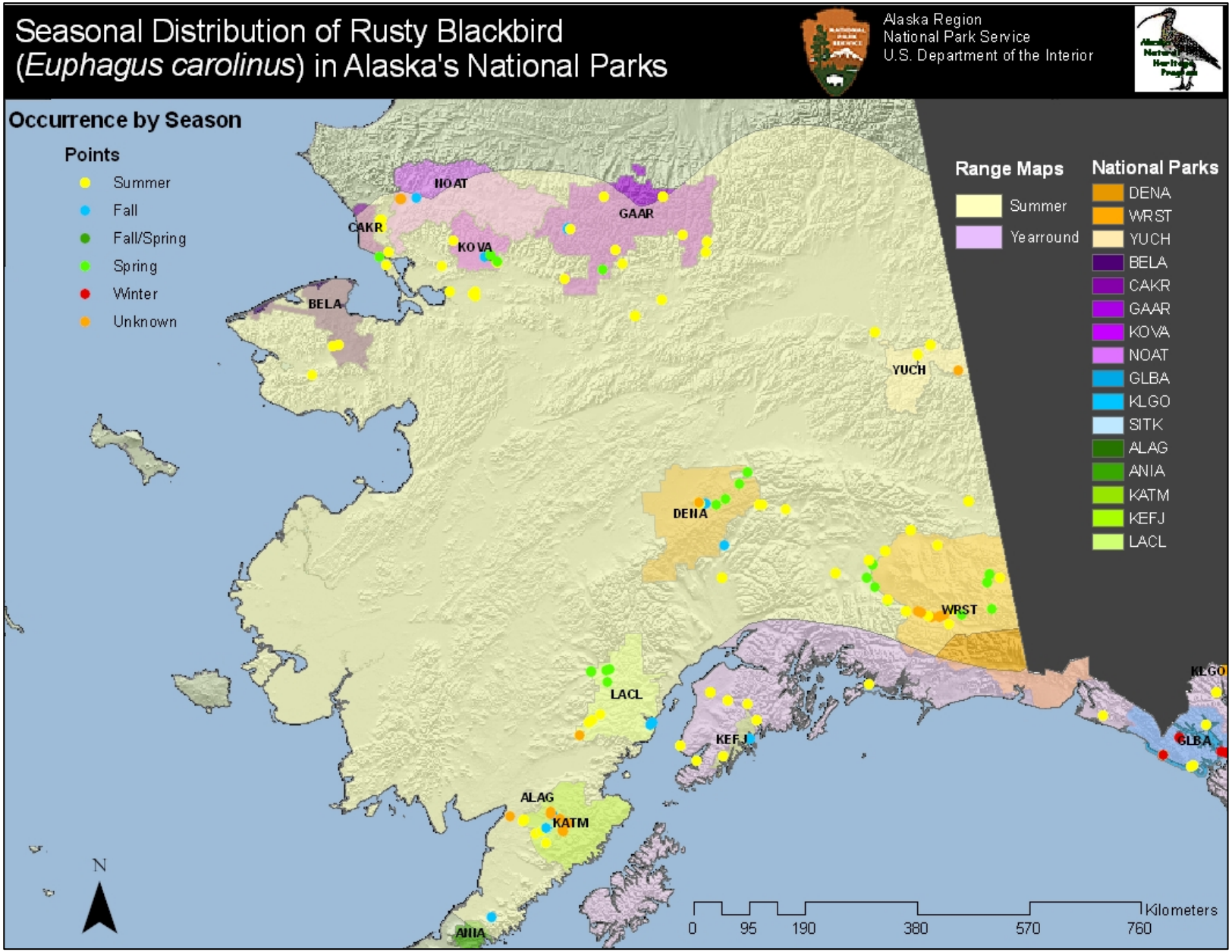


Figure 72. Seasonal distribution of Rusty Blackbird in and adjacent to Alaska's National Parks.

CONCLUSION

The scope and uses of the Alaska National Park Service Avian Observation Database exceed the results contained within this report. Although the intended goal of this project was to develop a database to summarize occurrence information and display seasonal distribution and potential migratory patterns for select avian species within and adjacent to Alaska's National Parks, there are many other ways that the data can be utilized. In the context of H5N1, this information could now be used to develop predictive risk assessment models for transmission pathways. The data could also be used to identify focus areas that support the persistence of key species. This summary of occurrence data could be used to help guide inventory, monitoring, and research efforts, by identifying data gaps in historic survey effort for individual species, suites of species, or areas.

The Alaska National Park Service Avian Observation Database was intended to be dynamic and was designed to enable further data entry to assist the National Park Service with future decision making and management. The value of entering historic data into an archival database cannot be overstated. The occurrence records summarized for this project will help build historic perspective and allow users to look farther back in time when conducting analyses, planning future inventories, or looking at changes in distribution as a result of climate change. The primary mission of NPS is to conserve unimpaired the natural and cultural resources and values of the National Park system for the enjoyment of present and future generations. Many parks are currently unable to fully achieve this mission due to a lack of basic knowledge about park resources. A compilation of historic occurrence records, such as these, should help the parks to realize this mission by providing baseline information for better understanding bird distributions across Alaska's National Parklands

ACKNOWLEDGEMENTS

Funding for this study was provided by the National Park Service (NPS) Alaska Region. We are especially grateful to Terry DeBryn, Russ Kucinski and the administrative staff at the Pacific Northwest CESU for providing administrative support and guidance during this project. Angie Southwald provided invaluable technical support throughout the project. We would like to thank Evette Gillies and Bob Platte for allowing us to use range map graphics that were developed previously for the Alaska Interagency HPAI Bird Surveillance Working Group 2006 sampling protocol report. Nicole Andler, Peter Bente, Jim Lawler, Lewis Sharman, Michael Shepard, Page Spencer, and Bill Thompson provided helpful advice on data gathering avenues and contacts. We give special thanks to the NPS personnel who helped us gather avian occurrence information from the 16 National Parks, including Bill Eichenlaub, Dashiell Feierabend, Melanie Flamme, Meg Hahr, Shelly Hall, Troy Hammon, Fritz Klasner, Shannon Kovac, Buck Mangipane, Katie Meyers, Dorothy Mortenson, Judy Putera, Dave Shirokauer, Brad Schults, Geoffrey Smith, Bill Thompson, and Rusty Xerxa. We thank Mayumi Arimitsu, James Bodkin, Heather Coletti, Eileen Davinney, Dirk Dirksen, Gary Drew, Matt Goff, Debbie Groves, Nikki Guldager, Colleen Handel, Brandt Meixell, Terry McMillan, Scott Miller, Deb Nigro, Bob Platte, Dan Ruthrauff, Susan Savage, Susan Sharbough, Shawn Stevenson, Bill Thompson, Sara Turner, and Nils Warnock for contributing data and/or answering questions regarding data, which greatly contributed to improving the comprehensiveness and usefulness of the project. We would also like to thank Susan Klein for her assistance with gathering source information.

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Appendix 1. Database fields included in the geodatabase.

FIELD NAME	DEFINITION
OBJECTID	ARCMAP unique identifier.
Bird_Observation_Id	Primary key and unique ID for each record in database.
Obs_Comm_Name	Common name.
Obs_Sci_Name	Scientific name (automatically populated).
Obs_Bird _Code	Unique four-letter code for each avian species recorded (automatically populated).
Obs_Bird_Count	Number of that bird species observed.
Obs_Type	Observation type.
Obs_Month	Month of observation.
Obs_Day	Day of observation.
Obs_Year	Year of observation. Populated with most recent year.
Obs_Date_Range	Range of dates when exact date of observation unknown.
Obs_Other_Dates	Other dates when observation occurred over more than one day.
Obs_Season	Season of documented occurrence implicated by source or assigned based on date and/or observation type.
Obs_Life_Stage_Comm	Comments regarding the life stage of the observation.
Obs_Specimen_Collected	Check-off field indicating specimen collected.
Obs_Coll_Comm	Comments regarding specimen collection ID, institution, and/or other details.
Found_by_Observer	Names of field personnel that recorded the observation.
Obs_Hab_Comm	Comments regarding habitats used by the bird during that observation.
Loc_Park_Name	Alaskan National Park Name.
Loc_adjacent	Park that observation is adjacent to when observation is not within a park.
Loc_Park_Netw	Alaskan National Park Network (automatically populated).
Loc_Site_Name	Name of site where observation was documented.
Loc_Directions	Directions to observation location.
Loc_Feature_Type	Feature type assigned to observation. Features can either by points or polygons.
Loc_Coord_Source	Coordinate Source describes how the coordinates were assigned.
Loc_Longitude	Longitude of point locations in Decimal Degrees NAD83.
Loc_Latitude	Latitude of point locations in Decimal Degrees NAD83.
Loc_Accuracy_m	Accuracy of point locations in meters.
Obs_Bird_State_Code	Field indicating state of bird during observation.
Loc_Mapping_Comm	Comments regarding how the observation was mapped.
Short_Citation	Short citation of reference.
Long_Citation	Long citation of reference.
Create_By	Initials of the AKNHP staff that entered the observation.