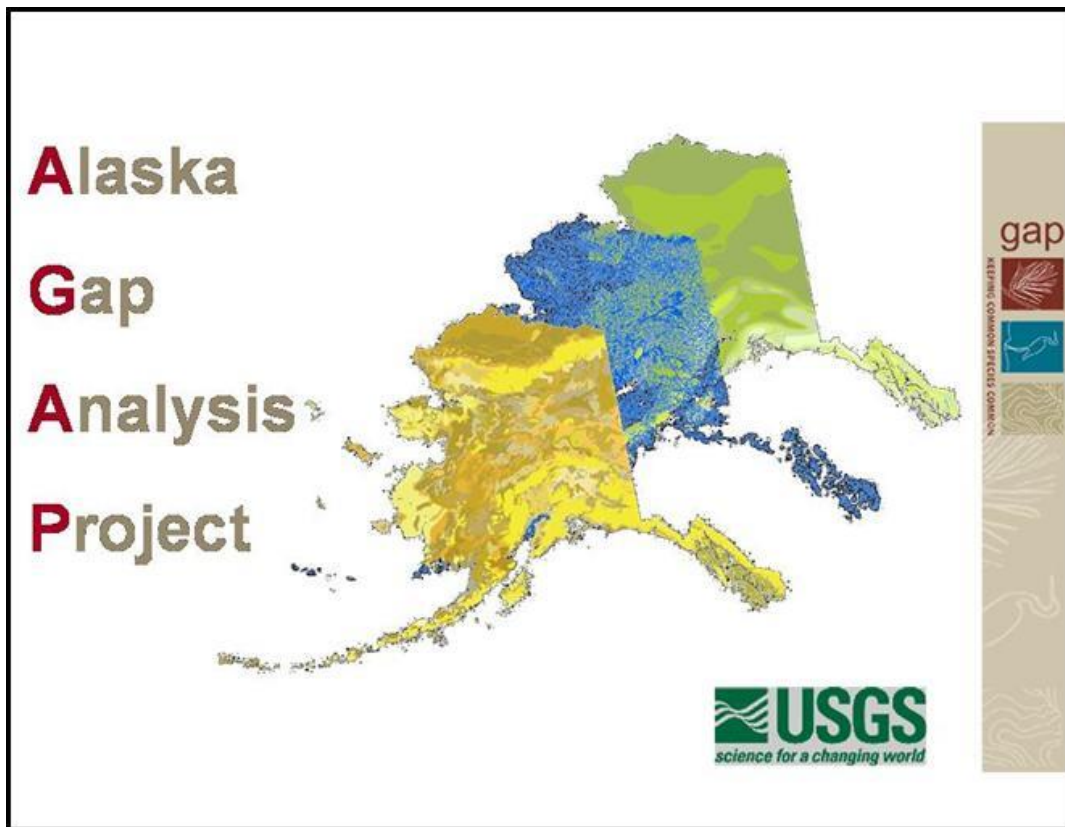


Alaska Gap Analysis Project Terrestrial Vertebrate Species Atlas



Tracey Gotthardt, Sanjay Pyare, Falk Huettmann, Kelly Walton, Miles Spathelf,
Kelly Nesvacil, Andy Baltensperger, Grant Humphries, and Tamara Fields

October 2013

Recommended Citation:

Gotthardt, T., S. Pyare, F. Huettmann, K. Walton, M. Spathelf, K. Nesvacil, A. Baltensperger, G. Humphries, and T.L. Fields. 2012. Alaska Gap Analysis Project Terrestrial Vertebrate Species Atlas. The Alaska Gap Analysis Project. University of Alaska.

Table of Contents

Overview 8

Amphibians 11

Caudates

Northwestern Salamander 12

Long-toed Salamander 14

Roughskin Newt 16

Anurans

Western Toad 18

Wood Frog 20

Columbia Spotted Frog 23

Birds 25

Anseriformes

Greater White-fronted Goose 26

Tule White-fronted Goose 28

Emperor Goose 30

Snow Goose 32

Brant 34

Cackling Goose 36

Taverner's Cackling Goose 38

Aleutian Cackling Goose 40

Cackling Cackling Goose 42

Canada Goose 44

Trumpeter Swan 46

Tundra Swan 48

Whooper Swan 50

Gadwall 52

American Wigeon 54

Mallard 56

Blue-winged Teal 58

Northern Shoveler 60

Northern Pintail 62

Green-winged Teal 64

Canvasback 66

Redhead 68

Ring-necked Duck 70

Tufted Duck 72

Greater Scaup 74

Lesser Scaup 76

Steller's Eider 78

Spectacled Eider 80

King Eider 82

Common Eider 84

Harlequin Duck 86

Surf Scoter 89

White-winged Scoter 91

Black Scoter 93

Long-tailed Duck 95

Bufflehead 97

Common Goldeneye 99

Barrow's Goldeneye 101

Hooded Merganser 103

Common Merganser	105	American Kestrel	173
Red-breasted Merganser	108	Merlin	175
<i>Galliformes</i>		Gyr Falcon	177
Ruffed Grouse	110	Peregrine Falcon	179
Spruce Grouse	112	American Peregrine Falcon	181
Willow Ptarmigan	115	Peale's Peregrine Falcon	183
Rock Ptarmigan	117	Arctic Peregrine Falcon	185
White-tailed Ptarmigan	119	<i>Caprimulgiformes</i>	
Sooty Grouse	121	Common Nighthawk	187
Sharp-tailed Grouse	123	<i>Gruiformes</i>	
Red-throated Loon	125	Sora	189
Arctic Loon	128	American Coot	191
Pacific Loon	130	Sandhill Crane	193
Common Loon	132	<i>Charadriiformes</i>	
Yellow-billed Loon	134	Black-bellied Plover	195
<i>Podicipediformes</i>		American Golden-plover	197
Horned Grebe	136	Pacific Golden-plover	199
Red-necked Grebe	138	Semipalmated Plover	201
<i>Suliformes</i>		Killdeer	203
Double-crested Cormorant	140	Eurasian Dotterel	205
Red-faced Cormorant	142	Black Oystercatcher	207
Pelagic Cormorant	144	Greater Yellowlegs	209
<i>Pelecaniformes</i>		Lesser Yellowlegs	211
American Bittern	146	Wood Sandpiper	213
Great Blue Heron	148	Solitary Sandpiper	215
<i>Accipitriformes</i>		Wandering Tattler	217
Osprey	151	Spotted Sandpiper	219
Bald Eagle	153	Upland Sandpiper	221
Northern Harrier	155	Whimbrel	224
Sharp-shinned Hawk	157	Bristle-thighed Curlew	226
Northern Goshawk	159	Hudsonian Godwit	228
Queen Charlotte Goshawk	162	Bar-tailed Godwit	230
Swainson's Hawk	164	Beringian Marbled Godwit	232
Red-tailed Hawk	166	Ruddy Turnstone	234
Rough-legged Hawk	168	Black Turnstone	236
Golden Eagle	171	Surfbird	238
<i>Falconiformes</i>		Red Knot	240

Sanderling	242	Common Murre	321
Semipalmated Sandpiper	244	Thick-billed Murre	323
Western Sandpiper	246	Black Guillemot	325
Red-necked Stint	248	Pigeon Guillemot	327
Least Sandpiper	250	Marbled Murrelet	329
White-rumped Sandpiper	252	Kittlitz's Murrelet	332
Baird's Sandpiper	254	Ancient Murrelet	334
Pectoral Sandpiper	256	Cassin's Auklet	336
Rock Sandpiper	258	Parakeet Auklet	338
Pribilof Rock Sandpiper	260	Least Auklet	340
Aleutian Rock Sandpiper	262	Whiskered Auklet	342
Dunlin	264	Crested Auklet	344
Stilt Sandpiper	266	Rhinoceros Auklet	346
Buff-breasted Sandpiper	268	Horned Puffin	348
Short-billed Dowitcher	271	Tufted Puffin	350
Long-billed Dowitcher	273	<i>Strigiformes</i>	
Wilson's Snipe	275	Western Screech-Owl	353
Common Snipe	277	Great Horned Owl	355
Red-necked Phalarope	279	Snowy Owl	357
Red Phalarope	281	Northern Hawk Owl	359
Bonaparte's Gull	283	Northern Pygmy-Owl	362
Mew Gull	285	Barred Owl	364
Ring-billed Gull	287	Great Gray Owl	366
Herring Gull	289	Short-eared Owl	368
Iceland Gull	291	Boreal Owl	370
Slaty-backed Gull	293	Northern Saw-whet Owl	372
Glaucous-winged Gull	295	<i>Apodiformes</i>	
Glaucous Gull	297	Black Swift	374
Sabines Gull	299	Vaux's Swift	376
Black-legged Kittiwake	301	Rufous Hummingbird	378
Red-legged Kittiwake	303	<i>Coraciiformes</i>	
Caspian Tern	305	Belted Kingfisher	380
Arctic Tern	307	<i>Piciformes</i>	
Aleutian Tern	310	Yellow-bellied Sapsucker	382
Pomarine Jaeger	312	Red-breasted Sapsucker	384
Parasitic Jaeger	314	Downy Woodpecker	386
Long-tailed Jaeger	317	Hairy Woodpecker	388
Dovekie	319		

American Three-toed Woodpecker	390	Arctic Warbler	472
Black-backed Woodpecker	392	Bluethroat	475
Northern Flicker	394	Northern Wheatear	477
<i>Passeriformes</i>		Mountain Bluebird	480
Olive-sided Flycatcher	396	Townsend's Solitaire	482
Western Wood-pewee	398	Gray-cheeked Thrush	484
Yellow-bellied Flycatcher	400	Swainson's Thrush	486
Alder Flycatcher	402	Hermit Thrush	489
Hammond's Flycatcher	404	American Robin	492
Pacific-slope Flycatcher	407	Varied Thrush	494
Say's Phoebe	410	Eastern Yellow Wagtail	496
Northern Shrike	412	White Wagtail	498
Warbling Vireo	414	Red-throated Pipit	500
Red-eyed Vireo	416	American Pipit	502
Gray Jay	419	Bohemian Waxwing	504
Steller's Jay	421	Cedar Waxwing	506
Black-billed Magpie	424	Tennessee Warbler	508
American Crow	426	Orange-crowned Warbler	510
Northwestern Crow	428	Yellow Warbler	512
Common Raven	430	Magnolia Warbler	514
Sky Lark	432	Yellow-rumped Warbler	516
Horned Lark	434	Townsend's Warbler	519
Tree Swallow	436	Blackpoll Warbler	522
Violet-green Swallow	438	American Redstart	525
Northern Rough-winged Swallow	440	Northern Waterthrush	528
Bank Swallow	442	Macgillivray's Warbler	530
Cliff Swallow	444	Common Yellowthroat	532
Barn Swallow	446	Wilson's Warbler	534
Black-capped Chickadee	448	Western Tanager	536
Chestnut-backed Chickadee	450	American Tree Sparrow	539
Boreal Chickadee	452	Chipping Sparrow	541
Gray-headed Chickadee	454	Brewer's Sparrow	543
Red-breasted Nuthatch	456	Savannah Sparrow	545
Brown Creeper	459	Fox Sparrow	548
Pacific Wren	462	Song Sparrow	550
American Dipper	465	Lincoln's Sparrow	553
Golden-crowned Kinglet	467	White-crowned Sparrow	556
Ruby-crowned Kinglet	470	Golden-crowned Sparrow	558

Dark-eyed Junco	560	Brambling	579
Lapland Longspur	562	Gray-crowned Rosy-Finch	581
Smith's Longspur	564	Pine Grosbeak	583
Snow Bunting	567	Red Crossbill	585
Mckay's Bunting	569	White-winged Crossbill	587
Red-winged Blackbird	571	Common Redpoll	589
Rusty Blackbird	574	Hoary Redpoll	591
Brown-headed Cowbird	577	Pine Siskin	593

Mammals 595

Soricomorphs

Cinereus (Masked) Shrew	596
American Pygmy Shrew	598
Pribilof Island Shrew	600
St. Lawrence Island Shrew	602
Dusky Shrew	604
American Water Shrew	607
Tundra Shrew	609
Barren Ground Shrew	611
Alaska Tiny Shrew	613

Chiropterans

Silver-haired Bat	615
California Myotis	617
Keen's Myotis	619
Little Brown Myotis	621
Long-legged Myotis	623

Terrestrial Carnivores

Arctic Fox	625
Pribilof Island Arctic Fox	627
Coyote	629
Wolf	631
Alexander Archipelago Wolf	633
Red Fox	635
Canadian Lynx	637
River Otter	639
Kodiak River Otter	641
Prince of Wales River Otter	644

Wolverine	646
American Marten	649
Pacific Marten	652
Ermine	655
Least Weasel	658
American Mink	660
American Black Bear	663
Brown Bear	666

Ungulates

Moose	669
Mule Deer	671
Caribou	673
Mountain Goat	676
Muskox	679
Dall's Sheep	681

Rodents

Alaska Marmot	683
Hoary Marmot	685
Woodchuck	687
Arctic Ground Squirrel	689
Red Squirrel	691
Northern Flying Squirrel	693
American Beaver	696
Admiralty Beaver	699
Meadow Jumping Mouse	702
Western Jumping Mouse	704
Southern Red-backed Vole	706

Northern Red-backed Vole	708
Nearctic Collared Lemming	710
Nearctic Brown Lemming	712
Bushy-tailed Woodrat	714
Insular Vole	717
Long-tailed Vole	719
Singing Vole	722
Root Vole (formerly Tundra Vole)	725
Meadow Vole	728
Admiralty Meadow Vole	730
Yellow-cheeked or Taiga Vole	732
Muskrat	734
Northern Bog Lemming	736
Northwestern Deermouse	738
North American Porcupine	740

Lagomorphs

Collared Pika	742
Snowshoe Hare	744
Alaskan Hare	746

Marine Carnivores

Pacific Walrus	748
Northern Fur Seal	750
Steller Sea Lion	752
Bearded Seal	755
Ringed Seal	757
Spotted Seal	759
Harbor Seal	761
Polar Bear	764

Overview

Purpose

The purpose of the vertebrate species distribution maps developed for gap analysis is to provide more precise information about the current distribution of individual native species within their general ranges by mapping associations to habitat features. Gap analysis uses the predicted distributions of native vertebrate species to evaluate their conservation status relative to existing land management, utilizing Geographic Information Systems (GIS) technology. Previous to this effort there were no maps available, digital or otherwise, showing the likely present-day distribution of species by habitat across their ranges in Alaska.

Besides gap analysis, the maps of vertebrate species distributions and associated information may be used to answer a wide variety of management, planning, and research questions relating to individual species or groups of species. These species maps and information are also available in digital GIS databases (see How to obtain GAP data) which enables computerized query and analysis of the data. It is important to stress that the information on species' habitat associations, elevation limits and statewide geographical distributions compiled in this atlas were collected for the purposes of statewide and regional analyses of biodiversity conservation. This information was not intended for the purpose of determining a measure of abundance, health or condition of populations of any species listed herein. Wherever possible we have tried to detail the circumstances where our mapping procedures were insufficient to accurately represent the geographic distribution of particular species.

How species distributions were predicted

The vertebrate species distributions in this atlas were predicted using a computer model, incorporating existing information on point locality records, range maps, and habitat and environmental conditions for each species. Deductive and inductive modeling techniques were used to produce the distribution models. Deductive distribution modeling followed the traditional, land cover-based procedures described by Csuti and Crist (1998). Inductive models were derived using known points of occurrence and their intersection with a suite of environmental parameters. Combined models were created as an intersection of where there was agreement between the two model types. See the AKGAP Final Project Report (Gotthardt et al. 2013) for more detailed information on methods related to range map and model development.

The modeling approach used included seven steps:

1. Range maps were produced for each target taxon. Range maps were created by tessellating a polygon range map to an 8-digit HUC layer, and then attributing this layer with season and type of occurrence based off point locality records and expert opinion.
2. A Wildlife-Habitat Relationships (WHRdb) database was developed, recording the association of terrestrial vertebrate species to features that had been digitally mapped within the state of Alaska, including land cover (vegetation) types, hydrological characteristics, human avoidance characteristics, forest interior and ecotone width, and association with edges.
3. A geographic atlas of environmental predictor variable was developed to assist with model development for both deductive and inductive modeling approaches.
4. Habitat-derived (deductive) models were generated using a python script that was used to query the WHRdb that stored the applicable variables for each taxon. The python script invoked a series of geospatial masks and raster calculations in ArcGIS 10.0 to generate a 60-m raster of predicted suitable habitats. The final deductive model was an intersection of those Ecological Systems

selected as suitable and any additional ancillary variables considered, delimited by HUC8 ranges for each taxon.

5. We acquired, summarized, and filtered occurrence data from numerous sources of varying quality and quantity to assist with model validation and to produce inductive models.
6. We used the modeling software, MaxEnt version 3.3.1, to relate modeling subset occurrence records to the final set of environmental predictor variables to produce an inductive model, delimited by HUC8 ranges for each taxon.
7. We intersected the results of the deductive and inductive models to produce a “combined model”. One model type (either deductive, inductive, or the combined) was selected as the final model – the best spatial representation of predicted potential habitat. Final model selection was determined by accuracy statistics, expert opinion, and whether or not the modeled output was representative of the species range extent.

Information provided in the atlas

For each of the 347 terrestrial vertebrate taxa modeled for this project, a range map and predicted distribution map were created. This atlas includes a complete species report for each taxon, including the following data:

Species taxonomic information – common and scientific name.

Seasonal range map – describes the time of year the species is known to occur within Alaska. Possible values were Summer, Spring/Fall, Winter, and Year -round. Especially for migratory taxa, the value of the Season attribute was assigned with the specific modeling season (e.g., Breeding equates with Summer) in mind. Seasons were broadly defined as follows: Winter (December - February); Fall/Spring (March - May and August - November); Summer (June or July); Year -round (all months).

Occurrence range map – occurrence data were overlain with the HUC8 range maps and attributed as such: Known, Suspected, Historical, or Accidental. “Known” equated to the presence of documented occurrences of the target taxon, or confident expert prediction of occurrence, within a given HUC8.

Final predicted distribution map – this includes model type (deductive, inductive, or combined), associated performance statistics (AUC), and a general quality rank based on AUC values denoted as low (0.5 – 0.7), moderate (0.7 – 0.9) and high (>0.9).

A detailed habitat description – information on habitat associations from the literature, with an emphasis on landcover types, though notes on structure, moisture and soil requirements and specific microhabitat features are noted where appropriate.

A list of citations - used to develop the habitat description in the WHRdb.

References

Csuti, B. and P. Crist. 1998. Methods for Assessing Accuracy of Animal Distribution Maps, Gap Analysis Program, University of Idaho, Moscow, Idaho. <http://www.gap.uidaho.edu/> Date Accessed: 02 July 2003.

Gotthardt, T., S. Pyare, F. Huettmann, K. Walton, M. Spathelf, K. Nesvacil, A. Baltensperger, G. Humphries, and T.L. Fields. 2013. Predicting the range and distribution of terrestrial vertebrate species in Alaska. The Alaska Gap Analysis Project. University of Alaska.

Official disclaimer for GAP data

“Although these data have been processed successfully on a computer system at the USGS Gap Analysis Program, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data. The USGS Gap Analysis Program shall not be held liable for improper or incorrect use of the data described and/or contained herein.

“These data were compiled with regard to the following standards. Please be aware of the limitations of the data. These data are meant to be used at a scale of 1:100,000 or smaller (such as 1:250,000 or 1:500,000) for the purpose of assessing the conservation status of vertebrate species and vegetation cover types over large geographic regions. The data may or may not have been assessed for statistical accuracy. Data evaluation and improvement may be ongoing. USGS Gap Analysis Program makes no claim as to the data’s suitability for other purposes.”

How to obtain GAP data

The National Gap Analysis Program has a species viewer, where data is available for download (<http://gapanalysis.usgs.gov/species/viewer/>). Data can also be obtained at the Alaska Gap Analysis web-potal (www.akgap.info).

Amphibians

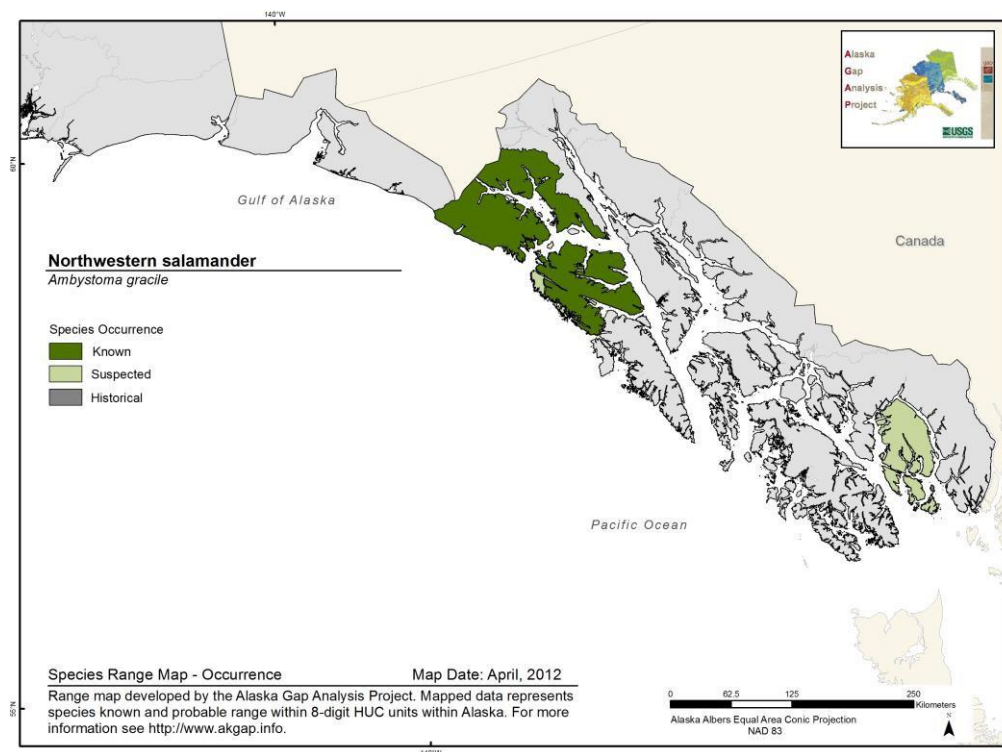


Roughskin newt, Credit: Michael Kohan

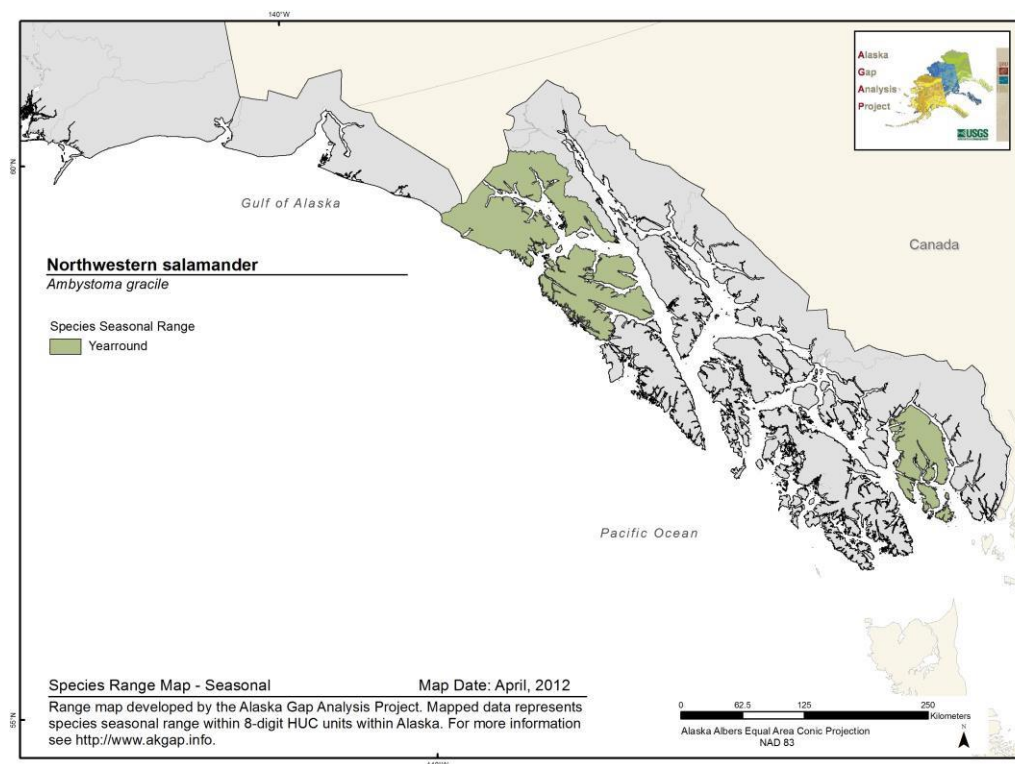
Northwestern Salamander *Ambystoma gracile*

Range Map and Distribution Model Summary

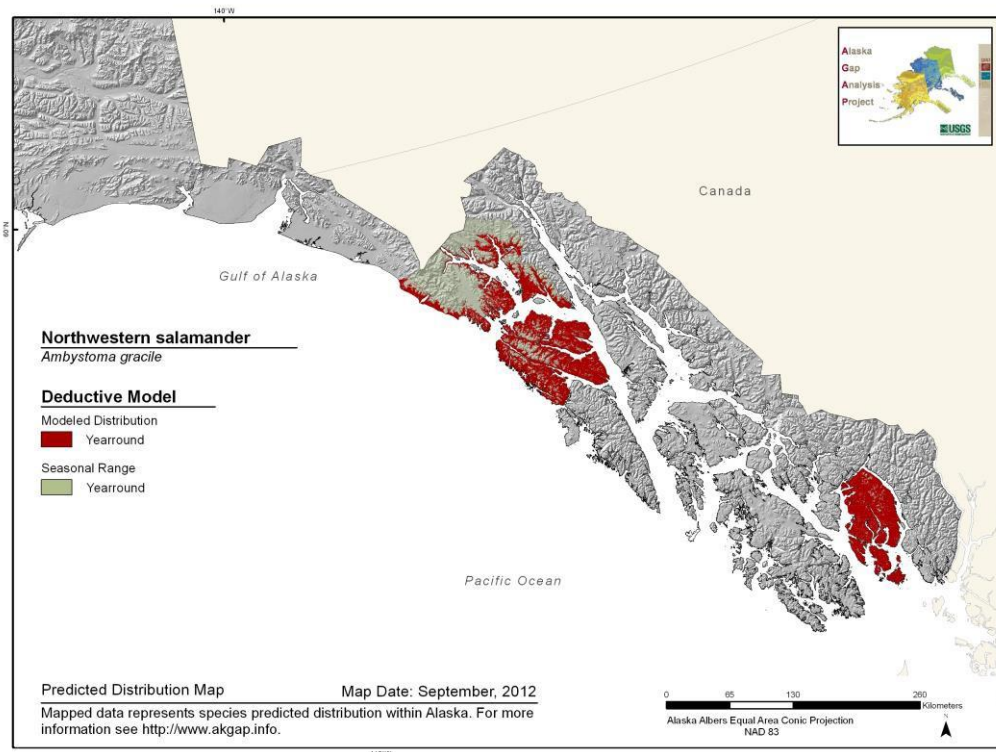
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.714**

**Model Quality
Summary:**
Moderate

Habitat Description

Adults subterranean. Known breeding sites in Alaska muskeg ponds and a freshwater lake (Waters 1992). Larvae require permanent source of water because metamorphosis may require 2 years (MacDonald 2003). Habitat includes grassland, woodland, and forest near breeding ponds. Thought to be associated with old growth, but different findings among studies may be a result of seasonal differences. During breeding season, found under logs and rocks. Eggs are laid in ponds, lakes, and slow moving streams, usually attached to vegetation (Efford and Mathias 1969, Nussbaum et al. 1983, Blaustein et al. 1995, Aubry 2000).

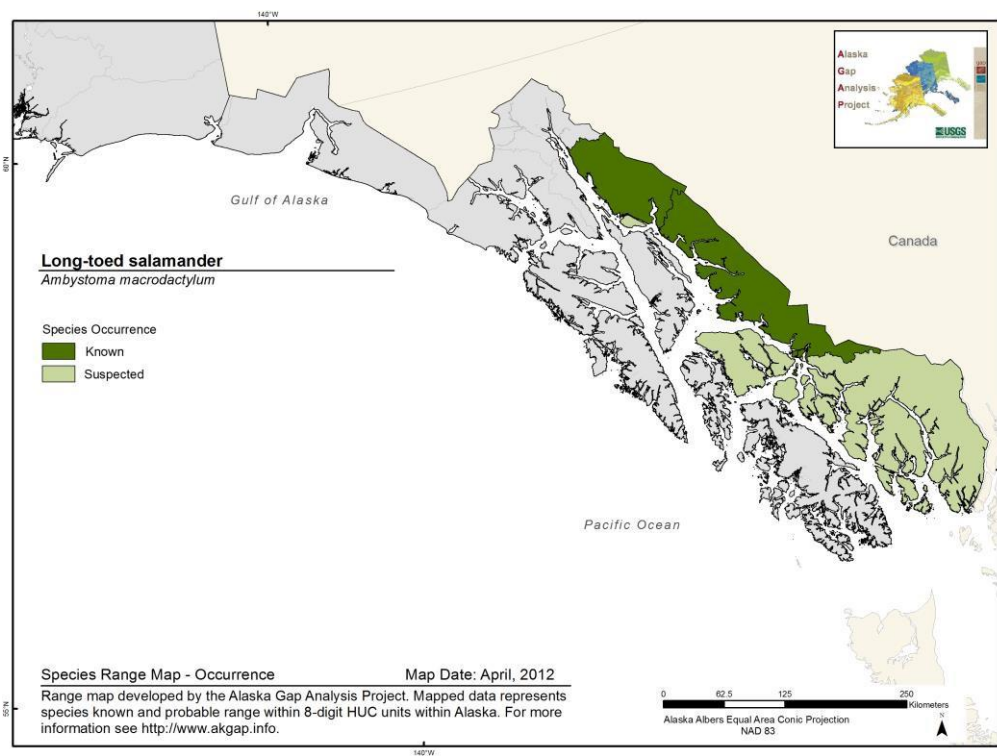
References

- Aubry, K.B. 2000. Amphibians in managed, second-growth Douglas-fir forests. *Journal of Wildlife Management*. 64(4):1041-1052
- Blaustein, A. B., B. Edmond, J. M. Kiesecker, J. J. Beatty, and D. G. Hokit. 1995. Ambient ultraviolet radiation causes mortality in salamander eggs. *Ecological Applications* 5:740-743.
- Efford, I.E. and J.A. Mathias. 1969. A comparison of two salamander populations in Marion Lake, British Columbia. *Copeia* 1969:723–736.
- MacDonald, S.O. 2003. The amphibians and reptiles of Alaska. A Field Handbook. Unpublished report to USFWS, Juneau, AK.
- Nussbaum, R.A., E.D. Brodie, Jr., and R.M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. Univ. Press of Idaho. 332 pp.
- Waters, D.L. 1992. Habitat associations, phenology, and biogeography of amphibians in the Stikine River basin and southeast Alaska. Unpubl. rep. of the 1991 pilot project. USDI, USFWS, California Cooperative Fishery Research Unit, Humboldt State University, Arcata, CA. 61 pp.

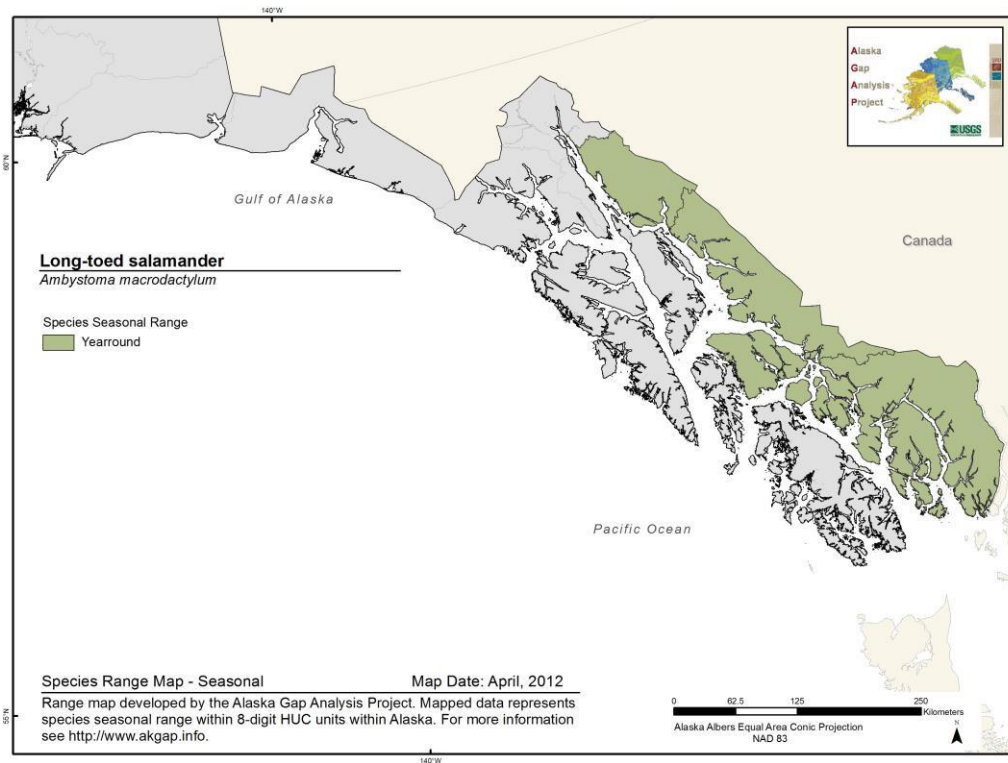
Long-toed Salamander *Ambystoma macrodactylum*

Range Map and Distribution Model Summary

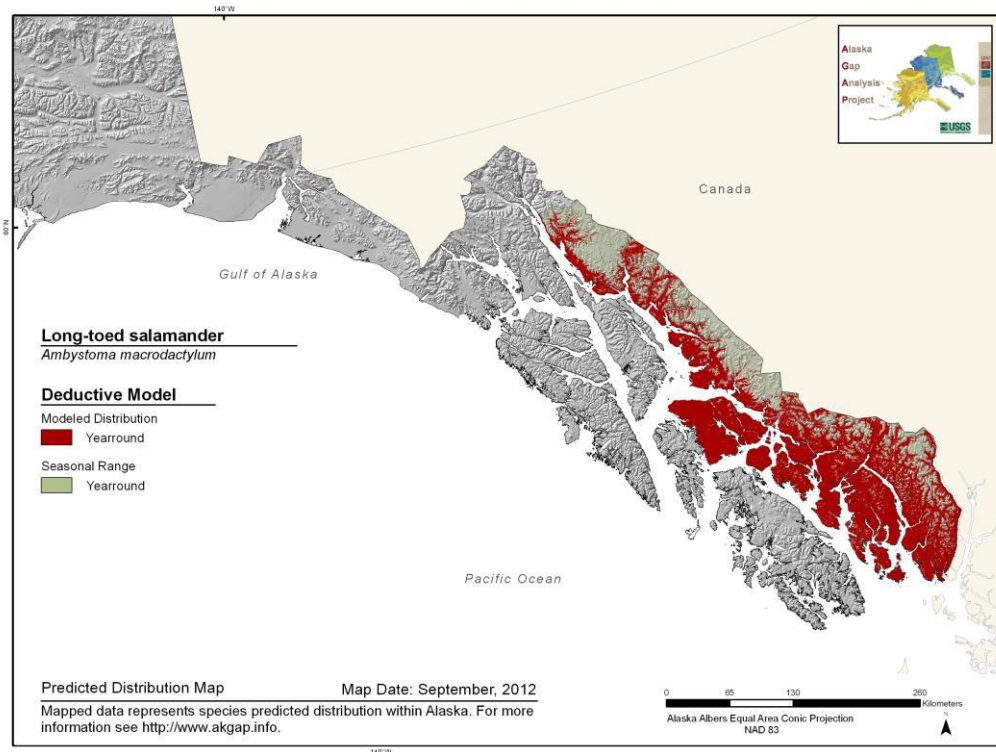
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.773**

**Model Quality
Summary:**
Moderate

Habitat Description

Adults are subterranean except for during the breeding season. Breeds in temporary or permanent ponds, or in quiet water at the edge of lakes and streams. During the breeding season adults may be found under logs, rocks, and other debris near water (Graham 1997). Occur in active logging areas in Alberta (Graham 1997).

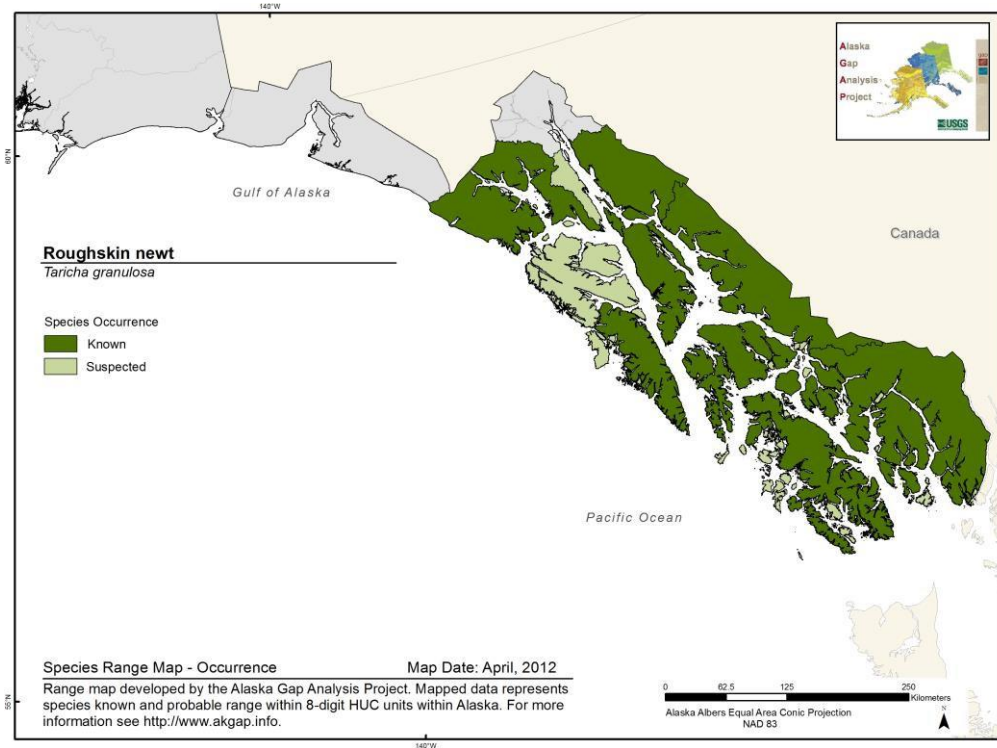
References

Graham, K.L. 1997. Habitat use by long-toed salamanders (*Ambystoma macrodactylum*) at three different scales. M.S. Thesis. University of Guelph, Ottawa (Ontario), Canada. 71pp.

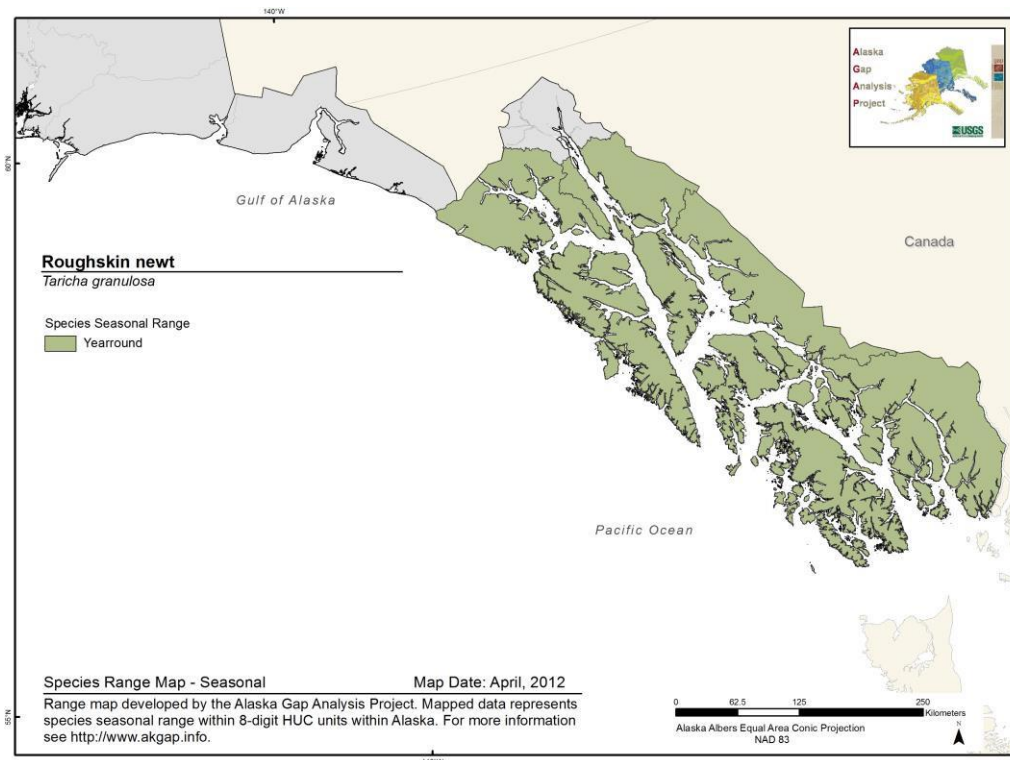
Roughskin Newt *Taricha granulosa*

Range Map and Distribution Model Summary

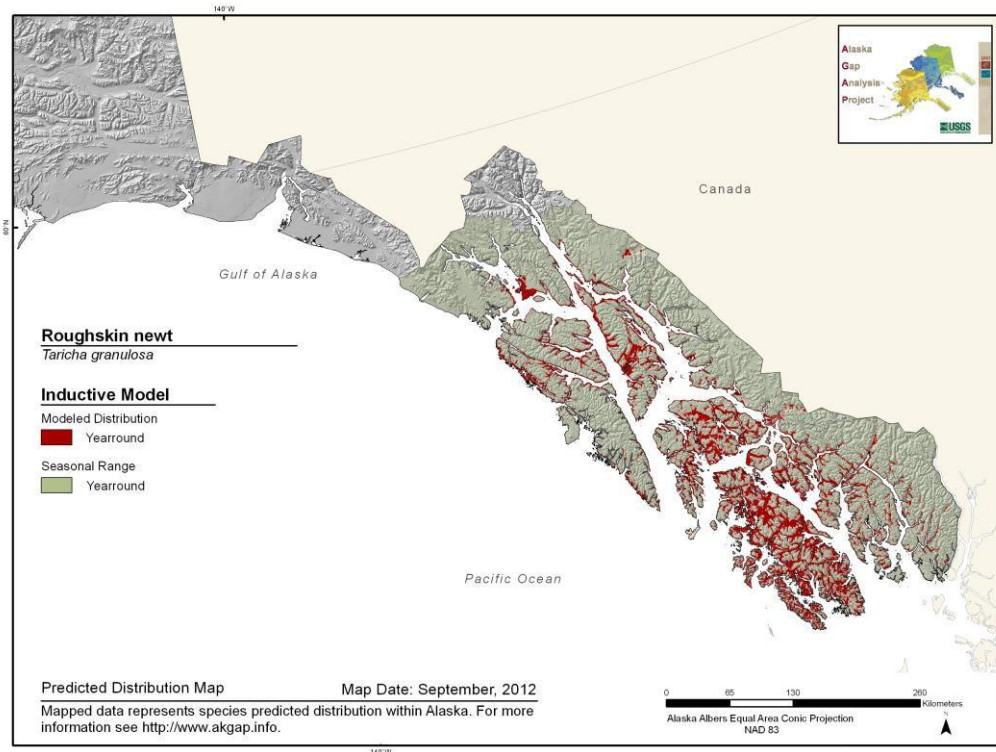
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.898**

**Model Quality
Summary:**
Moderate

Habitat Description

Species uses forested cover adjacent to aquatic habitat for breeding and overwintering. Found in and about small permanent bodies of water with abundant vegetation (Hodge 1976). On Wrangell Island, species found using backwater lakes and muskegs (Waters 1992).

References

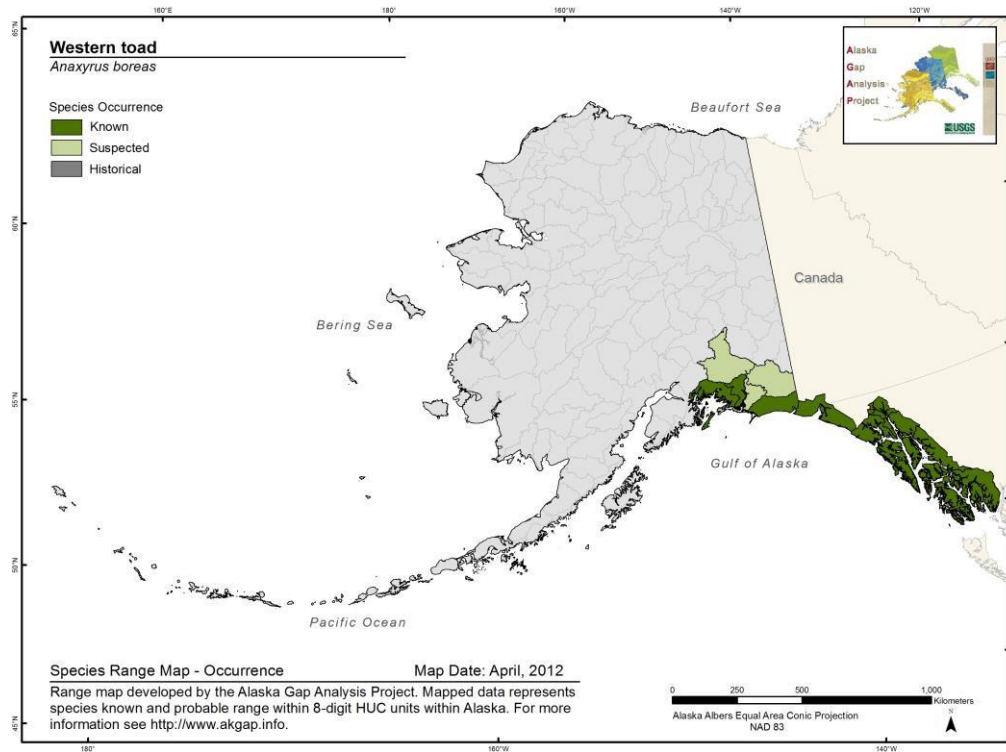
Hodge, R.P. 1976. Amphibians & reptiles in Alaska, the Yukon, & Northwest Territories. Alaska Northwest Publishing Company, Anchorage, AK. 89 p.

Waters, D.L. 1992. Habitat associations, phenology, and biogeography of amphibians in the Stikine River basin and southeast Alaska. Unpubl. rep. of the 1991 pilot project. USDI, USFWS, California Cooperative Fishery Research Unit, Humboldt State University, Arcata, CA. 61 pp.

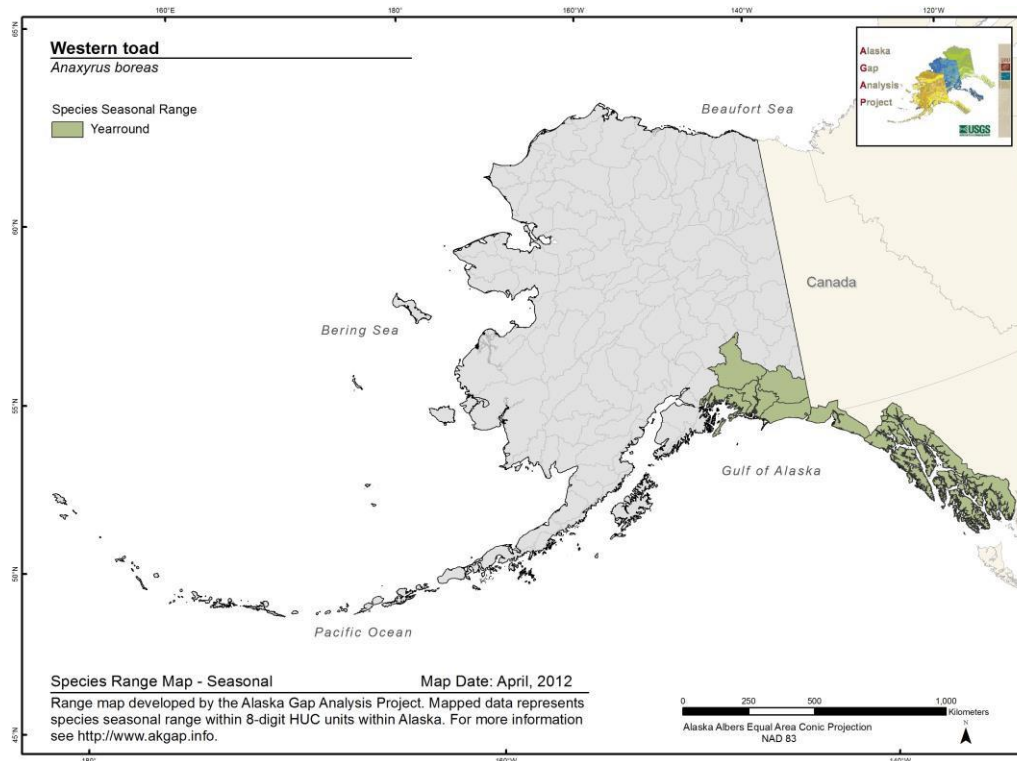
Western Toad *Anaxyrus boreas*

Range Map and Distribution Model Summary

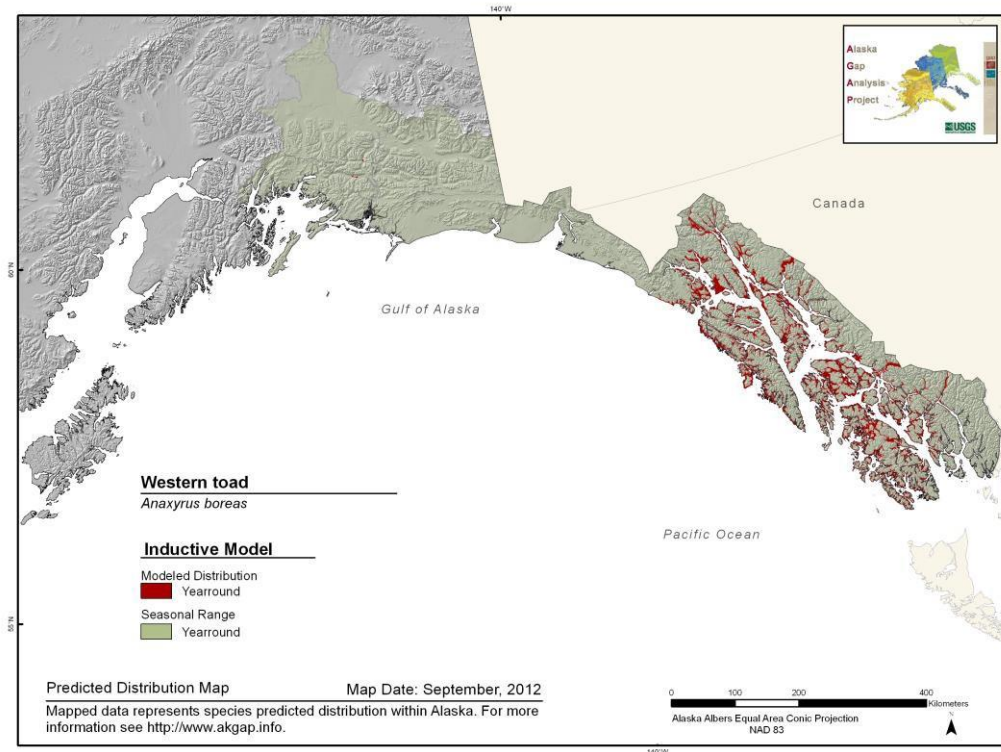
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.913**

**Model Quality
Summary:**
High

Habitat Description

Broad range of habitat use. Can be found from sea level to high mountain elevations; usually in open, non-forested areas near water. Primarily terrestrial, they enter water to breed in a variety of ponds, lakes, streams, backwaters, ephemeral and sometimes brackish pools. Hibernates in burrows below frostline in forested cover adjacent to aquatic habitat. Eggs develop in shallow areas of ponds, lakes, reservoirs, or in pools of slow moving streams. Western toads may be limited by temperature, acidity, and dissolved oxygen (Hodge 1976, MacDonald 2003).

References

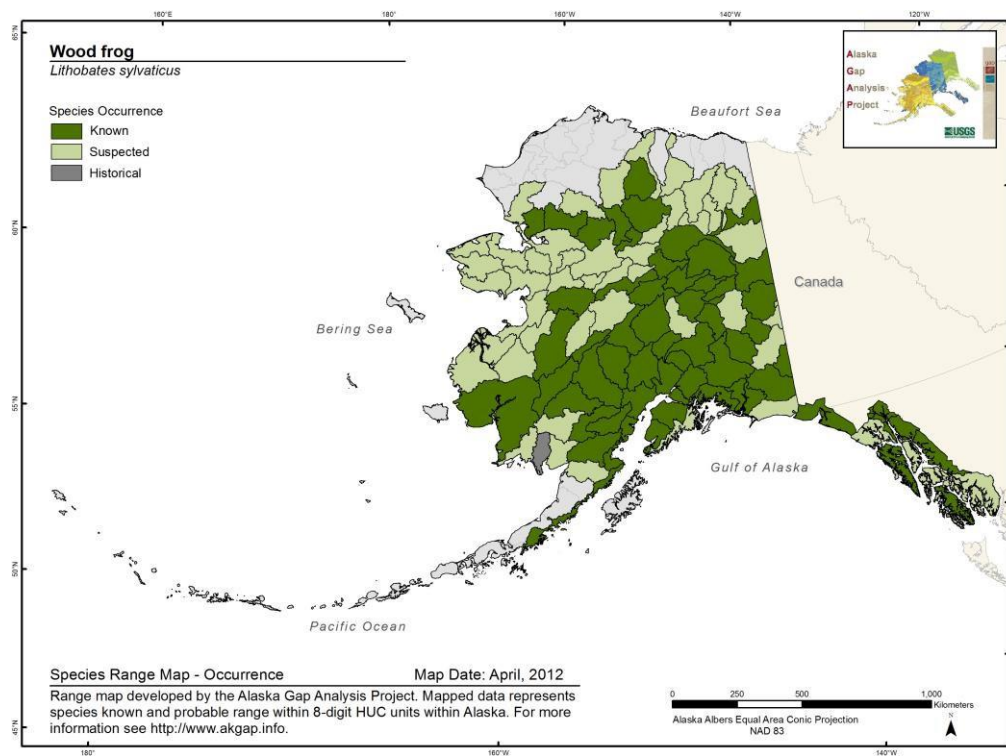
Hodge, R.P. 1976. Amphibians & reptiles in Alaska, the Yukon, & Northwest Territories. Alaska Northwest Publishing Company, Anchorage, AK. 89 p.

MacDonald, S.O. 2003. The amphibians and reptiles of Alaska. A Field Handbook. Unpublished report to USFWS, Juneau, AK.

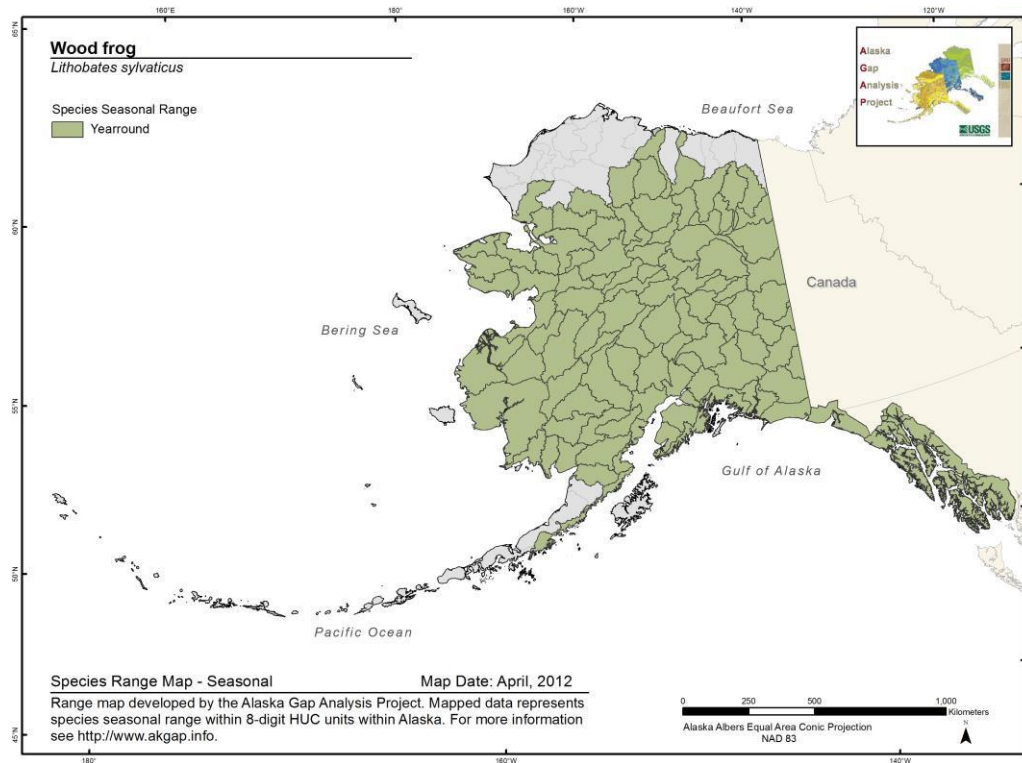
Wood Frog *Lithobates sylvaticus*

Range Map and Distribution Model Summary

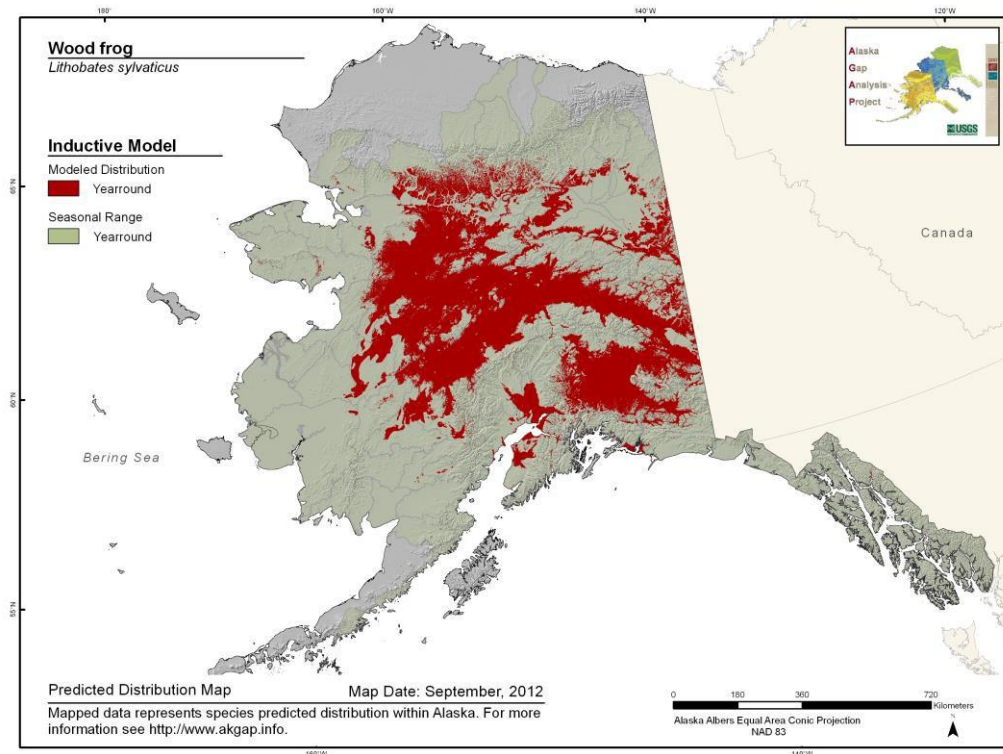
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.779**

**Model Quality
Summary:**
Moderate

Habitat Description

Associated with Alaska's interior forests. Inhabits diverse vegetation types, grassy meadows, open forests, muskegs, tundra. Breeds in shallow permanent or ephemeral water. Breeding habitat described as fish-free. Hibernates under snow in shallow depressions of compacted forest litter. Overwinters in areas surrounding breeding ponds. Tadpoles can't withstand desiccation. Growth rate between fertilization and free-living is dependent on water temperature and mortality is highest at this stage. 50% survival occurs when temperatures are between 6 and 24C and drops outside these temperatures. However, Frisbie et al. (2000) found that embryos could tolerate short period of subzero temperatures (Herreid and Kinney 1967, Kirton 1974, Hodge 1976, Frisbie et al. 2000, MacDonald 2003, Redmer and Trauth 2005).

References

Frisbie, M. P., J. P. Costanzo, and R. E. Lee Jr. 2000. Physiological and ecological aspects of low temperature tolerance in embryos of the wood frog, *Rana sylvatica*. Canadian Journal of Zoology 78: 1032-1041.

Herreid, C. F. II. And S. Kinney. 1967. Temperature and development of the wood frog, *Rana sylvatica*, in Alaska. Ecology 48:579-590.

Hodge, R.P. 1976. Amphibians & reptiles in Alaska, the Yukon, & Northwest Territories. Alaska Northwest Publishing Company, Anchorage, AK. 89 p.

Kirton, M.P. 1974. Fall movements and hibernation of the wood frog, *RANA SYLVATICA*, in interior Alaska. M.S. thesis. University of Alaska, Fairbanks.

MacDonald, S.O. 2003. The amphibians and reptiles of Alaska. A Field Handbook. Unpublished report to USFWS, Juneau, AK.

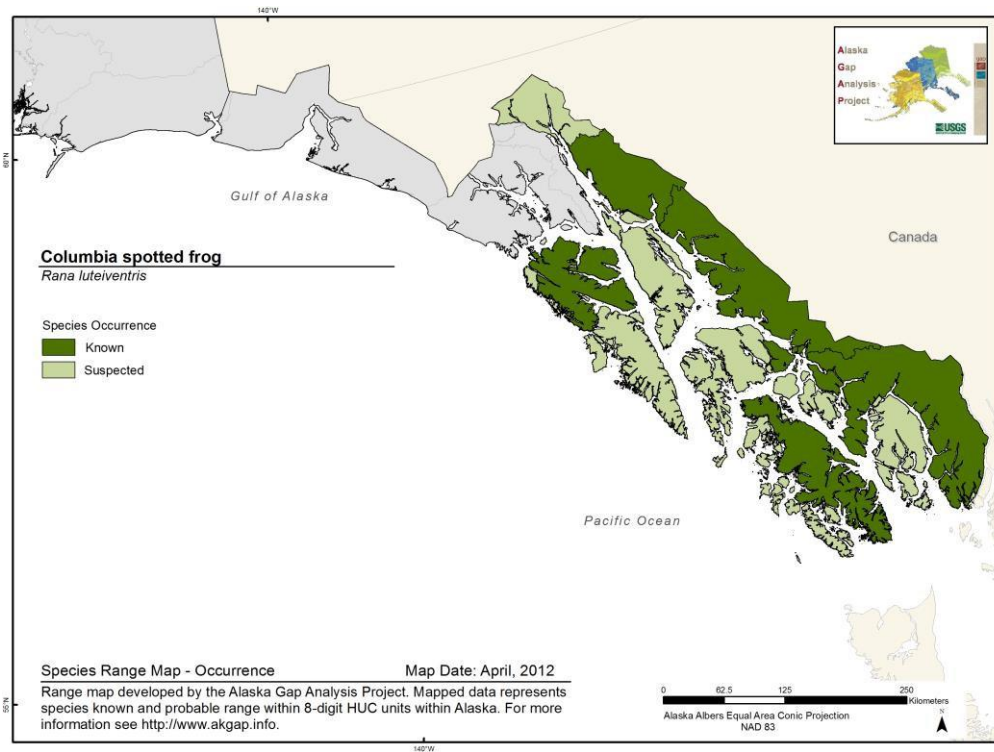
Redmer, M. and W. E. Trauth. 2005. *Rana sylvatica*. Pages 1-46 in M. Lanoo, editor, *Amphibian Declines: The Conservation Status of United States species*. University of California Press, Berkeley, Ca. Available at <<http://amphibiaweb.org/>>.

Columbia Spotted Frog

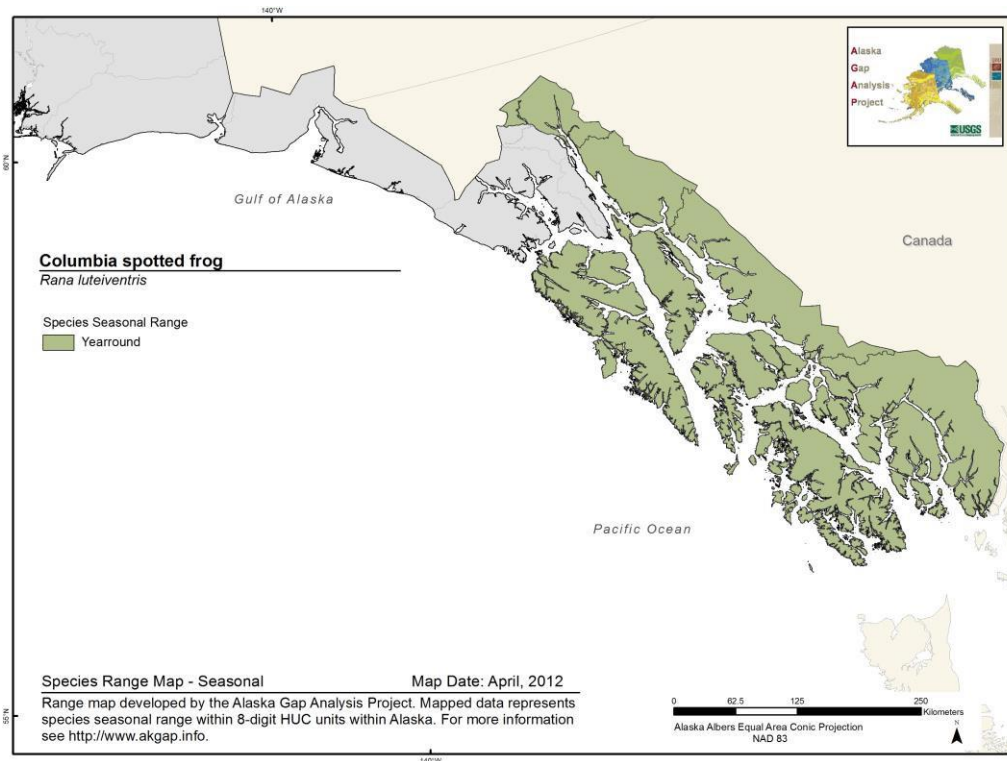
Rana luteiventris

Range Map and Distribution Model Summary

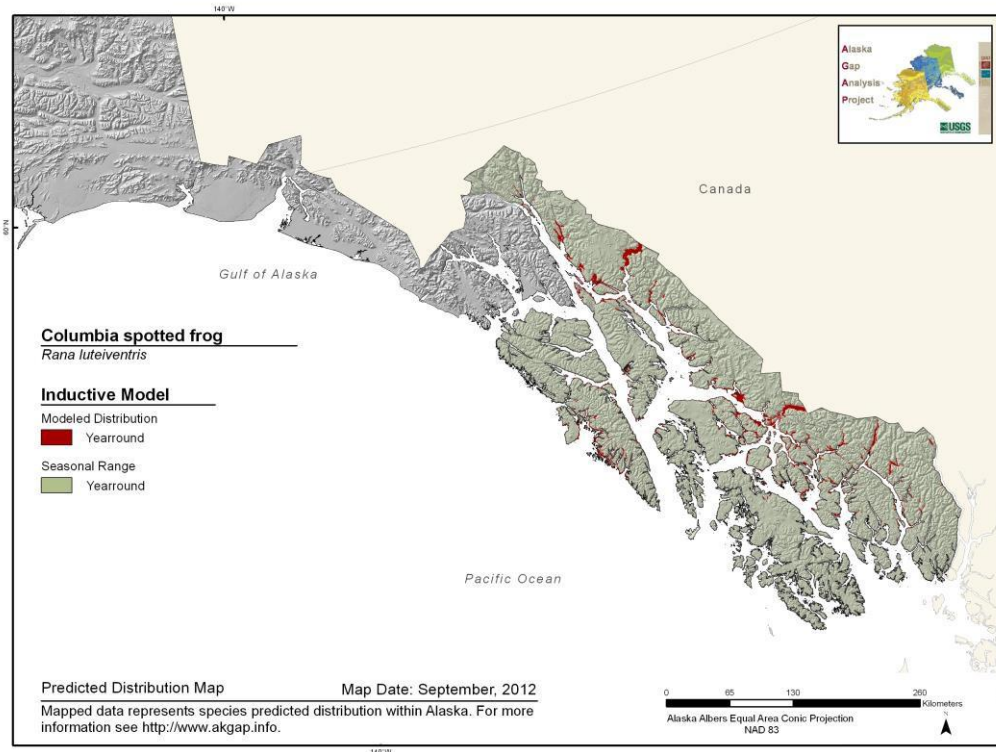
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.812**

Model Quality Summary:
Moderate

Habitat Description

Highly aquatic; closely associated with permanent water. Found predominantly in outwash ponds and backwater lakes, beaver ponds, muskeg ponds, river channels, and streams (Waters 1992, MacDonald 2003).

References

MacDonald, S.O. 2003. The amphibians and reptiles of Alaska. A Field Handbook. Unpublished report to USFWS, Juneau, AK.

Waters, D.L. 1992. Habitat associations, phenology, and biogeography of amphibians in the Stikine River basin and southeast Alaska. Unpubl. rep. of the 1991 pilot project. USDI, USFWS, California Cooperative Fishery Research Unit, Humboldt State University, Arcata, CA. 61 pp.

Birds



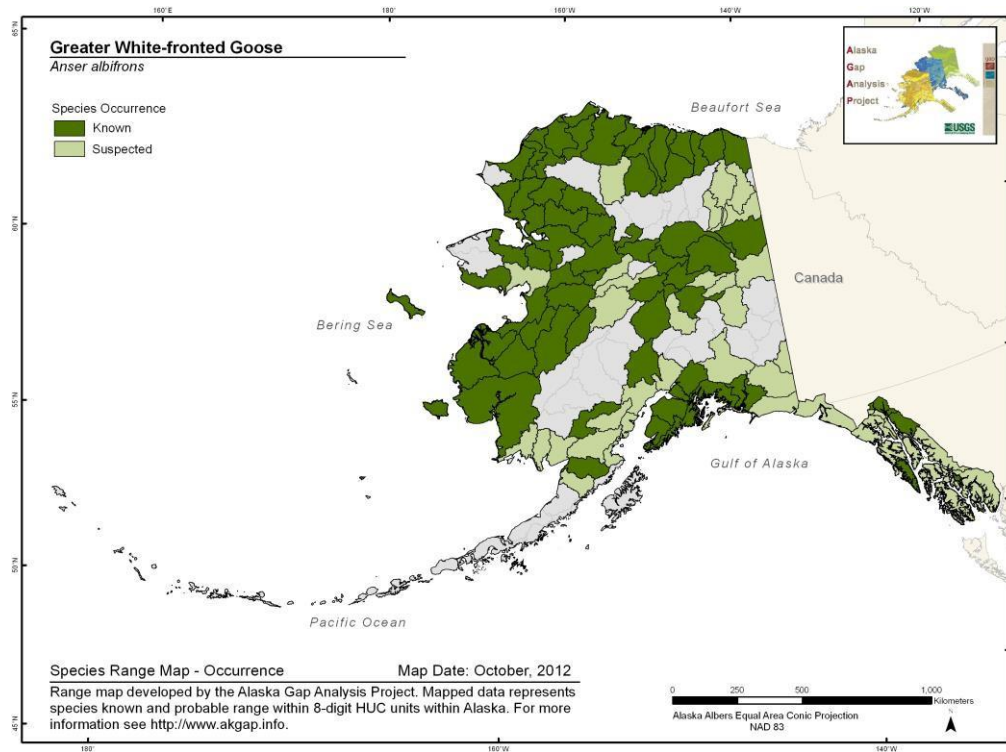
Juvenile black-legged kittiwake, Credit: Jennifer McGrath

Greater White-fronted Goose

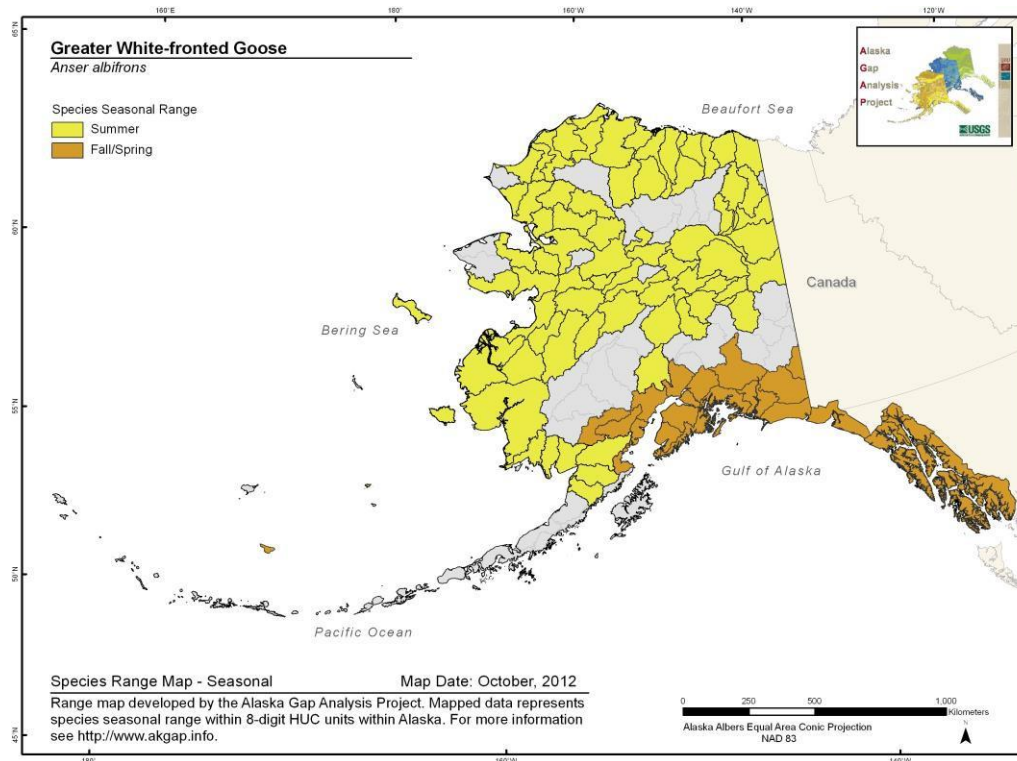
Anser albifrons

Range Map and Distribution Model Summary

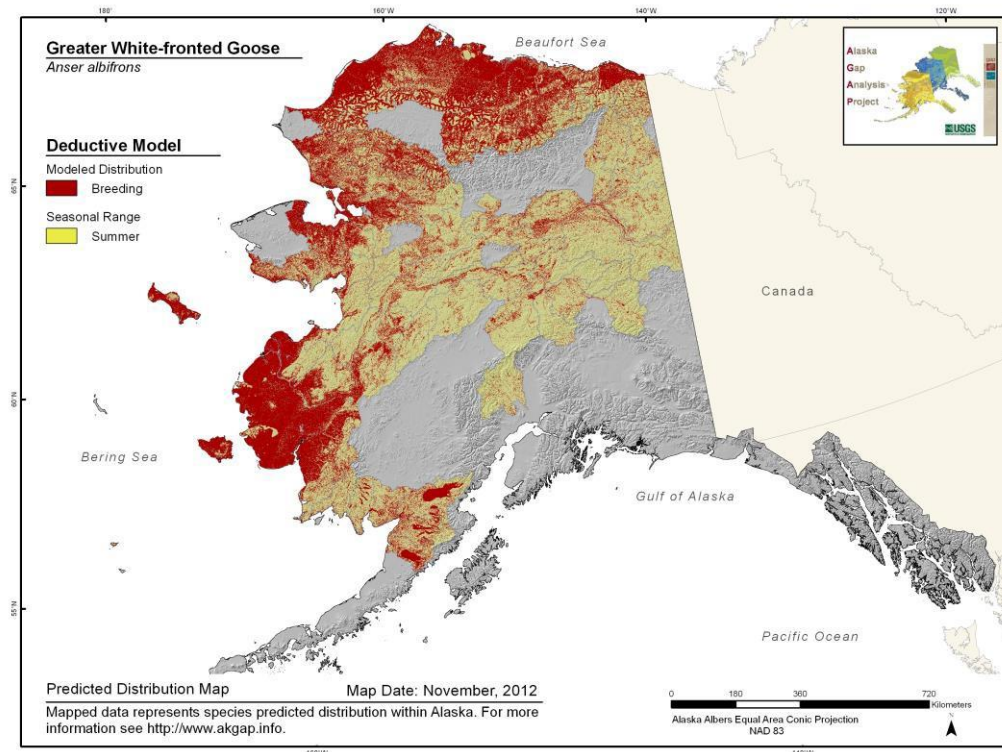
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.777**

**Model Quality
Summary:**
Moderate

Habitat Description

Prenesting birds on the Y-K Delta concentrate on meltwater areas, slough banks, and river edges within 30 km of the Bering Sea (Campbell et al. 1990). Nests located in moderate to dense cover of grasses and sedges or dwarf shrubs (Mickelson 1975, Ely and Raveling 1984) in meltwater areas and lower edges of pingos (Campbell et al. 1990). More interior populations breed in alluvium lowlands on stream deltas, low sedge- cotton grass-moss meadows, tussock lowlands, tundra ponds with *Carex aquatilis*, *Arctophila fulva* emergent ecotone, taiga forests and bogs, raised polygon edges, hummocky ground, inland tributary stream edges, dwarf and occasionally tall- shrub tundra of birch and willow; and to a lesser extent , heath tundra, drier rock fields, eskers, hill slopes with *Dryas* spp., grasses and lichens (Tieszen 1978, Bird 1980, Chapin et al. 1992, R. Bromley unpubl. data).

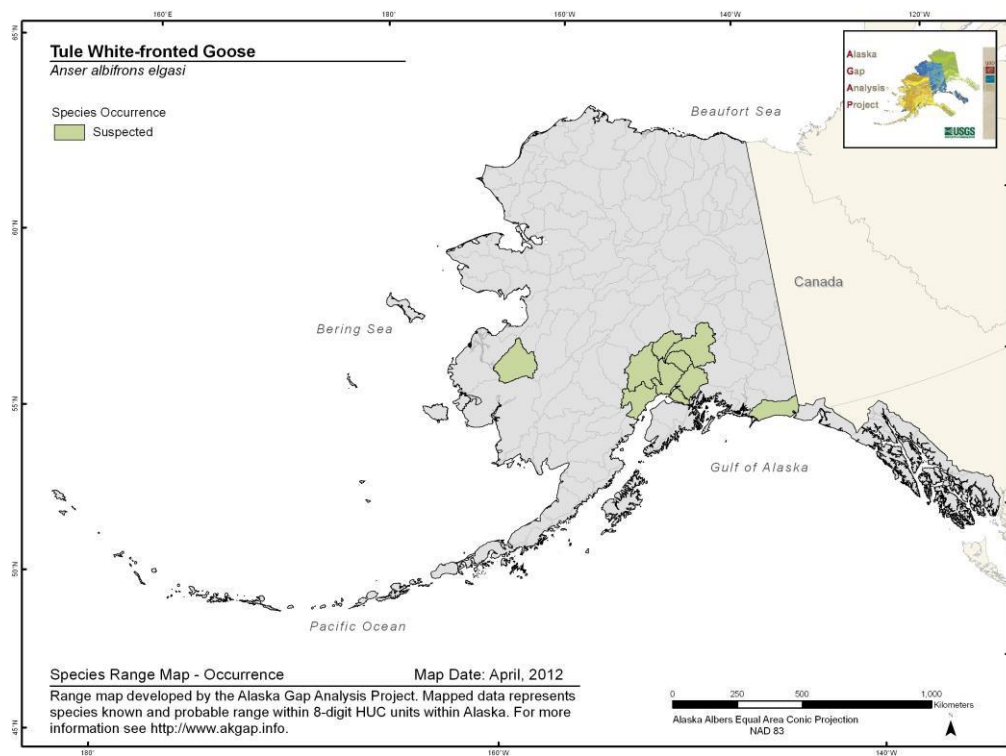
References

- Bird, B. J. 1980. The natural landscape of Canada, 2nd ed. John Wiley and Sons, Toronto, ON.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- Chapin, F. S., R. L. Reynolds, J. F. Shaver, and G. R. Svoboda, eds. 1992. Arctic ecosystems in a changing climate: an ecophysiological perspective. Academic Press, San Diego, CA.
- Ely, C. R. and D. G. Raveling. 1984. Breeding biology of pacific White-fronted Geese. J. Wildl. Manage. 48: 823-837.
- Mickelson, P. G. 1975. Breeding biology of cackling geese and associated species on the Yukon-Kuskokwim Delta, Alaska. Wildl. Monogr. 45.
- Tieszen, L. L. 1978. Vegetation and production ecology of an Alaskan arctic tundra. Ecological Studies, vol. 29. Springer-Verlag, New York.

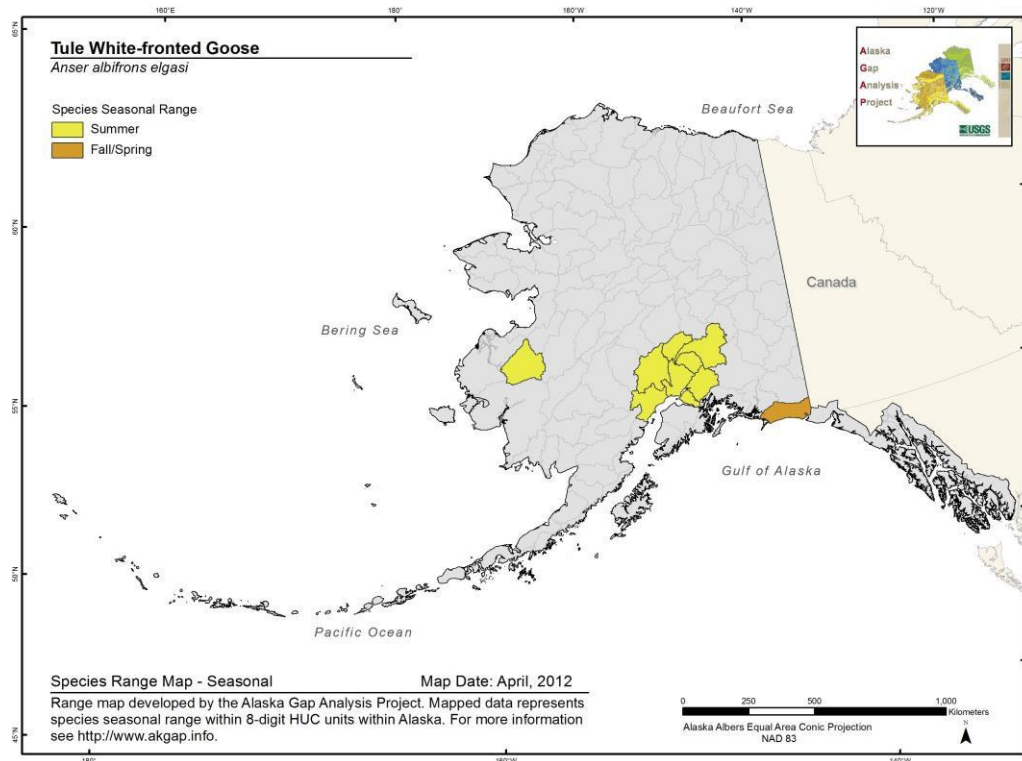
Tule White-fronted Goose *Anser albifrons elgasi*

Range Map and Distribution Model Summary

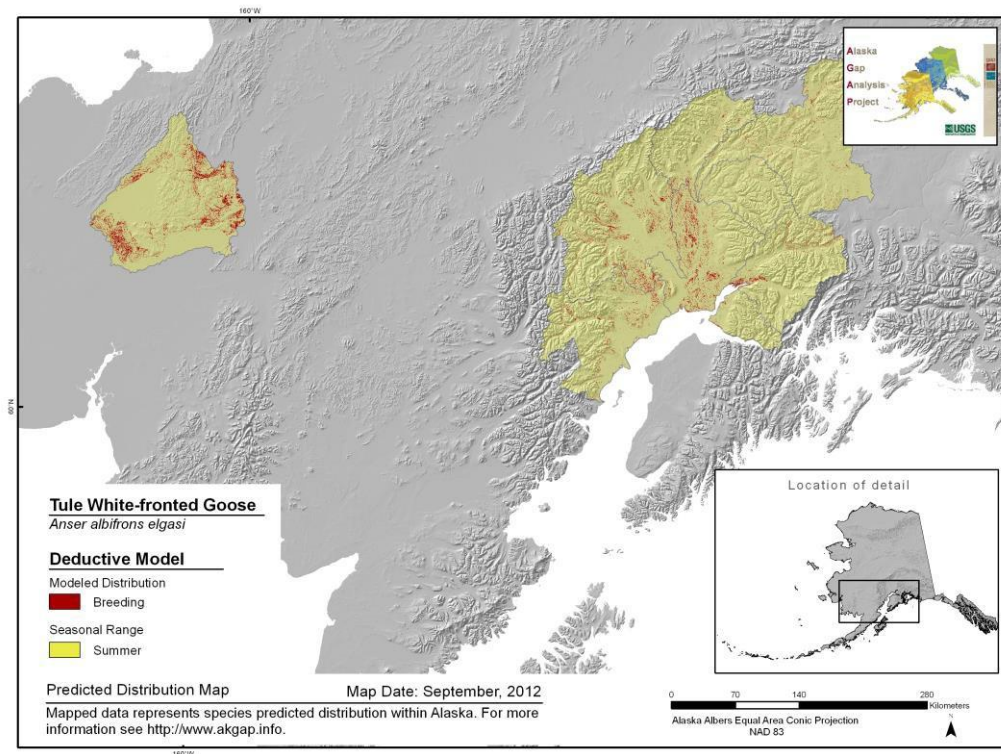
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

In Cook Inlet, nests along sloughs dominated by saline sedge-grass habitat and freshwater marsh/shrub bog (Timm and Sellers 1981).

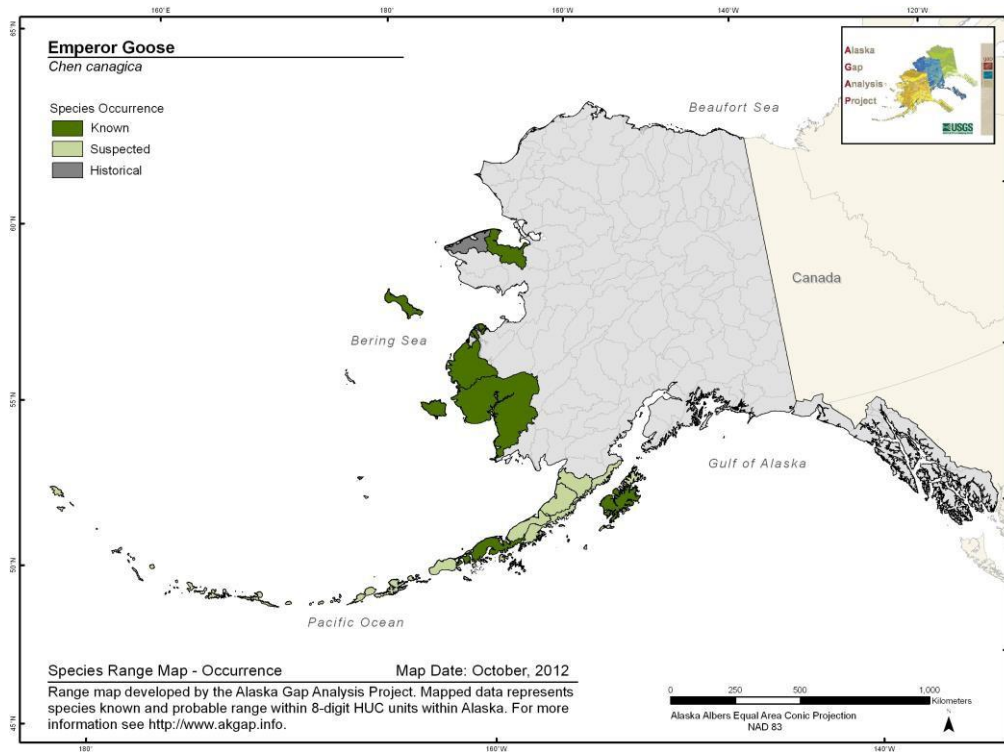
References

Timm, D. and D. Sellers. 1981. Investigations of the Tule White-fronted Geese in Alaska: 1980. Progress Rept. Alaska Dept. Fish and Game, Anchorage.

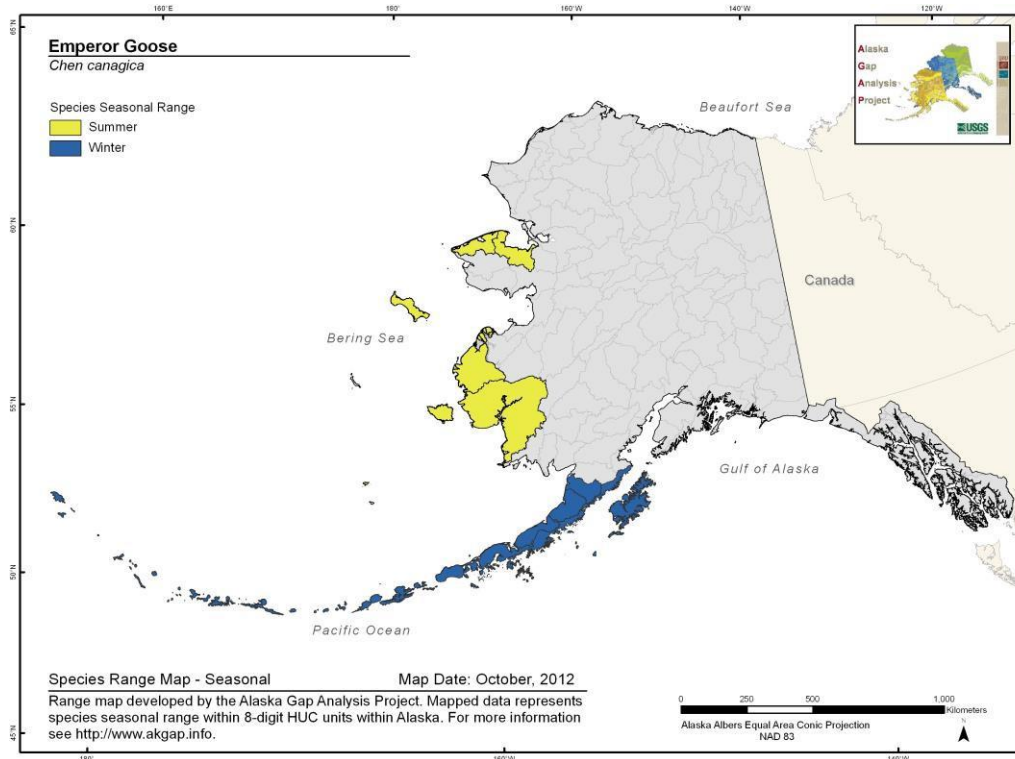
Emperor Goose *Chen canagica*

Range Map and Distribution Model Summary

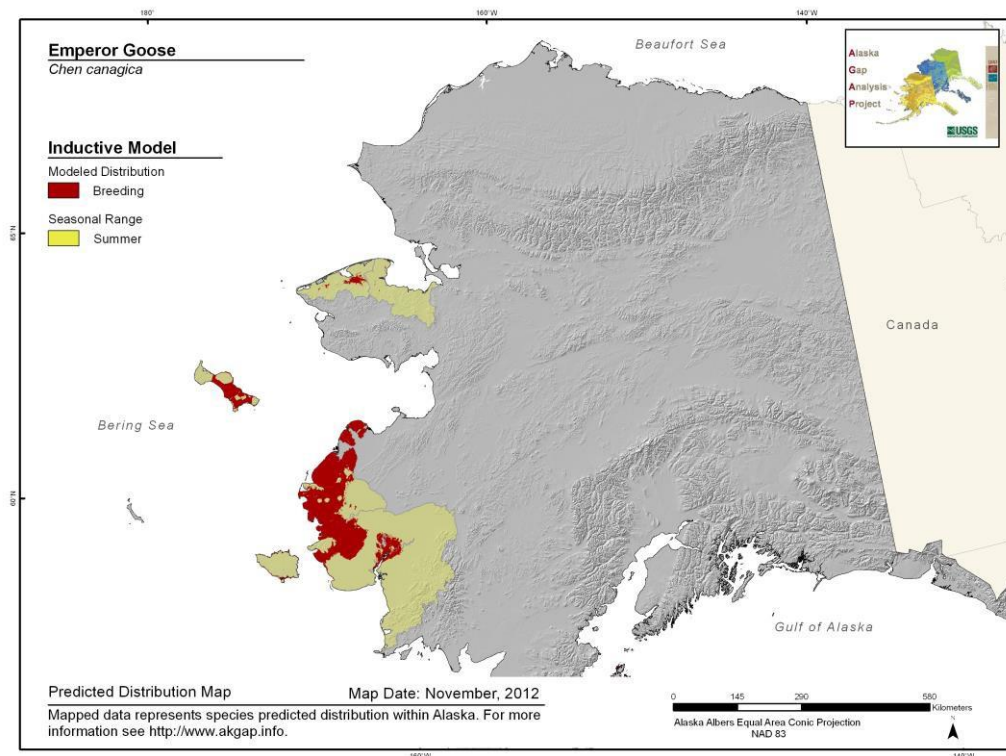
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.92**

**Model Quality
Summary:**
High

Habitat Description

Typically breeds within 15 km of the coast on the Y-K Delta on flat tidally influenced salt marsh habitats. This area is characterized by tidal rivers and sloughs, as well as brackish and freshwater ponds and lakes with halophytic plants and graminoid meadows (Petersen et al. 1994). Also nests on shore (e.g., among driftwood) or on low coastal or estuarine islands (Harrison 1978). Nests on high ground in areas subject to flooding. Typical brood rearing areas in Alaska (Kokechik River area): insides of bends of major sloughs and rivers that supported stands of *Carex rariflora* (Eisenhauer and Kirkpatrick 1977).

References

Eisenhauer, D. I., and C. M. Kirkpatrick. 1977. Ecology of the emperor goose in Alaska. Wildl. Monogr. No. 57:1-62.

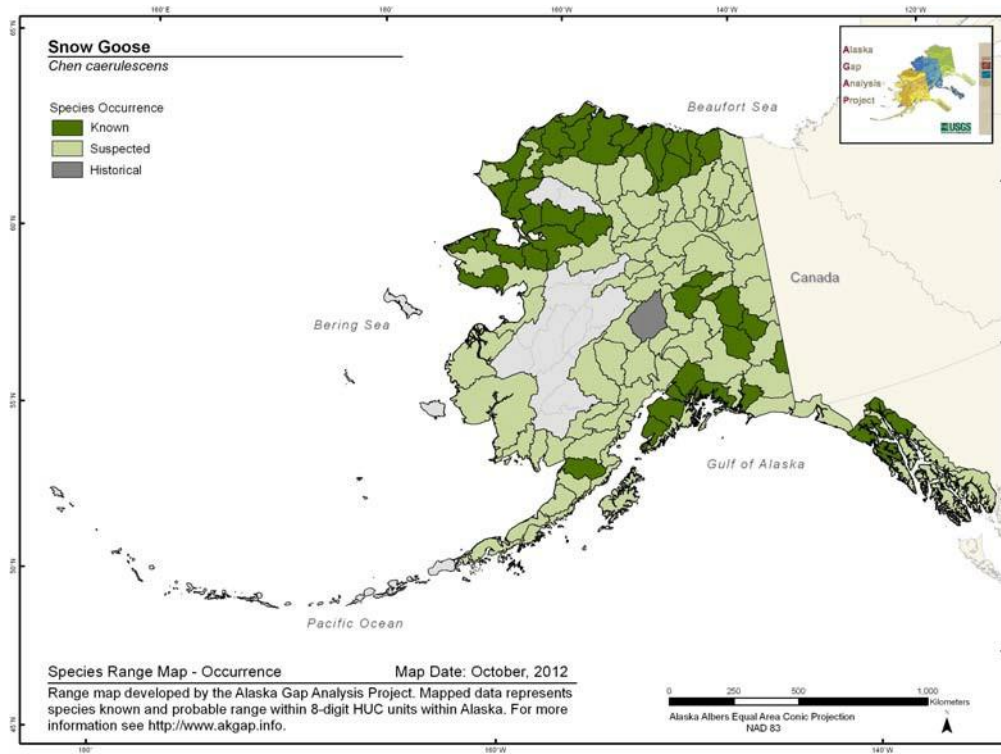
Harrison, C. 1978. A Field Guide to the Nests, Eggs and Nestlings of North American Birds. Collins, Cleveland, Ohio.

Petersen, M. R., J. A. Schmutz, and R. F. Rockwell. 1994. Emperor Goose (*Chen canagica*). In The Birds of North America, Vol. 3, No. 97 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

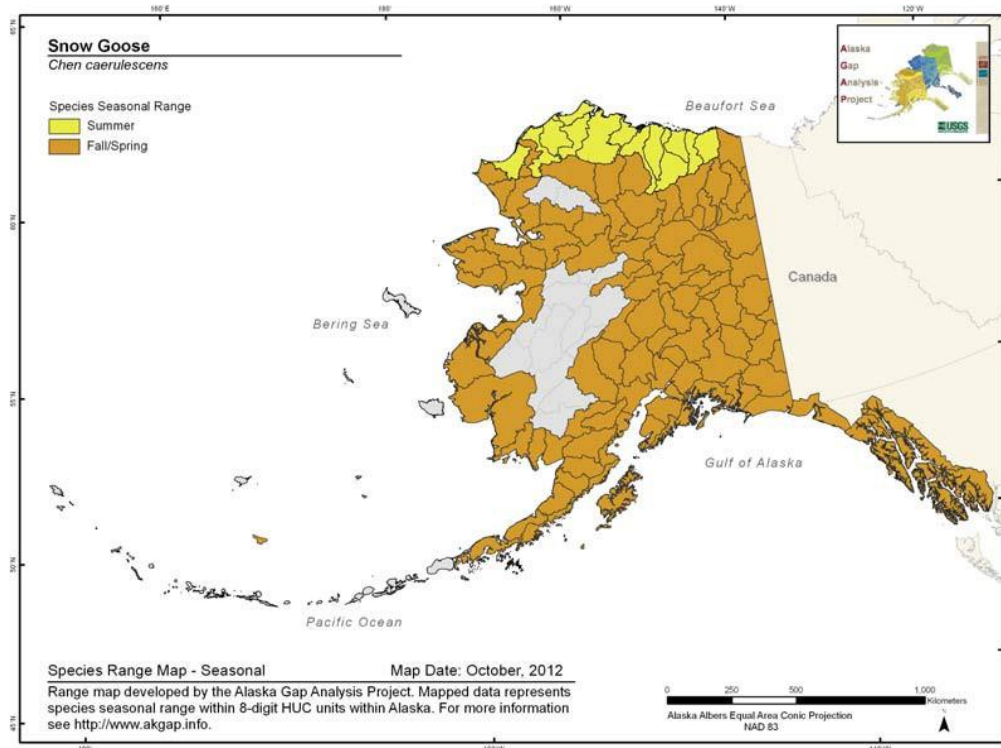
Snow Goose *Chen caerulescens*

Range Map and Distribution Model Summary

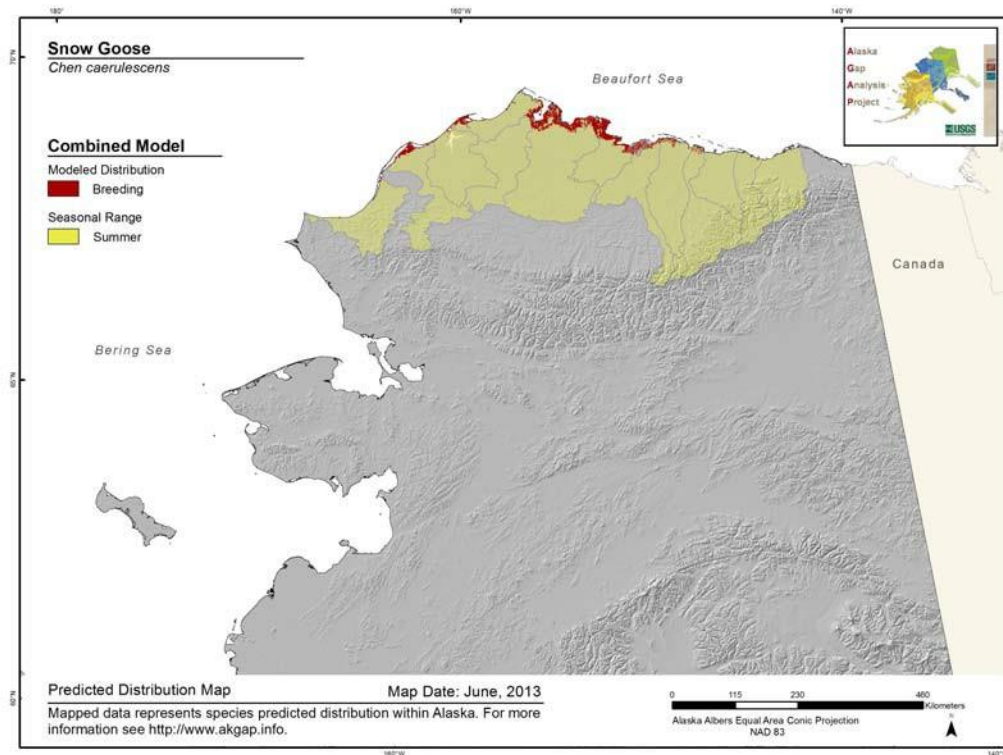
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.71**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in tundra marshes near water, on raised hummocks and ridges (NatureServe 2007b). In western Canadian arctic, breeds on coastal areas characterized by stretches of low sandy or silty ridges and narrow beaches interspersed with river deltas, barrier islands, spits, and lagoons with permafrost related features and an abundance of small lakes (Mowbray et al. 2000). Vegetation cover typically consists of a mosaic of dry tussock, wet sedge, and low shrub, with taller shrubs (1-3 m) in drainage courses (Salter et al. 1980). In Manitoba, geese nesting in tall willows had better reproductive success than did geese nesting in shorter willows or in areas without willows (Jackson et al. 1988).

References

Jackson, S. L., D. S. Hik, and R. F. Rockwell. 1988. The influence of nesting habitat on reproductive success of the lesser snow goose. *Can. J. Zool.* 66:1699-1703.

Mowbray, T. B., F. Cooke, and B. Ganter. 2000. Snow Goose (*Chen caerulescens*). In *The Birds of North America*, Vol. 13, No. 514 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Salter, R. E., M. A. Gollop, S. R. Johnson, W. R. Koski, and C. E. Tull. 1980. Distribution and abundance of birds on the arctic coastal plains of the Northern Yukon and adjacent Northwest Territories, 1971-1976. *Can. Field-Nat.* 94: 219-238.

Range Map and Distribution Model Summary

Pacific Black Brant
Branta bernicla

Species Occurrence

- Known
- Suspected

Beaufort Sea

Bering Sea

Gulf of Alaska

Pacific Ocean

Canada

Alaska

Gap

Analysis

Project

USGS

Species Range Map - Occurrence

Map Date: October, 2012

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species known and probable range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

0 250 500 1,000 Kilometers

Alaska Albers Equal Area Conic Projection
NAD 83

Pacific Black Brant
Branta bernicla

Species Seasonal Range

- Summer
- Fall/Spring

Map Date: October, 2012

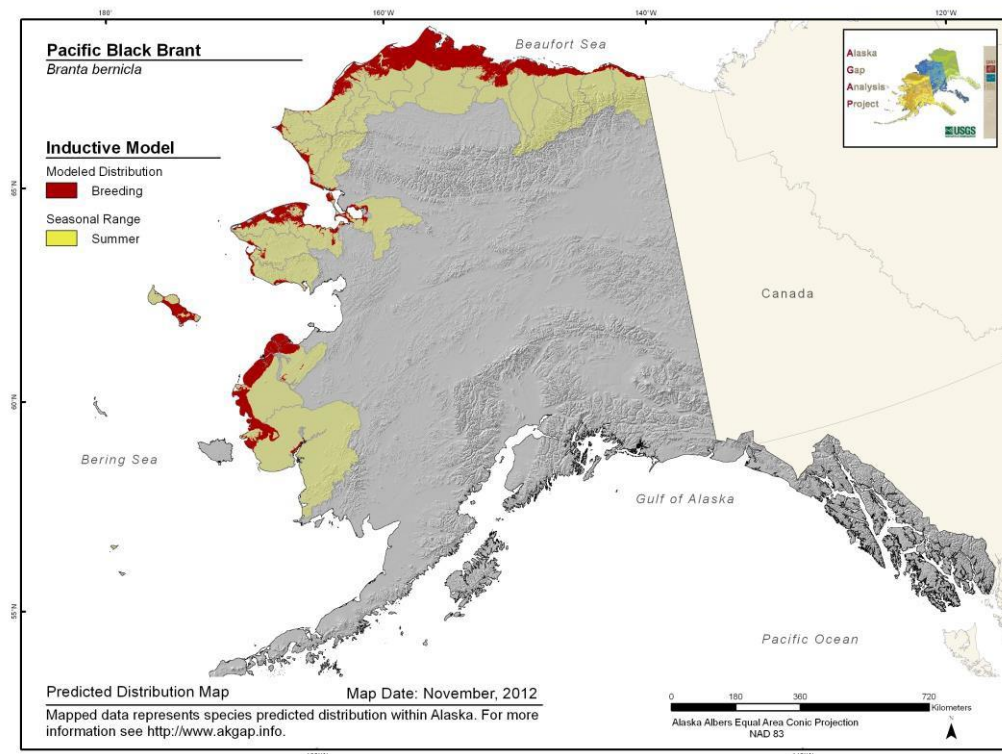
Range map developed by the Alaska Gap Analysis Project. Mapped data represents species seasonal range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

Alaska Gap Analysis Project
USGS

0 250 500 1,000
Kilometers

Alaska Albers Equal Area Conic Projection
NAD 83

Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.972**

**Model Quality
Summary:**
High

Habitat Description

In low arctic, nests near upper edge of salt marshes along gently sloping seacoasts or broad estuarine deltas with abundant low graminoid vegetation. Breeds on coastal tundra, in low and barren terrain; on islands, deltas, lakes, and sandy areas among puddles and shallows, and in vegetated uplands. Often nest on islands in small ponds or river deltas, on small offshore islands, or on gravel spits. In mid and high arctic, nests near braided river valleys, deltas, and inland lakes (up to 30 km inland) (Reed et al. 1998). Typically rears broods in salt marsh <1 km from tidal areas (Sedinger and Flint 1991, Stickney and Ritchie 1996).

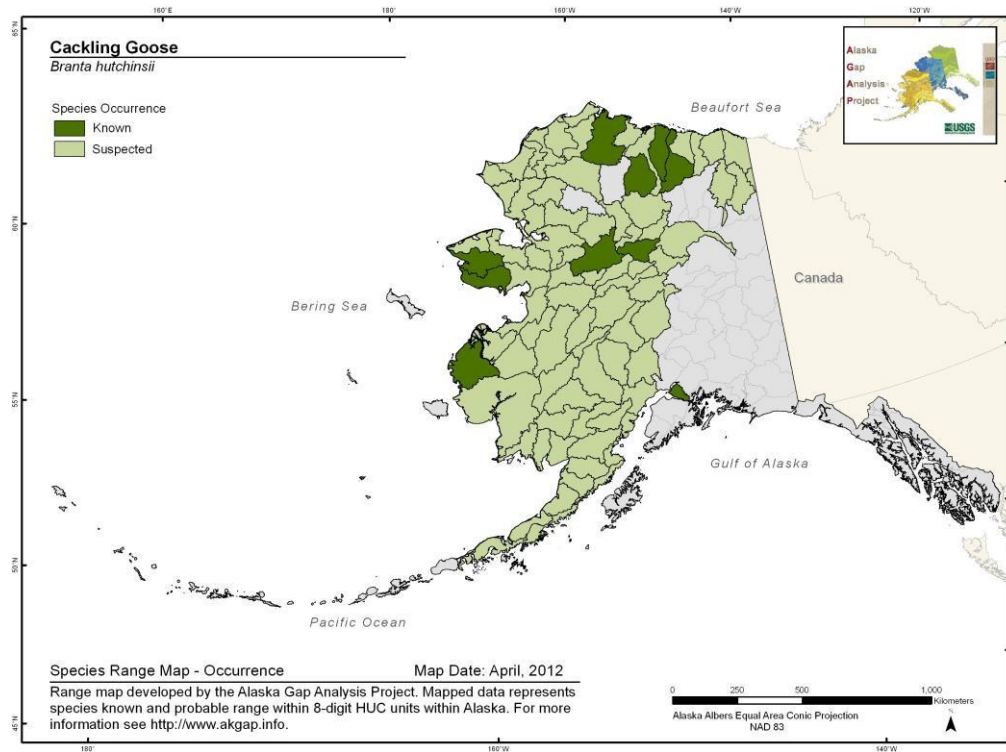
References

- Reed, A., D. H. Ward, D. V. Derksen, and J. S. Sedinger. 1998. Brant (*Branta bernicla*). In *The Birds of North America*, Vol. 9, No. 337 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Sedinger, J. S. and P. L. Flint. 1991. Growth rate is negatively correlated with hatch date in Black Brant. *Ecology* 72: 496-502.
- Stickney, A. A. and R. J. Ritchie. 1996. Distribution and abundance of brant (*Branta bernicla*) on the central arctic coastal plain of Alaska. *Arctic* 49: 44-52

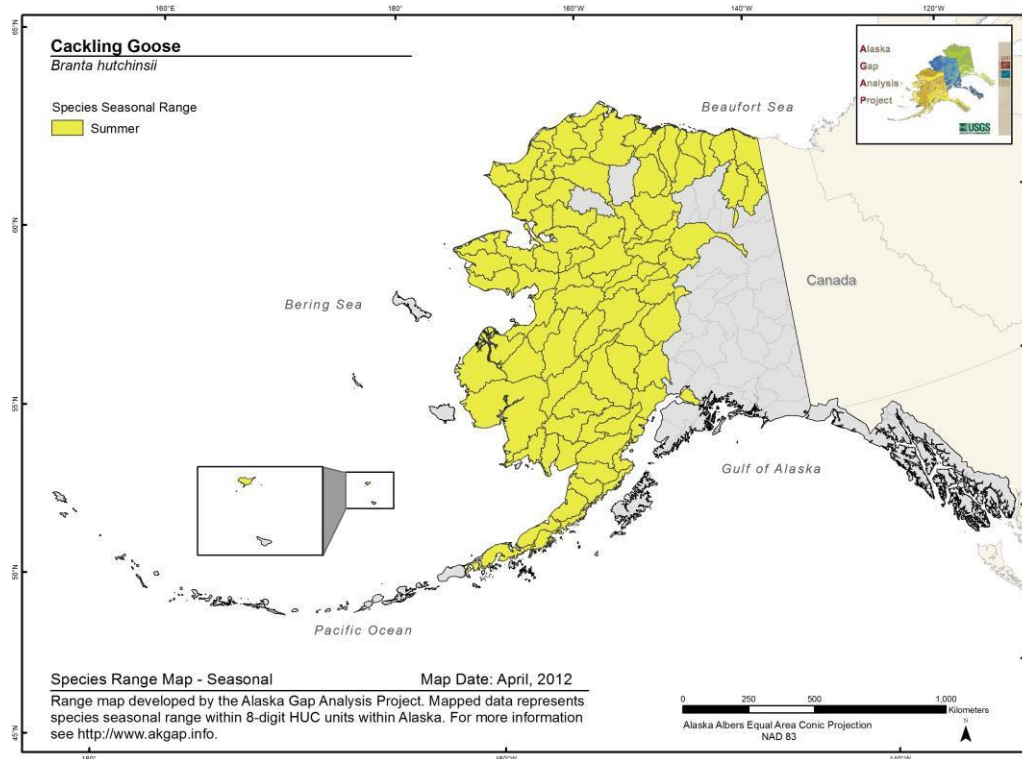
Cackling Goose *Branta hutchinsii*

Range Map and Distribution Model Summary

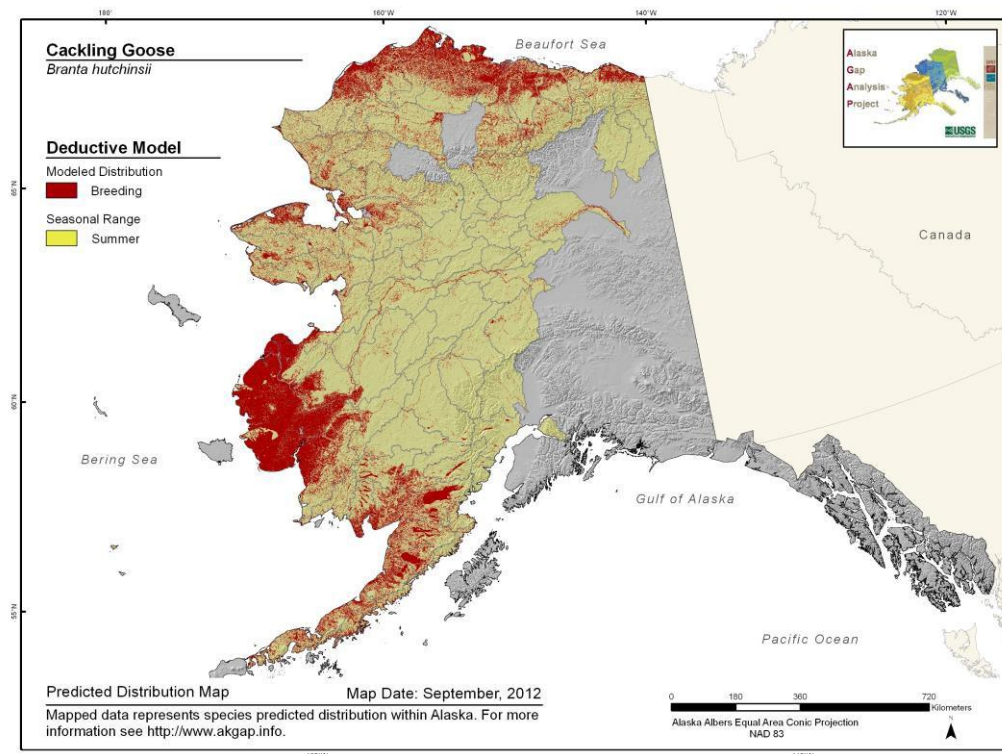
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.952**

**Model Quality
Summary:**
High

Habitat Description

Aleutian Cackling geese breed exclusively on a small number of Aleutian Islands (USFWS 1991). Nesting areas are located on grassy hillsides, along streams, in marshes and lagoons, and on rugged sea cliffs cut by watercourses where grasses and sedges grow in profusion (Murie 1959, Jones 1963, USFWS 1980). On the Y-K Delta different subspecies of the Crackling Goose breed in mixed arctic graminoid and low tundra vegetation on small islands in tundra ponds, small peninsulas that extend into ponds, and shorelines of ponds, lakes, and river on the floodplain of the delta (Mowbray et al. 2002).

References

Jones, R. D. 1963. Buldir Island, site of a remnant breeding population of Aleutian Canada geese. Wildfowl Trust Annual 14:80-84.

Mowbray, T. B., C. R. Ely, J. S. Sedinger, and R. E. Trost. 2002. Canada Goose (*Branta canadensis*). In The Birds of North America, Vol. 18, No. 682 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Murie, O. J. 1959. Fauna of the Aleutian Islands and Alaska Peninsula. USDI, USFWS Rep. no. 61. Washington, D. C. N. Amer. Fauna 61: 1-364.

USFWS. 1980. Selected vertebrate endangered species of the seacoast of the United States - Aleutian Canada goose. FWS/OBS-80/01.34. USFWS, Biological Services Program. 9 p.

USFWS. 1991. Aleutian Canada Goose (*Branta canadensis leucopareia*) recovery plan. Aleutian Canada Goose Recovery Team. USFWS, Anchorage, AK. 55 pp.

Range Map and Distribution Model Summary

Taverner's Cackling Goose
Branta hutchinsii tavneri

Species Occurrence

- Known
- Suspected

Species Range Map - Occurrence **Map Date: April, 2012**

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species known and probable range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

Alaska Gap Analysis Project
Alaska Gap Analysis Project
Alaska Gap Analysis Project

Taverner's Cackling Goose
Branta hutchinsii taverneri

Species Seasonal Range
Summer

Beaufort Sea
Bering Sea
Canada
Gulf of Alaska
Pacific Ocean

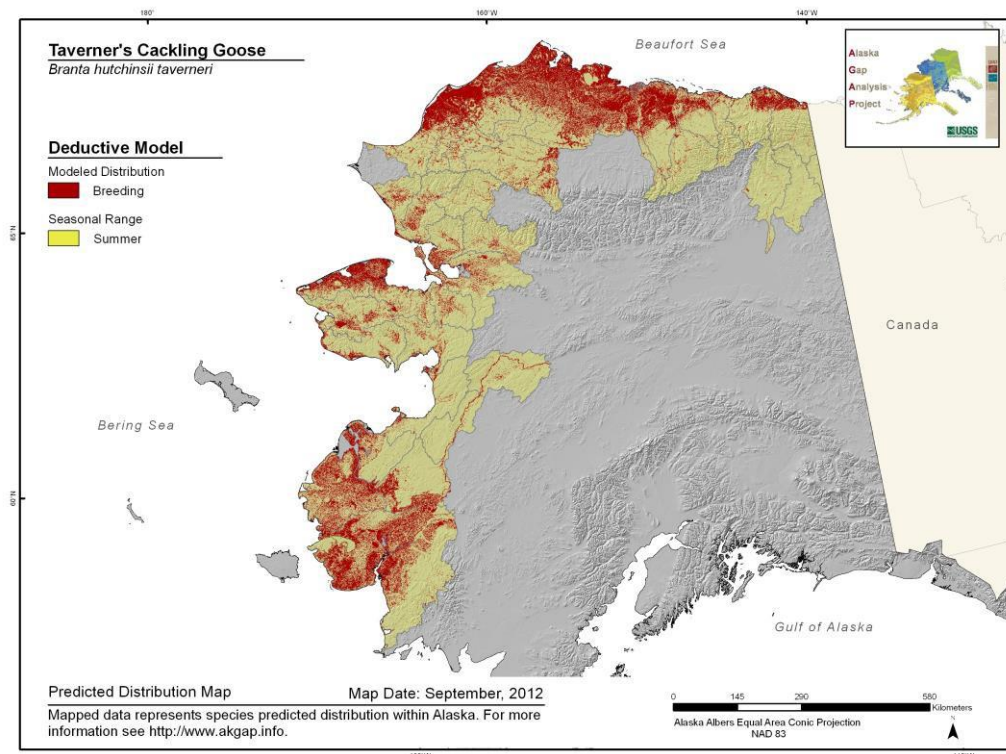
Alaska
Gap
Analysis
Project
USGS

Species Range Map - Seasonal
Map Date: April, 2012

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species seasonal range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

0 250 500 1,000
Alaska Albers Equal Area Conic Projection
NAD 83
kilometers
N

Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in low tundra vegetation along the shorelines of major rivers and small braided streams, shorelines of small tundra ponds, and on islands in tundra ponds and lakes of the Y-K Delta (Mowbray et al. 2002). Restricted to inland areas beyond the influence of tides, populations extends inland up to the North Slope (Johnson et al. 1979, Jarvis and Bromley 1998).

References

Jarvis, R. L. and R. G. Bromley. 1998. Managing racially mixed flocks of Canada Geese. Pp. 413-423 In: Biology and Management of Canada Geese (D. H. Rusch, M. D. Samuel, D. D. Humburg, and B. D. Sullivan, eds.). Proc. Int. Canada Goose Symp., Milwaukee, WI.

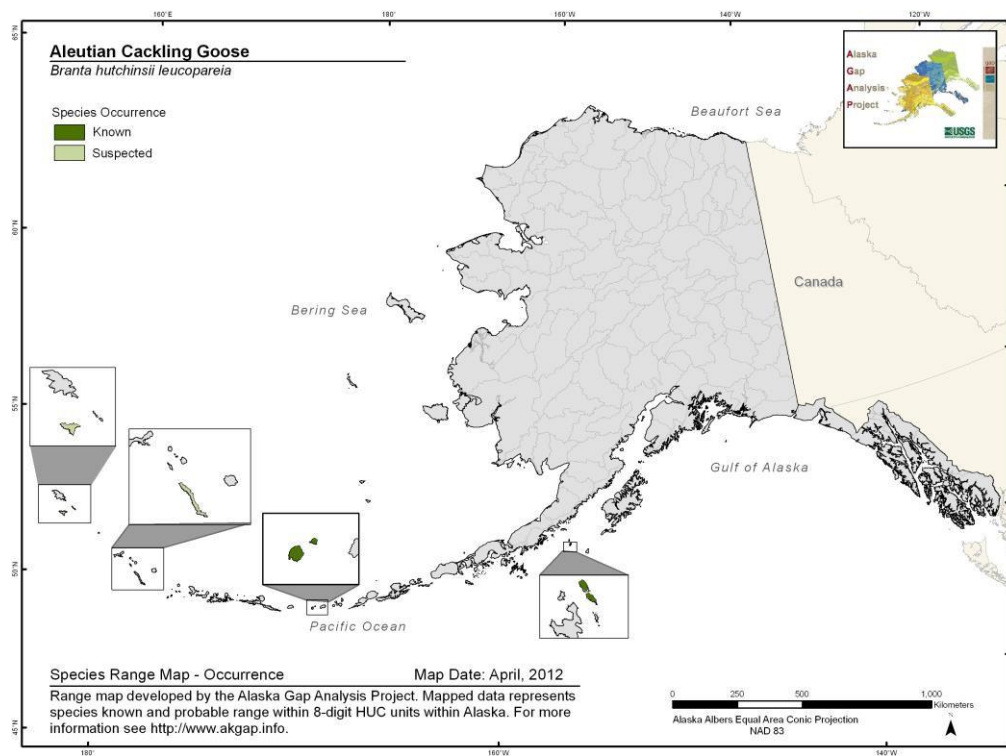
Johnson, D. H., D. E. Timm, and P. F. Springer. 1979. Morphological characteristics of Canada Geese in the Pacific Flyway. Pp. 56-80 In: Management and biology of Pacific Flyway geese (R. L. Jarvis and J. C. Bartonek, eds.). Oregon State Univ. Bookstores, Corvallis.

Mowbray, T. B., C. R. Ely, J. S. Sedinger, and R. E. Trost. 2002. Canada Goose (*Branta canadensis*). In The Birds of North America, Vol. 18, No. 682 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

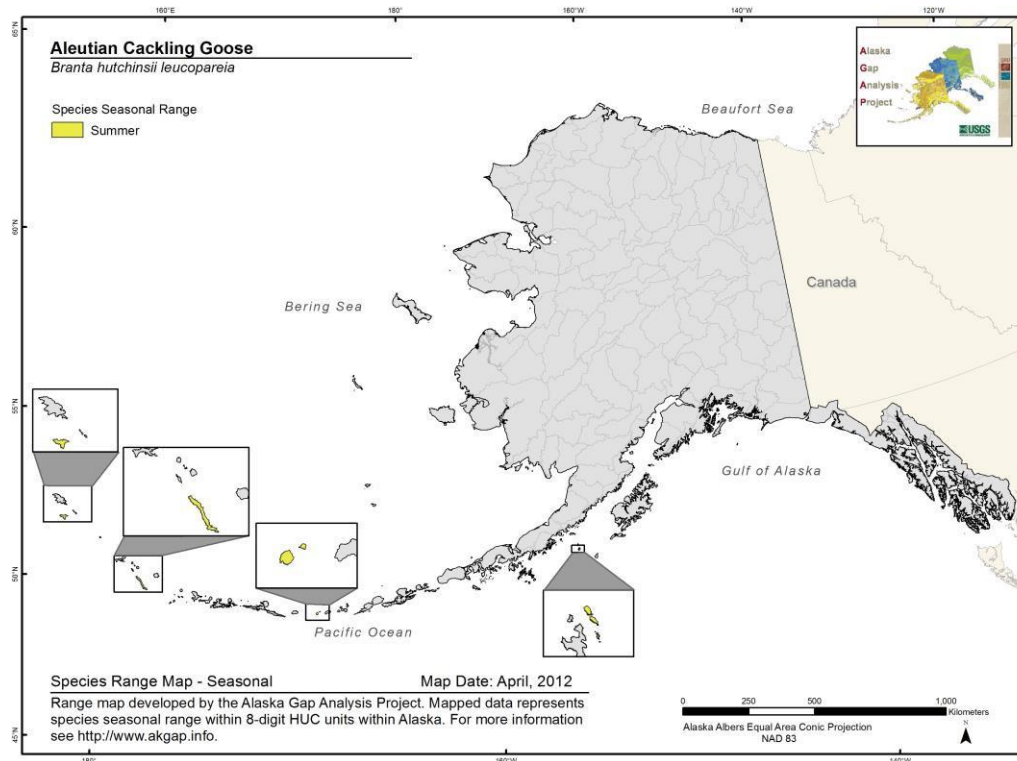
Aleutian Cackling Goose *Branta hutchinsii leucopareia*

Range Map and Distribution Model Summary

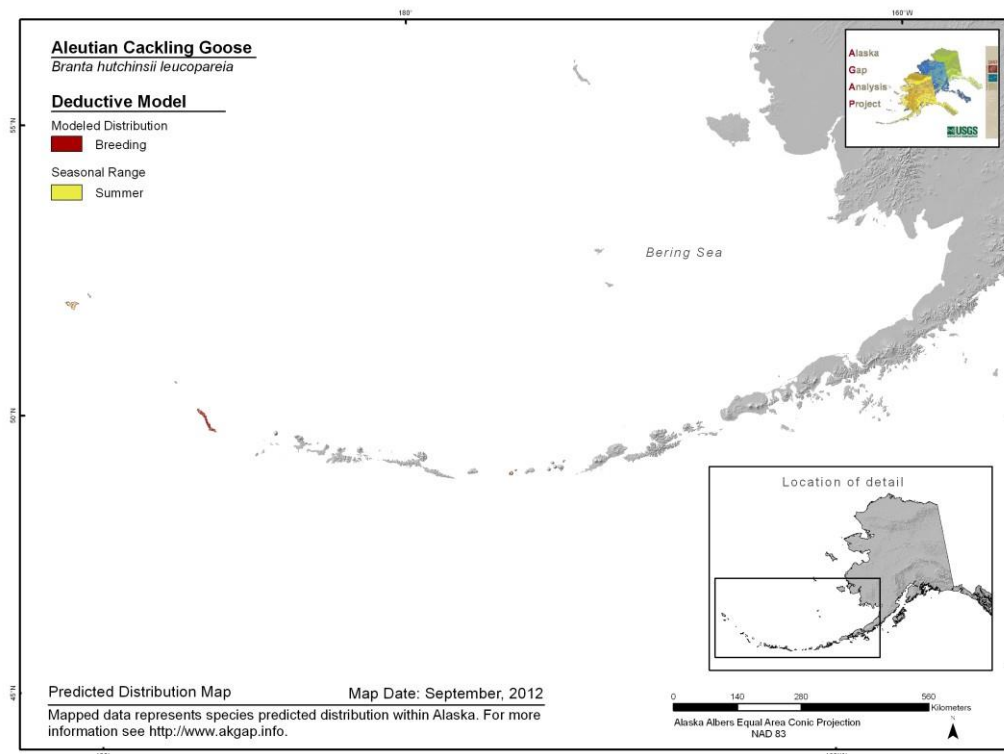
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Aleutian Cackling geese breed exclusively on a small number of Aleutian Islands (U.S. Fish and Wildlife Service 1991). Nesting areas are located on grassy hillsides, along streams, in marshes and lagoons, and on rugged sea cliffs cut by watercourses where grasses and sedges grow in profusion (Murie 1959, Jones 1963, U.S. Fish and Wildlife Service 1980).

References

Jones, R. D. 1963. Buldir Island, site of a remnant breeding population of Aleutian Canada geese. Wildfowl Trust Annual 14:80-84.

Murie, O. J. 1959. Fauna of the Aleutian Islands and Alaska Peninsula. USDI, USFWS Rep. no. 61. Washington, D. C. N. Amer. Fauna 61: 1-364.

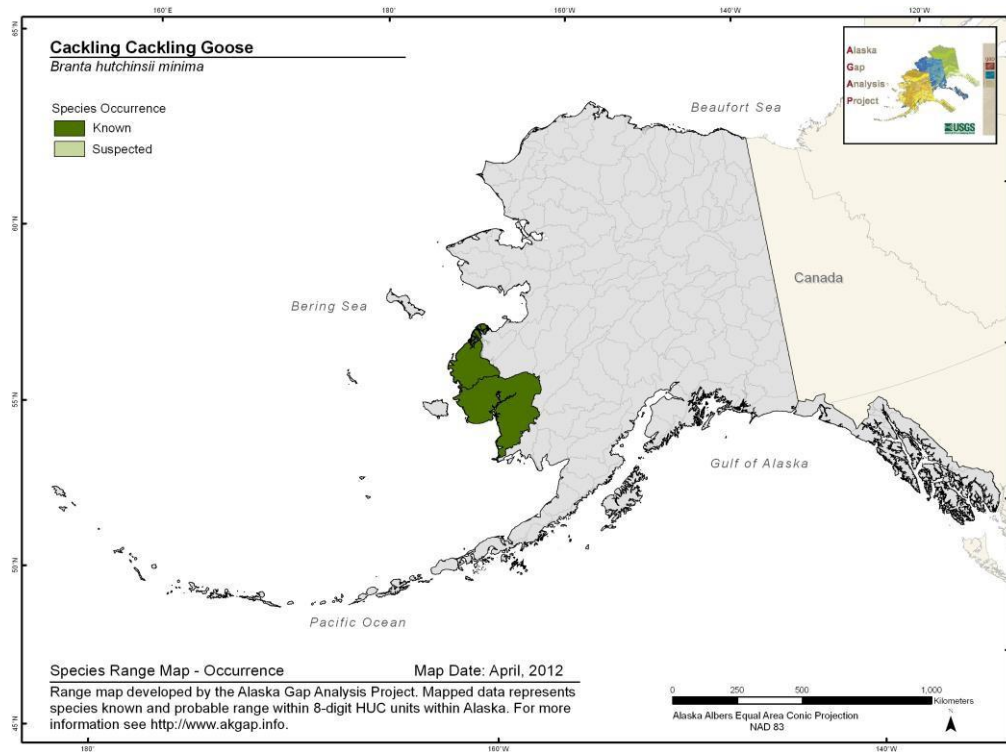
USDA USFS. 1991. Environmental effects. In: Tongass land management plan revision, supplement to the draft environmental impact statement. R10-MB-146. USDA, USFS, Juneau Alaska. Pages 1-765.

USFWS. 1980. Selected vertebrate endangered species of the seacoast of the United States - Aleutian Canada goose. FWS/OBS-80/01.34. USFWS, Biological Services Program. 9 p.

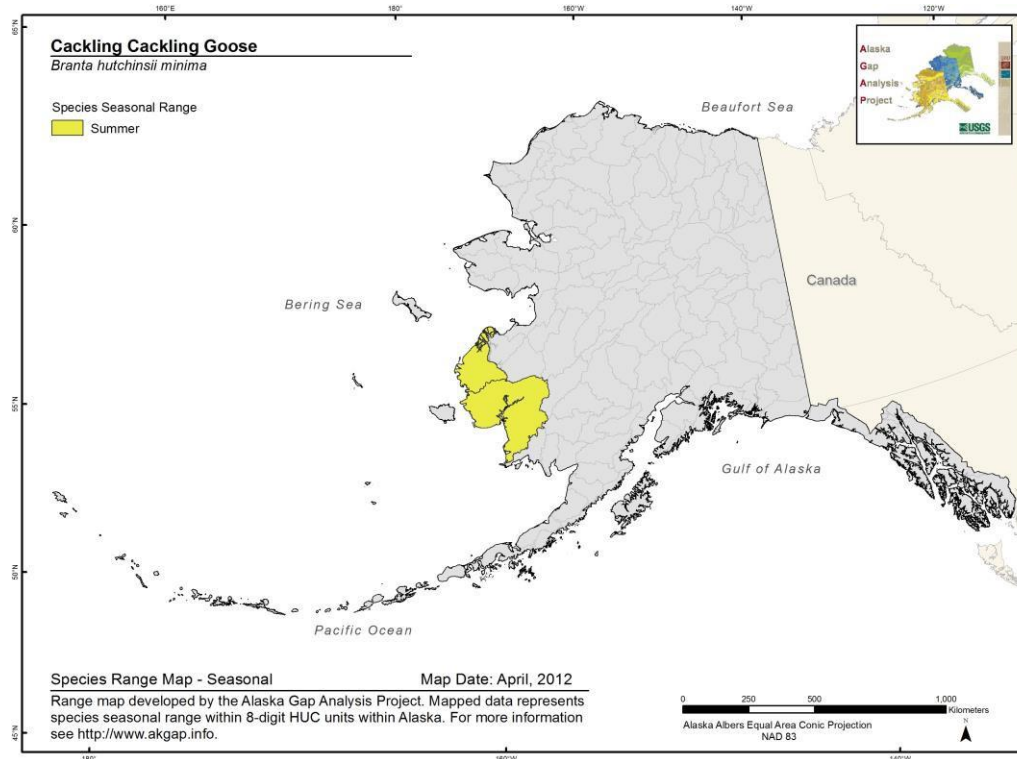
Cackling Cackling Goose *Branta hutchinsii minima*

Range Map and Distribution Model Summary

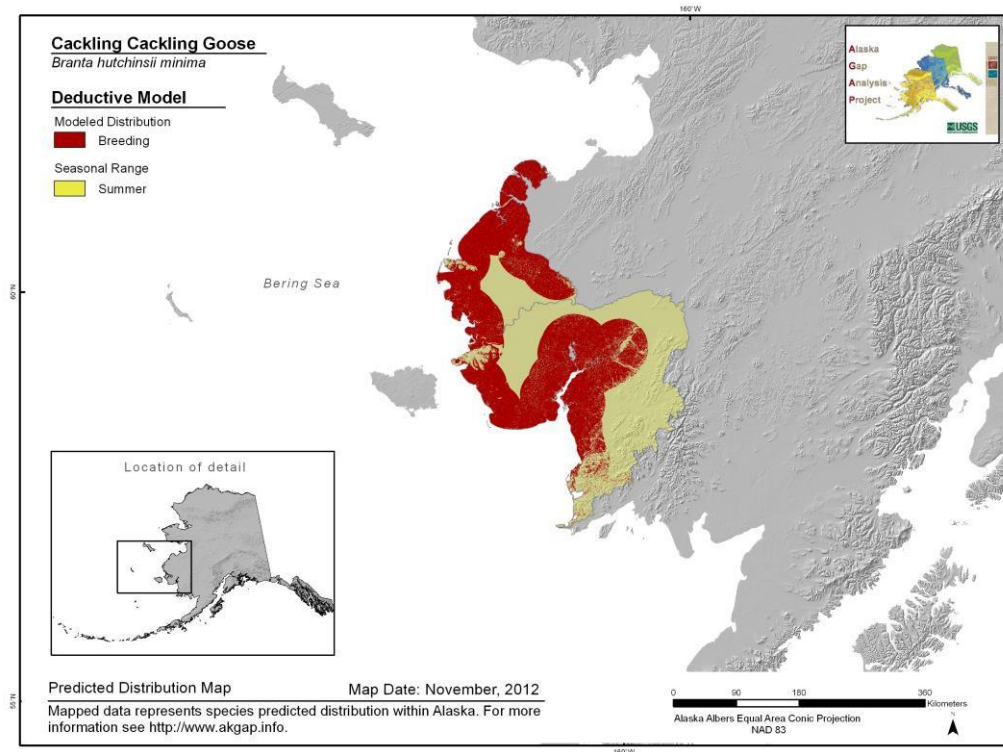
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in mixed arctic graminoid vegetation on small islands in tundra ponds, small peninsulas that extend into ponds, and pond edges on the tidal margin of the low coastal floodplain of the Y-K Delta from 1 to 24 km inland of the Bering Sea (Mickelson 1975, Peterson 1990).

References

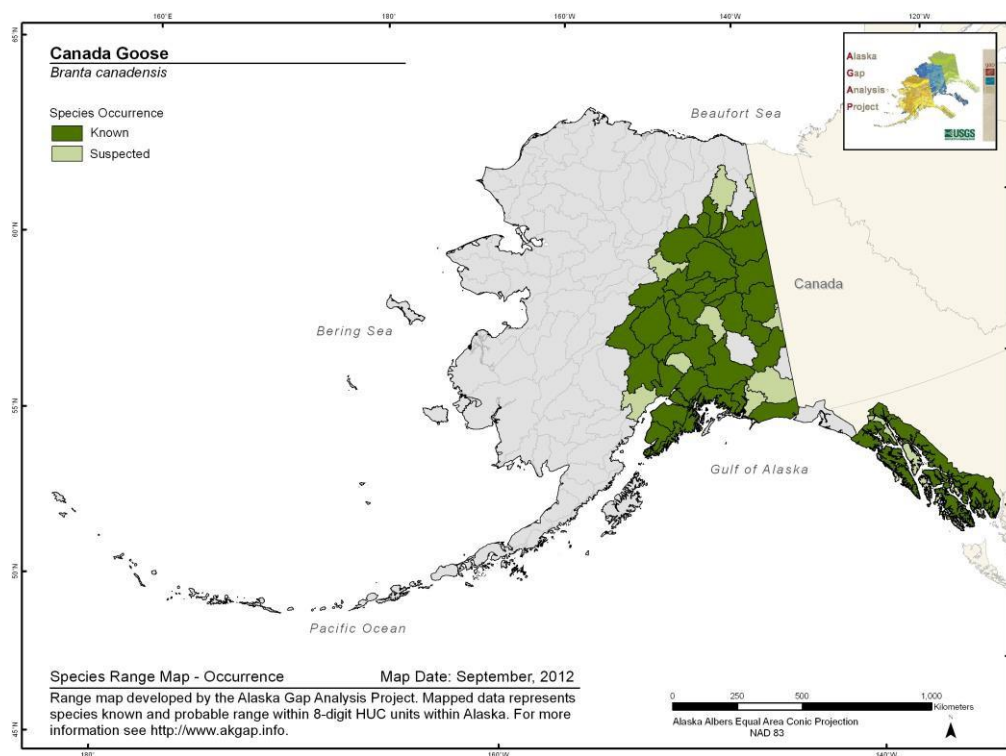
Mickelson, P. G. 1975. Breeding biology of cackling geese and associated species on the Yukon-Kuskokwim Delta, Alaska. Wildl. Monogr. 45.

Peterson, , M. R. 1990. Nest-site selection by Emperor Geese and Cackling Canada Geese. Wilson Bull. 102: 413-426.

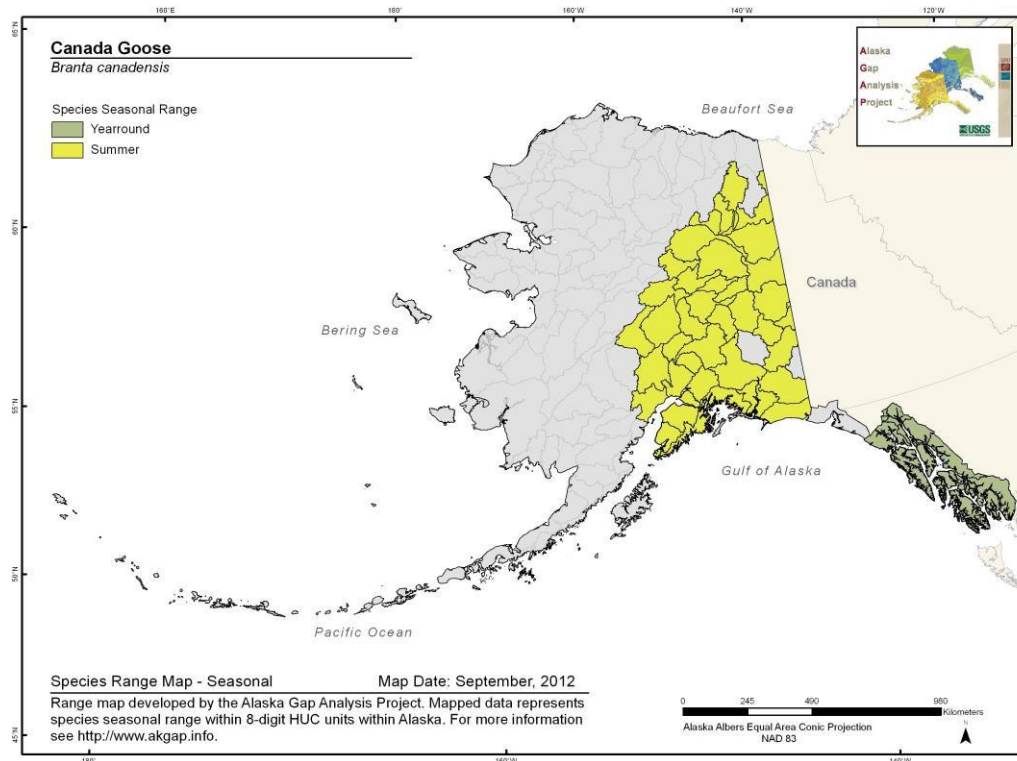
Canada Goose *Branta canadensis*

Range Map and Distribution Model Summary

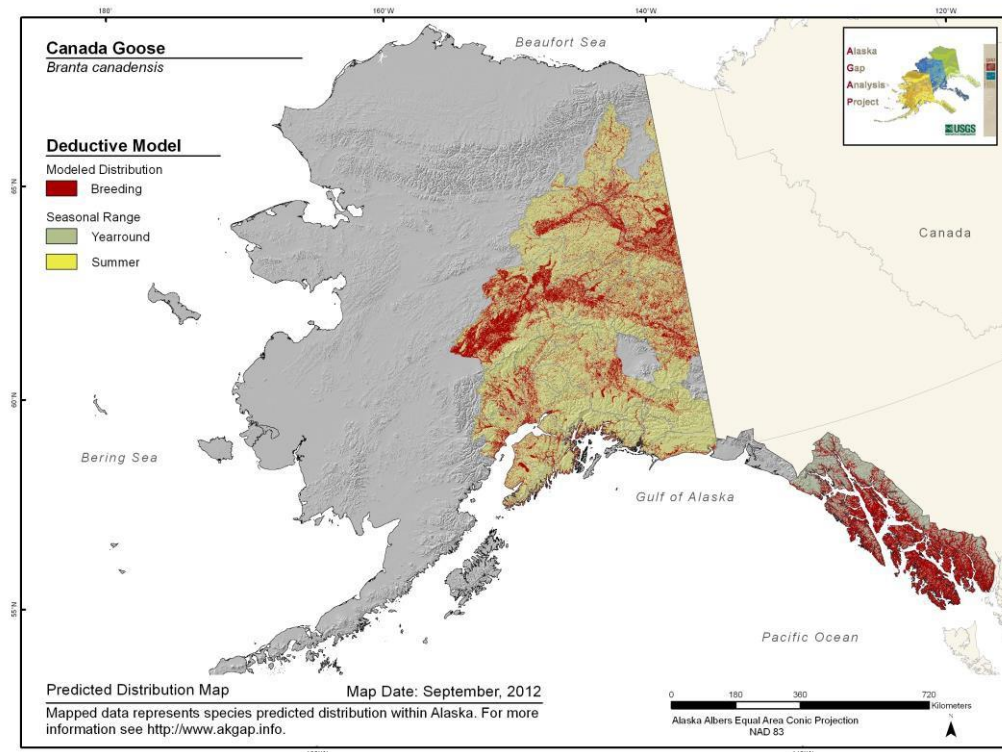
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.524**

**Model Quality
Summary:**
Low

Habitat Description

In B.C., breeds from sea level to 1,250 m in inland and coastal marshes, islands in lakes, ponds, sloughs, rivers, tundra, muskeg, and man-made environments with water nearby. Most nests are with 60 m of water (Campbell et al. 1990). Broods are typically seen along gently sloping pond or river shorelines, with mudflats or mud barrens, and abundant short prostrate grasses, sedges, or semiaquatic plants (MacInnes 1962, O'Neil 1988, Babcock and Ely 1994, Conover 1998).

References

Babcock, C. A. and C. R. Ely. 1994. Classification of vegetation communities in which geese rear broods on the Yukon-Kuskokwim Delta, Alaska. *Can. J. Bot.* 72: 1294-1301.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. *The Birds of British Columbia. Vol. 1 and 2, Nonpasserines.* UBC Press, Vancouver, B.C.

Conover, M. R. 1998. Reproductive biology of an urban population of Canada Geese. Pp. 67-70 In: *Biology and management of Canada Geese* (D. H. Rusch, M. D. Samuel, D. D. Humburg, and B. D. Sullivan, eds.). *Proc. Int. Canada Goose Symp.*, Milwaukee, WI.

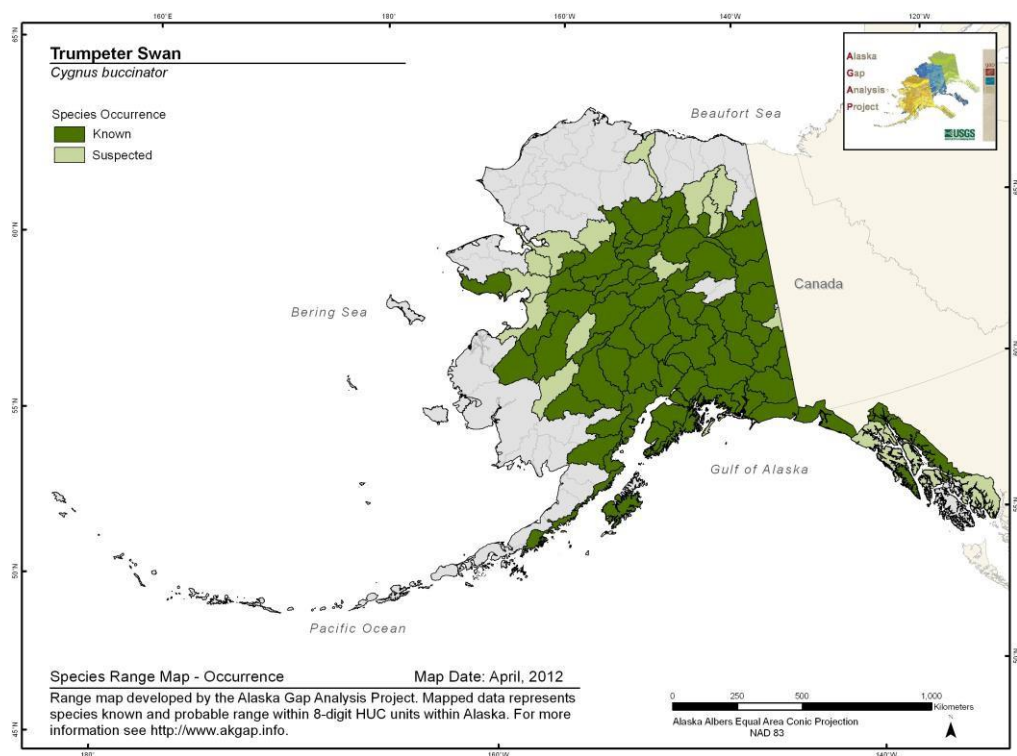
MacInnes, C. D. 1962. Nesting of small Canada Geese near Eskimo Point, Northwest Territories. *J. Wildl. Manage.* 26: 247-256.

O'Neil, T. A. 1988. Effects of removal and replacement of brood-rearing habitats on a Canada Goose flock. *Murrelet* 69: 41-45.

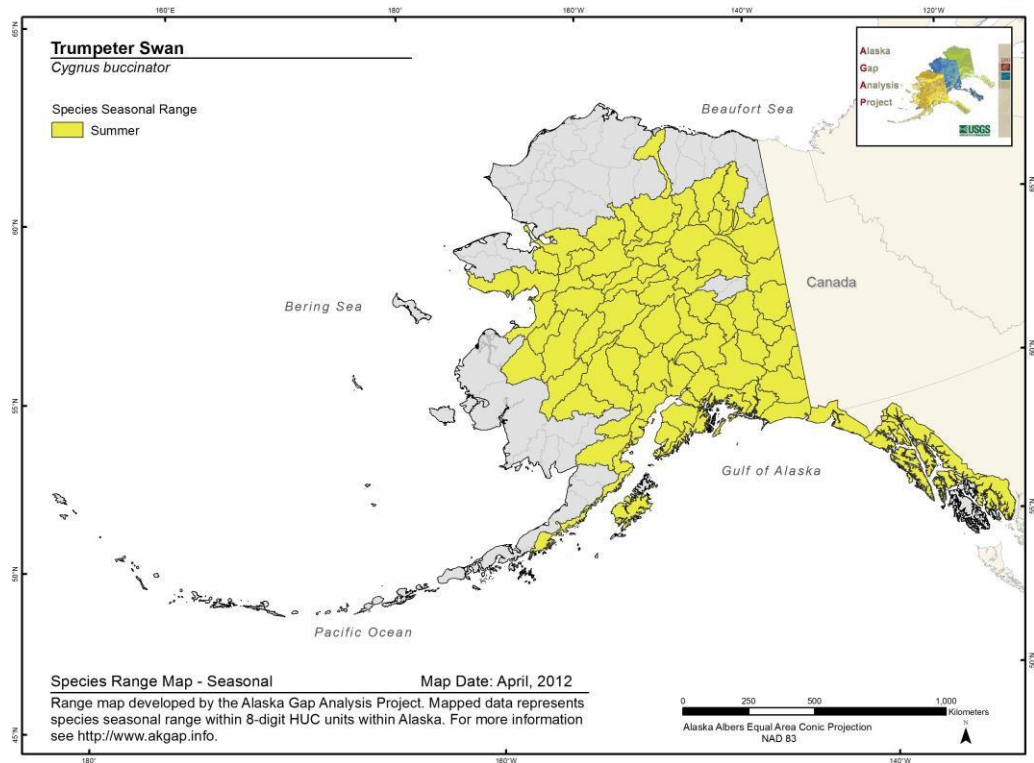
Trumpeter Swan *Cygnus buccinator*

Range Map and Distribution Model Summary

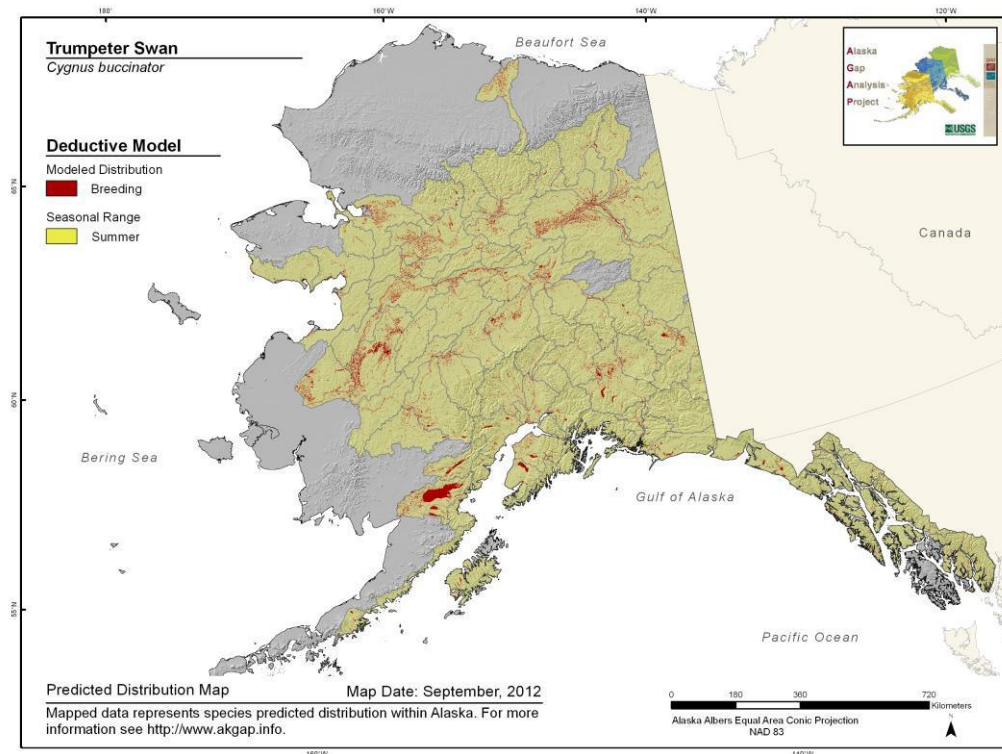
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.546**

**Model Quality
Summary:**
Low

Habitat Description

Ponds, lakes, and marshes, breeding in areas of reeds, sedges or similar emergent vegetation, primarily on freshwater, occasionally in brackish situations (AOU 1983). Prefer water bodies with ample room from take off and structure (such as an island) for nesting (Mitchell 1994).

References

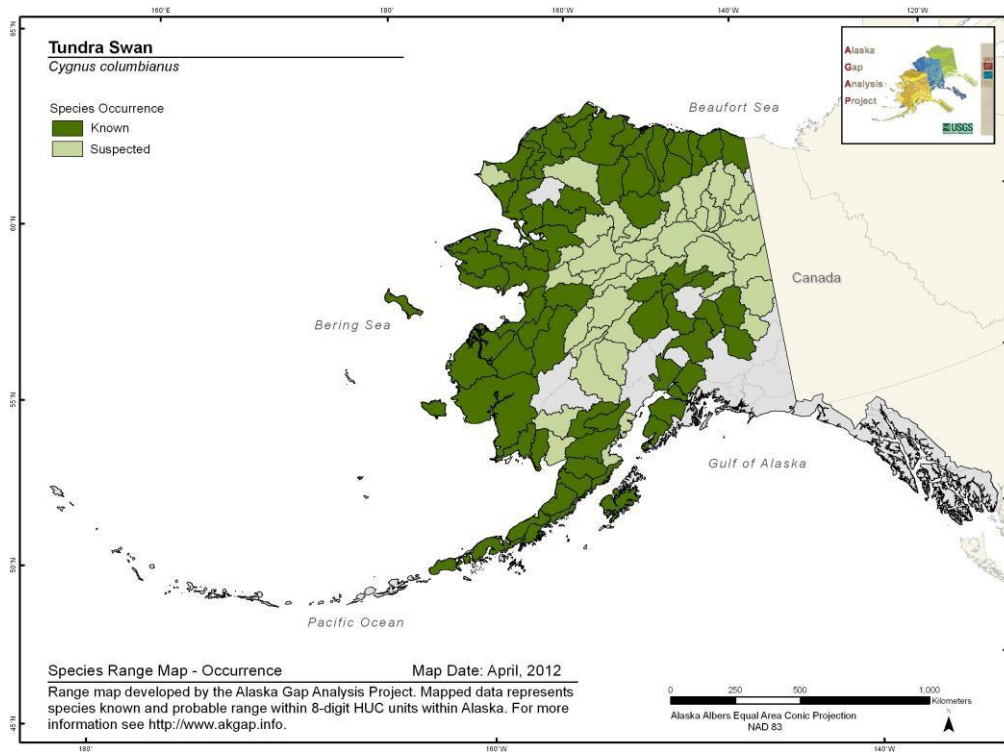
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Mitchell, C. D. 1994. Trumpeter Swan (*Cygnus buccinator*). In *The Birds of North America*, Vol. 3, No. 105 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

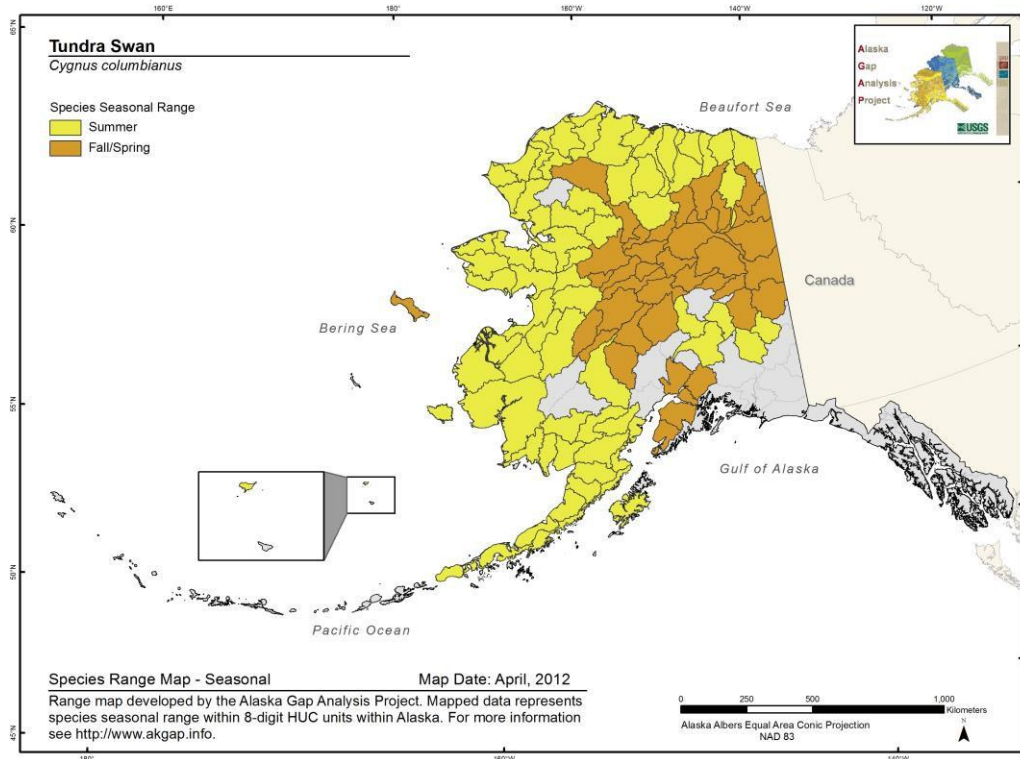
Tundra Swan *Cygnus columbianus*

Range Map and Distribution Model Summary

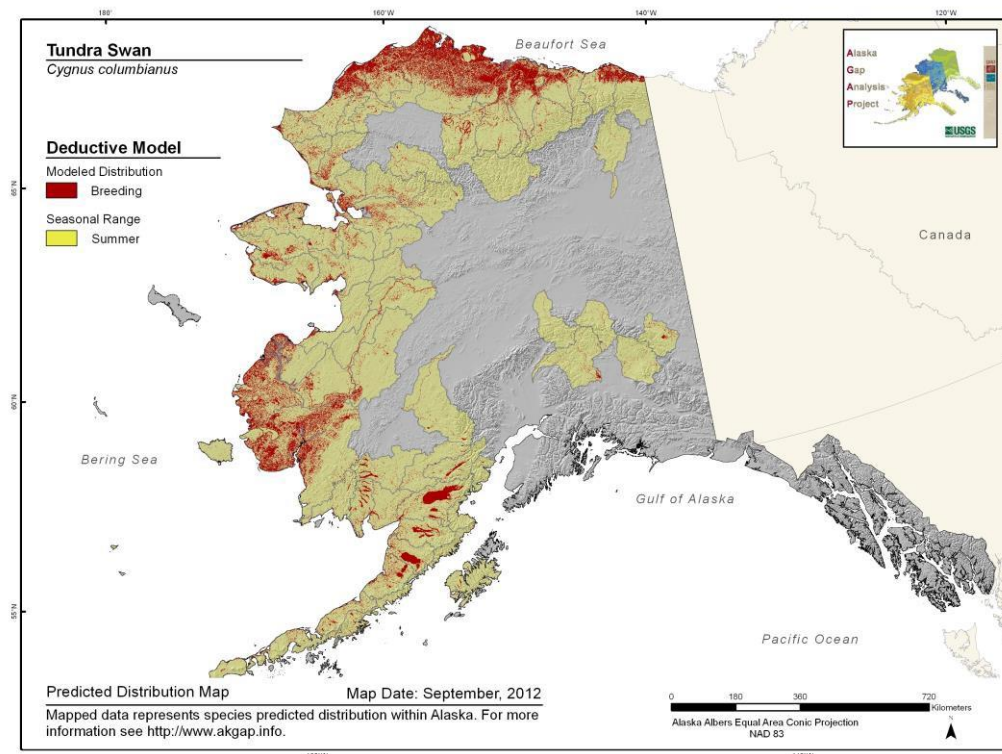
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.738**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds on tundra lakes, ponds, and pools, primarily in coastal deltas and less frequently inland to treeline. Prefers lakes with pondweed (*Potamogeton* spp.) (Monda 1991, Spindler and Hall 1991). In Bristol Bay lowlands, breed along coast and in broad drainage basins with little relief, wet meadows, and shallow lakes with littoral emergent vegetation (Wilk 1988). On the Colville River Delta, prefers large lakes that are connected to a river channel or are partially drained, and utilize polygon lakes and moist tundra near the water's edge (Earnst 1992). Primary emergent vegetation includes *Carex aquatilis* and *Arctophila fulva*, and primary moist vegetation includes *Carex* spp., *Puccinellia phryganodes*, *Dupontia fisheri*, and *Stellaria humifusa* (Limpert and Earnst 1994).

References

Earnst, S. L. 1992. Behavior and ecology of Tundra Swans during summer, autumn, and winter. Ph. D. diss., Ohio State Univ., Columbus.

Limpert, R. J. and S. L. Earnst. 1994. Tundra Swan (*Cygnus columbianus*). In *The Birds of North America*, Vol. 3, No. 89 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Monda, M. J. 1991. Reproductive ecology of Tundra Swans on the Arctic National Wildlife Refuge, Alaska. Ph. D. diss., Univ. Idaho, Moscow.

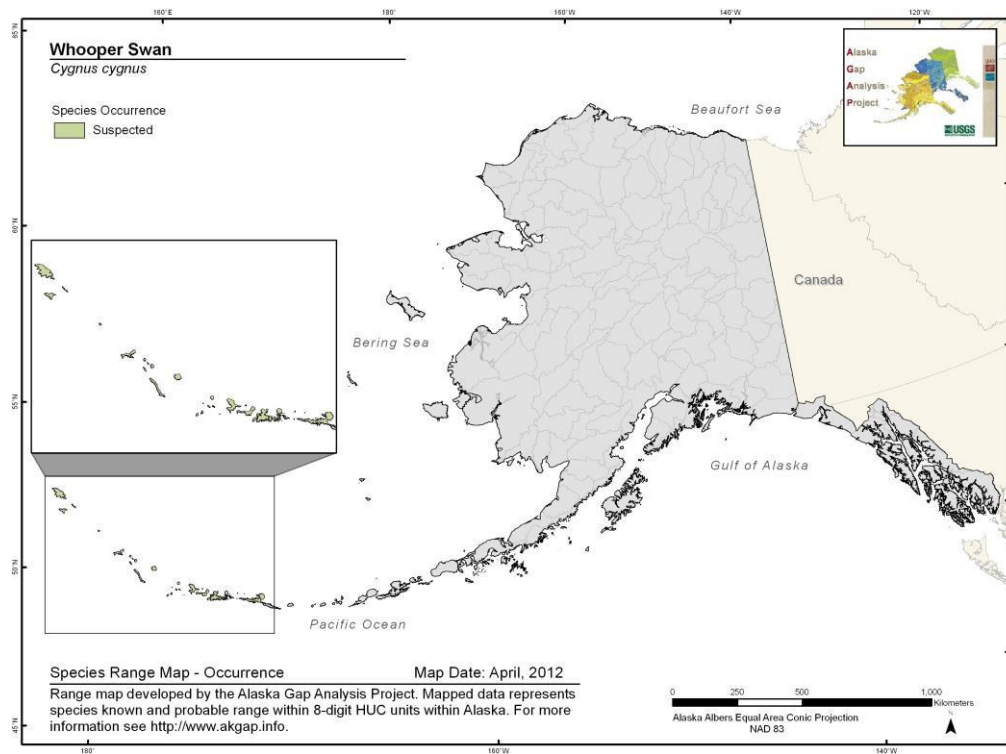
Spindler, M. A. and K. F. Hall. 1991. Local movements and habitat use of Tundra or Whistling Swans *Cygnus columbianus* in the Kobuk-Selawik lowlands of northwest Alaska. *Wildfowl* 42: 17-32.

Wilk, R. J. 1988. Distribution, abundance, population structure and productivity of Tundra Swans in Bristol Bay, Alaska. *Arctic* 41: 288-292.

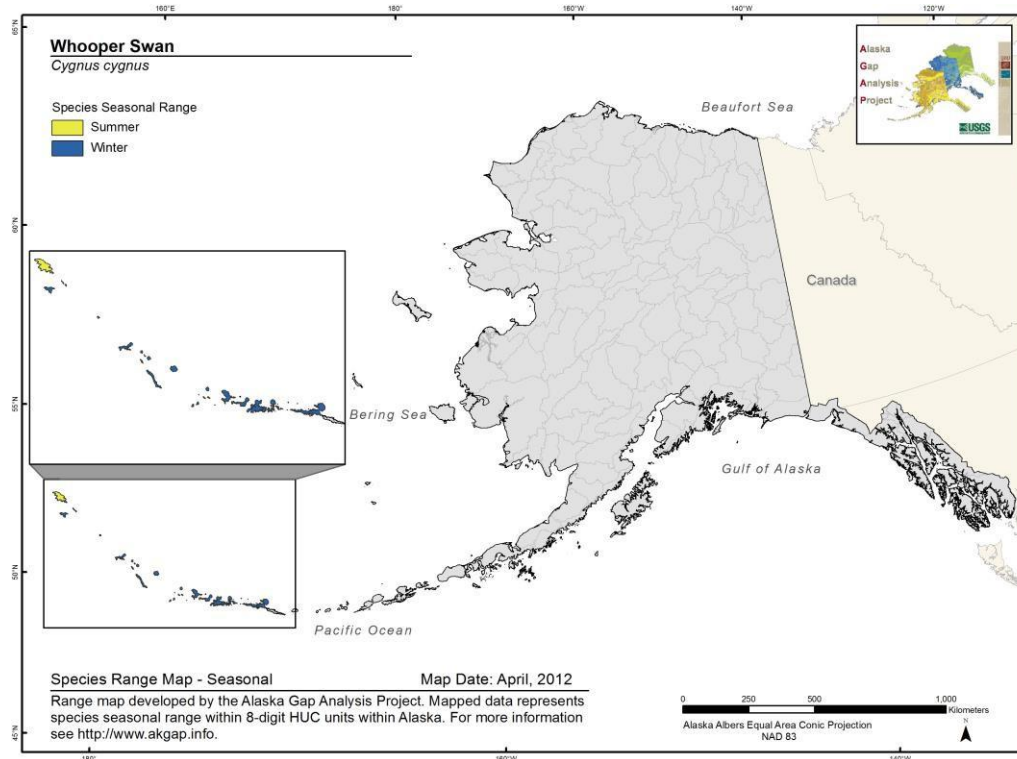
Whooper Swan *Cygnus cygnus*

Range Map and Distribution Model Summary

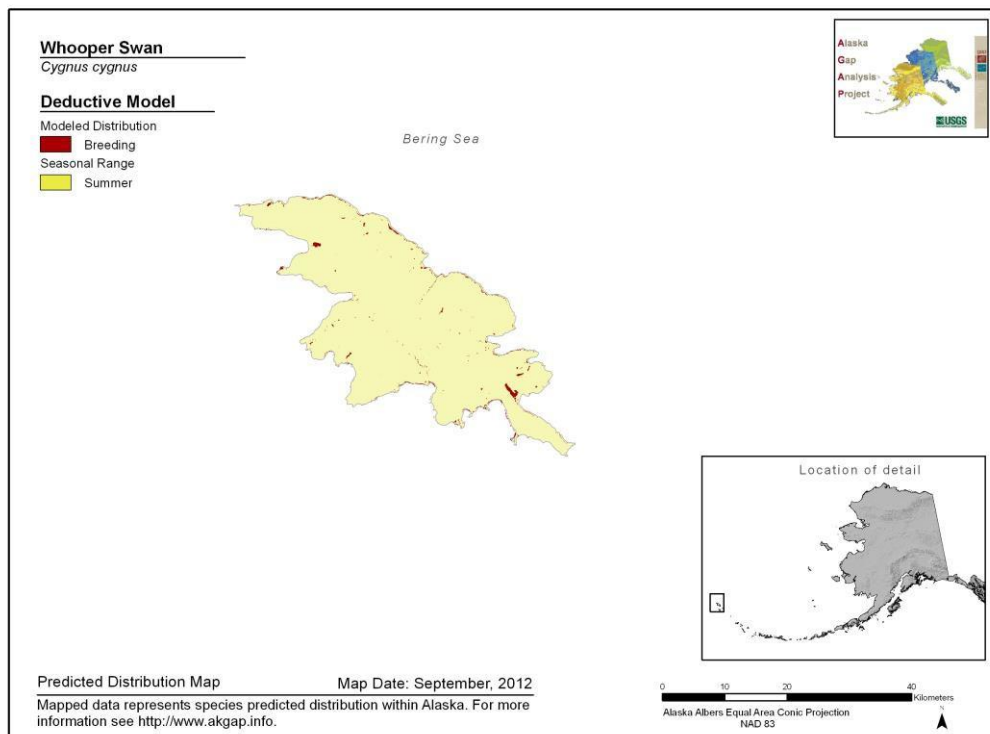
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nests along seacoasts, tidal waters, lakes, rivers, and tundra (Terres 1980).

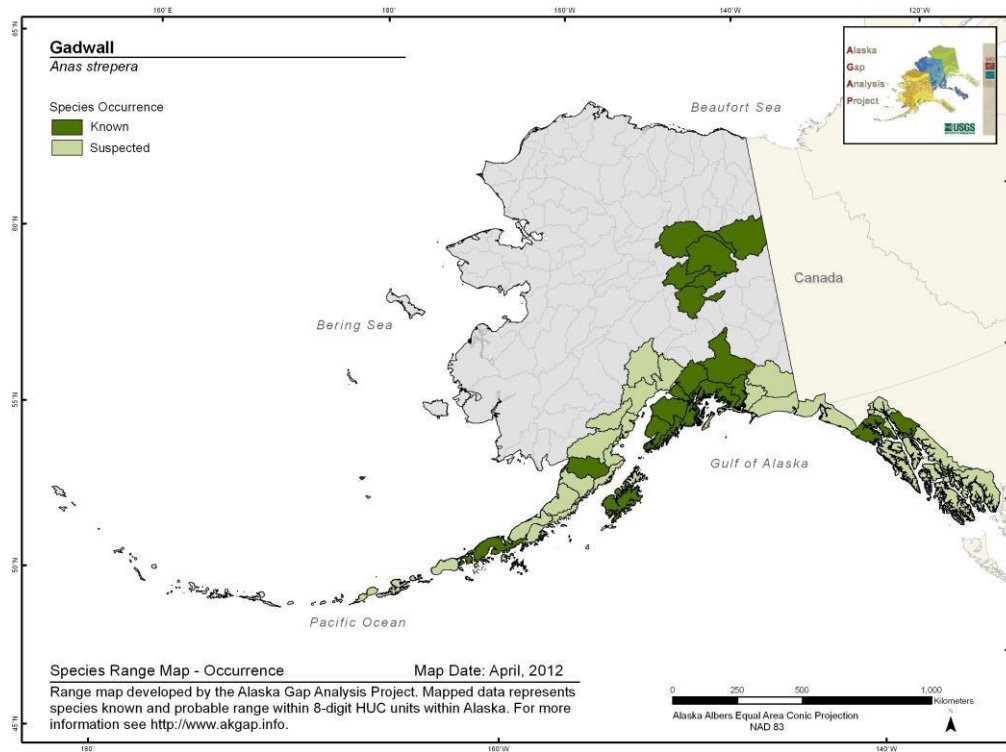
References

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

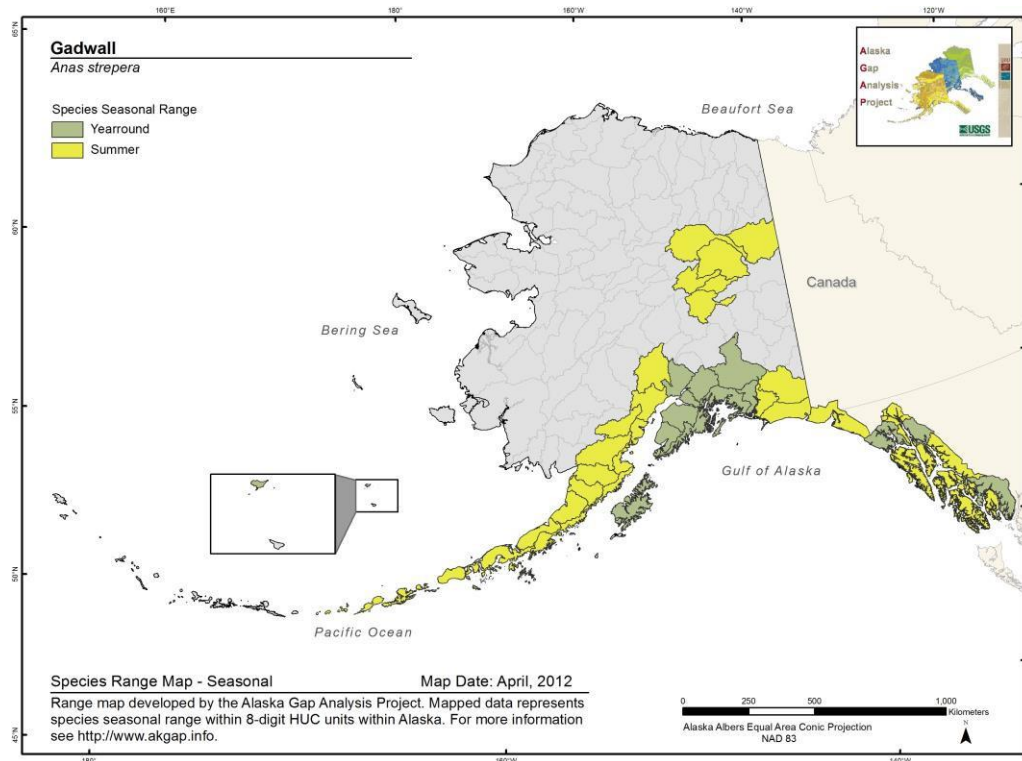
Gadwall *Anas strepera*

Range Map and Distribution Model Summary

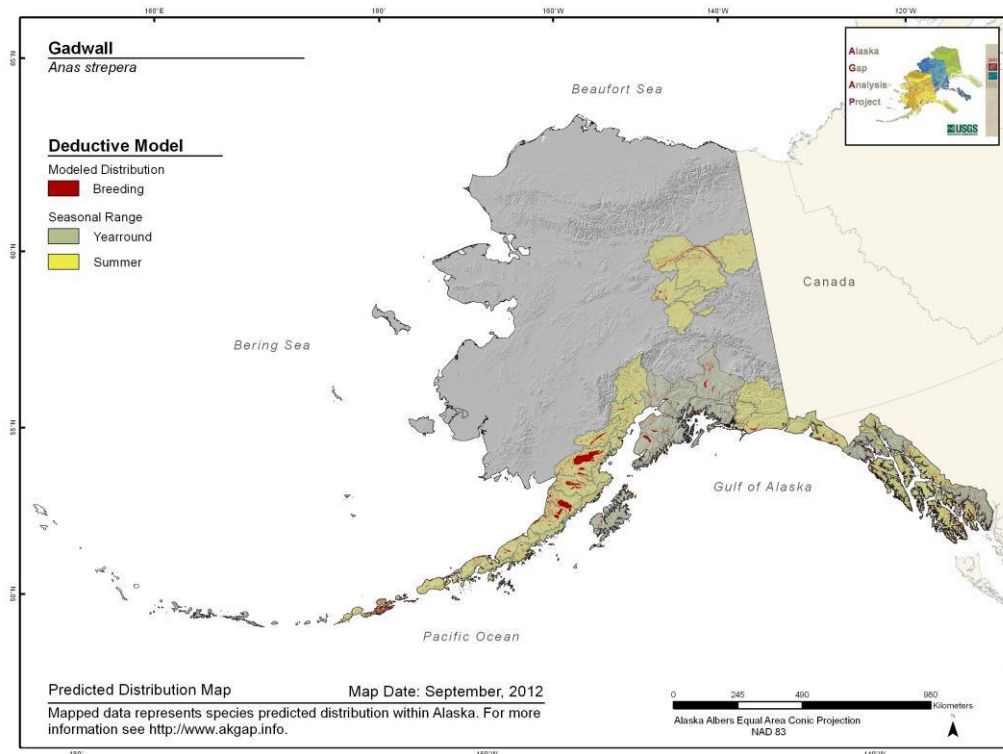
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.52**

**Model Quality
Summary:**
Low

Habitat Description

Lakes, ponds, rivers, marshes. Prefers freshwater but may be found on any open water during migration and winter. Moderate- to large-sized wetland of a permanent or semi-permanent nature, expanses of open water with submersed vegetation, and open undisturbed shorelines are important molting habitats (Ringelman 1990). Nests in thick vegetation near freshwater lakes, ponds, or streams, including open brackish or alkaline waters. Nests usually in dry upland site under clump of shrubs or in herbaceous vegetation, average of 300 m from water. Tends to nest near semi-permanent wetlands that are relatively resistant to drought (Ringelman 1990). Commonly uses man-made ponds. May nest on island, upland meadow or grassland. Suitable nesting islands should be 0.1-0.5 ha in size, elongate, and separated from mainland by at least 150 m of water that remains 0.9 m deep in nesting season (Ringelman 1990). In B.C., this species is found from sea level to 1,300 m in wet areas in the interior and in estuaries, brackish and freshwater marshes, mudflats, and sewage lagoons in coastal areas (Campbell et al. 1990).

References

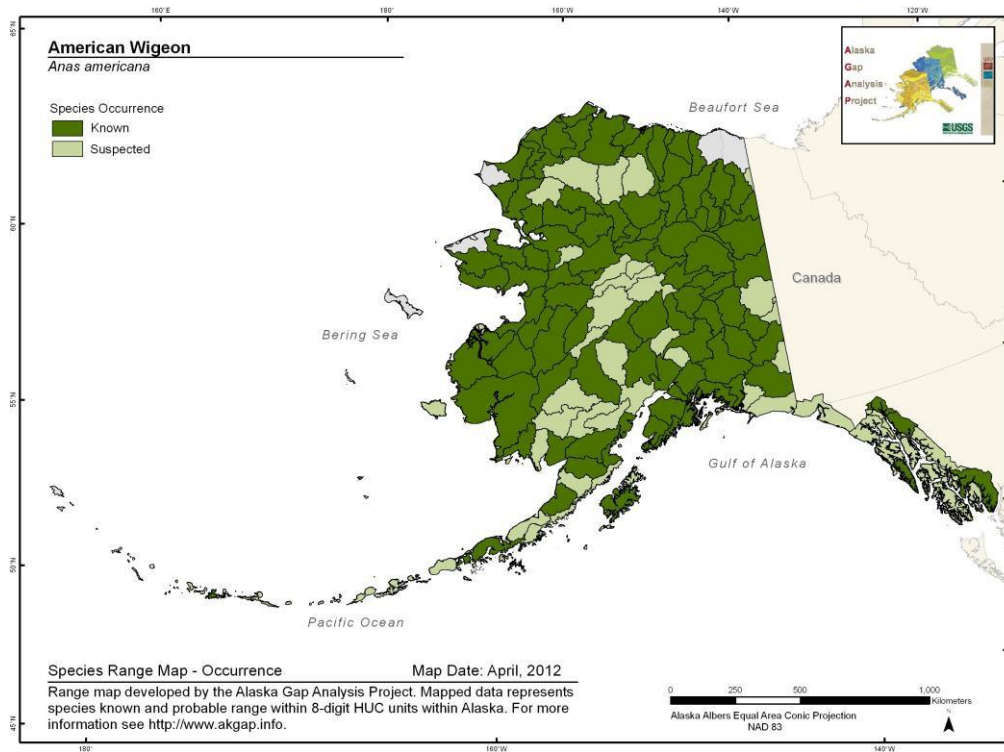
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Ringelman, J. K. 1990. Life history traits and management of the gadwall. U.S. Fish & Wildl. Serv., Fish and Wildlife Leaflet 13.1.2. 6 pp.

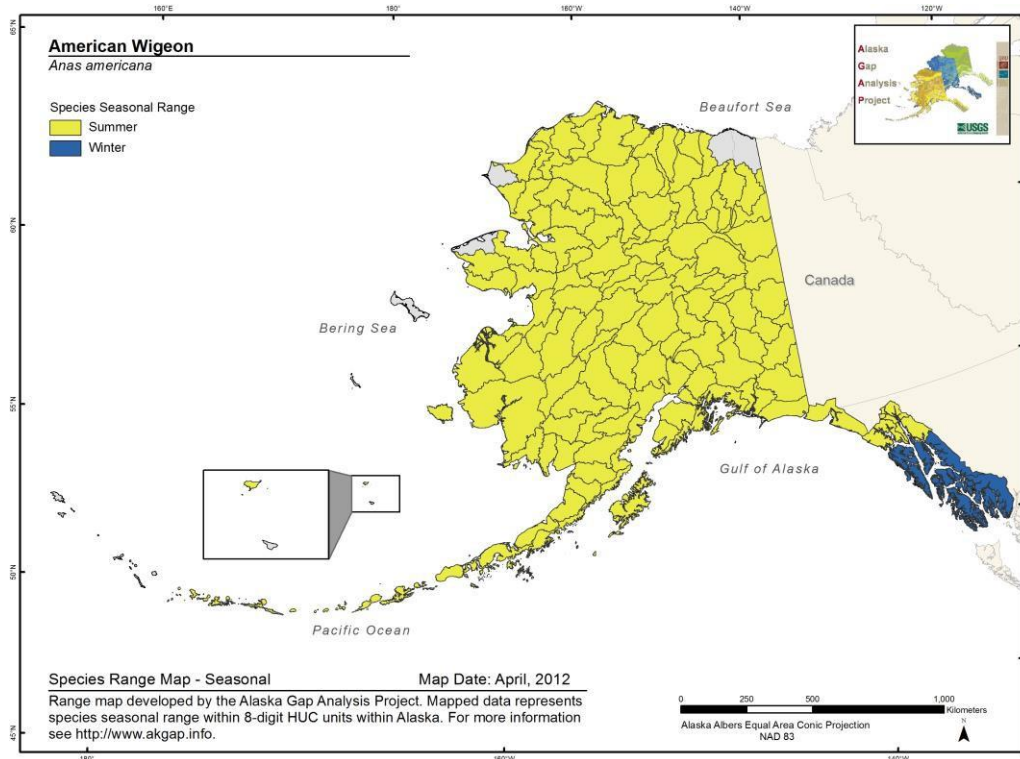
American Wigeon *Anas americana*

Range Map and Distribution Model Summary

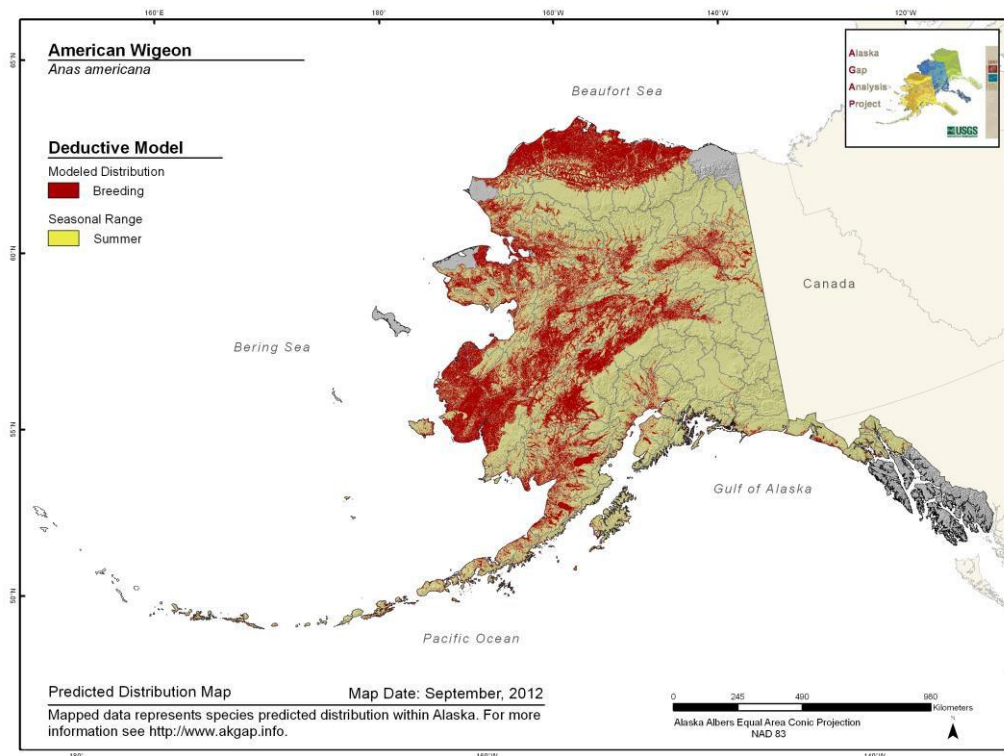
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.664**

**Model Quality
Summary:**
Low

Habitat Description

In B.C., breeds from sea level to 1,200 meters elevation in the vicinity of freshwater sloughs, lakes, ponds, marshes, and rivers, but can breed far from water. Nests have been found in brushy, upland habitats often near lakes or marshy sloughs (Campbell et al. 1990, Mowbray 1999). In Yukon, breeds in coastal plains near major river deltas that are underlain by continuous permafrost with polygonal ground and other permafrost - related features. Vegetation is a mosaic of dry tussock, wet sedge, and low shrub tundra with tall brush (>3 m) in drainage courses and around lakeshores (Salter et al. 1980). In Alaska, breeds as far north as the coastal tundra (Bellrose 1980).

References

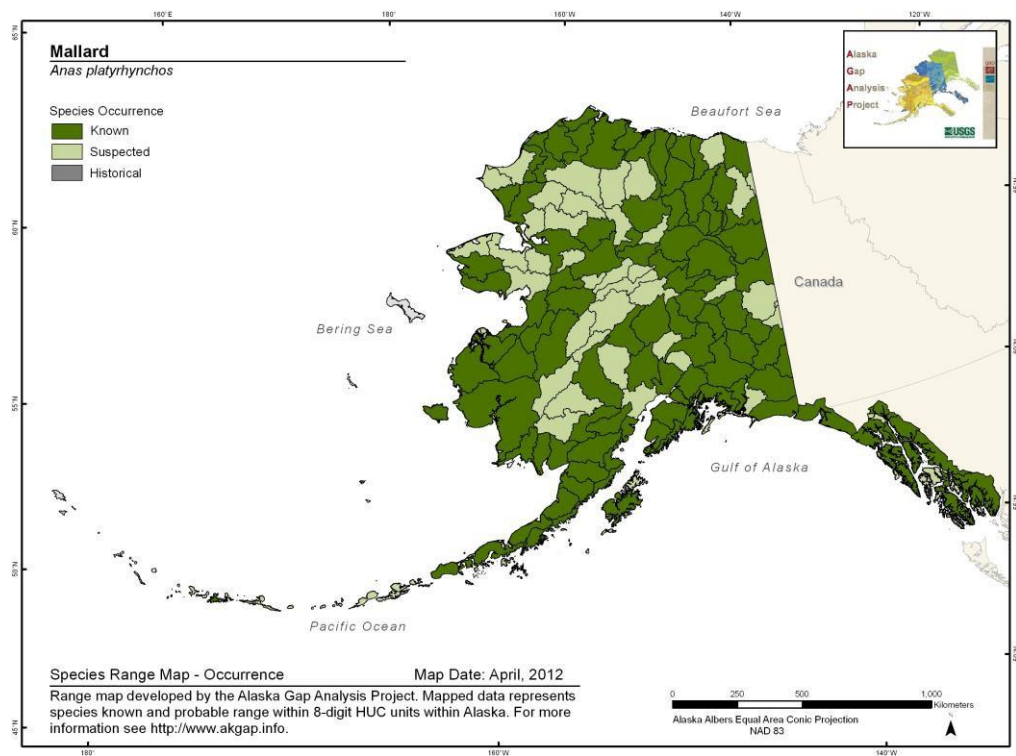
- Bellrose, F. C. 1980. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, PA.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- Mowbray, T. 1999. American Wigeon (*Anas americana*). In The Birds of North America, Vol. 11, No. 401 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Salter, R. E., M. A. Gollop, S. R. Johnson, W. R. Koski, and C. E. Tull. 1980. Distribution and abundance of birds on the arctic coastal plains of the Northern Yukon and adjacent Northwest Territories, 1971-1976. Can. Field-Nat. 94: 219-238.

Mallard

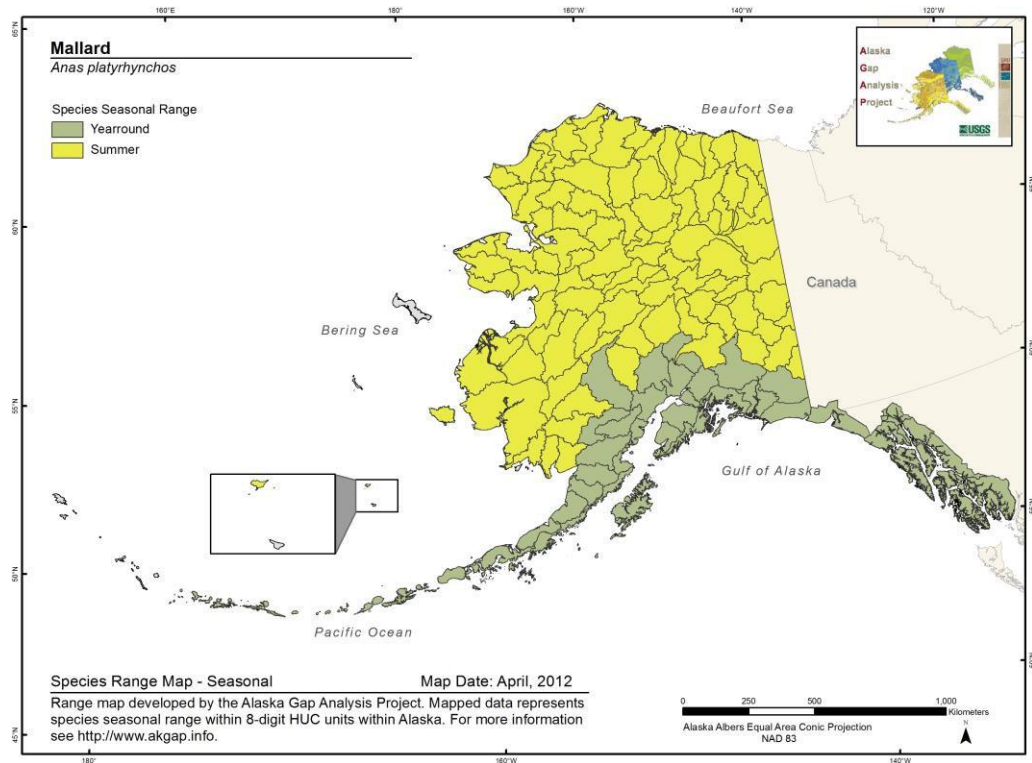
Anas platyrhynchos

Range Map and Distribution Model Summary

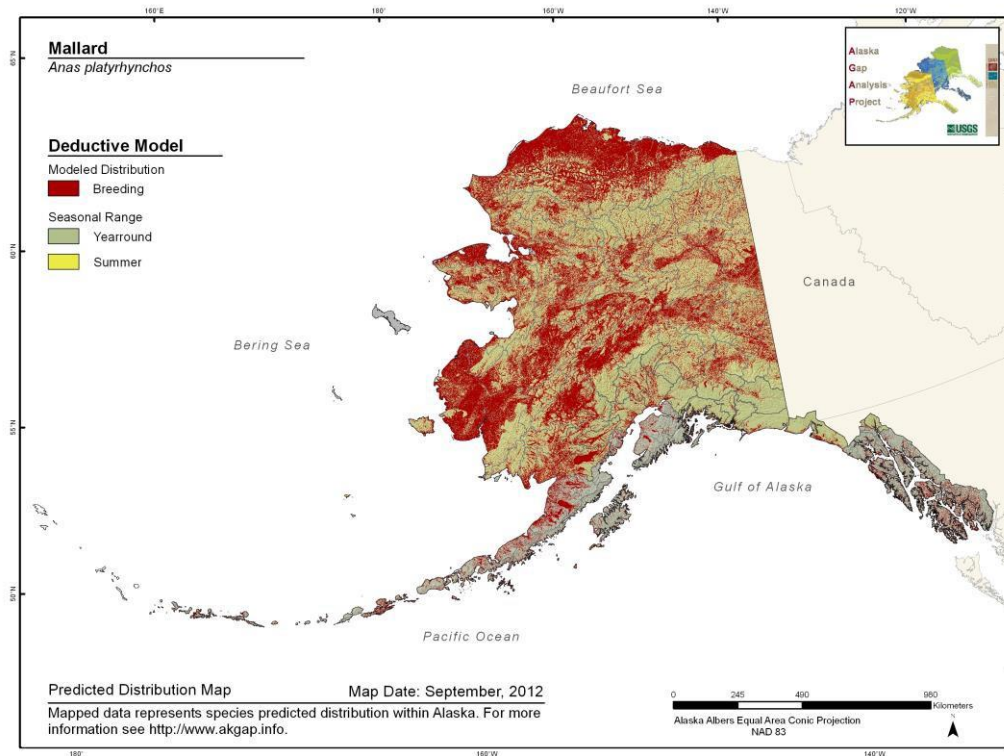
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.616**

**Model Quality
Summary:**
Low

Habitat Description

Nest usually within 0.8 km of water (Palmer 1976). In the Yukon, this species nest among shrubs, and other low vegetation associated with lakes, rivers, and wetlands and females and young utilize marshy areas (Alexander et al. 2003). In B.C., breeds from sea level to 1,300 m in sloughs, marshes, lakes, swamps, islands, riparian woodlands, city parks, agricultural fields, and private yards (Campbell et al. 1990).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

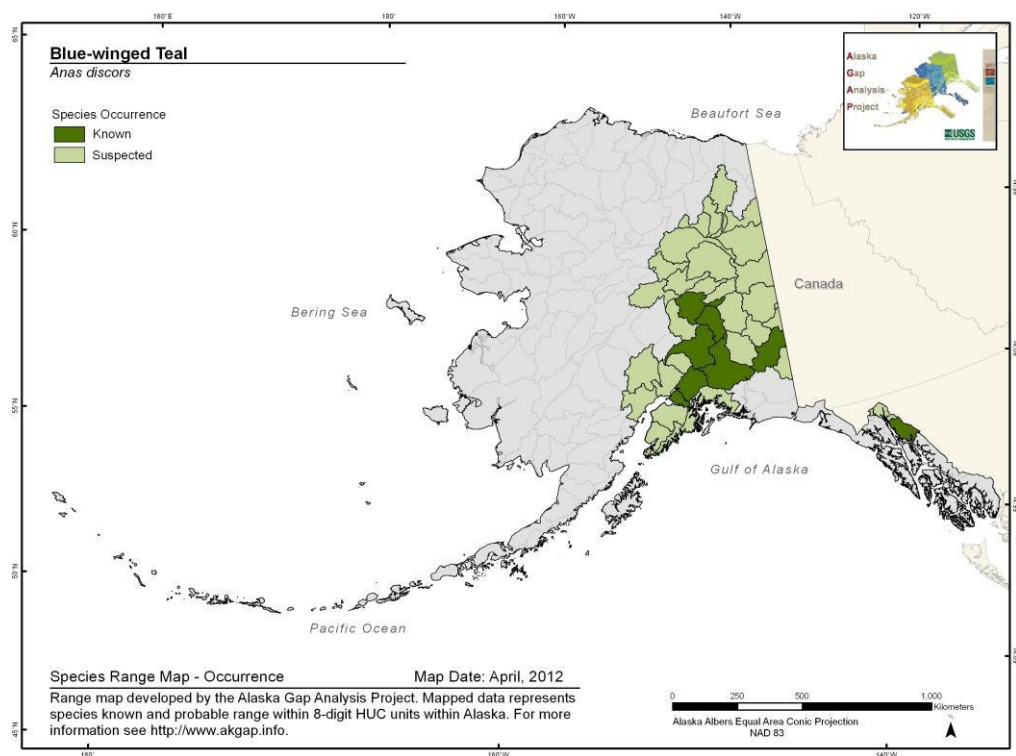
Palmer, R. S., editor. 1976. Handbook of North American birds. Vol. 2. Waterfowl (first part). Whistling ducks, swans, geese, sheld-ducks, dabbling ducks. Yale Univ. Press, New Haven. 521 pp.

Blue-winged Teal

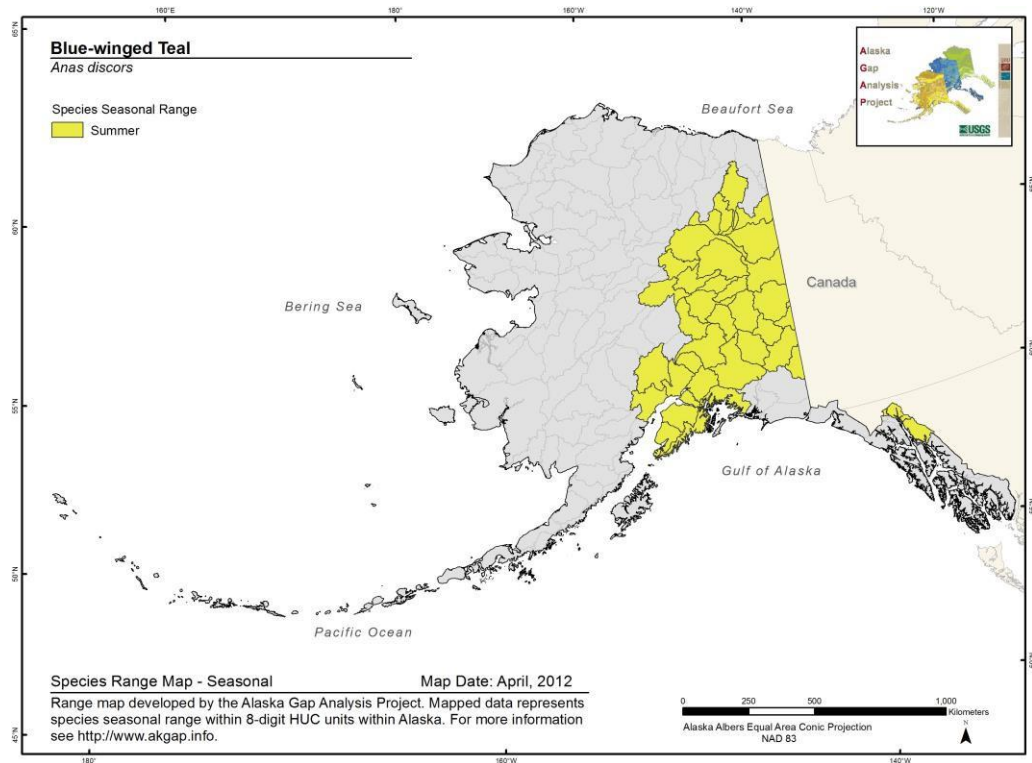
Anas discors

Range Map and Distribution Model Summary

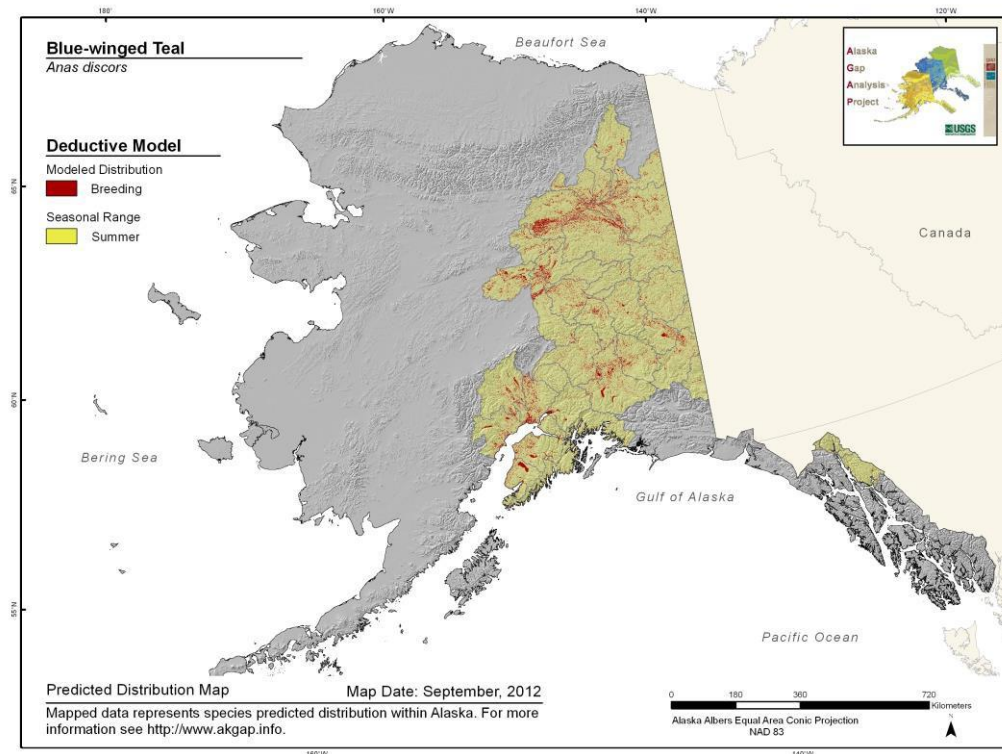
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.564**

**Model Quality
Summary:**
Low

Habitat Description

Optimal nesting habitats include semi-permanent wetlands, ponds, and seasonal wetlands surrounded by grassland (Brewer et al. 1991). Nests usually on the ground among tall grasses or sedges, usually near water; seems to prefer to nest in native grass communities in good range condition (Gammonley and Fredrickson 1995). Stock ponds with well-developed emergent vegetation provide locally important brood habitat (Gammonley and Fredrickson 1995).

In B.C., breeds from sea level to 1,200 m, and nests are found as far as 50 m from small water bodies (most within 23 m of water) including fresh and brackish water marshes, bogs, swamps, and sloughs (Campbell et al. 1990).

References

Brewer, R., G. A. McPeck, and R. J. Adams, Jr. 1991. The Atlas of Breeding Birds of Michigan. Michigan State University Press, East Lansing, Michigan. Xvii + 594 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

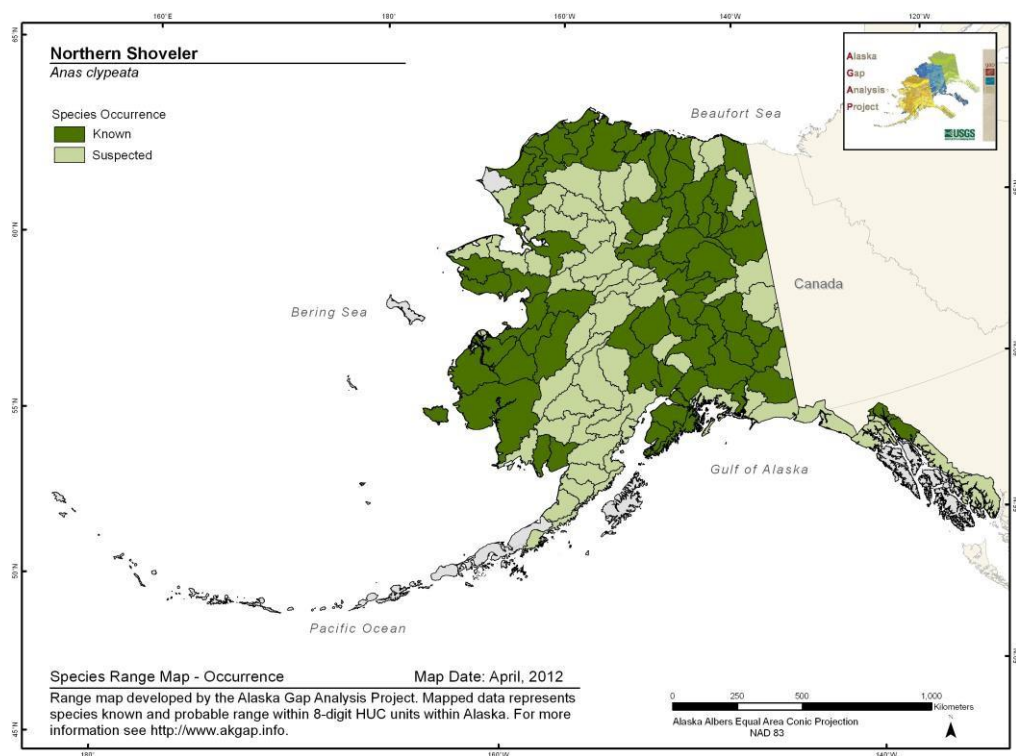
Gammonley, J. H., and L. H. Fredrickson. 1995. Life history and management of the blue-winged teal. USDI National Biological Service, Waterfowl Management Handbook 13.1.8. 7 pp.

Northern Shoveler

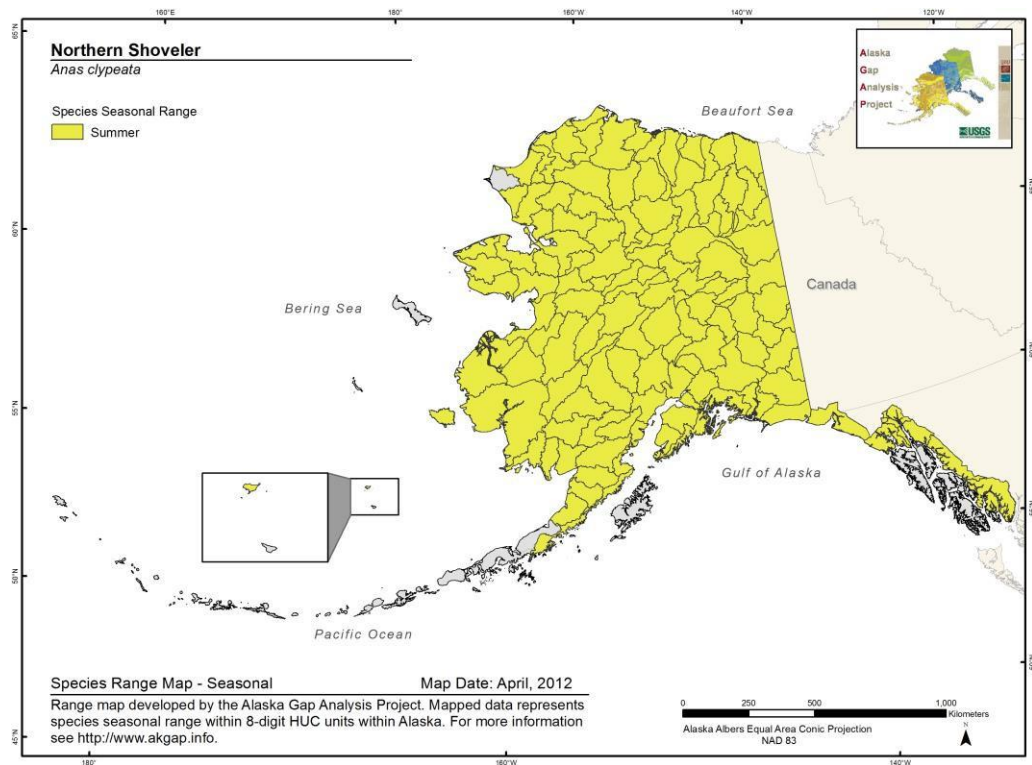
Anas clypeata

Range Map and Distribution Model Summary

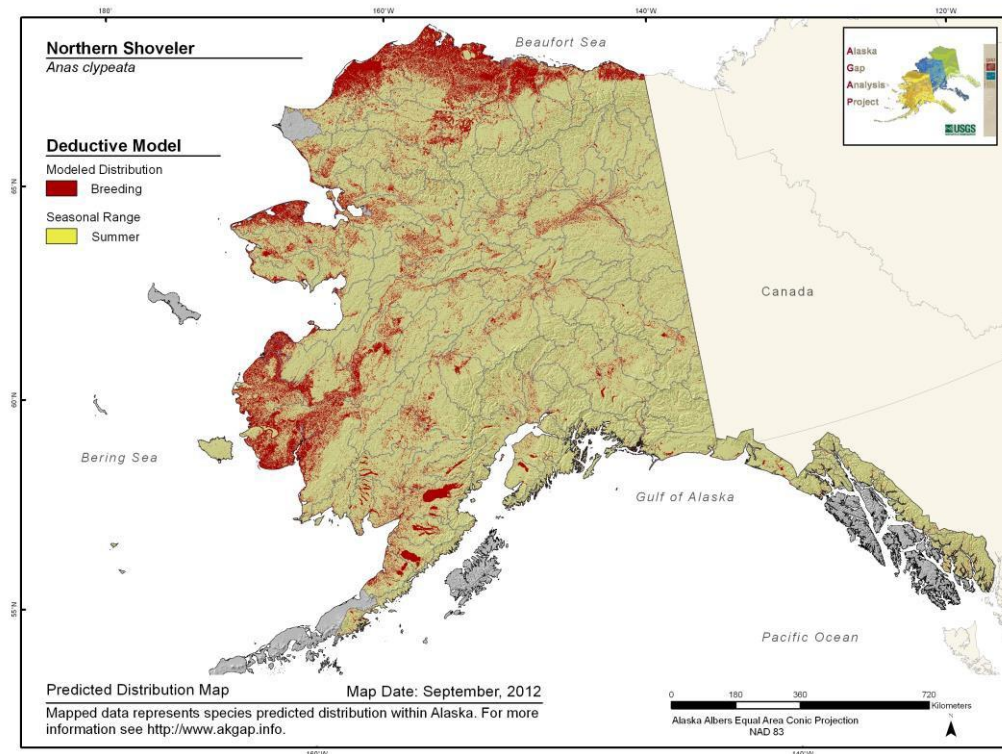
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.677**

**Model Quality
Summary:**
Low

Habitat Description

Shallow, often muddy, fresh-water areas with surrounding cover. Ponds, marshes, sloughs, and creeks. Nests near shallow freshwater lake, pond, marsh, etc. (AOU 1983). In B.C., breeds from sea level to 1,100 m elevation in open and semi-open habitats (Campbell et al. 1990).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

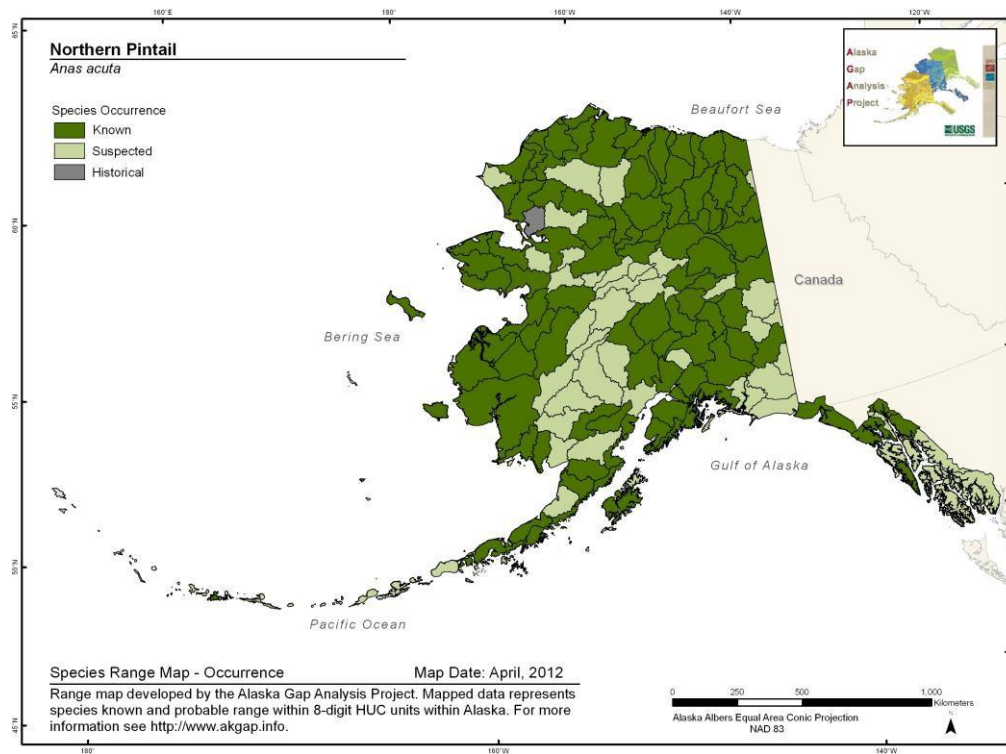
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Northern Pintail

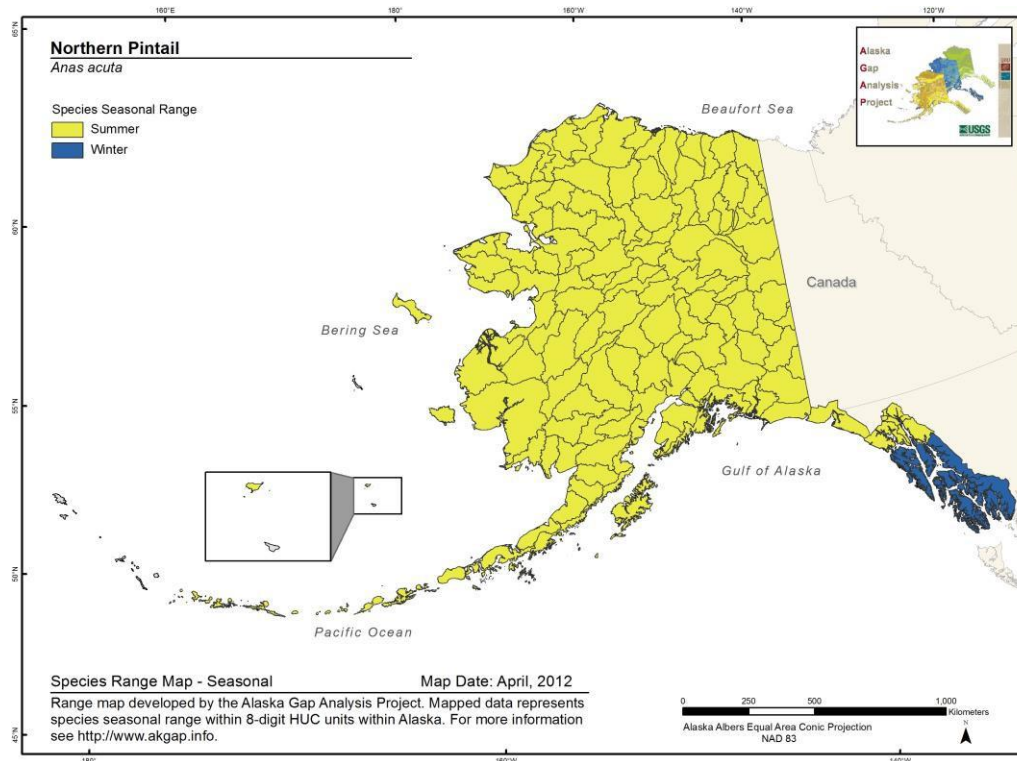
Anas acuta

Range Map and Distribution Model Summary

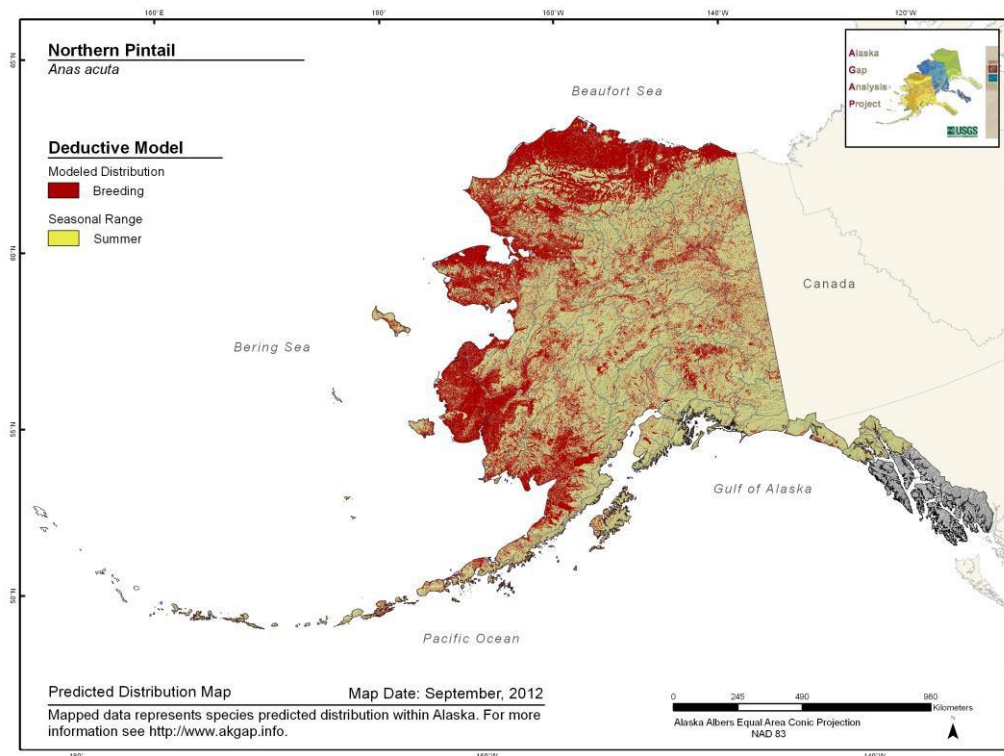
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.76**

**Model Quality
Summary:**
Moderate

Habitat Description

In B.C., breeding habitat is in sparse or low vegetation, not necessary near water. Specific habitats include drier margins of lakes, sloughs, ponds, lagoons, dry grasslands, shrubby fields, edges of mixed forests, damp meadows, and subalpine bogs (Campbell et al. 1990). Often associated with seasonal and semi-permanent wetlands (Suchy and Anderson 1987). In boreal forests, birds are found in meadows with low sedge and herb growth, and in Alaska birds are often found on coastal barrier islands (Austin and Miller 1995). In the Yukon-Kuskokwim Delta, broods use 1 to 5 ha wetlands with abundant emergent and submergent aquatic vegetation (J.B. Grand pers. Comm. In Austin and Miller 1995). In Yukon, birds are found in low willow and birch shrubs and tussock tundra (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Austin, J. E. and M. R. Miller. 1995. Northern Pintail (*Anas acuta*). In *The Birds of North America*, Vol. 5, No. 163 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. *The Birds of British Columbia*. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

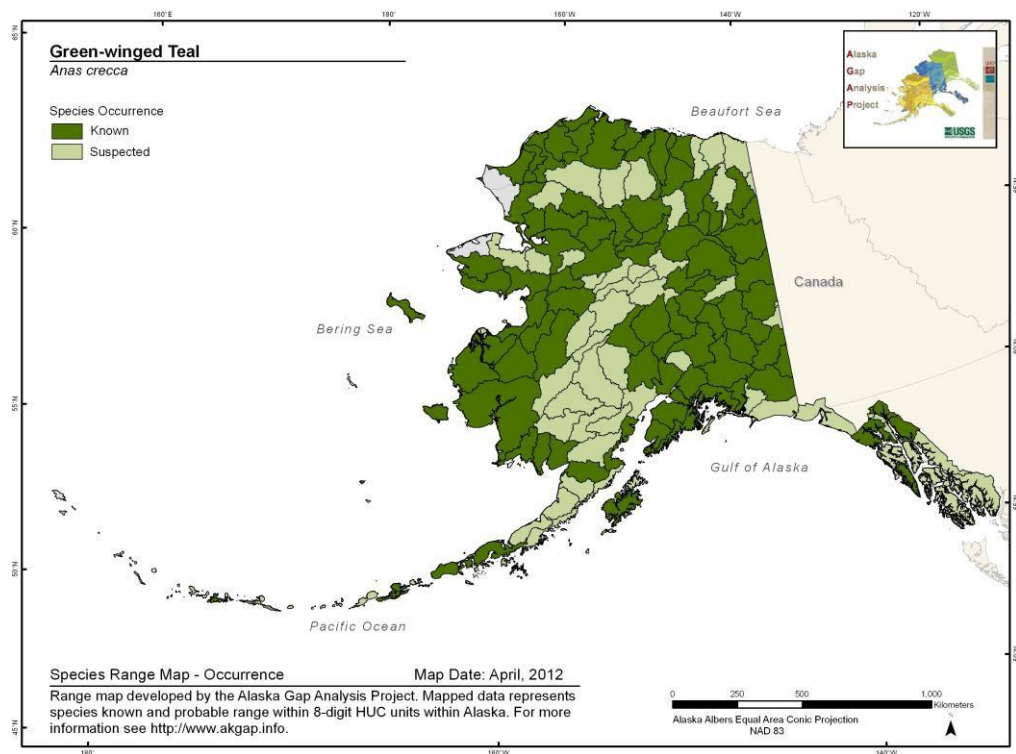
Suchy, W. J., and S. H. Anderson. 1987. Habitat suitability index models: northern pintail. *U.S. Fish Wildl. Serv. Biol. Rep.* 82(10.145). 23 pp.

Green-winged Teal

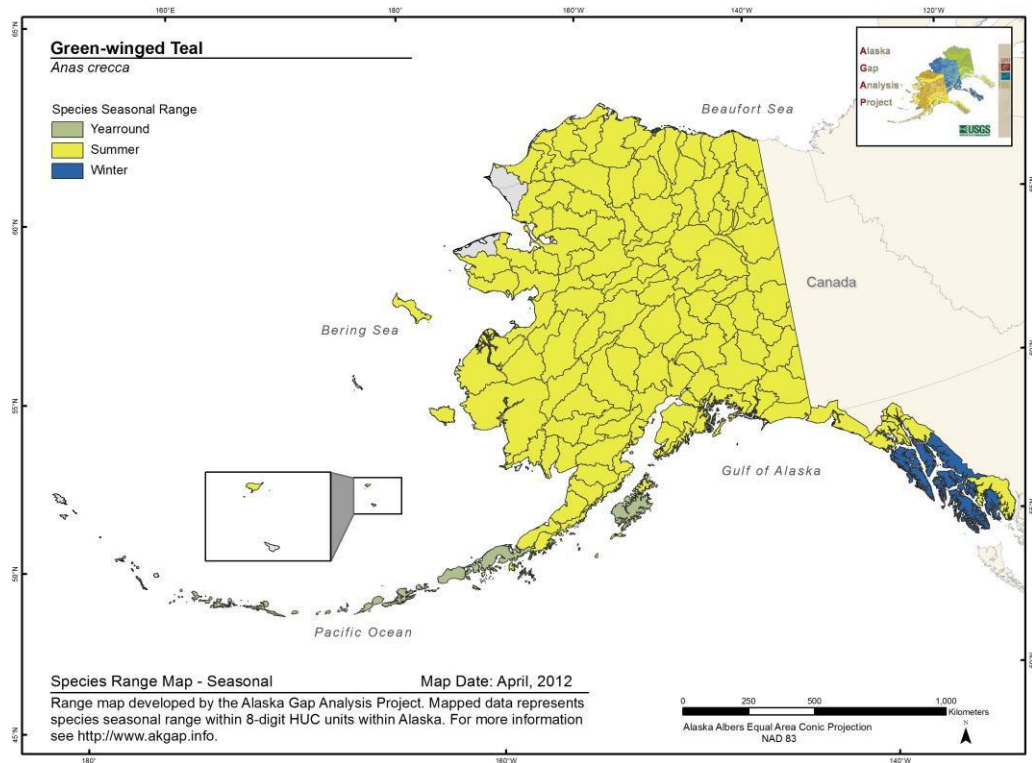
Anas crecca

Range Map and Distribution Model Summary

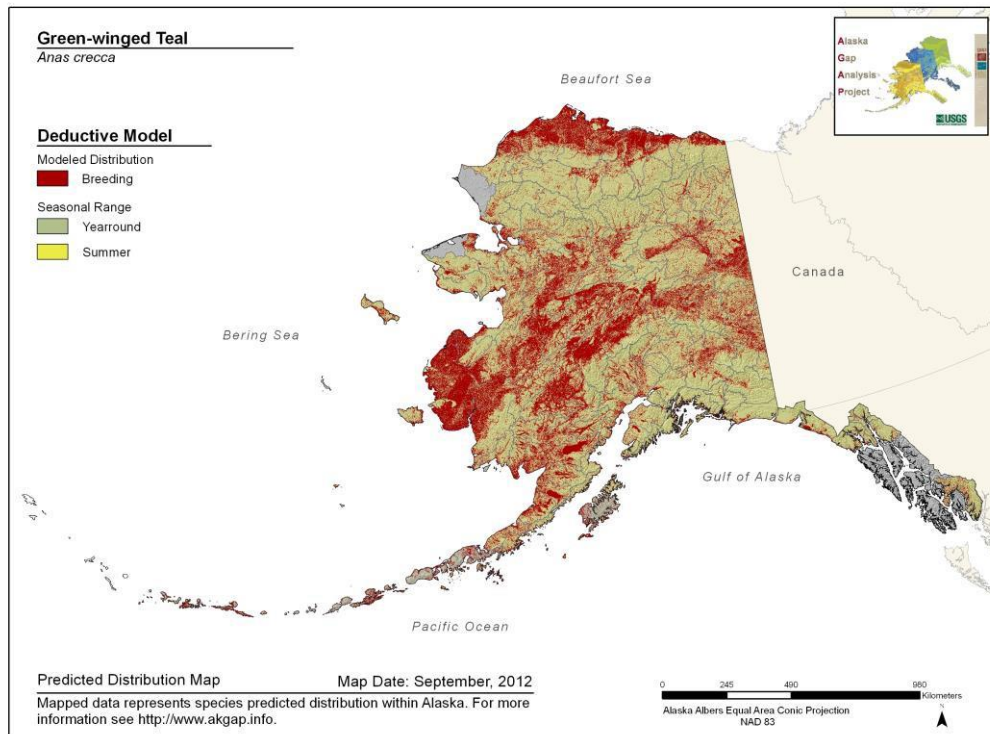
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.617**

**Model Quality
Summary:**
Low

Habitat Description

In B.C., breeds from sea level to 1,525 m in grassy, brushy, or lightly wooded upland habitat near freshwater marshes (in the interior) and in sloughs and ponds associated with estuaries in coastal areas (Campbell et al. 1990). Nests in areas with dense emergent vegetation on islands and lake edges (NatureServe 2007b), and in the Yukon, nests among shrubs, grasses, and other low vegetation in wooded and open areas (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

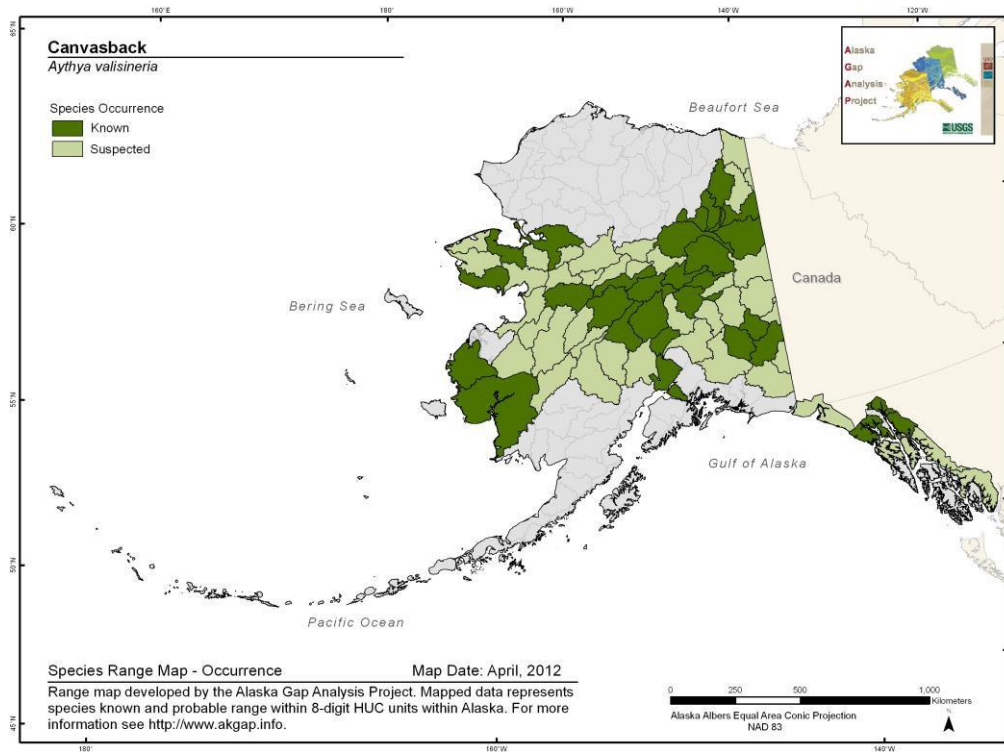
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

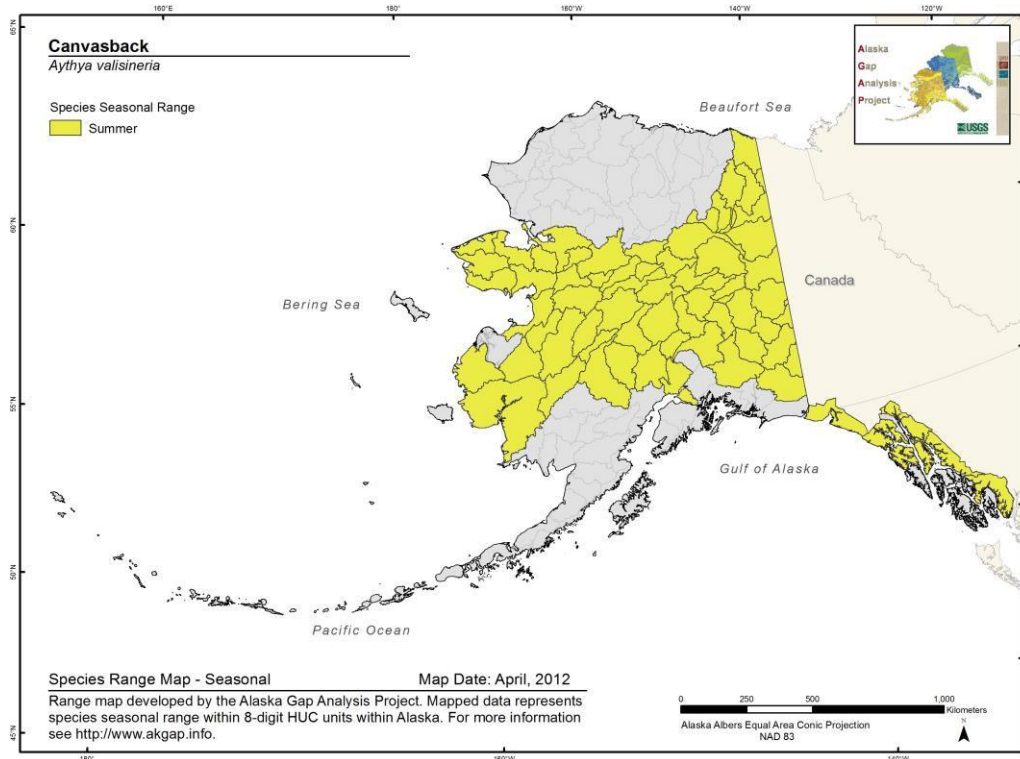
Canvasback *Aythya valisineria*

Range Map and Distribution Model Summary

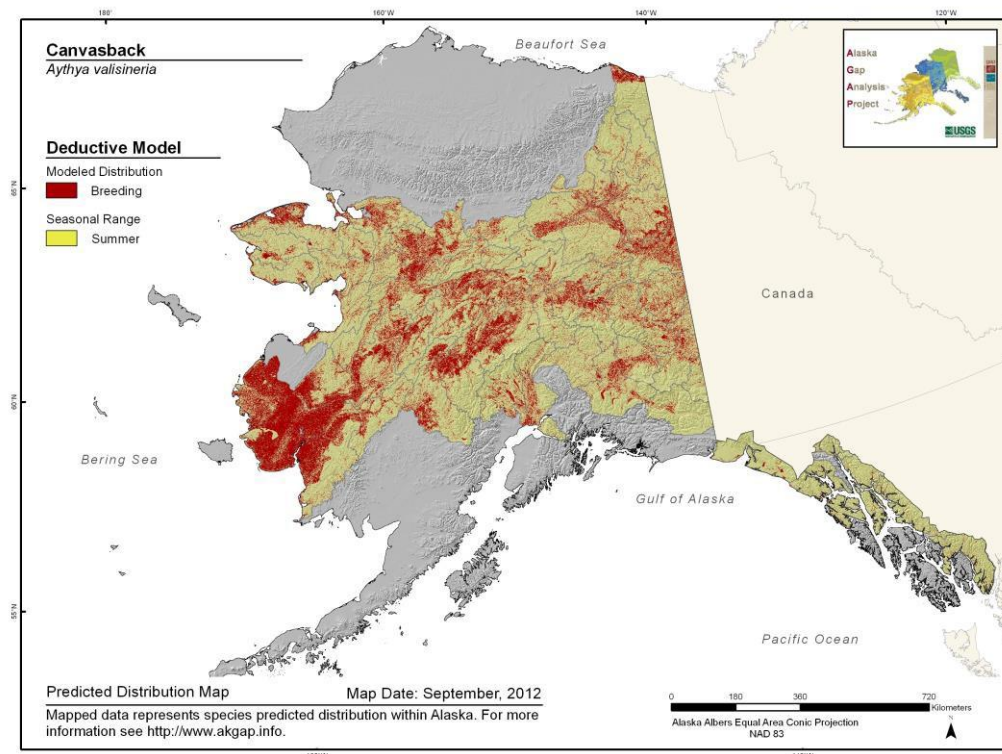
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.624**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in small lakes, deep-water marshes, sheltered bays of large freshwater and alkali lakes, permanent and semi-permanent ponds, sloughs, potholes, and shallow river impoundments (Mowbray 2002) bordered by dense emergent vegetation or marshy areas (Campbell et al. 1990). In Yukon, nests in productive wetlands (Alexander et al. 2003) and a study in Manitoba indicated need for secure nesting site in a diversified wetland complex containing a variety of size, permanency, and cover types (Stoudt 1982).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

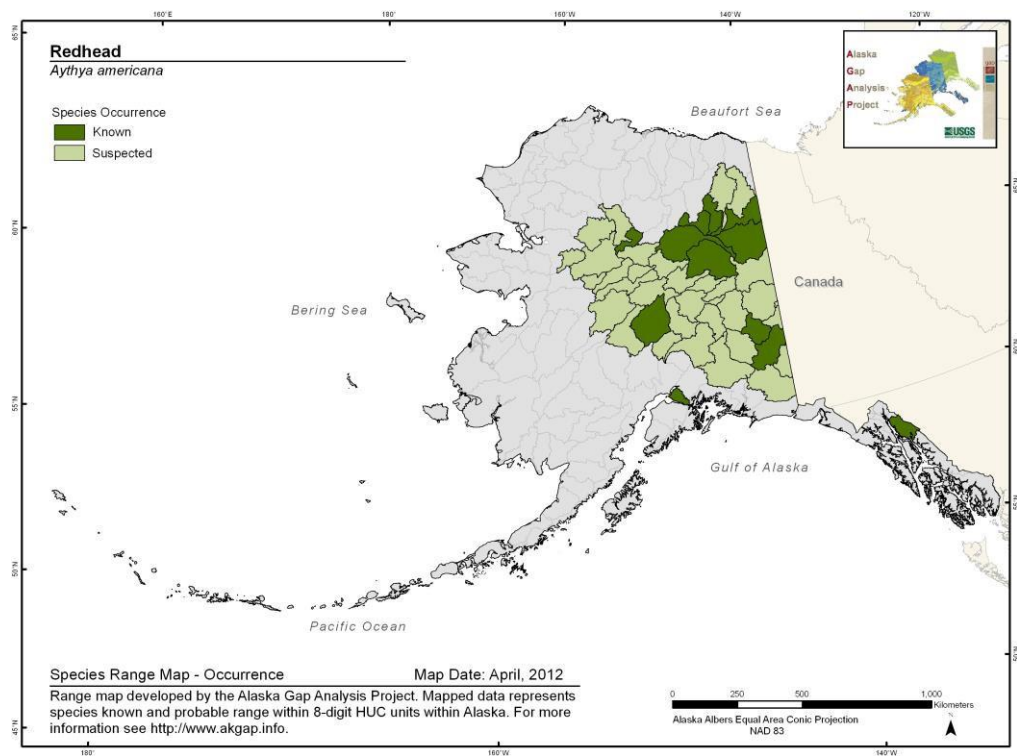
Mowbray, T. 2002. Canvasback (*Aythya valisineria*). In The Birds of North America, Vol. 17, No. 659 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Stoudt, J. H. 1982. Habitat use and productivity of canvasbacks in southwestern Manitoba, 1961-72. U.S. Fish and Wildl. Serv., Spec. Sci. Rep. No. 248. 31 pp.

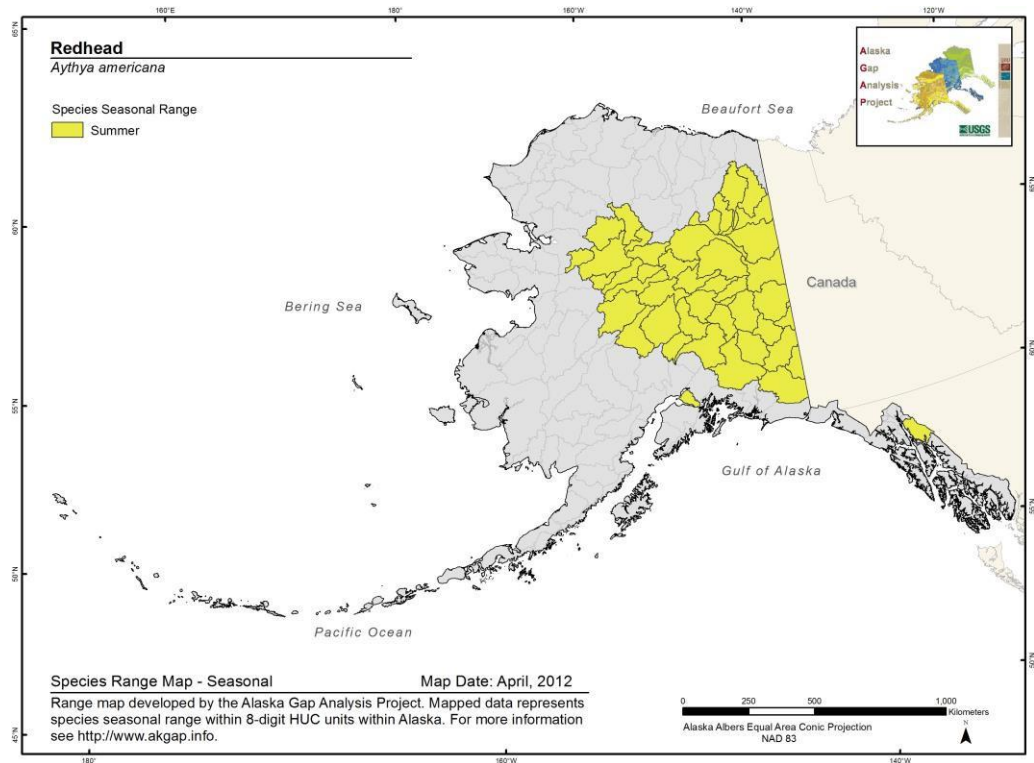
Redhead *Aythya americana*

Range Map and Distribution Model Summary

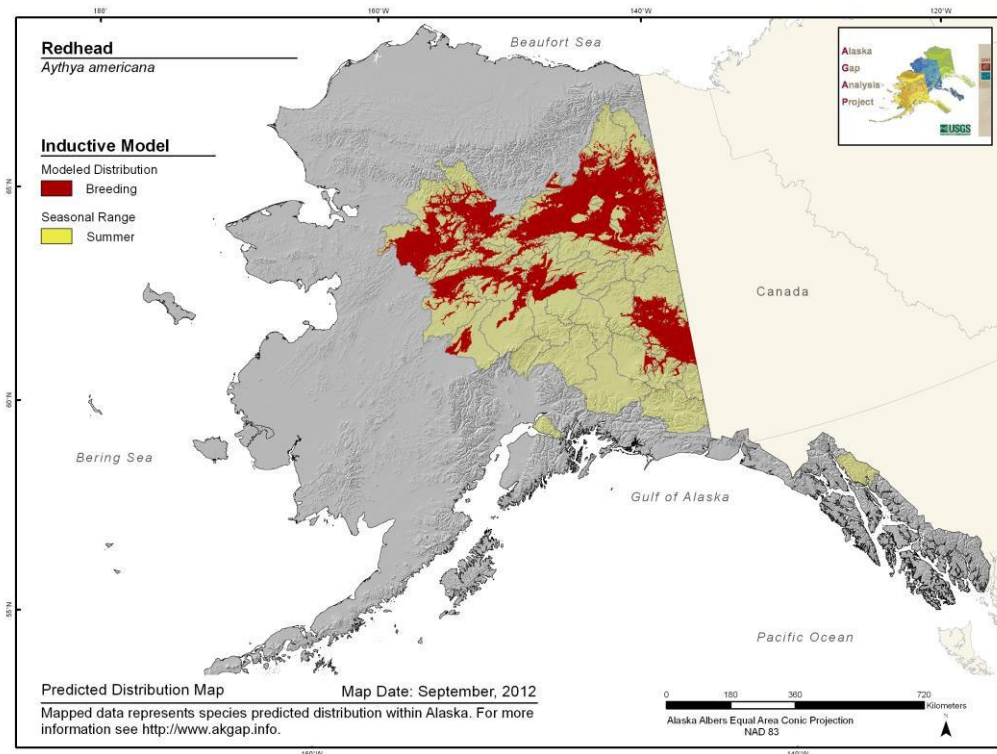
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.781**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in large freshwater marshes (semi-permanently and seasonally flooded palustrine wetlands with persistent emergent vegetation; optimum nesting conditions are wetlands that are 2 ha or more and not more than 0.4 km from a large permanent or semi-permanent lake; nests usually are placed in dense bulrush or cattail stands that are interspersed with small areas of open water; nests usually are within 3-4 m of open water (Custer 1993). Broods use shallow ponds if emergent vegetation is available for escape cover; later, access to deeper water with ample pondweeds is important (Custer 1993). After nesting, many move to large lakes to molt (Custer 1993). In B.C., breeds from 330 to 1,000 m in shallow freshwater lakes, marshes, ponds, and sloughs (Campbell et al. 1990).

References

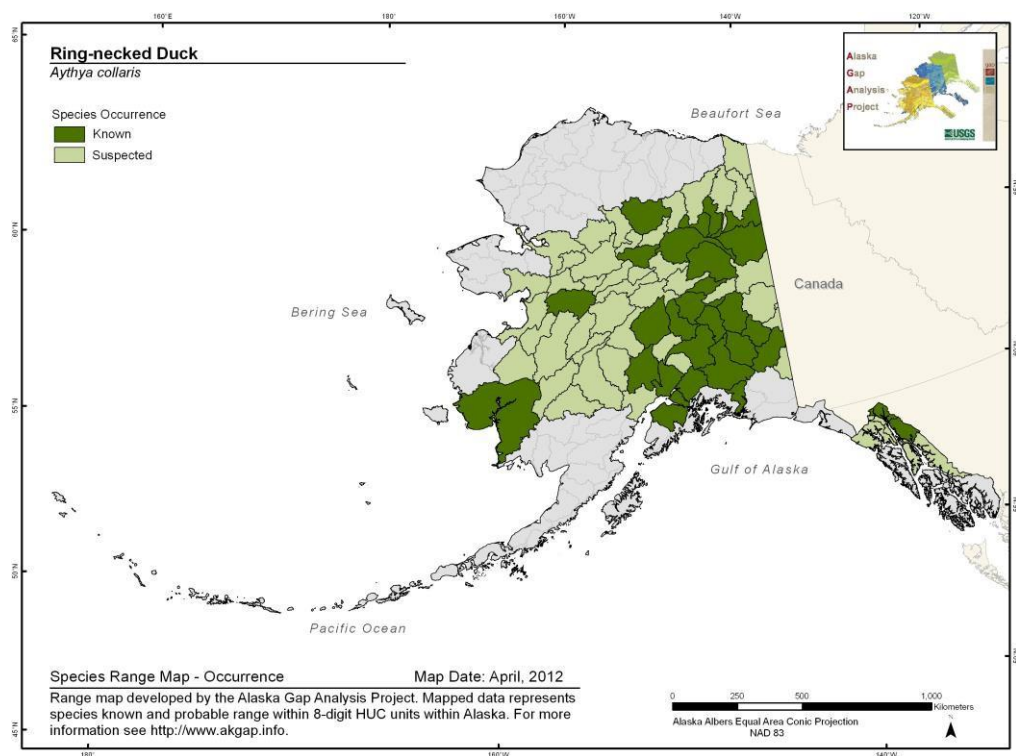
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Custer, C. M. 1993. Life history traits and habitat needs of the redhead. Part 13.1.11 of Waterfowl management handbook. 7 pp.

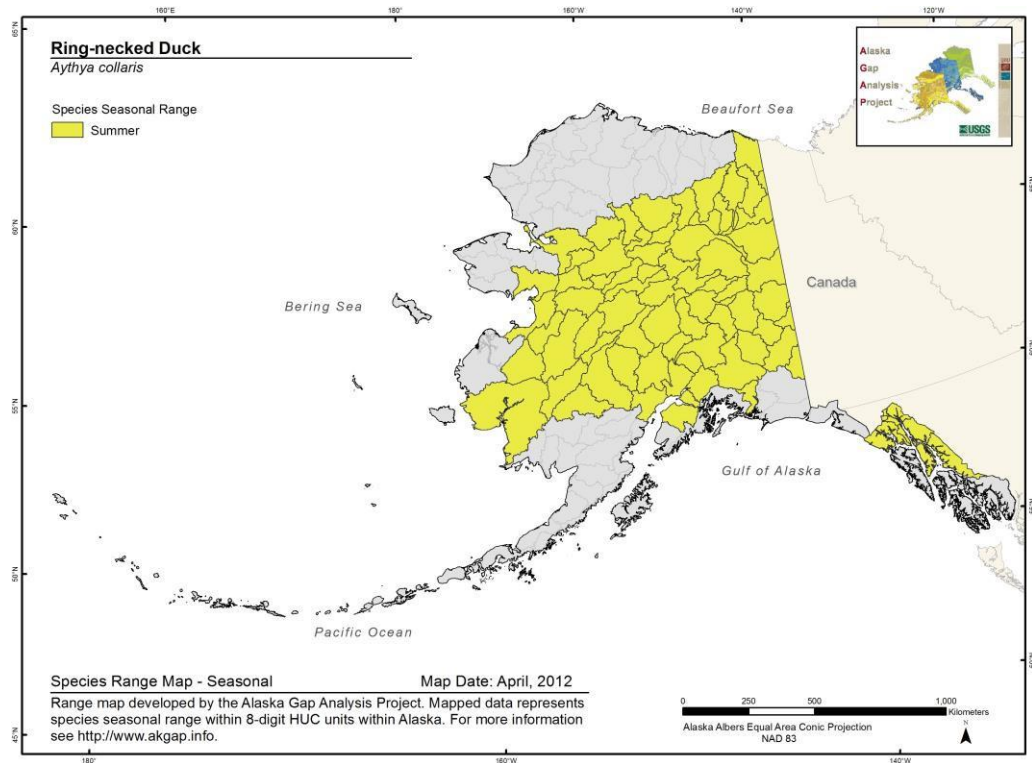
Ring-necked Duck *Aythya collaris*

Range Map and Distribution Model Summary

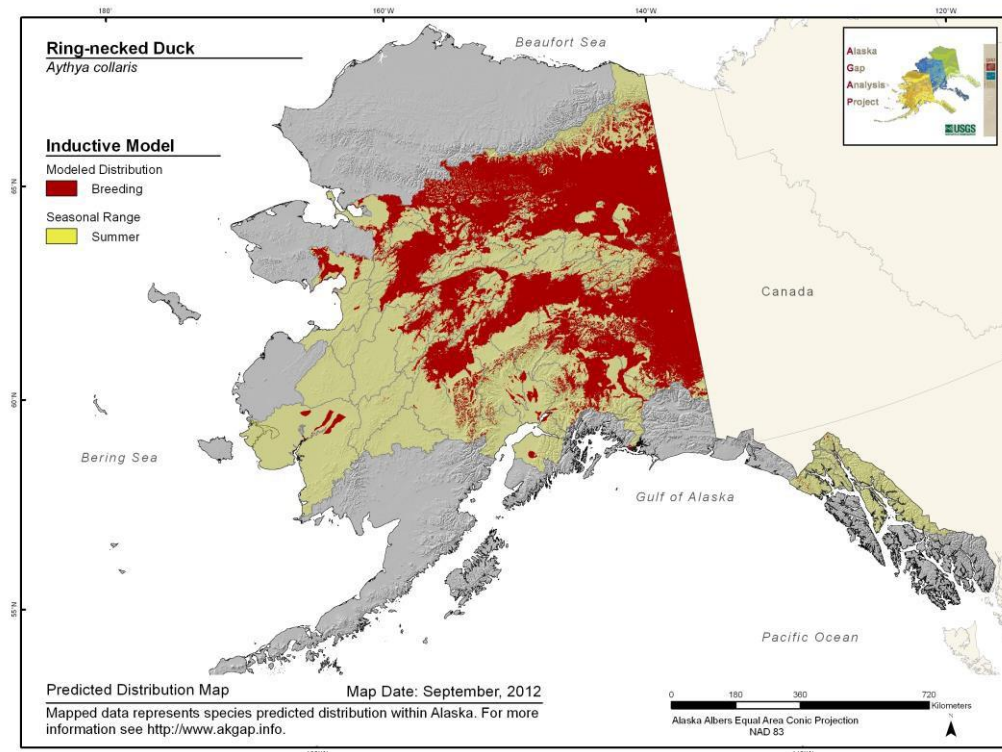
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.8**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in freshwater wetlands, especially marshes, fens, and bogs that are generally shallow (<1.5 m deep), with fringes of flooded or floating emergents, predominantly sedges interspersed with other herbaceous vegetation and shrubs. Also utilizes open water zones vegetated with abundant submerged or floating aquatic plants (Hohman and Eberhardt 1998). In B.C., breeds from 300 to 1,200 m in elevation, primarily in freshwater lakes (Campbell et al. 1990).

References

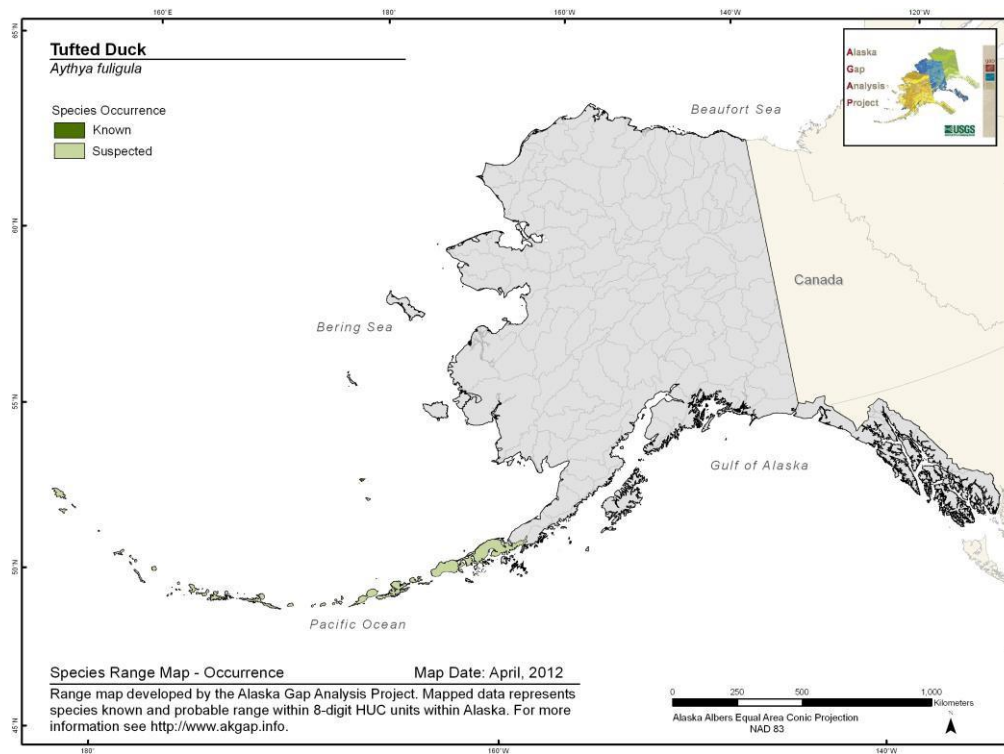
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Hohman, W. L. and R. T. Eberhardt. 1998. Ring-necked Duck (*Aythya collaris*). In The Birds of North America, Vol. 9, No. 329 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

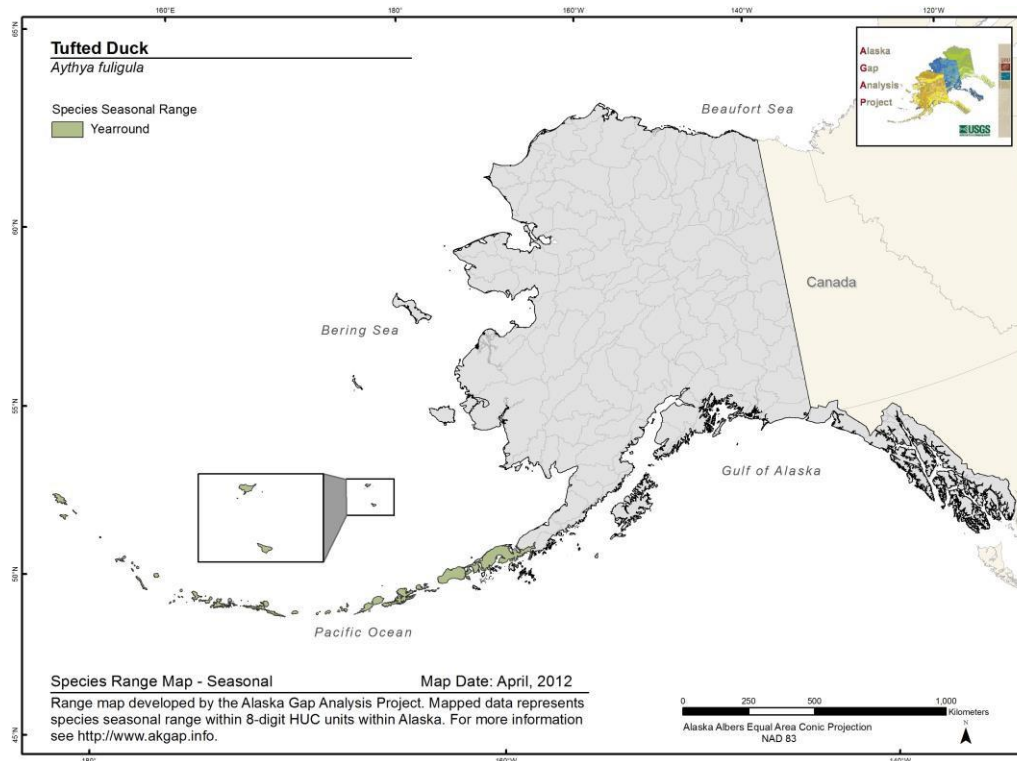
Tufted Duck *Aythya fuligula*

Range Map and Distribution Model Summary

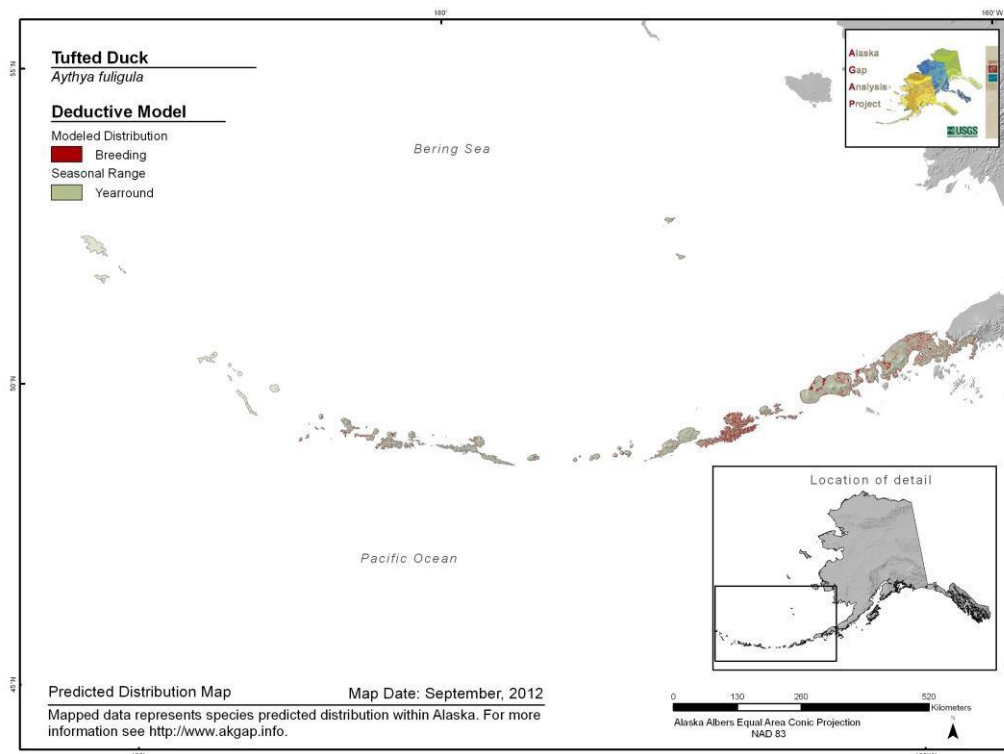
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.501**

**Model Quality
Summary:**
Low

Habitat Description

Marshes, ponds, lakes, swamps, especially with emergent vegetation (Sibley and Monroe 1990), and marine bays, inlets, and harbors (Campbell et al. 1990); in migration also rivers and brackish coastal areas (Sibley and Monroe 1990). Nests on islands in lakes or on banks of small pools; nest is hidden in reeds or under bushes close to water or in tuft of grass on slope (Terres 1980).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

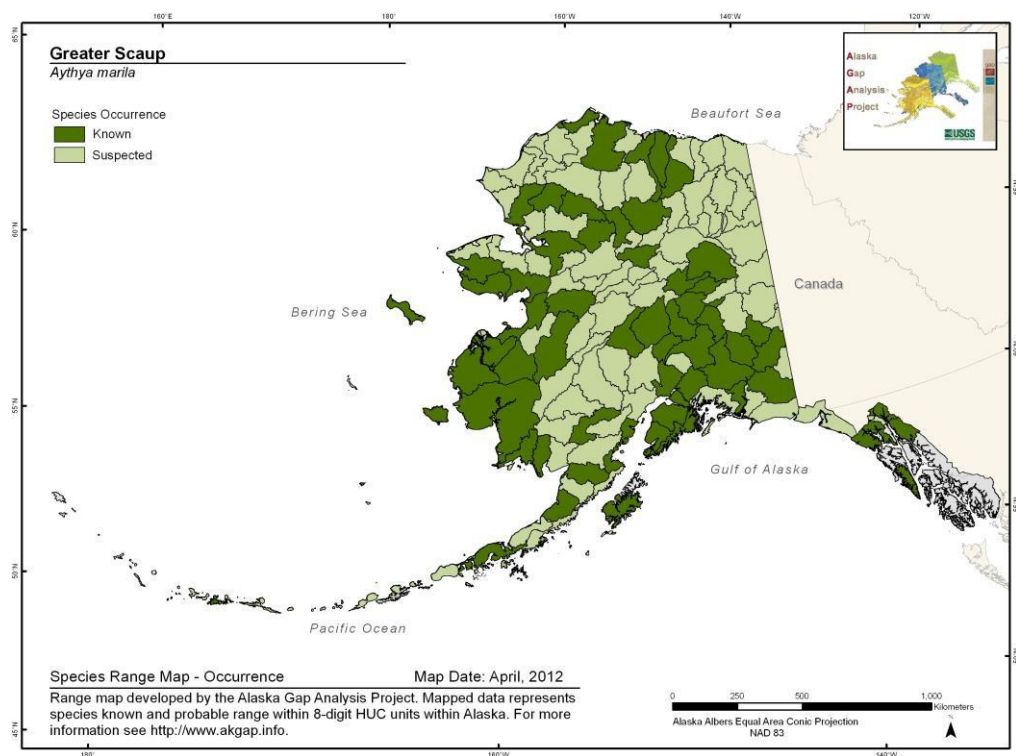
Sibley, C.G., and B.L. Monroe, Jr. 1990. Distribution and taxonomy of birds of the world. Yale University Press, New Haven, CT. xxiv + 1111 pp.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

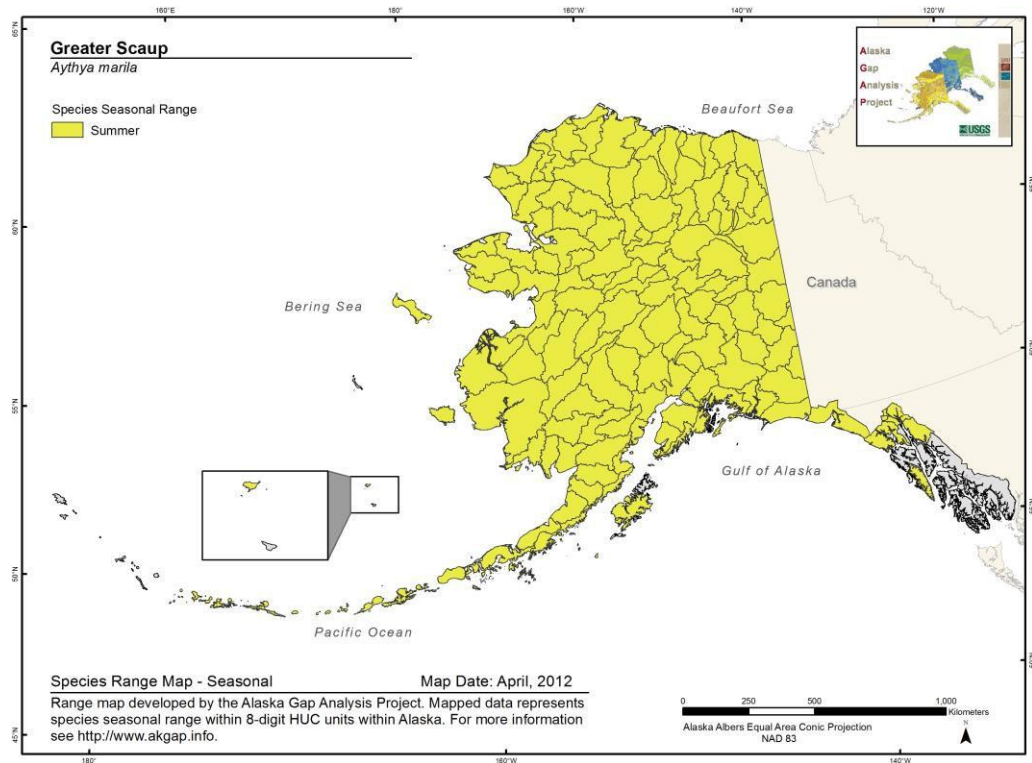
Greater Scaup *Aythya marila*

Range Map and Distribution Model Summary

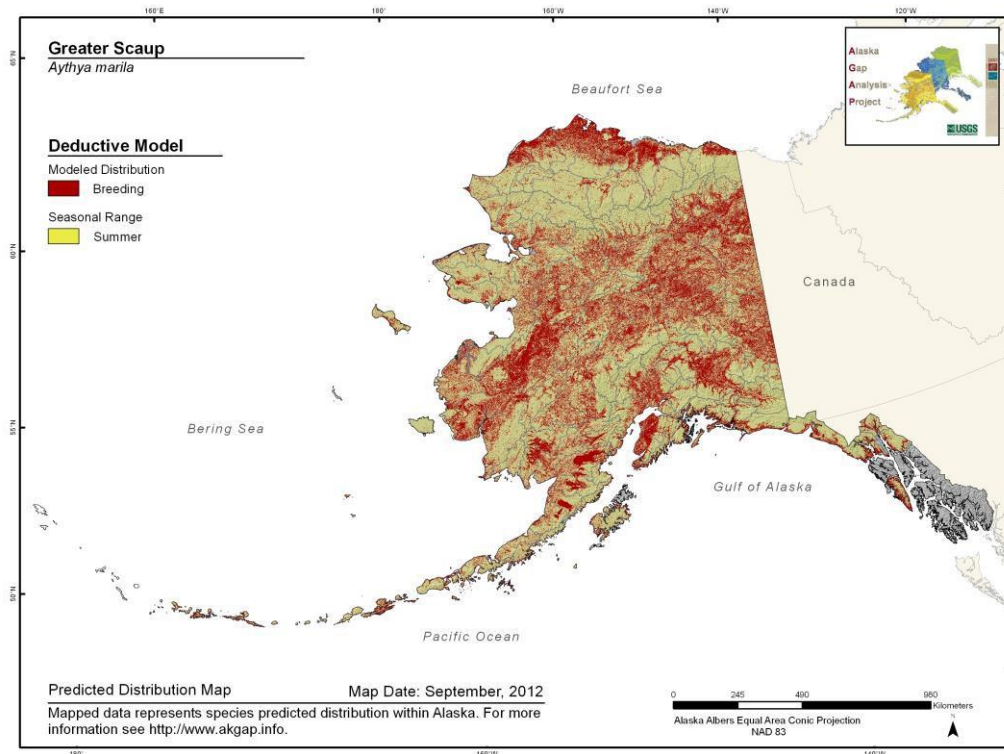
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.523**

**Model Quality
Summary:**
Low

Habitat Description

Breeds near shores of ponds and lakes, in marshes, or on islands, primarily in forested tundra and northern borders of the taiga; among grass or shrubs, or under spruce boughs (NatureServe 2007b). In the northern Yukon, nests in wet sedge and on floating mats of sedge and buckbean (Alexander et al. 2003).

References

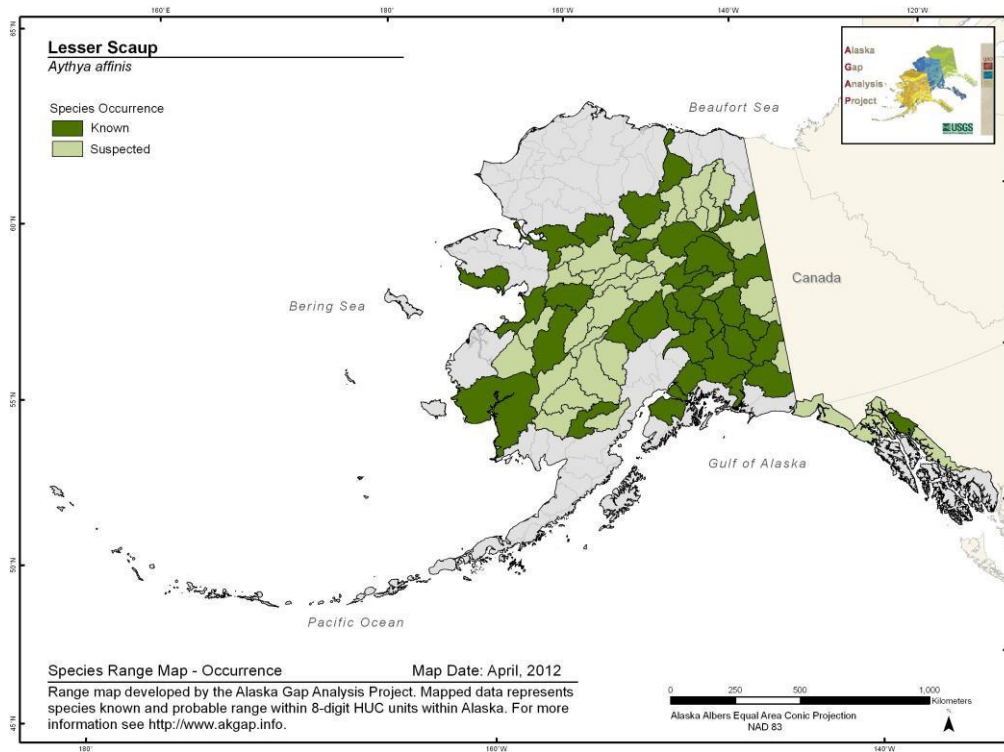
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

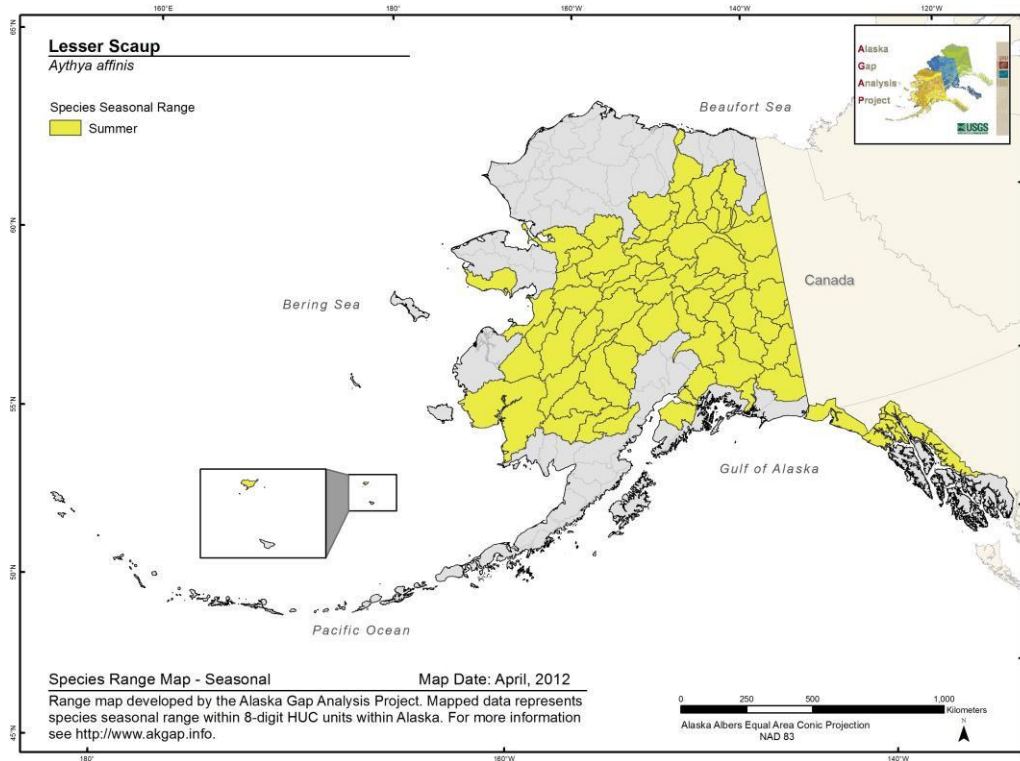
Lesser Scaup *Aythya affinis*

Range Map and Distribution Model Summary

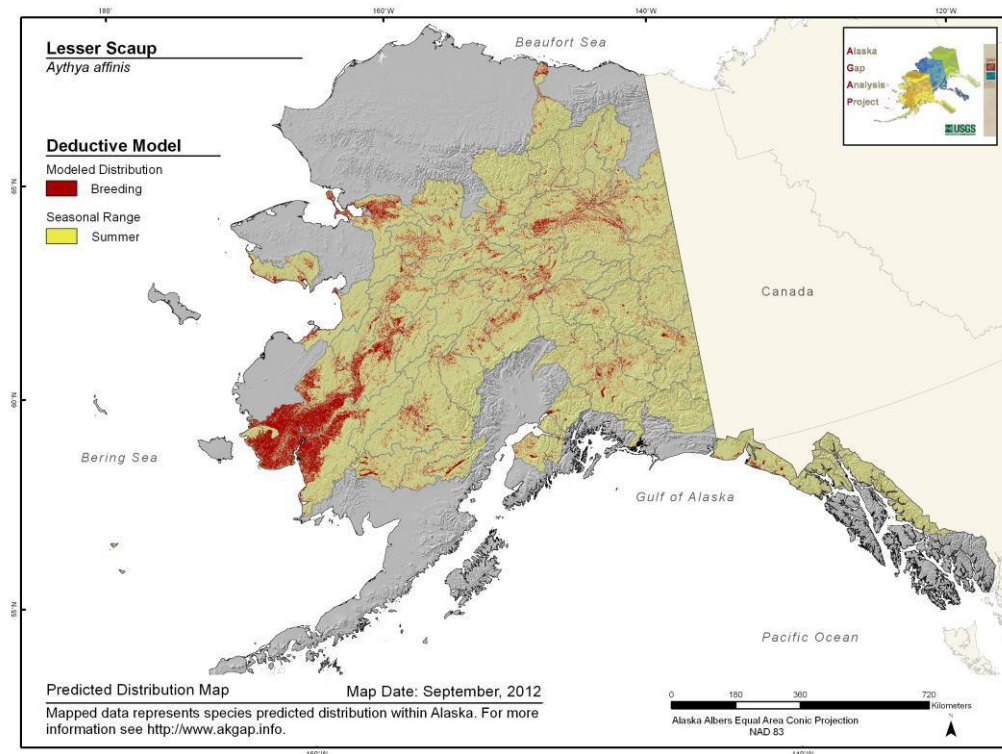
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.61**

Model Quality Summary:
Low

Habitat Description

Usually nests near small ponds and lakes, sedge meadows, creeks; in cover 1-2 ft high, within 46 m of water (NatureServe 2007b). Nests around semi-permanent (< 1 ha) waterbodies with emergent vegetation, but will also nest in sparse shrub patches (Austin et al. 1998). In interior Alaska, broods use >1 ha semi-permanent and permanent wetlands characterized by cattail and sedge (van Horn 1991).

References

Austin, J. E., C. M. Custer, and A. D. Afton. 1998. Lesser Scaup (*Aythya affinis*). In *The Birds of North America*, Vol. 9, No. 338 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

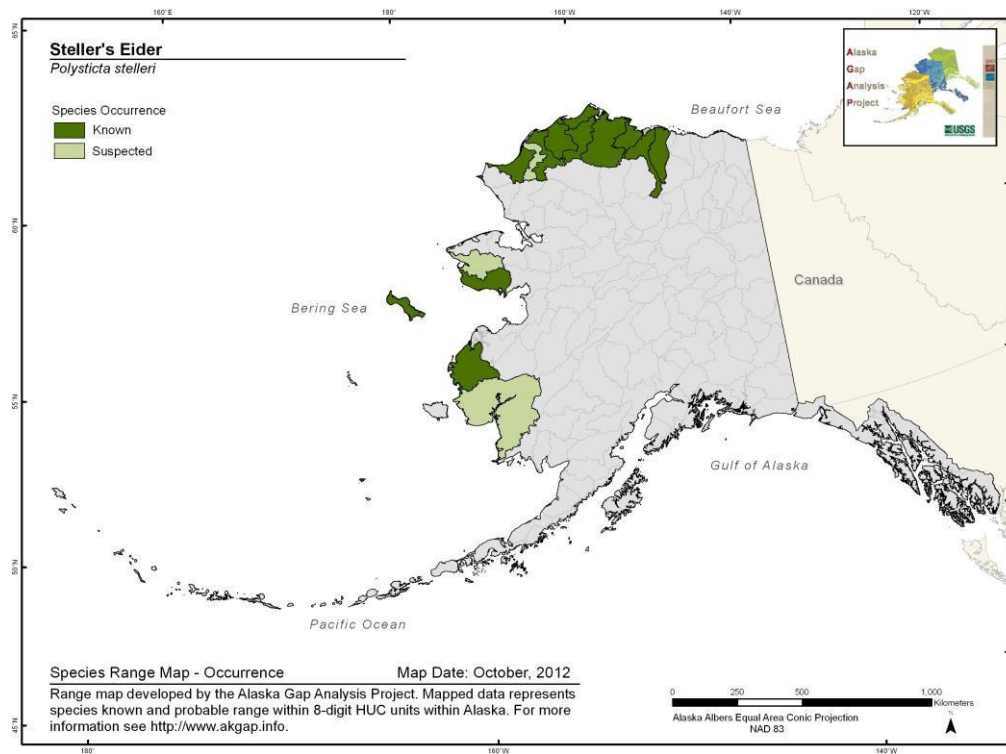
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

van Horn, K. 1991. Habitat use and activity patterns of interior Alaskan waterbirds. Master's thesis, Univ. of Missouri, Columbia.

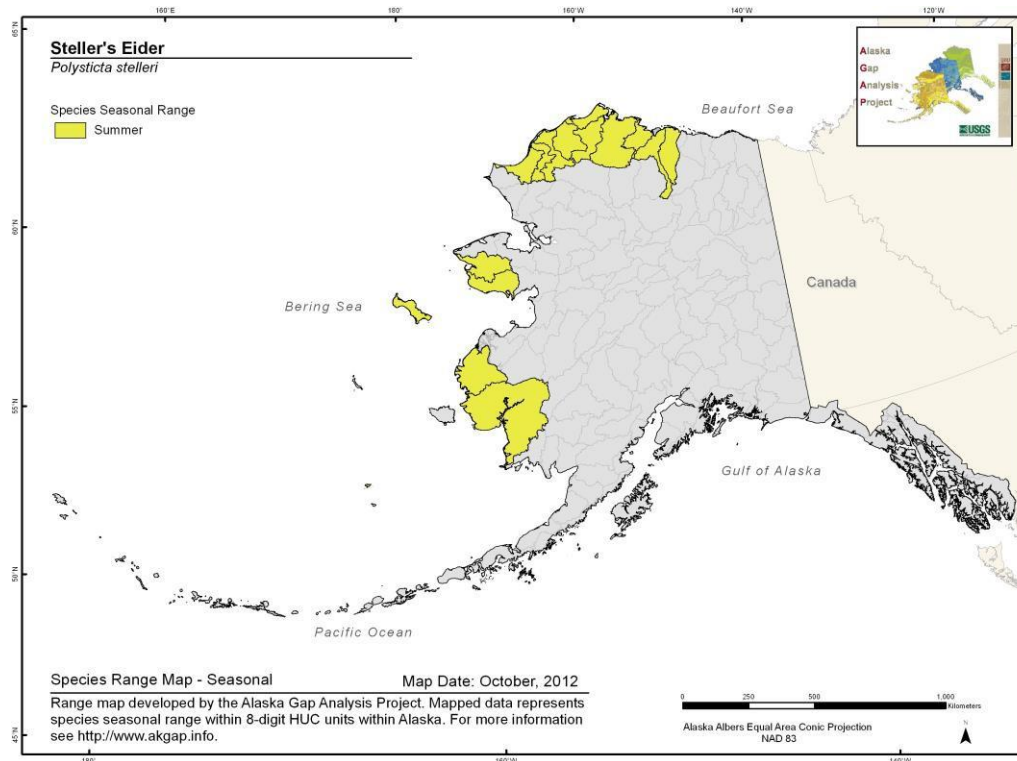
Steller's Eider *Polysticta stelleri*

Range Map and Distribution Model Summary

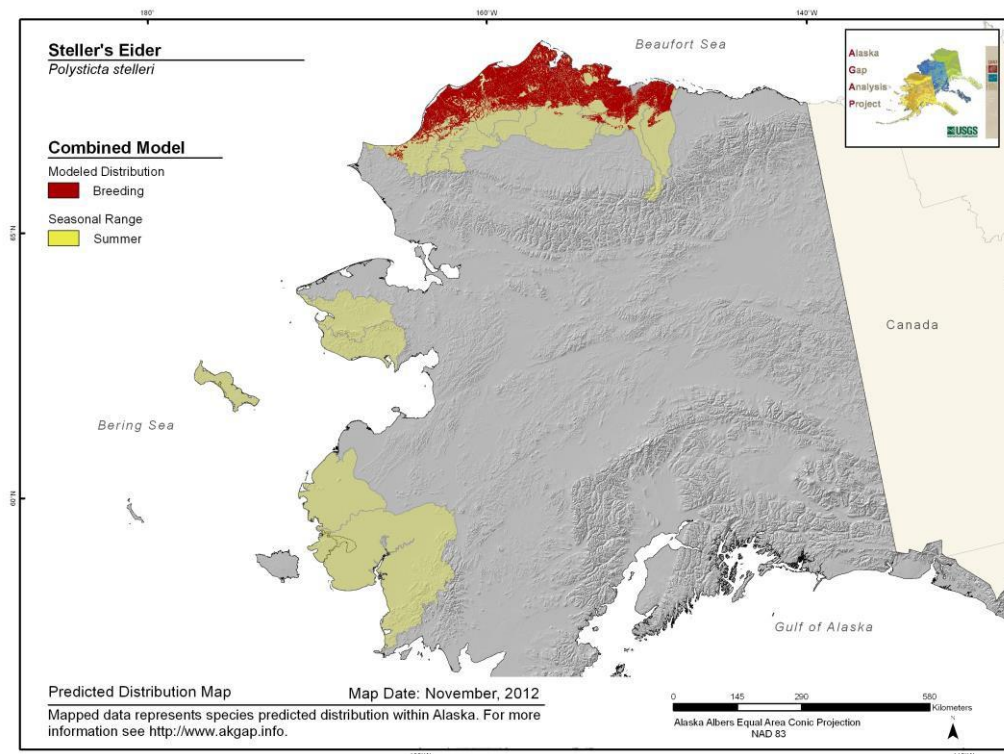
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.894**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests on grassy edges of tundra lakes and ponds, or within drained lake basins (Soothill and Whitehead 1978); occasionally on barren rocky tundra, ridges, islands or peninsulas (Fredrickson 2001). Nests located in dry moss or in depressions between grassy hummocks (Soothill and Whitehead 1978). Preferred habitat on Lena Delta, Russia, and in Barrow, Alaska, region is moss-lichen polygonal tundra (Pihl 1999, Quakenbush et al. 1995). Generally, choose nesting habitat within 20 to 30 km of the coast but have been reported as far as 100 to 150 km inland (Fredrickson 2001). Females with broods near Barrow were documented using ponds and streams with emergent pendant grass or sedges, and were also observed in blooming cotton grass (*Eriophorum* sp.) (Quakenbush et al. 1995). Deeper parts of ponds with emergent vegetation serve as important escape cover for ducklings (Fredrickson 2001).

References

Fredrickson, L. H. 2001. Steller's eider: *Polysticta stelleri*. In *The Birds of North America*, No. 571, (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Pihl, S. (compiler). 1999. European species action plan for Steller's Eider (*Polysticta stelleri*). Final draft, September 1999. Prepared by BirdLife International on behalf of the European Commission. 37pp. Available at:
<http://europa.eu.int/comm/environment/nature/directive/birdactionplan/polystictastelleri.htm>. Accessed 23 November 2000.

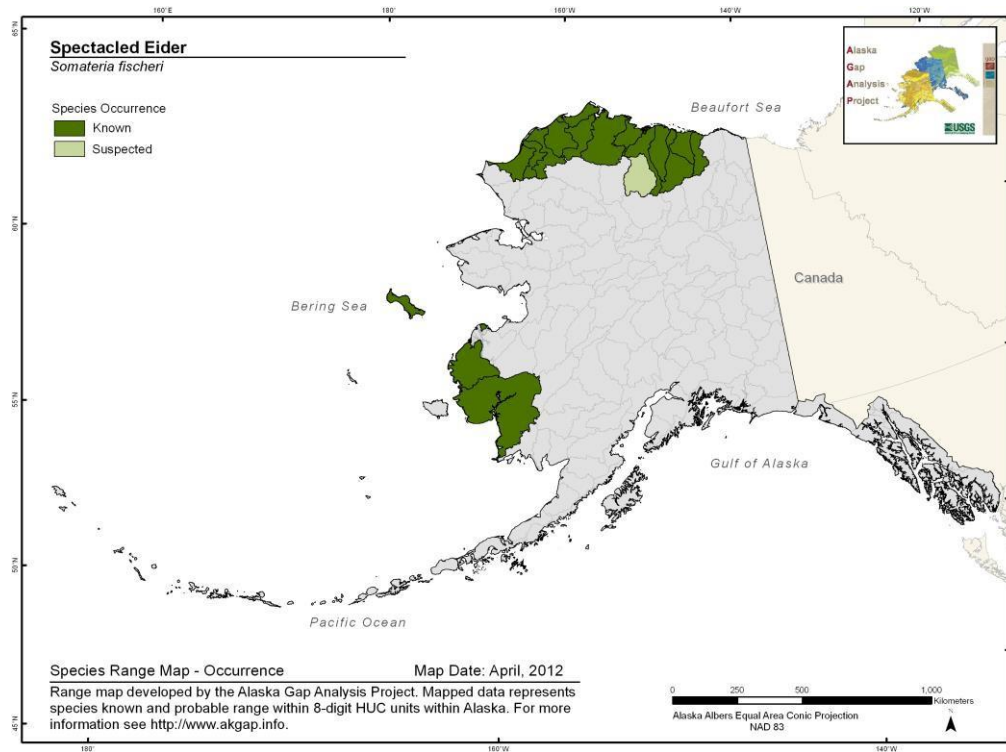
Quakenbush, L. T., R. S. Suydam, K. T. Fluetsch, C. L. Donaldson. 1995. Breeding biology of Steller's Eiders nesting near Barrow, Alaska, 1991-1994. Ecological Services, Fairbanks, Alaska, USFWS, Technical Report NAES-TR-95-03. 53 pp.

Soothill, E., and P. Whitehead. 1978. *Wildfowl of the world*. Peering Books, London.

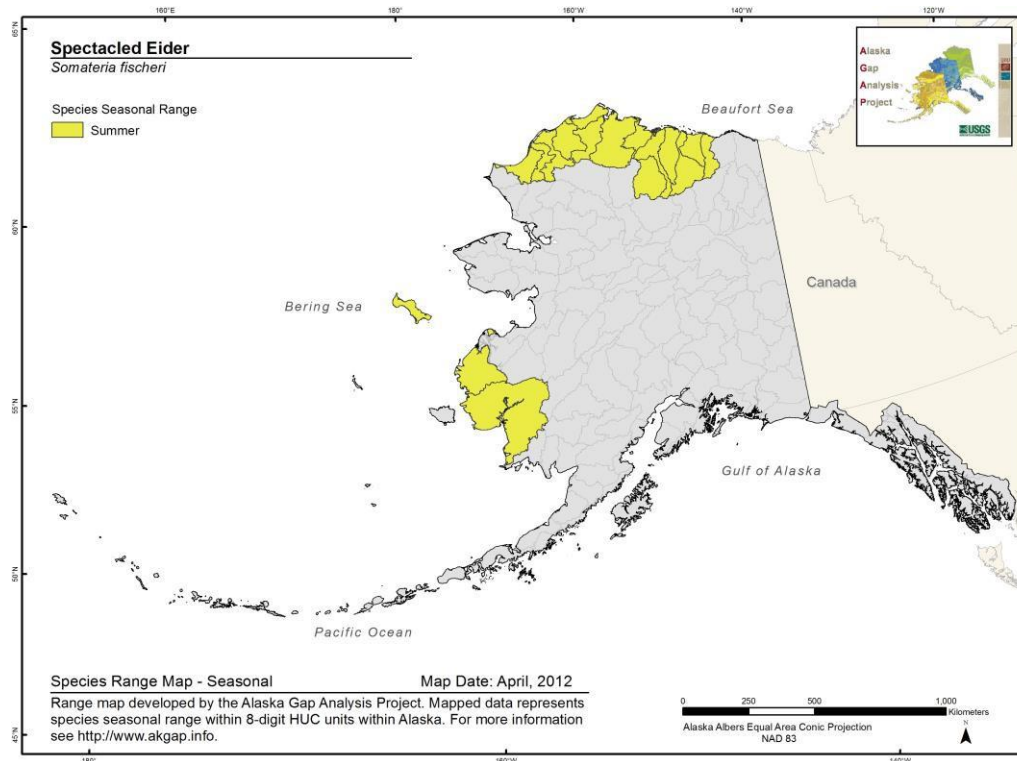
Spectacled Eider *Somateria fischeri*

Range Map and Distribution Model Summary

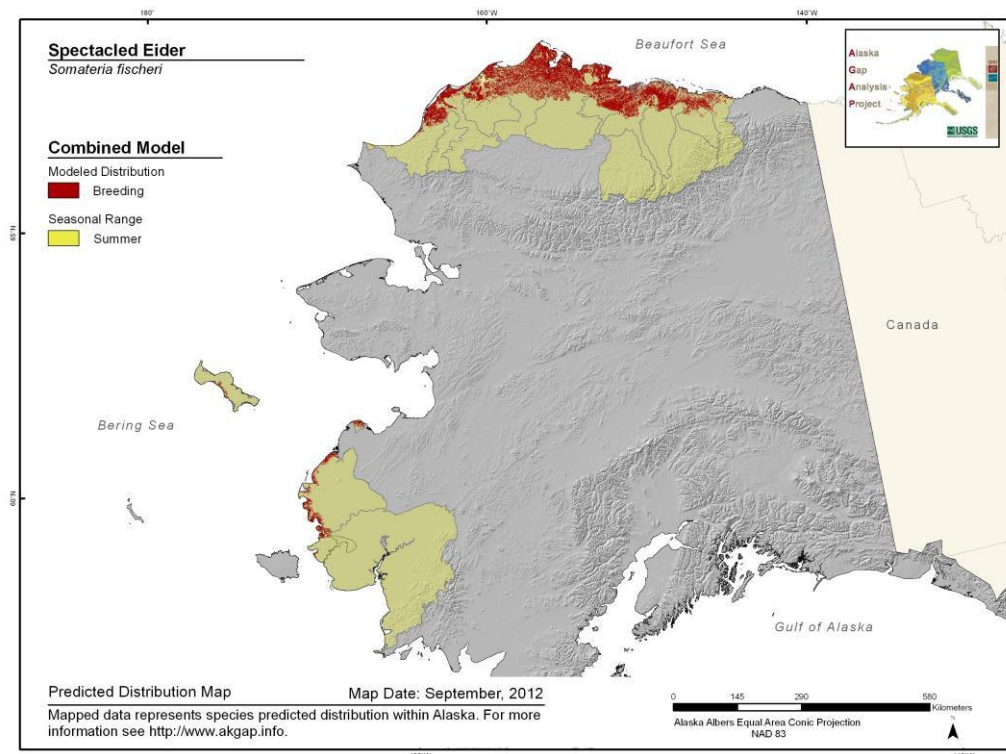
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.793**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeding range in western Alaska consists of coastal salt marshes that grade into thousands of wetlands and lakes. Sedges, grasses with higher areas containing shrubs. Islands in river deltas and wetlands characterize habitat on the north slope (King and Dau 1981, Feder et al. 1994, Anderson et al. 1999).

References

Anderson, B. A., C. B. Johnson, B. A. Cooper, L. N. Smith, and A. A. Stickney. 1999. Habitat associations of nesting Spectacled Eiders on the Arctic Coastal Plain of Alaska. Pp. 27-33 in Behaviour and ecology of sea ducks (R. I. Goudie, M. R. Petersen, and G. J. Robertson, eds.) Can. Wildl. Serc. Occas. Pap. no. 100.

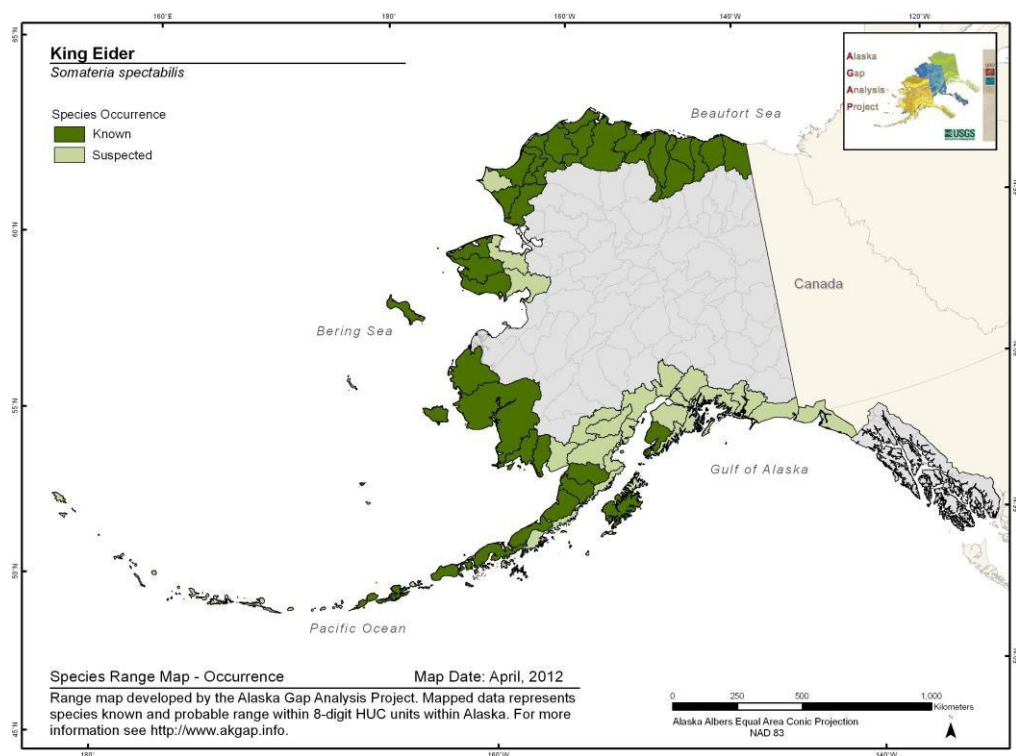
Feder, H. M., A. S. Naidu, S. C. Jewett, J. M. Hameedi, W. R. Johnson, and T. E. Whitledge. 1994. The northeastern Chukchi Sea: benthos-environmental interactions. Mar. Ecol. Prog. Ser. 111:171-190.

King, J.G. and C.P. Dau. 1981. Waterfowl and their habitats in the eastern Bering Sea. Pp. 739-753 In D.W. Hood and J.A. Calder (eds.). The eastern Bering Sea shelf: its oceanography and resources. Vol. 2. NOAA and BLM.

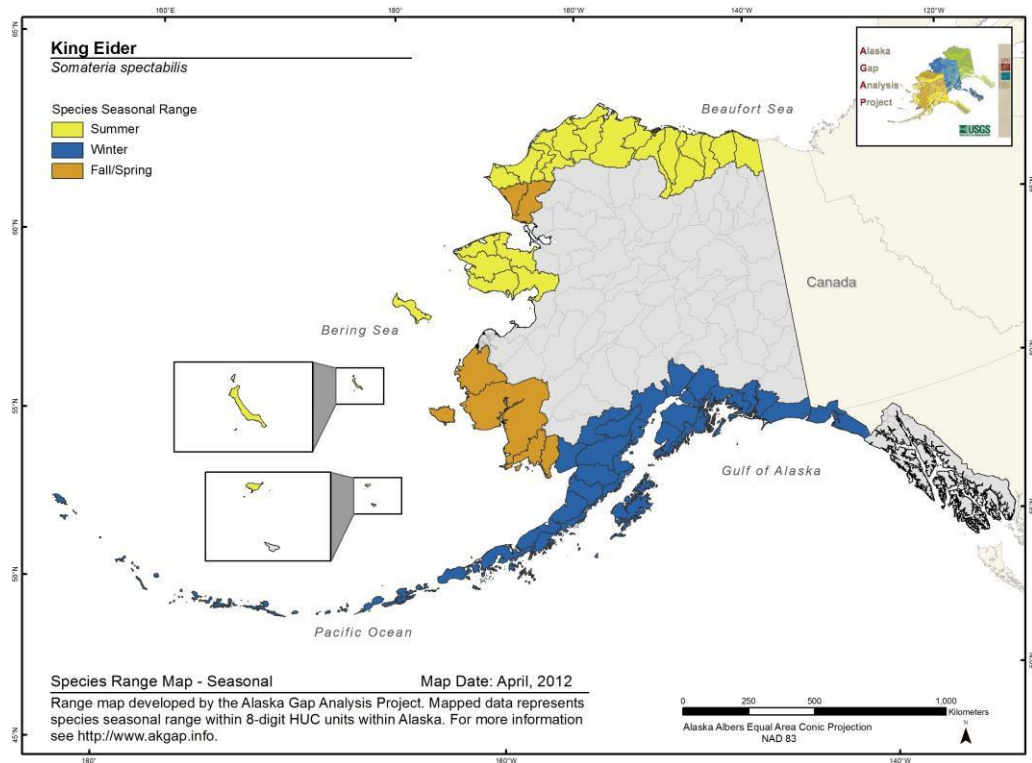
King Eider *Somateria spectabilis*

Range Map and Distribution Model Summary

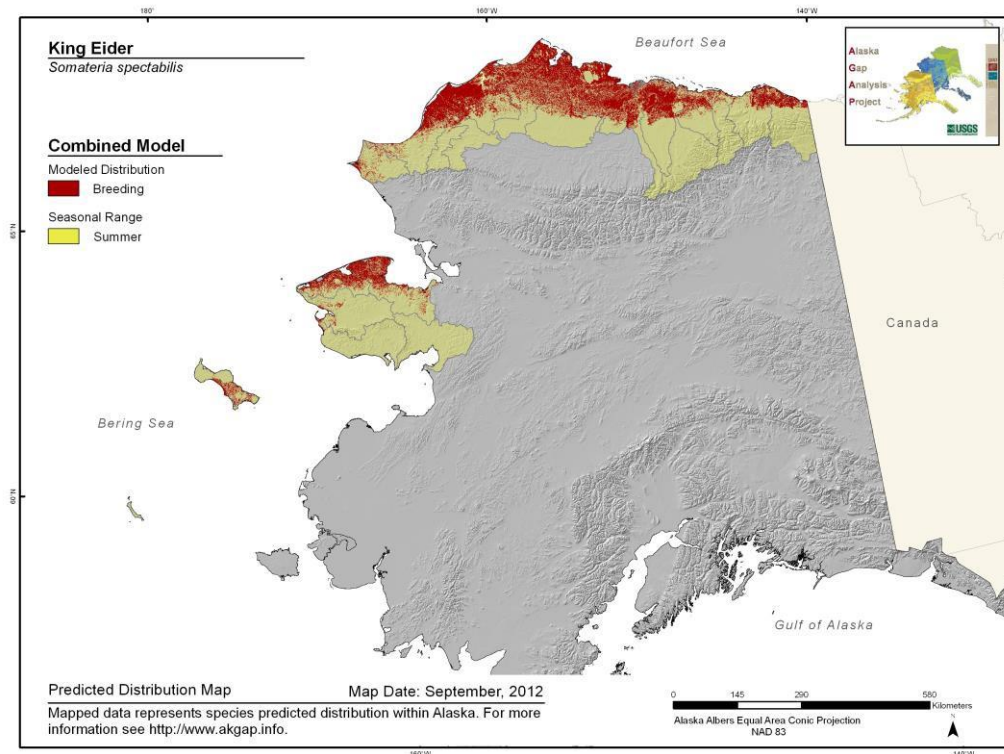
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.795**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests on ground away from, but not distant from water in open tundra (Palmer 1976); often in graminoid meadows within a few miles of the coast. Distance from coast varies; generally nests further inland than Common and Spectacled Eider (Palmer 1976). Moves to fresh or salt water habitats to rear broods, feeding in shallow ponds with sedges along the way and eventually ending up in salt water where fledging occurs (Suydam 2000)

References

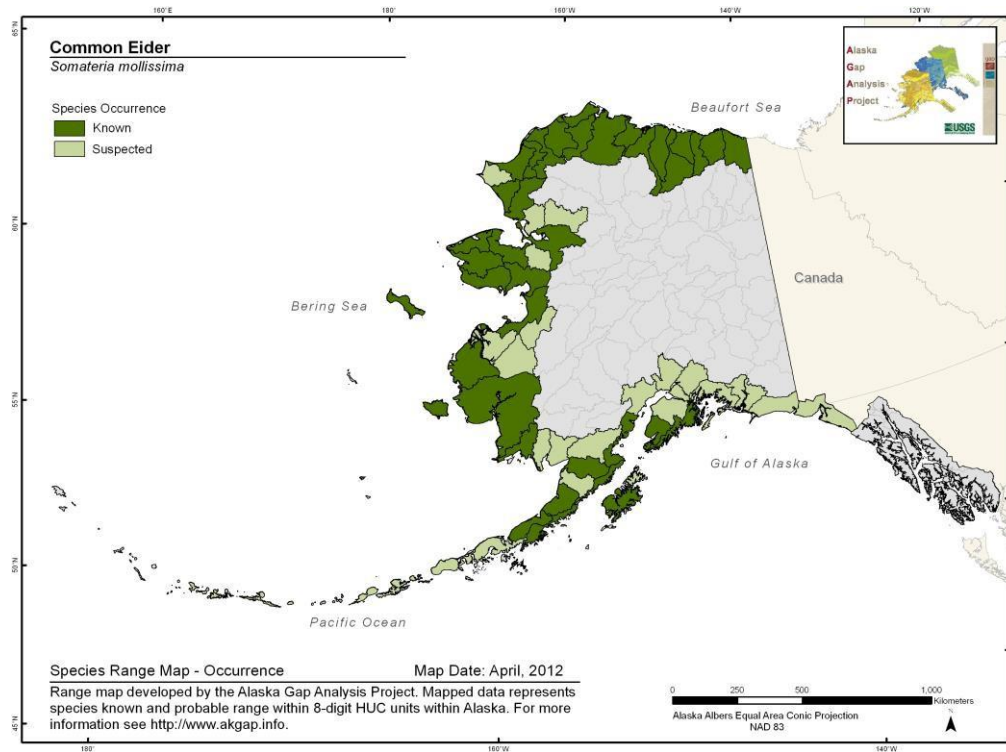
Palmer, R. S., editor. 1976. Handbook of North American birds. Vol. 2. Waterfowl (first part). Whistling ducks, swans, geese, sheld-ducks, dabbling ducks. Yale Univ. Press, New Haven. 521 pp.

Suydam, R. S. 2000. King Eider (*Somateria spectabilis*). In *The Birds of North America*, No. 491 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

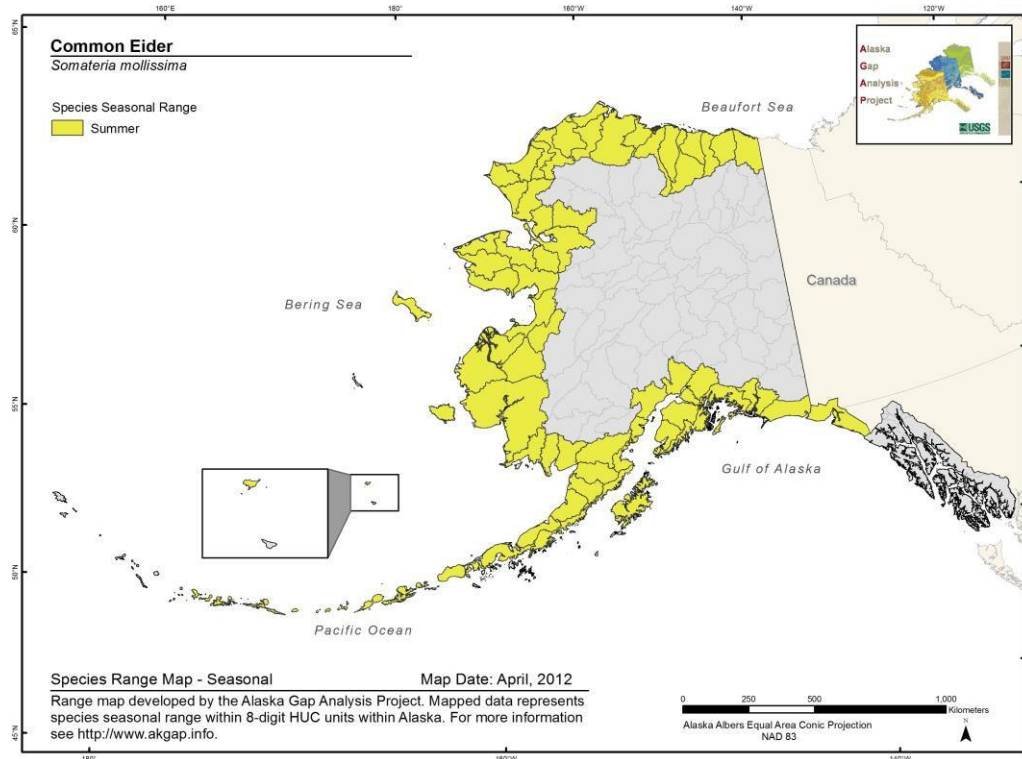
Common Eider *Somateria mollissima*

Range Map and Distribution Model Summary

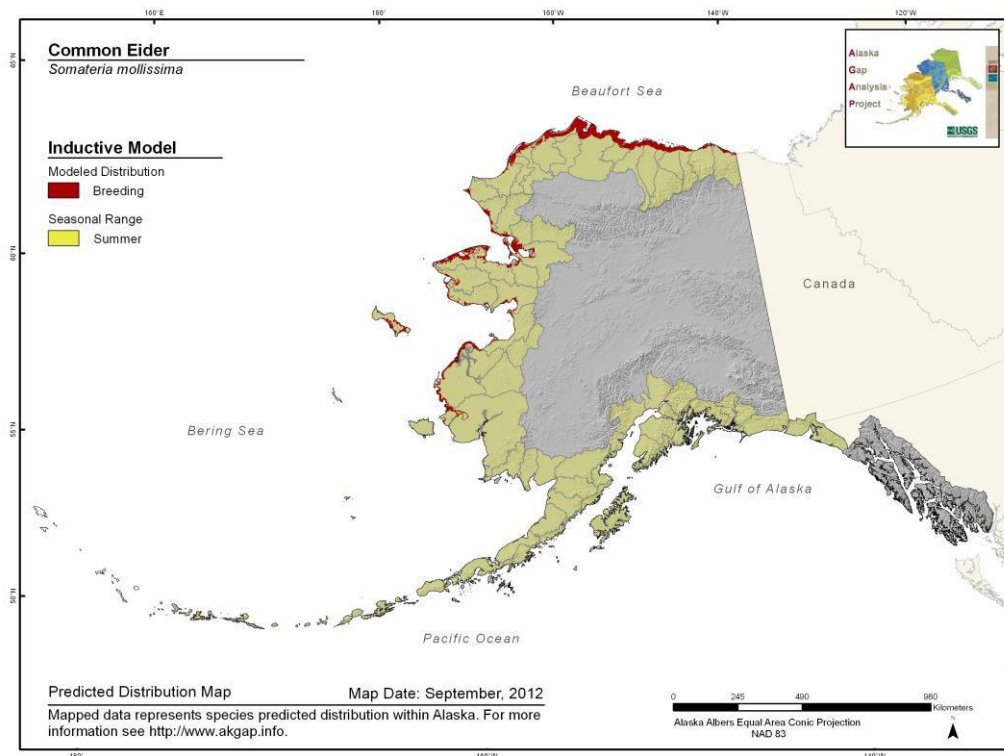
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.865**

**Model Quality
Summary:**
Moderate

Habitat Description

Prefers small islands, islets, and low-lying points of land. Sometimes nest on islands or islets in freshwater lakes, ponds, lagoons, near outlet to the sea (Nakashima 1986, Cornish and Dickson 1997). Vegetation at nest sites variable and can range from rocky substrate to coniferous forests (Goudie et al. 2000). Most productive nests occur in driftwood on high elevation islands in flood plumes of large rivers (Johnson 2000).

References

Cornish, B. J. and D. L. Dickson. 1997. Common Eiders nesting in the western Canadian Arctic. Pp. 40-50 in King and Common eiders of the western Canadian Arctic (D. L. Dickson, ed.). Can. Wildl. Serv. Occas. Pap. No. 94.

Goudie, R. I., G. J. Robertson, A. Reed. 2000. Common Eider (*Somateria mollissima*). In The Birds of North America, Vol. 7, No. 546 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

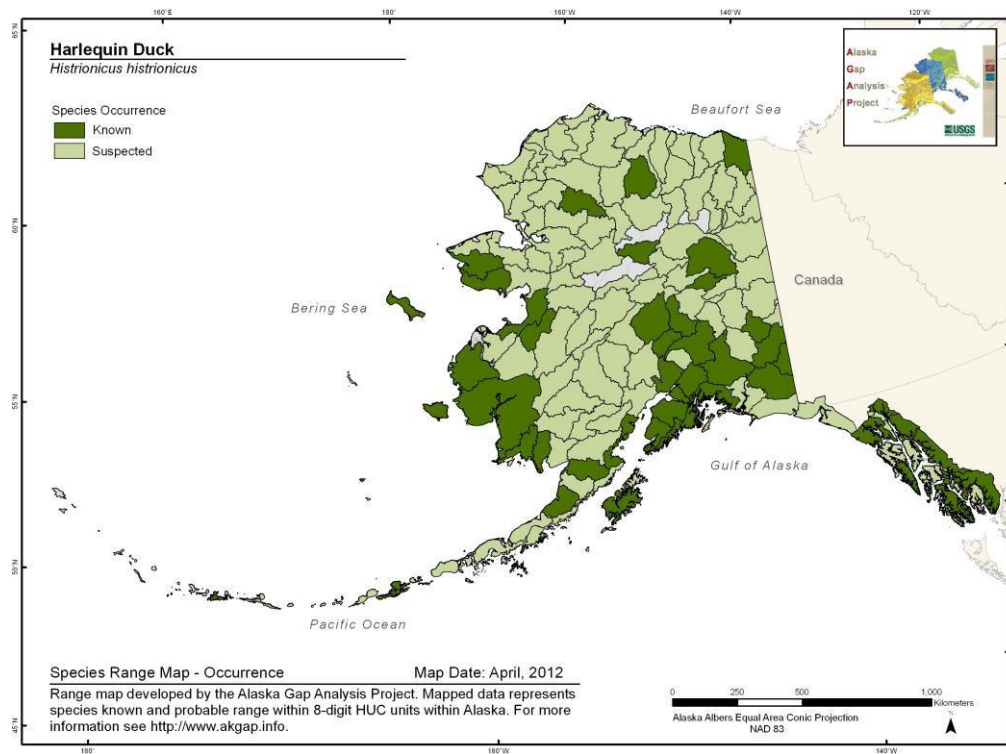
Johnson, S. R. 2000. Pacific eider. In: Truett, J. C. and Johnson, S.R., eds. Natural history of an Arctic oil field: development and the biota. San Diego: Academic Press. 259-272.

Nakashima, D. J. 1986. Inuit knowledge of the ecology of the Common Eider in north Quebec. Pp. 102-113 in Eider ducks in Canada (A. Reed, ed.) Can. Wildl. Serv. Rep. Ser. No. 47, Ottawa, ON.

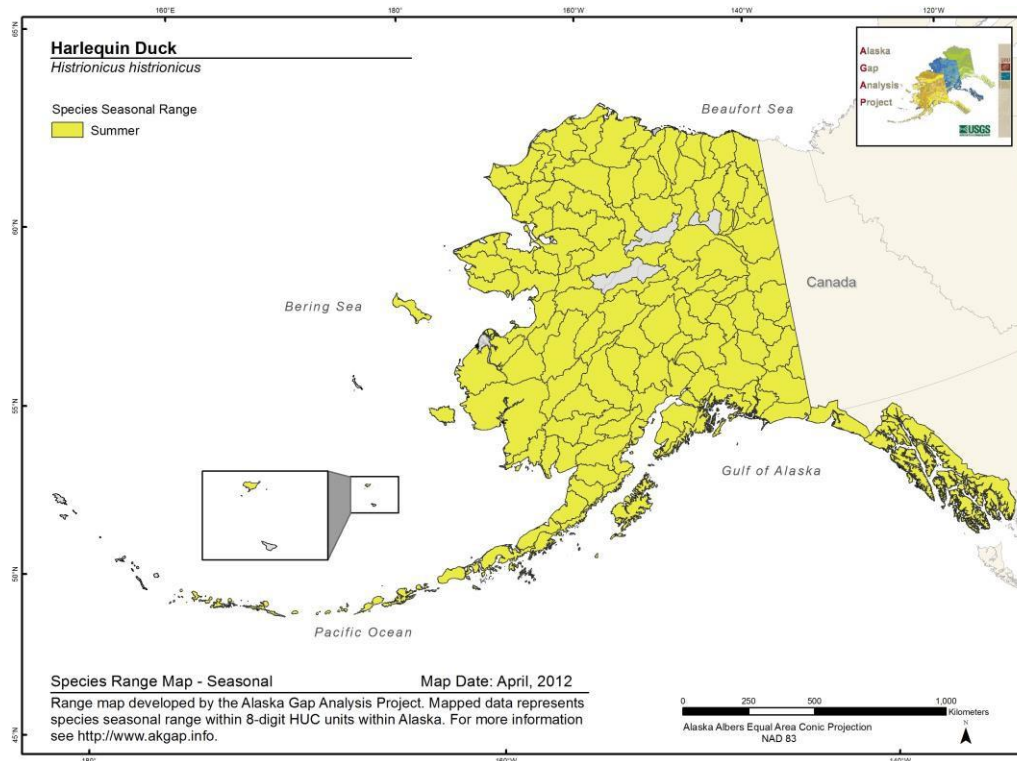
Harlequin Duck *Histrionicus histrionicus*

Range Map and Distribution Model Summary

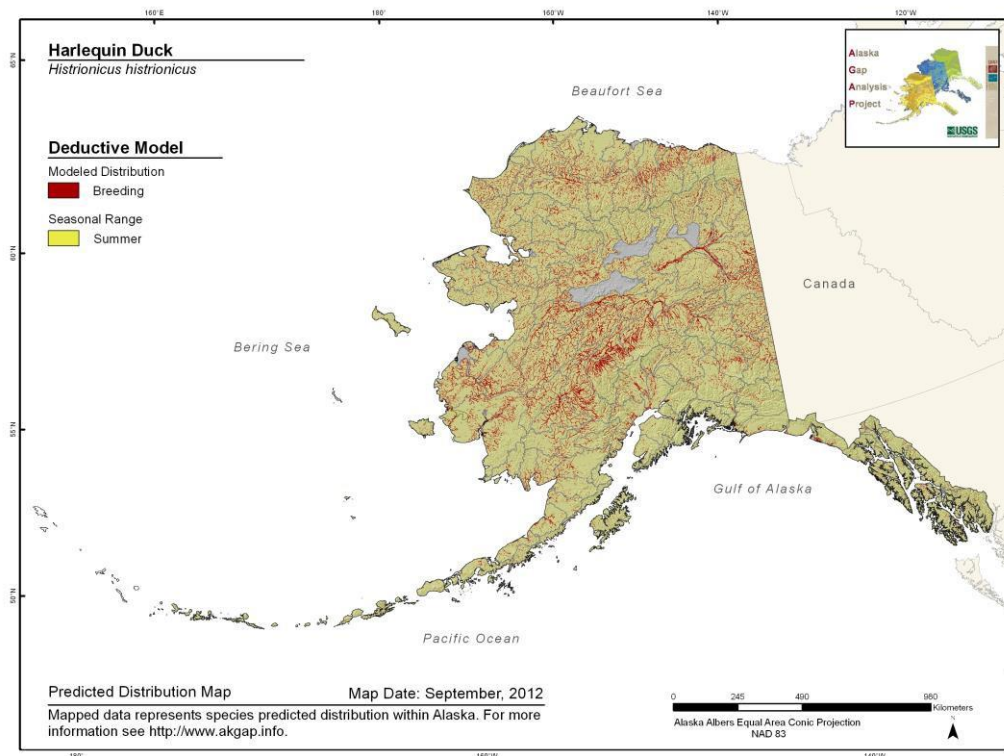
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.544**

**Model Quality
Summary:**
Low

Habitat Description

Nests along fast-moving rivers and mountain streams on rocky islands or banks. Streams are braided to reticulate with many riffles and rapids (Cassirer et al. 1993). Requires relatively undisturbed, low gradient, meandering mountain streams with dense shrubby riparian areas (greater than 50% streamside shrub cover), and woody debris for nesting and brood rearing; also needs mid-stream boulders or log jams and overhanging vegetation for cover and loafing; indicator of high water quality (Spahr et al. 1991). Sometimes nests beside mountain lakes and lake outlets. Nests in a hollow, usually under the cover of bushes within about 30 m of water; also in rock crevice among boulders, in rock cavity in cliff face, in a tree cavity (Cassirer et al. 1993), in a puffin burrow, or similar hidden site; occasionally on open tundra (Ehrlich et al. 1992). In coastal Alaska, uses streams with larger discharges, widths, estuary areas, and riparian zones (Crowley 1994, Crowley and Patten 1996).

References

Cassirer, E. F., A. Breault, P. Clarkson, D. L. Genter, R. I. Goudie, B. Hunt, S. C. Latta, G. H. Mittelhauser, M. McCollough, G. Schirato, R. L. Wallen. 1993. Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. March 1993. 83 pp.

Crowley, D. W. 1994. Breeding habitat of Harlequin Ducks in Prince William Sound, Alaska. Master's thesis, Oregon State Univ., Corvallis.

Crowley, D. W. and S. M. Patten, Jr. 1996. Breeding ecology of Harlequin Ducks in Prince William Sound, Alaska. Exxon Valdez Oil Spill/ Federal Natural Resources Damage Assessment Final Report (Restoration Study no. 71), Alaska Dept. Fish and Game, Anchorage.

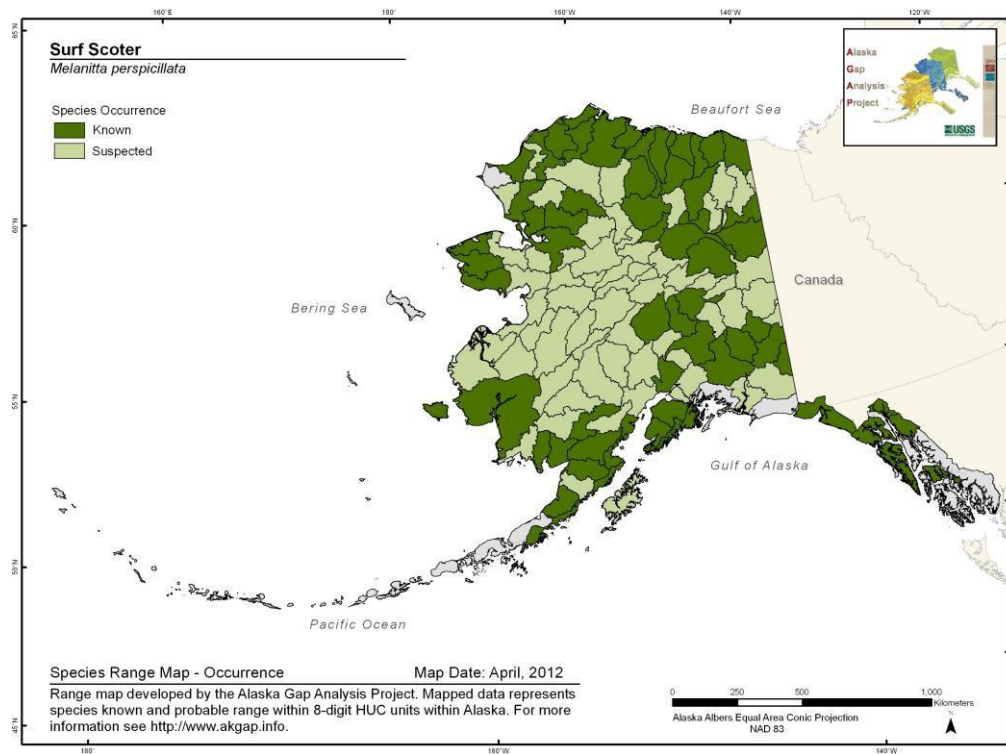
Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. Birds in jeopardy: the imperiled and extinct birds of the United States and Canada, Including Hawaii and Puerto Rico. Stanford University Press, Stanford, California. 259 pp.

Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. USDA USFS, Ogden, Utah.

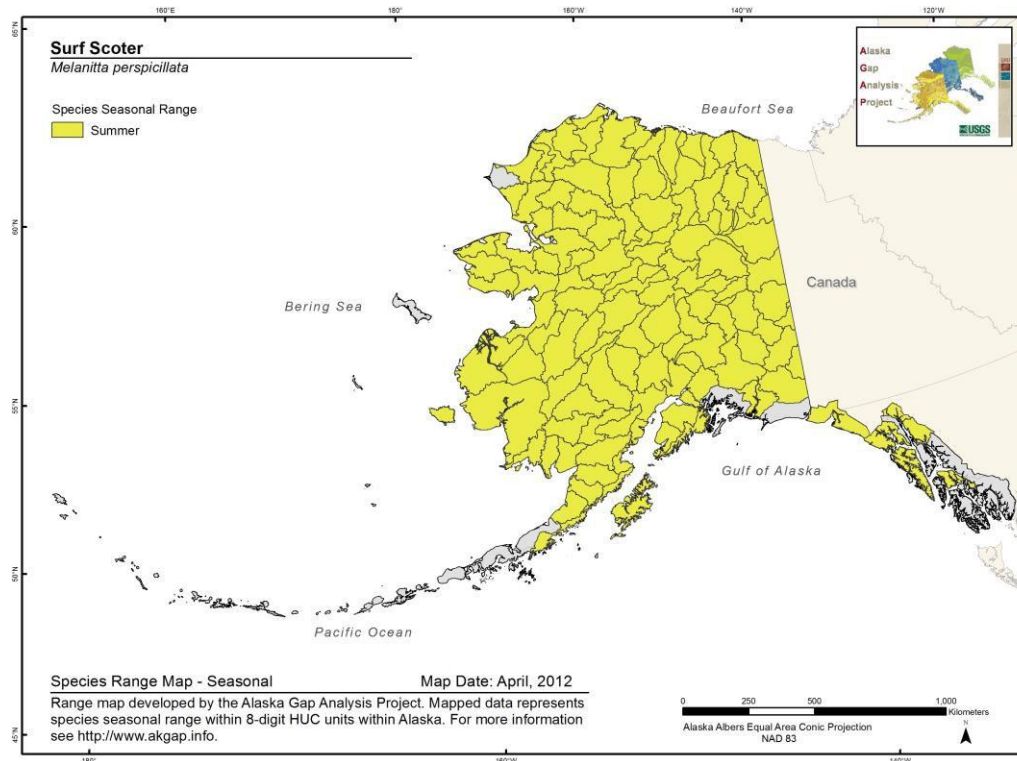
Surf Scoter *Melanitta perspicillata*

Range Map and Distribution Model Summary

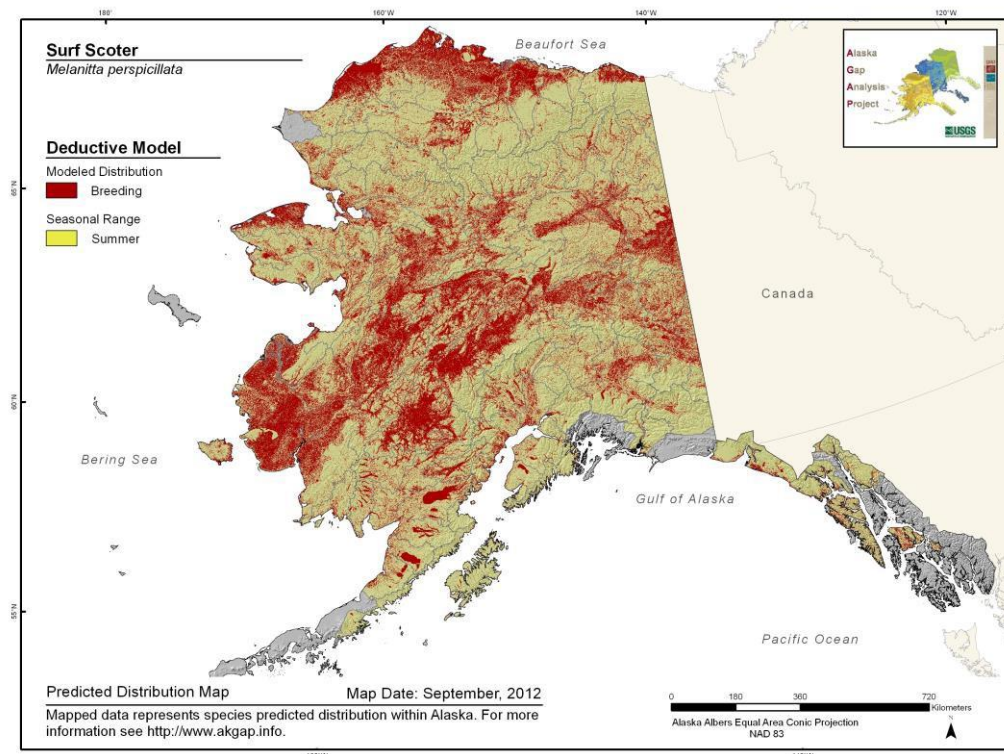
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.559**

**Model Quality
Summary:**
Low

Habitat Description

Nests in brushy tundra, in freshwater marsh, or in wooded area near pond, bog, or stream. Nests on the ground in an area protected by vegetative cover. (NatureServe 2007b). Also uses rocky-shored lakes and ponds within boreal forests and tundra zones (Goudie et al. 1994). In Quebec, breeding habitat includes shallow lakes <10 ha (Decarie et al. 1995, Bergeron et al. 1996).

References

Bergeron, R., R. J. Hughes, and A. Reed. 1996. Projet de Laforge-1. Etude de la sauvagine et caracterisation de ses habitats-ete 1995. Final report. Direction Ingenierie et Environnement, Societe d' energie de la Baie James and Groupe Dryade Ltee, QC.

Decarie, R., F. Morneau, D. Lambert, S. Carriere, and J. P. L. Savard. 1995. Habitat use by brood-rearing waterfowl in subarctic Quebec. *Arctic* 48:383-390.

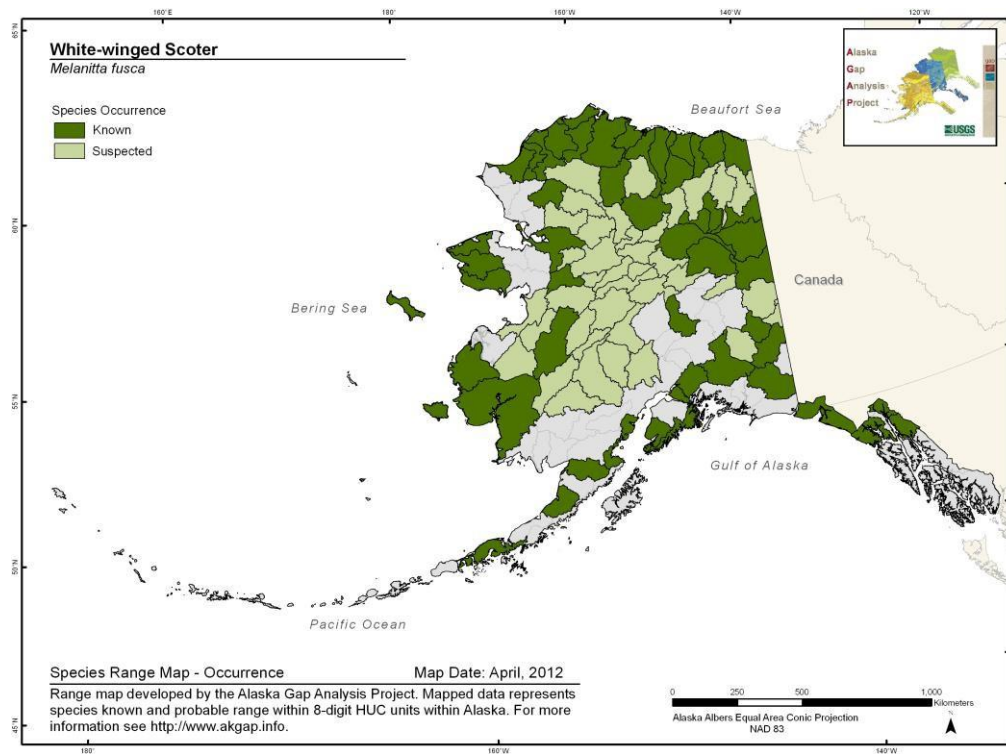
Goudie, R. I., S. Brault, B. Conant, A. V. Kondratyev, M. R. Petersen, and K. Vermeer. 1994. The status of sea ducks in the north Pacific rim: toward their conservation and management. *Trans. N. Am. Wildl. Nat. Res. Conf.* 59:27-49.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

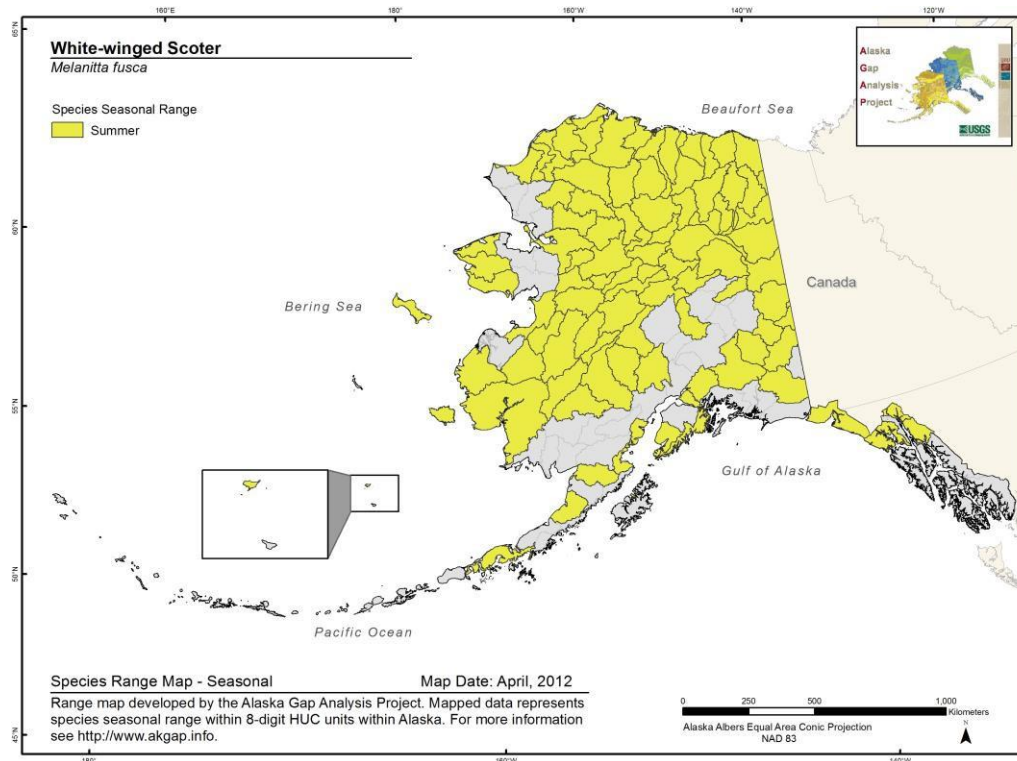
White-winged Scoter *Melanitta fusca*

Range Map and Distribution Model Summary

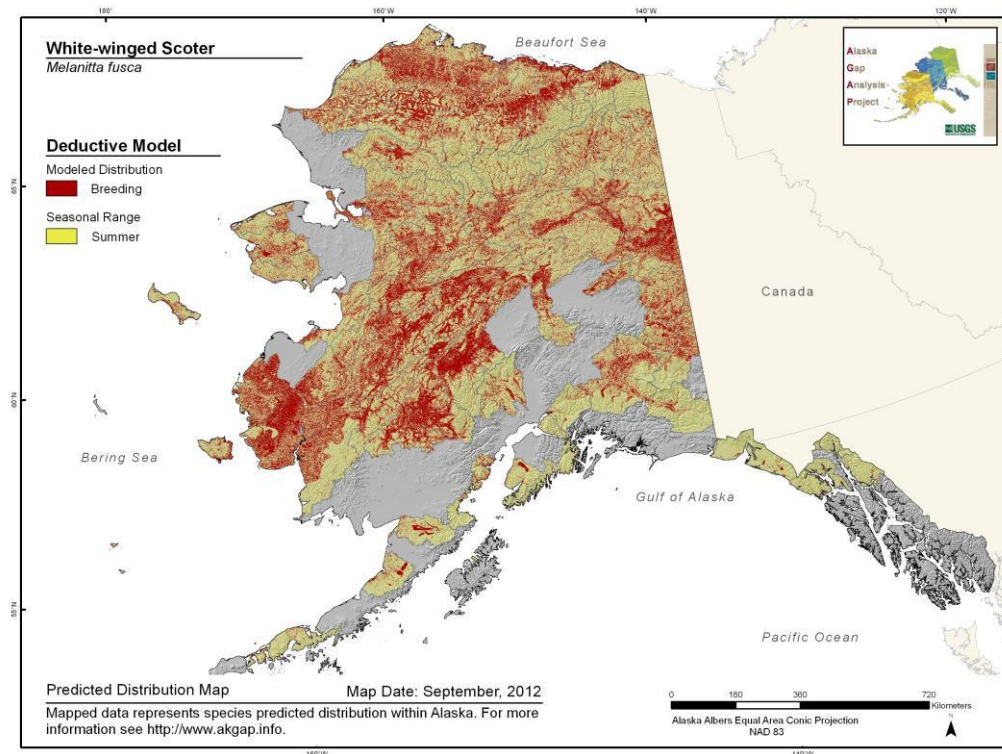
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.521**

**Model Quality
Summary:**
Low

Habitat Description

Nests on large, shallow freshwater lakes and wetlands. Also nests on slow-moving streams in wooded, bushy, overgrown sites, or, less commonly, in concealed or bare sites in open tundra (NatureServe 2007b). High densities on lakes with densely vegetated (shrubs) islands. In Alaska, high densities on lakes and rivers within boreal forest zone.

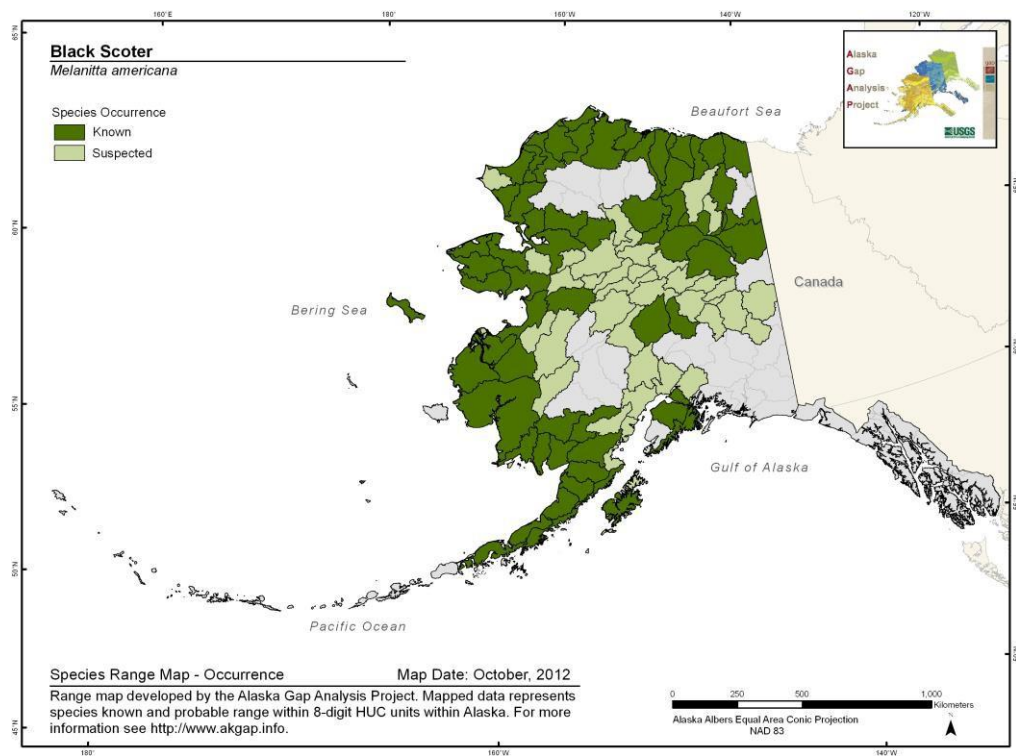
References

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

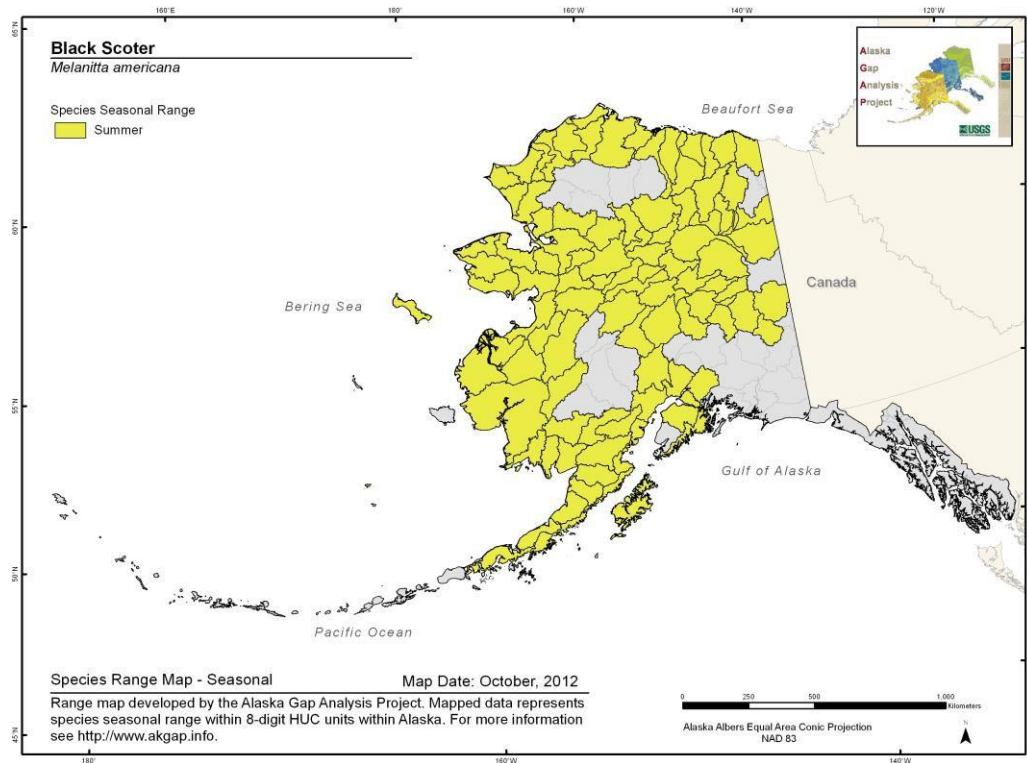
Black Scoter *Melanitta americana*

Range Map and Distribution Model Summary

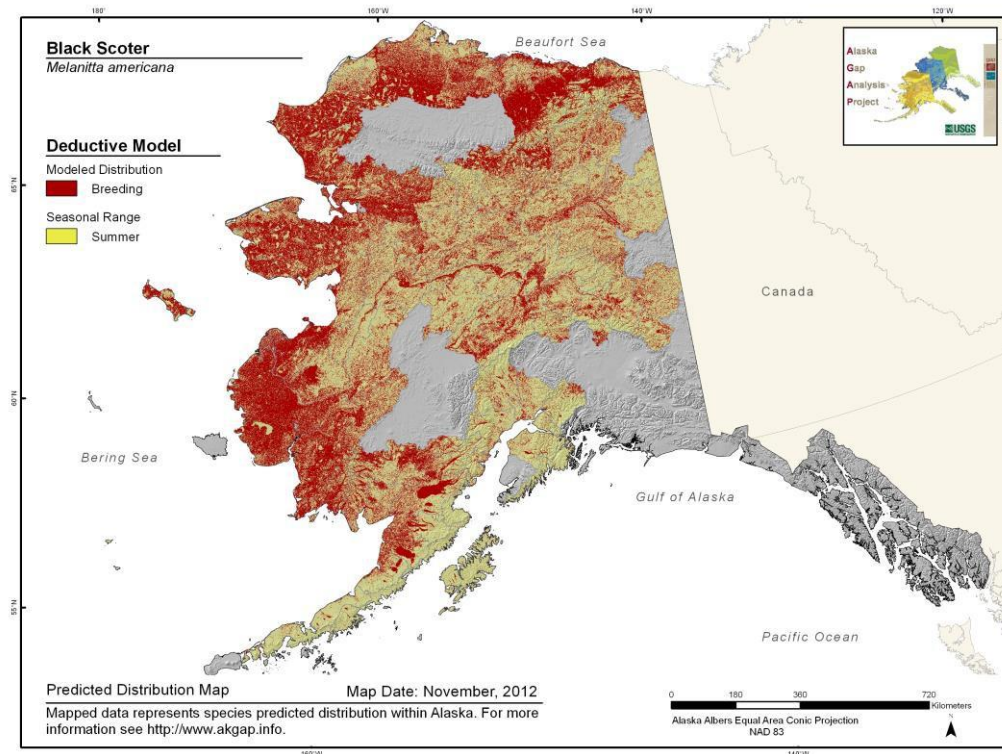
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.679**

**Model Quality
Summary:**
Low

Habitat Description

Nests near lakes and pools on grassy or brushy tundra and in northern taiga (AOU 1983). Usually nests close to water. In Quebec, Black Scoters used shallow (<5 m) lakes, generally with till or rock substrate (Bordage and Savard 1995). They preferred lakes <10 ha in area, but also used lakes up to 100 ha. On the Yukon-Kuskokwim Delta, Black Scoters used disturbed areas such as river banks and sloughs, preferring areas of tall grass used to conceal nests (C.P. Dau per. comm. in Bordage and Savard 1995).

References

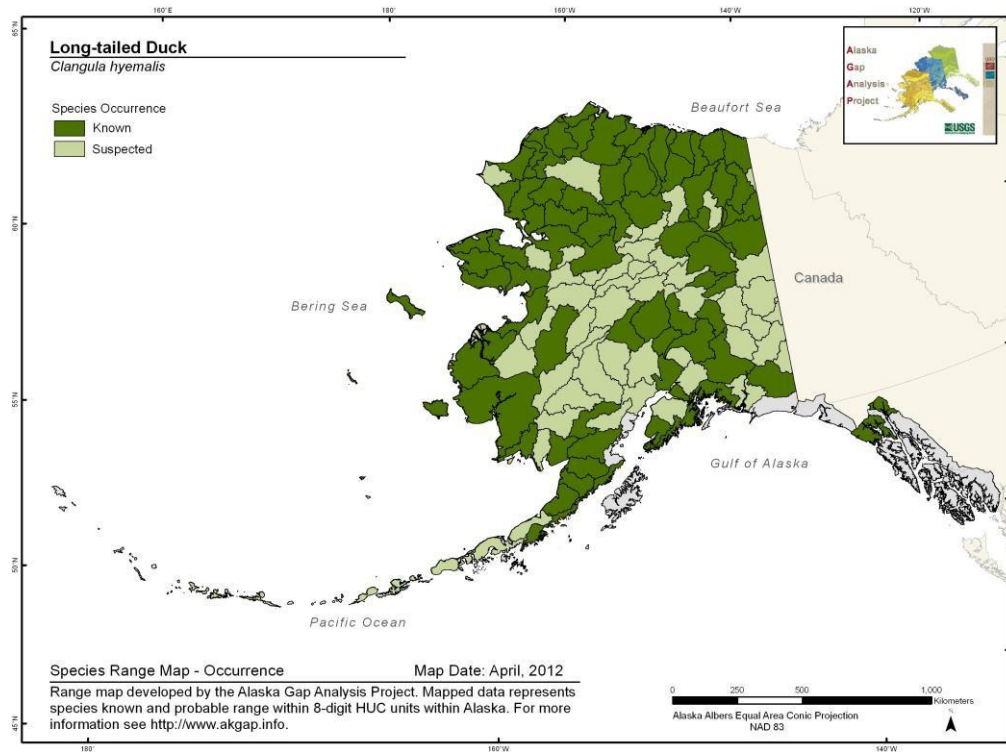
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Bordage, D. and J. L. Savard. 1995. Black Scoter (*Melanitta nigra*). In *The Birds of North America*, No. 177 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

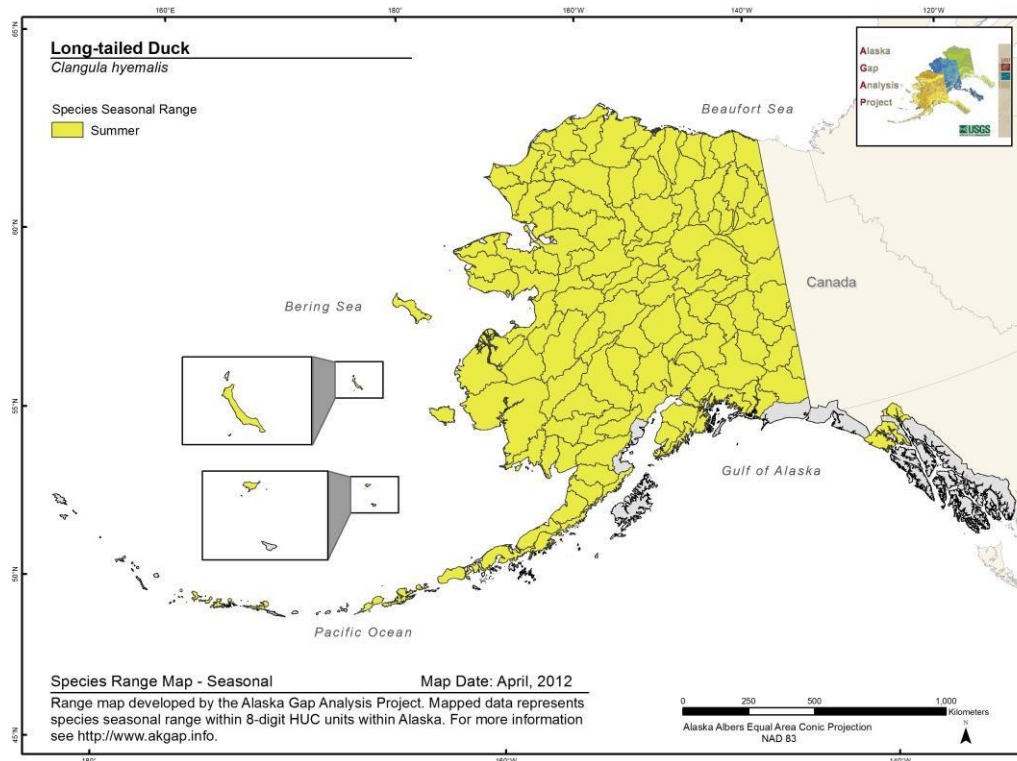
Long-tailed Duck *Clangula hyemalis*

Range Map and Distribution Model Summary

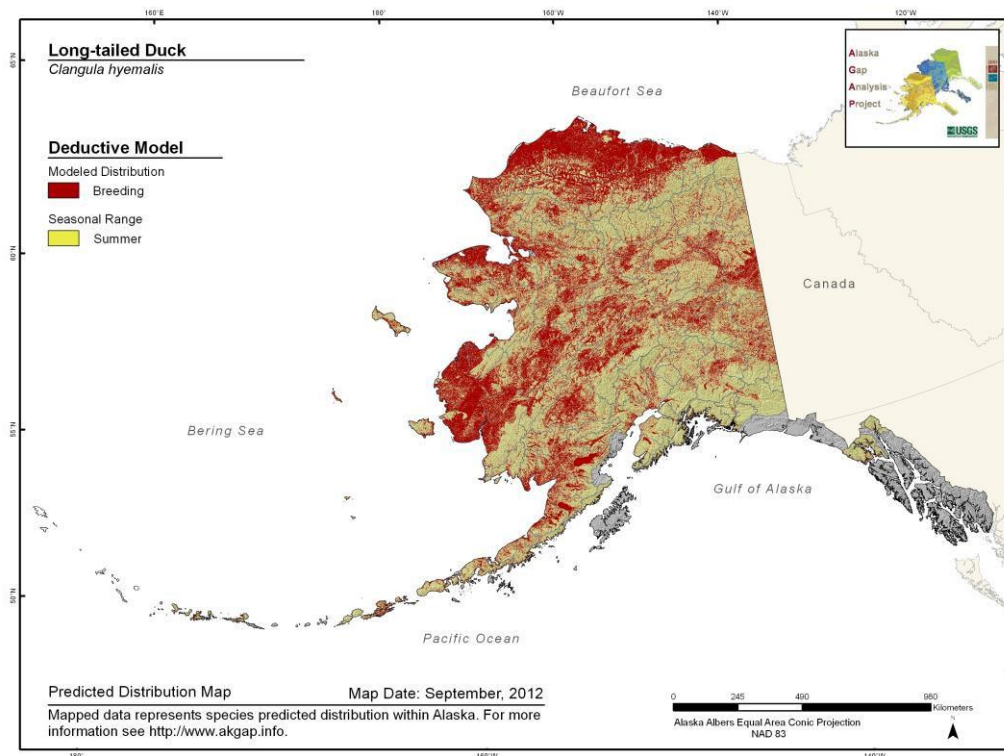
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.722**

**Model Quality
Summary:**
Moderate

Habitat Description

Subarctic and arctic wetlands, rarely to tree line; occasionally found in tundra habitats at higher latitudes. Nests near and raises broods on freshwater (including offshore islands with freshwater ponds and tundra vegetation). Often nests on islands or peninsulas in lakes. In Alaska, breeding birds use shallow sedge (*Carex*) or pendant grass (*Artophila*)-dominated ponds and braided streams (Robertson and Savard 2002). Nests are often concealed by vegetation, low-growing shrubs or spruce trees (*Picea* spp.), and broods are usually reared on ponds with emergent vegetation (Todd 1996). In the Arctic NWR, the highest density of breeding Long-tailed Ducks was found in an area characterized by a flooded pond complex with vegetation dominated by sedges and willows (*Salix* spp.; Spindler and Miller 1983).

References

Robertson, G.J. and J.L. Savard. 2002. Long-tailed Duck *Clangula hyemalis*. In *The Birds of North America*, No. 651 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

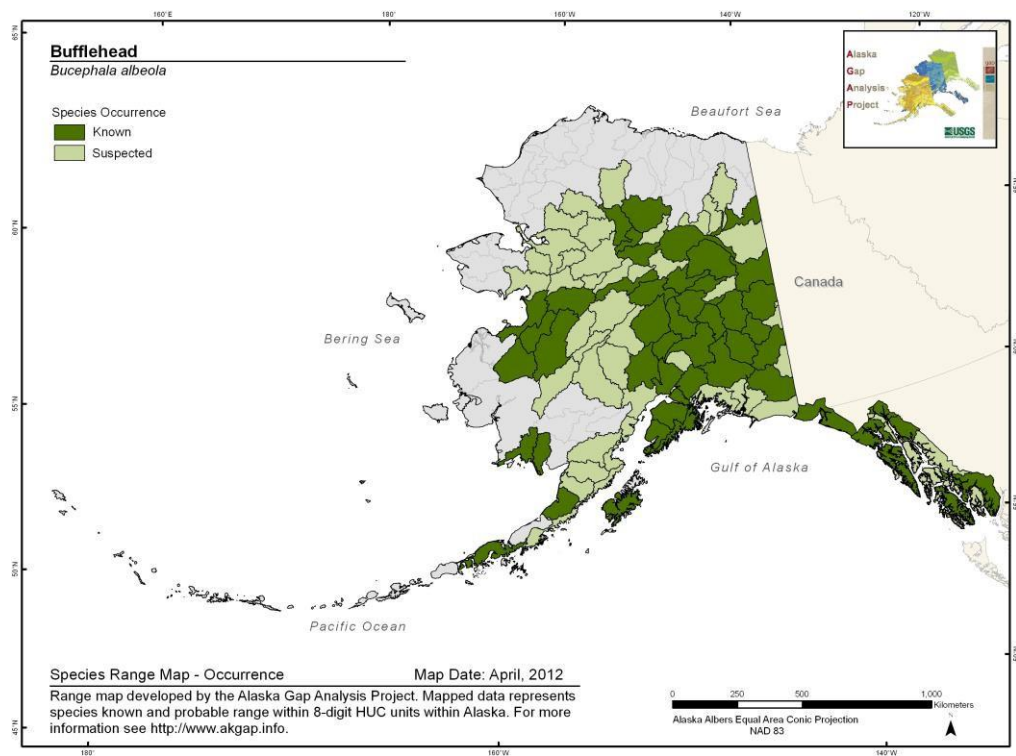
Spindler, M. A. and P. A. Miller. 1983. Terrestrial bird populations and habitat use on coastal plain tundra of the Arctic National Wildlife Refuge. ANWR Prog. Rep. No. FY83-5. Arctic NWR Coastal Plain Resource Assessment, USFWS, Fairbanks, AK. Pp 108-200 In 1982 Update report baseline study of the fish, wildlife, and their habitats. Section 1002C, ANILCA, USDI, USFWS, Reg. 7, Anchorage, AK, January 1983.

Todd, F. S. 1996. *Natural History of the Waterfowl*. San Diego Natural History Museum, San Diego, CA. Ibis Pub. Co., California. 490 pp.

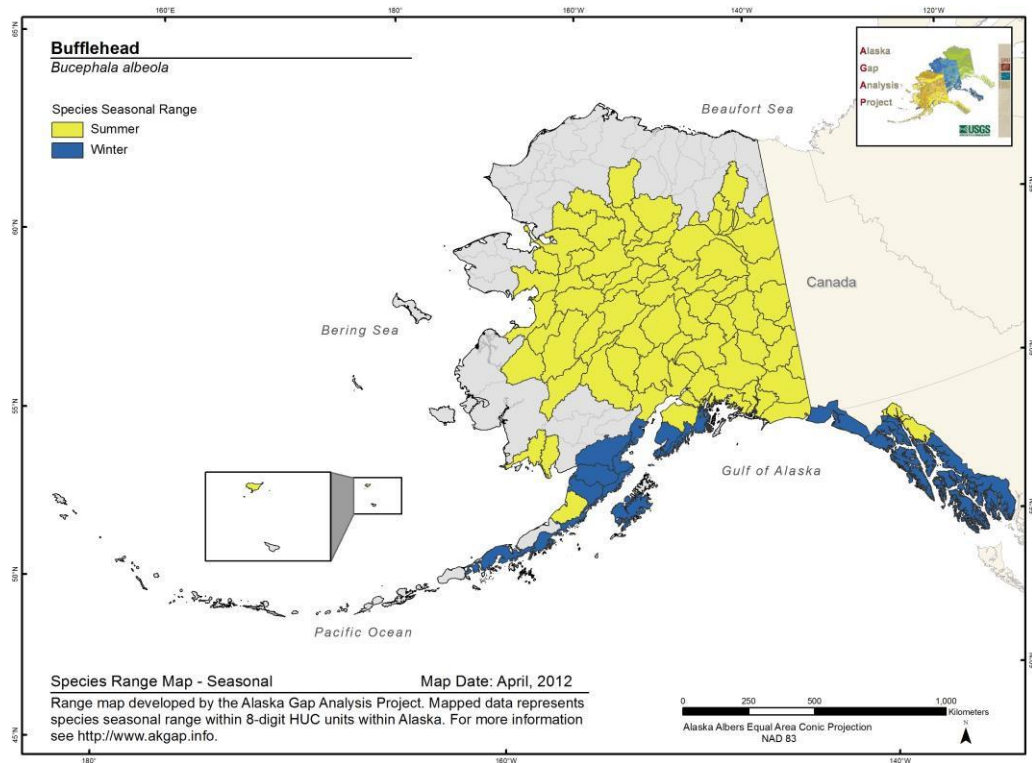
Bufflehead *Bucephala albeola*

Range Map and Distribution Model Summary

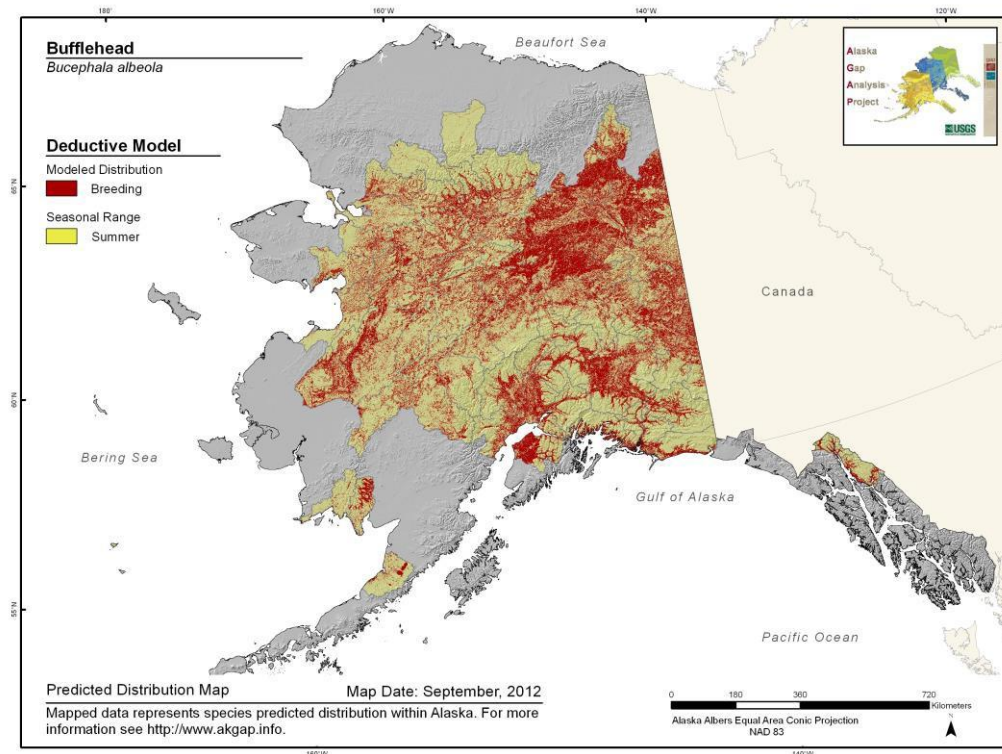
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.61**

**Model Quality
Summary:**
Low

Habitat Description

Breeds near freshwater, permanent ponds with no outlet or only seasonal outflow, and small lakes, with only a small fringe of emergent vegetation along the shoreline. Ponds with extensive emergent or submergent vegetation are avoided. Nests in cavities in conifer forest mixed with popular (Gauthier 1993). In B.C., breeds from 300 to 1,430 m in elevation (Campbell et al. 1990).

References

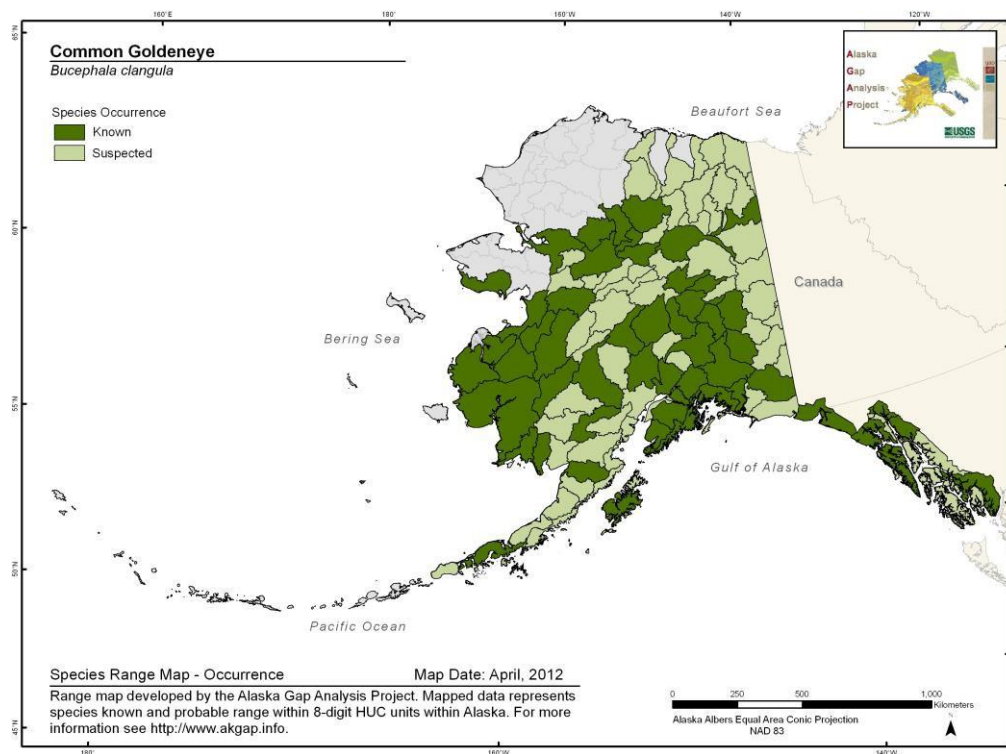
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Gauthier, G. 1993. Bufflehead (*Bucephala albeola*). In The Birds of North America. Vol. 2, No. 67 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

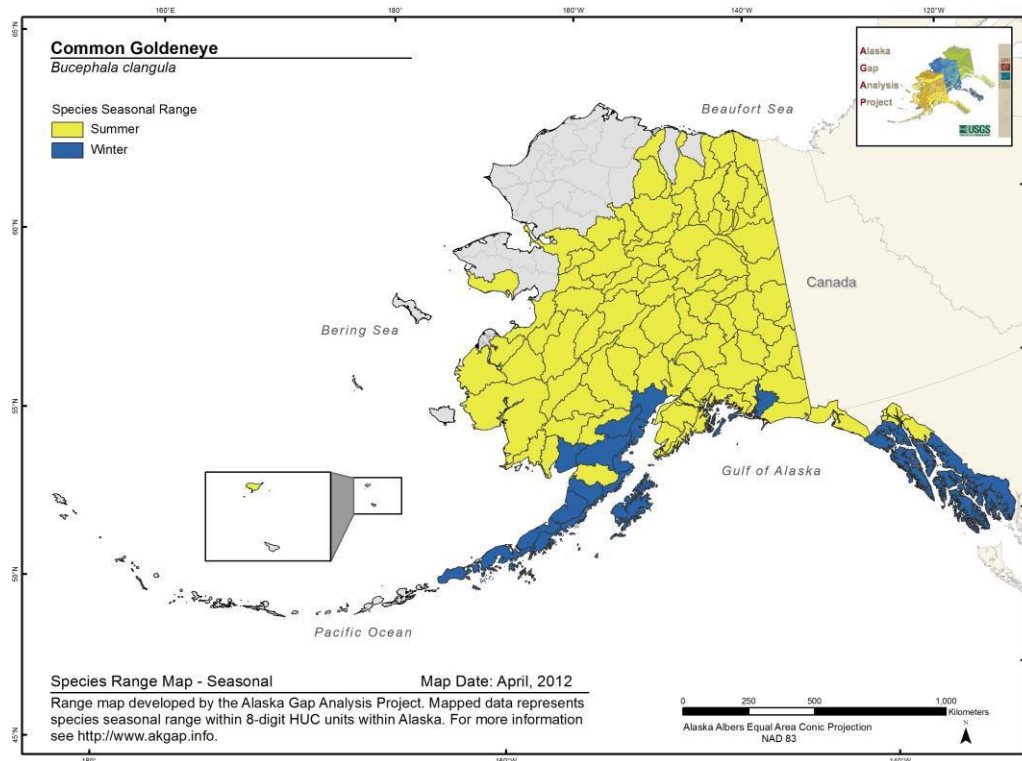
Common Goldeneye *Bucephala clangula*

Range Map and Distribution Model Summary

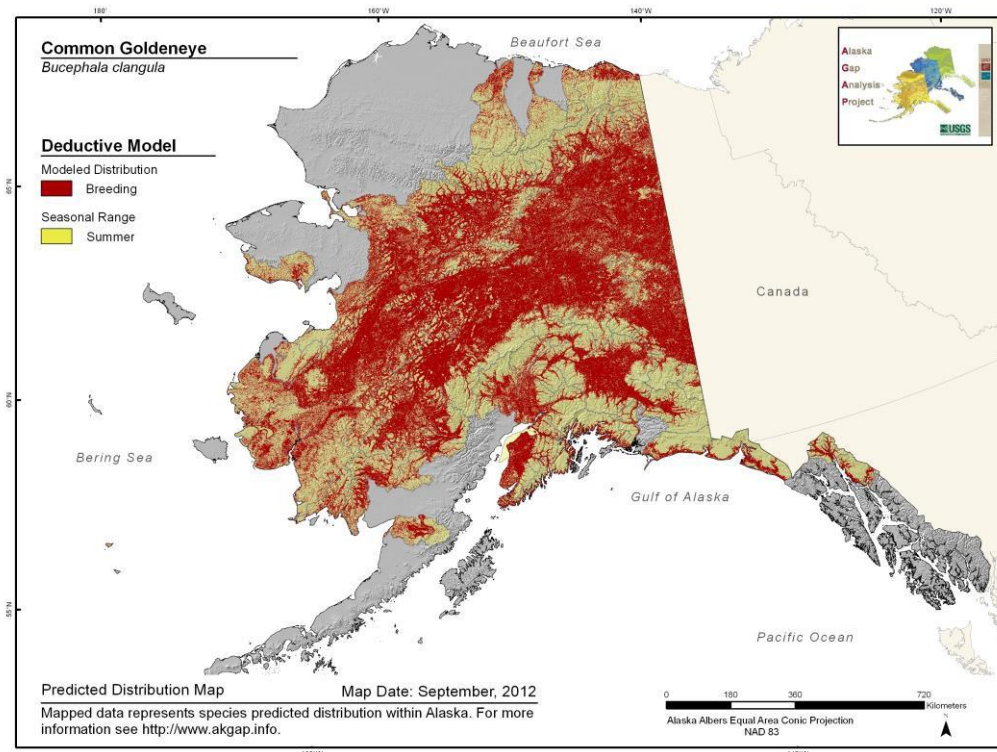
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.737**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests usually near ponds, lakes, or rivers, but may nest in woodlands up to a mile from water (NatureServe 2007b). Both coniferous and deciduous trees are used for nesting and birds typically prefer lakes with clear water that lack emergent or submerged vegetation (Nummi and Pöysä 1993, Wayland and McNicol 1994). In B.C., breeds from 180 to 1,550 m elevation (Campbell et al. 1990).

References

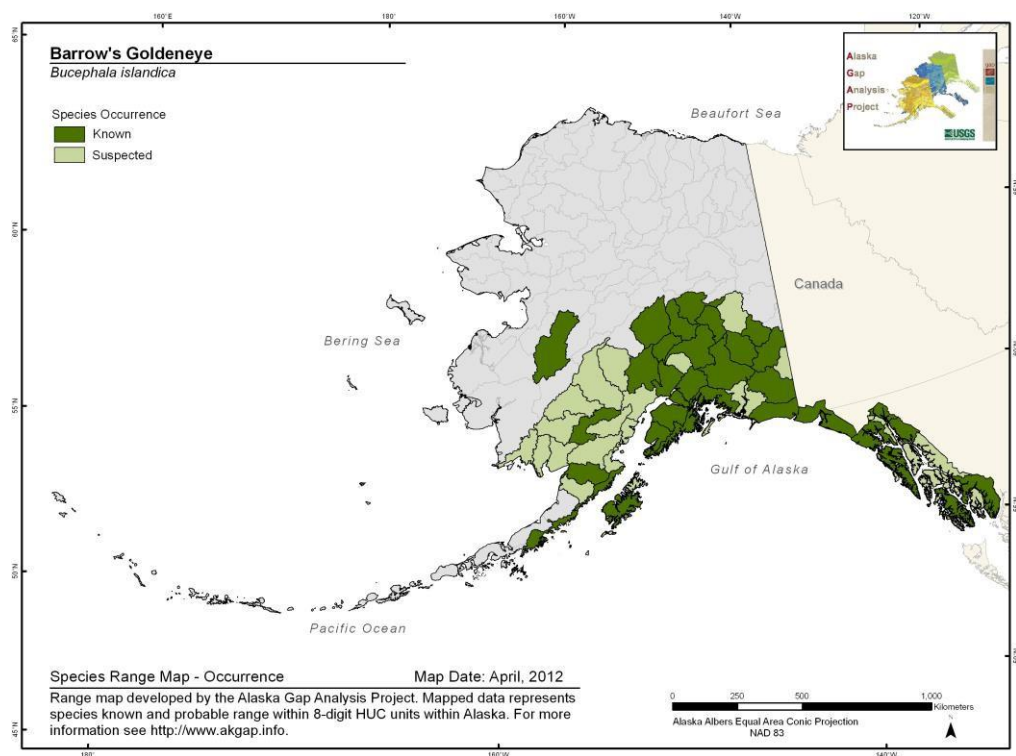
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- Nummi, P. and H. Pöysä. 1993. Habitat associations of ducks during different phases of the breeding season. *Ecography* 16: 319-328.
- Wayland, M. and D. K. McNicol. 1994. Movements and survival of Common Goldeneye broods near Sudbury, Ontario, Canada. *Can. J. Zool.* 72: 1252-1259.

Barrow's Goldeneye

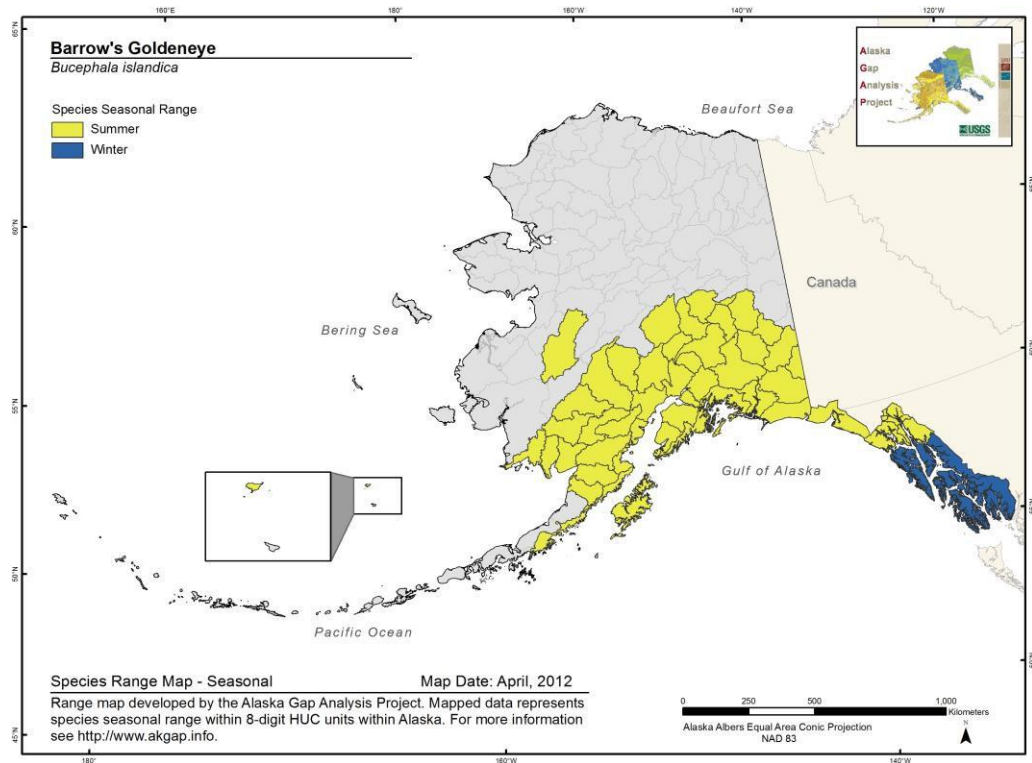
Bucephala islandica

Range Map and Distribution Model Summary

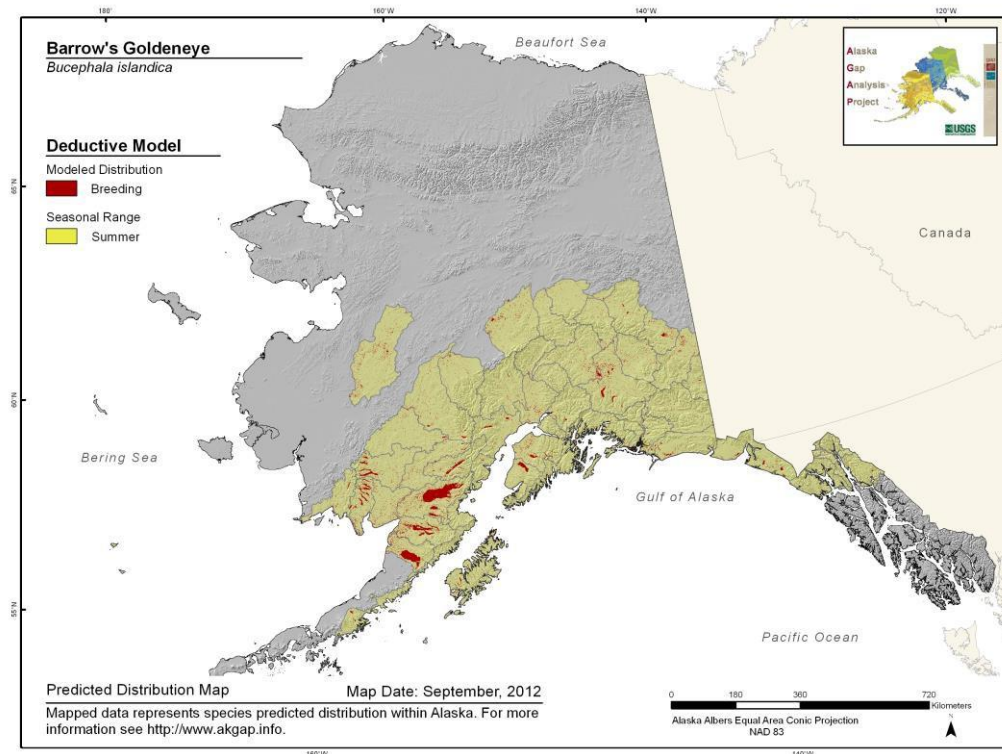
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.502**

**Model Quality
Summary:**
Low

Habitat Description

Breeds near ponds and lakes in forested areas (Alexander et al. 2003). In B.C., nests in both coniferous (spruce) and deciduous (aspen and black cottonwood) forests in tree and other natural cavities. Most nesting sites were on or near the edge of a wetland, but ranged from 3 to 440 m from water (Campbell et al. 1990).

References

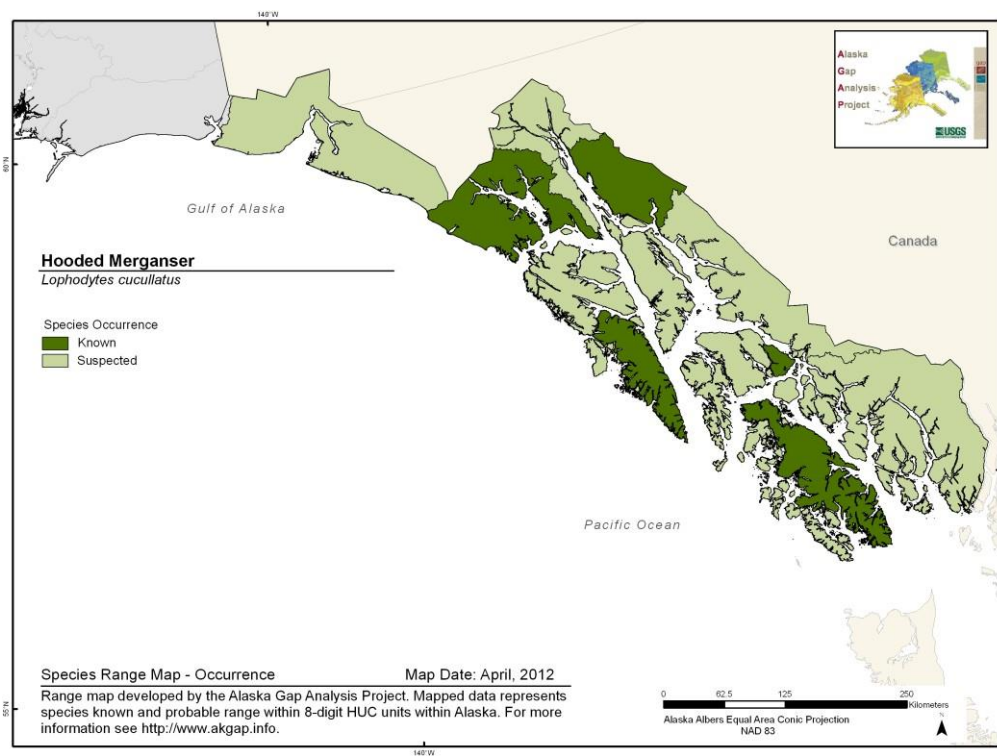
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

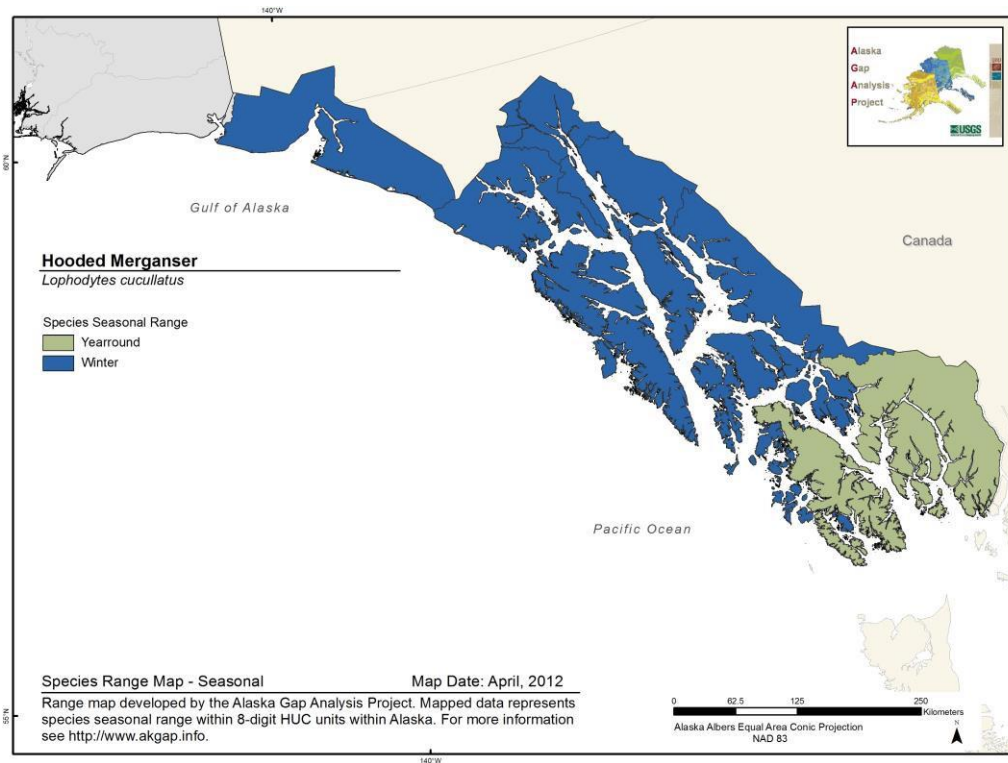
Hooded Merganser *Lophodytes cucullatus*

Range Map and Distribution Model Summary

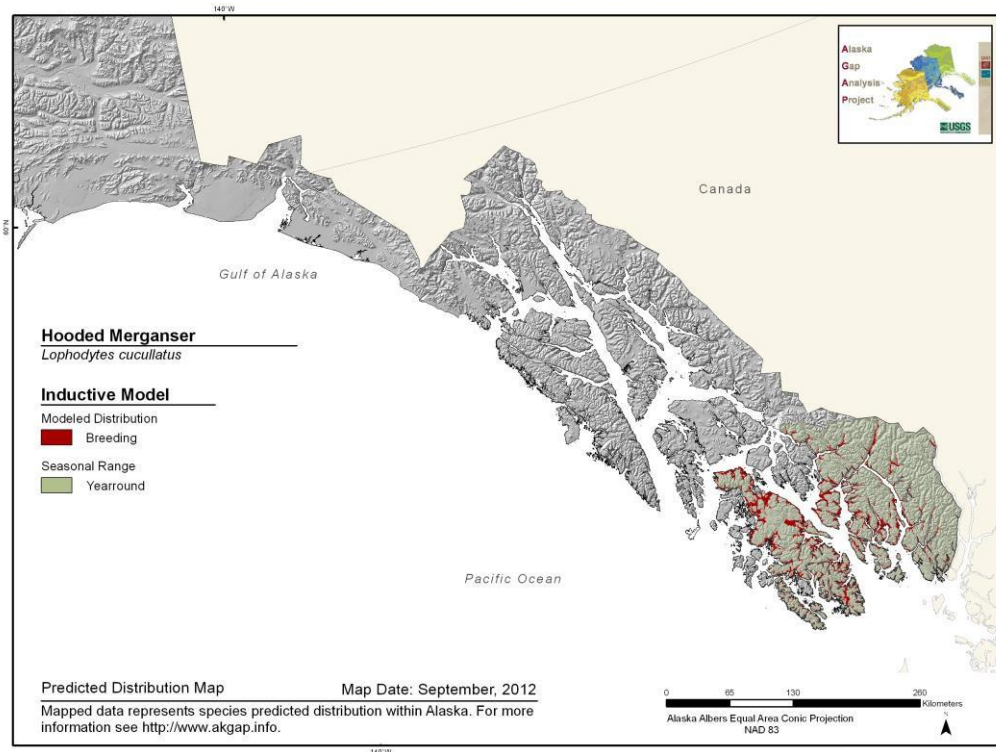
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in forested freshwater wetland systems (Dugger et al. 1994), including rivers, lakes, marshes, streams, sloughs, and beaver ponds (Campbell et al. 1990). Winters on shallow, freshwater and brackish bays, estuaries, and tidal creeks and ponds, where they often concentrate along the edges of ice (e.g., Veit and Petersen 1993, Sibley 1993).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Dugger, B. D., and K. M. Dugger, and L. H. Fredrickson. 1994. Hooded Merganser (*Lophodytes cucullatus*). In The Birds of North America. Vol. 3, No. 98 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

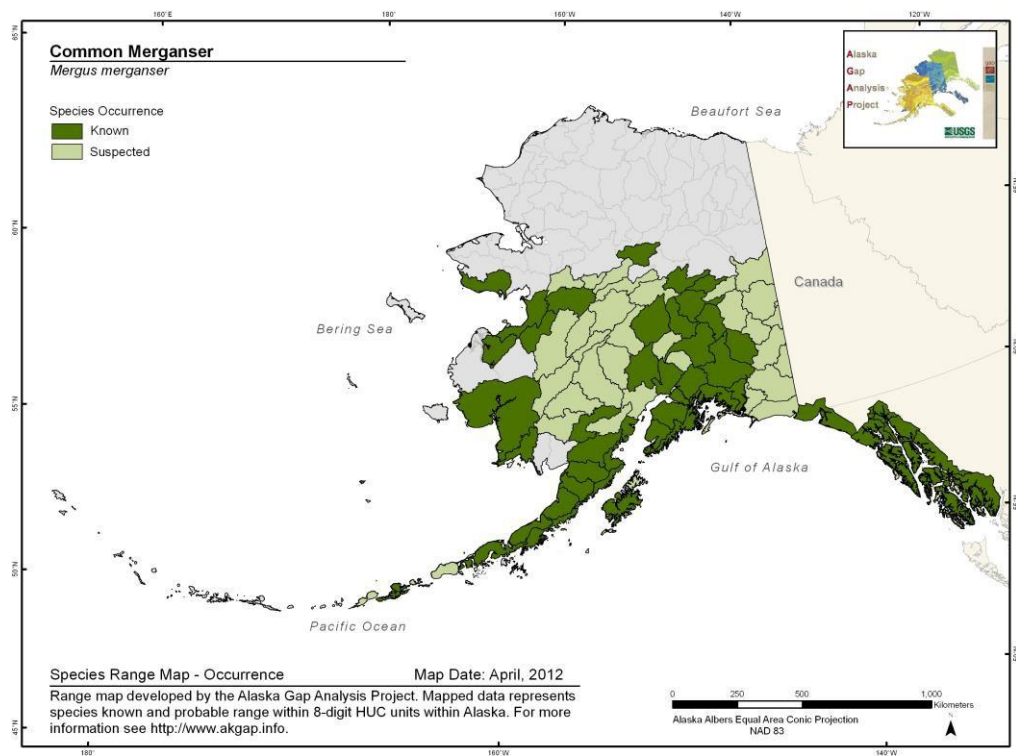
Sibley, D. 1993. The birds of Cape May. New Jersey Audubon Society, Cape May Point, NJ.

Veit, R. R. and W. R. Petersen. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln.

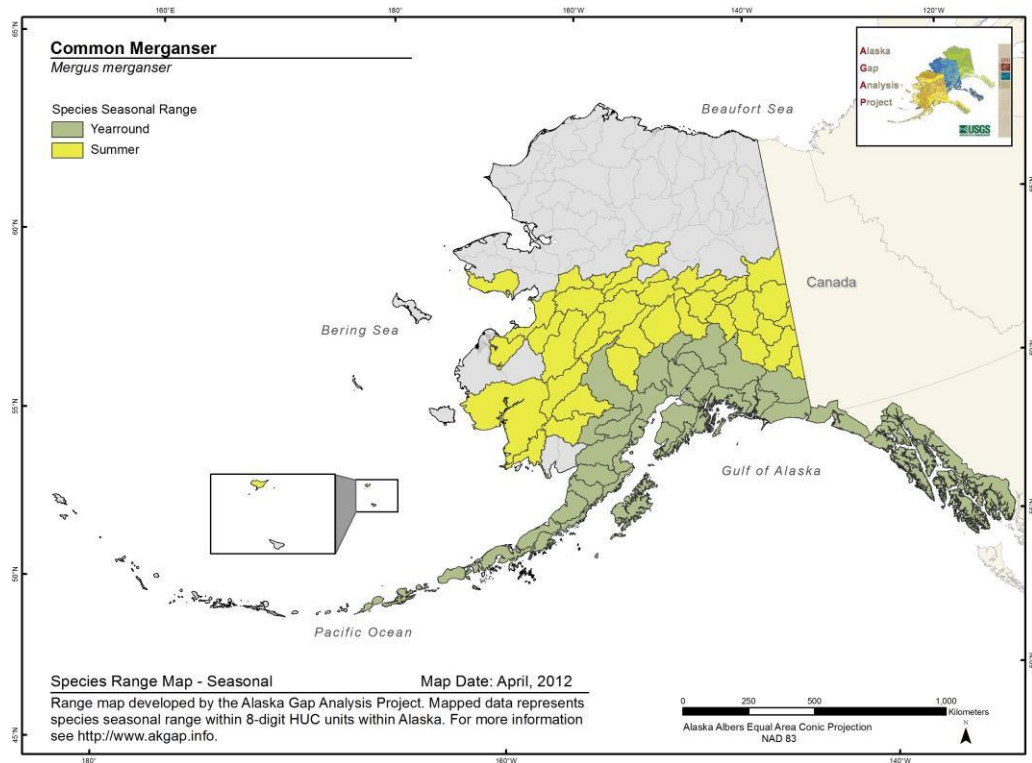
Common Merganser *Mergus merganser*

Range Map and Distribution Model Summary

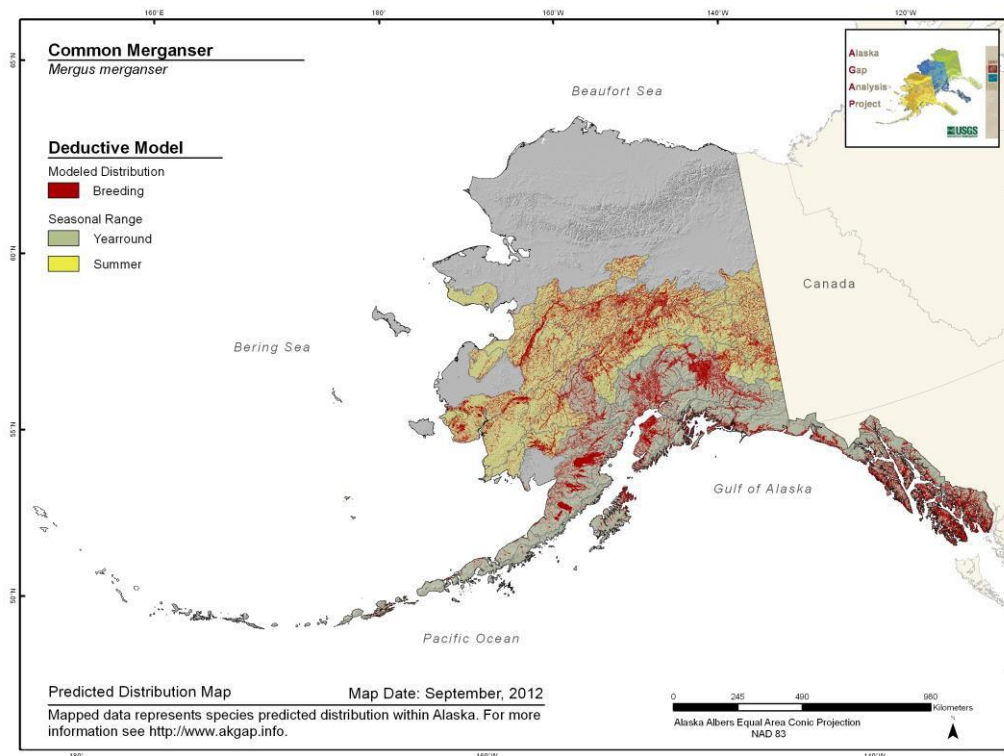
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.632**

**Model Quality
Summary:**
Low

Habitat Description

Lakes and rivers bordered by forests mature (conifer or mixed) enough to provide nesting cavities (Mallory and Metz 1999) and in mountainous terrain (AOU 1983, Terres 1980). Northern limit of breeding range follow limit of open boreal forest (Palmer 1976, Haapanen and Nilsson 1979, Bellrose 1980). Females move broods downstream to larger rivers, lakes, or bays (White 1957, Erskine 1972, Wood 1985, McNicol et al. 1995). In B.C., breeds on marine shores at sea level to mountainous regions up to 1,000 m in elevation (Campbell et al. 1990).

References

- AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.
- Bellrose, F. C. 1980. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, PA.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- Erskine, A. J. 1972. Buffleheads. Can. Wildl. Serv. Monogr. Ser. No. 4.
- Haapanen, A. and L. Nilsson. 1979. Breeding waterfowl populations in northern Fennoscandia. Ornis. Scand. 10: 145-219.
- Mallory, M. and K. Metz. 1999. Common Merganser (*Mergus merganser*). In The Birds of North America. Vol. 12, No. 442 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

McNicol, D. K., R. K. Ross, M. L. Mallory, and L. A. Brisebois. 1995. Trends in waterfowl populations: evidence of recovery from acidification. Ch. 16. Pp. 203-217 In: Environmental restoration and recovery of an industrial region (J. M. Gunn, ed.). Springer-Verlag, New York.

Palmer, R. S., editor. 1976. Handbook of North American birds. Vol. 2. Waterfowl (first part). Whistling ducks, swans, geese, sheld-ducks, dabbling ducks. Yale Univ. Press, New Haven. 521 pp.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

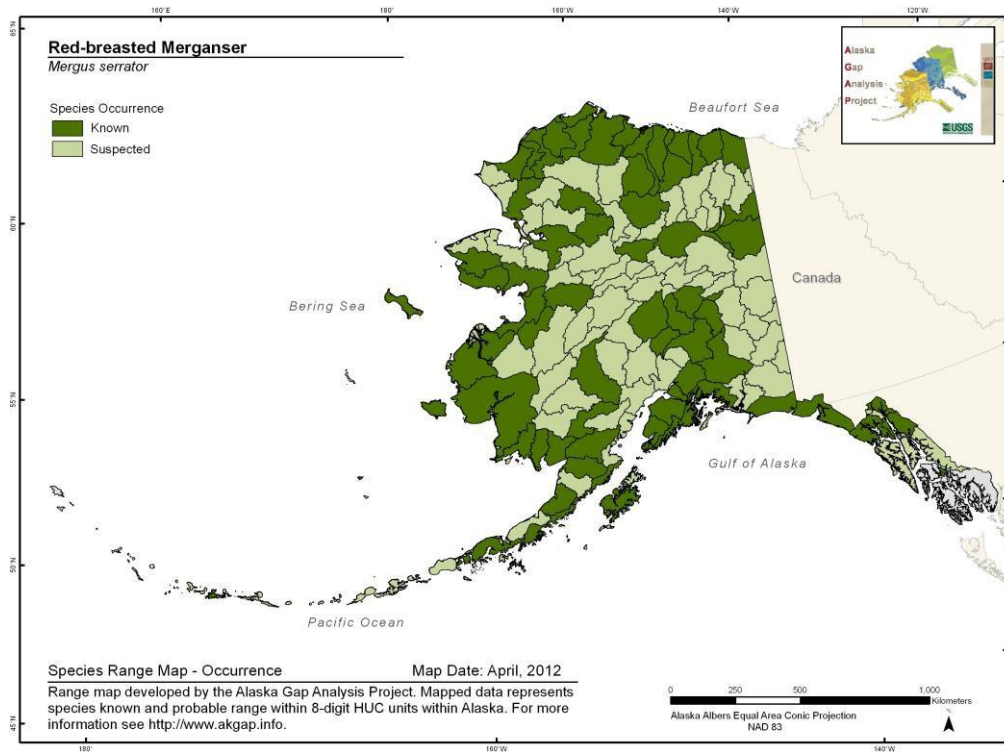
White, H. C. 1957. Food and natural history of mergansers on salmon waters in the maritime provinces of Canada. Fish Res. Board Canada Bull. No. 116.

Wood, C. C. 1985. Aggregative response of Common Mergansers (*Mergus merganser*): predicting flock size and abundance on Vancouver Island salmon streams. Can J. Fish. Aquat. Sci. 42: 1259-1271.

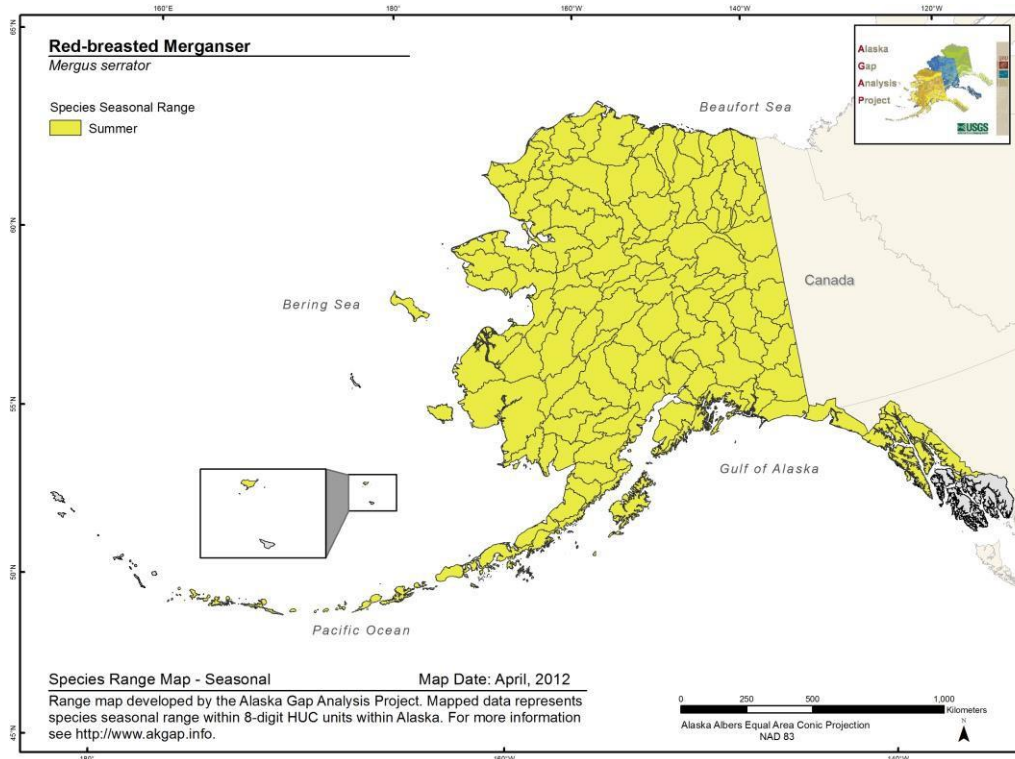
Red-breasted Merganser *Mergus serrator*

Range Map and Distribution Model Summary

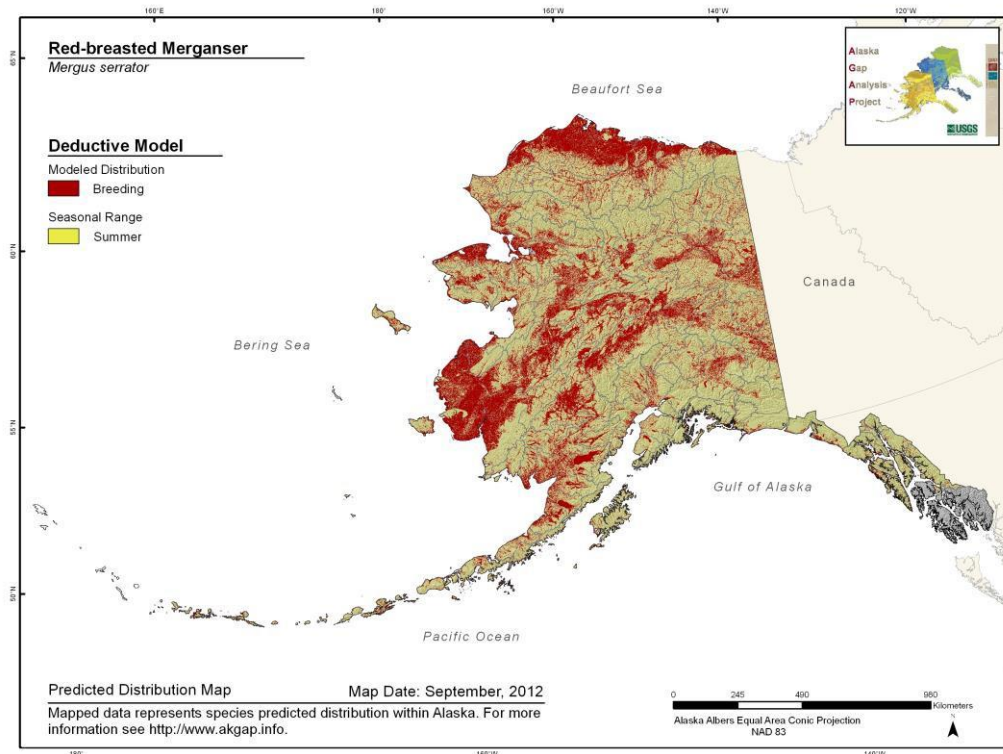
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Tundra and boreal forest zones on fresh, brackish, and saltwater wetlands with sheltered bays, typically not far from sea coast (Titman 1999). Nests along inland waters, generally on ground on small islands with low vegetative cover, and also near seacoast and occasionally on shores of ocean or on coastal islands (NatureServe 2007b). In B.C., breeding sites were heavily vegetated with shrubs and trees and ranged from sea level to 770 m in elevation (Campbell et al. 1990). Nests on islets in B.C. were situated among dune wild rye, Nootka rose, coastal strawberry, Nootka lupine, or salal (M. S. Rodway pers. Comm. In Campbell et al. 1990).

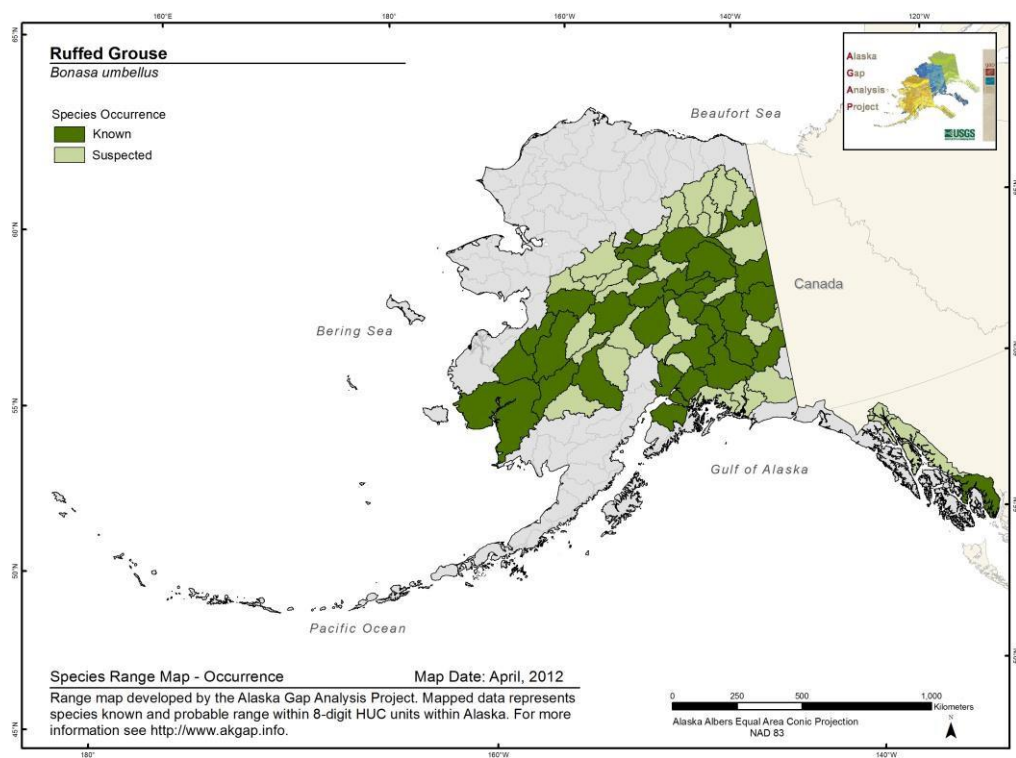
References

- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- Titman, R. D. 1999. Red-breasted Merganser (*Mergus serrator*). In The Birds of North America, Vol. 12, No. 443 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

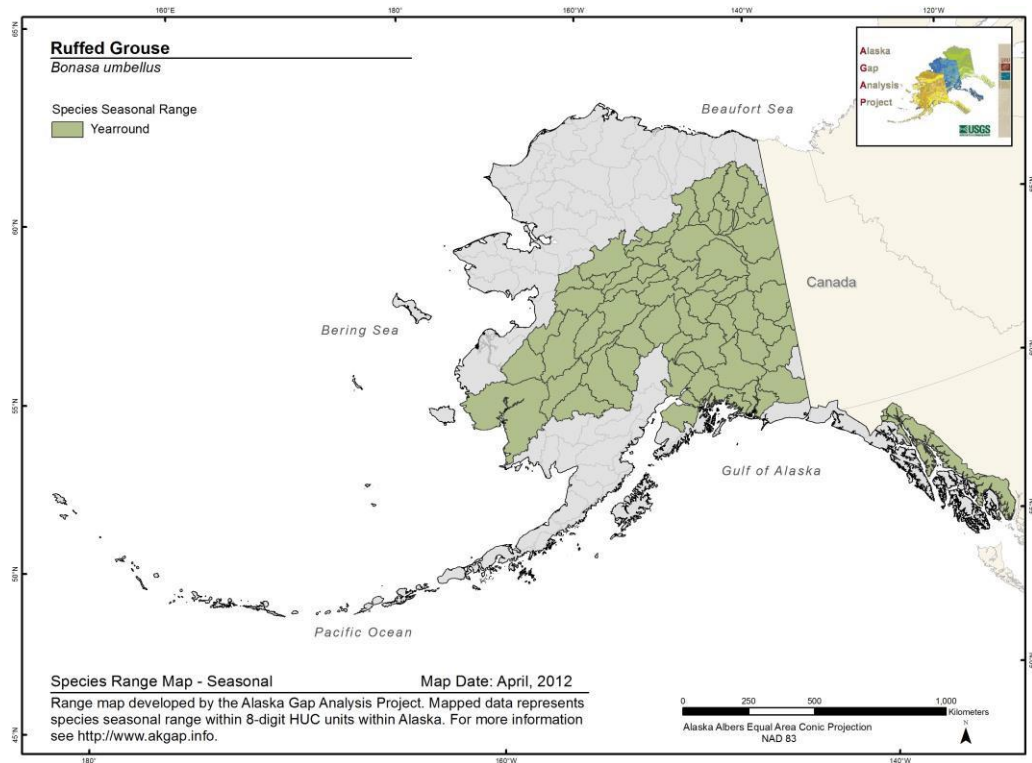
Ruffed Grouse *Bonasa umbellus*

Range Map and Distribution Model Summary

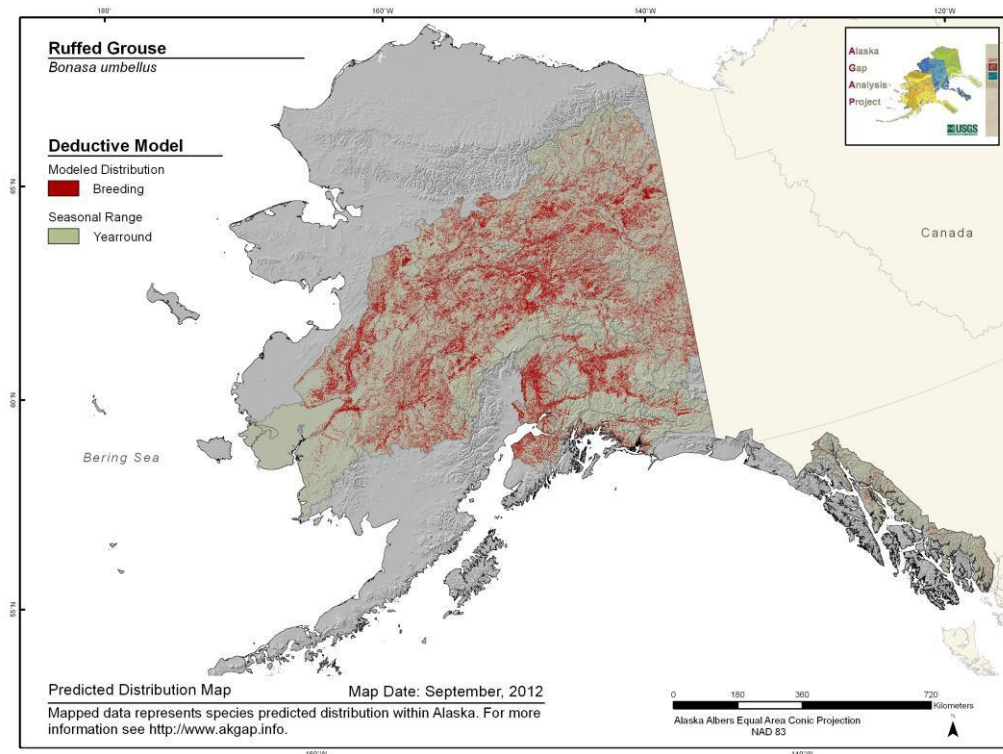
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.557**

**Model Quality
Summary:**
Low

Habitat Description

This species inhabits woodland habitats, preferring second-growth deciduous and mixed deciduous-coniferous forests, usually with moderate slopes and water nearby. Prospers in brushy areas along streams, in alder thickets, shrubby forest edges, brushy areas of logged and burned areas, trembling aspen corpses, and occasionally in dense woodlands. Conifer forests are frequented more often in the winter, more open mixed woodlands in the spring, and open brushy areas in late summer and early autumn. In B.C., ruffed grouse are found from sea level to 2,225m, but prefer lower elevations, especially river bottoms (Campbell et al. 1990).

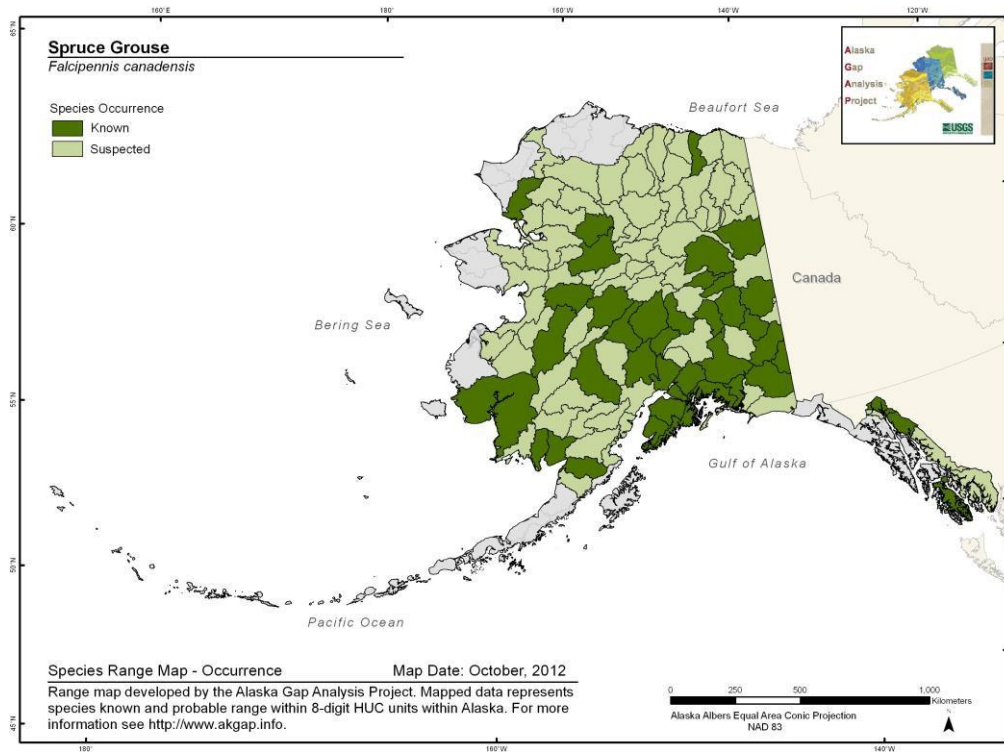
References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

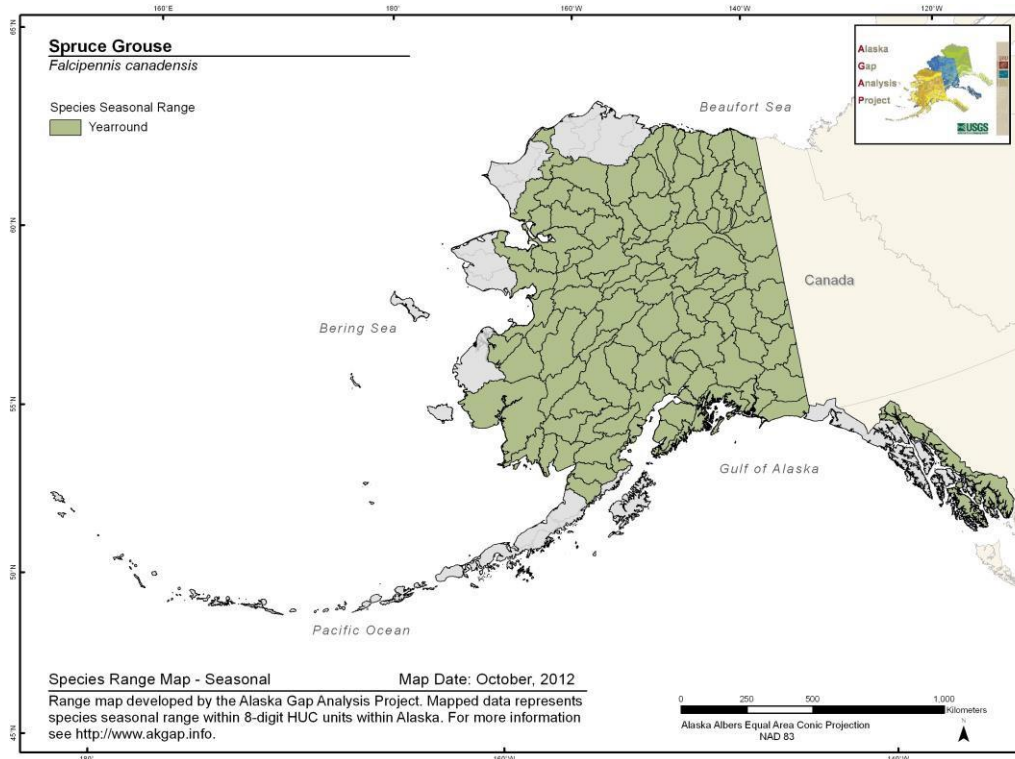
Spruce Grouse *Falcipennis canadensis*

Range Map and Distribution Model Summary

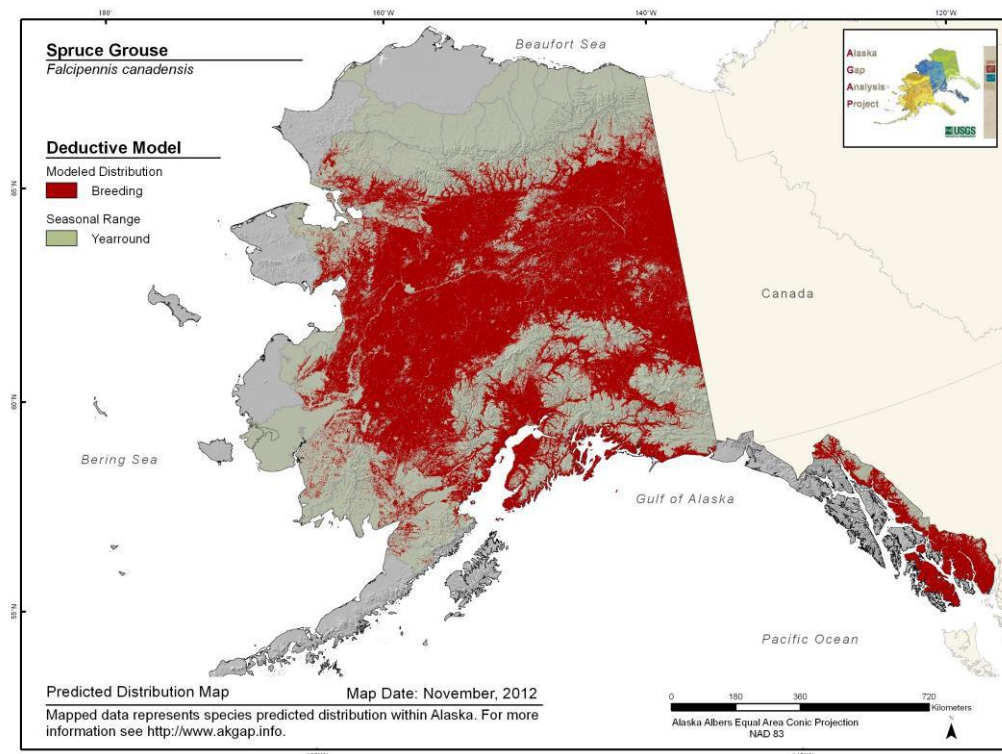
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.532**

**Model Quality
Summary:**
Low

Habitat Description

Sitka spruce and hemlock forests (ADF&G 2005b). Prefer young successional stands, such as those created postfire, characterized by dense stands with a well developed middle story (Boag and Schroeder 1987, Schroeder and Boag 1991). A study in B. C., found that spruce grouse used areas on knolls with greater canopy cover and more short trees. Use increased with proximity to wetlands until 20m from the wetlands. Occurrences declined in proportion to percent timber removed and more pronounced declines in use were observed for uniform timber cuts. The study recommended retention of areas with a buffer of at least 10 m from harvested and natural edges (Huggard 2003). In B.C, found from 300 to 2,500 m in elevation (Campbell et al. 1990) and in the Yukon, preferred habitat is spruce forests (Alexander et al. 2003)

References

ADF&G. 2005b. The Grouse and Ptarmigan of Alaska: A guide to their identification, habits and habitat.

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Boag, D. A. and M. A. Schroeder. 1987. Population fluctuations in Spruce Grouse: what determines their number in spring? Canadian Journal of Zoology 62: 1034-1037.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Huggard, D. J. 2003. Use of habitat features, edges and harvest treatments by spruce grouse in subalpine forest. Forest Ecol. and Manage. 175 (2003) 531-544.

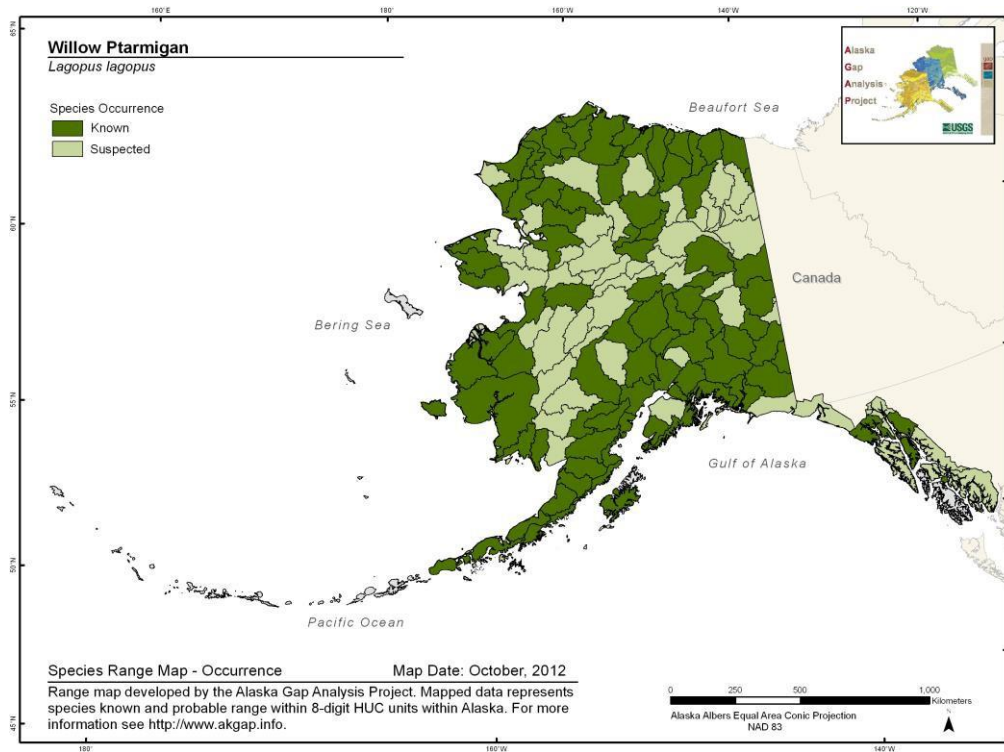
Schroeder, M. A. and D. A. Boag. 1991. Spruce Grouse population in successional lodgepole pine. *Ornis Scandinavica* 22:186-191.

Willow Ptarmigan

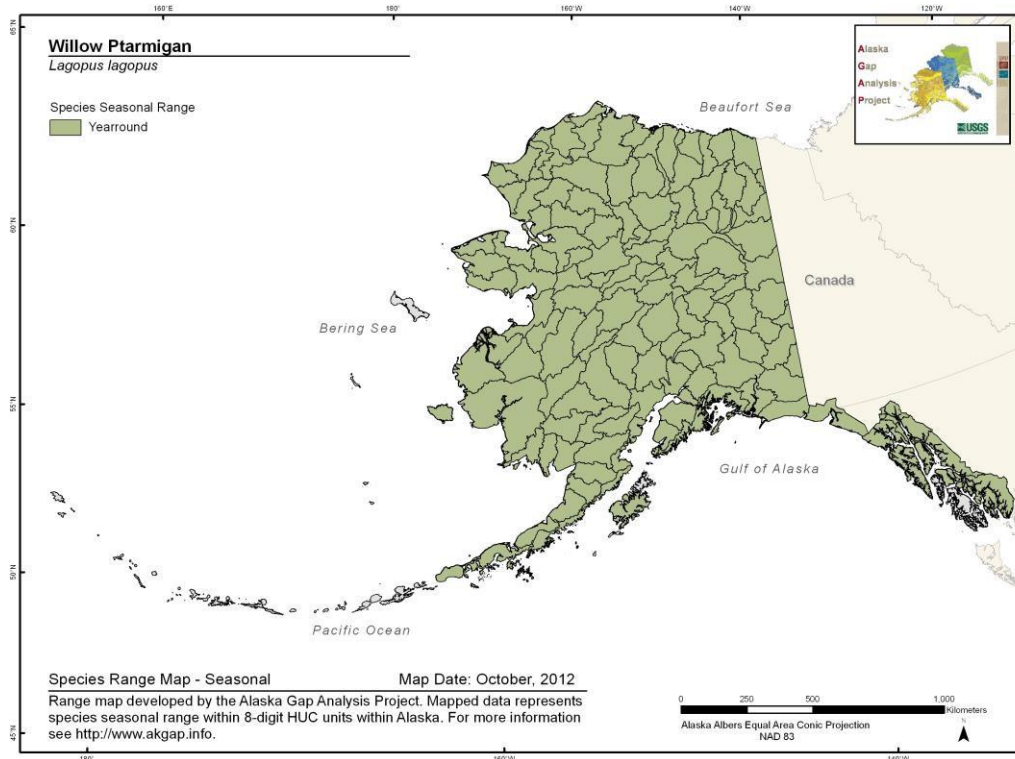
Lagopus lagopus

Range Map and Distribution Model Summary

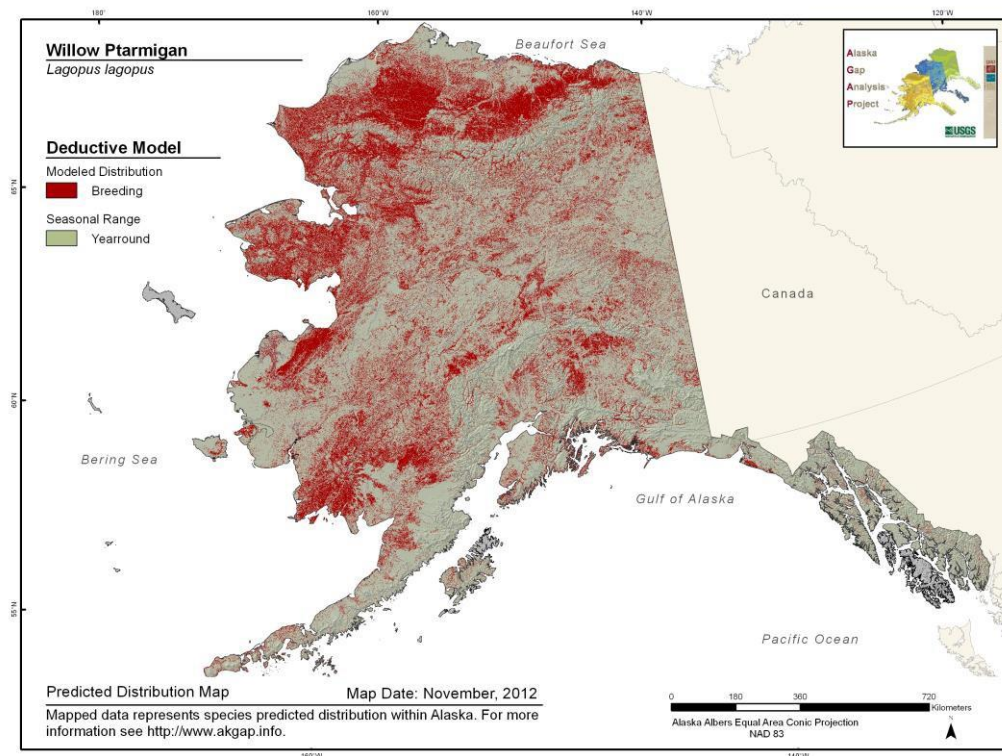
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.524**

**Model Quality
Summary:**
Low

Habitat Description

Primarily inhabits subarctic and subalpine zones, particularly shrubby habitats in relatively low, moist areas. Common in areas with patches of dense vegetation, especially where willow or birch shrubs are abundant (shrub height of 0.3 to 2.0 m; Weeden 1965, Moss 1972a, Martin and Hannon 1987). Also found in sedge-willow marshes, in meadows, along road and forest edges, and on open tundra (Campbell et al. 1990). In winter, typically moves to areas with greater vegetation cover, such as muskegs, river and lake margins, and forest openings (Bent 1932, Godfrey 1986, Campbell et al. 1990).

References

Bent, A.C. 1932. Life histories of North American gallinaceous birds, Orders Galliformes and Columbiformes. U.S. Natl. Mus. Bull. 162.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Martin, K. and S. J. Hannon. 1987. Natal philopatry and recruitment of Willow Ptarmigan in north central and northwestern Canada. *Oecologia* 71: 518-524.

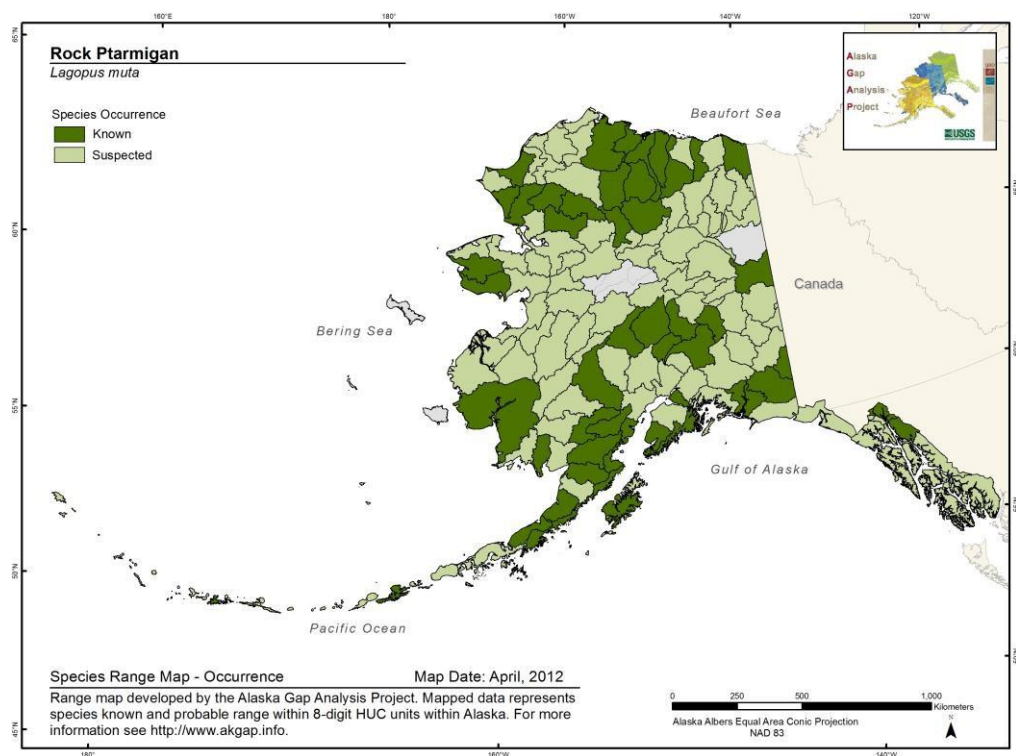
Moss, R. 1972. Social organization of Willow Ptarmigan on their breeding grounds in interior Alaska. *Condor* 74: 144-151.

Weeden, R.B. 1965. Further notes on Wandering Tattlers in central Alaska. *Condor* 67:87-89.

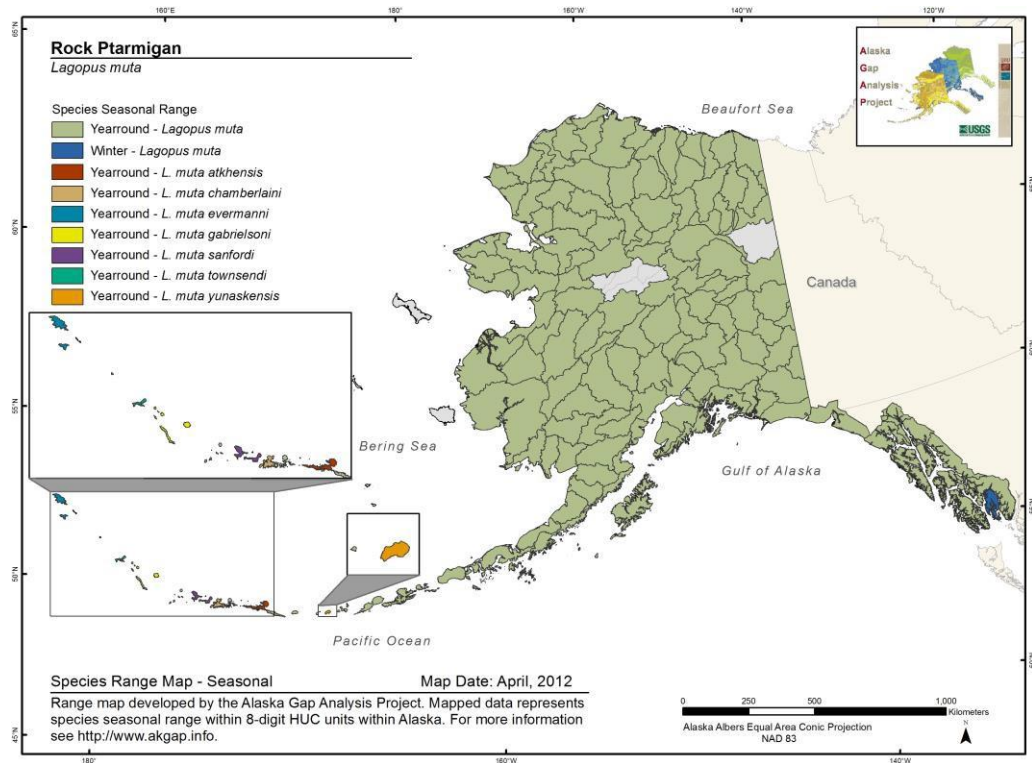
Rock Ptarmigan *Lagopus muta*

Range Map and Distribution Model Summary

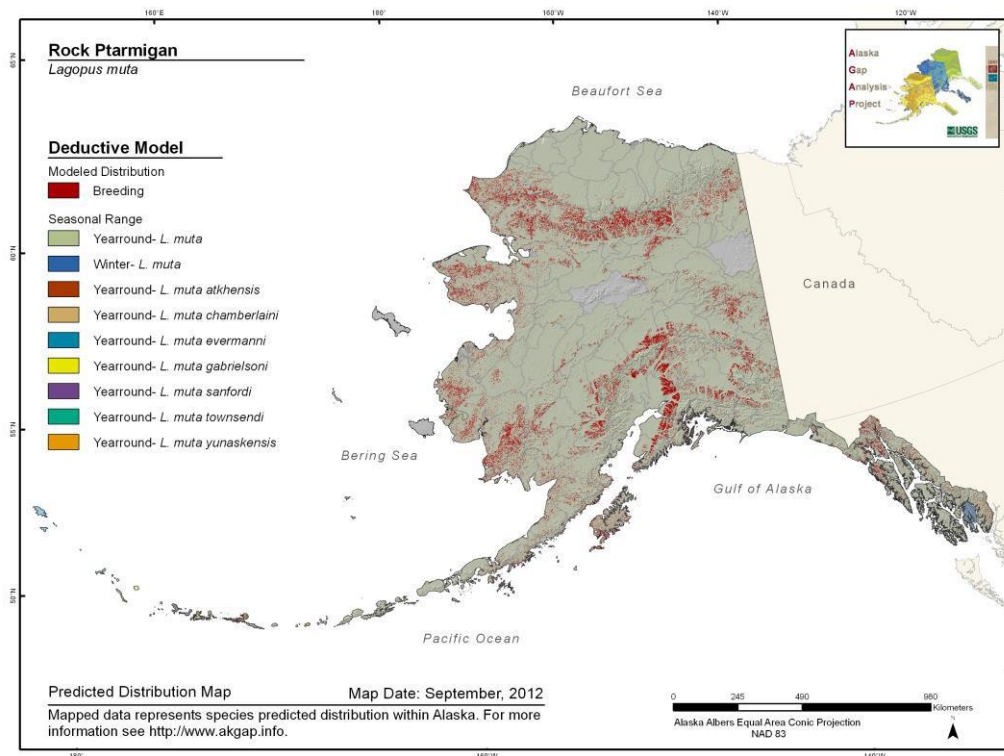
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.566**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in well-drained, hummocky arctic and alpine tundra with rocky ridges or outcrops and mixed vegetation (Dryas-lichen ridges, solifluction zones, sedge meadows, Salix or Betula communities, muskeg), vegetation sparse in most arid regions and highest slopes; denser and shrubbier vegetation at lower latitudes/elevations. Nests in dry, rocky areas (Holder and Montgomerie 1993). Winter in breeding habitat on in shrubby areas at or above treeline, in boreal forest on margins of lakes and rivers near treeline, and large shrubby openings near timberline (Weeden 1964). In B.C., this species is found up to 2,450 m in elevation (Campbell et al. 1990).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Holder, K. and R. Montgomerie. 1993. Rock Ptarmigan (*Lagopus mutus*). In The Birds of North America, Vol. 2, No. 51 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

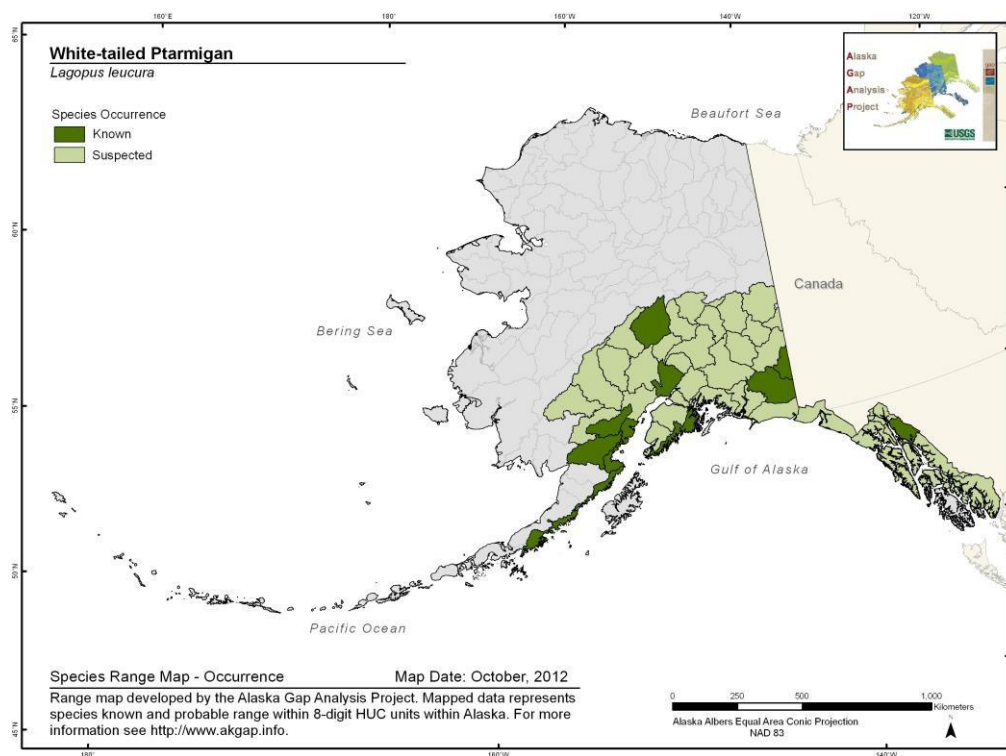
Weeden, R. B. 1964. Spatial separation of sexes in rock and willow ptarmigan in winter. Auk 81: 534-541.

White-tailed Ptarmigan

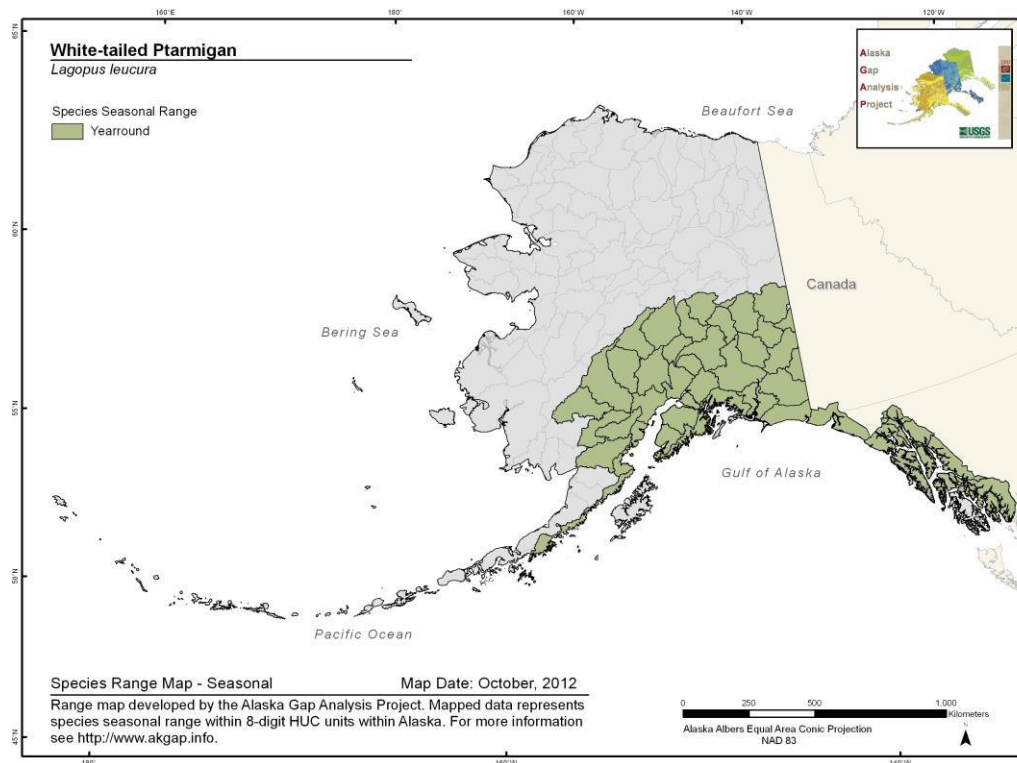
Lagopus leucura

Range Map and Distribution Model Summary

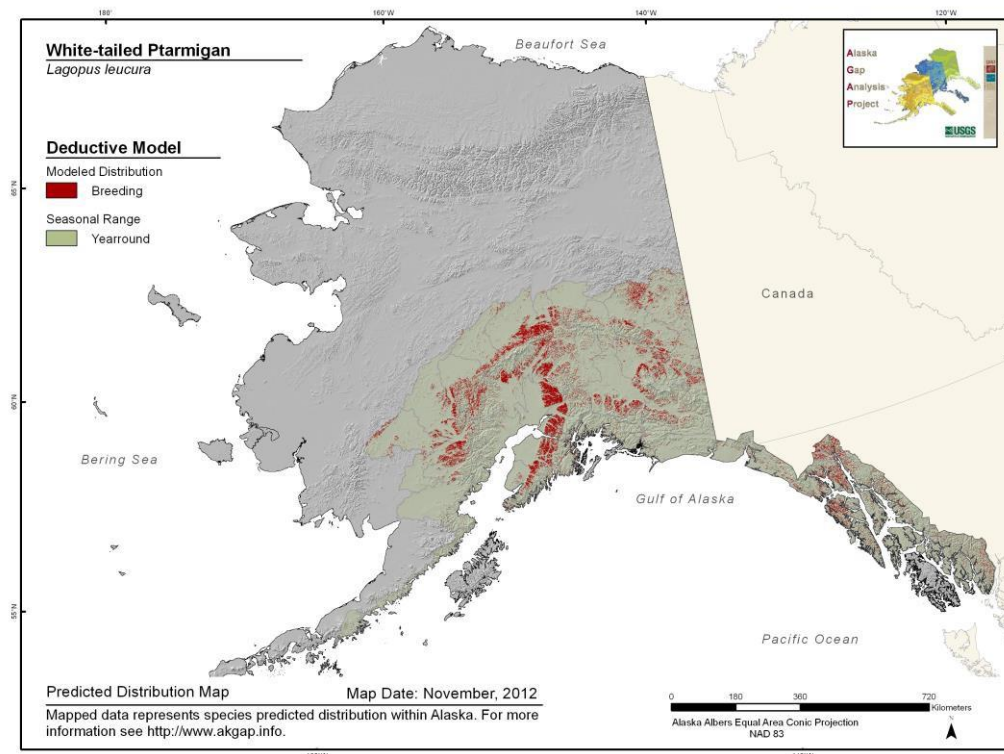
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds at elevations of 1,219-1,542 m in Alaska (Weeden 1959). This species inhabits subalpine and alpine habitats including rocky unvegetated areas, rockslides, alpine meadows, krummholtz, logged and burned subalpine forests, screes, and lake and stream shores (Campbell et al. 1990). Will winter in willow dominated basins where snow accumulates and in areas with willow-sedge marsh, hairgrass meadows, sedge-grass wet meadows, and krummholtz (Braun et al. 1976).

References

Braun, C. E., R. W. Hoffman, and G. E. Rogers. 1976. Wintering areas and winter ecology of White-tailed Ptarmigan in Colorado. Colo. Div. Wildl. Spec. Rep. No. 38.

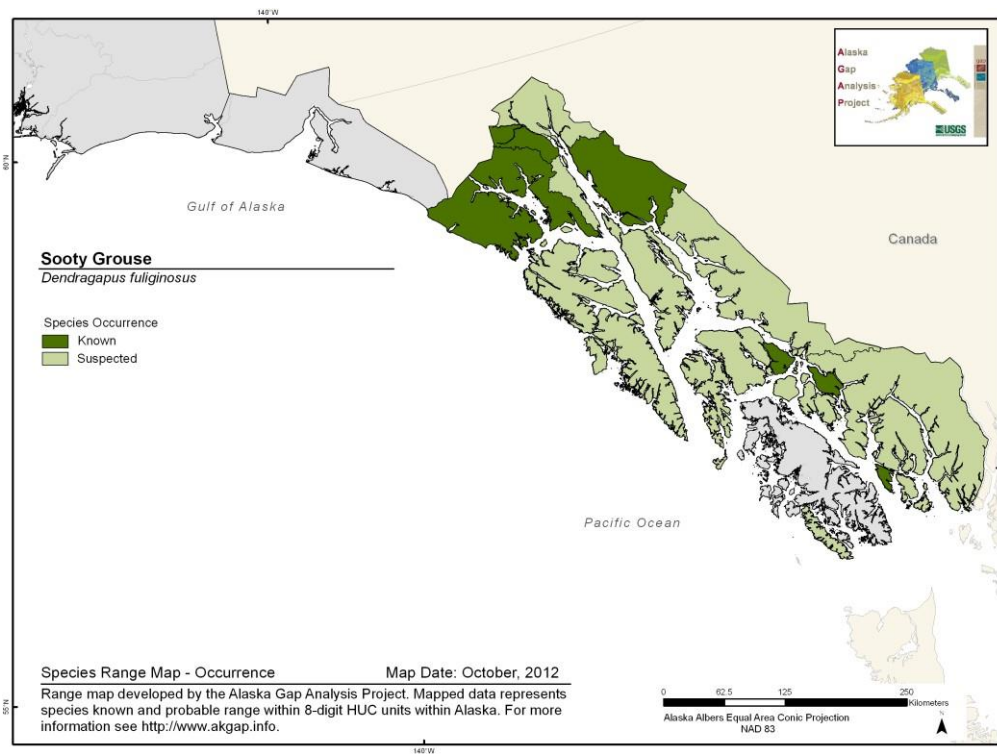
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Weeden, R. B. 1959. The ecology and distribution of ptarmigan in western North America. Ph.D. thesis, Univ. British Columbia, Vancouver.

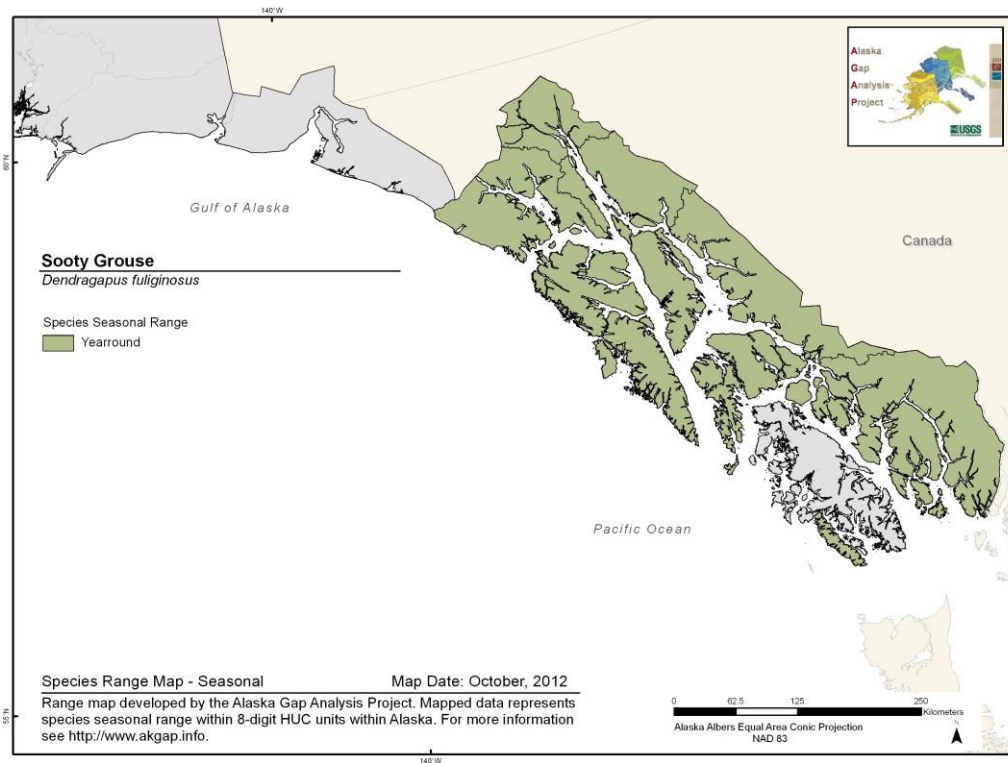
Sooty Grouse *Dendragapus fuliginosus*

Range Map and Distribution Model Summary

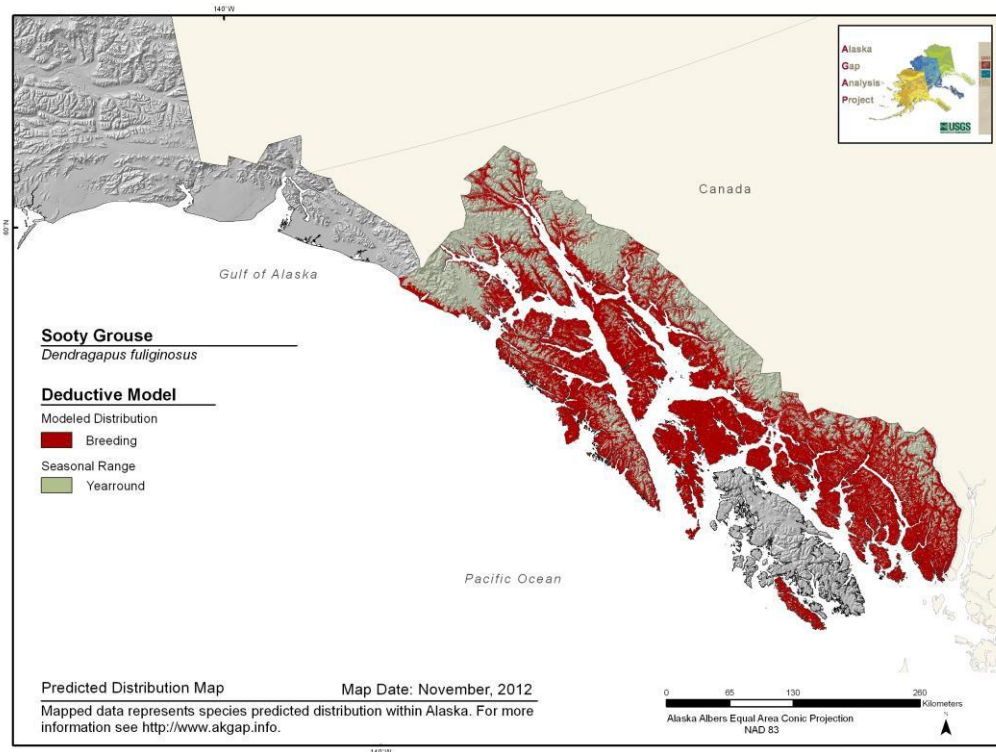
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.963**

**Model Quality
Summary:**
High

Habitat Description

Coastal birds inhabit old-growth or recently logged forests year round. Inland birds occur on forest edges in the summer and coniferous forests in the winter (Kaufman 1996). In Alaska, found in coniferous and mixed forests and dwarf conifer forests at treeline (Andres 1999b). Breeding habitat includes herb, grass, shrub layer (Zwicker and Bendell 1985).

References

Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

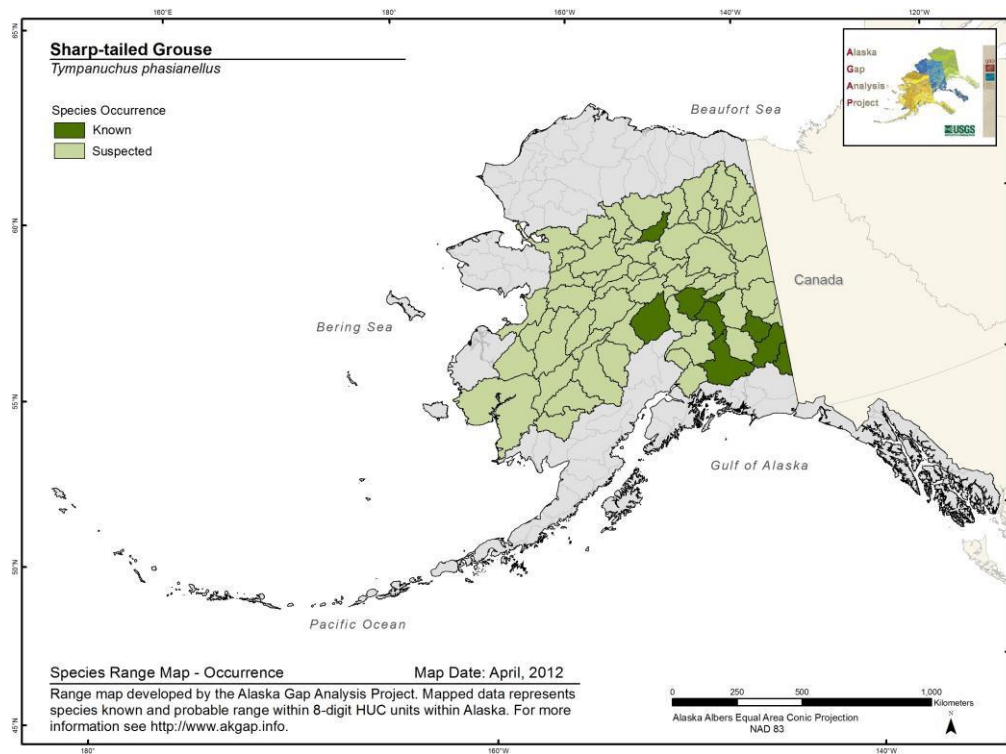
Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin, New York. 675 pp.

Zwicker, F. C. and J. F. Bendell. 1985. Blue Grouse - effects on, and influences of, a changing forest. Forestry Chron. 6: 185-188.

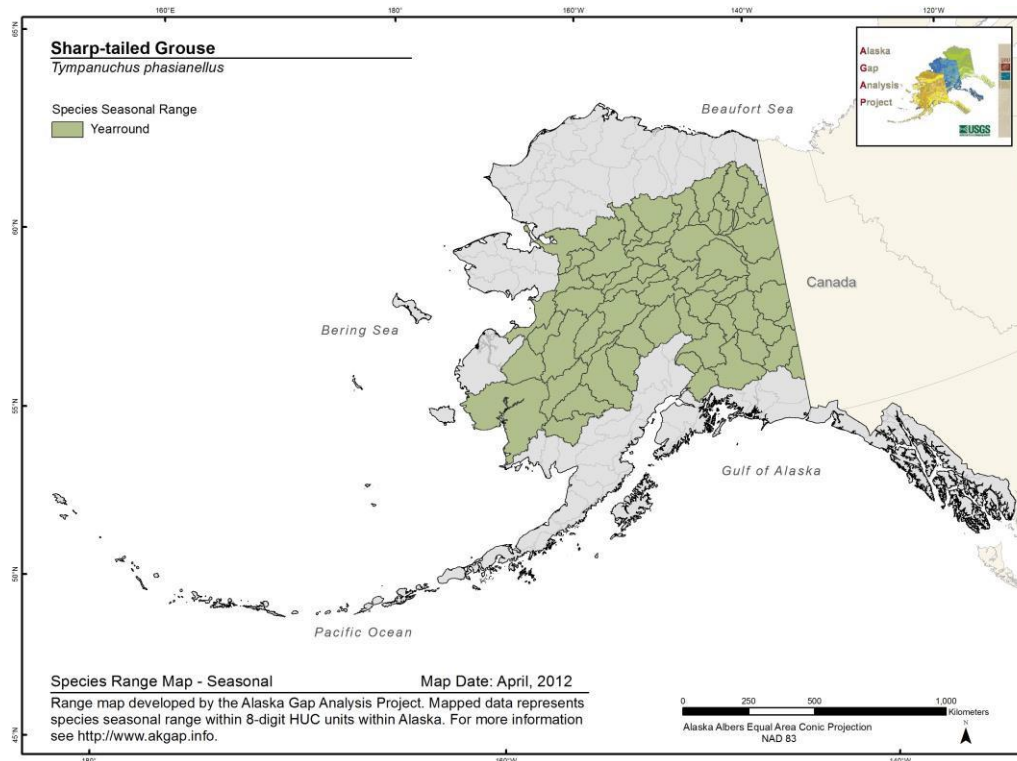
Sharp-tailed Grouse *Tympanuchus phasianellus*

Range Map and Distribution Model Summary

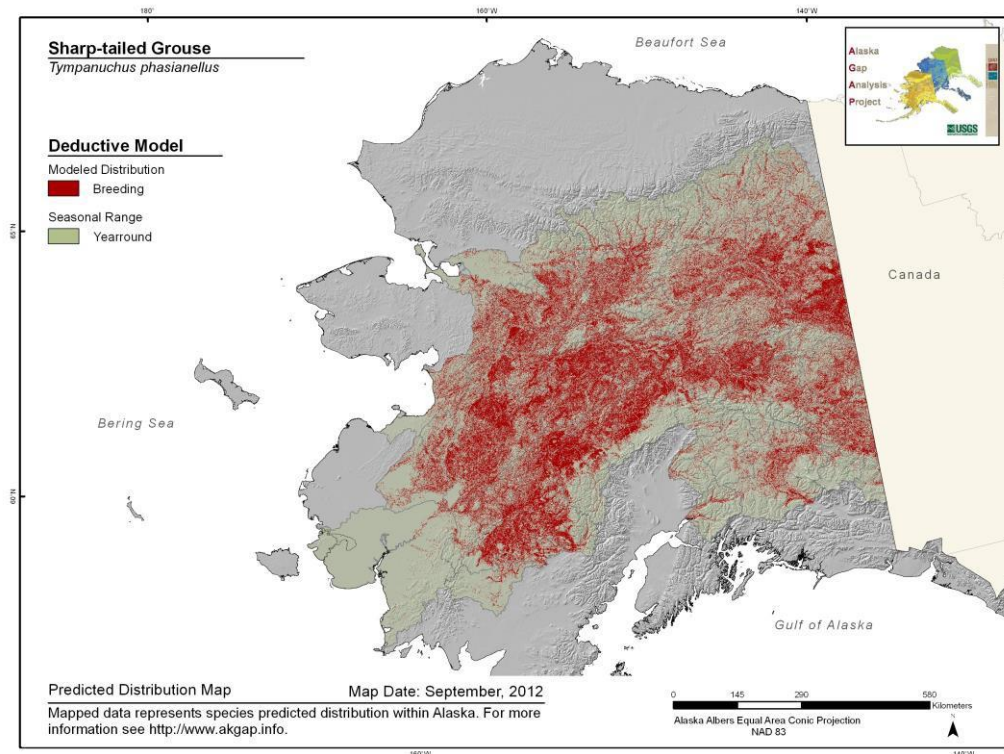
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.775**

**Model Quality
Summary:**
Moderate

Habitat Description

During winter often relies on riparian areas and other sites that support deciduous trees and shrub; also utilizes non-native cultivated grains and hedgerow species. In the boreal forests of B.C., inhabits open swamps and muskegs (Campbell et al. 1990). Habitat and distribution is constrained in regions where fire suppression has reduced early and mid-successional vegetation communities. Leks may be located on mowed wet meadows, cattle-trampled areas, low ridges and knolls, recent burns, forest clearcuts, shorelines, natural openings, and other areas with low sparse vegetation allowing good visibility and unrestricted movement, especially areas near dense herbaceous vegetation (Prose 1987, Deeble 1996). High-quality nesting habitat provided by structural diversity, including stand of grasses, shrubs, and forbs (Meints et al. 1992).

References

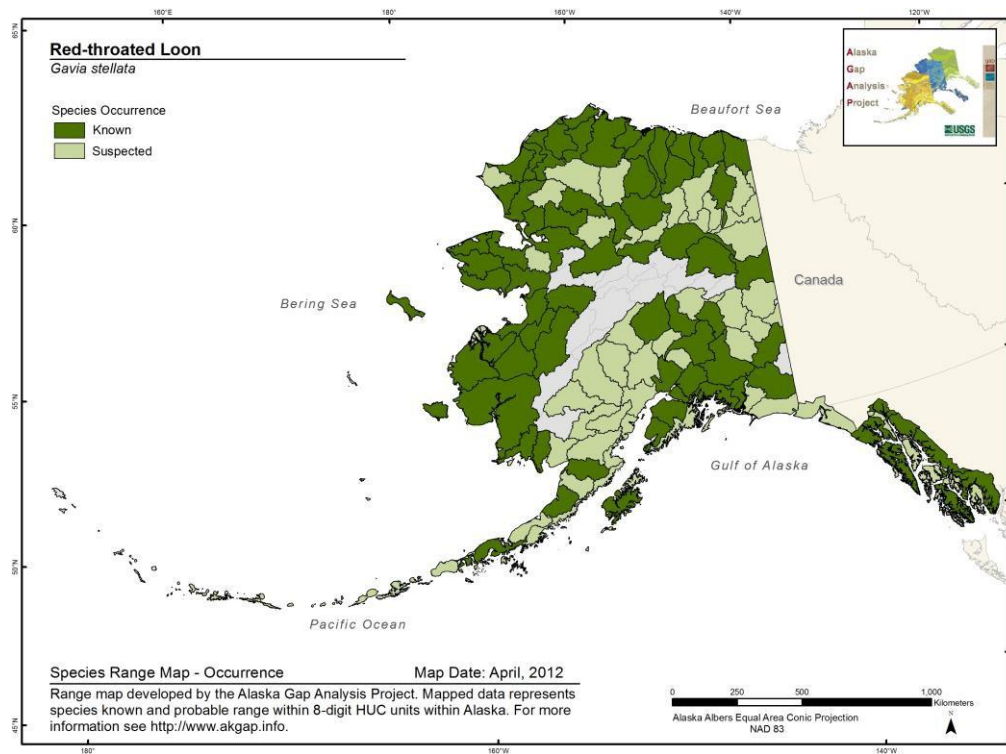
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- Deeble, B.D. 1996. Conservation of Columbian sharp-tailed grouse, with special emphasis on the upper Blackfoot Valley, Montana. M.S. thesis, University of Montana, Missoula, MT. 70 pp.
- Meints, D. R., J. W. Connelly, K. P. Reese, A. R. Sands, T. P. Hemker. 1992. Habitat suitability index procedure for Columbian sharp-tailed grouse. Station Bulletin 55. Idaho Forest, Wildlife and Range Experiment Station, University of Idaho. Moscow, Idaho. 27 pp.
- Prose, B. L. 1987. Habitat suitability index models: plains sharp-tailed grouse. U. S. Fish Wildl. Serv. Biol. Rep. 82(10.142). 31 pp.

Red-throated Loon

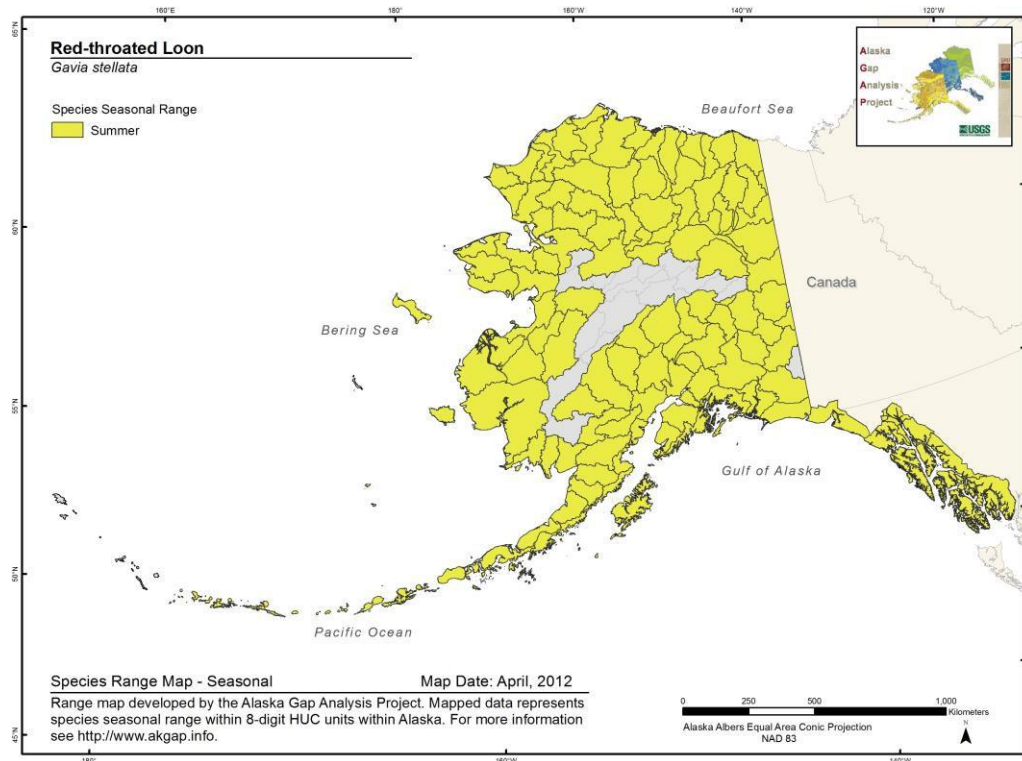
Gavia stellata

Range Map and Distribution Model Summary

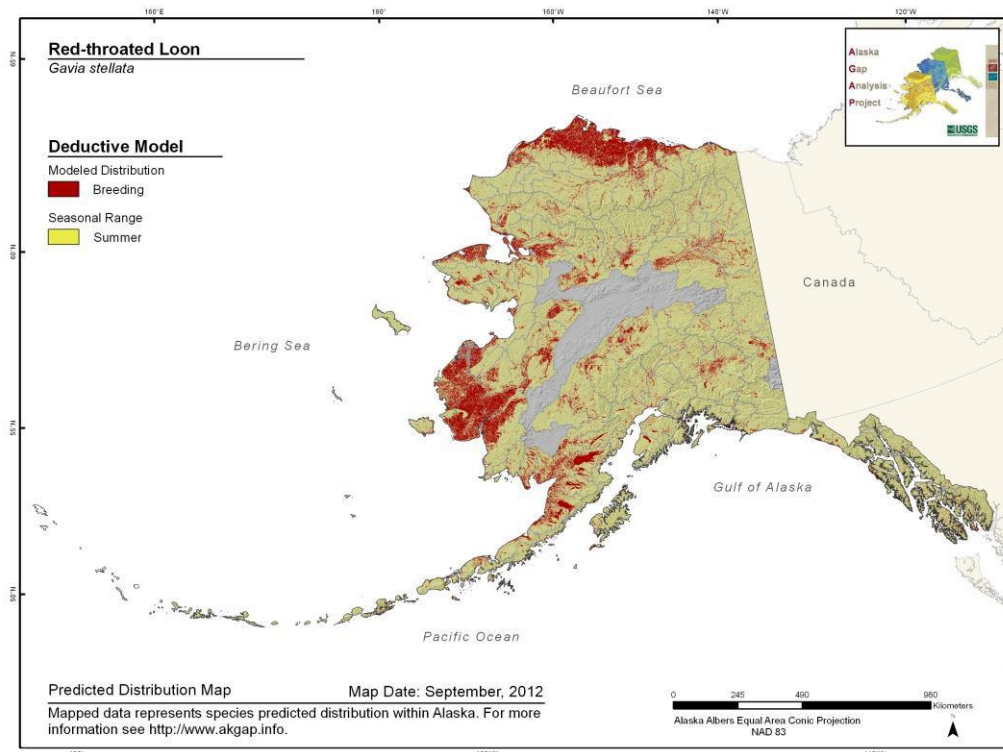
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

Model Evaluation Statistic (AUC): No AUC

Model Quality Summary:
Not validated

Habitat Description

Typically select marshy islands for nest sites or on dry shores. Nest on small oligotrophic lakes in diverse habitats, such as forests, or tundra up to 1070 m. Select partially drained shallow ponds with stands of *Carex aquatilis*. Select smaller ponds that thaw earlier. Availability of freshwater fish limits distribution; higher reproductive success was found for those nesting within 9 km of marine foraging habitat (Soper 1946, Palmer 1962, Davis 1972, Bundy 1976, Bergman and Derksen 1977, Cramp and Simmons 1977, Merrie 1978, Derksen et al. 1981, Furness 1983, Reimchen and Douglas 1984, Johnsgard 1987, Douglas and Reimchen 1988, Eberl and Picman 1993, Barr et al. 2000).

References

Barr, J.R., C. Earl, and J.W. McIntyre. 2000. Red-throated loon (*Gavia stellata*). In: A. Poole and F. Gill (eds.). The Birds of North America, No. 513. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Bergman, R. D. and D. V. Derksen. 1977. Observations on Arctic and Red-throated loons at Storkersen Point, Alaska, *Arctic* 30:41-51.

Bundy, G. 1976. Breeding biology of the red-throated diver. *Bird Study* 23:149-256

Cramp, S. and K. E. L. Simmons, eds. 1977. The Birds of the Western Palearctic. Vol. 1. Oxford Univ. Press, Oxford, UK.

Davis, R.A. 1972. A comparative study of the use of habitat by arctic loons and red-throated loons. Ph.D. diss., Univ. of Western Ontario, London.

Derksen, D.V., T.C. Rothe, and W.D. Eldridge. 1981. Use of wetland habitats by birds in the National

Petroleum Reserve-Alaska. Resource Pub. 141. USFWS, Washington, D.C. 27 pp.

Douglas, S.D. and T.E. Reimchen. 1988. Habitat characteristics and population estimate of breeding red-throated loons, *Gavia stellata*, on the Queen Charlotte Islands, British Columbia. *Canad. Field-Naturalist* 102:679-684.

Eberl, C. and J. Picman. 1993. Effect of nest-site location on reproductive success of Red-throated loons (*Gavia stellata*). *The Auk* 110: 436-444.

Furness, R. W. 1983. Pages 18-30 in Foula, Shetland, Volume 4. Birds of Foula. The Brathay Hall Trust, Ambleside, Cumbria.

Johnsgard, P.A. 1987. Diving birds of North America. Univ. Nebraska Press, Lincoln, NE. 292 pp.

Merrie, T.D.H. 1978. Relationship between spatial distribution of breeding divers and the availability of fishing waters. *Bird Study* 25: 119-122.

Palmer, R. S., ed. 1962. Handbook of North American birds. Vol. 1: loons through flamingoes. Yale University Press, New Haven, CT.

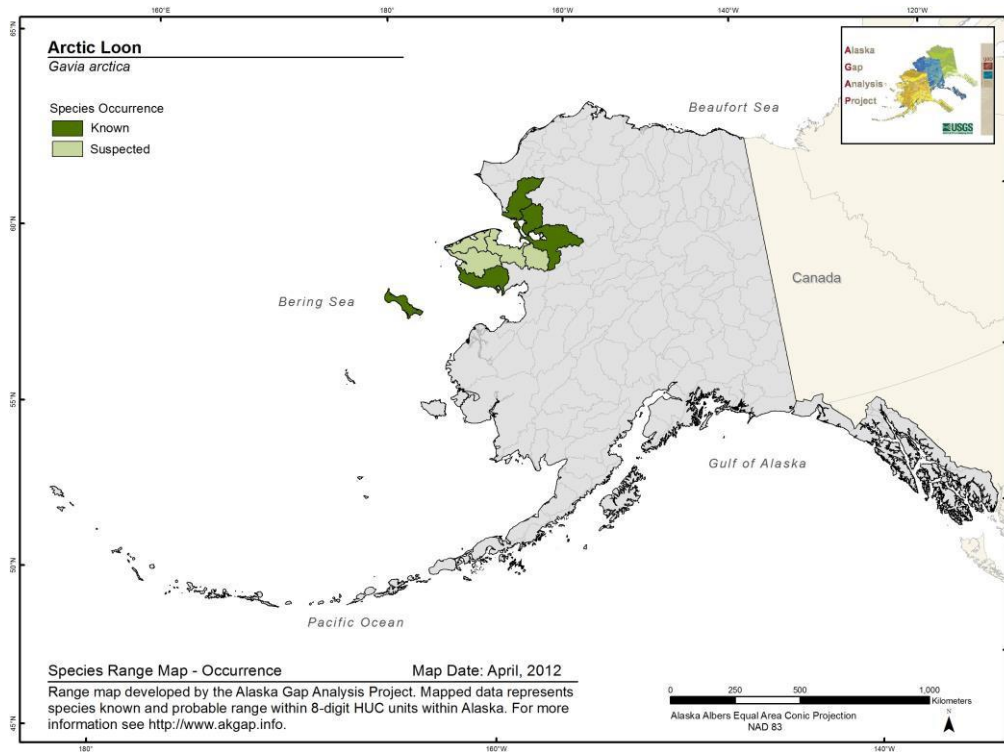
Reimchen, T.E. and S. Douglas. 1984. Feeding schedule and daily food consumption in red-throated loons (*Gavia stellata*) over the prefledging period. *Auk* 101:593-599.

Soper, J. D. 1946. Ornithological results of the Baffin Island expeditions of 1928-1929 and 1930-1931, together with more recent records. *Auk* 63:1-24, 223-239, 418-427.

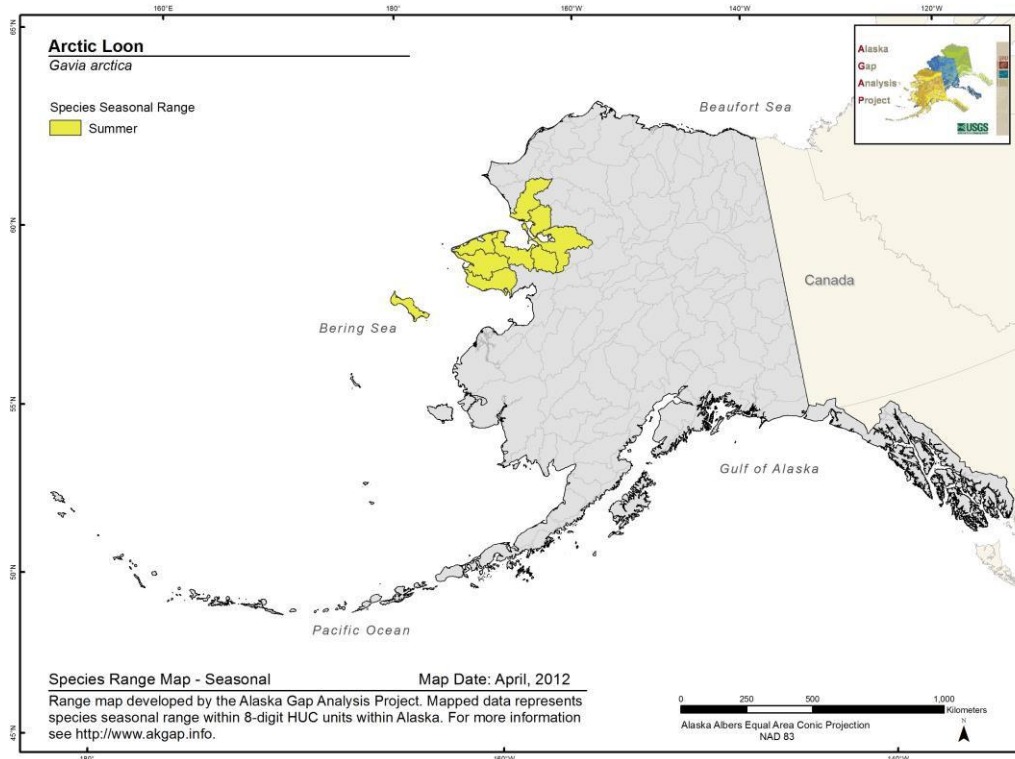
Arctic Loon *Gavia arctica*

Range Map and Distribution Model Summary

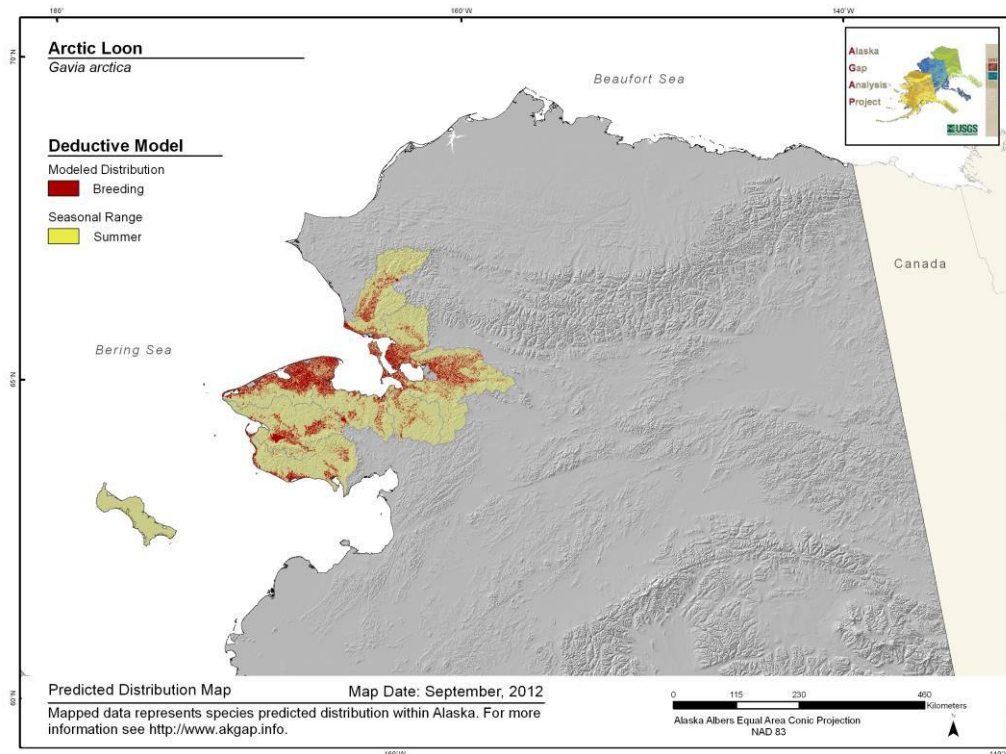
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.562**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, breeds in small brackish lakes and forages on freshwater lakes adjacent to wet sedge meadows up to 800 m inland (Portenko 1972, Douglas and Sowl 1993).

References

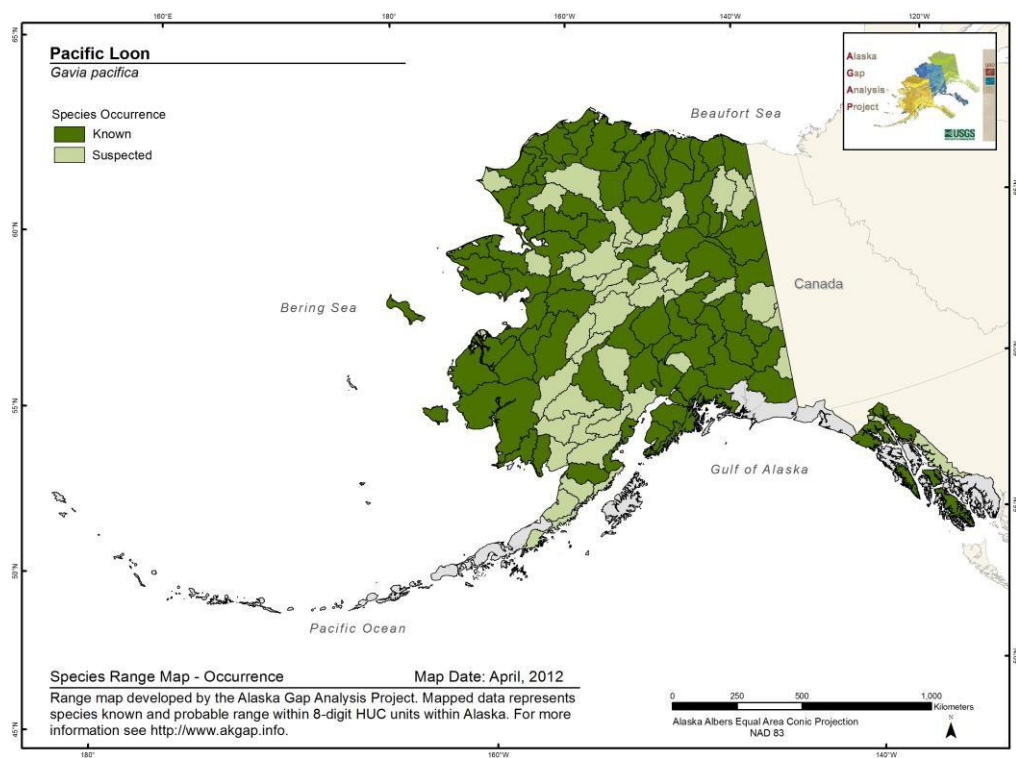
Douglas, H. and K. Sowl. 1993. Northeastern extension of the breeding range of the Arctic Loon in northwestern Alaska. *Western Birds* 24: 98-100.

Portenko, L. A. 1972. *Birds of Chukotski Peninsula and Wrangell Island. Part I: Loons to shorebirds.* Nauka Pres, Leningrad.

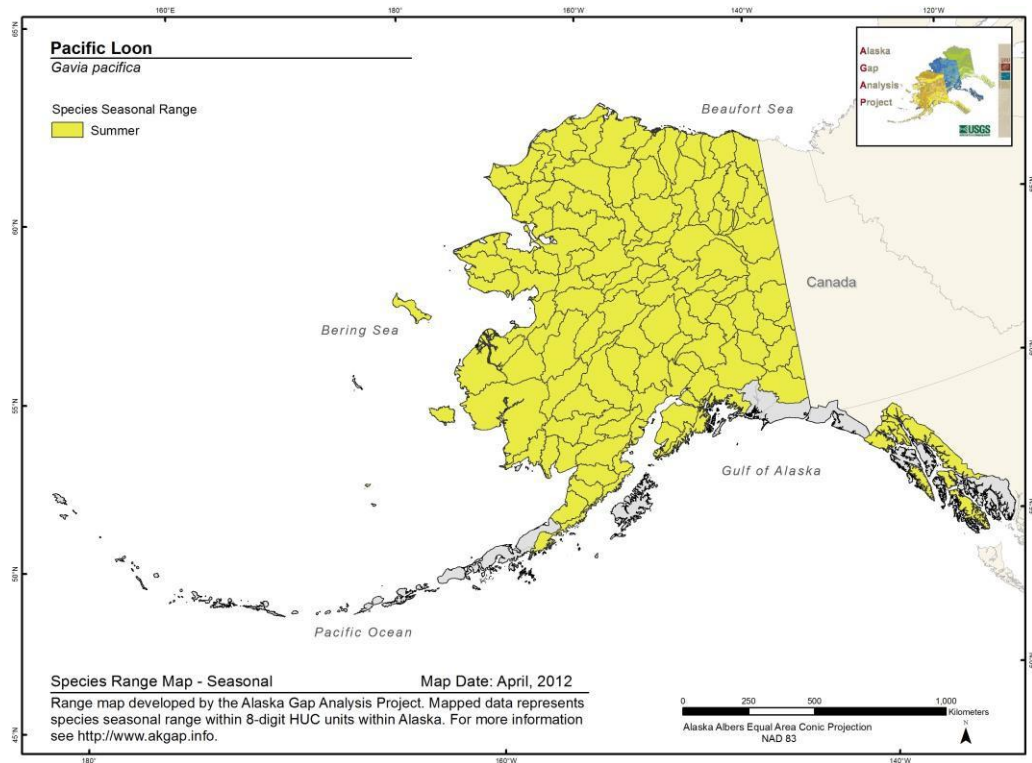
Pacific Loon *Gavia pacifica*

Range Map and Distribution Model Summary

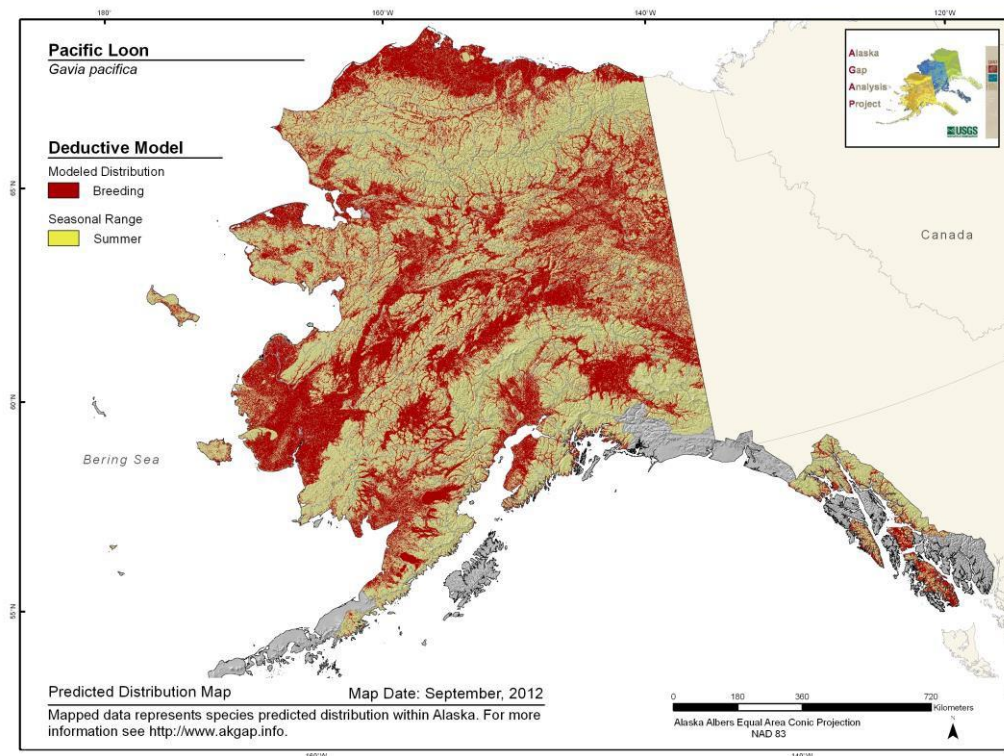
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds on freshwater lakes on arctic and subarctic tundra and taiga with varying topography and in both treeless and forested areas (Bergman and Derksen 1977). At the Y-K Delta nested in wet marsh tundra and heath tundra with lacustrine ponds of 1.5 ha and 1.5 m depth. All ponds used contained ninespine stickleback with no other fish. Vegetation was dominated by bur-reed, marsh five-finger, sedges, and mare's tail; submergent vegetation primarily pondweeds (Petersen 1989). Other wetland types used include basin complex lakes, beaded streams, shallow ponds, deep lakes with abrupt shores, sublittoral shelves, and coastal wetlands (Russell 2002).

References

Bergman, R. D. and D. V. Derksen. 1977. Observations on Arctic and Red-throated loons at Storkersen Point, Alaska, Arctic 30:41-51.

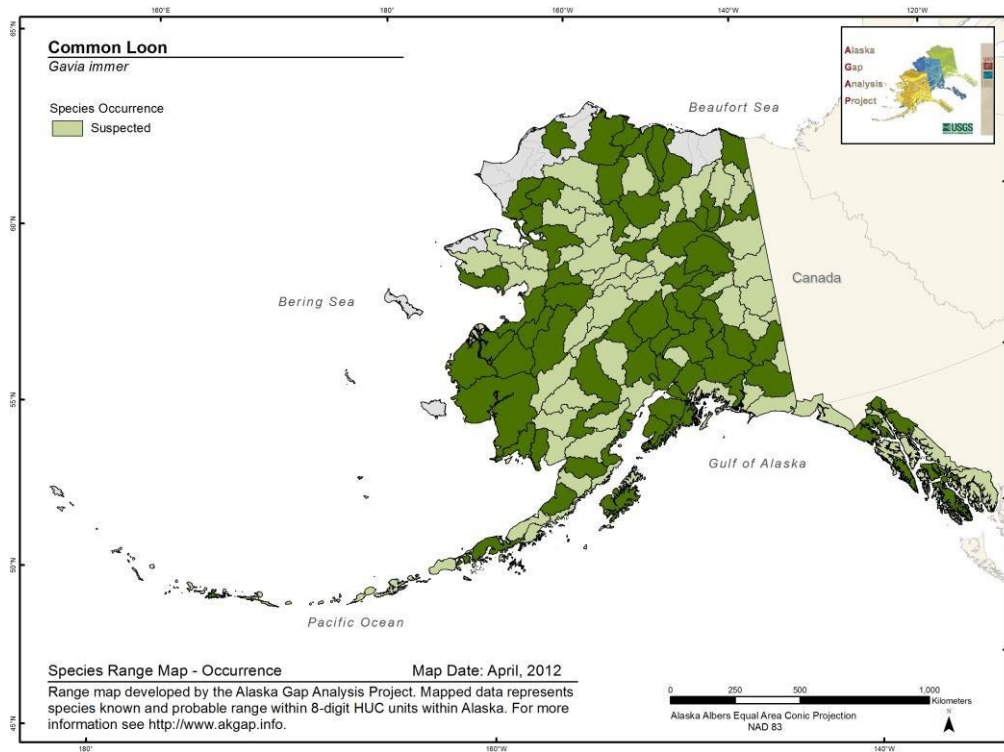
Petersen, M. R. 1989. Nesting biology of Pacific Loons, *Gavia pacifica*, on the Yukon-Kuskokwim Delta, Alaska. Canadian Field-Naturalist 103:265-269.

Russell, R. W. 2002. Pacific Loon (*Gavia pacifica*) and Arctic Loon (*Gavia arctica*). In The Birds of North America, No. 657 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

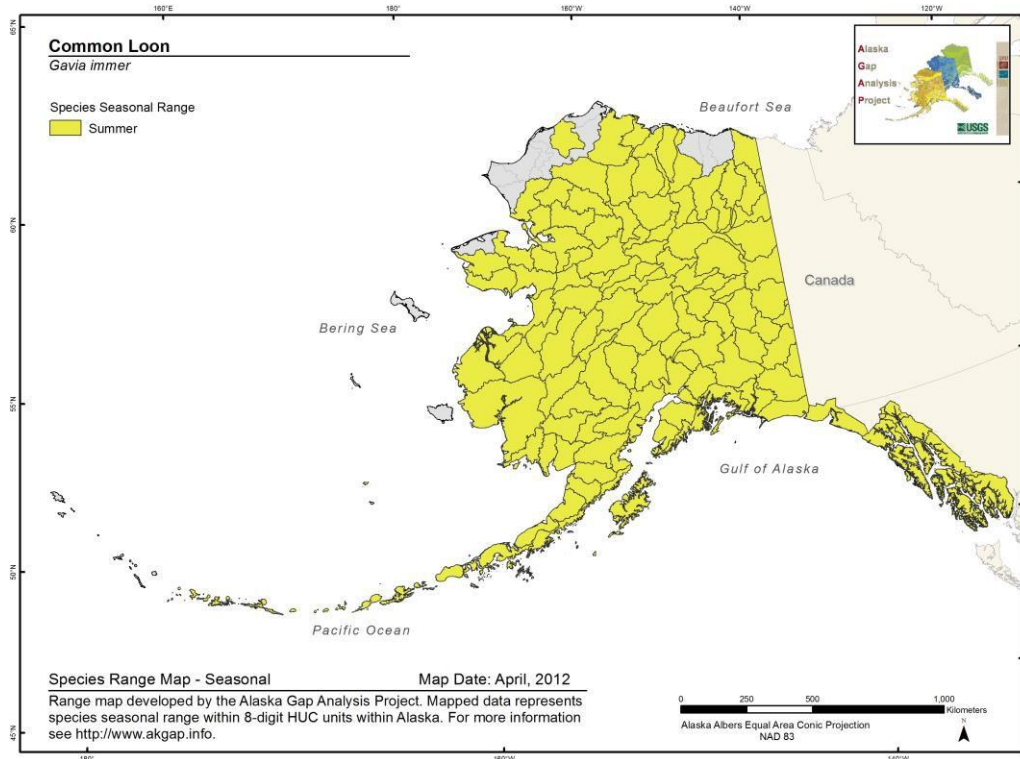
Common Loon *Gavia immer*

Range Map and Distribution Model Summary

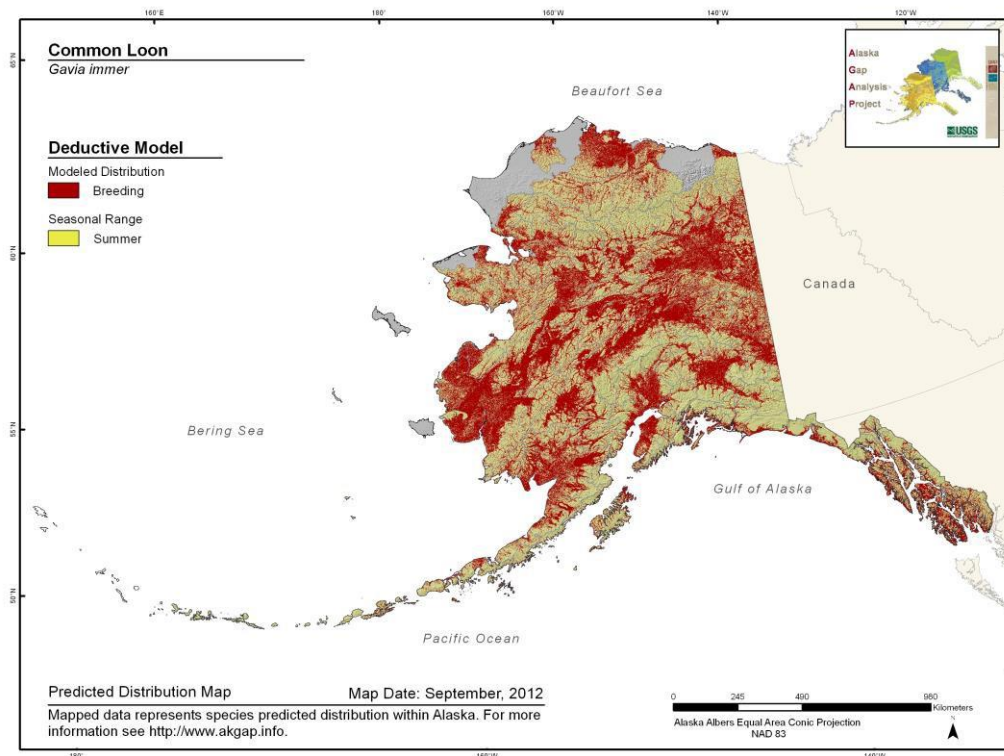
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.705**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds near clear, oligotrophic lakes with fish, islands, floating bogs, and indented bays surrounded by forest and rocky shorelines (Barr 1973, 1996). Found in boreal forests and riparian areas in Alaska (Groves et al. 1996). Stages on rivers, lakes, and reservoirs with ample food (McIntyre and Barr 1983).

References

Barr, J. F. 1973. Feeding biology of the Common Loon (*Gavia immer*) in oligotrophic lakes of the Precambrian Shield. Ph. D. dissertation, University of Guelph, Ontario.

Barr, J. F. 1996. Aspects of Common Loon (*Gavia immer*) feeding biology on its breeding ground. *Hydrobiologia* 321: 119-144.

Groves, D.J., B. Conant, R.J. King, J.I. Hodges, and J.G. King. 1996. Status and trends of loon populations summering in Alaska, 1971-1993. *The Condor* 98:189-195.

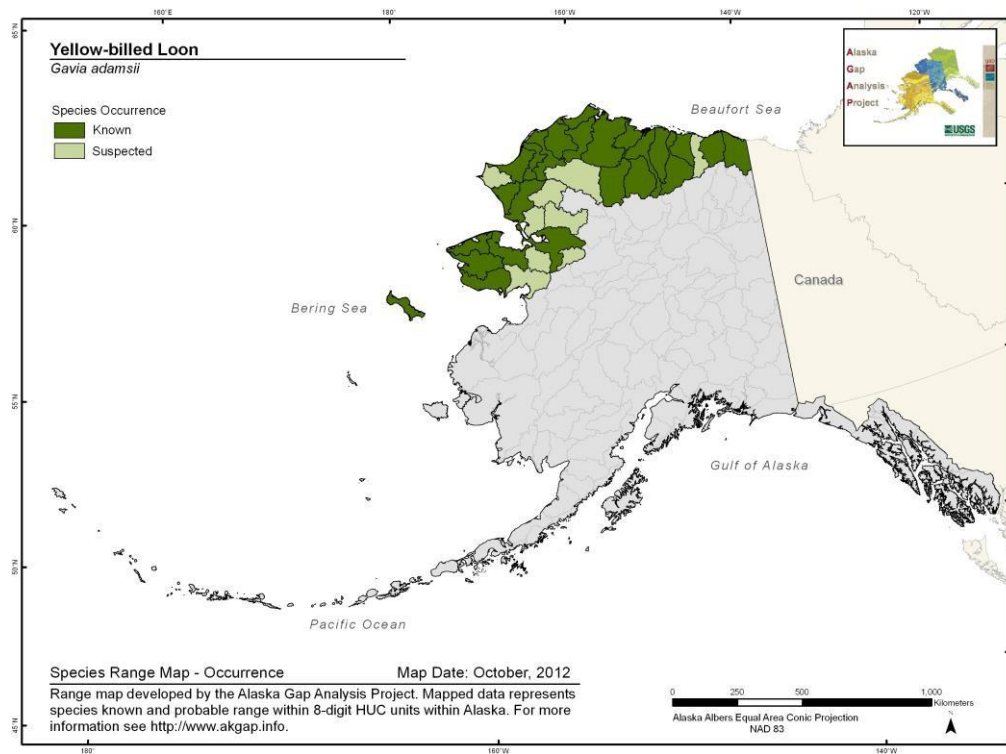
McIntyre, J. W. and J. F. Barr. 1983. Pre-migratory behavior of Common Loons on the autumn staging grounds. *Wilson Bulletin* 95:121-125.

Yellow-billed Loon

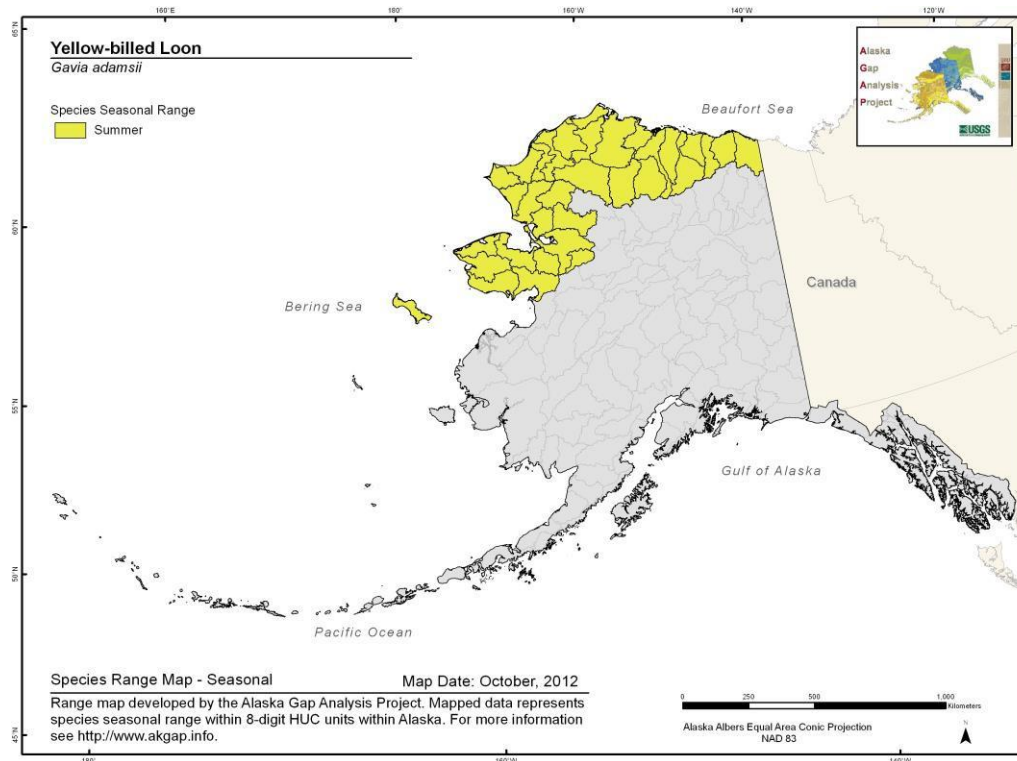
Gavia adamsii

Range Map and Distribution Model Summary

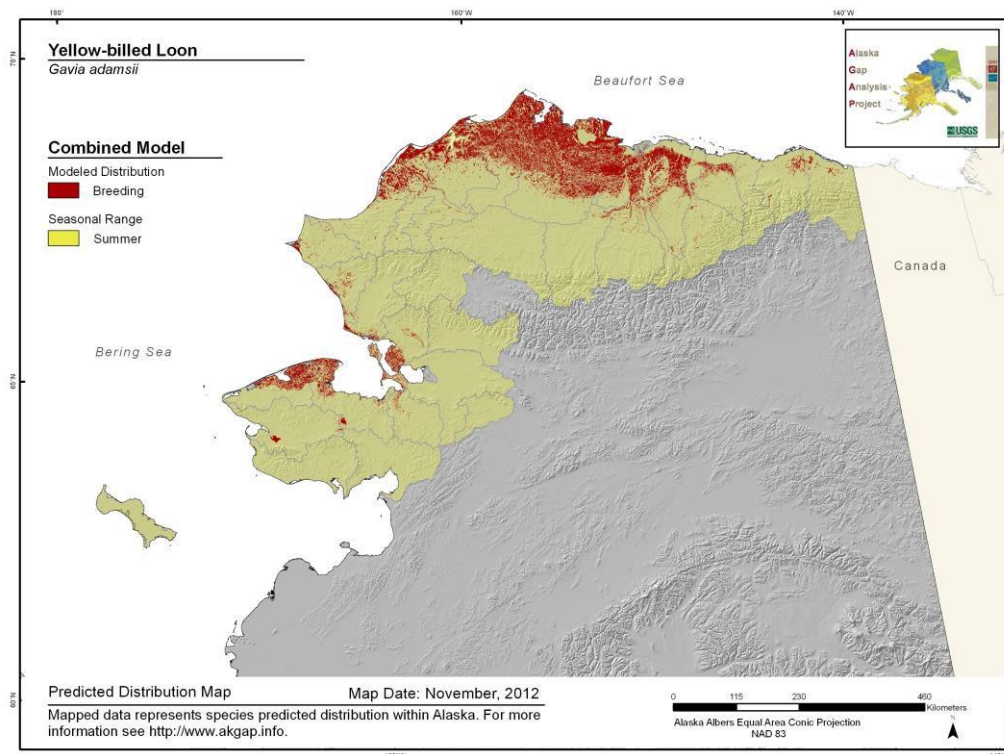
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.793**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in low-lying treeless tundra regions, usually coastal, at around 62-74 degrees latitude on larger (in Alaska, 8-229 ha), clear, low-rimmed lakes. Breeding sites may also be on inland lakes or large river deltas with untapped lakes (North 1994, Fair 2002). Requires nesting and brood-rearing lakes that are large enough to allow easy take-off from open water; form an ice-free moat around shore in early spring; have clear water supporting a substantial overwintering population of small fishes; have segments of gently sloping shoreline in which nesting and brooding occurs; and have sheltered, vegetated areas, where young chicks rest and take refuge during disturbances (Earnst 2004). Lake size, depth, connectivity to streams, shoreline complexity and proportion of shoreline in moist to aquatic cover types were each significant predictors in a survey of 757 lakes in northern Alaska (Earnst 2004). Nests placed at the water's edge, typically in a low, gently sloping area. Deep open water with islands is a preferred habitat for nesting relative to its availability. Most nests are placed on the leeward lake or island shore (Earnst 2004).

References

Earnst, S. L. 2004. Status assessment and conservation plan for the Yellow-billed Loon (*Gavia adamsii*). USGS, Scientific Investigations Report 2004-5258, 42 pp.

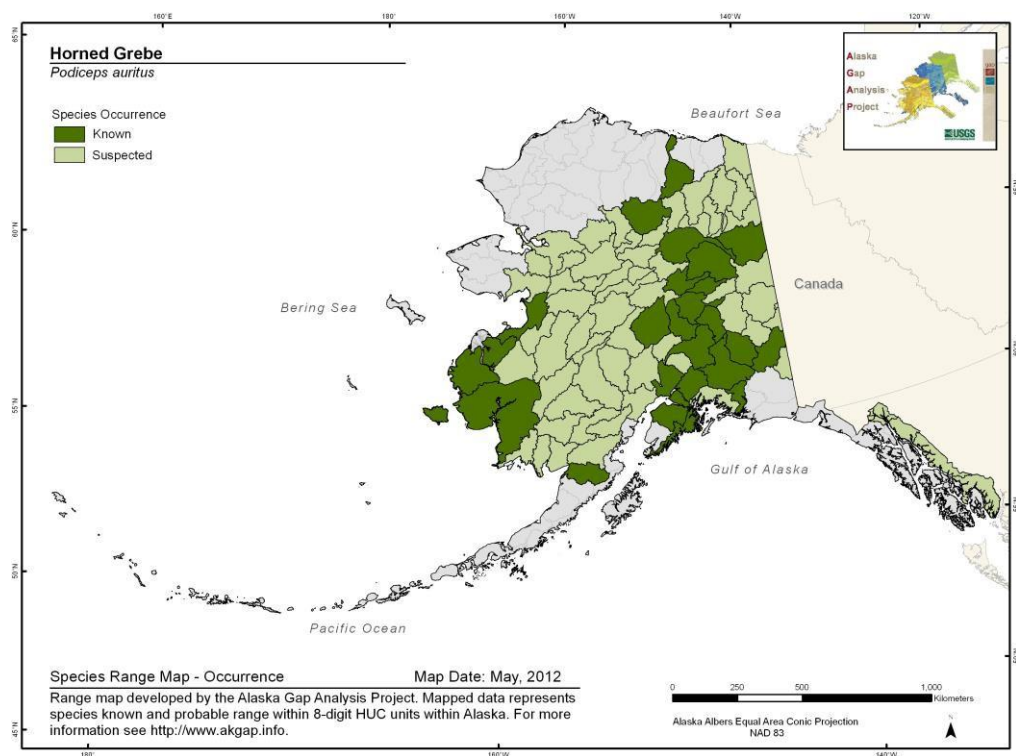
Fair, J. 2002. Status and significance of Yellow-billed Loon (*Gavia adamsii*) populations in Alaska. Report to The Wilderness Society and Trustees for Alaska. Anchorage, Alaska.

North, M.R. 1994. Yellow-billed Loon (*Gavia adamsii*). In The Birds of North America, No. 121 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

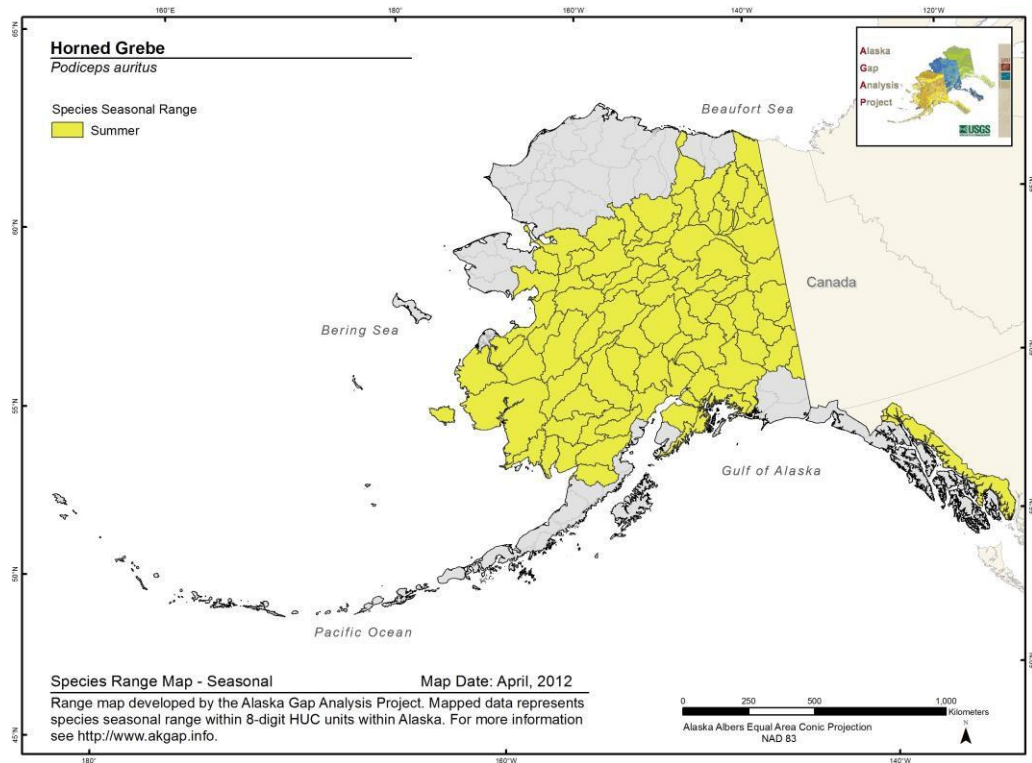
Horned Grebe *Podiceps auritus*

Range Map and Distribution Model Summary

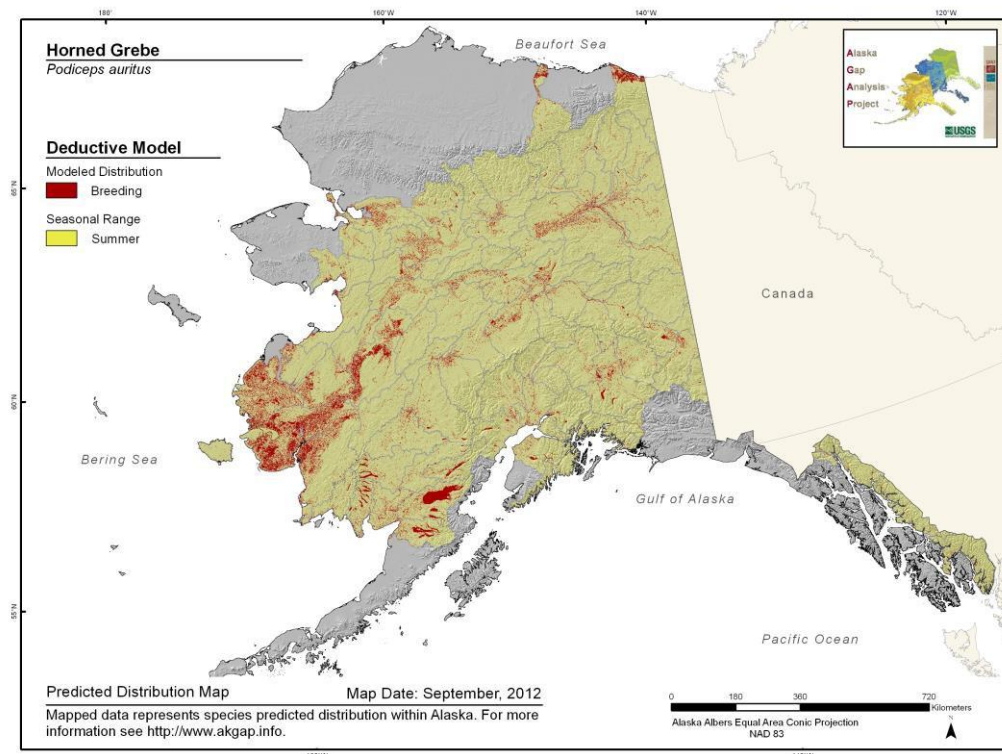
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.517**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in shallow small to medium ponds or marshes with emergent vegetation, especially sedges, cattails, and rushes and open water (Faaborg 1976, Riske 1976, Sugden 1977, Fergeson and Sealy 1983, Fournier and Hines 1999). Sixty nine percent of breeding ponds in a Canadian study were less than 1 ha in size with extensive use of ponds between 0.3 and 2.0 ha. The same study found high use of artificial ponds for nesting. Existence of sufficient residual vegetation an important factor in habitat selection. High use of areas with cattail and willow residual cover observed in Canada (Fournier and Hines 1999).

References

Faaborg, J. 1976. Habitat selection and territorial behavior of the small grebes of North Dakota. Wilson Bulletin 88:390-399.

Fergeson, R.S. and G. S. Sealy. 1983. Breeding ecology of the Horned Grebe, *Podiceps auritus*, in southwestern Manitoba. Canadian Field Naturalist 97:401-408.

Fournier, M. A. and J. E. Hines. 1999. Breeding ecology of the Horned Grebe (*Podiceps auritus*) in subarctic wetlands. Occasional papers no. 99.

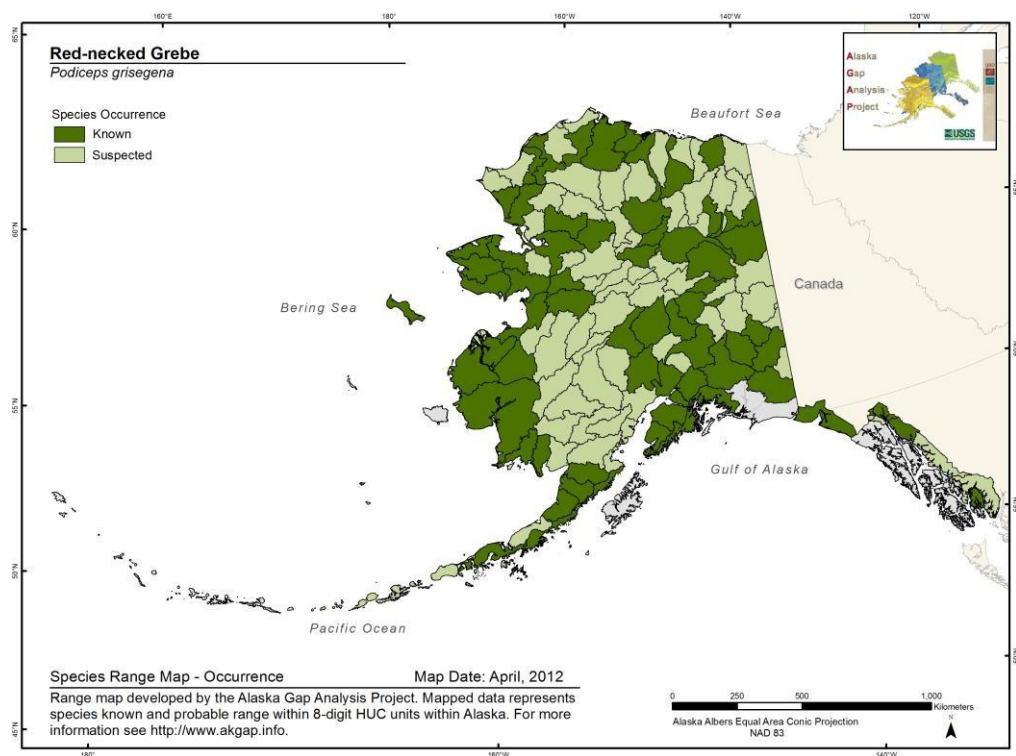
Riske, M. E. 1976. Environmental and human impacts upon grebes breeding in central Alberta. Ph.D. Dissertation, University of Calgary, Calgary, ALB.

Sugden, L. G. 1977. Horned Grebe breeding habitat in Saskatchewan parklands. Canadian Field Naturalist 91:372-376.

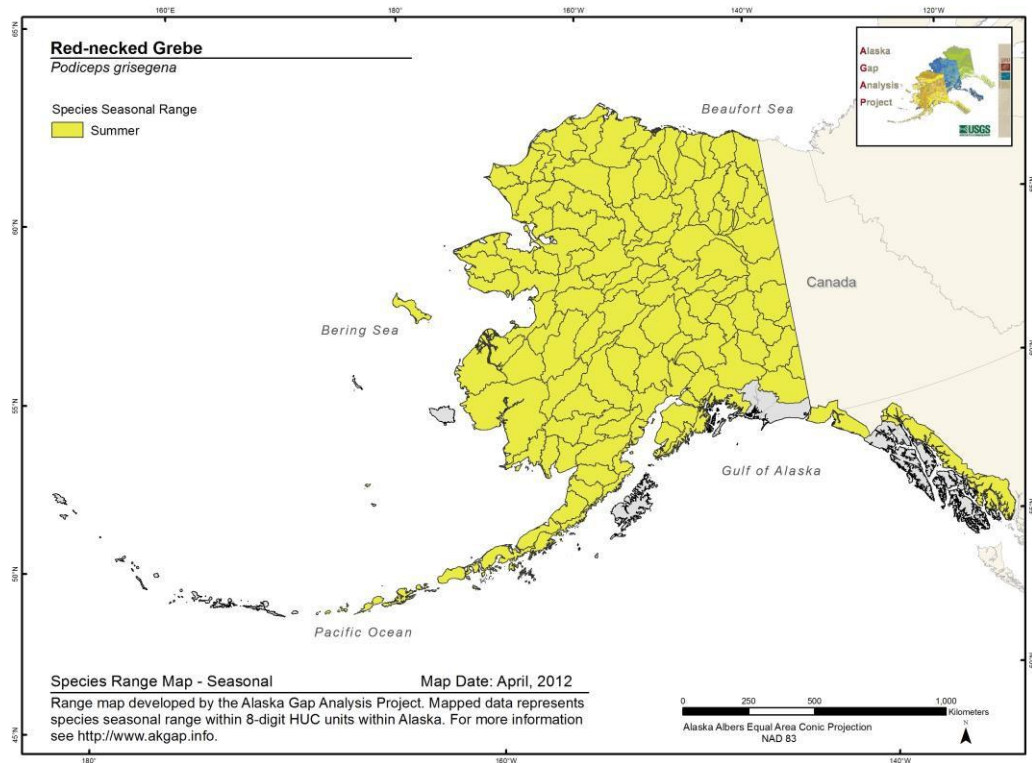
Red-necked Grebe *Podiceps grisegena*

Range Map and Distribution Model Summary

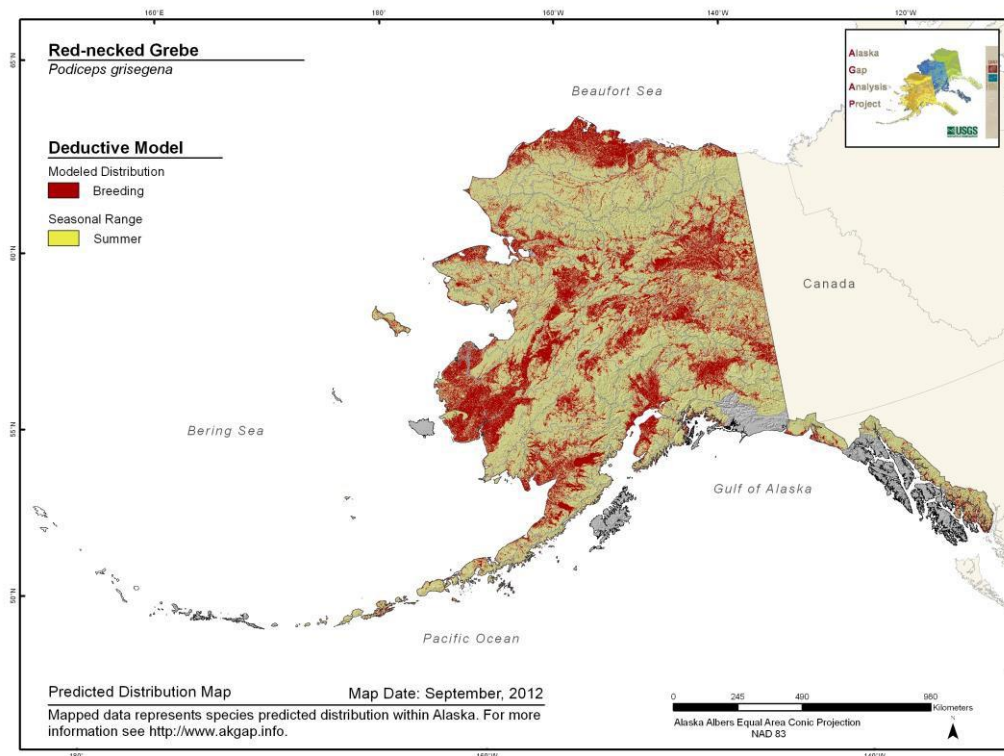
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nests mainly on shallow, freshwater lakes (>2 ha.) or shallow protected marsh areas and secluded bays of larger lakes, usually with at least some emergent vegetation and fish populations (Stout and Neuchterlein 1999). Sites are chosen for combination of shelter from wind and waves, availability of nest materials and anchorage, easy swimming access, proximity to open water, and distance from shore-bound predators (Stout and Neuchterlein 1999).

References

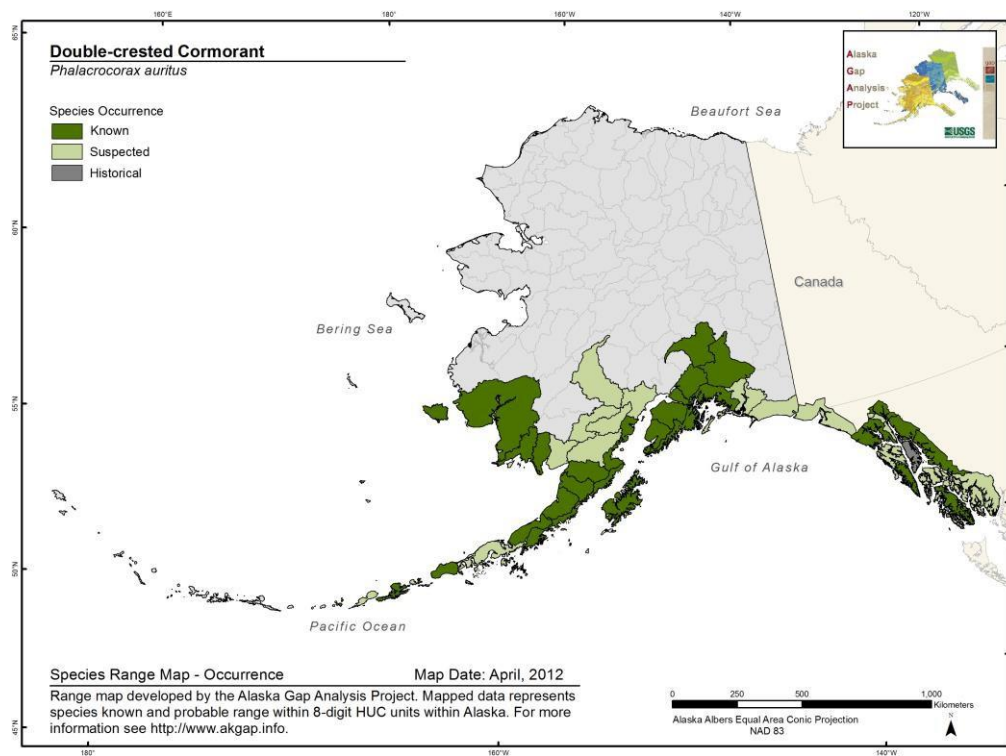
Stout, B.E., and G.L Neuchterlein. 1999. Red-necked grebe (*Podiceps grisegena*). In *The Birds of North America*, No. 465 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Double-crested Cormorant

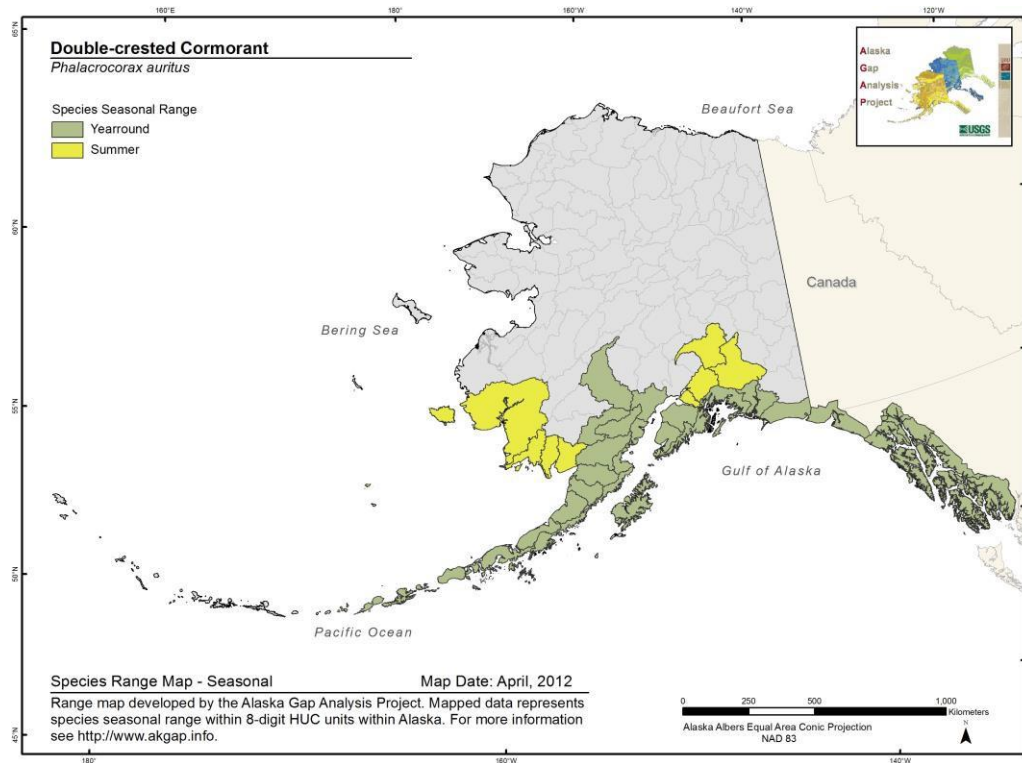
Phalacrocorax auritus

Range Map and Distribution Model Summary

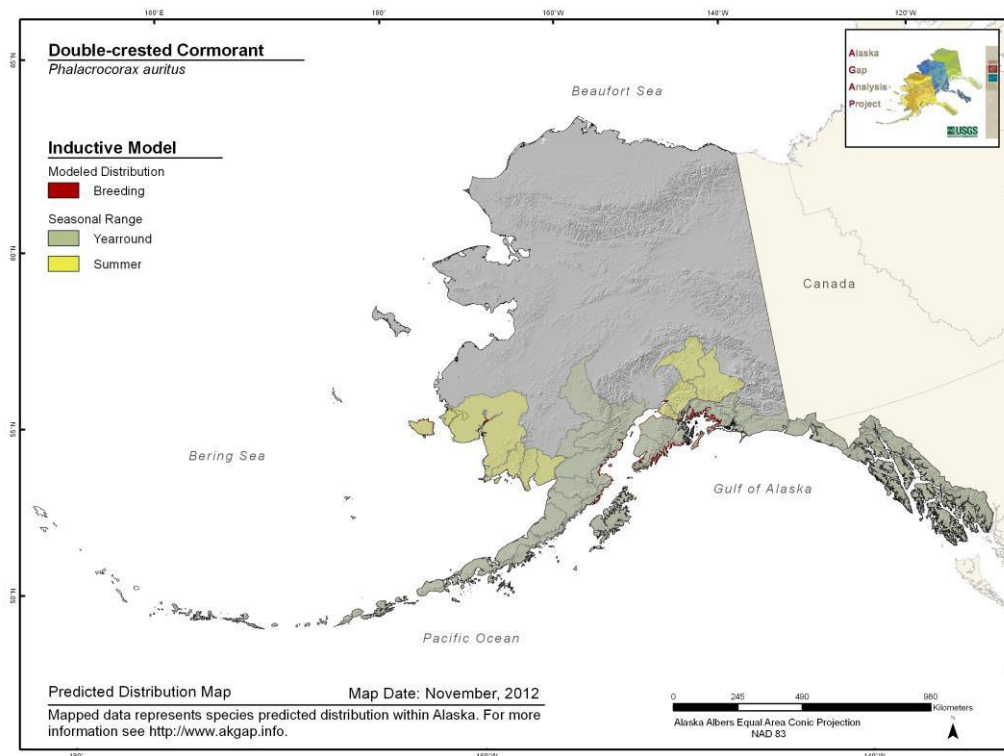
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.667**

**Model Quality
Summary:**
Low

Habitat Description

Lakes, ponds, rivers, lagoons, swamps, coastal bays, marine islands, and seacoasts; usually within sight of land. Nests on the ground or in trees in freshwater situations, and on coastal cliffs (usually high sloping areas with good visibility). Nest in trees in or near water, especially when predators present, in sandy or rocky islands, emergent vegetation in marshes, or artificial structures on islands free of predators. In the Yukon, this species is often seen on large lakes and rivers (Alexander et al. 2003).

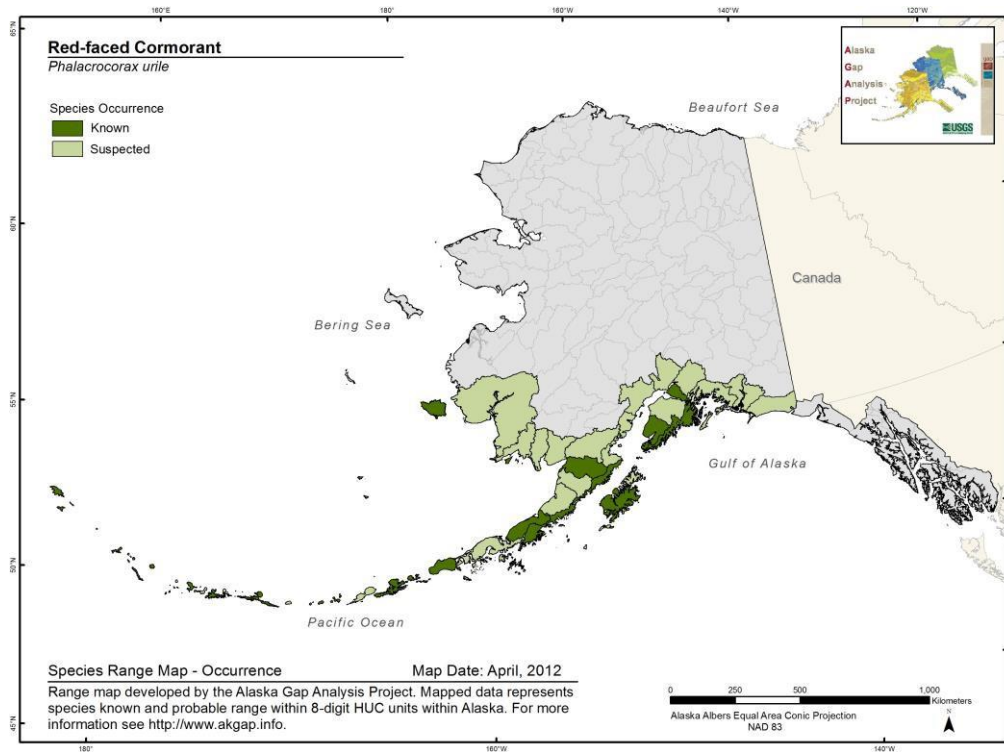
References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

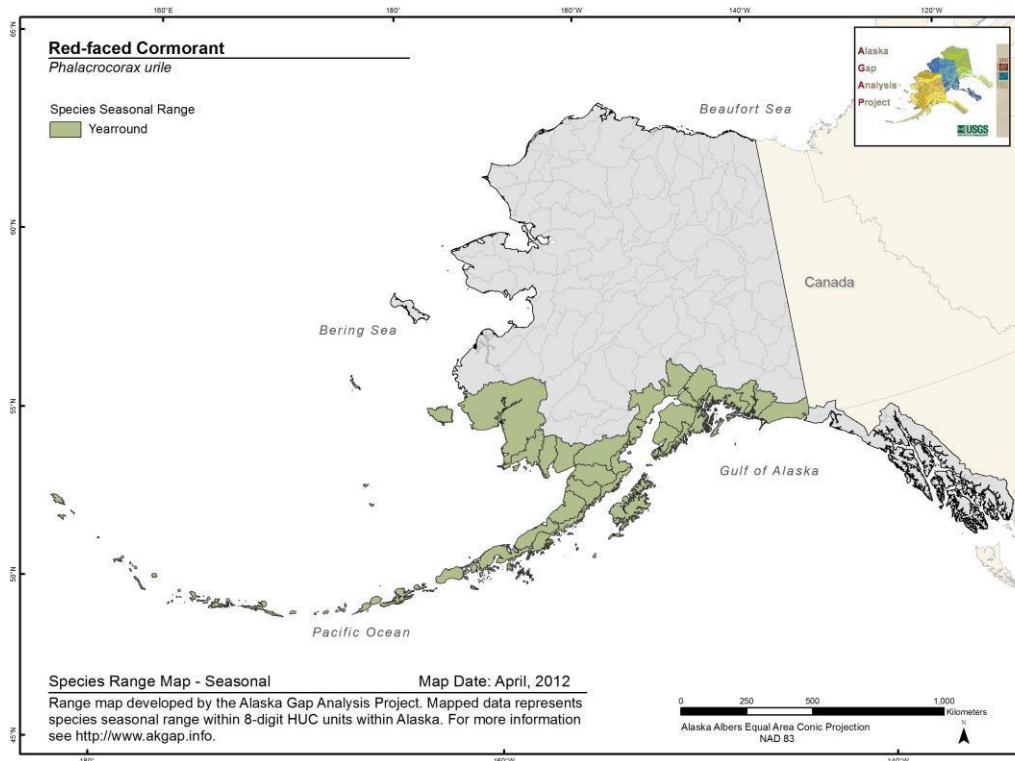
Red-faced Cormorant *Phalacrocorax urile*

Range Map and Distribution Model Summary

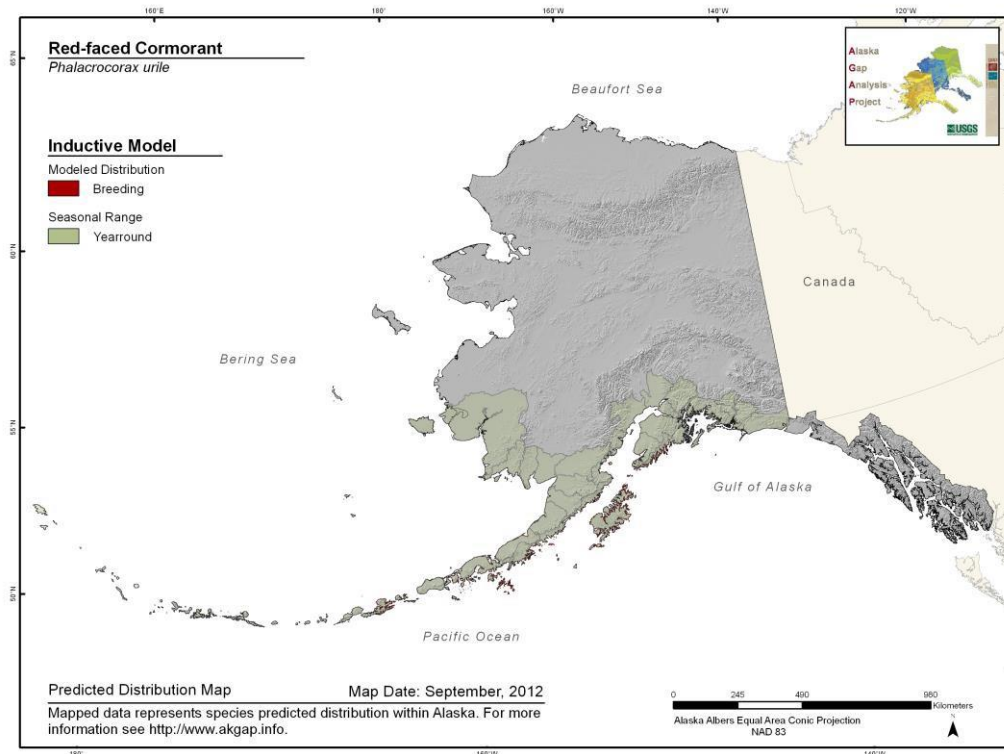
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Closely associated with rock-bottom coastlines of North Pacific marine islands and isolated areas of mainland Alaska, Kamchatka and Japan; often close to shore in water less than 50 m deep. Nests on steep, relatively inaccessible slopes, on ledges averaging about 40 cm wide (Johnsgard 1993), including rocky sea islands alongside gulls, murres, and auklets. Roosts on offshore rocks or protected cliff outcroppings and forages in water near shore (< 20 km) (Causey 2002).

References

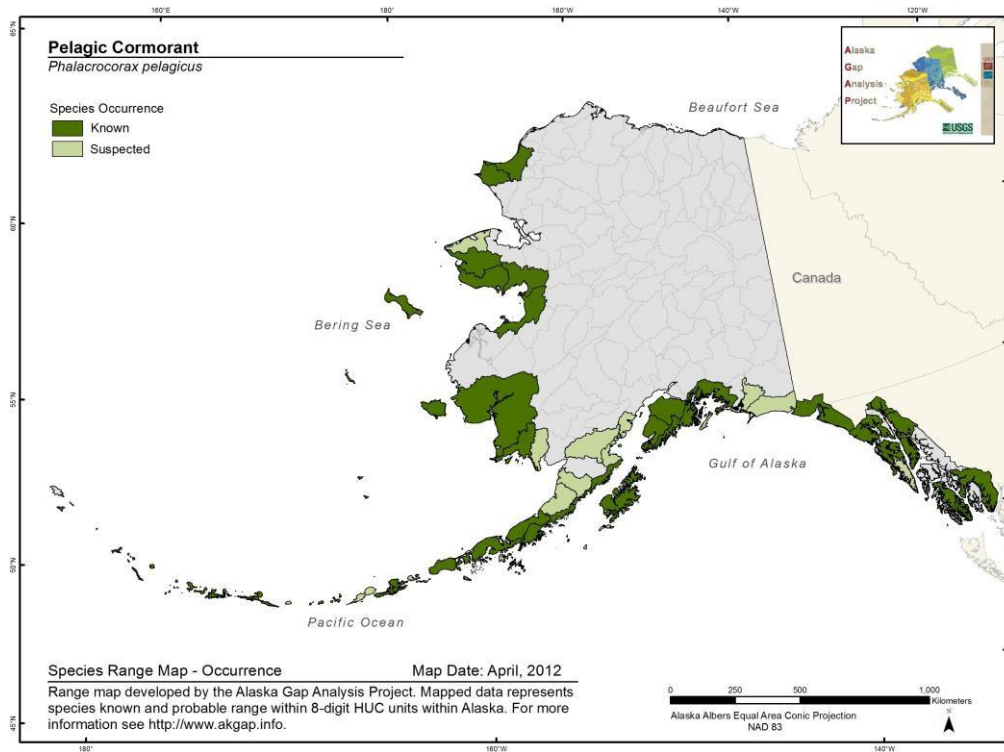
Causey, D. 2002. Red-faced cormorant (*Phalacrocorax urile*). In *The Birds of North America*, No. 617 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Johnsgard, P. A. 1993. *Cormorants, darters, and pelicans of the world*. Smithsonian Institution Press, Washington, D.C. xiv + 445 pp.

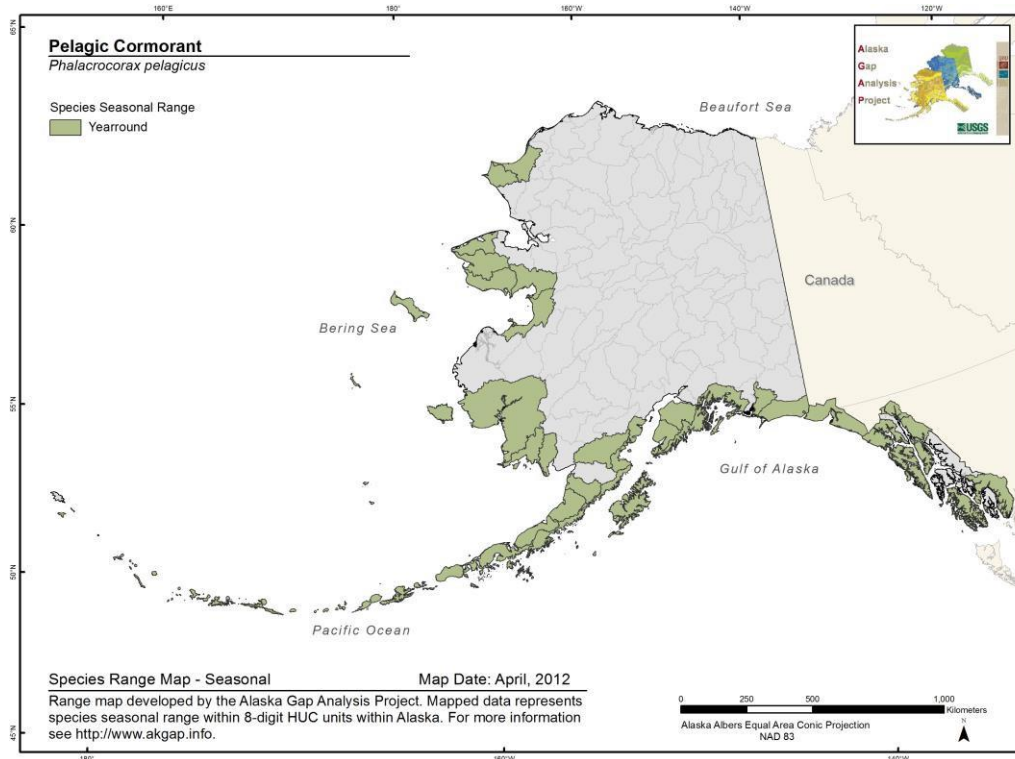
Pelagic Cormorant
Phalacrocorax pelagicus

Range Map and Distribution Model Summary

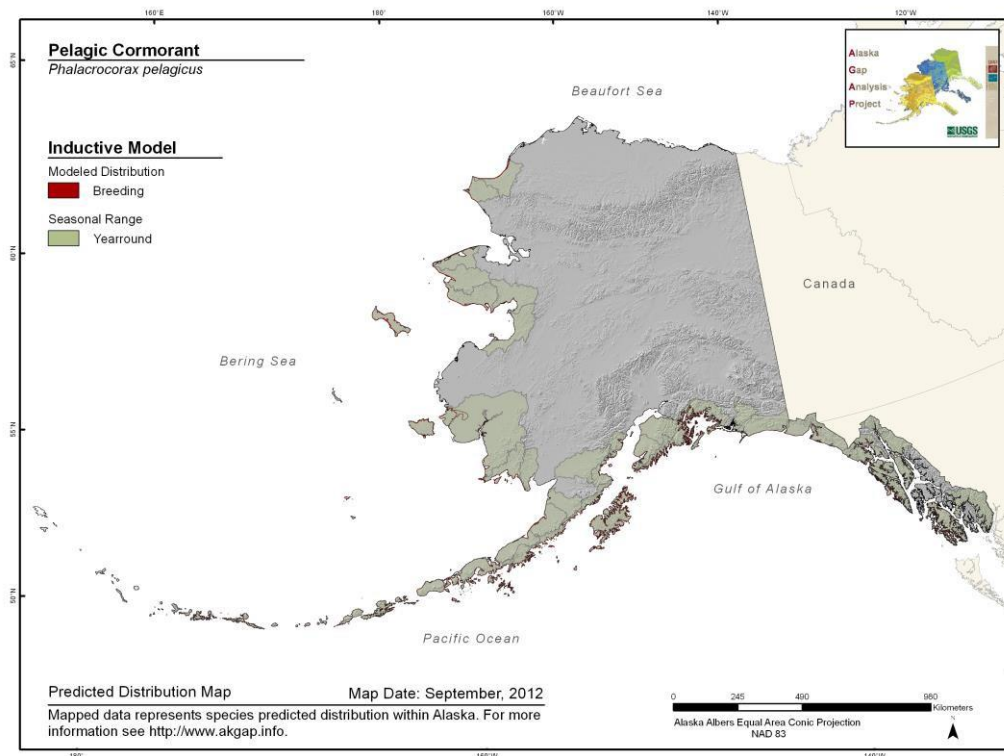
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.895**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeding and roost sites include rocky habitat along coast, bays, inlets, estuaries, rapids, coves, harbors, lagoons (Campbell et al. 1990). Nesting colonies occur on cliffs of forested, grassy and rocky islands, ledges, sea caves, driftwood logs, pilings, and manmade structures (Gabrielson and Lincoln 1959, Hobson and Wilson 1985, Campbell et al. 1990). Diurnal roosts sandbars, rocky islands, cliffs, logs, and pilings (Godfrey 1986).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

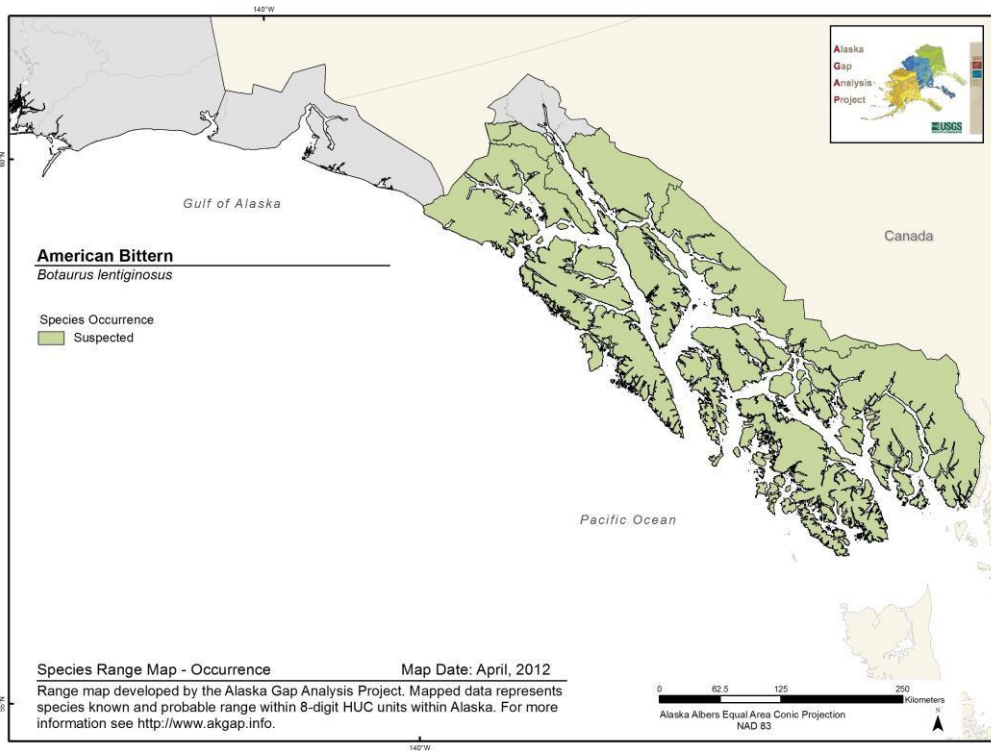
Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Hobson, K. A. and D. Wilson. 1985. Colony establishment on man-made structures in southwest coastal British Columbia. Murrelet 66: 84-86.

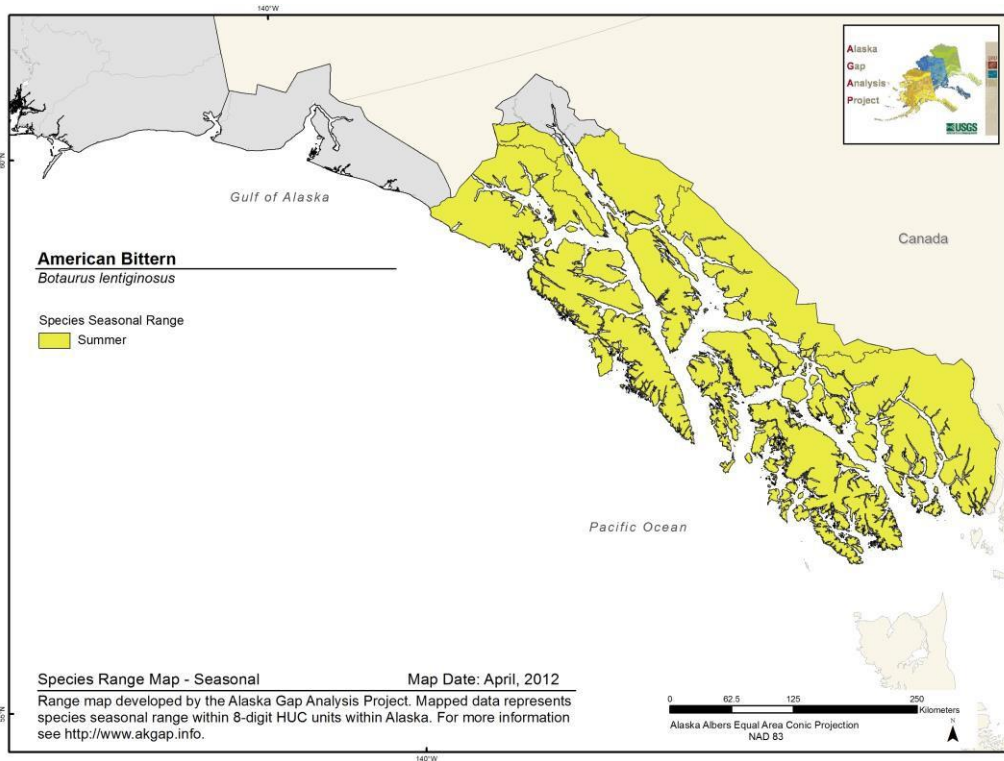
American Bittern *Botaurus lentiginosus*

Range Map and Distribution Model Summary

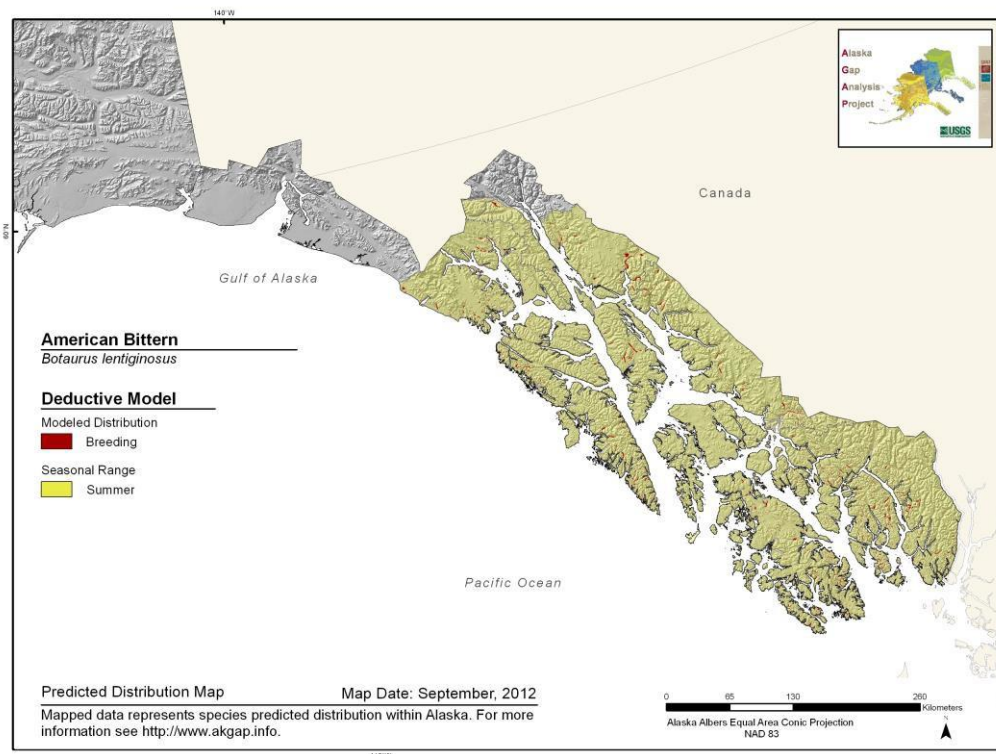
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Freshwater lakes and marshes with heavy tall, emergent vegetation. Primarily large freshwater and (less often) brackish marshes, including lake and pond edges where cattails, sedges, or bulrushes are plentiful and marshes where there are patches of open water and aquatic-bed vegetation. Use sparsely vegetated wetlands occasionally and tidal marshes rarely. Wetlands of 2.5 ha or more may support nesting (Gibbs and Melvin 1992).

Auxiliary habitat: smaller wetlands may serve as alternate foraging sites (Gibbs and Melvin 1992). May nest in uplands if not modified by agriculture.

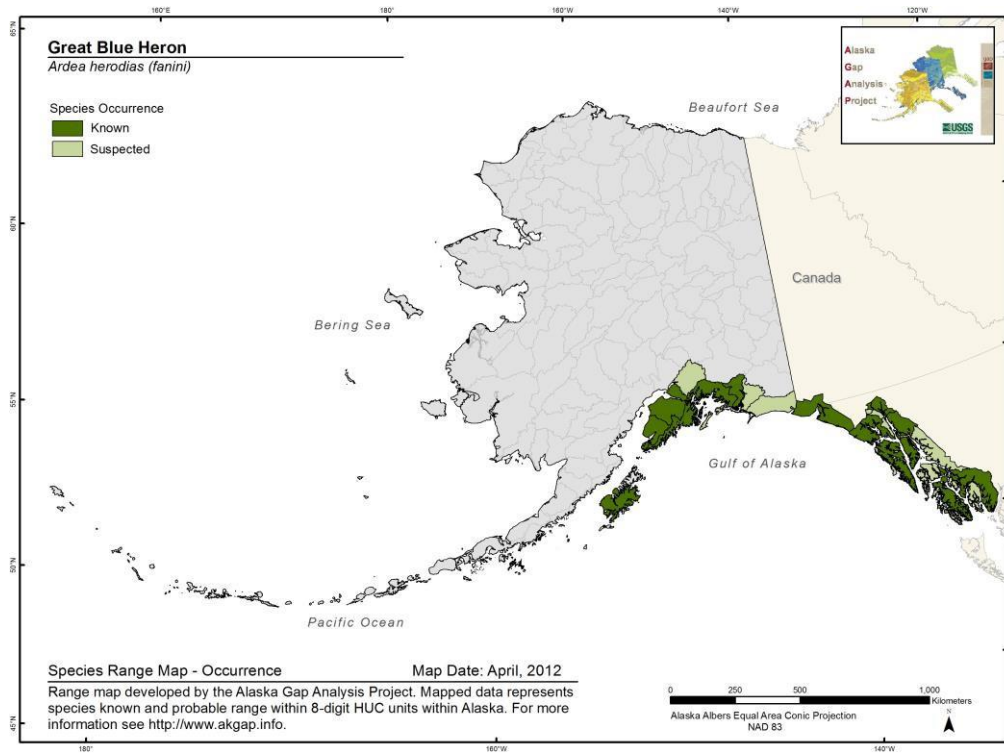
References

Gibbs, J. P., and S. M. Melvin. 1992. American bittern, *BOTAURUS LENTIGINOSUS*. Pages 51-69 in K. J. Schneider and D. M. Pence, editors. Migratory nongame birds of management concern in the Northeast. USFWS, Newton Corner, Massachusetts. 400 pp.

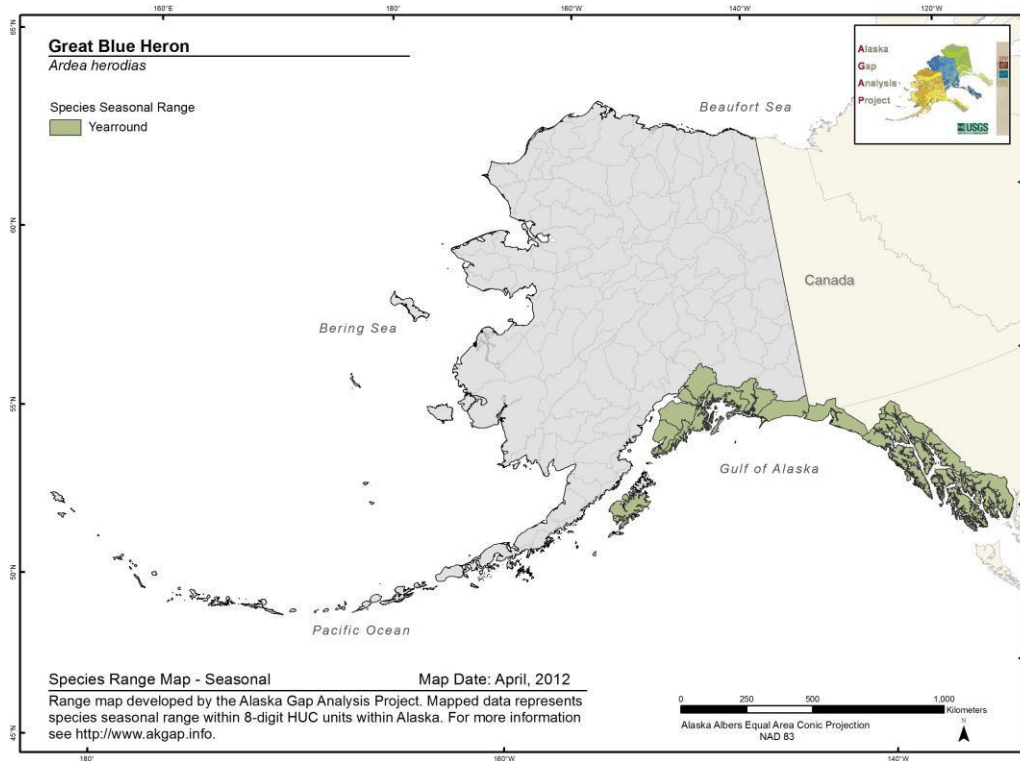
Great Blue Heron *Ardea herodias*

Range Map and Distribution Model Summary

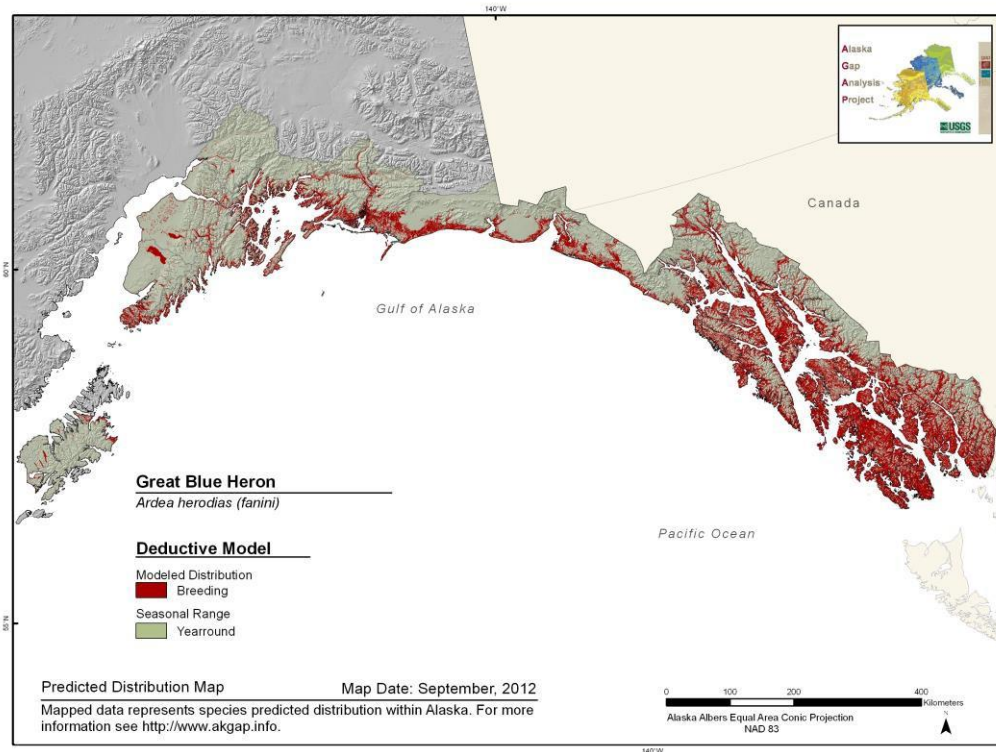
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.644**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, found in tidal sloughs, saltwater inlets and beaches, lower reaches of salmon spawning streams, shallow lakes, freshwater ponds and marshes. Nests in upperparts of trees and more rarely in shrubs or on ground. Nests in areas devoid of predators. Nests colonially in tall Sitka spruce, western red cedar, western hemlock, pine, red alder and black cottonwood (Campbell et al. 1990). Isolation from disturbance appears to be an important factor in nest site selection (Werschkul et al. 1976, Henny and Kurtz 1978, Parker 1980). Foraging habitat includes aquatic areas generally less than 0.5 m deep, such as: marine intertidal areas, estuaries, riparian areas, wetlands, freshwater lakes, and muskegs (Gabrielson and Lincoln 1959, Willard 1977). These areas are generally within 5 km of the nest site, although some areas have been identified up to 33 km (Mathisen and Richard 1978, Parris and Grau 1979, Thompson 1979). Considered adaptable. In winter and fall flies to estuaries and nearby grasslands or along riverbanks in BC.

References

- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.
- Henny, C.J. and J.E. Kurtz. 1978. Great blue herons respond to nesting and habitat loss. Wildl. Soc. Bull. 6:35-37.
- Mathisen, J. and A. Richards. 1978. Status of great blue herons on the Chippewa National Forest. Loon 50:104-106.

Parker, J. 1980. Great blue herons (*Ardea herodias*) in northwestern Montana: nesting habitat use and the effects of human disturbance. M.S. Thesis, Univ. of Montana. 82 p.

Parris, R.W. and G.A. Grau. 1979. Feeding sites of great blue herons in southwestern Lake Erie. *Proceedings Colonial Waterbird Group* 2:110-113.

Thompson, D.H. 1979. Feeding areas of great blue herons and great egrets nesting within the floodplain of the upper Mississippi River. *Proceedings of Colonial Waterbird Group*. 2:202-213.

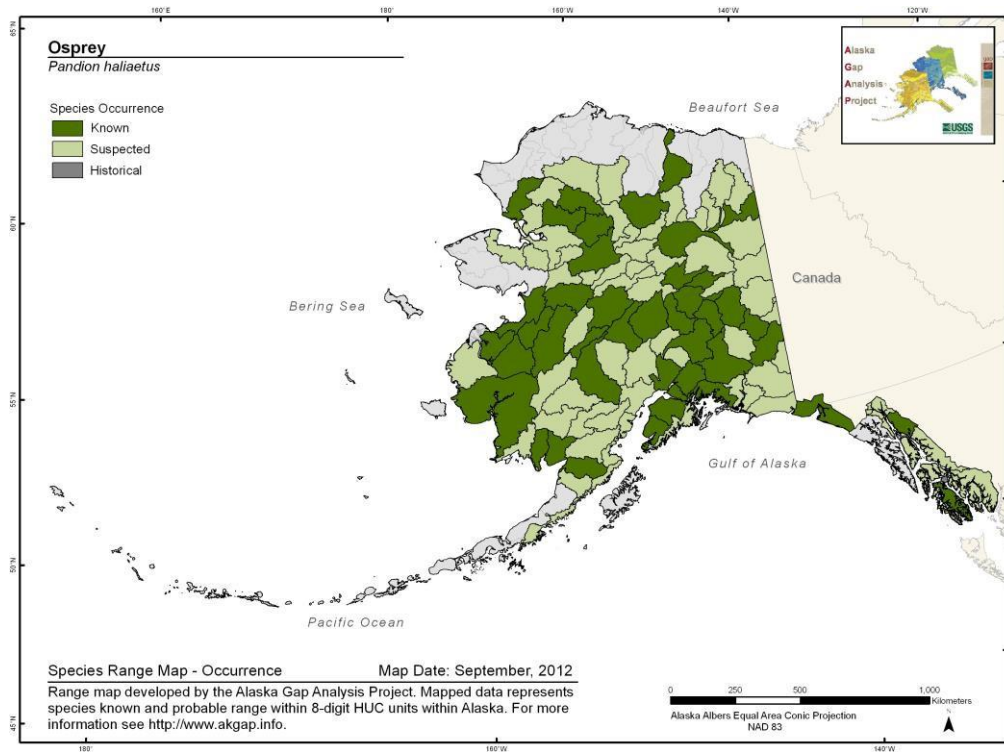
Werschul, D.F., E. McMahon, and M. Leitschuh. 1976. Some effects of human activities on the great blue heron in Oregon. *Wilson Bull.* 88(4):660-662.

Willard, D.E. 1977. The feeding ecology and behavior of five species of herons in southeastern New Jersey. *Condor* 79:462-470.

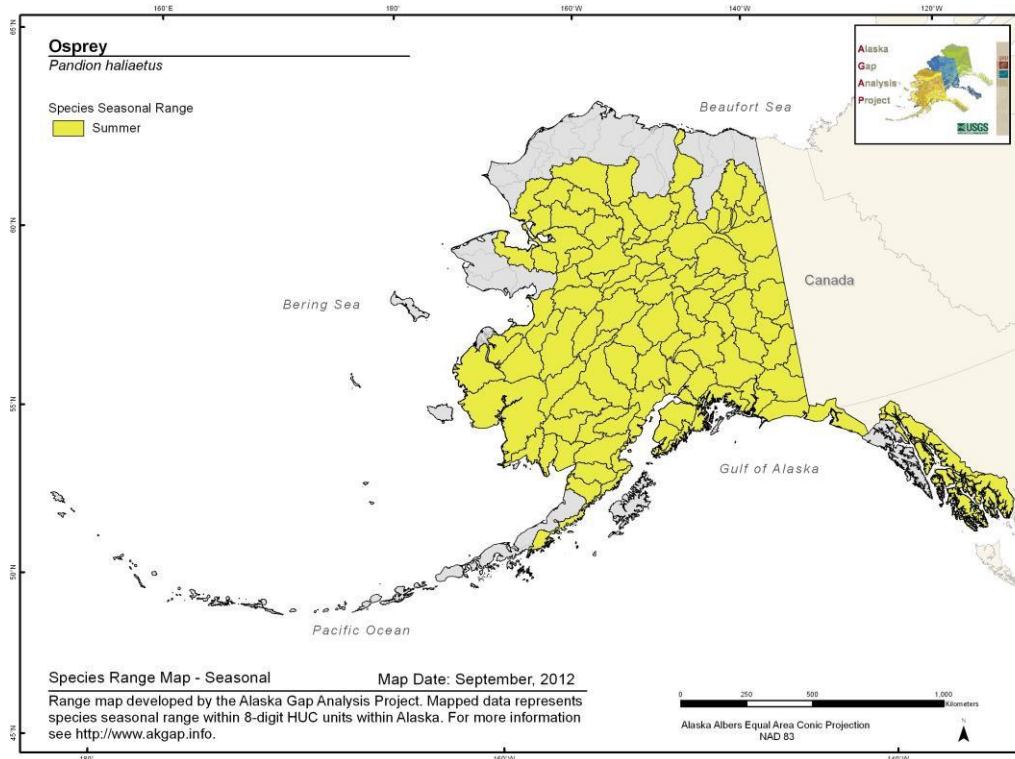
Osprey *Pandion haliaetus*

Range Map and Distribution Model Summary

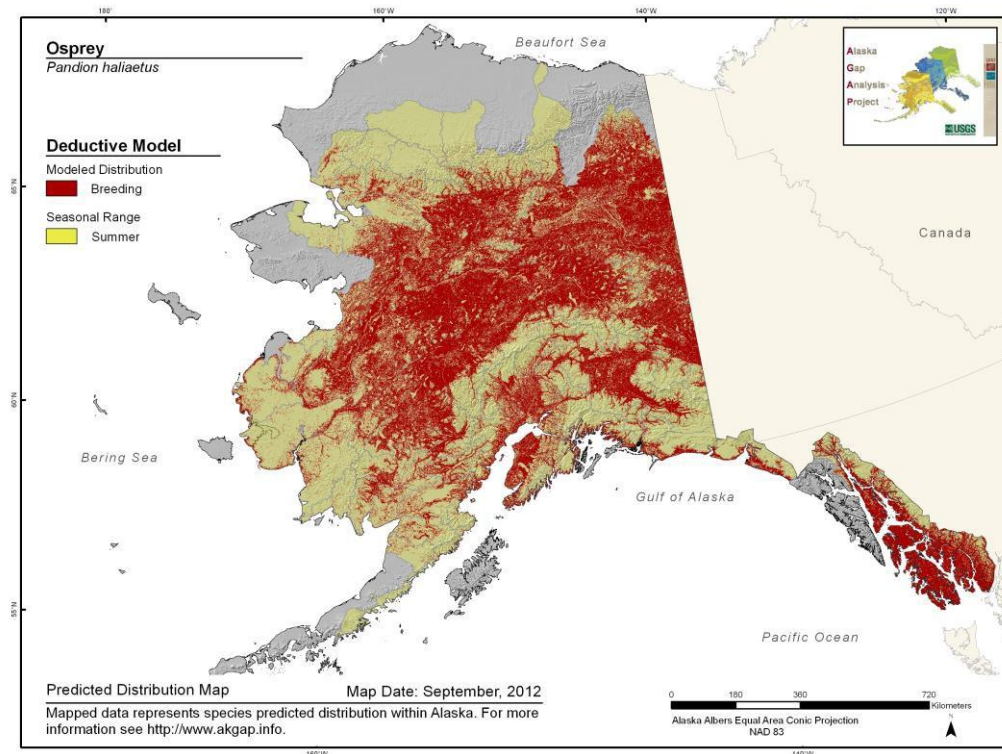
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.542**

**Model Quality
Summary:**
Low

Habitat Description

Boreal forests and other northern forests of Alaska with foraging habitat of shallow water nearby. Nest sites in trees, large rocks, bluffs, or artificial structures, especially over water. Presence of beavers may be an important habitat component because flooding creates dead snags for nesting and shallow water for fish (Poole et al. 2002). Need adequate supply of fish within 10-20 km and shallow waters, open nest sites free of predators (elevated), and ice free season for fledglings. Forages in a variety of habitats: coasts, salt marshes, lagoons, ponds, estuaries, coral reefs, and offshore (Poole et al. 2002).

References

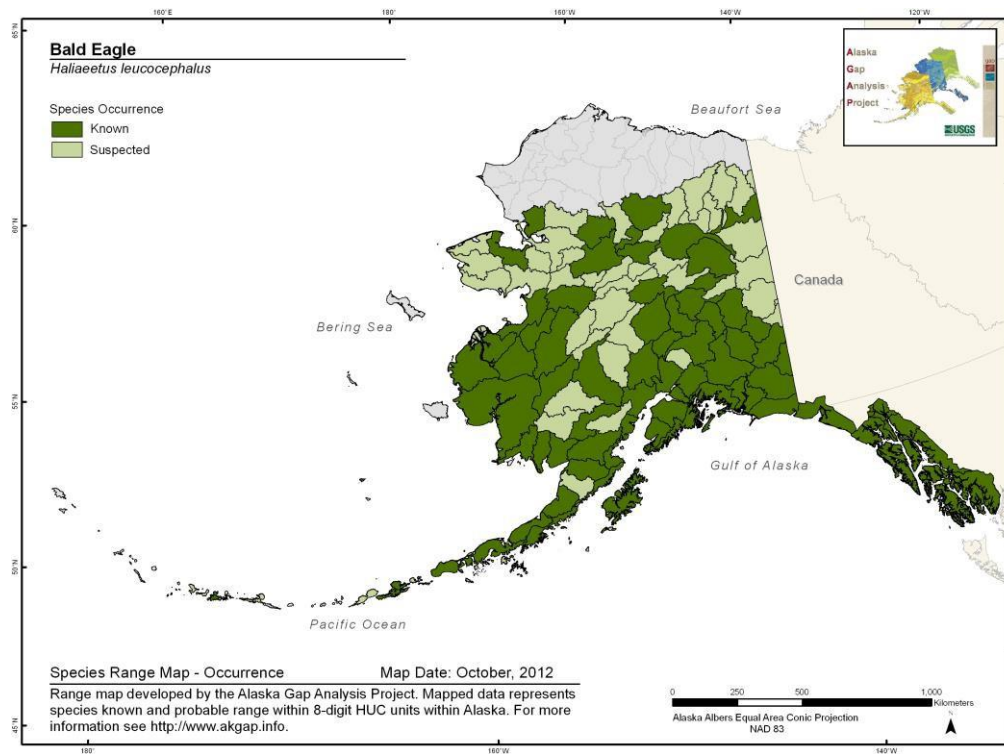
Poole, A. F., R. O. Bierregaard, and M. S. Martell. 2002. Osprey (*Pandion haliaetus*). In *The Birds of North America*, Vol. 7, No. 683 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Bald Eagle

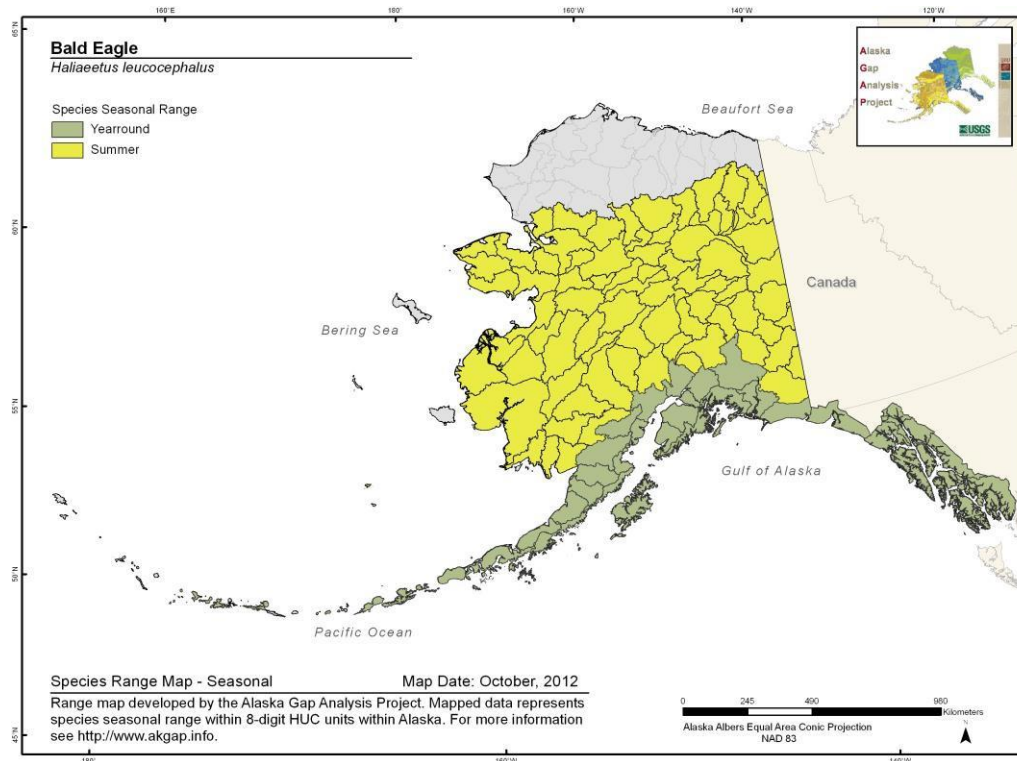
Haliaeetus leucocephalus

Range Map and Distribution Model Summary

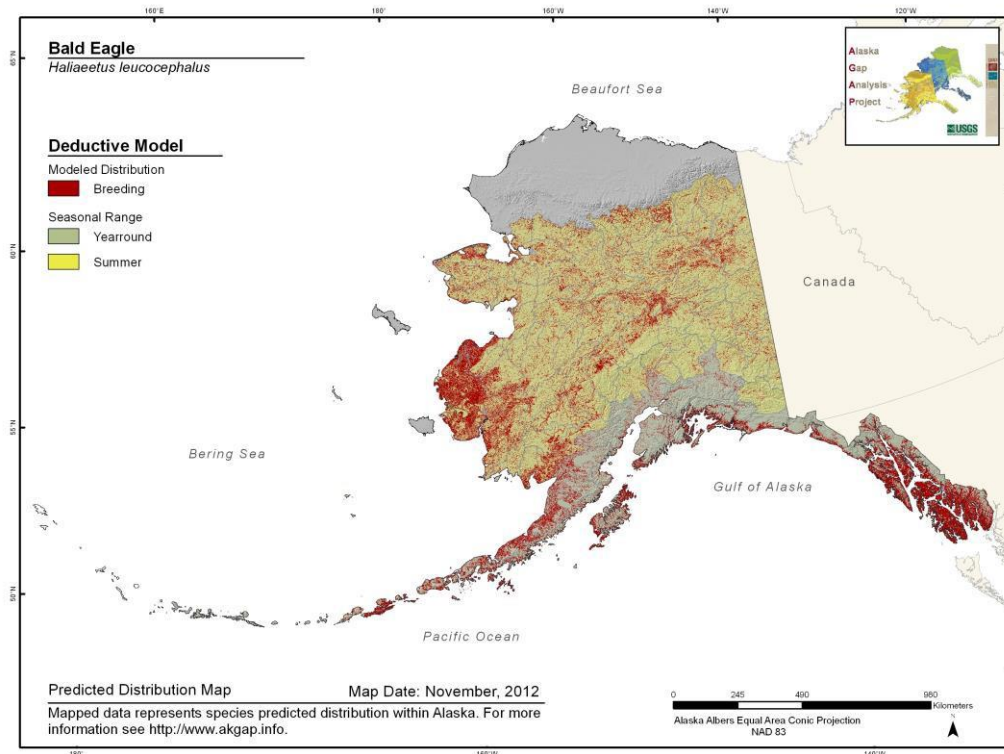
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.569**

**Model Quality
Summary:**
Low

Habitat Description

Breed in mature and old-growth forests near (<2 km) large bodies of water (Buehler 2000). Nests in trees, less frequently on cliffs or ground (Sherrod et al. 1976).

References

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In *The Birds of North America*. Vol. 7, No. 506 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

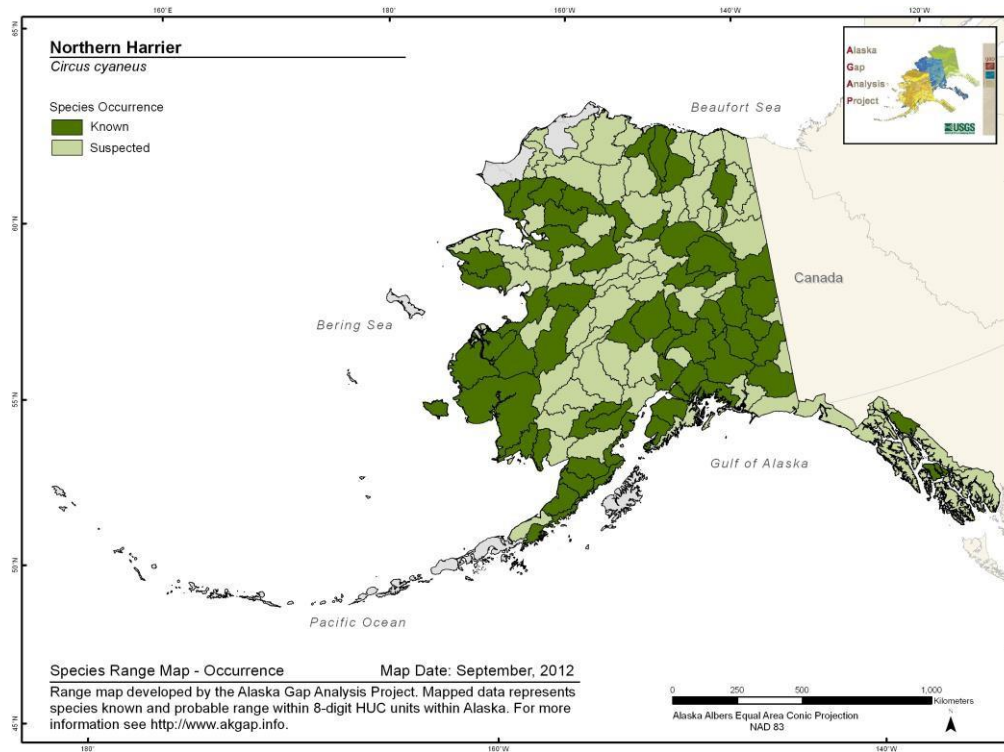
Sherrod, S. K., C. M. White, and F. S. L. Williamson. 1976. Biology of the Bald Eagle on Amchitka Island, Alaska. *Living Bird* 15:145-182.

Northern Harrier

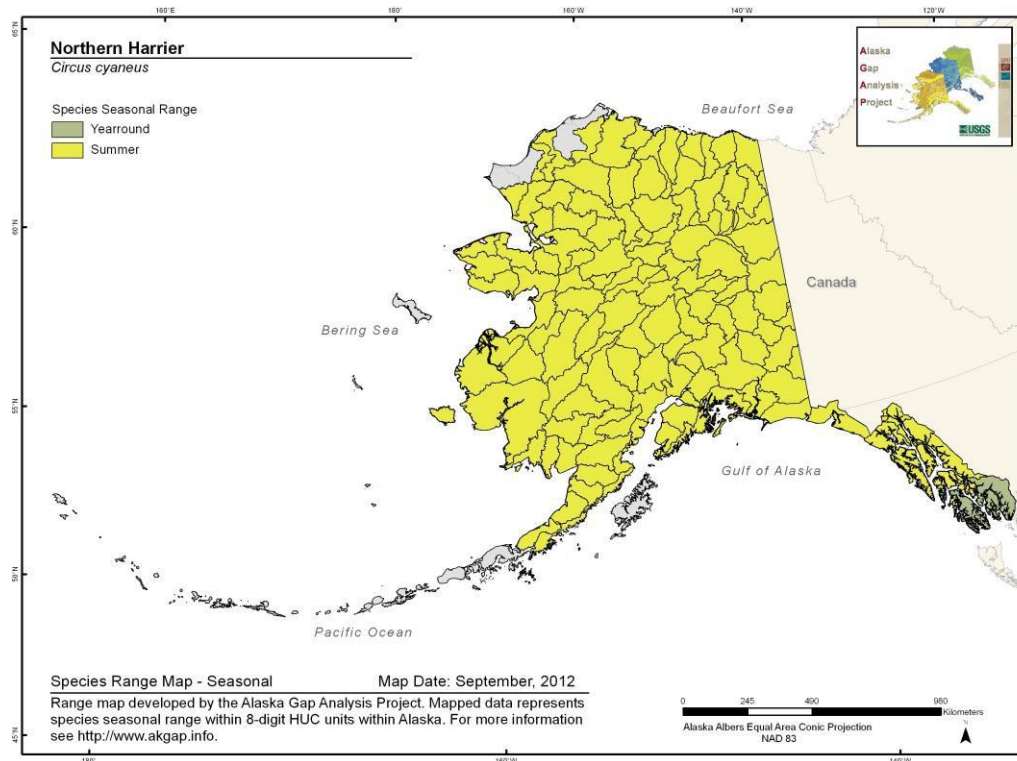
Circus cyaneus

Range Map and Distribution Model Summary

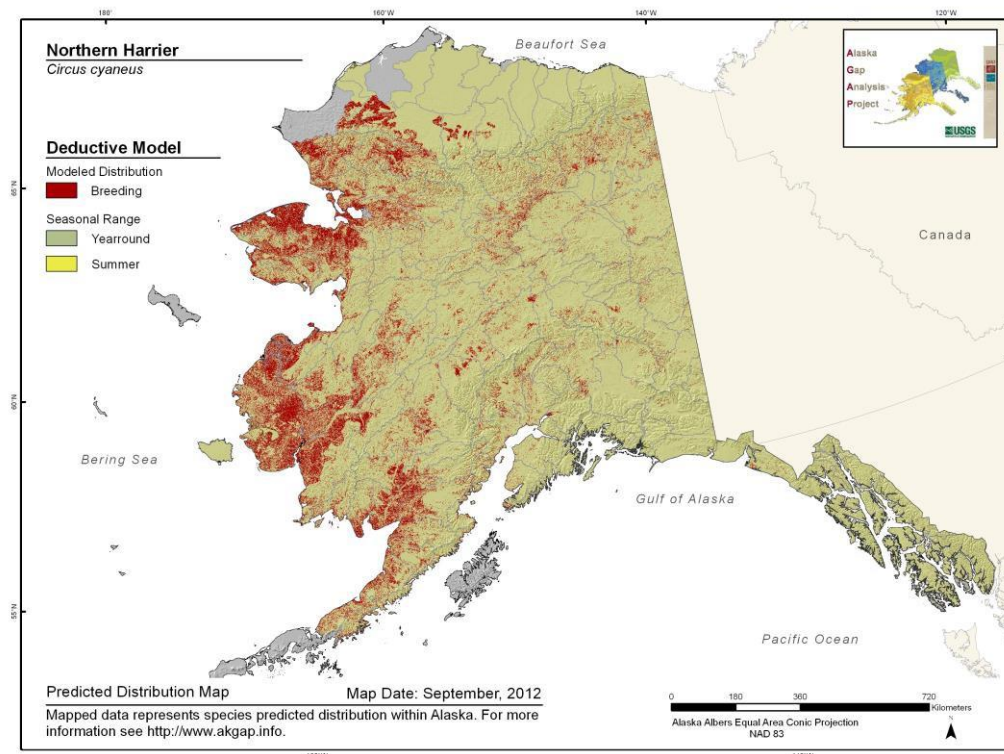
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.502**

**Model Quality
Summary:**
Low

Habitat Description

Occupies a variety of open habitats, typically with herbaceous cover and occasionally intermixed with woody species. Predominantly breeds in moist-open areas such as freshwater, saltwater and brackish marshes, wet meadows, lightly grazed pastures, abandoned fields, bogs, moorlands, tundra, and alpine meadows (Serrentino 1992, Macwhirter and Bildstein 1996).

References

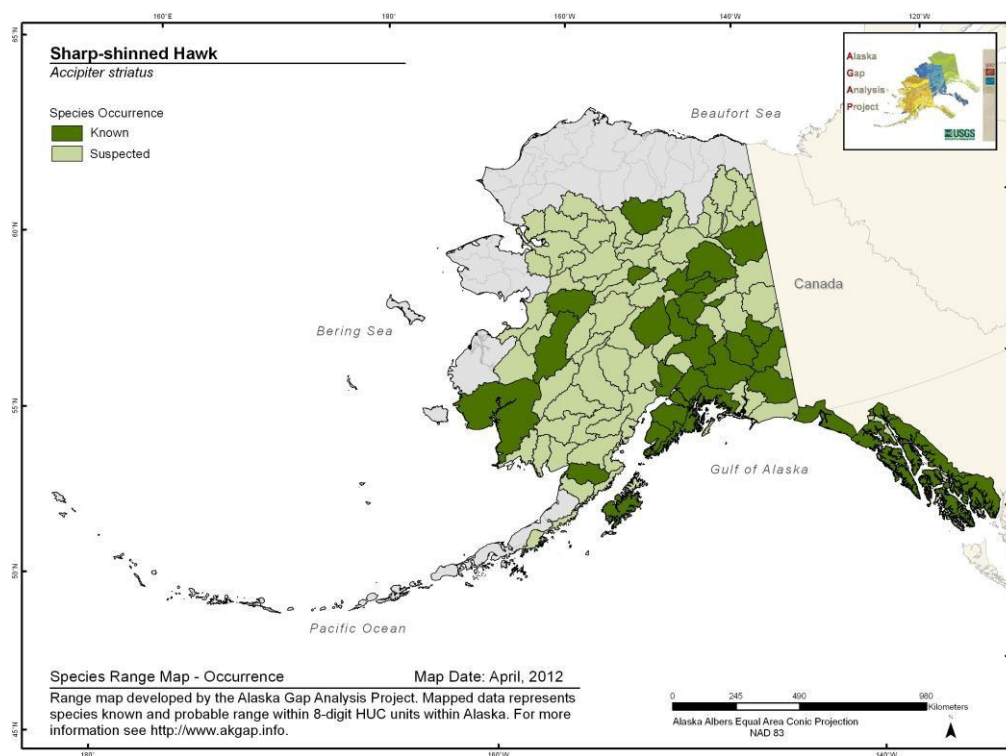
MacWhirter, R. B., and K. L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). In *The Birds of North America*, No. 210 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Serrentino, P. 1992. Northern Harrier, *Circus cyaneus*. Pages 89-117 in: K. J. Schneider and D. M. Pence, editors. *Migratory nongame birds of management concern in the Northeast*. USFWS, Newton Corner, MA. 400 pp.

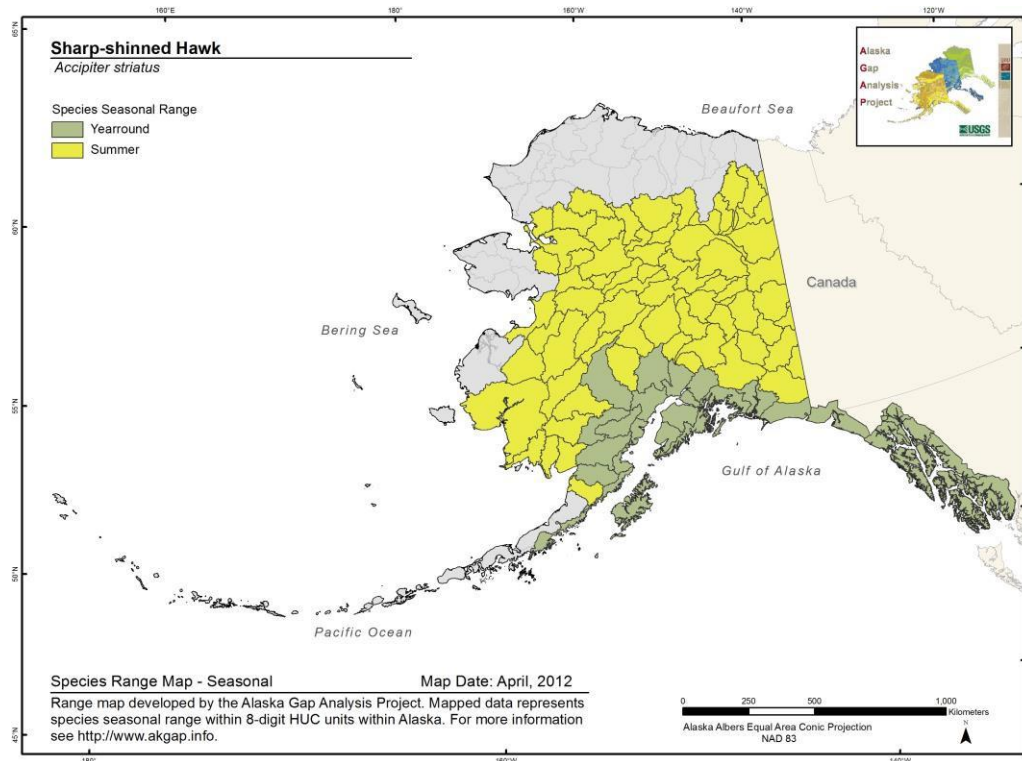
Sharp-shinned Hawk *Accipiter striatus*

Range Map and Distribution Model Summary

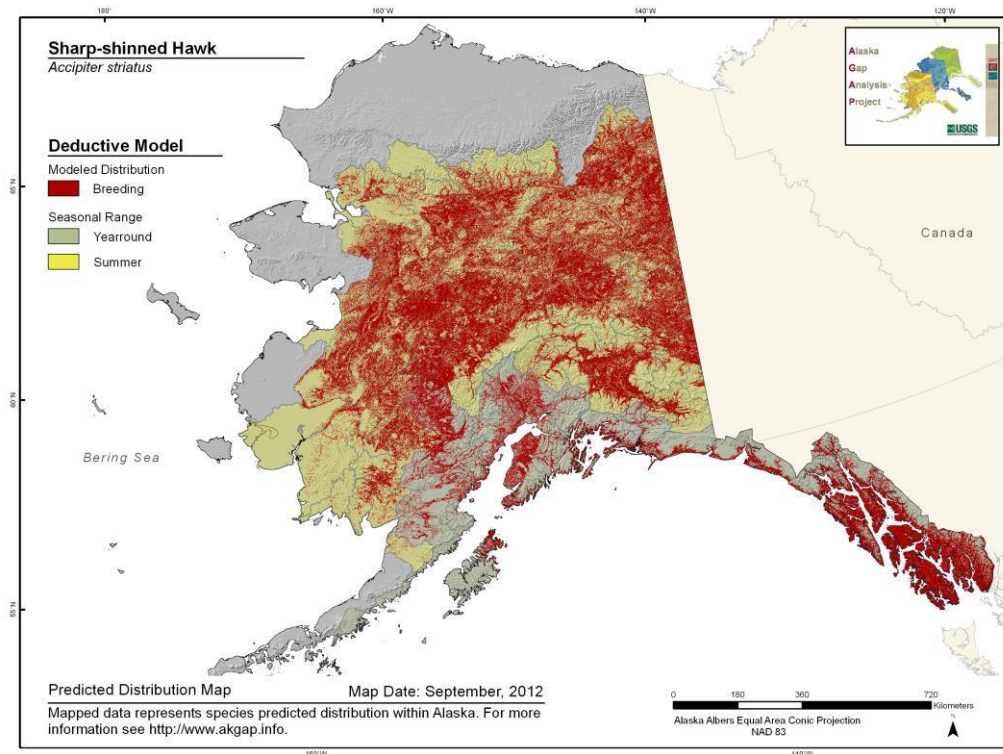
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.645**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in large stands of young, dense, deciduous, coniferous, and mixed pine-hardwood forests and pine plantations. Nests generally seem to be in a stand of dense conifers near a forest opening, though this may reflect observer bias (Meyer 1987). The foraging habitat during the breeding season is essentially the same as that chosen for nesting, and the birds appear to avoid open, deciduous forests, at least in Canada (Meyer 1987).

References

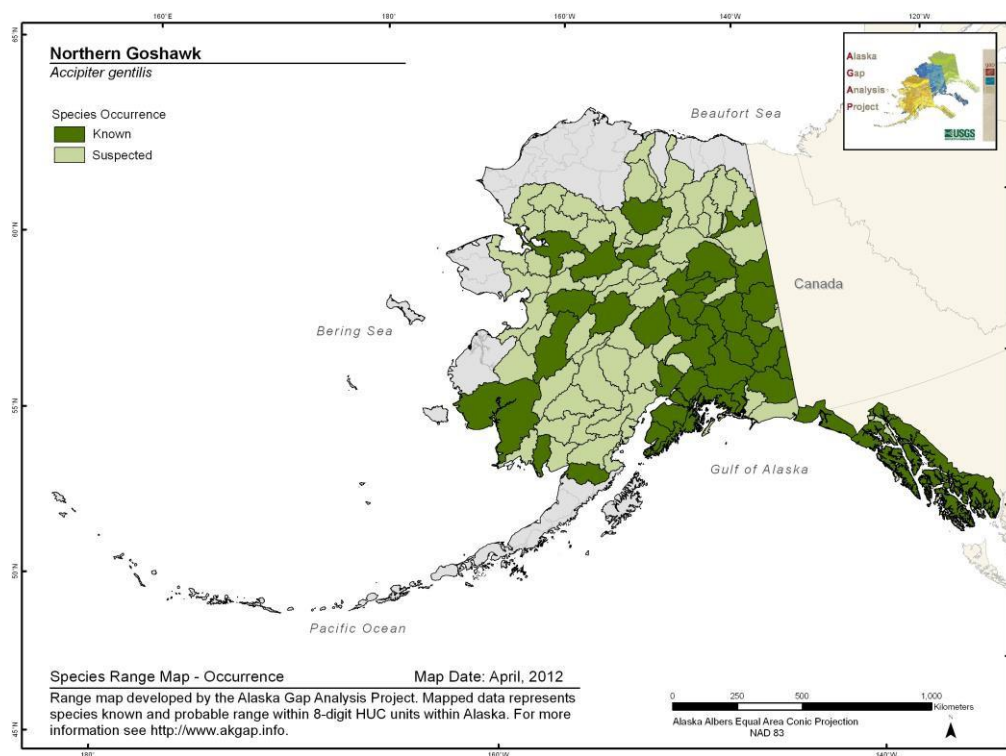
Meyer, K. D. 1987. Sexual dimorphism and the behavioral ecology of breeding and wintering Sharp-shinned Hawks. Ph.D. dissertation. University of North Carolina, Chapel Hill.

Northern Goshawk

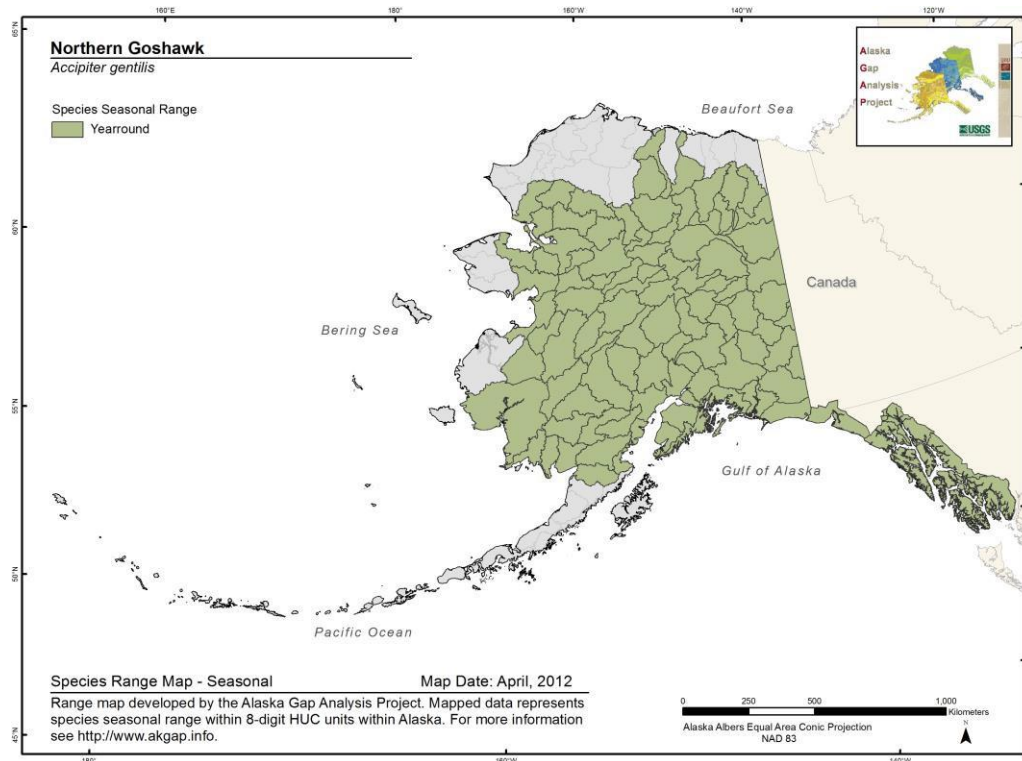
Accipiter gentilis

Range Map and Distribution Model Summary

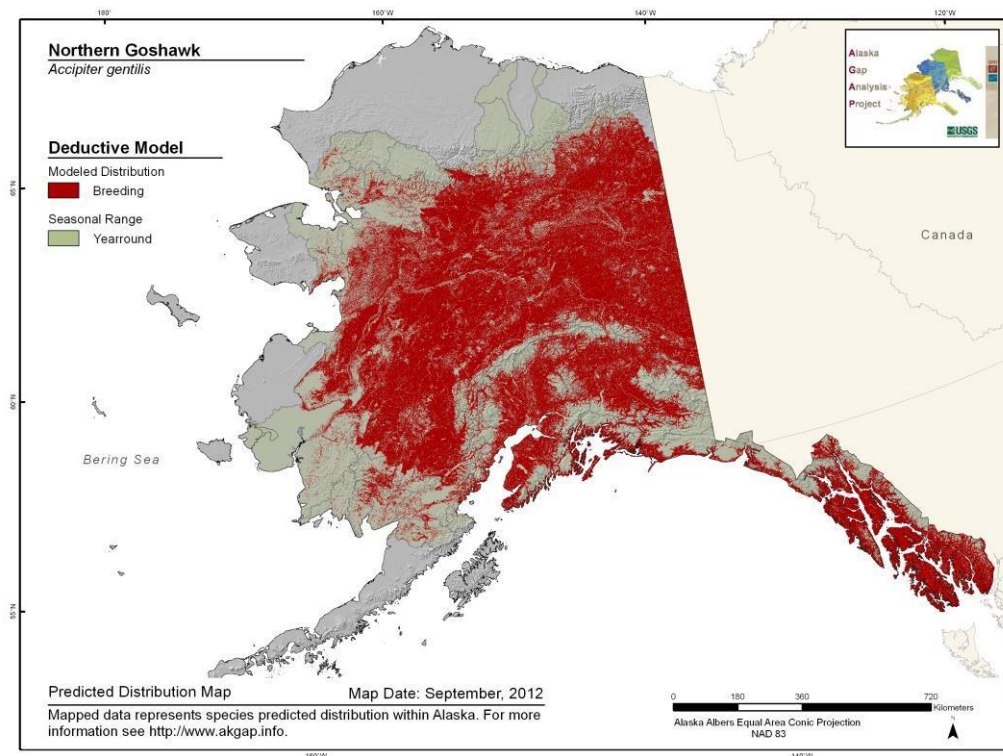
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.676**

**Model Quality
Summary:**
Low

Habitat Description

Nests in a variety of forest types. In interior Alaska, birch was preferred for nesting followed by other broadleaf trees (McGowan 1975). In coastal Alaska most nests in coniferous forests (Iverson et al. 1996). Nests are typically located in mature or old-growth forests consisting of primarily large trees with high canopy cover, and sparse ground cover (Reynolds et al. 1982, Speiser and Bosakowski 1987, Hayward and Escano 1989, Squires and Ruggiero 1996). Nest sites are often found near water (Bull and Hohman 1994, Hargis et al. 1994) and openings in the forest. Forages in a variety of open and forested habitats (Squires and Reynolds 1997). Wintering habitat less understood. Large patches of mature forests preferred; also used agricultural lands, wetlands, and clear-cuts (Widen 1989).

References

Bull, E. L. and J. E. Hohmann. 1994. Breeding biology of northern goshawks in northeastern Oregon. *Studies in Avian Biology* 16:103-105.

Hargis, C. D., C. McCarthy, and R. D. Perloff. 1994. Home ranges and habitats of northern goshawks in eastern California. *Studies in Avian Biology* 16:66-74.

Hayward, G. D. and R. E. Escano. 1989. Goshawk nest-site characteristics in western Montana and northern Idaho. *The Condor* 91:476-479.

Iverson, G. C., G. D. Hayward, K. Titus, E. DeGayner, R. E. Lowell, D. C. Crocker-Bedford, P. F. Schempf and J. Lindell. 1996. Conservation assessment for the Northern Goshawk in Southeast Alaska. C.G. Shaw III, Technical Coordinator. Gen. Tech. Rep. PNW-GTR-387. Portland, OR: USDA, USFS, Pacific Northwest Research Station. 101 pp.

McGowan, J. D. 1975. Distribution, density and productivity of goshawks in interior Alaska. Final report. Federal aid in wildlife restoration. Projects W-17-3, W-17-4, W-17-5, and W-17-6. Job 10.6R. Alaska Dept. of Fish and Game, Juneau, AK. 31 p. + appendices.

Reynolds, R. T., E. C. Meslow, and H. M. Wight. 1982. Nesting habits of coexisting *Accipiter* in Oregon. *Journal of Wildlife Management* 46:124-31.

Speiser, R., and T. Bosakowski. 1987. Nest site selection by northern goshawks in northern New Jersey and southeastern New York. *Condor* 89:387-394.

Squires, J. R. and R. T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). In *The Birds of North America*, No. 298 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Squires, J.R. and L.F. Ruggiero. 1996. Nest-site preference of northern goshawks in southcentral Wyoming. *Journal of Wildlife Management* 60(1):170-177.

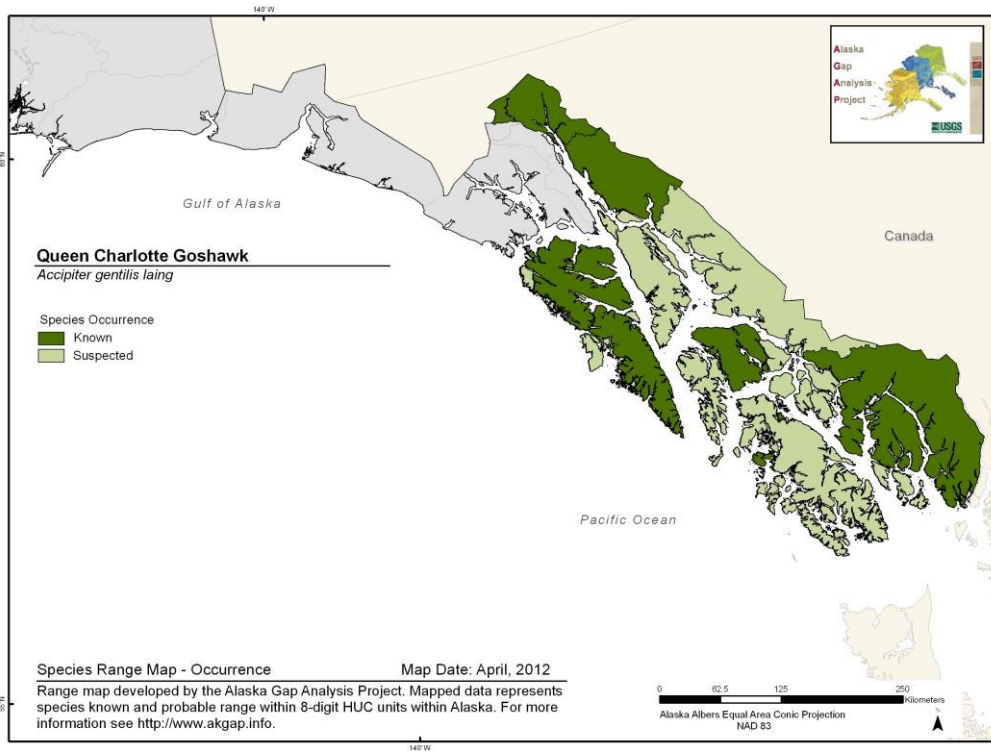
Widen, P. 1989. The hunting habitat of goshawks *Accipiter gentilis* in boreal forests of central Sweden. *Ibis*. 131(2): 205-31.

Queen Charlotte Goshawk

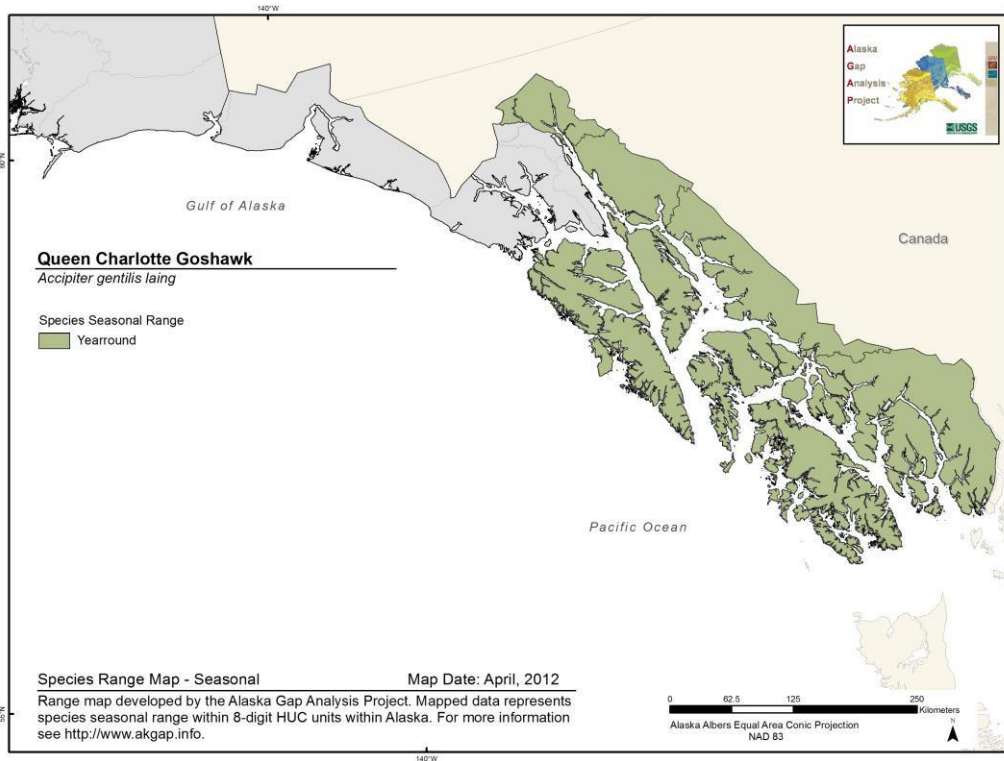
Accipiter gentilis laingi

Range Map and Distribution Model Summary

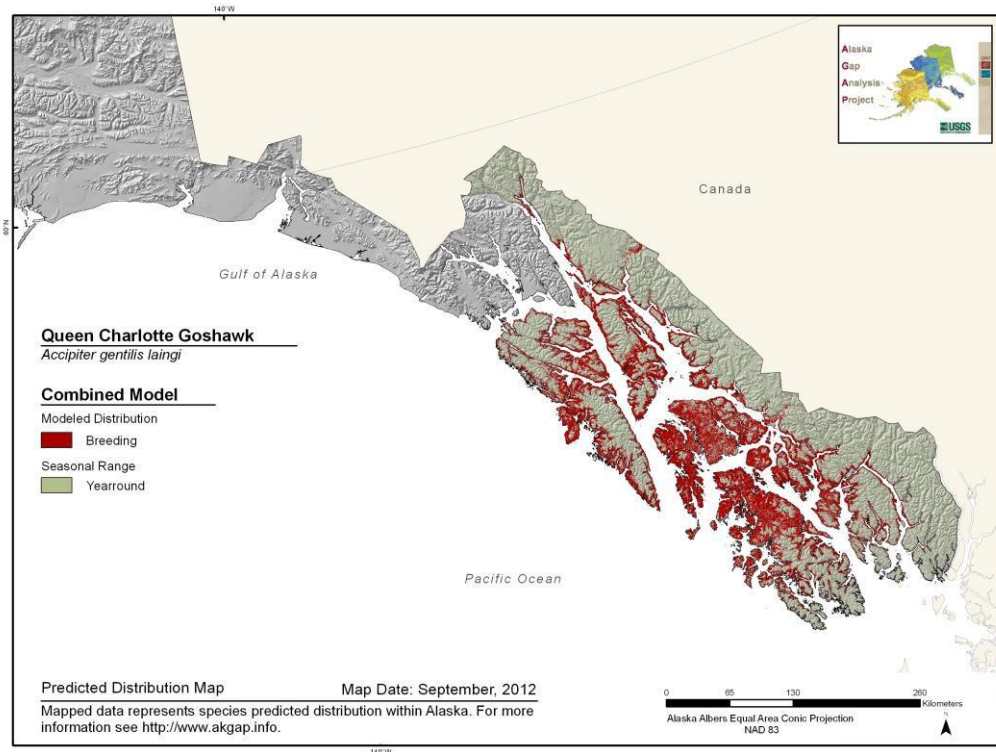
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.645**

**Model Quality
Summary:**
Low

Habitat Description

90% of nests in SE Alaska located in old growth. Nest in large western hemlock dominated forests with dense canopy and shrub layer. Nest trees either Sitka Spruce or Western Hemlock. Radio telemetry studies of birds in Southeast Alaska showed an avoidance of young forests and clearcuts in this subspecies (Iverson et al. 1996). The Queen Charlotte Goshawk forages in continuous forests and is less associated with edges compared to the species elsewhere. Habitat generalist, but nest sites specific.

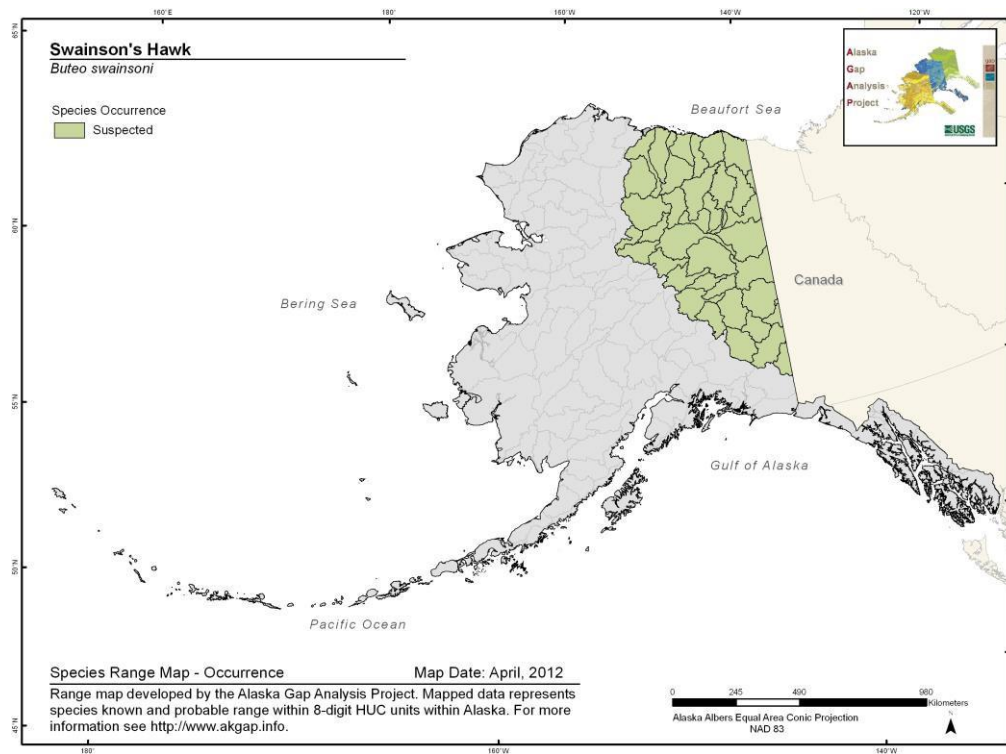
References

Iverson, G. C., G. D. Hayward, K. Titus, E. DeGayner, R. E. Lowell, D. C. Crocker-Bedford, P. F. Schempf and J. Lindell. 1996. Conservation assessment for the Northern Goshawk in Southeast Alaska. C.G. Shaw III, Technical Coordinator. Gen. Tech. Rep. PNW-GTR-387. Portland, OR: USDA, USFS, Pacific Northwest Research Station. 101 pp.

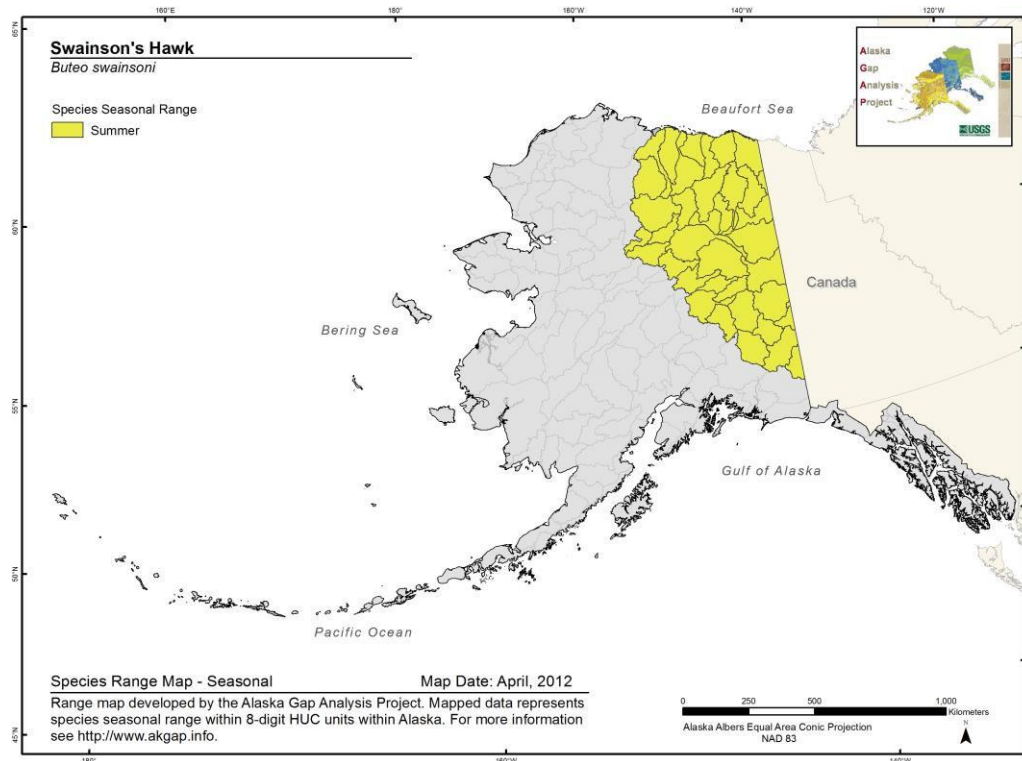
Swainson's Hawk *Buteo swainsoni*

Range Map and Distribution Model Summary

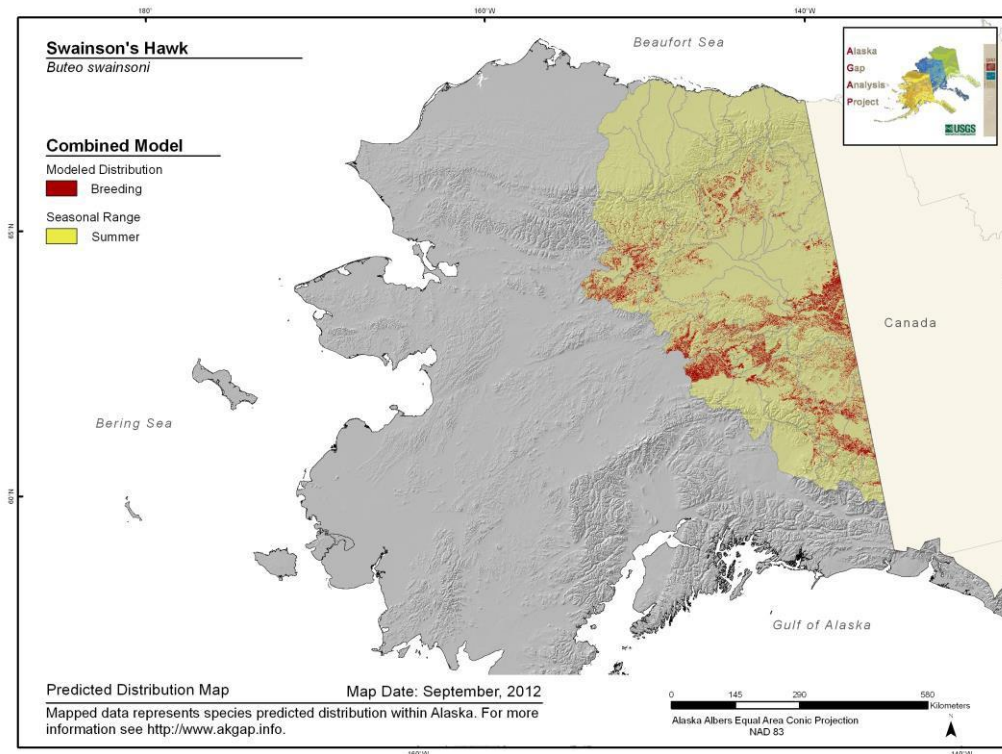
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Forages in open grass dominated habitat, sparse shrublands, and small open woodlands. Has adapted to agricultural areas with crops that do not exceed the height of native vegetation. Nests in scattered trees within foraging areas. In B.C., nests sites are typically in uplands areas of foothills and valleys (Campbell et al. 1990) and in the Yukon sightings have been near riverside cliffs where there is close access to open tundra (Alexander et al. 2003).

References

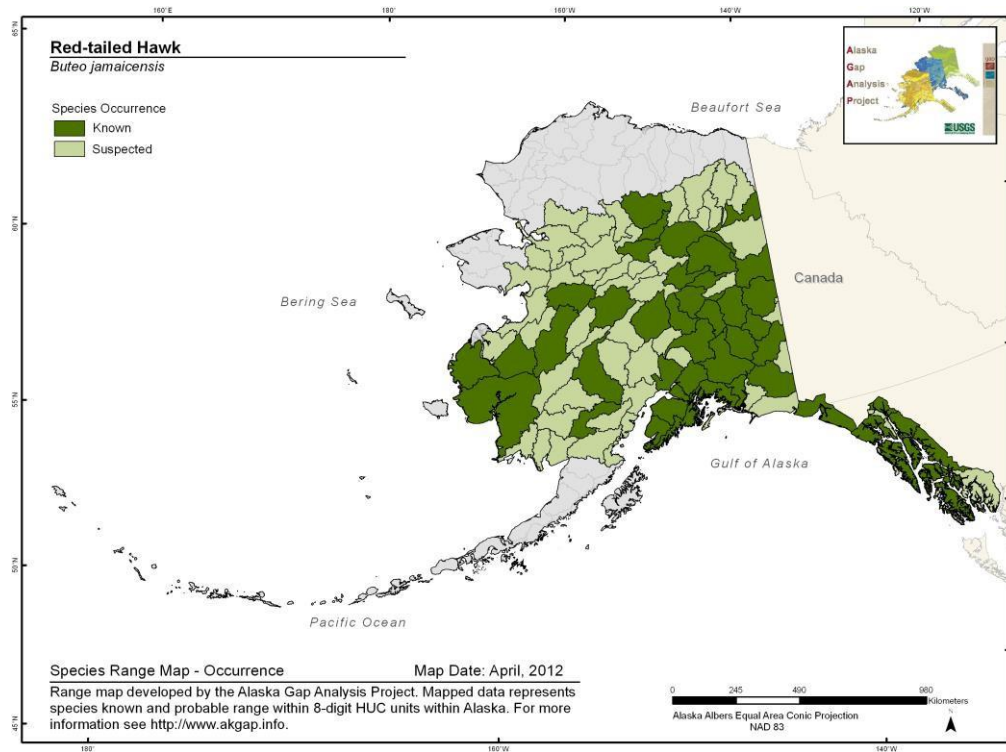
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

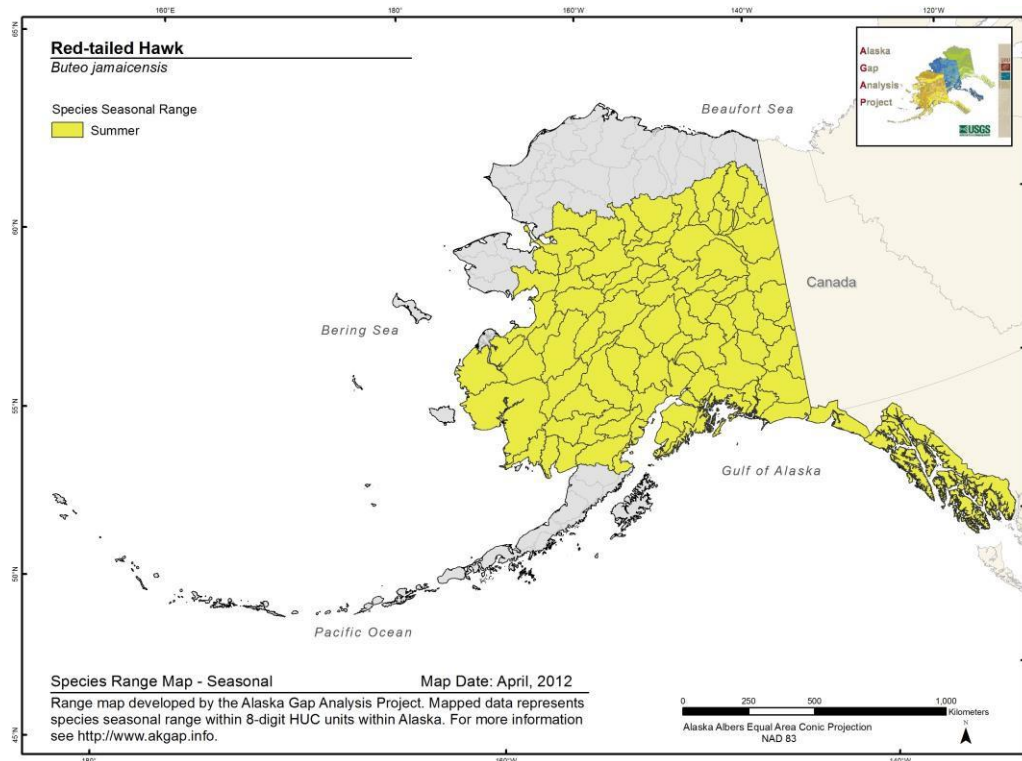
Red-tailed Hawk *Buteo jamaicensis*

Range Map and Distribution Model Summary

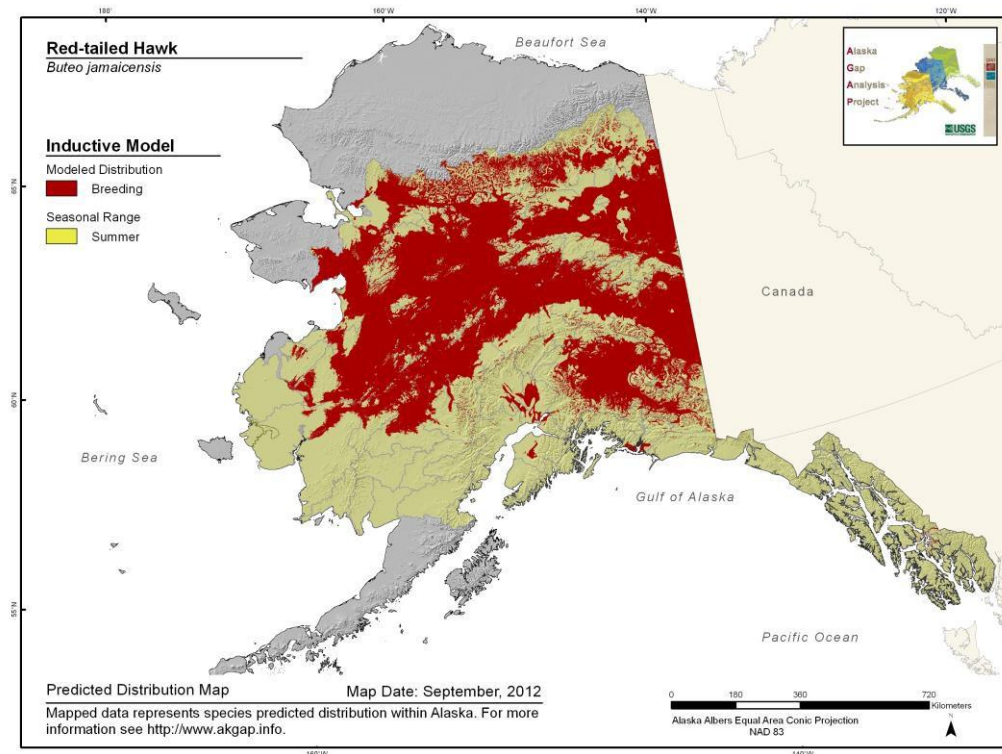
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.636**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat varies considerably, but is closely associated with open or semi open areas, such as edges of deciduous, coniferous, and mixed woodlands, agricultural fields, parkland, river bottomlands, woods bordering lakes, bogs, and marshes. Breeds from sea level to at least 2,230 m elevation in B.C. (Campbell et al. 1990).

References

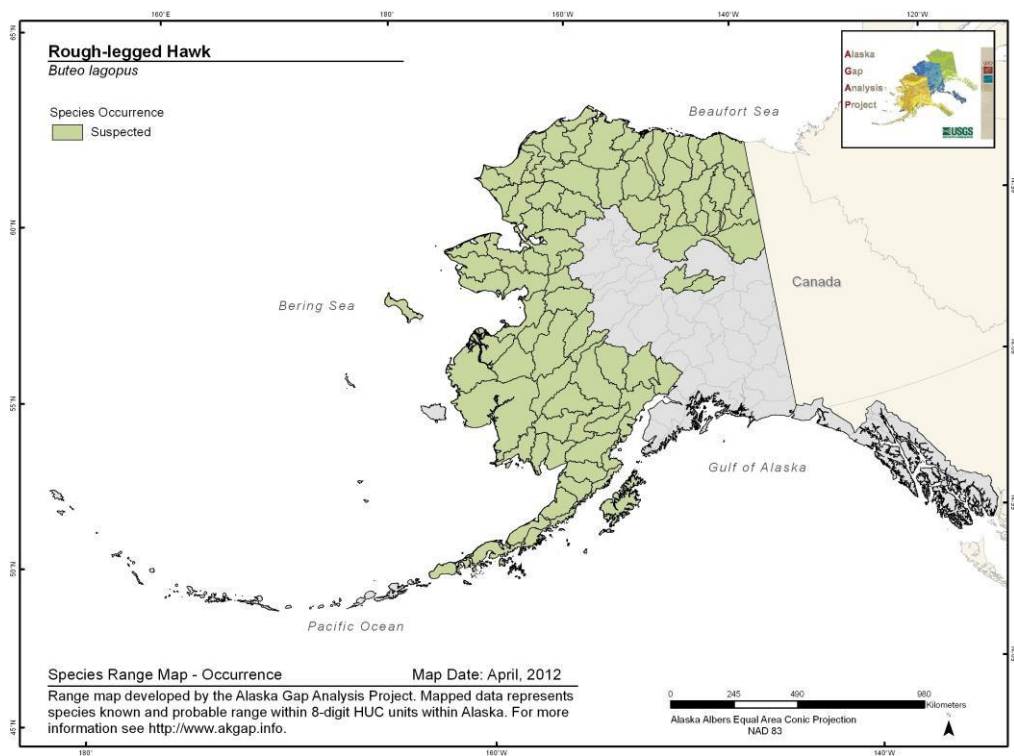
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Rough-legged Hawk

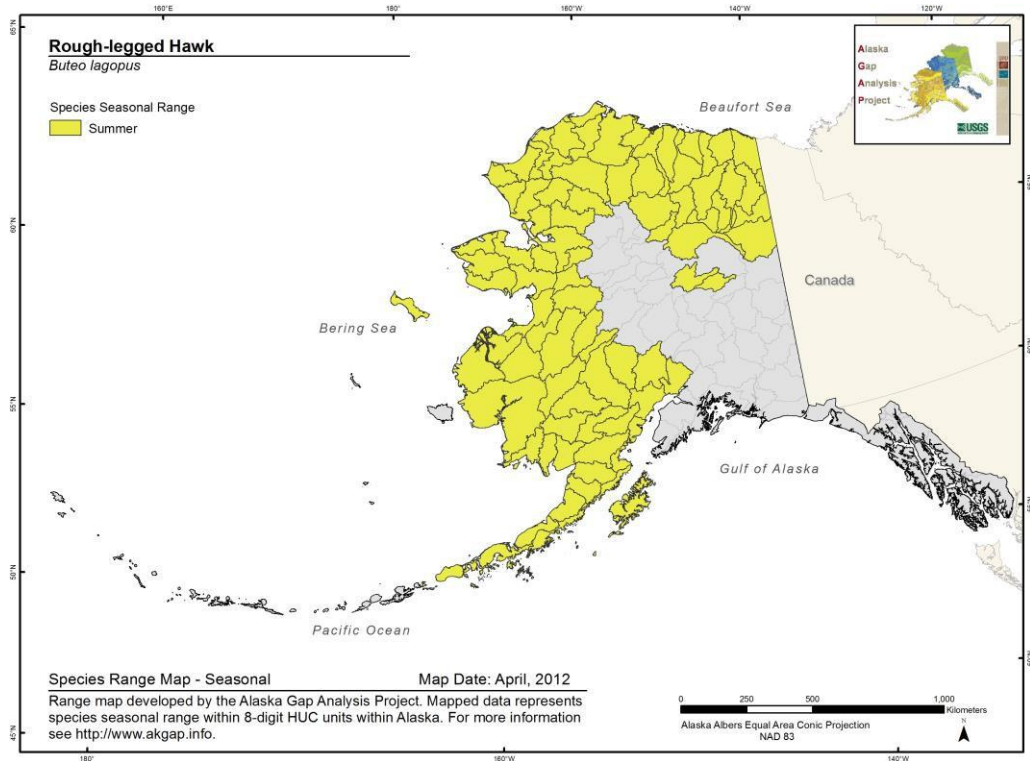
Buteo lagopus

Range Map and Distribution Model Summary

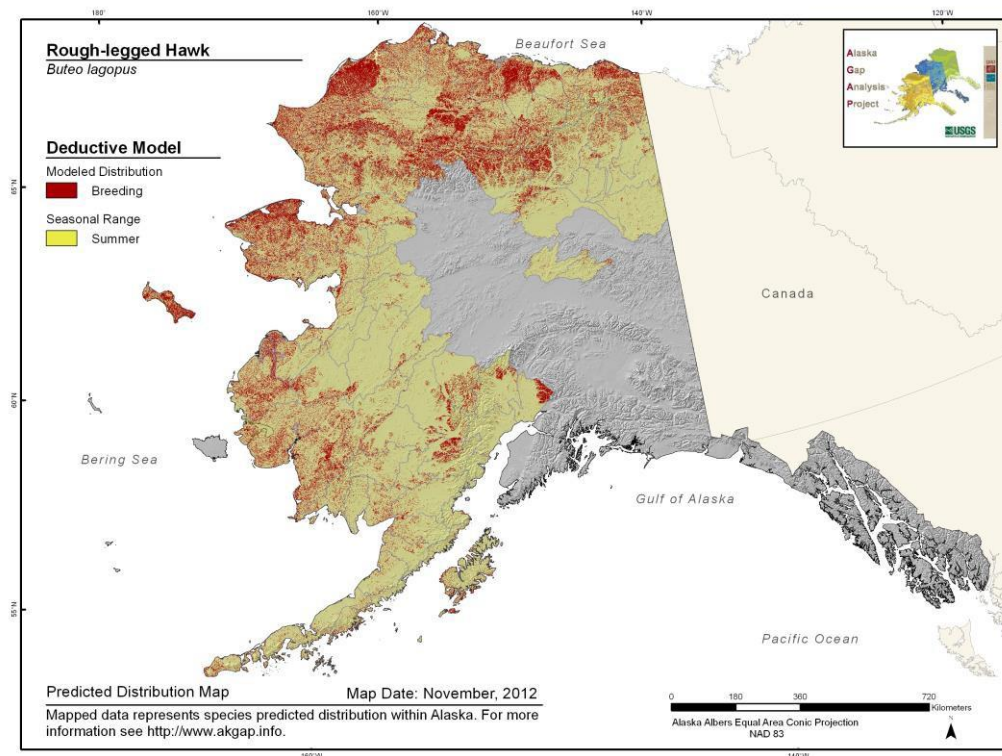
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.534**

**Model Quality
Summary:**
Low

Habitat Description

Primarily in high subarctic and arctic latitudes in boreal forests, low-lying boreal forest-tundra ecotones, and in tundra (Sealy 1966, White and Cade 1971, Calef and Heard 1979, Kuyt 1980, Mindell 1983, Poole and Bromley 1988, Kessel 1989, Ritchie 1991). In Alaska, hunts over bogs and other clearings (Mindell 1983). Nests on coastal, riverine, or upland cliffs. May nest in trees (Harwood pers. comm. in Bechard and Swem 2002).

References

Bechard, M. J. and T. R. Swem. 2002. Rough-legged Hawk (*Buteo lagopus*). In *The Birds of North America*, Vol. 7, No. 641 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Calef, G. W. and D. C. Heard. 1979. Reproductive success of Peregrine Falcons and other raptors at Wager Bay and Melville Peninsula, Northwest Territories. *Auk* 96:662-674.

Kessel, B. 1989. *Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history*. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

Kuyt, E. 1980. Distribution and breeding biology of raptors in the Thelon River Area, Northwest Territories, 1957-1969. *Canadian Field-Naturalist* 94:121-130.

Mindell, D. P. 1983. Nesting raptors in southwestern Alaska: status, distribution, and aspects of biology. USDI, BLM, Alaska Tech. Rep. 8. Anchorage, AK.

Poole, K. G. and R. G. Bromley. 1988. Interrelationships within a raptor guild in the central Canadian Arctic. *Canadian Journal of Zoology* 66:2275-2282.

Ritchie, R. J. 1991. Effects of oil development on providing nesting opportunities for Gyrfalcons and Rough-legged Hawks in northern Alaska. *Condor* 93:180-184.

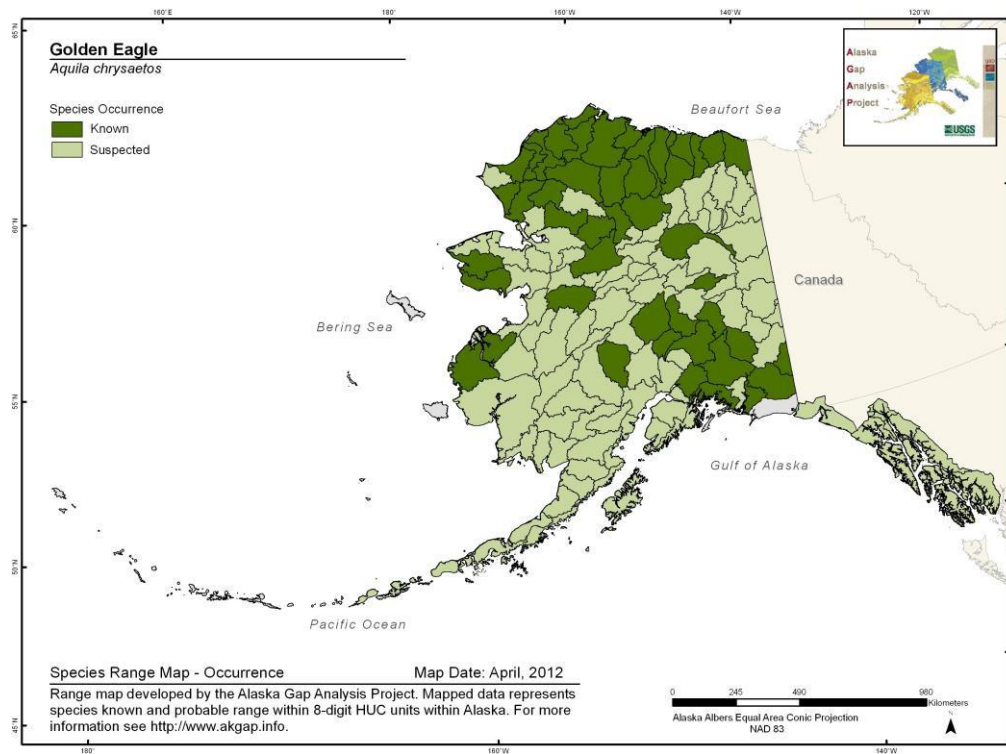
Sealy, S. G. 1966. Notes on the Rough-legged Hawk in the Perry River Region, Northwest Territories. *Blue Jay* 24:127-128.

White, C. M. and T. J. Cade. 1971. Cliff nesting raptors and ravens along the Colville River in arctic Alaska. *Living Bird* 10: 107-150.

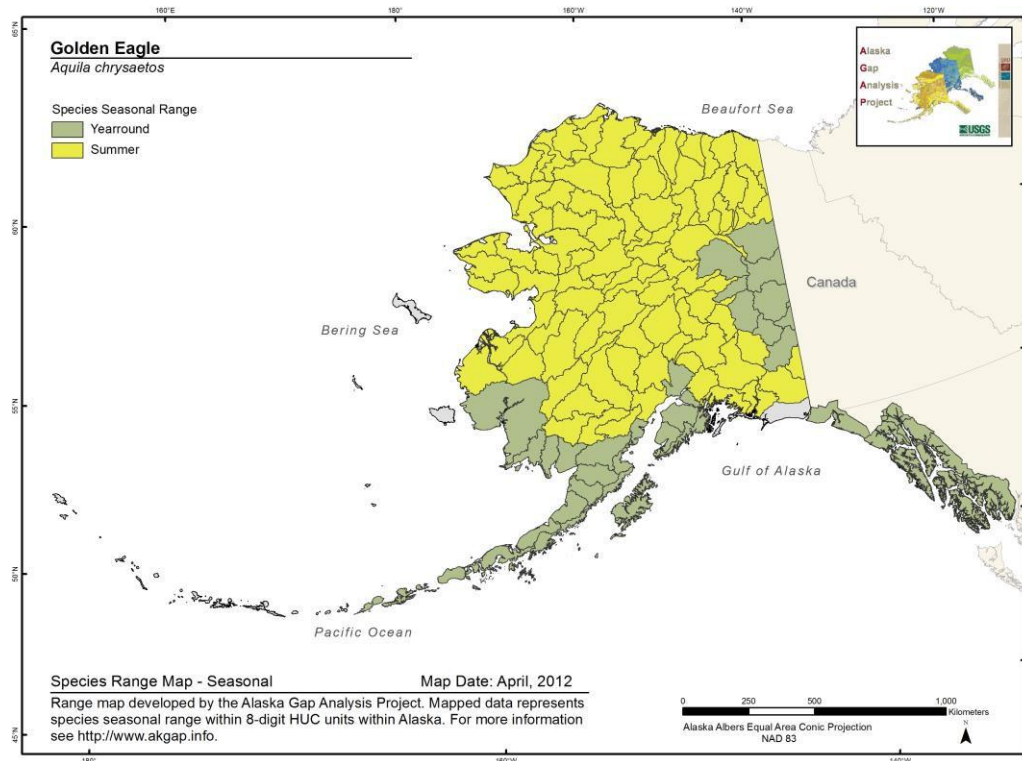
Golden Eagle *Aquila chrysaetos*

Range Map and Distribution Model Summary

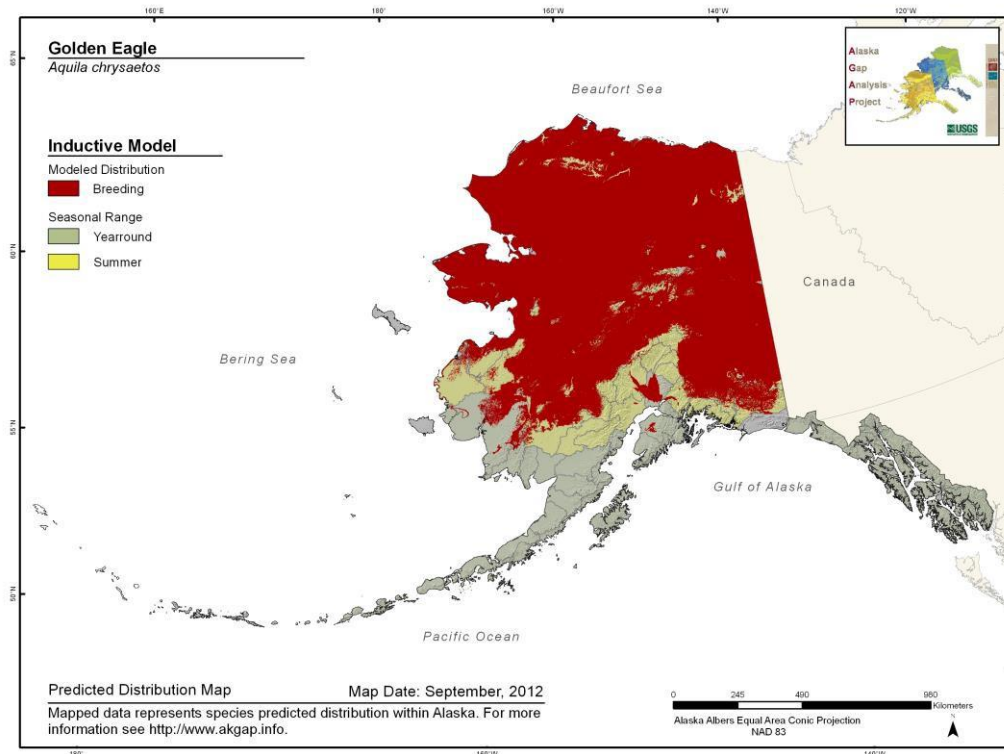
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.655**

**Model Quality
Summary:**
Low

Habitat Description

General habitat is open and semi-open habitats. Breeding habitat in N. and interior Alaska is rugged, mountainous terrain near or above timberline. Also, breeds along bluffs and cliffs along rivers below treeline and sea cliffs in nw. Alaska. In Denali NP breeds in alpine and subalpine habitats. Forages on alpine tundra at edges of subalpine scrub in sw. AK and tundra river valleys (Sage 1974, Ritchie and Curatolo 1982, Petersen et al. 1991, Young et al. 1995).

References

Petersen, M. R., D. N. Weir, and M. H. Dick. 1991. Birds of the Kilbuck and Ahklun Mountain Region, Alaska. North American Fauna 76. 158 pp.

Ritchie, R. J. and J. A. Curatolo. 1982. Notes on Golden Eagle productivity and nest site characteristics, Porcupine River, Alaska, 1979-1982. Raptor Research 16:123-127.

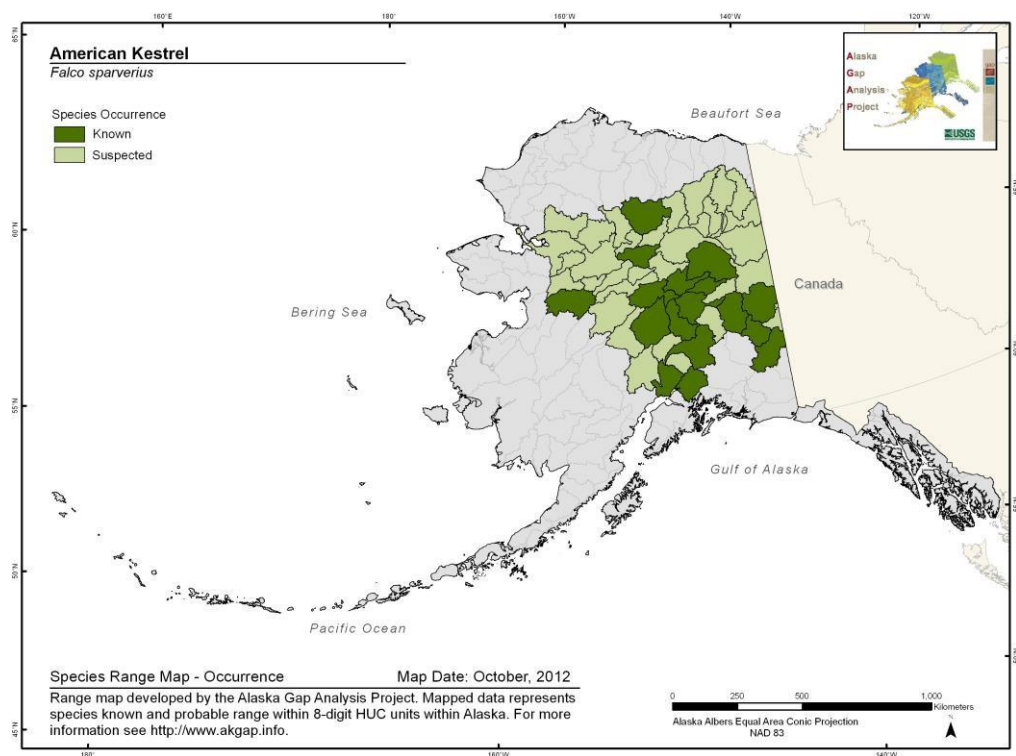
Sage, B. L. 1974. Ecological distribution of birds in the Atigun and Sagavanirktok River Valleys, arctic Alaska. Canadian Field-Naturalist 88:281-291.

Young, D. D., Jr., C. L. McIntyre, P. J. Bente, T. R. McCabe, and R. E. Ambrose. 1995. Nesting by Golden Eagles on the north slope of the Brooks Range in northeastern Alaska. Journal of Field Ornithology 66:373-379.

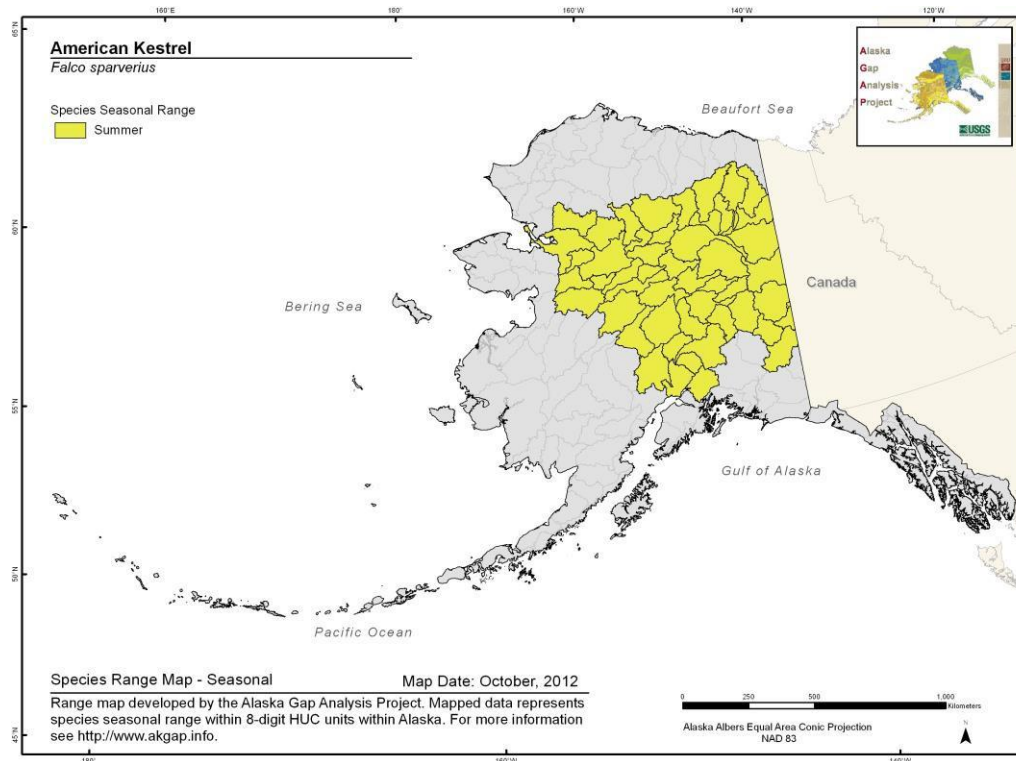
American Kestrel *Falco sparverius*

Range Map and Distribution Model Summary

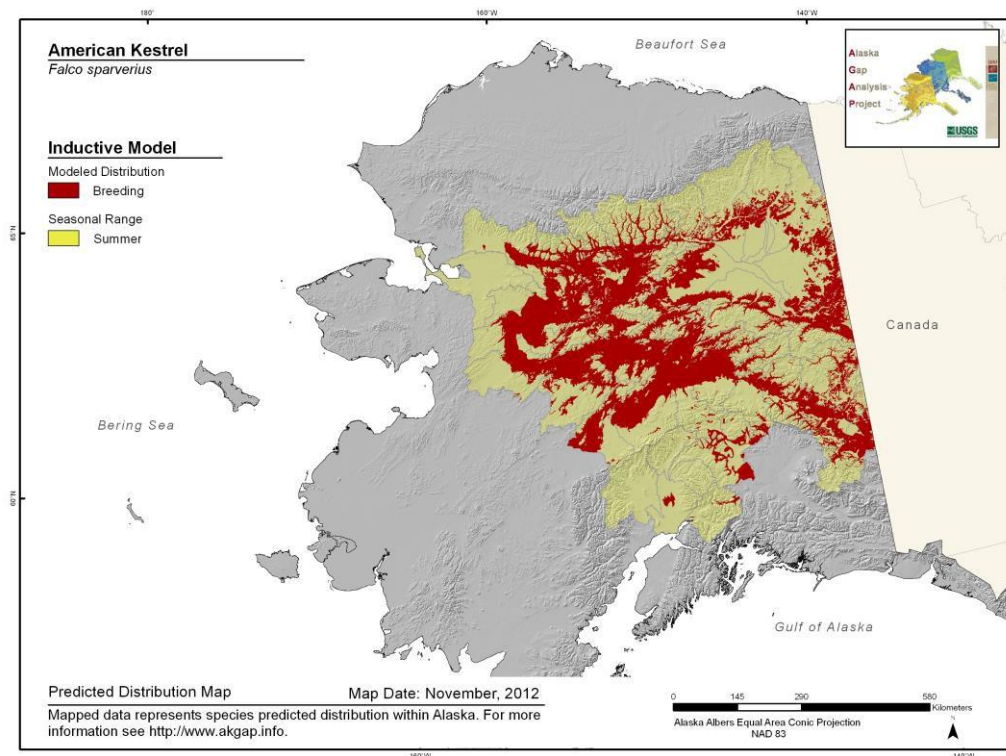
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.705**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in semi-open to open country, with trees, poles, and cliffs. In B.C., found from sea level to at least 1,770 m in elevation and breeding habitat includes trembling aspen groves, woodland edges, river bottomlands, wooded lakeshores, farmlands, burns, meadows, marshes, bogs, and infrequently residential areas (Campbell et al. 1990). In the Yukon, this species is also found in alpine and tundra areas not far from treeline and in open spruce and mixed spruce/aspen forests (Alexander et al. 2003).

Nests in natural holes in trees, abandoned woodpecker holes, holes in buildings or cliffs, abandoned magpie nests, and similar sites.

References

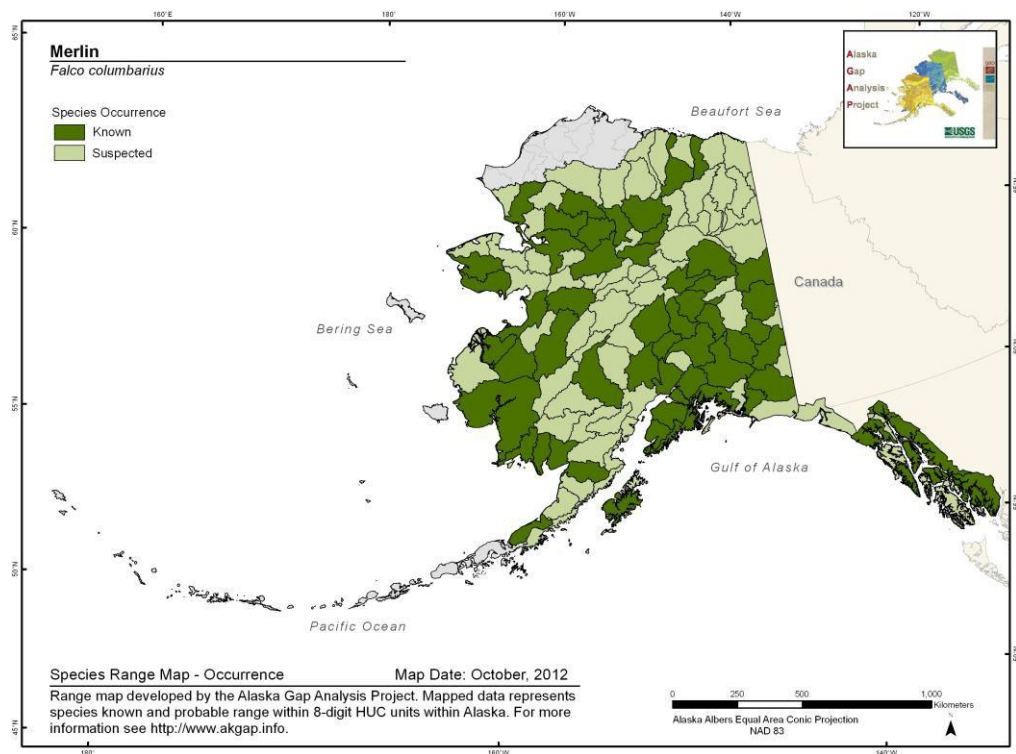
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

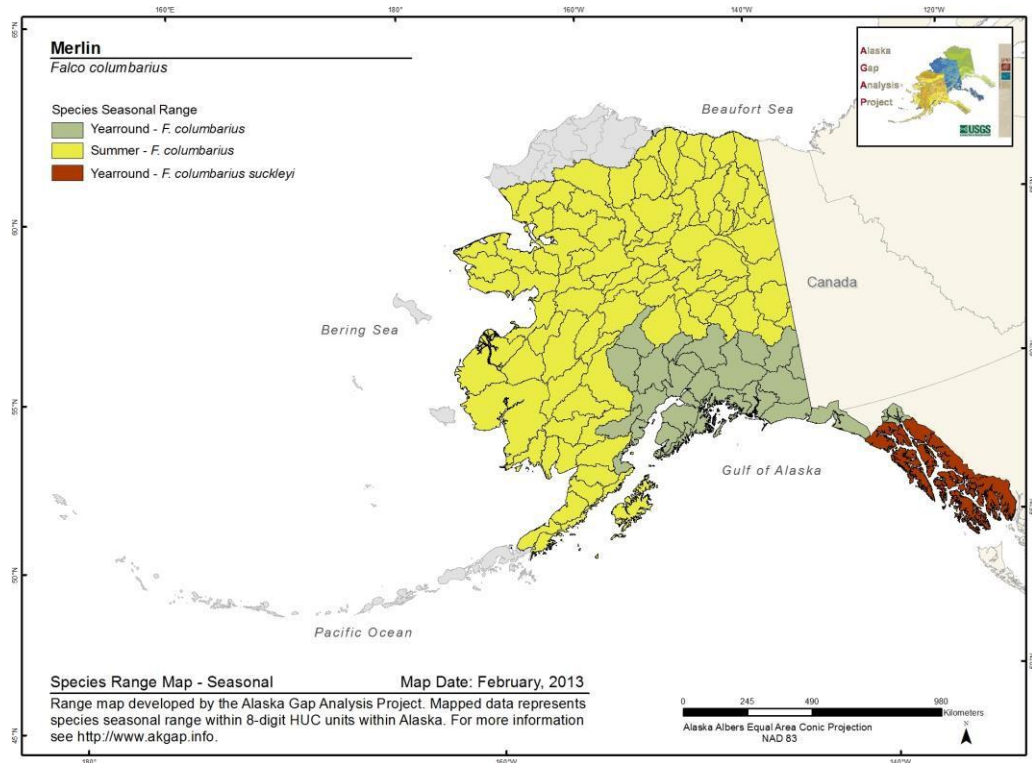
Merlin *Falco columbarius*

Range Map and Distribution Model Summary

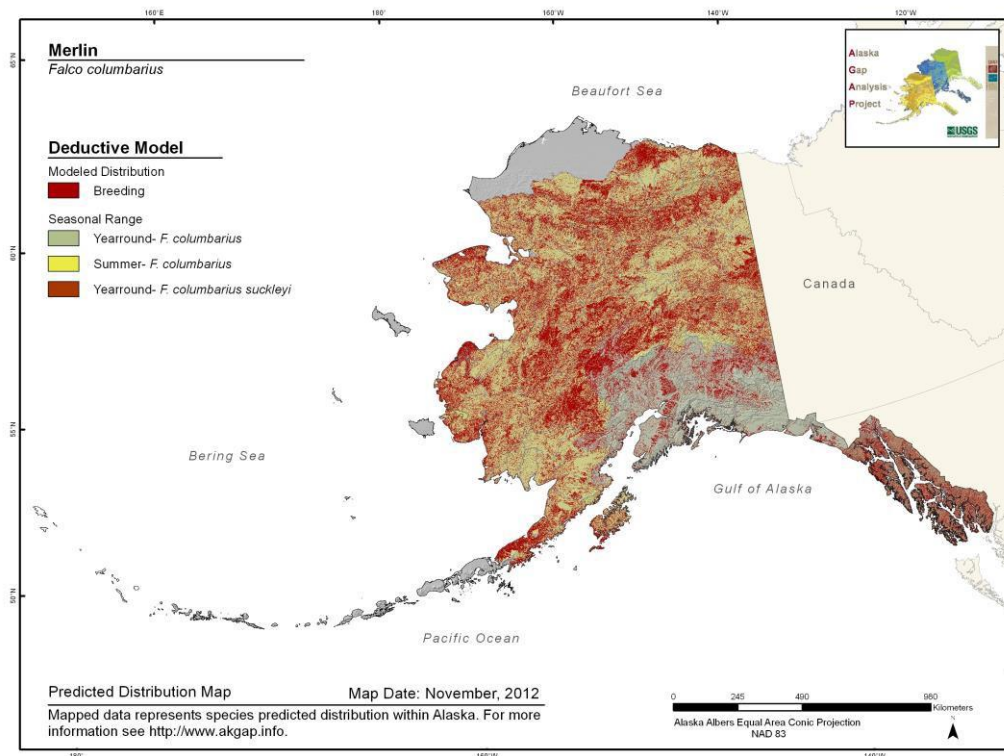
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.554**

**Model Quality
Summary:**
Low

Habitat Description

Semi-open areas. Taiga merlins nest near forest openings, in fragmented woodlots, open woodlands, and often near rivers, lakes, or bogs. Often use old black-billed magpie nests. Also, use squirrel nests, ledges, parasitic growths on spruce trees, and in ground nests. Black merlins nest along rivers and coastal areas, and possibly near alpine meadows. Associated with northwestern crows. Edges of forest habitat adjoining open areas, such as muskegs, ponds, lakes, ocean may be suitable. In the Yukon, frequents open riparian and alpine areas (Alexander et al. 2003).

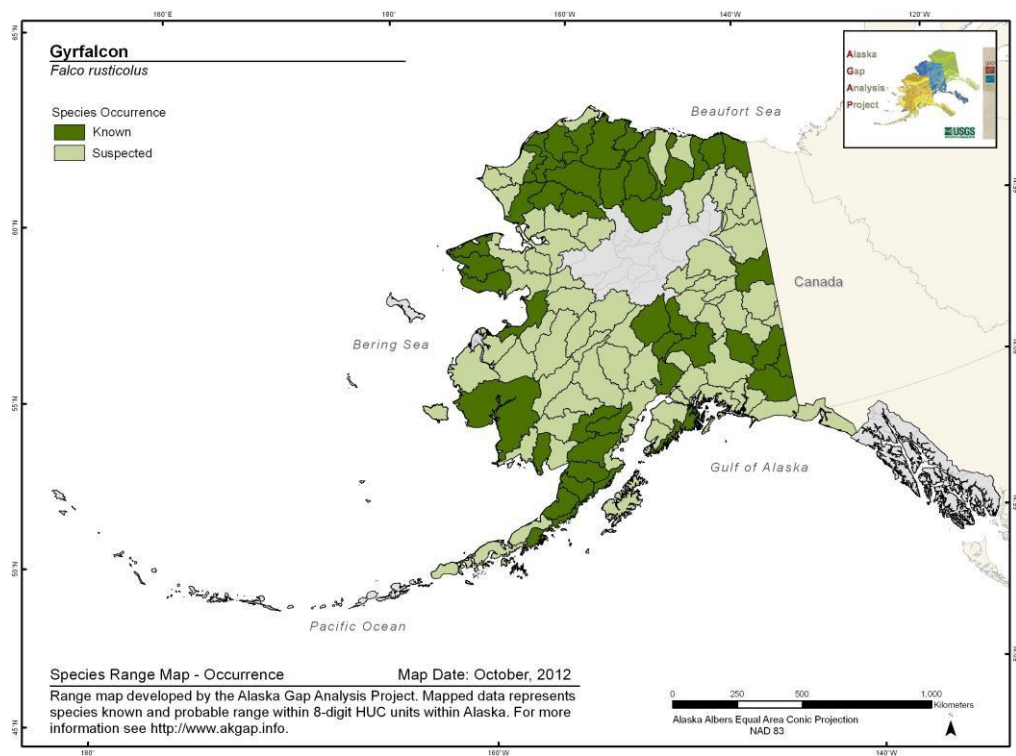
References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

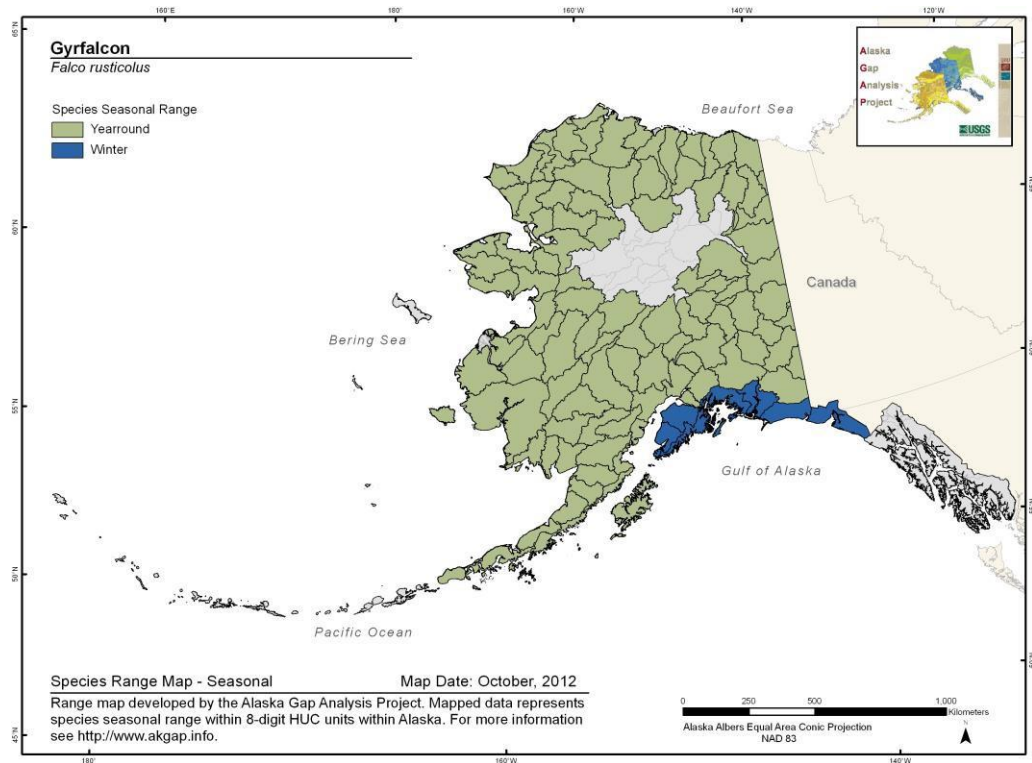
Gyr Falcon *Falco rusticolus*

Range Map and Distribution Model Summary

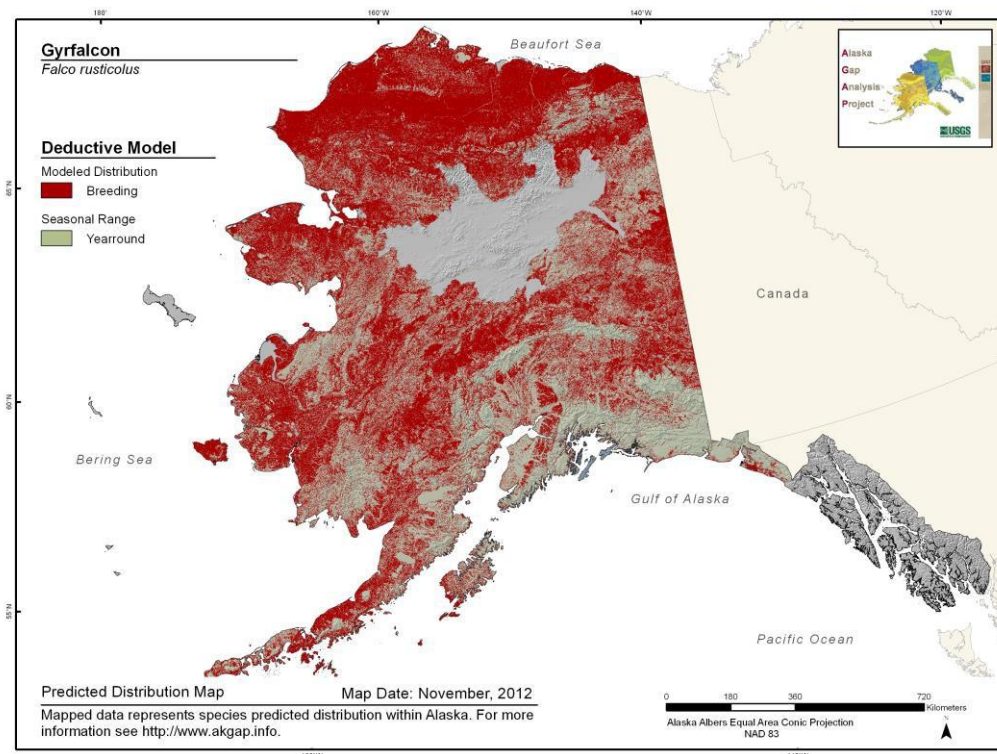
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.507**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, forage over open terrain or water and nest on cliffs along rivers, mountains, or sea coasts. Breeding habitat arctic and alpine tundra, frequently along rivers and seacoasts. Also, tundra-boreal ecotone, discontinuous spruce stands, drainages, beach strands, dunes, and mountainous regions (Cade 1960, Clum and Cade 1994, Swem et al. 1994).

References

Cade, T. J. 1960. Ecology of the Peregrine and Gyrfalcon populations in Alaska. University California Pub. Zool. 63: 151-290.

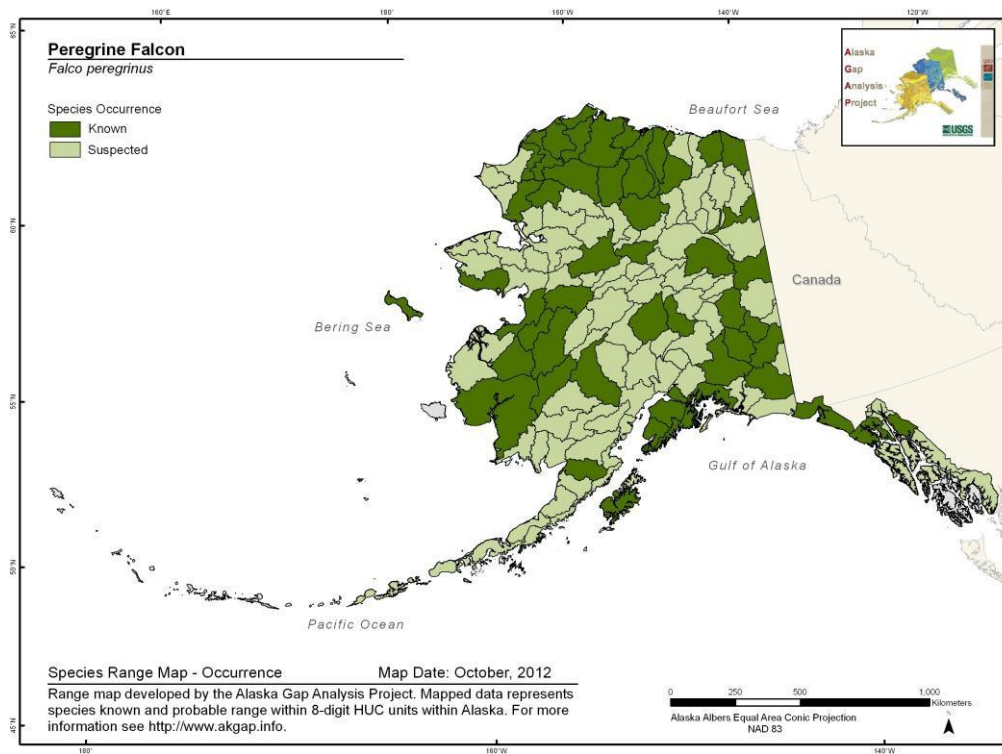
Clum, N. J. and T. J. Cade. 1994. Gyrfalcon (*Falco rusticolus*). In A. Poole, P. Stettenheim, and F. Gill, eds. The Birds of North America, No. 114. Academy of Natural Sciences., Philadelphia, PA. and AOU, Washington, DC. 20pp.

Swem, T., C. McIntyre, R. J. Ritchie, P. J. Bente, and D. G. Roseneau. 1994. Distribution, abundance, and notes on breeding biology of Gyrfalcons *Falco rusticolus* in Alaska. Pp. 437-444 in IV World Conf. on Birds of Prey, Berlin.

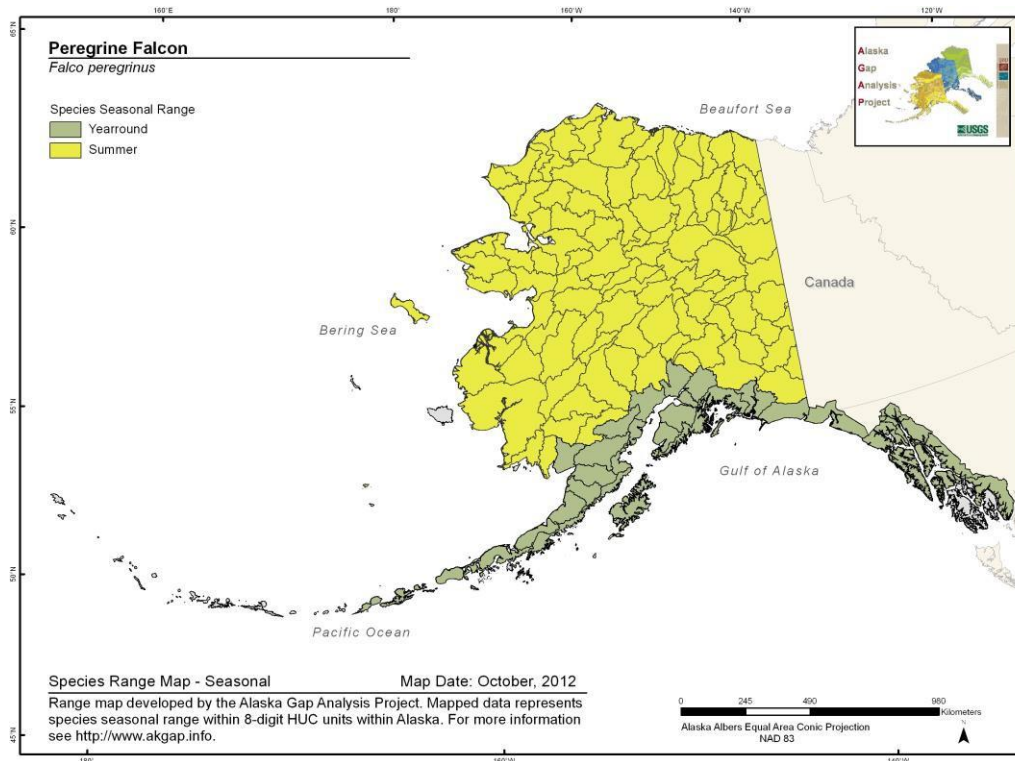
Peregrine Falcon *Falco peregrinus*

Range Map and Distribution Model Summary

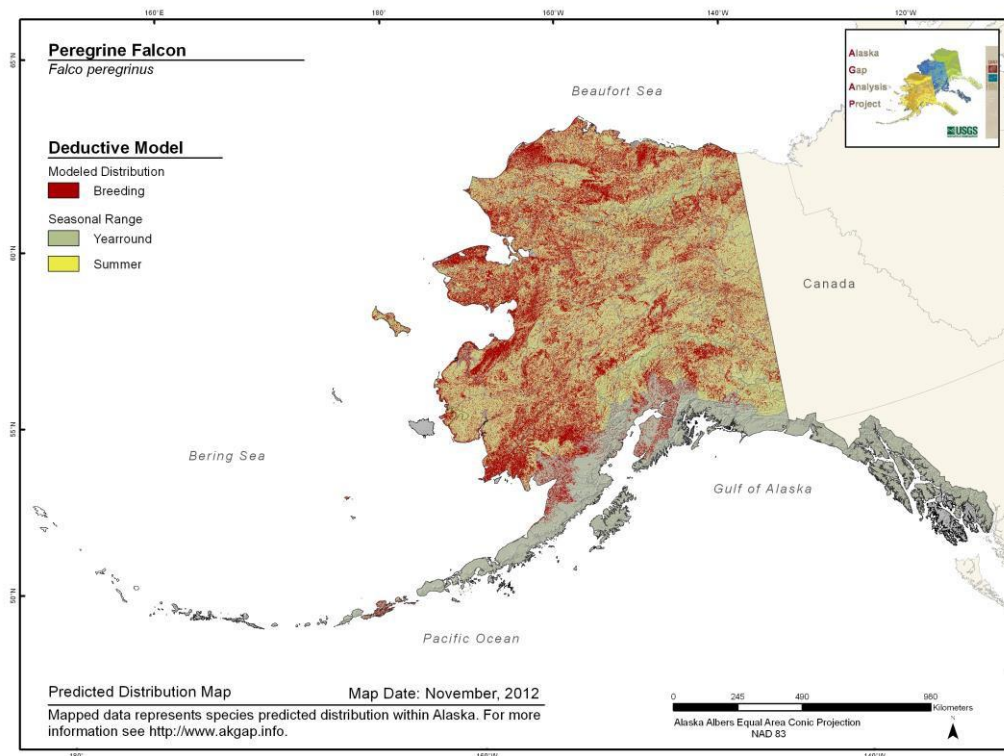
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.517**

**Model Quality
Summary:**
Low

Habitat Description

Various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (AOU 1983). Often nests on ledge or hole on face of rocky cliff or crag. River banks, tundra mounds, open bogs, large stick nests of other species, tree hollows, and man-made structures (e.g., ledges of city buildings) are used locally (Cade 1982). Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang (Palmer 1988, Campbell et al. 1990). Tundra populations nests typically on rocky cliffs, bluffs, or dirt banks. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms.

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Cade, T. J. 1982. The falcons of the world. Cornell University Press, Ithaca, NY. 192 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

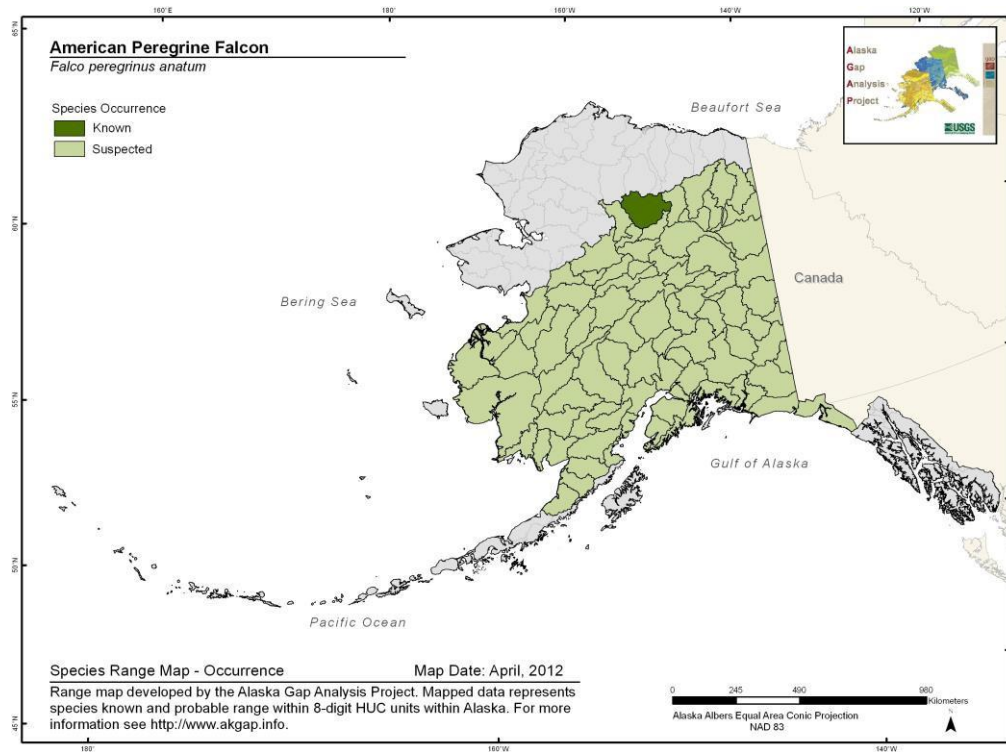
Palmer, R. S. (ed.). 1988. Handbook of North American Birds. Vol. 4. Diurnal raptors, Part 1. Yale Univ. Press, New Haven, CT. 433 pp.

American Peregrine Falcon

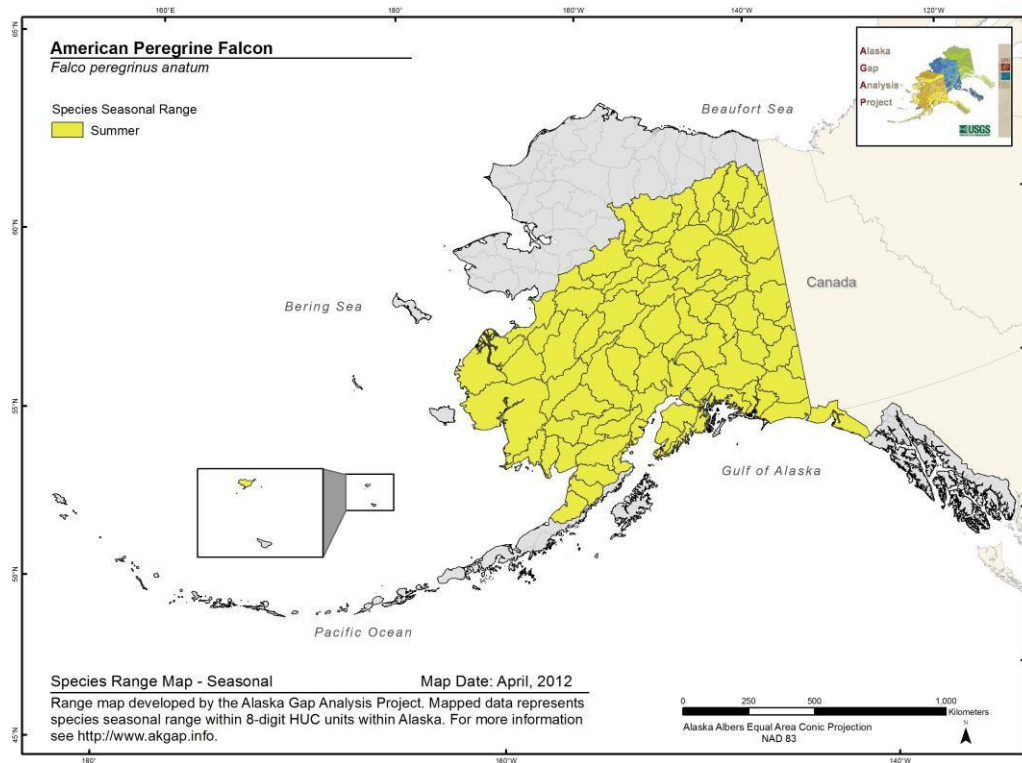
Falco peregrinus anatum

Range Map and Distribution Model Summary

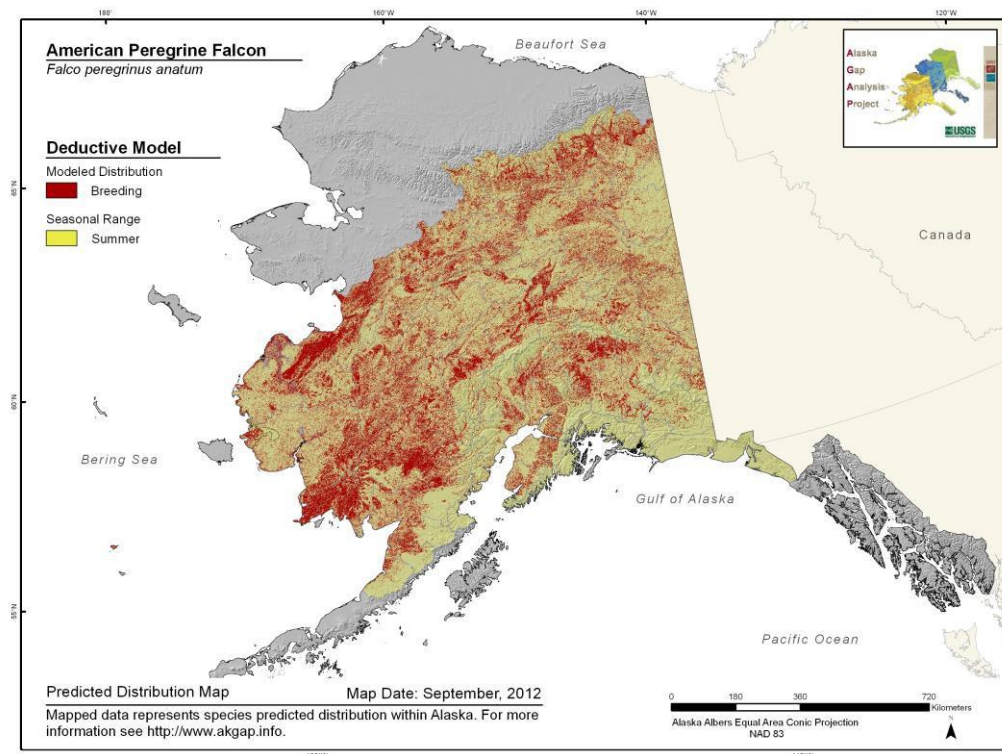
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (AOU 1983). Often nests on ledge or hole on face of rocky cliff or crag. River banks, tundra mounds, open bogs, large stick nests of other species, tree hollows, and man-made structures (e.g., ledges of city buildings) are used locally (Cade 1982). Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang (Palmer 1988, Campbell et al. 1990). Tundra populations nests typically on rocky cliffs, bluffs, or dirt banks. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey.

Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms.

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Cade, T. J. 1982. The falcons of the world. Cornell University Press, Ithaca, NY. 192 pp.

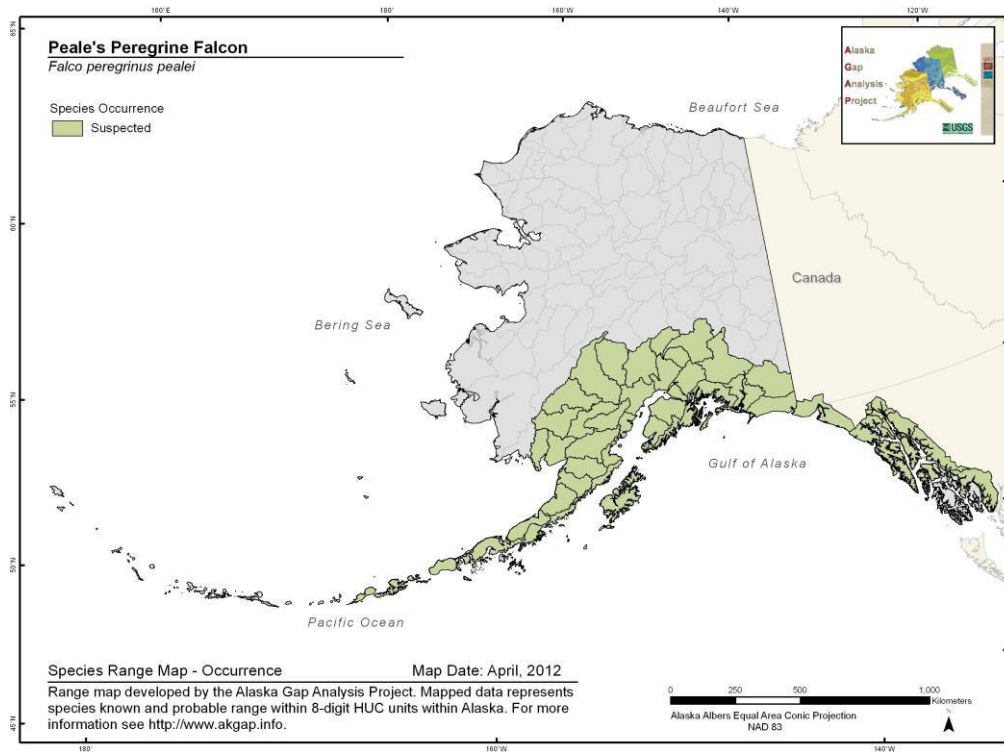
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Palmer, R. S. (ed.). 1988. Handbook of North American Birds. Vol. 4. Diurnal raptors, Part 1. Yale Univ. Press, New Haven, CT. 433 pp.

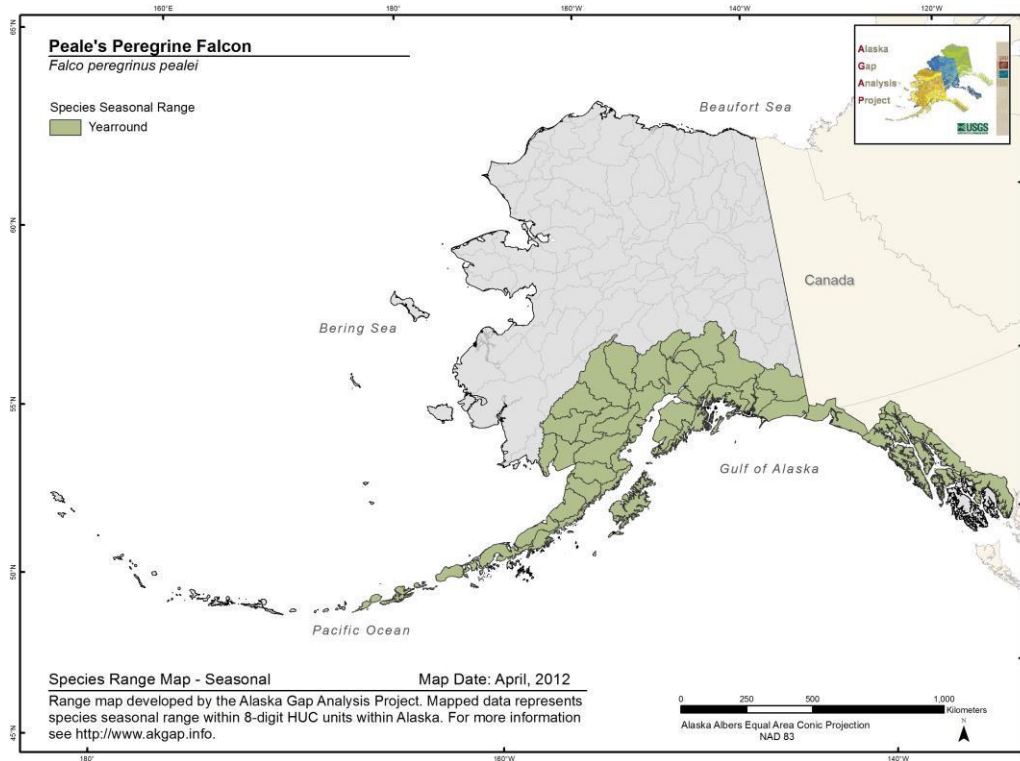
Peale's Peregrine Falcon
Falco peregrinus pealei

Range Map and Distribution Model Summary

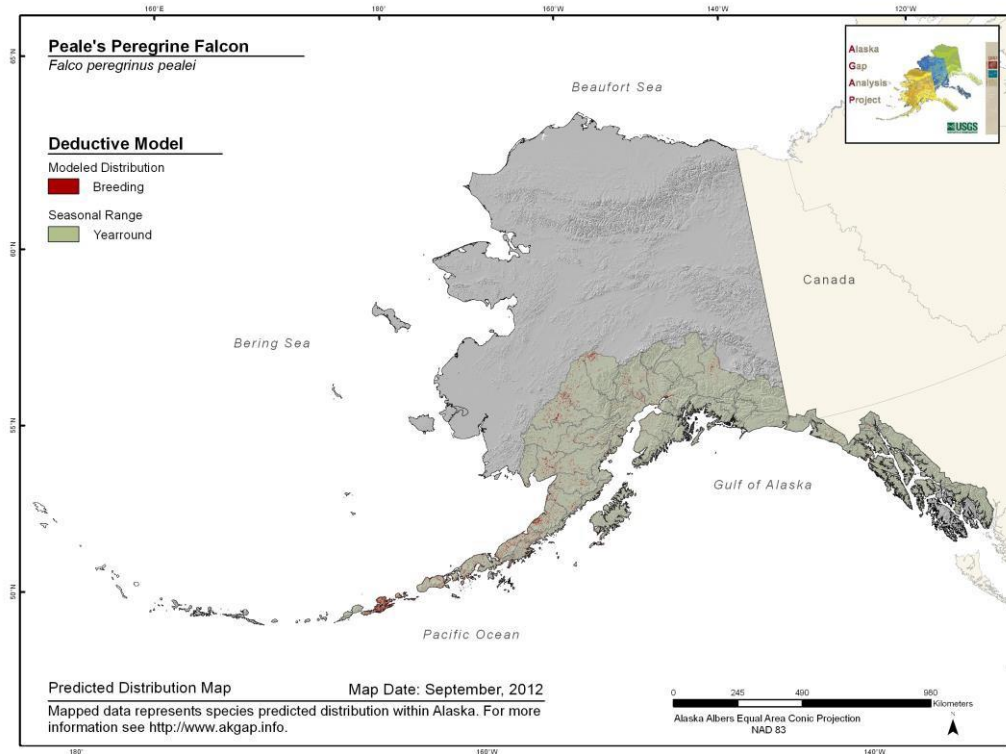
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Coastal beaches, tidal flats, reefs, islands, marshes, estuaries, and lagoons. Nests mostly found on ledges of vertical rocky cliffs in the vicinity of seabird colonies; some nests on grassy benches of rocky bluffs (NatureServe 2006).

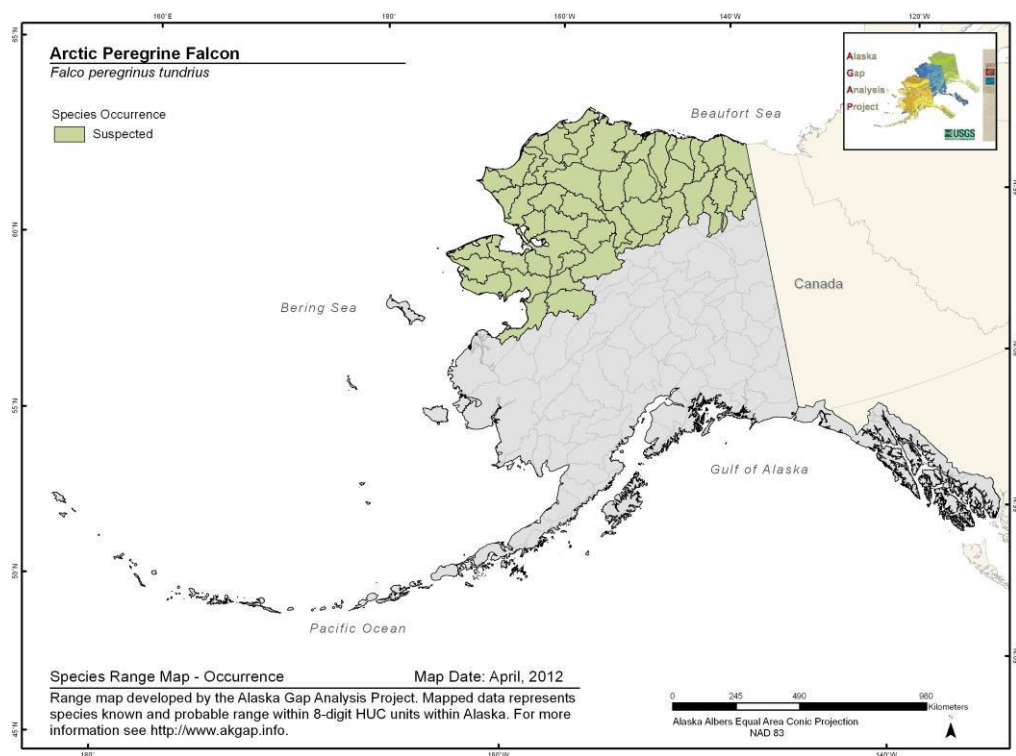
References

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life. Version 5.0. NatureServe, Arlington, VA. Available <http://www.natureserve.org/explorer>.

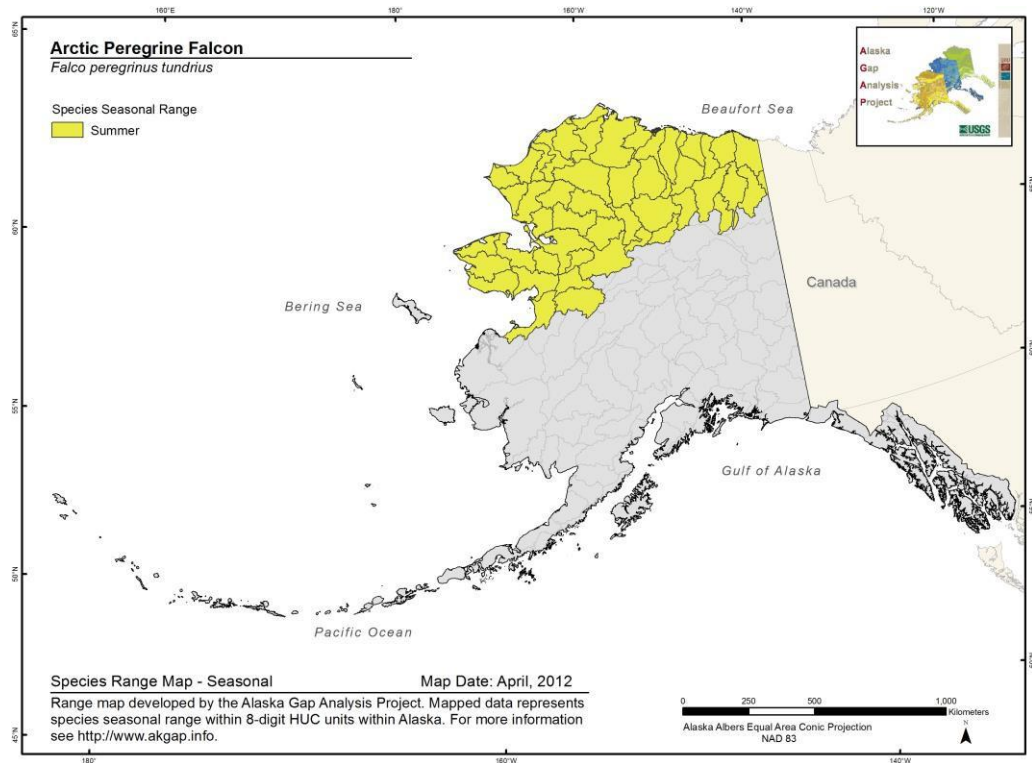
Arctic Peregrine Falcon *Falco peregrinus tundrius*

Range Map and Distribution Model Summary

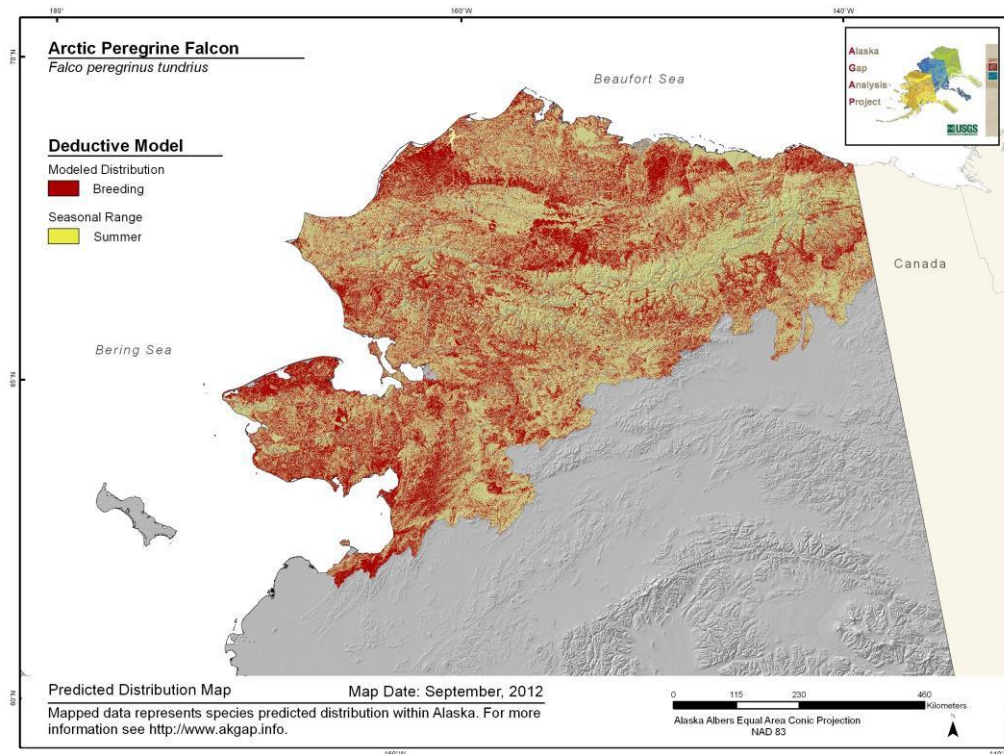
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nesting occurs on gentle open slopes to low embankments, low or high rock outcrops, or tall sheer cliffs. Nests near rivers and lakes (Wheeler 2003, Ritchie et al. 2004). Uses tussock-heath tundra with lakes and sedge grass marshes and riparian areas for foraging (White and Nelson 1991).

References

Ritchie, R. J., A. M. Wildman, and C. M. White. 2004. Peregrine Falcons nesting on lake bluffs on the Arctic Coastal Plain of northern Alaska. *Raptor Research* 38:158-160.

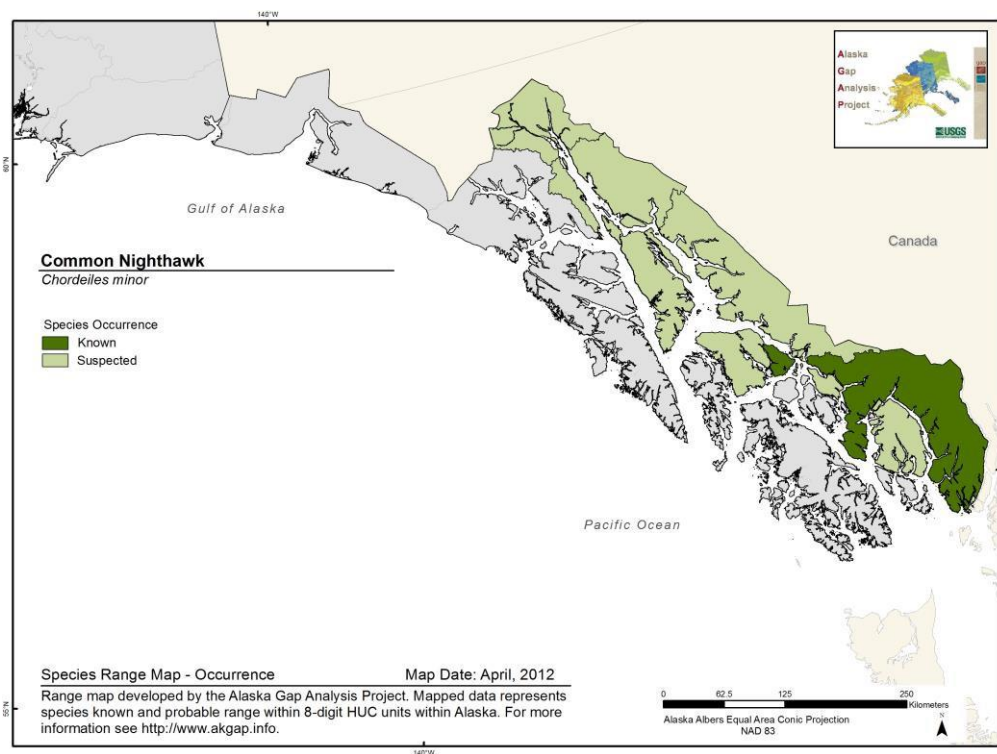
Wheeler, B. K. 2003. *Raptors of western North America*. Princeton University Press, Princeton, NJ.

White, C. M. and R. W. Nelson. 1991. Hunting range and strategies in a tundra breeding Peregrine Falcon and Gyrfalcon observed from a helicopter. *Journal of Raptor Research* 25:49-62.

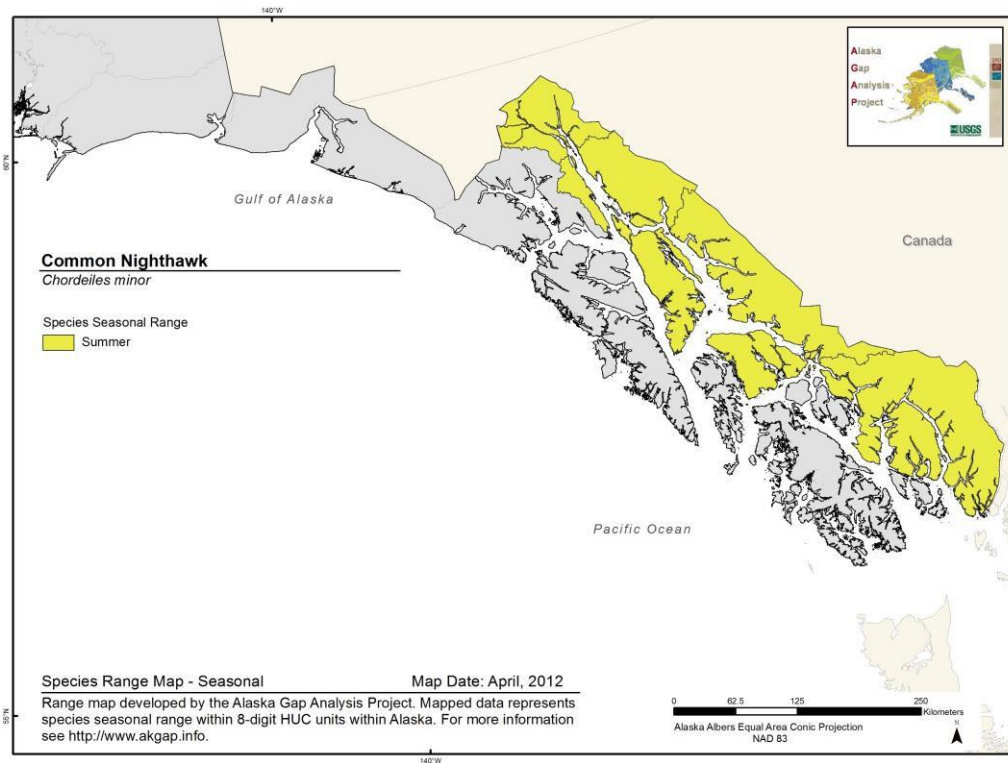
Common Nighthawk *Chordeiles minor*

Range Map and Distribution Model Summary

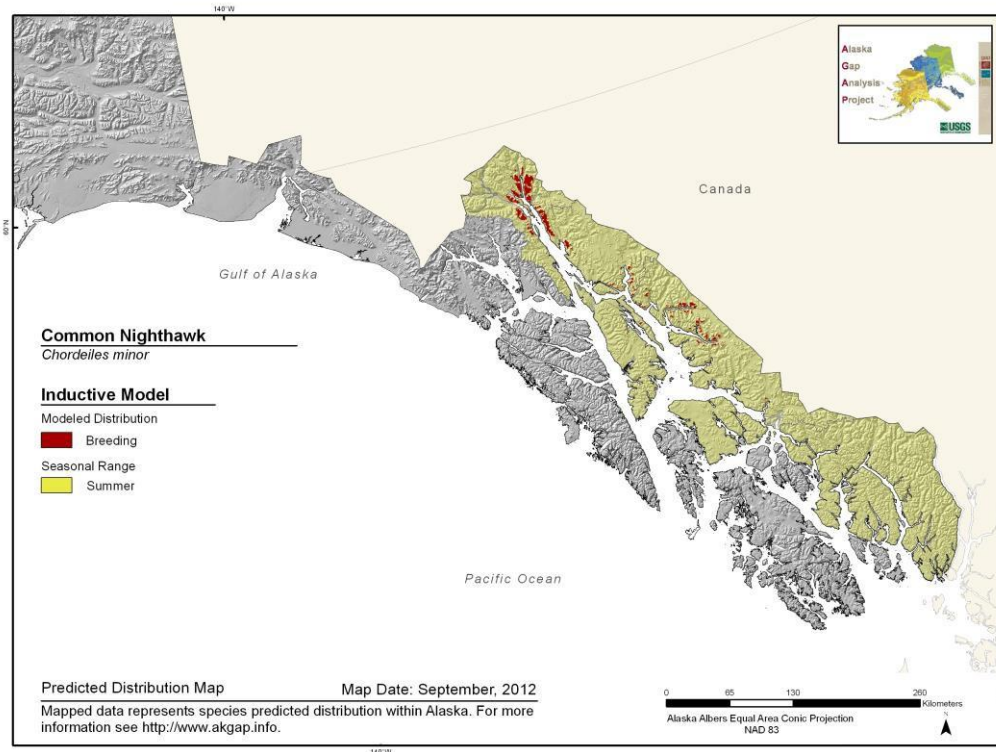
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

In the Yukon, this species has been found in or near lodgepole pine forests, old burned areas, open mixed forests, and in wetlands (Alexander et al. 2003). Additionally, in B.C., these birds are found breeding in logged and slash burned coastal forests, open ponderosa pine forests, grassland habitat of the interior, sand and gravel habitat associated with marine and fluvial beaches, spits, bars, and rocky bluffs or outcroppings. Less frequently used breeding habitats include farmland, construction sites, openings in regenerating forests, coastal island meadows, and urban areas. It has been reported breeding from sea level to 1,250 m elevation in B.C. (Campbell et al. 1990).

References

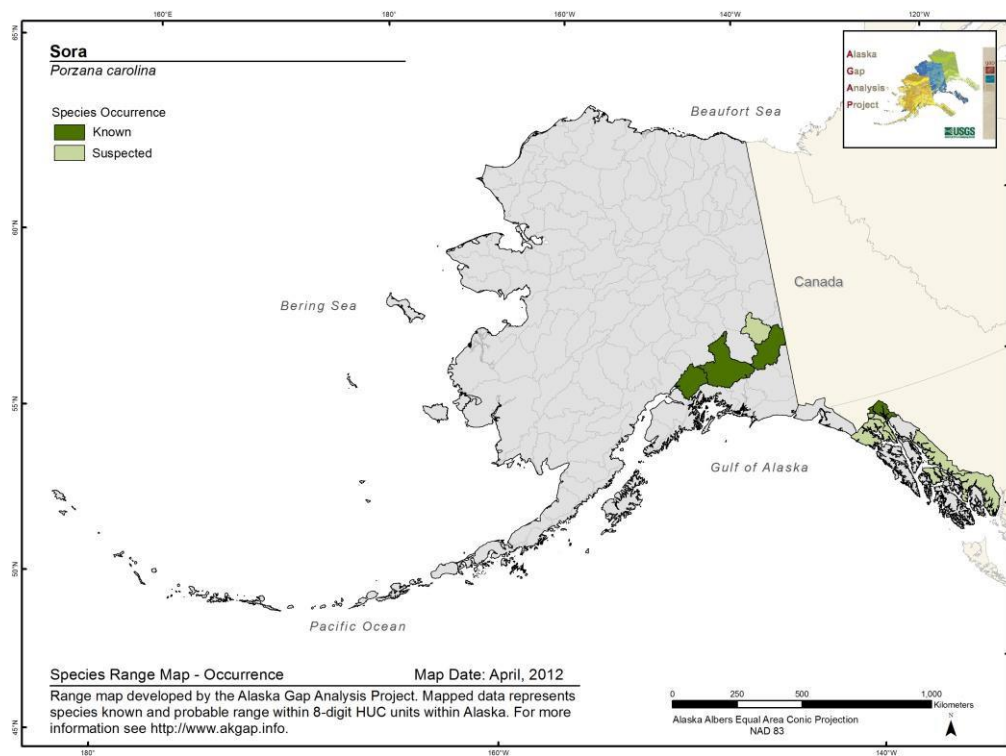
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

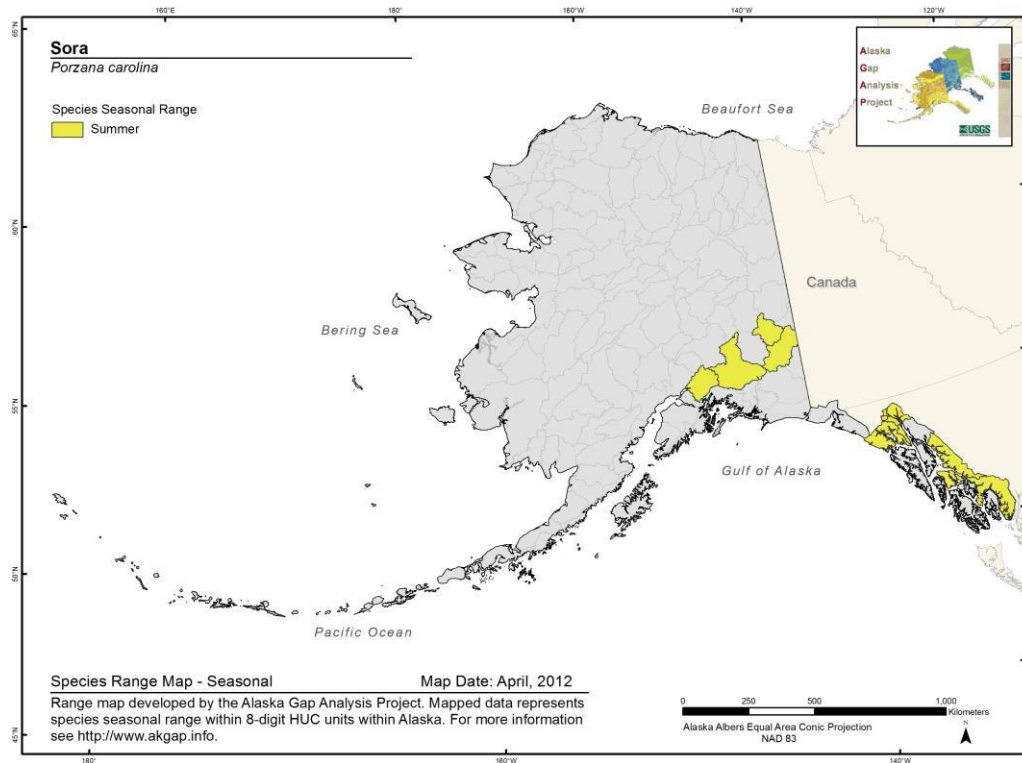
Sora *Porzana carolina*

Range Map and Distribution Model Summary

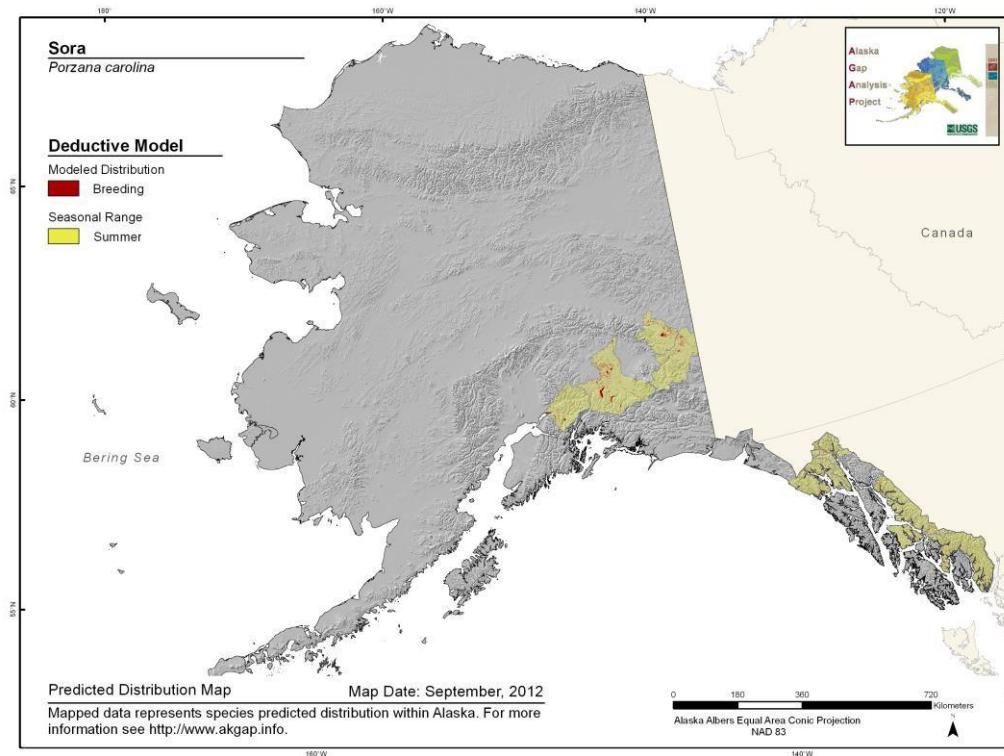
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.64**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat is freshwater wetlands with shallow and intermediate water depths dominated by fine leaved emergent vegetation. Coastal marshes and palustrine emergent wetlands (Melvin and Gibbs 1996).

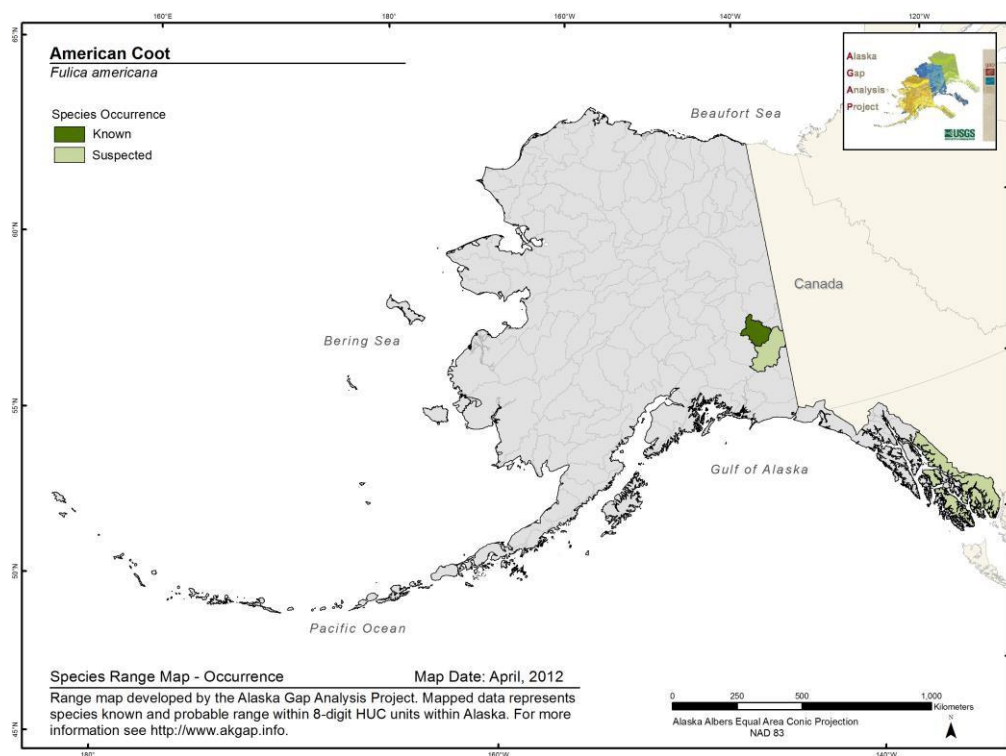
References

Melvin, S. M. and J. P. Gibbs. 1996. Sora (*Porzana carolina*). In: A. Poole and F. Gill, eds. The birds of North America, No. 250. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C. 28pp.

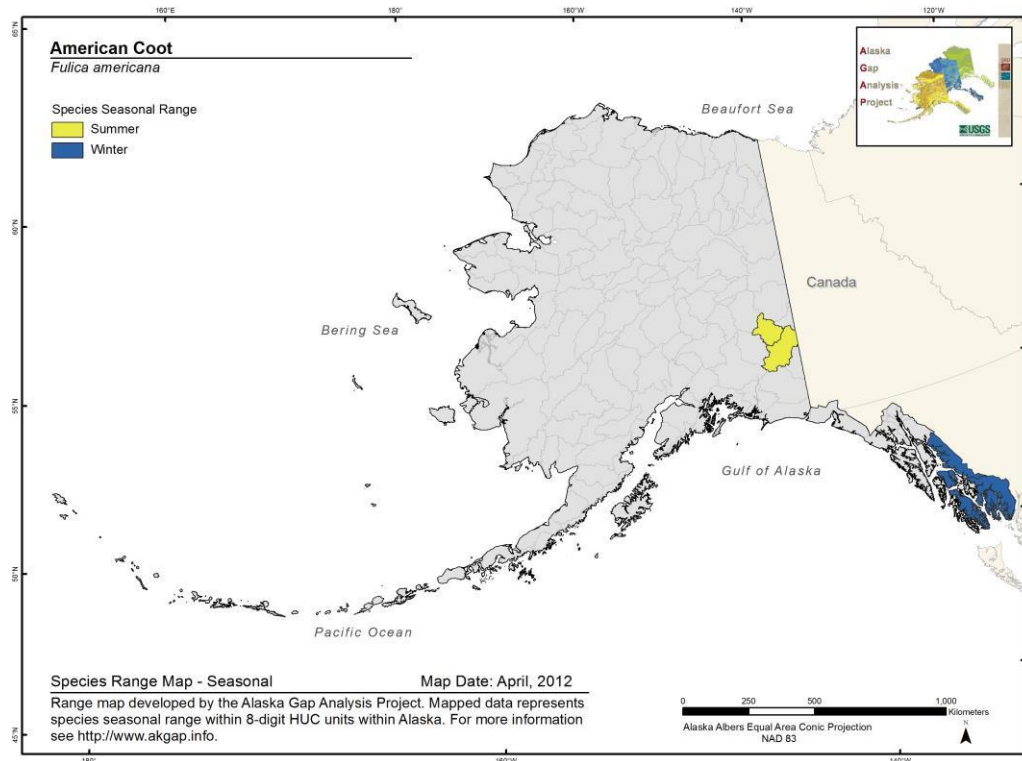
American Coot *Fulica americana*

Range Map and Distribution Model Summary

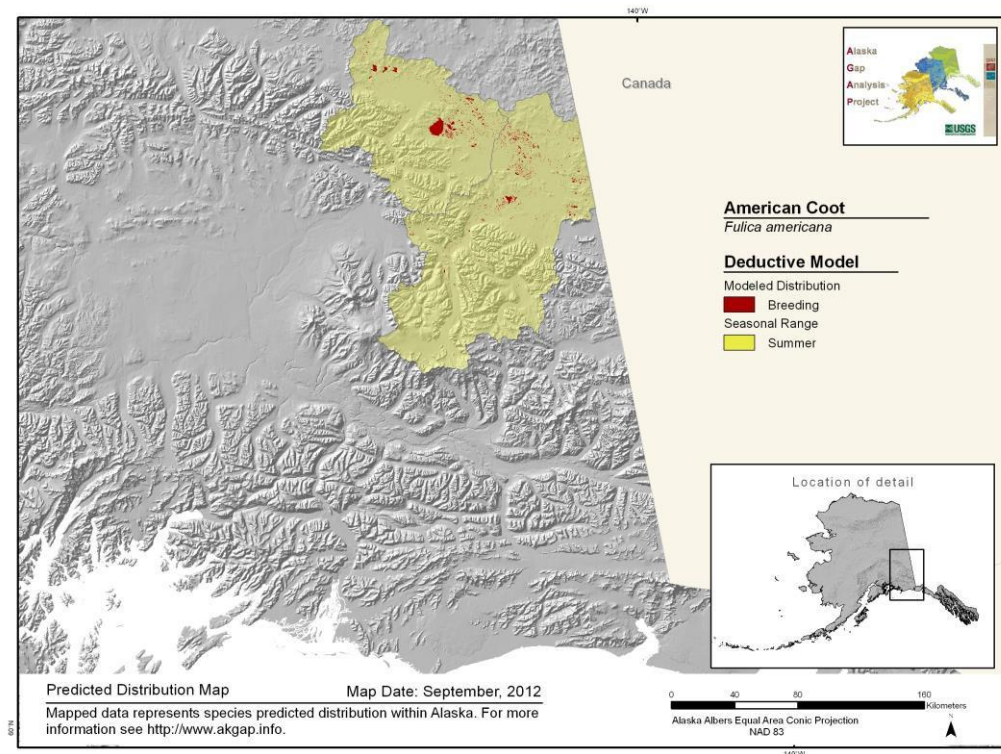
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.605**

**Model Quality
Summary:**
Low

Habitat Description

Broad array of wetlands, including freshwater lakes, ponds, marshes, ditches, waste impoundments during breeding season. Common characteristics of breeding wetlands include heavy stands of emergent vegetation with some shoreline and at least some depth of standing water during nesting and brood-rearing (Brisbin and Mowbray 2002).

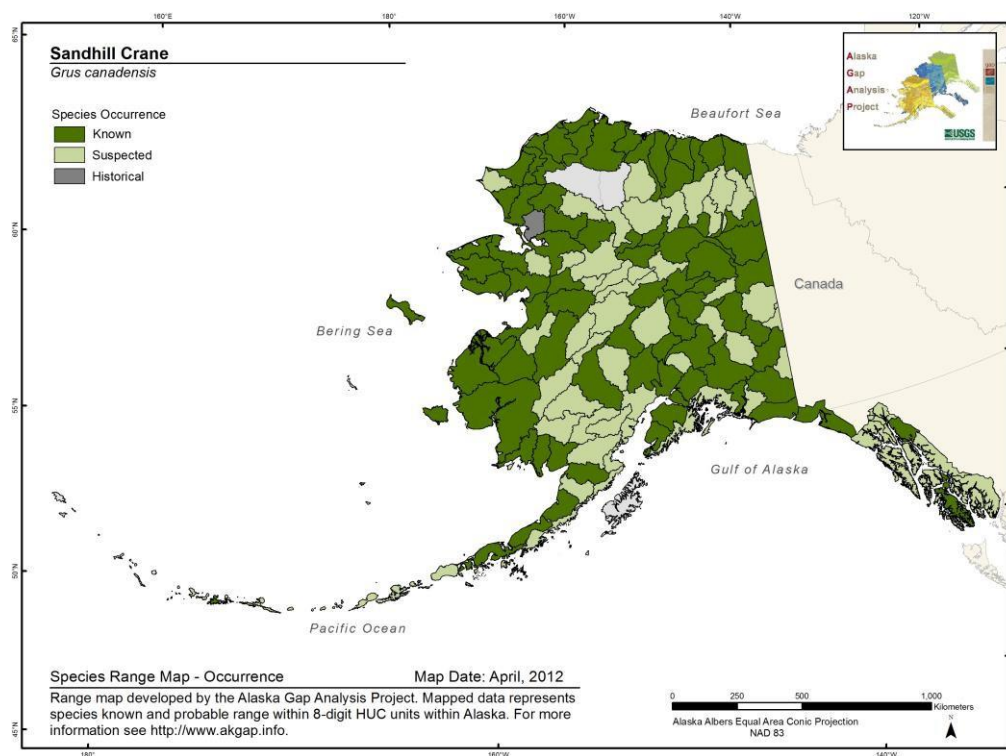
References

Brisbin, I. L., Jr. and T. B. Mowbray. 2002. American Coot (*Fulica americana*). In *The Birds of North America*, No. 697 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

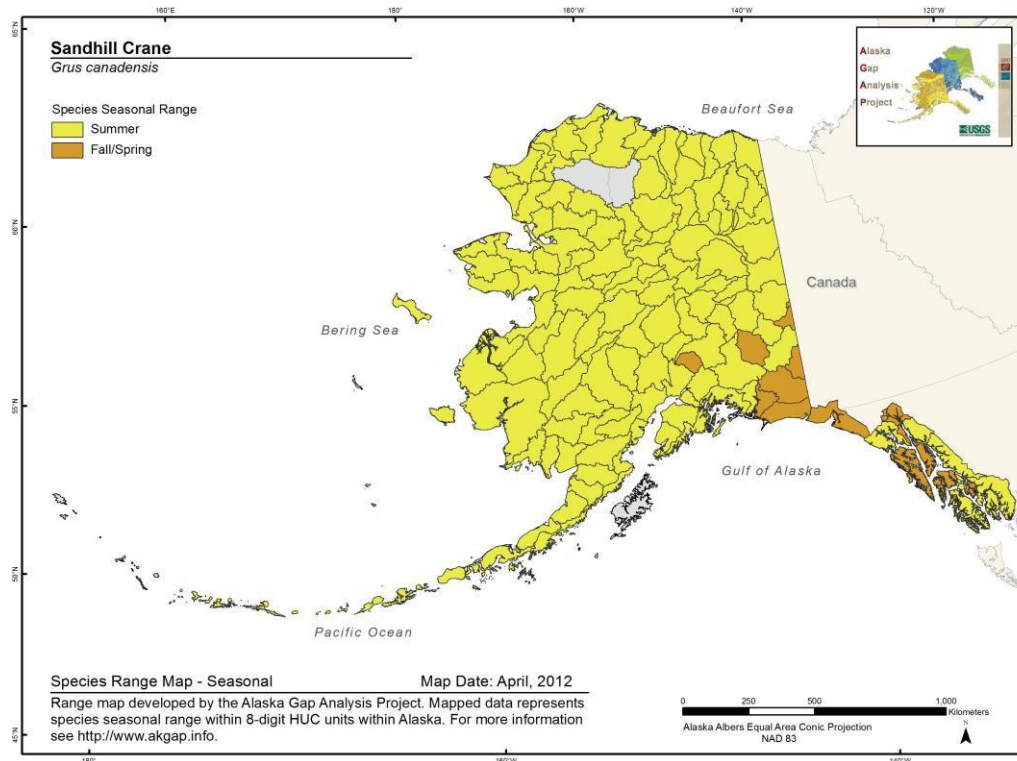
Sandhill Crane *Grus canadensis*

Range Map and Distribution Model Summary

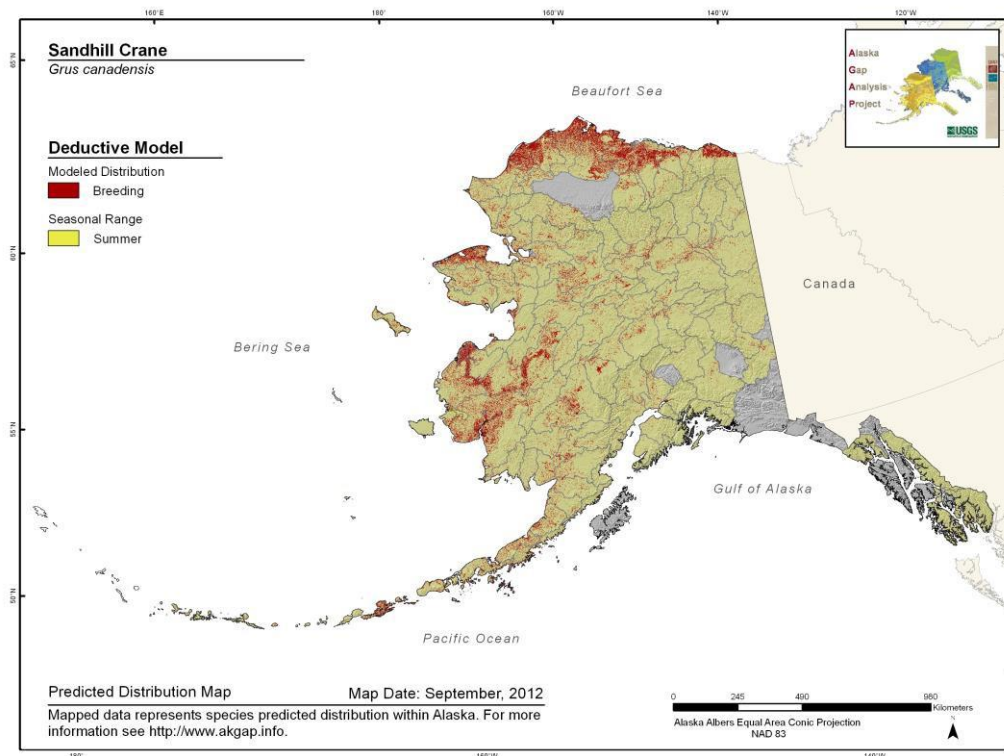
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.555**

**Model Quality
Summary:**
Low

Habitat Description

On the e. Copper River Delta, cranes roost primarily in wetlands associated with medium shrub and intertidal mudflat habitats, and feed primarily in wet meadow habitats (Herter 1982). On the Y-K Delta (and probably on the Copper River) breeding habitat is located in wet marsh or sedge meadow areas of the tundra (Boise 1976). Broods spend most of their time in taller *Elymus* vegetation along slough banks, heath tundra, and short-grass meadows (Tacha et al. 1992).

References

Boise, C. M. 1976. Breeding biology of the Lesser Sandhill Crane *Grus canadensis* *canadensis* (L.) on the Yukon-Kuskokwim Delta, Alaska. M.S. thesis. Univ. Alaska, Fairbanks.

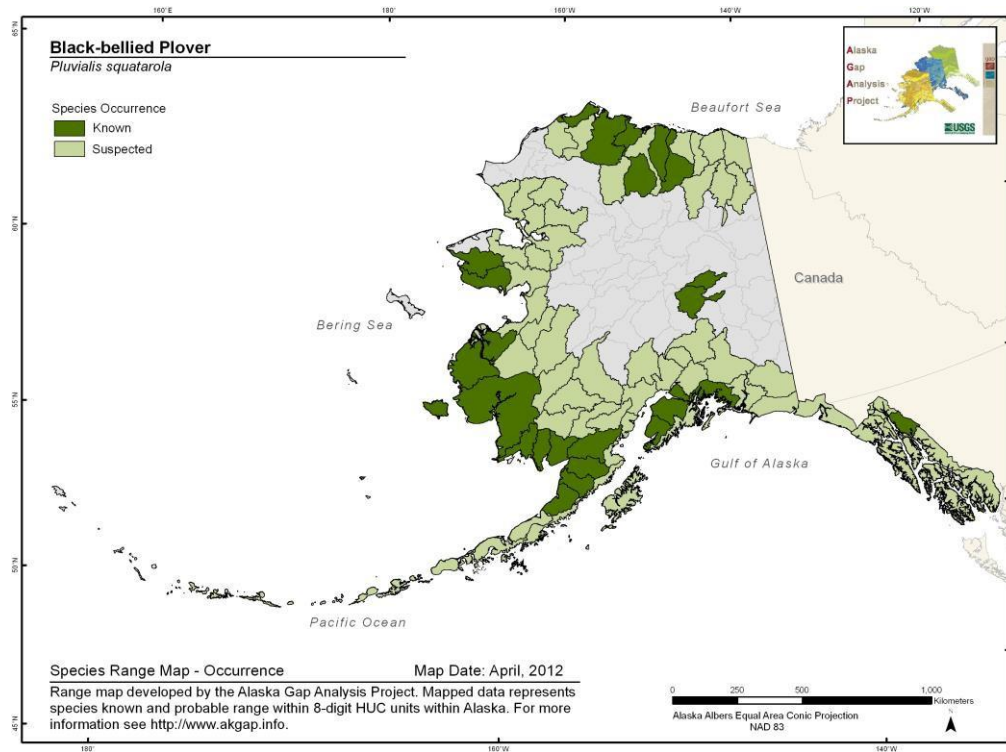
Herter, D. R. 1982. Staging of Sandhill Cranes on the Copper River Delta, Alaska, pp. 273-280 in Proc. 1981 Int. Crane Workshop (J. C. Lewis, ed). Nat. Audubon Soc., Tavernier, FL.

Tacha, T. C., S. A. Niesbitt, and P. A. Vohs. 1992. Sandhill Crane (*Grus canadensis*). In *The Birds of North America*, Vol. 1, No. 31 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

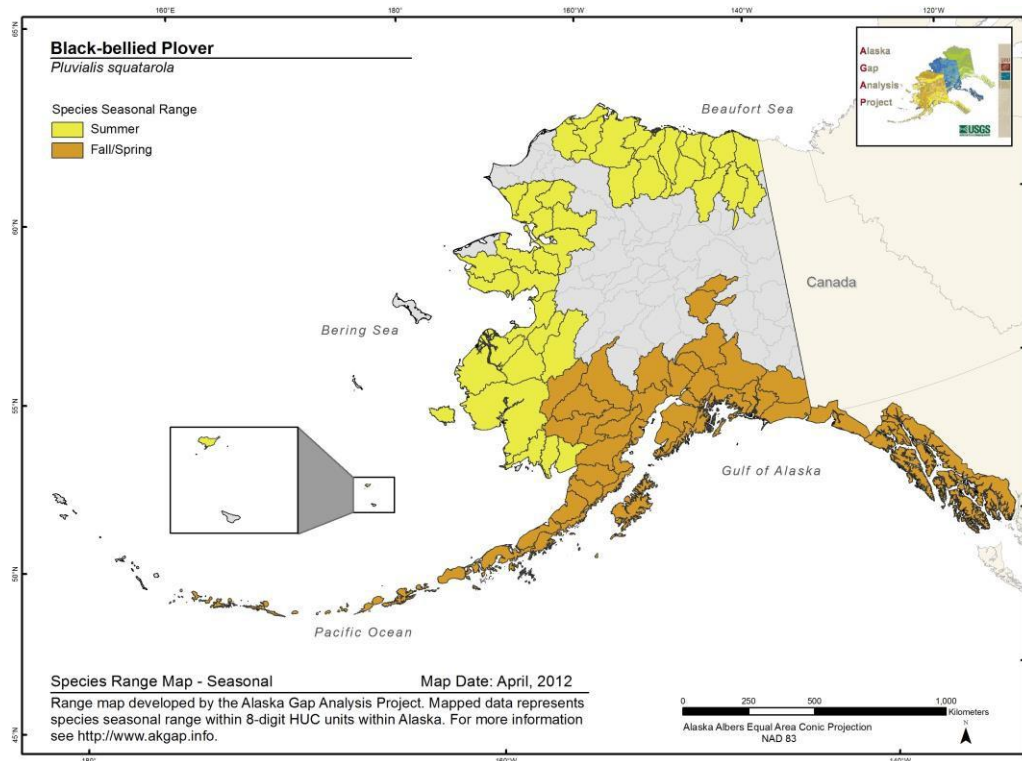
Black-bellied Plover *Pluvialis squatarola*

Range Map and Distribution Model Summary

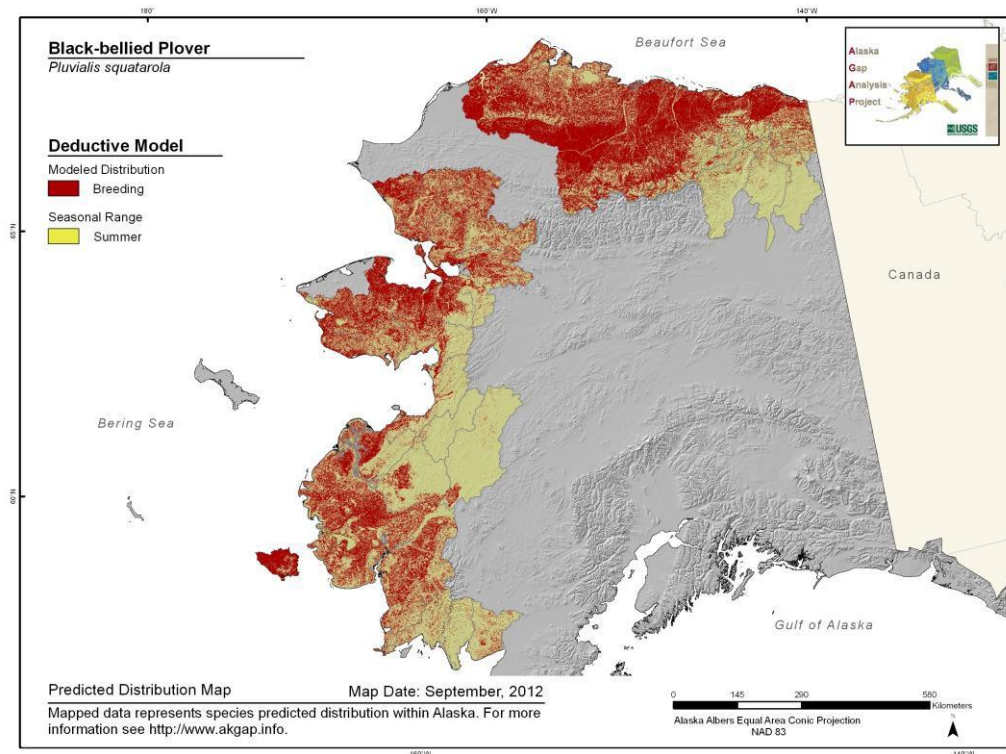
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.595**

**Model Quality
Summary:**
Low

Habitat Description

Breeds on tundra, drier or stony ridges within wet tundra areas (Armstrong 1995). Selects nest sites in light-colored moss and lichens (Johnson and Herter 1989).

References

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

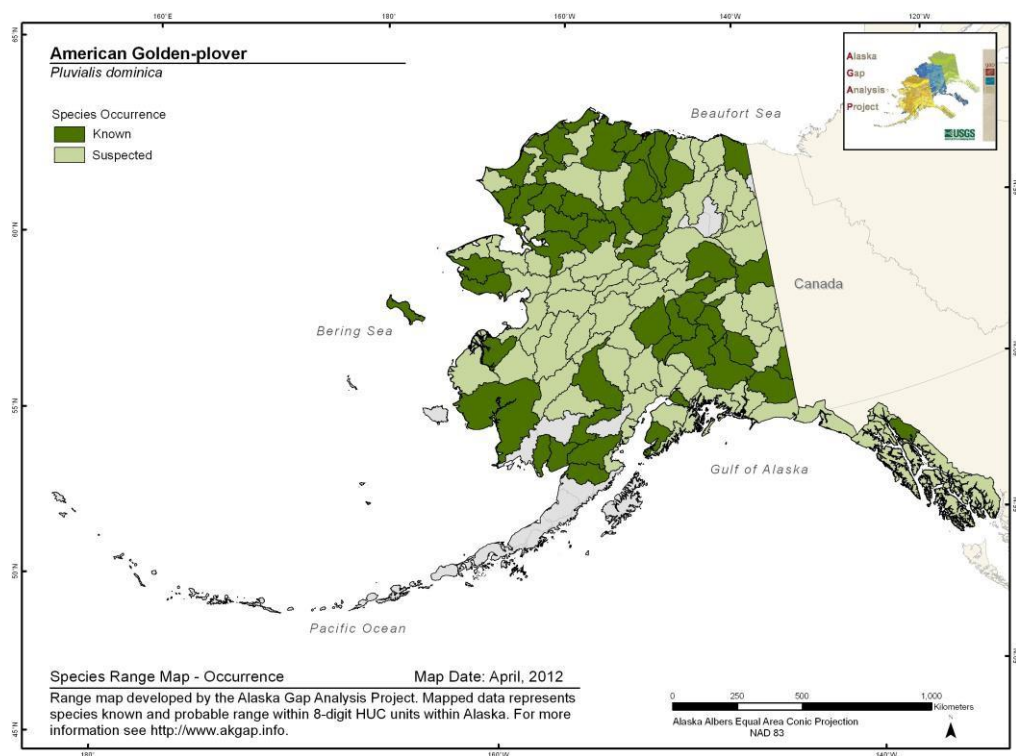
Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

American Golden-plover

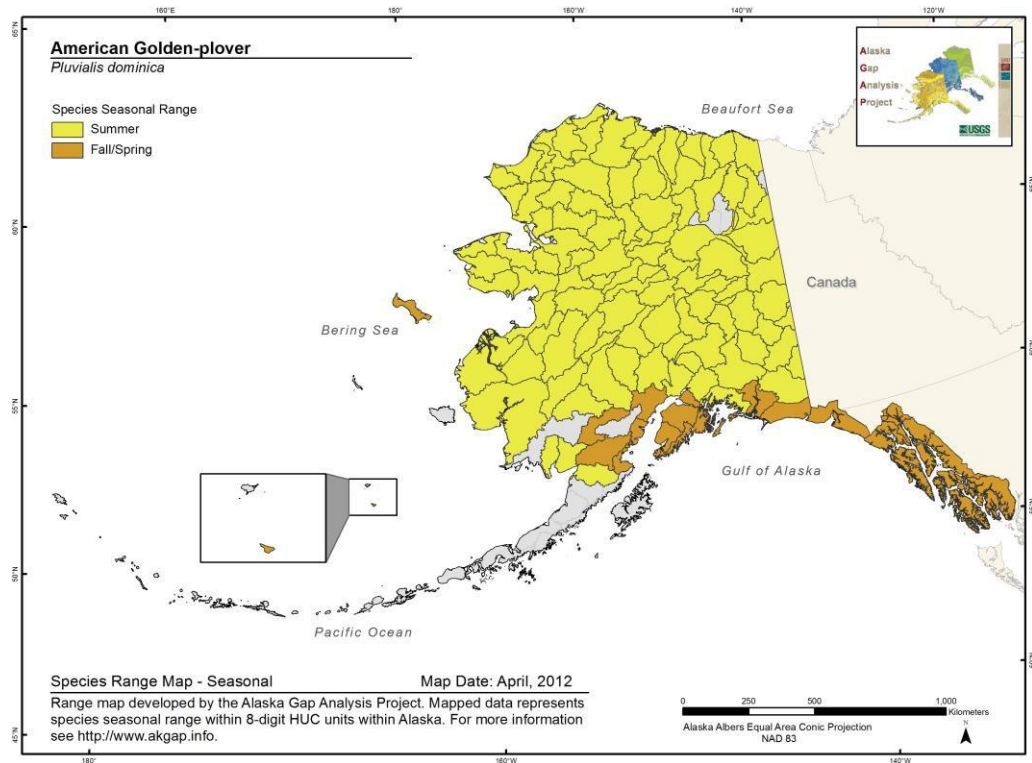
Pluvialis dominica

Range Map and Distribution Model Summary

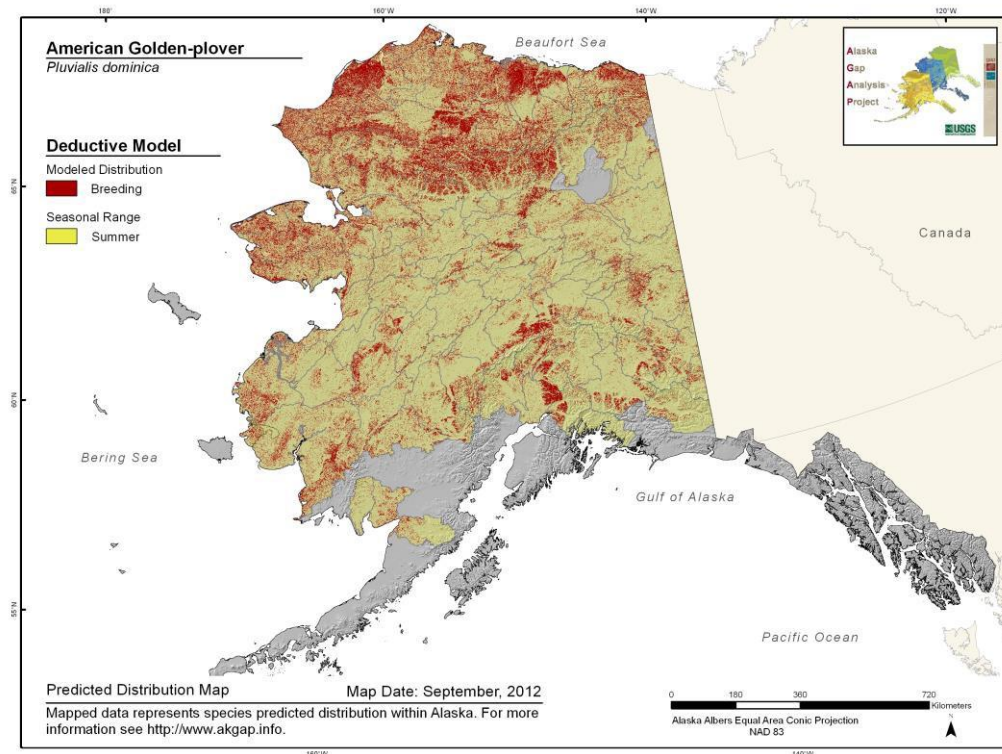
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.625**

**Model Quality
Summary:**
Low

Habitat Description

Nests on grassy arctic and subarctic tundra and sometimes montane tundra (Johnson and Connors 1996). Typically nest in sparse lower vegetation on higher well-drained rocky slopes where sympatric with Pacific Golden-Plover (Connors et al. 1993). In the Yukon, nests in dry tussock tundra or on small ridges surrounded by moist tussock tundra or hummocky tundra (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

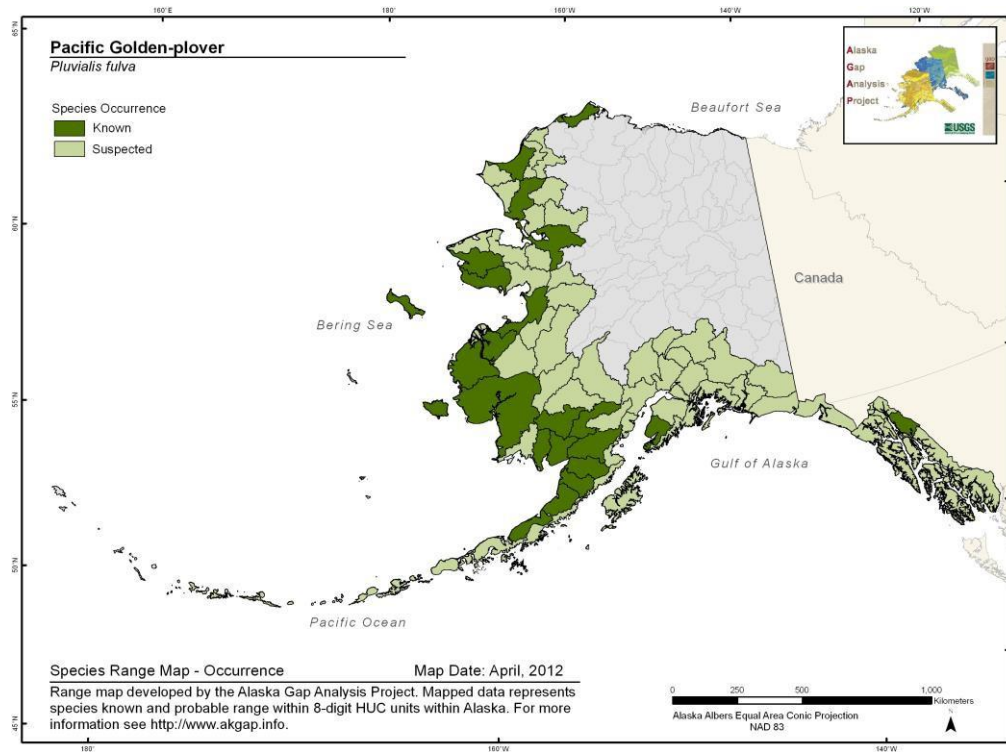
Connors, P. G., B. J. McCaffery, and J. L. Marion. 1993. Speciation in golden-plovers, *Pluvialis dominica* and *P. fulva*: evidence from the breeding grounds. *Auk* 110:9-20.

Johnson, O. W. and P. G. Connors. 1996. American Golden-Plover (*Pluvialis dominica*) and Pacific Golden-Plover (*Pluvialis fulva*). In *The Birds of North America*, No.201-202 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

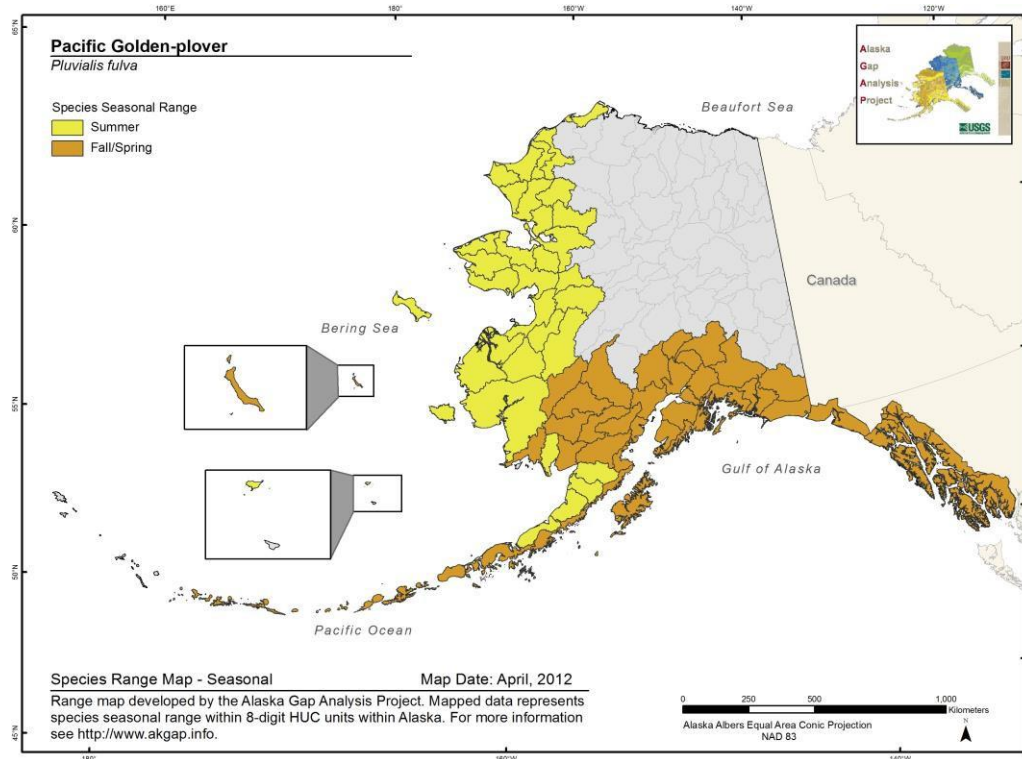
Pacific Golden-plover *Pluvialis fulva*

Range Map and Distribution Model Summary

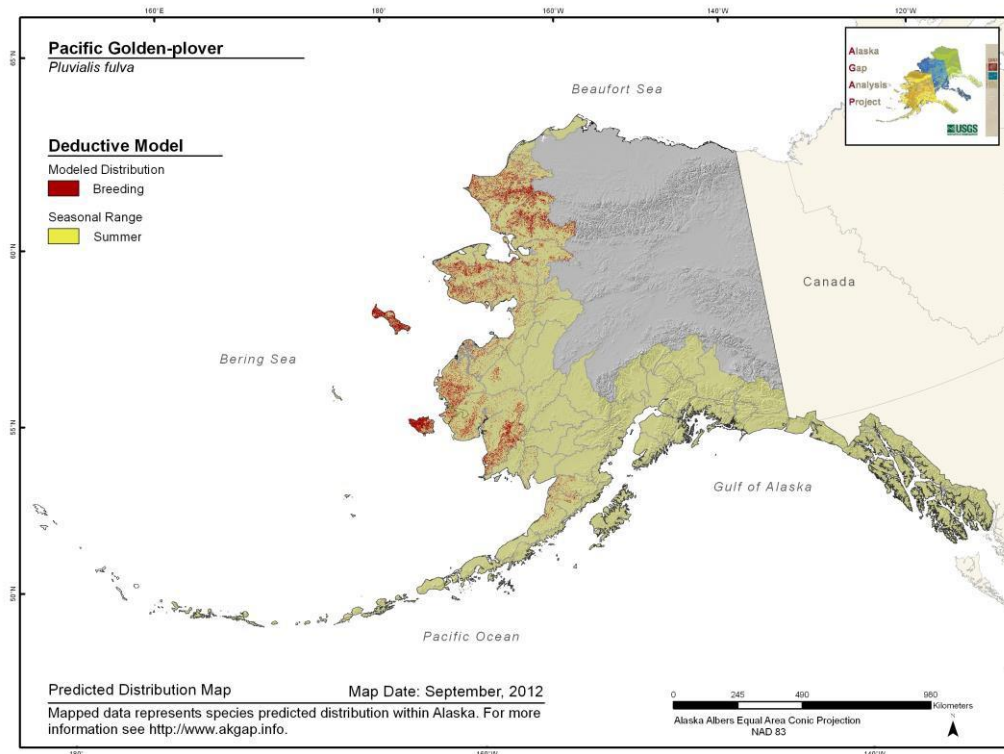
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nest on grassy arctic and subarctic tundra and sometimes montane tundra (Johnson and Connors 1996). Typically nest in dense vegetation on lower, dry to moist sites with fewer rocks where sympatric with American Golden-Plover (Connors et al. 1993).

References

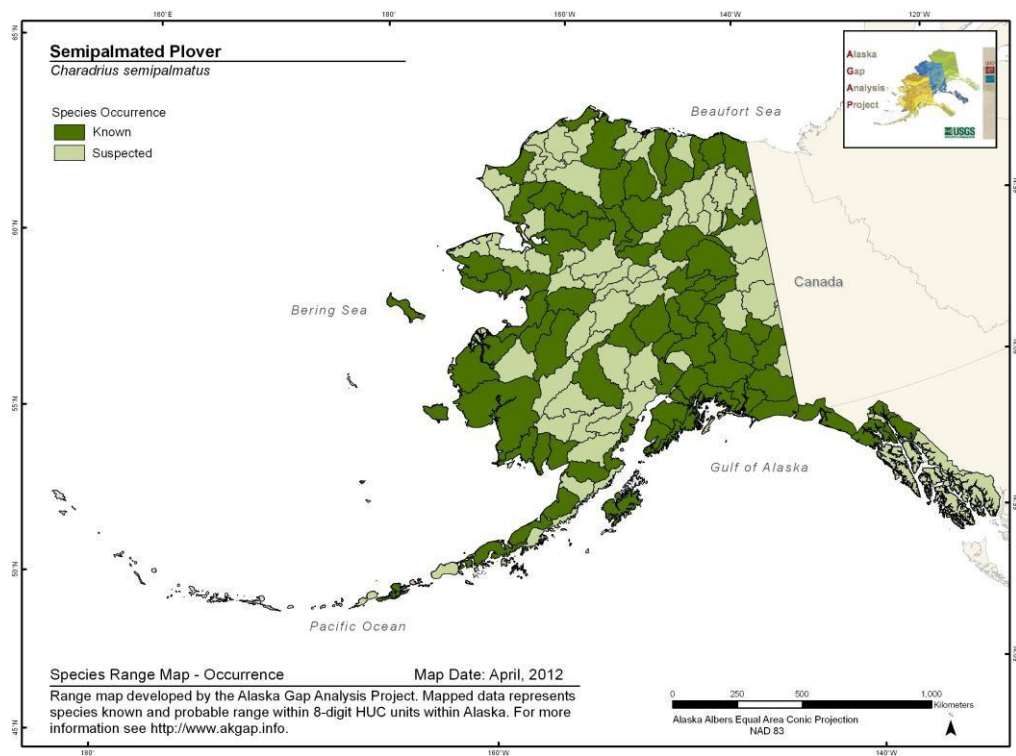
Connors, P. G., B. J. McCaffery, and J. L. Marion. 1993. Speciation in golden-plovers, *Pluvialis dominica* and *P. fulva*: evidence from the breeding grounds. *Auk* 110:9-20.

Johnson, O. W. and P. G. Connors. 1996. American Golden-Plover (*Pluvialis dominica*) and Pacific Golden-Plover (*Pluvialis fulva*). In *The Birds of North America*, No.201-202 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

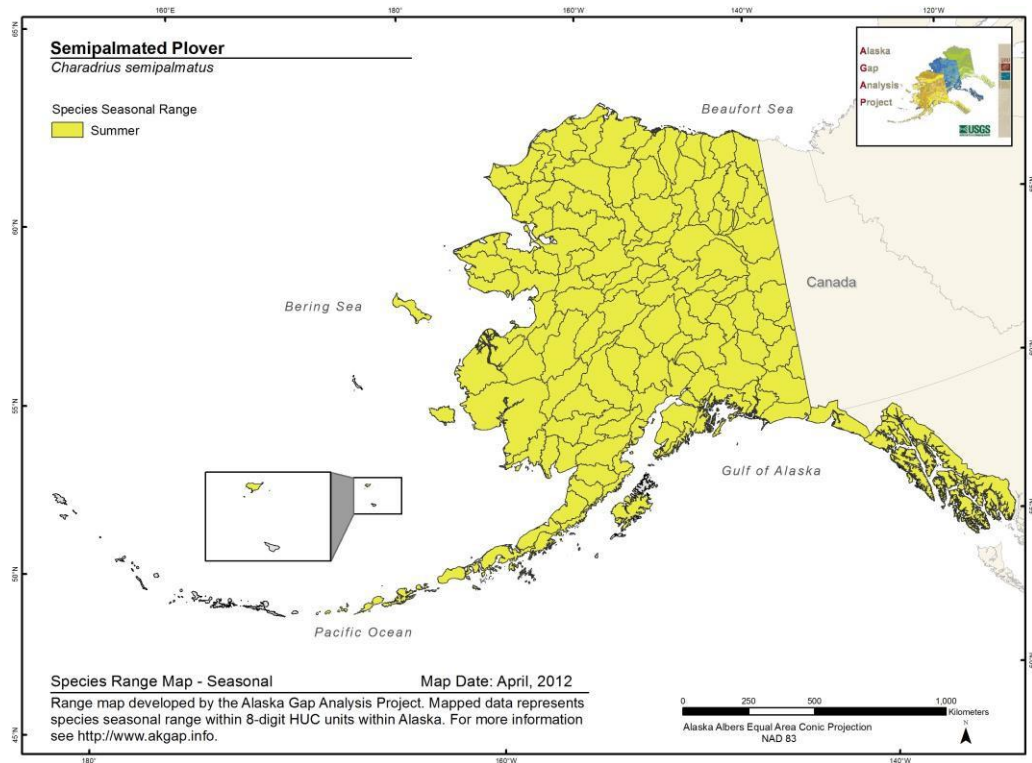
Semipalmated Plover *Charadrius semipalmatus*

Range Map and Distribution Model Summary

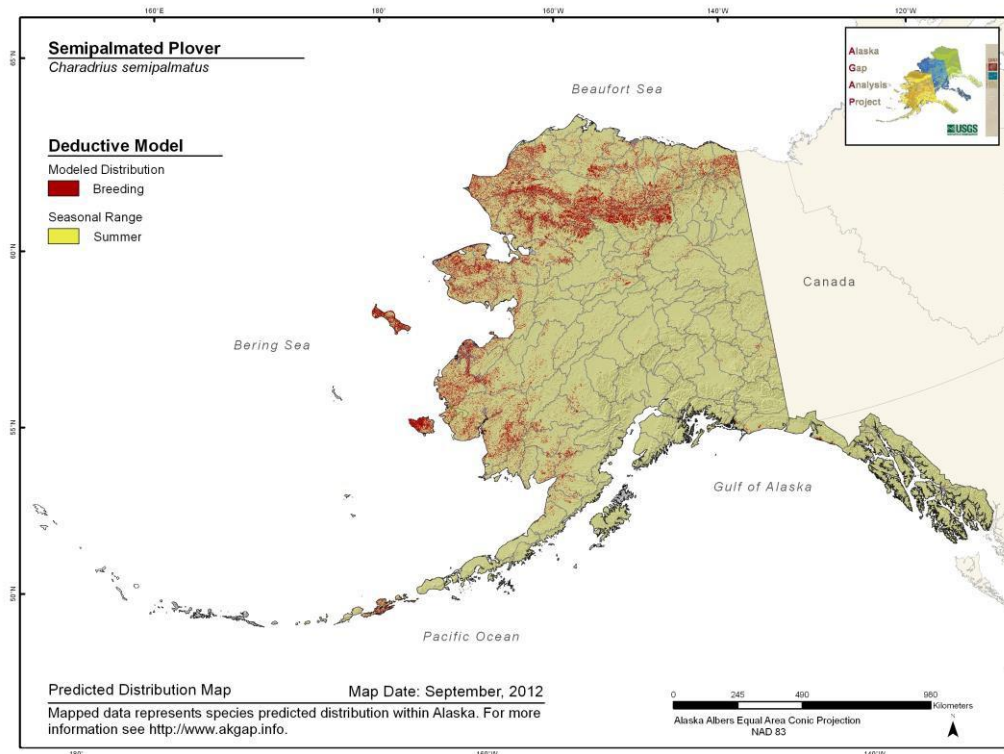
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.515**

**Model Quality
Summary:**
Low

Habitat Description

Nests on grassy or mossy tundra, river gravel bars, coastal flats and dunes, beaches, stony ridges, and other rocky well-drained, and/or barren habitats (Johnson and Herter 1989). In the Yukon, typically breeds at both high and low elevation in dry, sparsely vegetated habitats (Alexander et al. 2003).

References

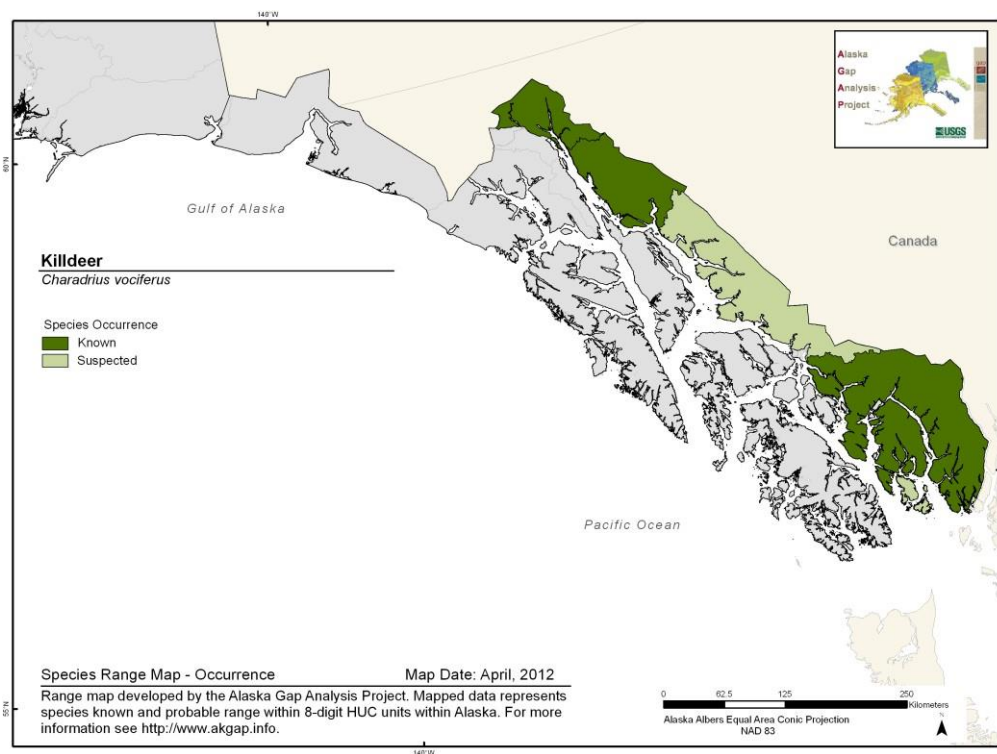
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

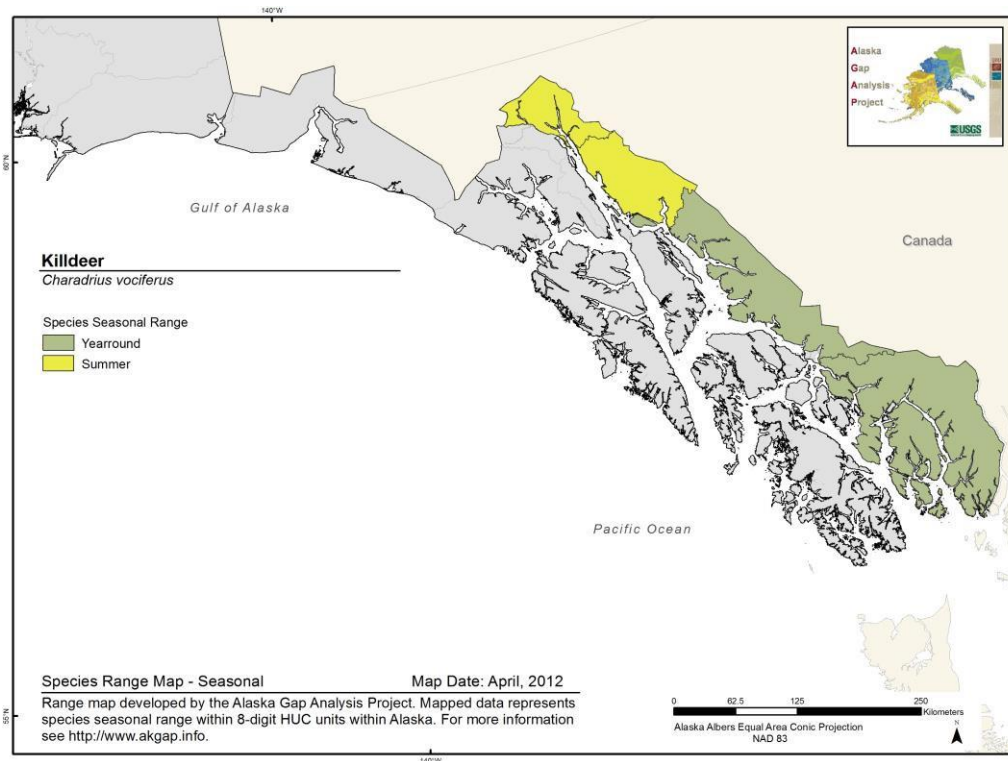
Killdeer *Charadrius vociferus*

Range Map and Distribution Model Summary

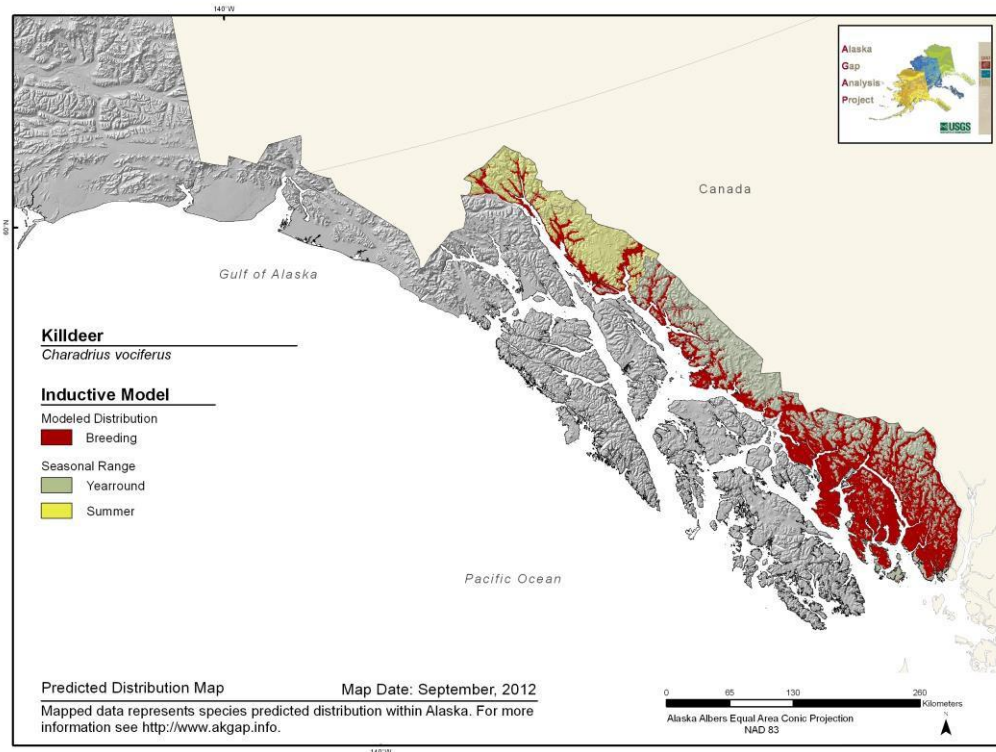
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Habitat generalist. Inhabits marshes, tidal sloughs, lakeshores, rivers, ponds, grasslands, sandbars, mudflats, pastures, and human modified landscapes, such as cultivated fields, athletic fields, airports, golf courses, asphalt parking lots, rooftops. Nests on ground in open dry or gravelly situations, sometimes in similar situations on roofs, driveways, etc. (NatureServe 2007b).

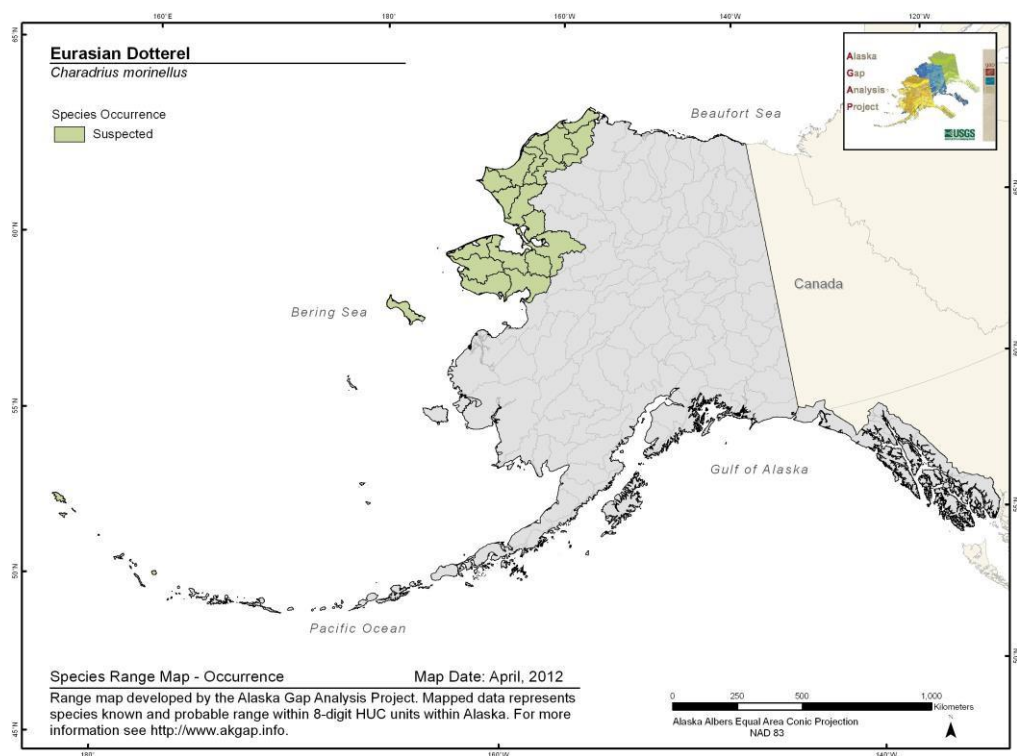
References

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

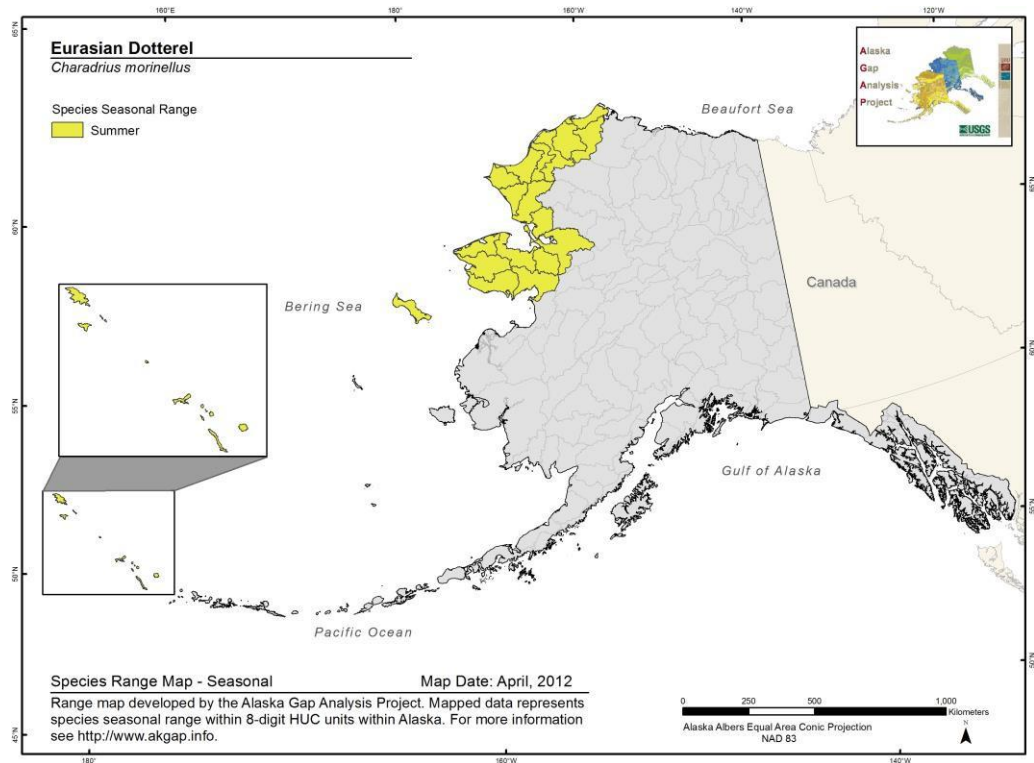
Eurasian Dotterel *Charadrius morinellus*

Range Map and Distribution Model Summary

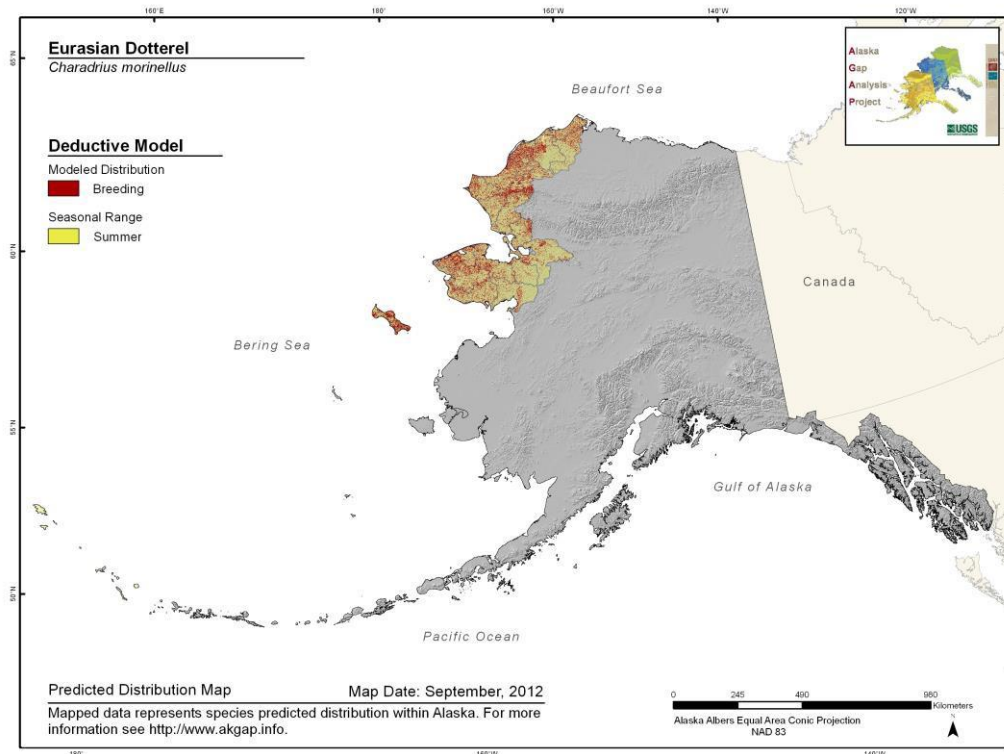
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Occurs in arctic tundra or arctic-alpine zone. Open stony or sandy areas, less frequently marshes, mudflats, seacoasts (AOU 1983). Nests on stony steppes, plains, newly plowed fields, and marginal grassland (AOU 1983); highlands and tundra in northwestern Alaska (National Geographic Society 1983). Favors open flat, unvegetated areas above or below treeline and below snow line.

References

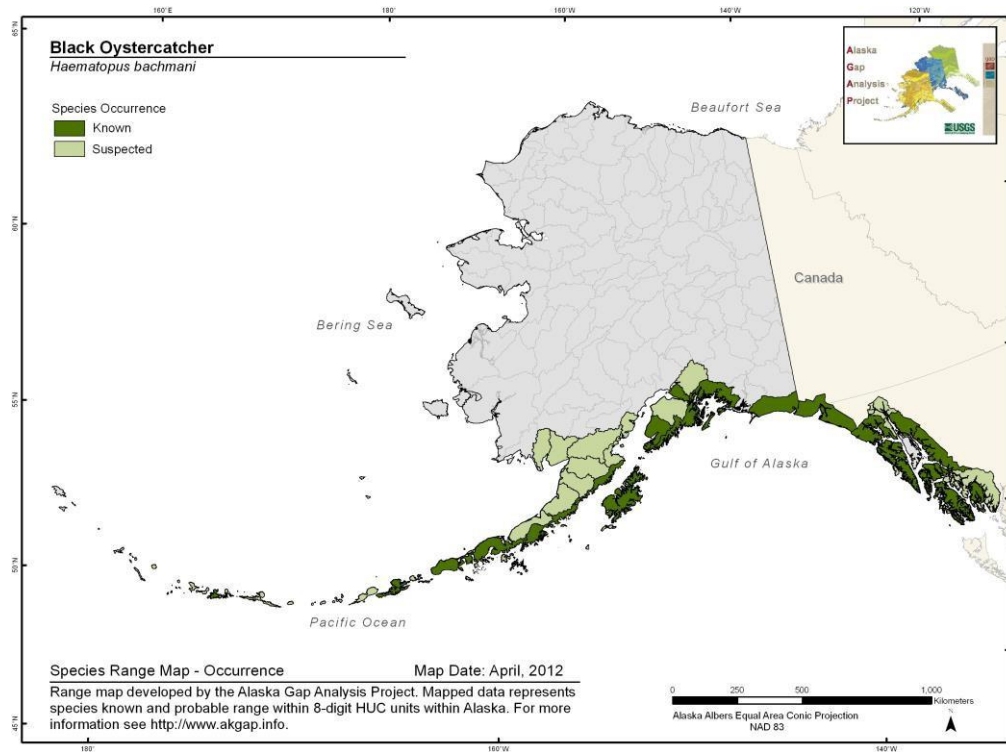
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

National Geographic Society. 1983. Field guide to the birds of North America. National Geographic Society, Washington, DC.

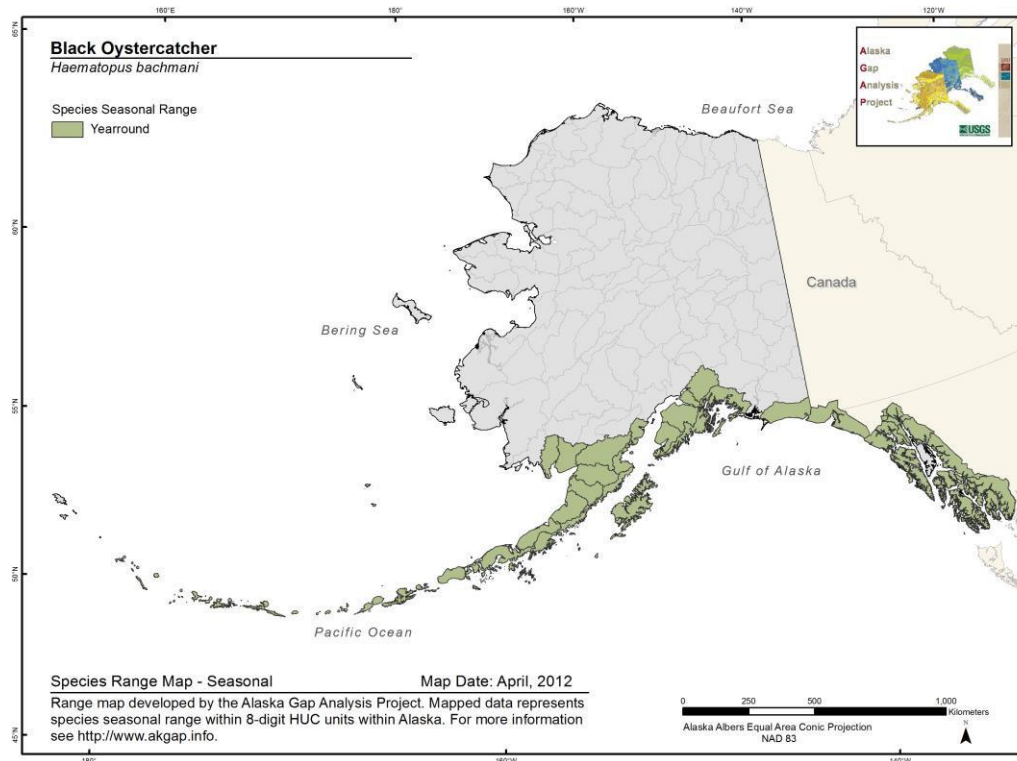
Black Oystercatcher *Haematopus bachmani*

Range Map and Distribution Model Summary

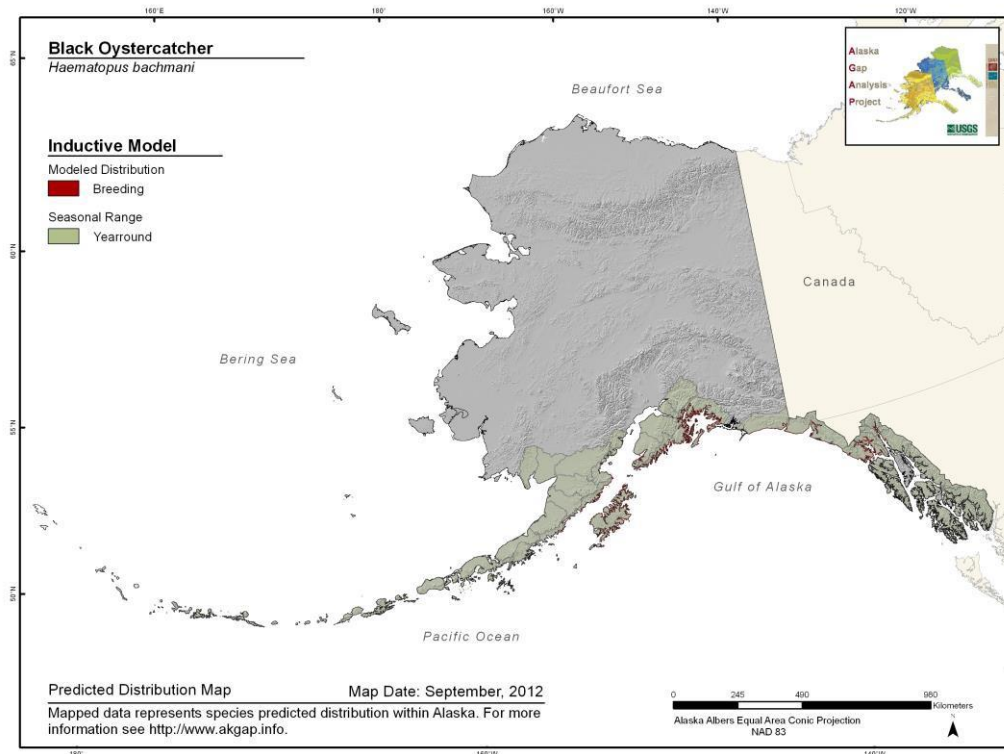
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.929**

**Model Quality
Summary:**
High

Habitat Description

Obligate inhabitants of intertidal zone. Habitat is exclusively associated with the high tide margin of the intertidal zone, and includes mixed sand and gravel beaches, cobble and gravel beaches, exposed rocky headlands, rocky islets, and tidewater glacial moraines. In Alaska, highest breeding densities occur on non-forested islands dominated by sloping beaches of shell or gravel (Andres 1998). In winter, flocks concentrate on protected, ice-free tidal flats (Hartwick and Blaylock 1979).

References

Andres, B. A. 1998. Black Oystercatcher (*Haematopus bachmani*). Exxon Valdez Oil Spill Trustee Council Restoration Notebook. 8 pp.

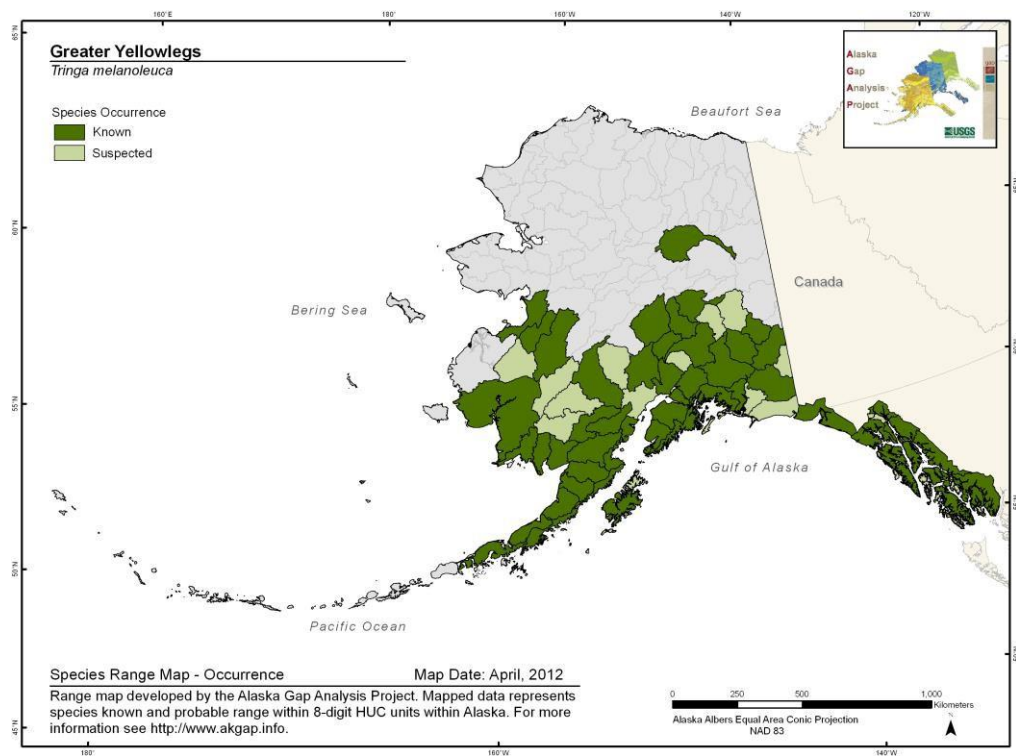
Hartwick, E. B. and W. Blaylock. 1979. Winter ecology of a Black Oystercatcher population. *Stud. Avian Biol.* 2:207-215.

Greater Yellowlegs

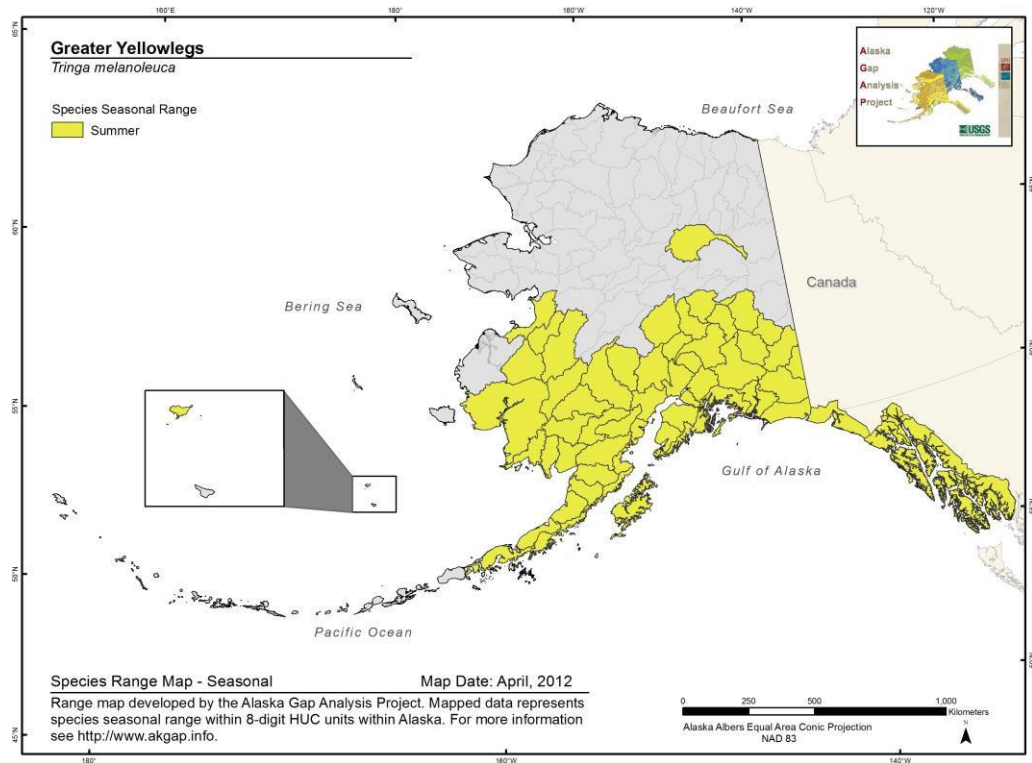
Tringa melanoleuca

Range Map and Distribution Model Summary

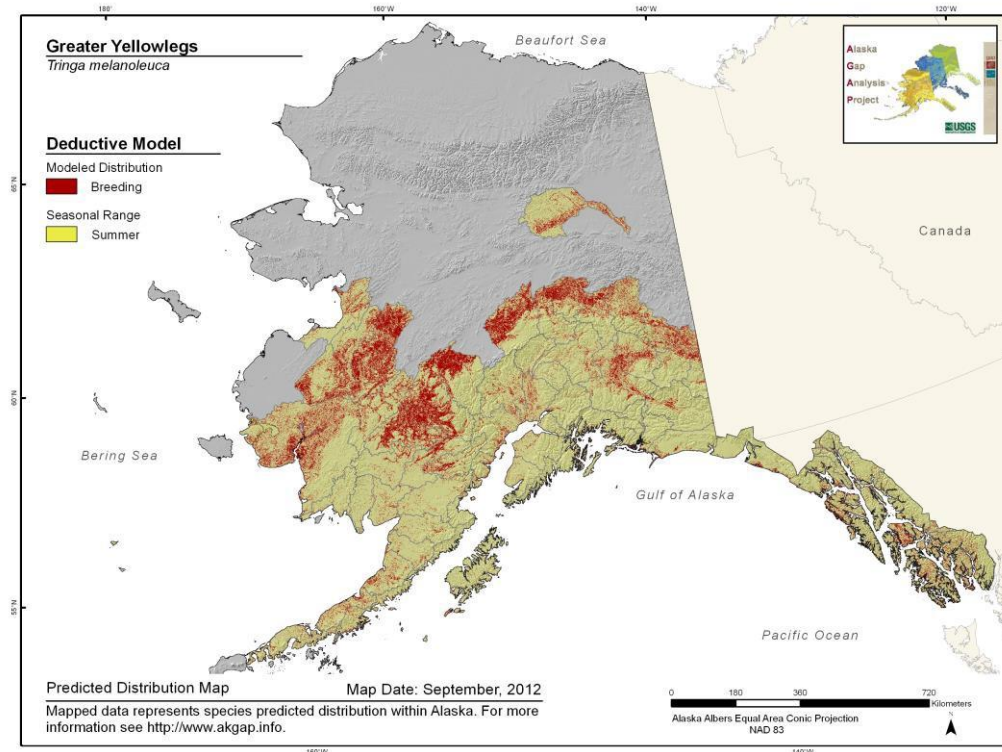
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.509**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in swampy forested lands between 900 and 1,220 m in B.C. Also found in open to sparsely treed, mixed forests with low to sparse undergrowth near sloughs, wet meadows, and bogs. Utilizes burned ridges and forest clearings (Campbell et al. 1990).

References

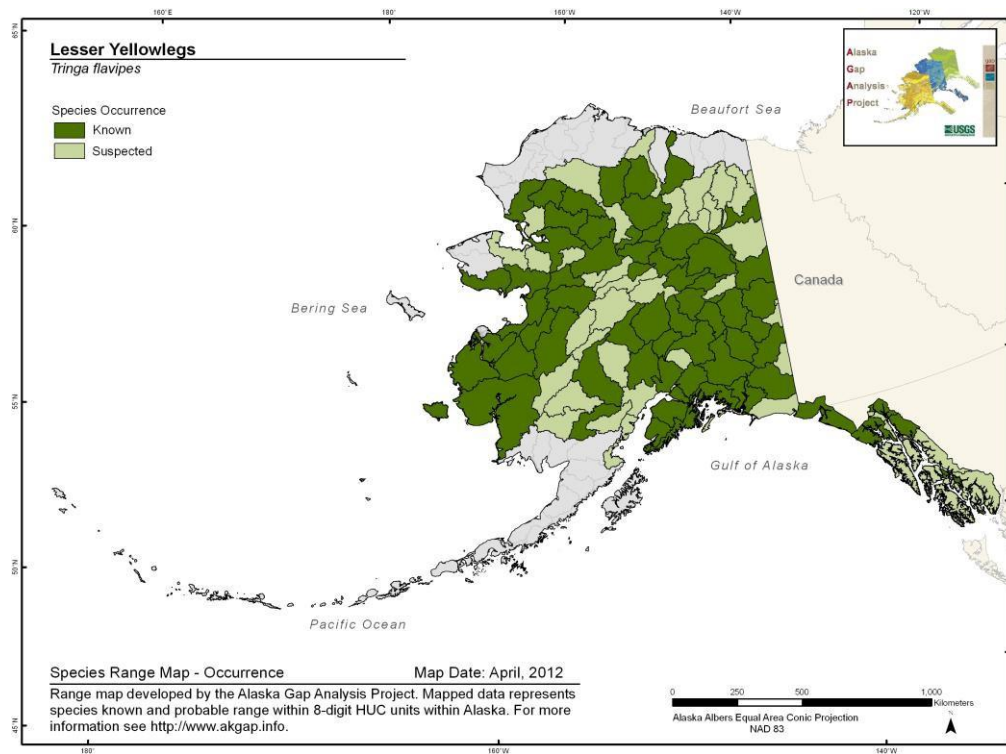
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Lesser Yellowlegs

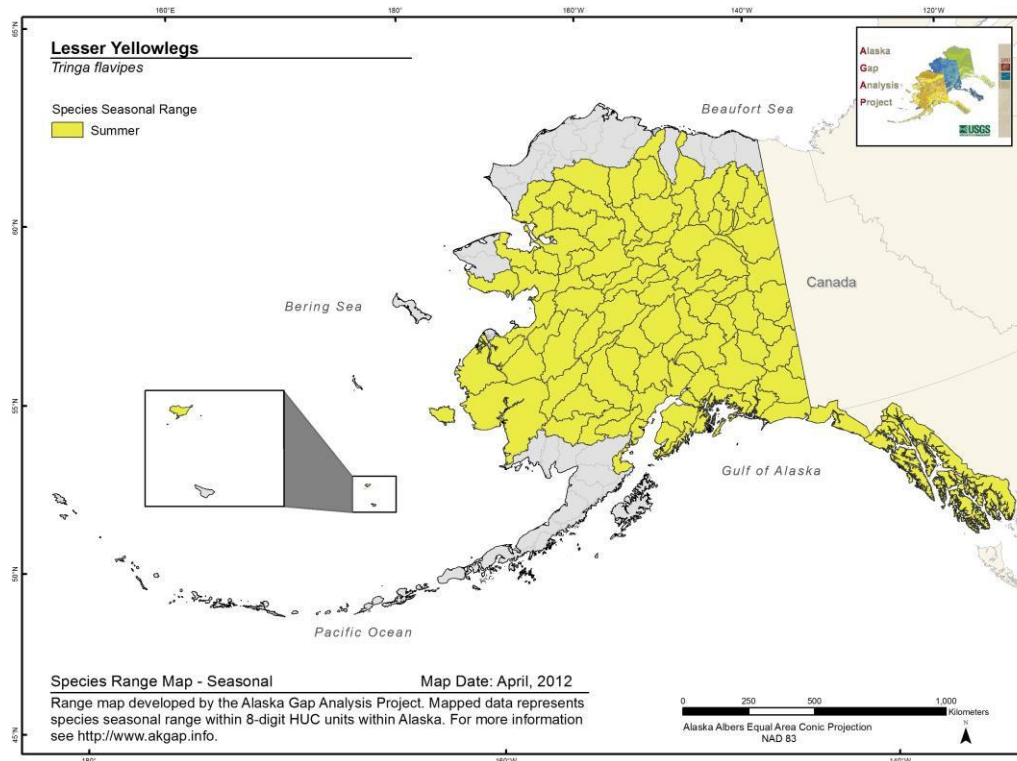
Tringa flavipes

Range Map and Distribution Model Summary

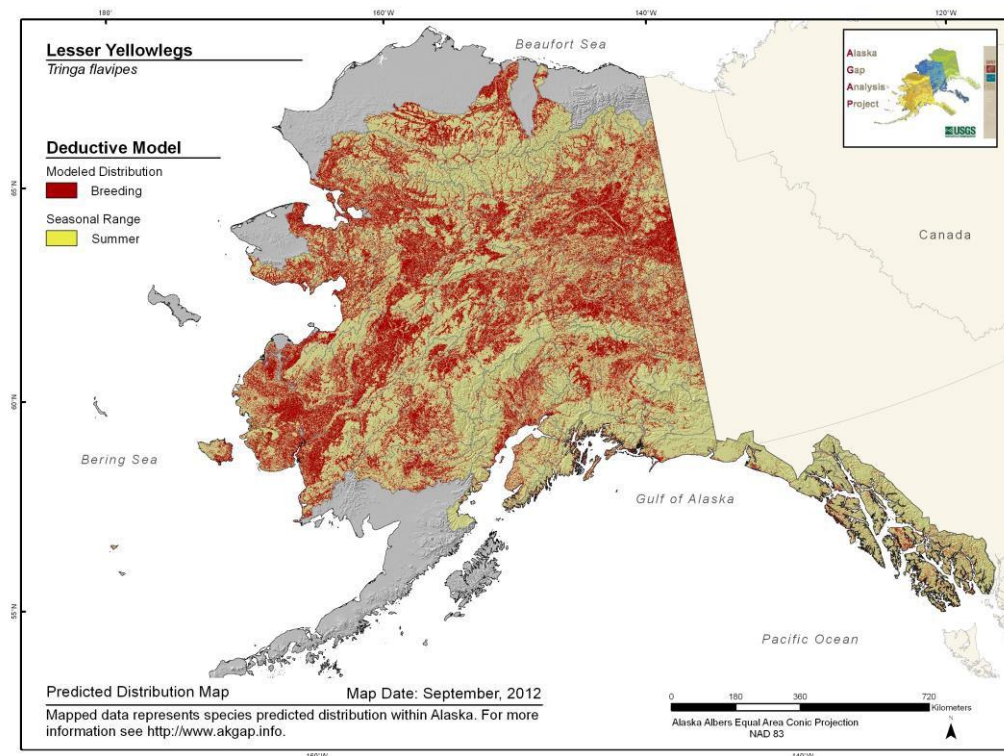
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.511**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in muskegs and freshwater marshes in open boreal forests and forest/tundra transition habitats. Often nests in drier, more densely vegetated habitats than sympatric Greater Yellowlegs (Tibbitts and Moskoff 1999). Nesting habitat is typically a combination of shallow wetlands, trees, shrubs, and open water. Forages in boreal forest wetlands, saltmarsh ponds, and intertidal areas.

References

Tibbitts, T. L., and W. Moskoff. 1999. Lesser Yellowlegs (*Tringa flavipes*). In *The Birds of North America*, No. 427 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Range Map and Distribution Model Summary

Wood Sandpiper
Tringa glareola

Species Occurrence

- Known
- Suspected

Beaufort Sea

Canada

Bering Sea

Gulf of Alaska

Pacific Ocean

Map Date: April, 2012

Species Range Map - Occurrence

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species known and probable range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

0 250 500 1,000 Kilometers

Alaska Albers Equal Area Conic Projection
NAD 83

Wood Sandpiper
Tringa glareola

Species Seasonal Range

- Summer
- Fall/Spring

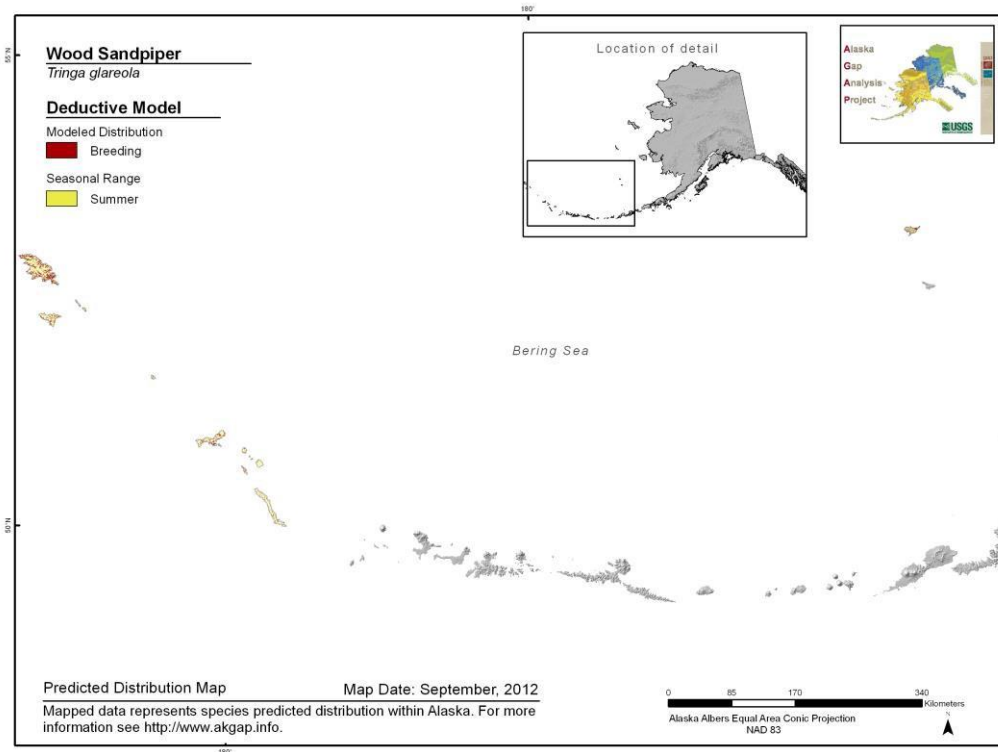
Map Date: April, 2012

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species seasonal range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

Scale: 0 250 500 1,000 Kilometers

Alaska Albers Equal Area Conic Projection
NAD 83

Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Lakes, ponds, streams, wet meadows, marshes, bogs, shallow pools; frequently in wooded regions; often near dead trees or brush (AOU 1983, Pratt et al. 1987). Edges of ponds in taiga (AOU 1983).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

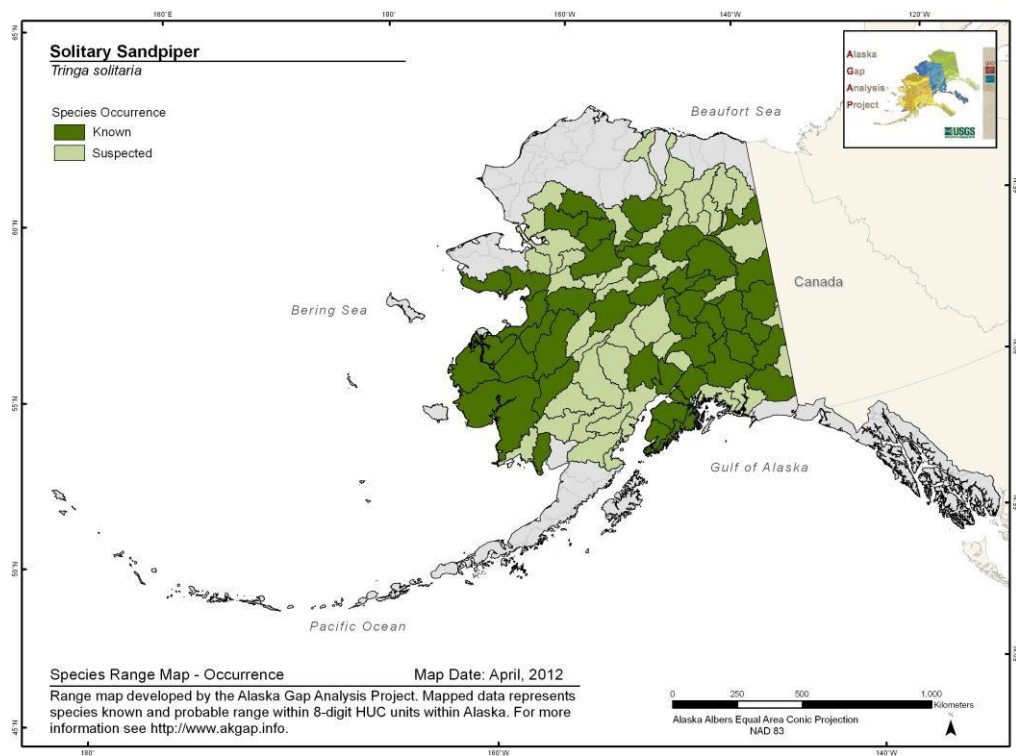
Pratt, H.D., P.L. Bruner, and D.G. Berrett. 1987. A Field Guide to the Birds of Hawaii and the Tropical Pacific. Princeton University Press, Princeton, New Jersey. 409 pp. + 45 plates.

Solitary Sandpiper

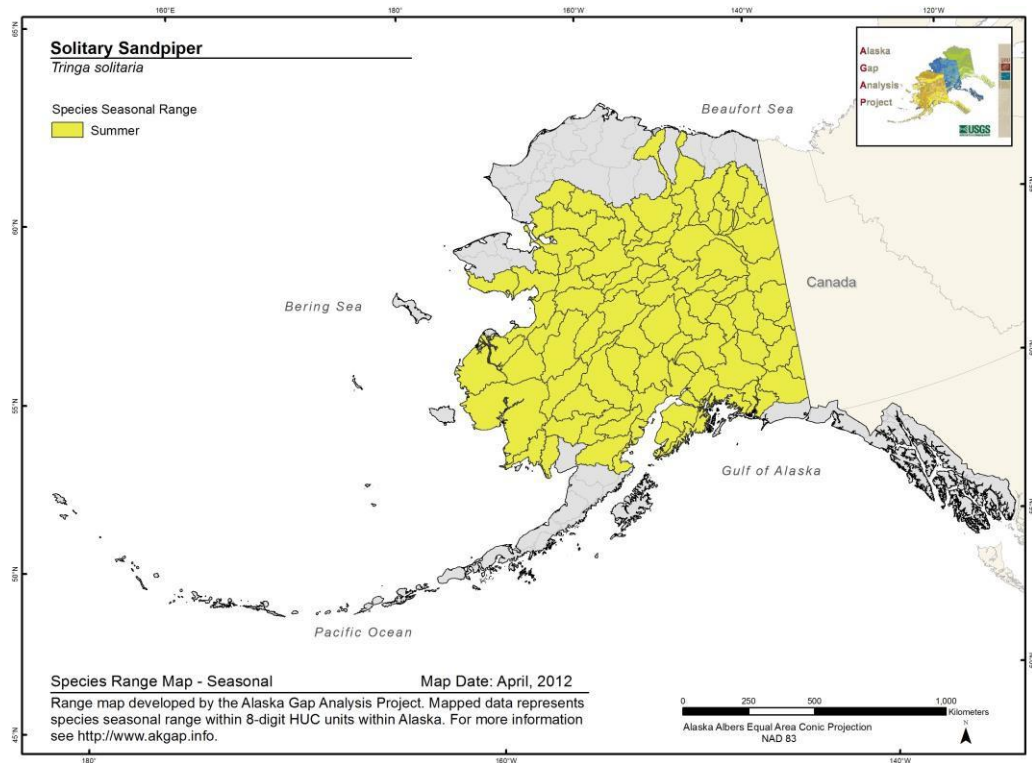
Tringa solitaria

Range Map and Distribution Model Summary

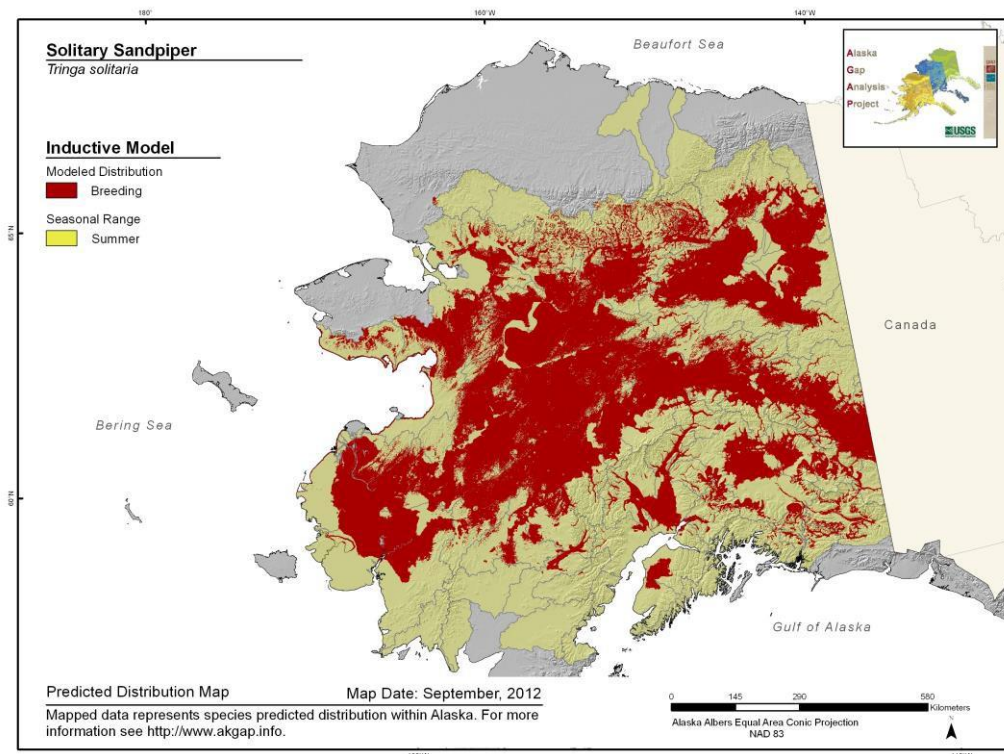
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.768**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in wooded wetlands in muskeg bogs, spruce forests, and deciduous riparian woodlands (Moskoff 1995); occasionally riparian tall shrub thickets (Spindler and Kessel 1980, McCaffery and Harwood 2004). On the Kenai Peninsula, Alaska, associated with wet forest gaps 10 to 20 m wide (Collins et al. 1999). In the Yukon, breeding birds have been reported using subalpine shrub habitats, up to 1,600 m in elevation (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Collins, W.B., D. Williams, and T. Trapp. 1999. Spruce beetle effects on wildlife. Federal Aid in Wildlife Restoration Research Progress Report. ADF&G, Division of Wildlife Conservation. Grant W-27-1, Study 1.53.

McCaffery, B. J. and C. H. Harwood. 2004. Species at risk: Solitary Sandpiper (*Tringa solitaria*), summary of ecology, abundance, and population trends in North America. Unpublished poster presented at the 10th Alaska Bird Conference, Anchorage, AK.

Moskoff, W. 1995. Solitary Sandpiper (*Tringa solitaria*). In The Birds of North America, No.156 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

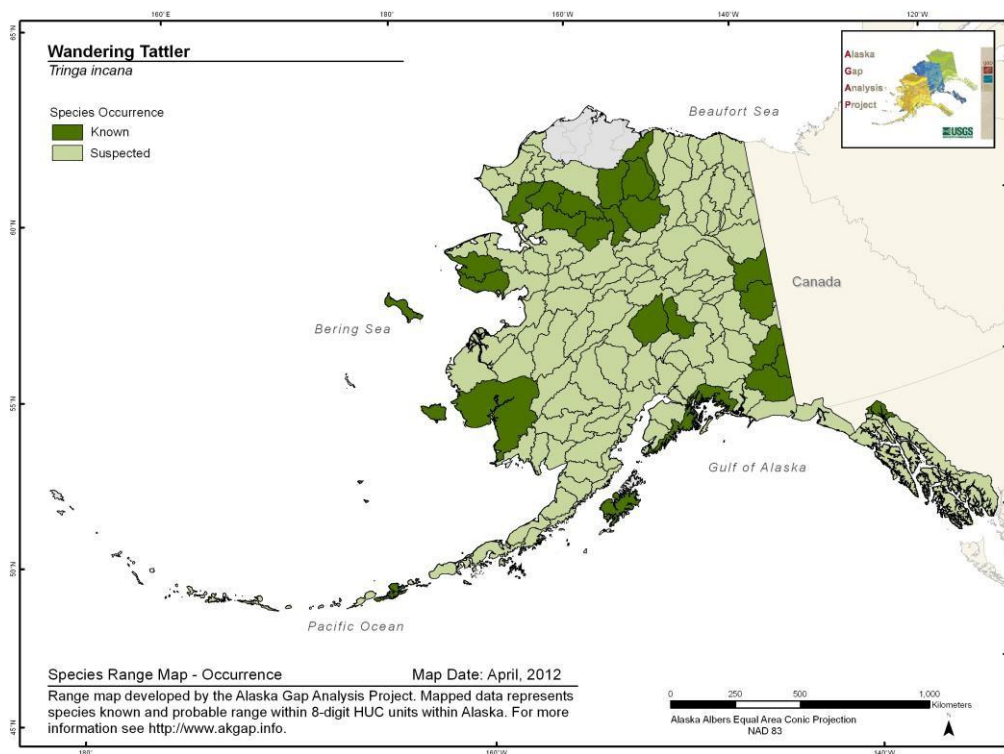
Spindler, M. A. and B. A. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. *Syesis* 13:61-104.

Wandering Tattler

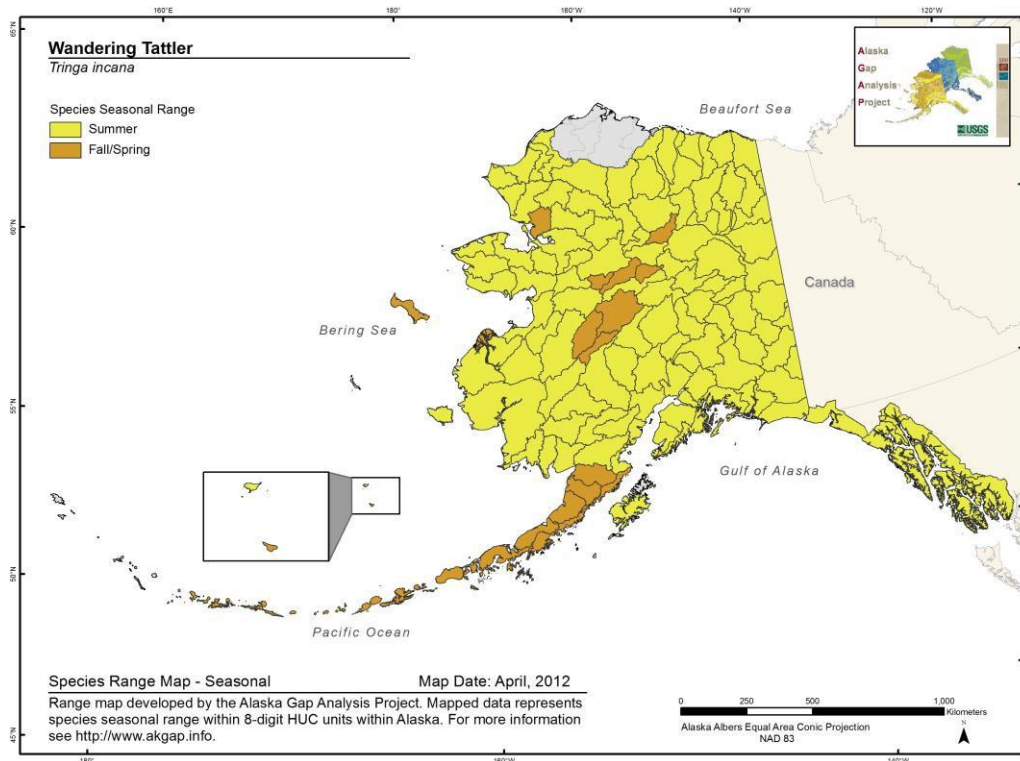
Tringa incana

Range Map and Distribution Model Summary

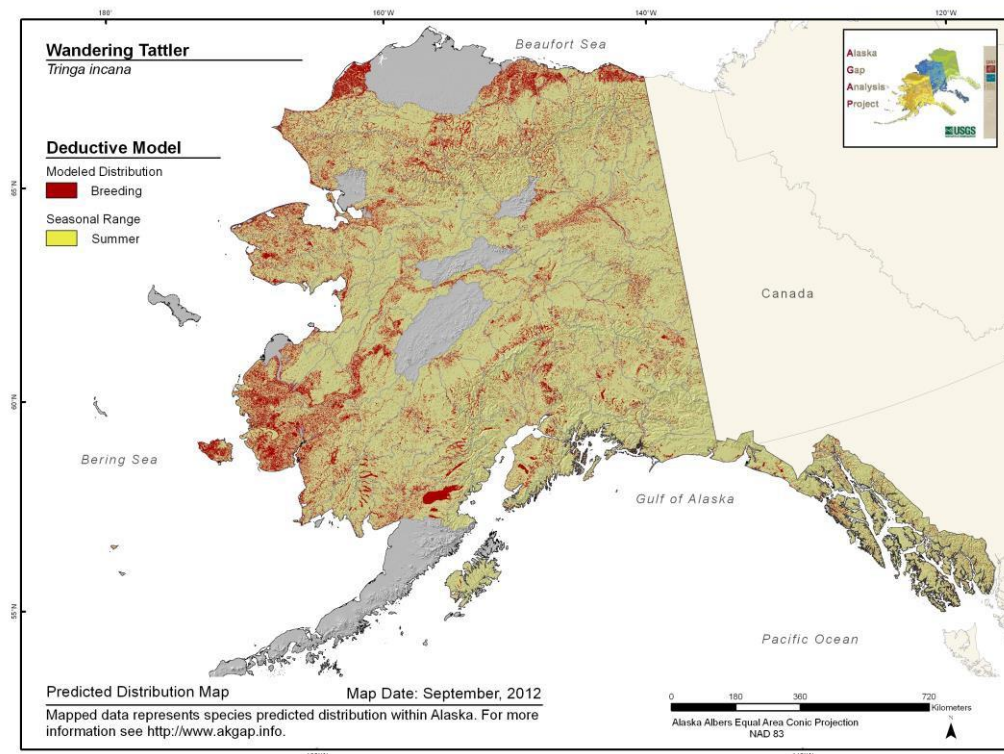
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.665**

**Model Quality
Summary:**
Low

Habitat Description

Mostly restricted to the alpine zone, usually breeds along rocky or scrubby vegetated edges of mountain streams and lakes; frequents rapidly-flowing streams and tundra habitats, wet meadows, moraine deposits, scree slopes, braided rivers, sometimes found in forest clearings away from water. Often nests on the ground in a rocky or gravelly site. In Prince William Sound, Alaska, known to nest above tide line on gravel areas of the immediate coast, and also commonly observed nesting on/near sparsely vegetated tailing piles in areas of old placer mining activity (Weeden 1965, Johnsgard 1981, Weeden 1959 in Gill et al. 2002a). Nests also observed in dwarf shrub tundra near streams or lakes (Spindler et al. 1980, Gill et al. 2002a).

References

Gill, R. E., B. J. McCaffery and P. S. Tomkovich. 2002a. Wandering tattler (*Heteroscelus incanus*). In *The Birds of North America*, No. 642, (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Johnsgard, P. A. 1981. *The plovers, sandpipers, and snipes of the world*. Univ. of Nebraska Press, Lincoln.

Spindler, M. A., M. A. Mouton and S.O. MacDonald. 1980. *Biological surveys in the Firth-Mancha Research Natural Area, Alaska, 1979-1980*. Fairbanks, AK: William O. Douglas Arctic Wildlife Range, Arctic National Wildlife Refuge. 91 pp.

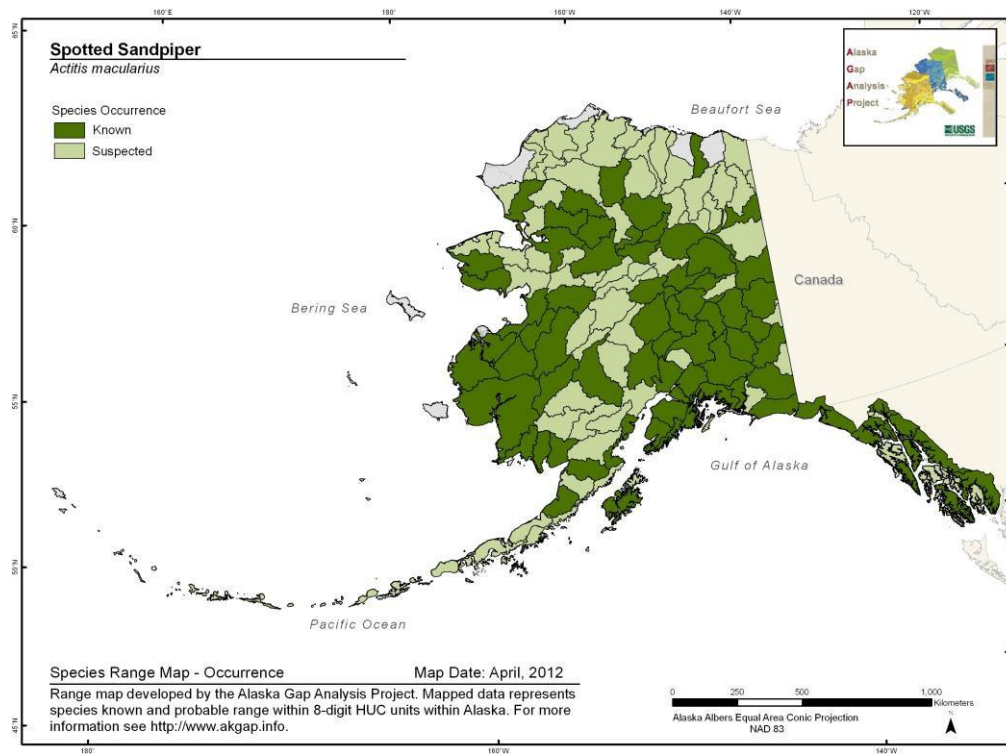
Weeden, R.B. 1965. Further notes on Wandering Tattlers in central Alaska. *Condor* 67:87–89.

Spotted Sandpiper

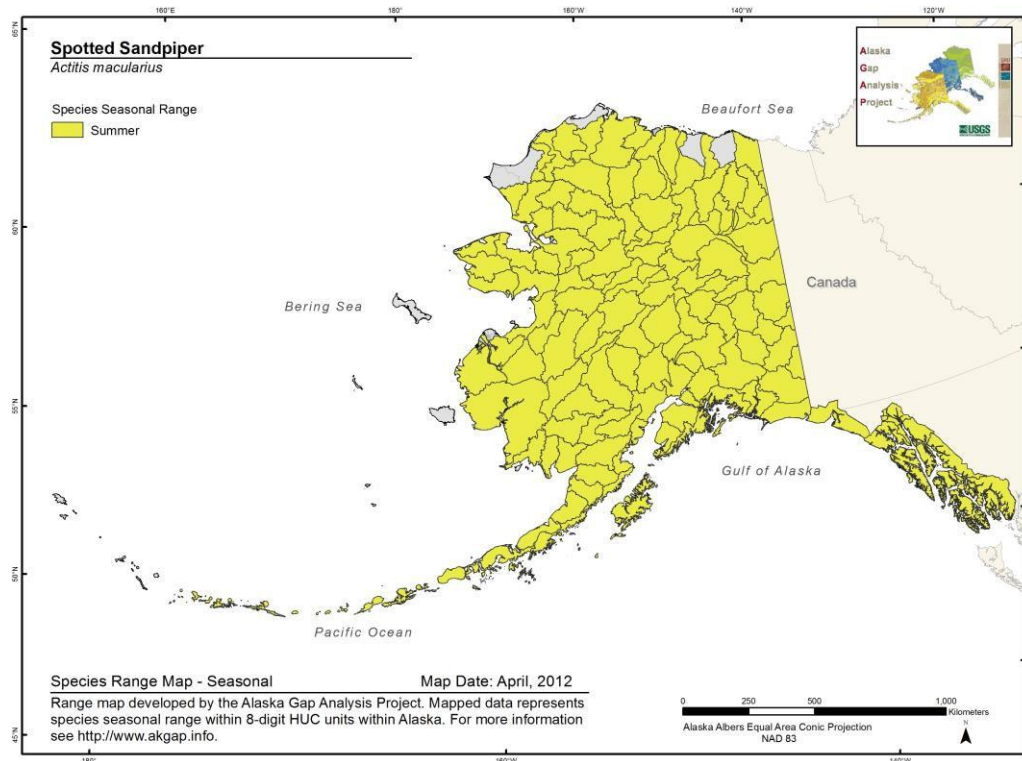
Actitis macularius

Range Map and Distribution Model Summary

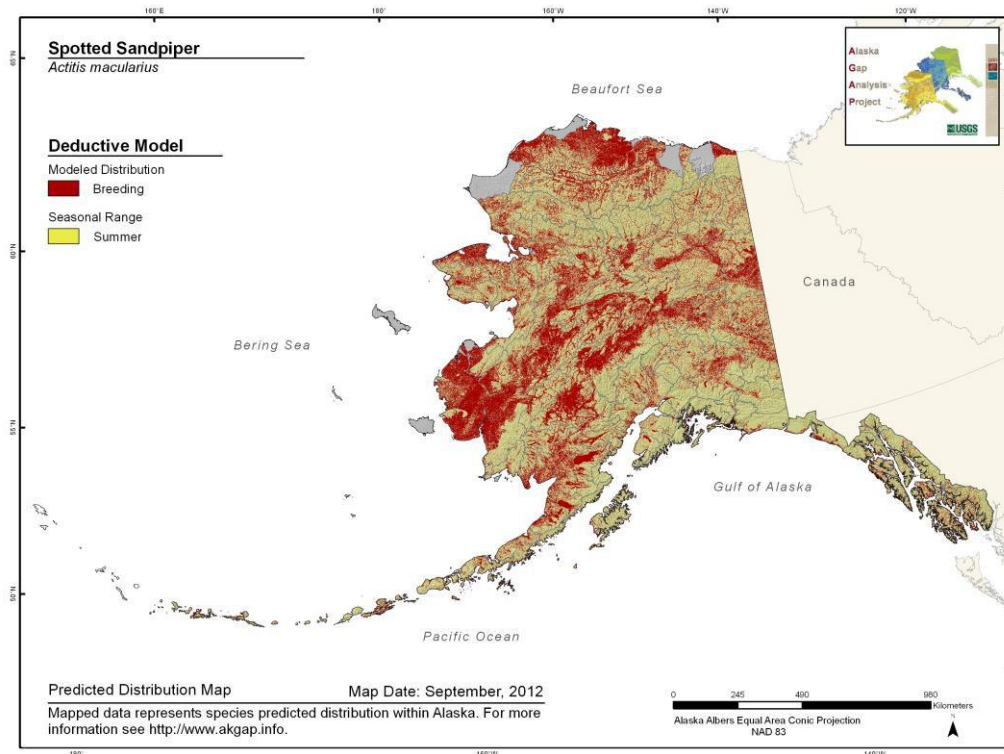
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.561**

**Model Quality
Summary:**
Low

Habitat Description

In B.C., breeds almost anywhere there is freshwater, including along the perimeter of lakes and rivers, coastal grassy beaches, man-made clearings, and roadsides. Typical breeding habitat is the edge of an open or semi-open area adjacent to water, with low ground cover, such as shrub-dotted or lightly treed meadows or grassland. Prefers shores with rocks, wood, or debris (NatureServe 2007b). Found at sea level on open beaches to 1,800 m in sub-alpine meadows of B.C. (Campbell et al. 1990).

References

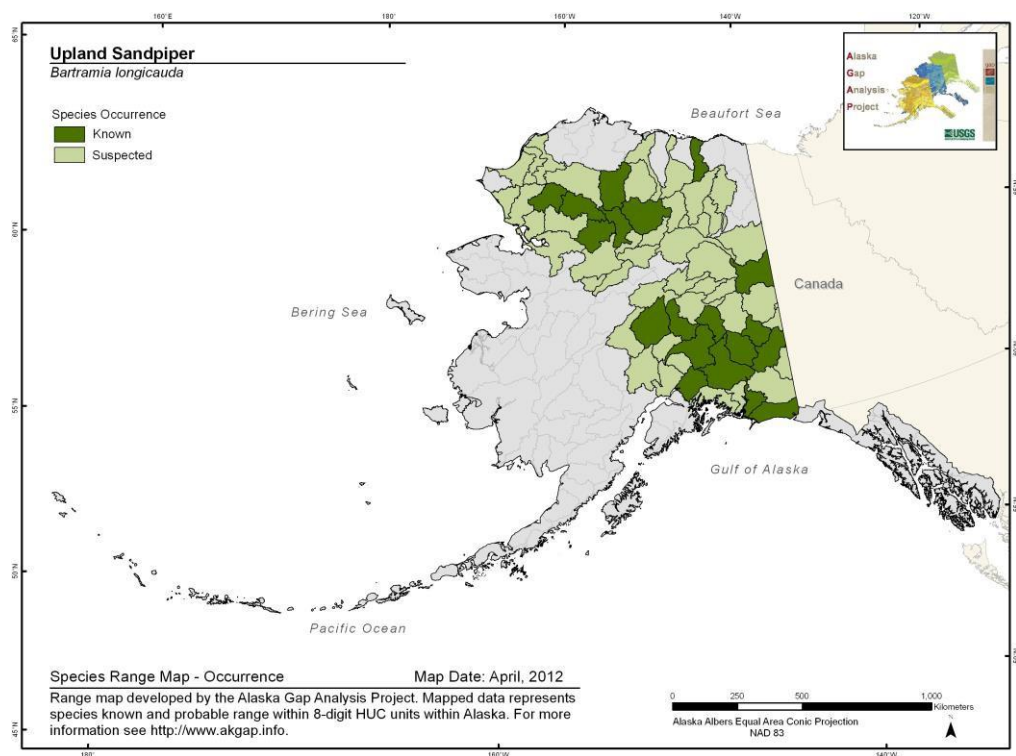
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

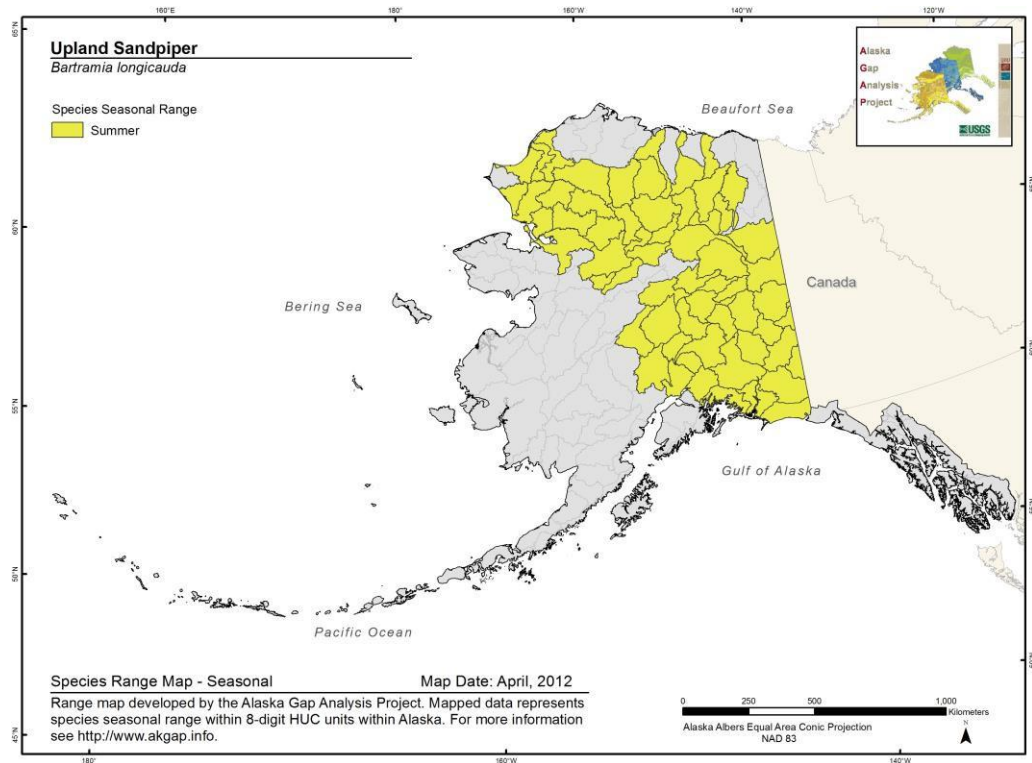
Upland Sandpiper *Bartramia longicauda*

Range Map and Distribution Model Summary

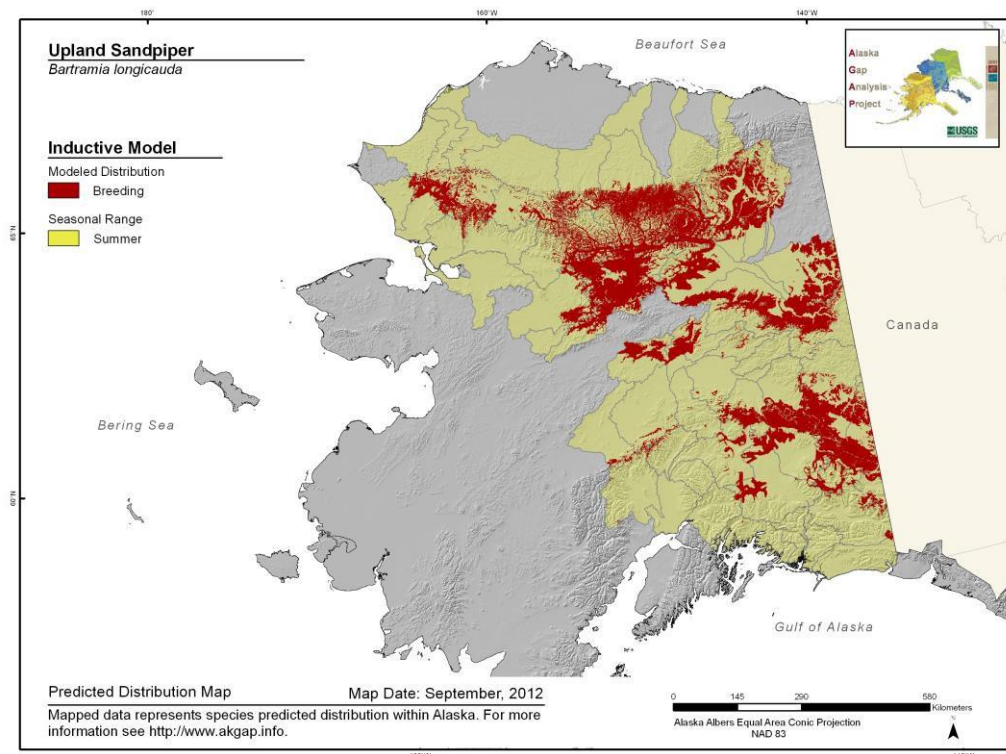
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.843**

**Model Quality
Summary:**
Moderate

Habitat Description

Open grassy fields and sparsely vegetated uplands (Armstrong 1995). In Alaska, habitat is damp, upland tundra heath, and swale of tall grass and sedge amidst tall willows (Murie 1946). Restricted primarily to extensive, open tracts of short grassland habitat. Nest (in the north) peatlands and scattered woodlands near timberline (Forbush 1925, Higgins et al. 1969, AOU 1983, Osborne and Peterson 1984, Godfrey 1986). Nesting is also known to occur in dry patches of wet meadows (Stewart 1975, Herman et al. 1984) and in blueberry (*Vaccinium* spp.) barrens (J. Albright, pers. comm.). In northern Yukon, nesting habitat includes tussock tundra, sedge tussock meadows with adjacent spruce, wet willow- horsetail slopes, spruce edge, cotton-grass tussock tundra with patches of dwarf birch and willow, wetlands, hillsides, and open spruce (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

Forbush, E. H. 1925. Birds of Massachusetts and other New England states. Part 1: Water birds, marsh birds and shore birds. Massachusetts Department of Agriculture, Boston, Massachusetts. 486 pp.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Herman, S. G., J. W. Scoville, and S. G. Waltcher. 1984. The upland sandpiper in Bear Valley and Logan Valley, Grant County, Oregon. Special Report submitted to Oregon Department of Fish and Wildlife. 23 pp.

Higgins, K. F., H. F. Duebber, and R. B. Oetting. 1969. Nesting of the upland plover on the Missouri Couteau. *Prairie Naturalist* 1:45-8.

Murie, A. 1946. Observations on birds of Mount McKinley National Park, Alaska. *Condor* 46: 253-266.

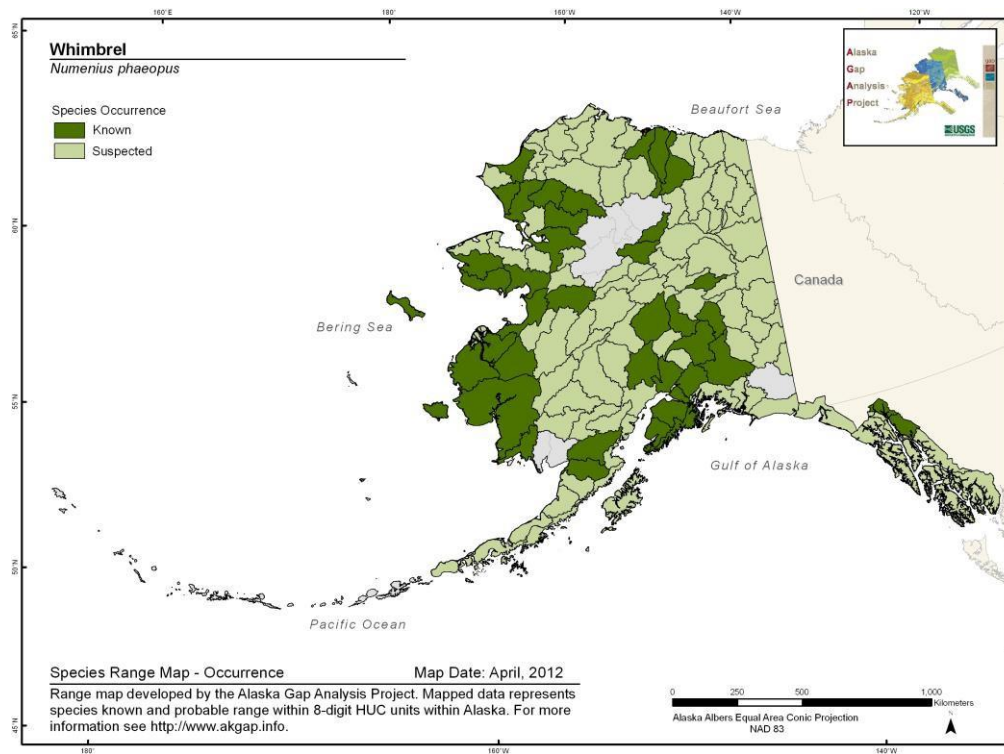
Osborne, D. R., and A. T. Peterson. 1984. Decline of the upland sandpiper (*BARTRAMIA LONGICAUDA*) in Ohio: an endangered species. *Ohio J. Sci.* 84(1):8-10.

Stewart, R. E. 1975. *Breeding Birds of North Dakota*. Tri-College Center for Environmental Studies, Fargo ND.

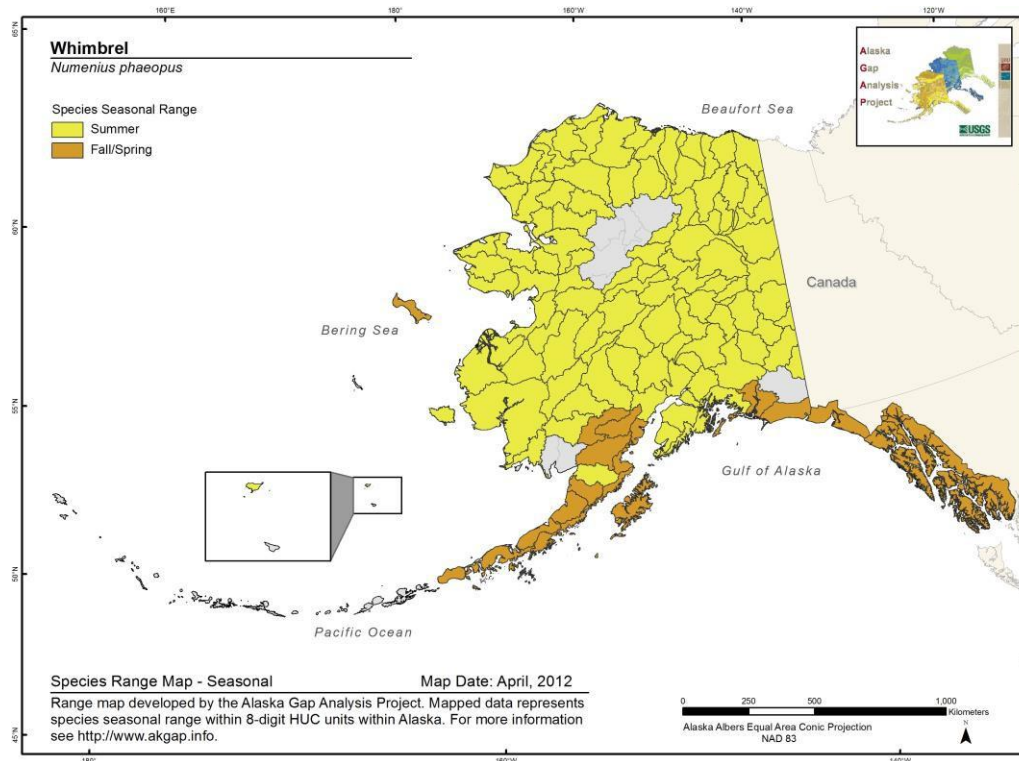
Whimbrel *Numenius phaeopus*

Range Map and Distribution Model Summary

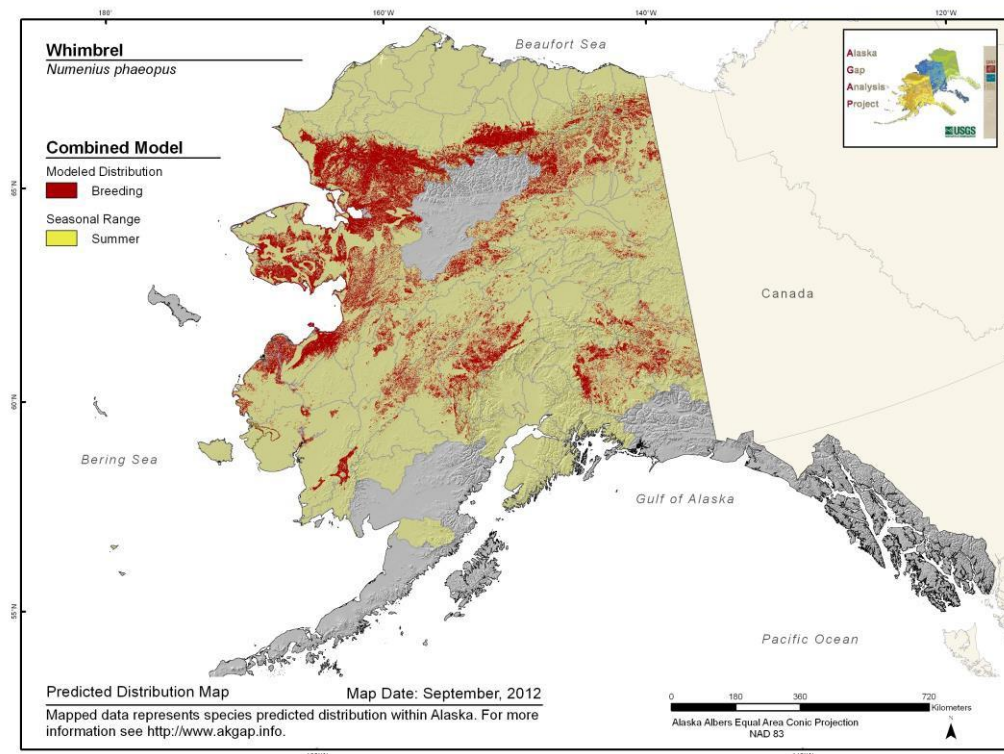
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.654**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, nests in wet, flat, dwarf shrub tundra, dry dwarf-shrub ridges and steep slopes, and rolling (50-500 m elevation, 3-10% slope), open, usually moist tundra among sedge hummocks (Murie 1963, Skeel and Mallory 1996). Areas characterized by abundant berry-producing shrubs (McCaffery, personal communication, in Skeel and Mallory 1963). Habitat types in breeding areas include: low shrub/tussock tundra (*Betula nana*, *Empetrum nigrum*, *Ledum palustre*, *Vaccinium* spp., *Salix* spp.), mixed shrub thicket/tundra (*Salix* spp., *Betula nana*, and *Alnus crispa* over tussocks), tall shrubs (*Salix alaxensis*, typically along water courses), and shrub meadow/tundra (similar species as low shrub/tussock tundra but more prostrate and more bare ground). Sedge (*Carex aquatilis*, *C. bigelowii*, *Eriophorum* spp.) and lichen meadows, though a small fraction of the overall land area, are also important habitats.

References

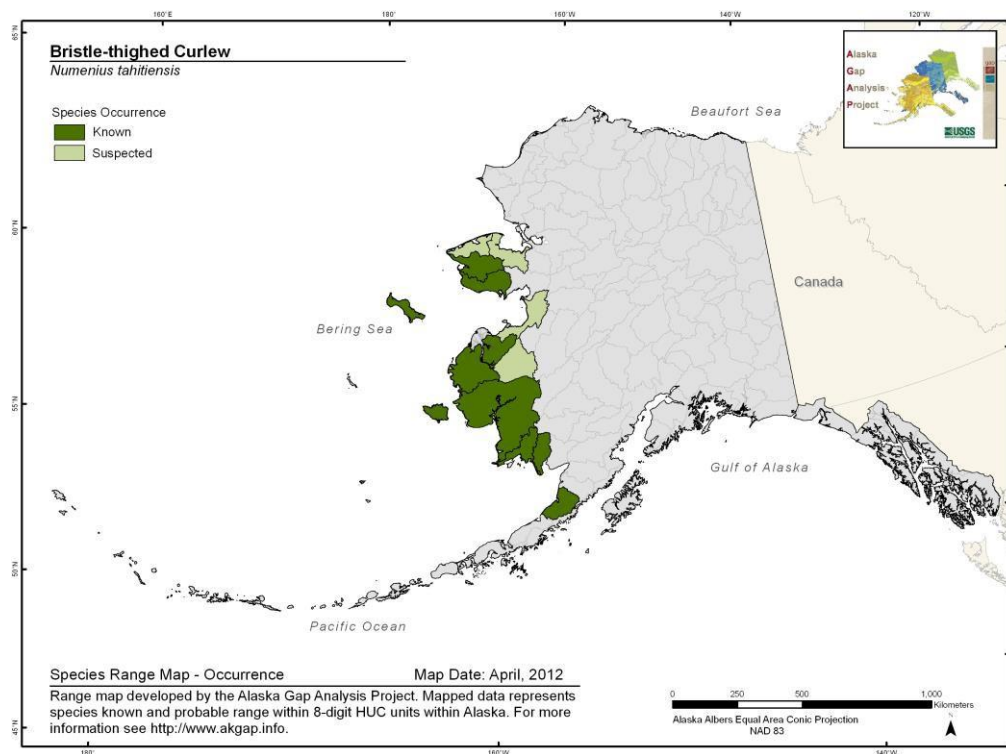
Murie, A. 1963. Birds of Mount McKinley National Park, Alaska. Mt. McKinley Nat. Hist. Assoc., San Francisco, CA.

Skeel, M. A. and E. P. Mallory. 1996. Whimbrel (*Numenius phaeopus*). In *The Birds of North America*, No.219 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

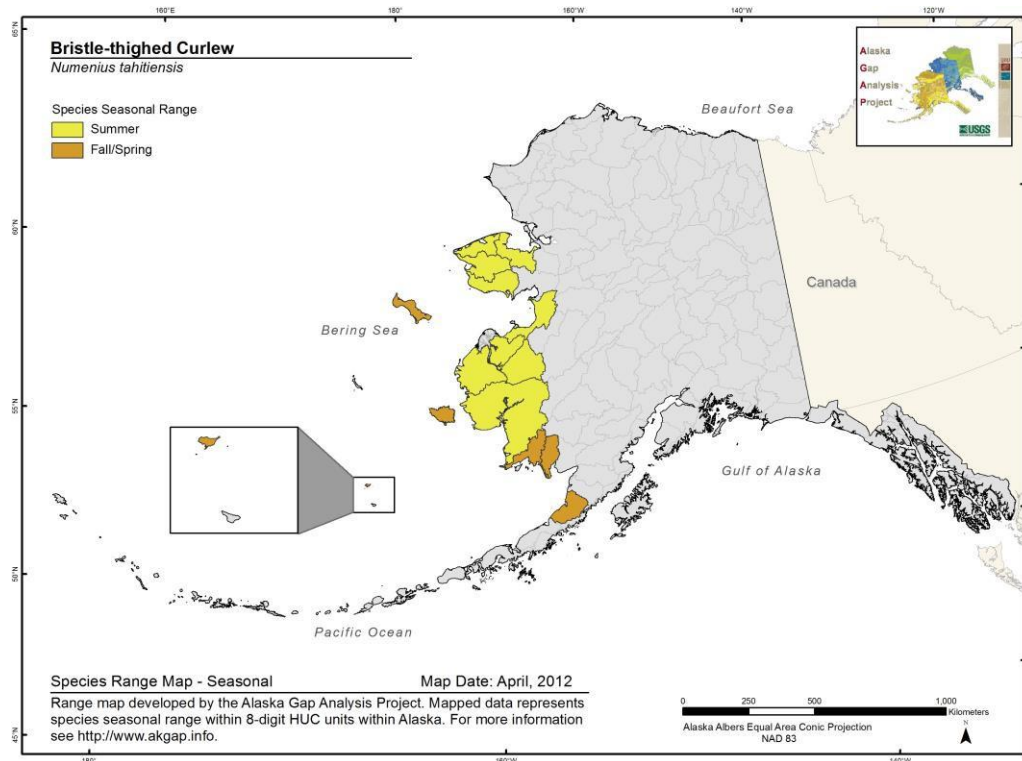
Bristle-thighed Curlew *Numenius tahitiensis*

Range Map and Distribution Model Summary

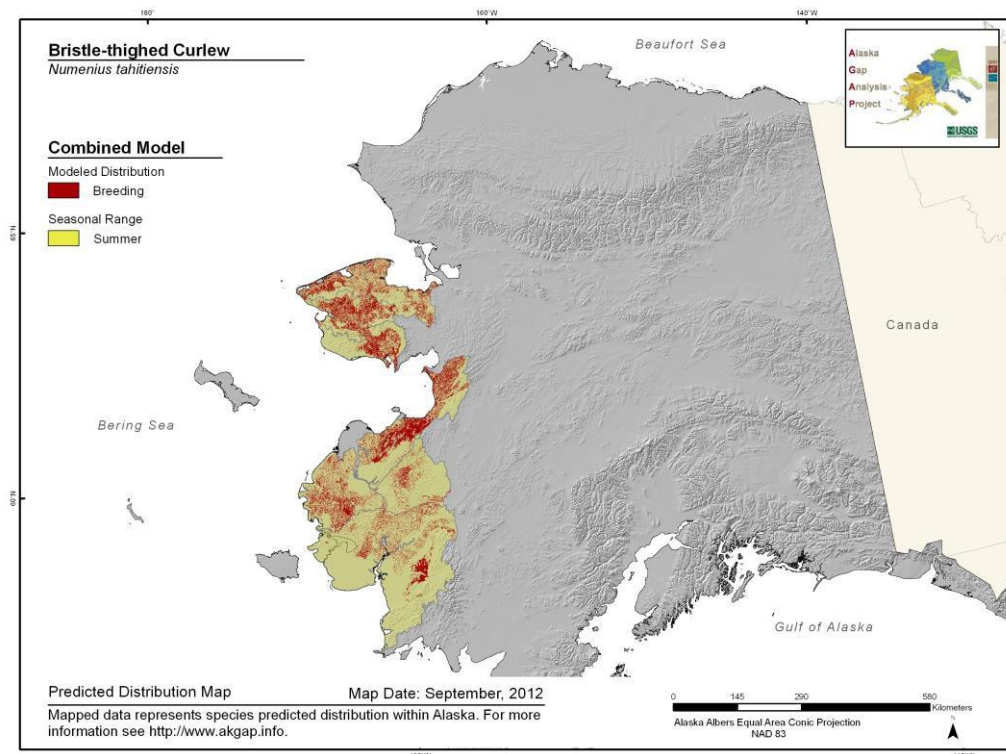
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.599**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat encompasses mosaic of subarctic and arctic tundra, including low shrub/tussock (*Betula nana*, *Empetrum nigrum*, *Ledum palustre*, *Vaccinium* spp., *Salix* spp.), , mixed shrub thicket/tundra (*Salix* spp., *Betula nana*, and *Alnus crispa* over tussocks), tall shrubs and shrub meadow in the low, mountainous regions northeast of the lower Yukon River (Nulato Hills) and uplands of the Seward Peninsula, Alaska (Handel and Dau 1988, Marks et al. 2002). Sedge and lichen meadows also important. Habitat use changes during the breeding season. During pre-nesting, curlews tend to be found primarily in shrub meadow/tundra (33%) and low shrub/tussock (47%); during nesting the birds shift their activities mostly to shrub meadow/tundra; and during brood rearing, adults attending young increase their use of sedge meadows. Younger broods tend to use habitats with a moderate level of tussocks and shrub cover; after fledging they prefer sedge and lichen meadows.

References

Handel, C. M. and C. P. Dau. 1988. Seasonal occurrence of migrant Whimbrels and Bristle-thighed Curlews on the Yukon-Kuskokwim Delta, Alaska. *Condor* 90: 782-790.

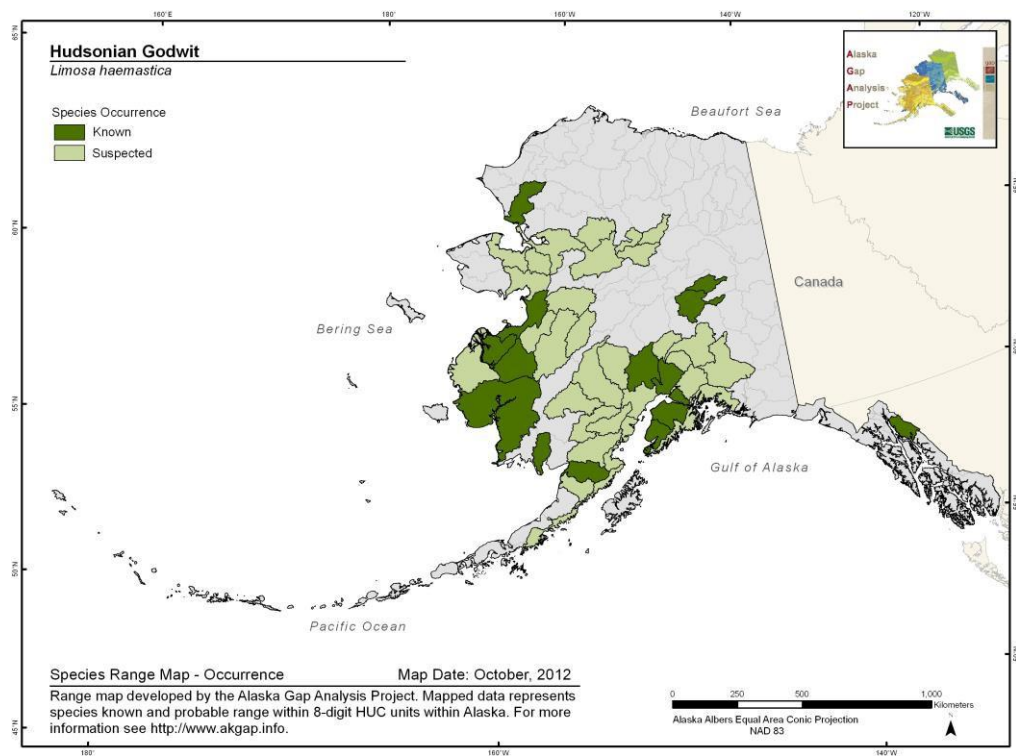
Marks, J.S., T. L. Tibbits, R. E. Gill, and B. J. McCaffery. 2002. Bristle-thighed Curlew (*Numenius tahitiensis*). In *The Birds of North America*, No. 705 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Hudsonian Godwit

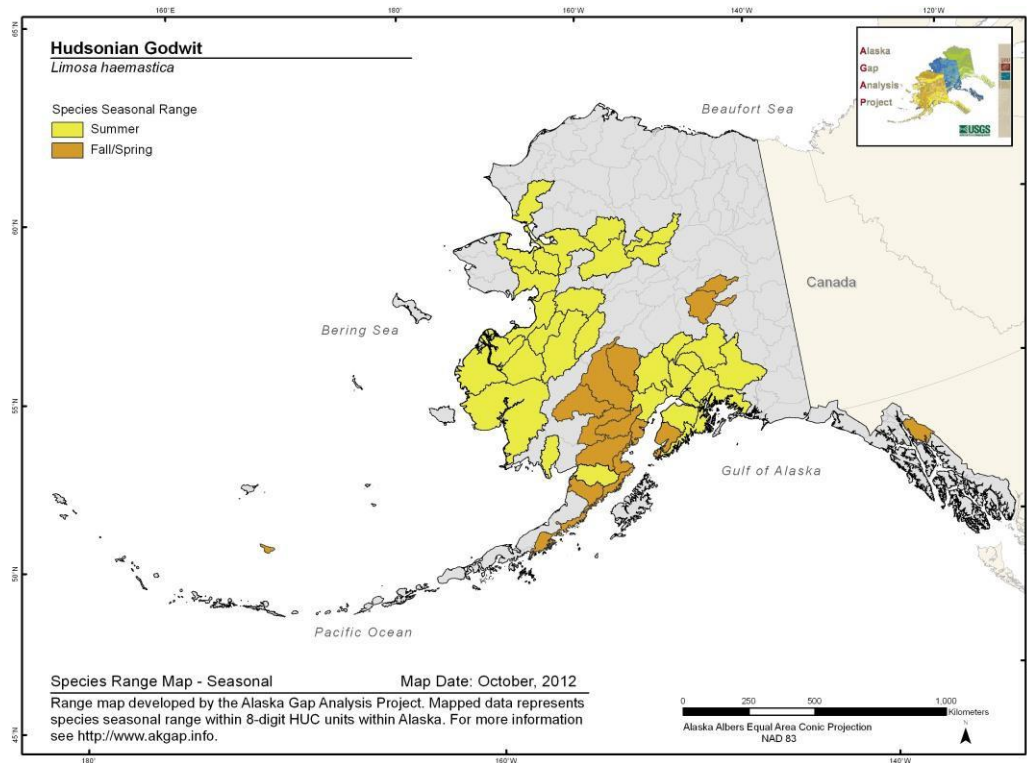
Limosa haemastica

Range Map and Distribution Model Summary

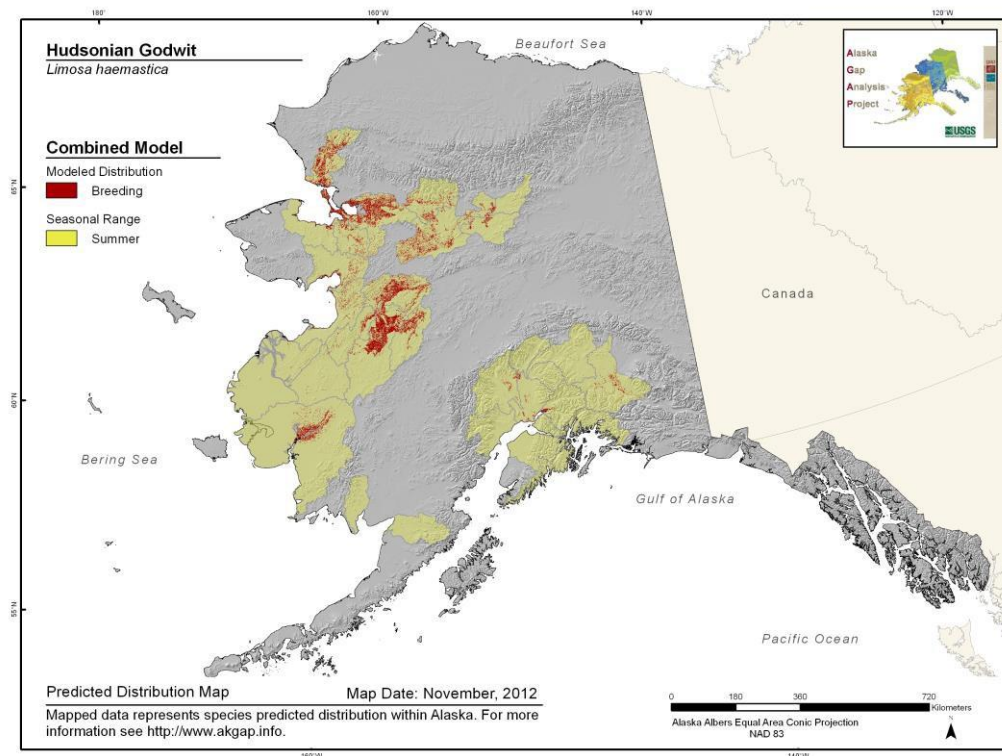
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.506**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat includes sedge-grass marshes, wet tundra, and taiga bogs (Armstrong 1995). Nesting habitat open sedge meadows intermixed with forest within Alaska. Cook Inlet habitat muskeg with wet bog, shallow pools, spruce islands, and drier upland areas surrounded by conifer forests. Similar in western Alaska where species breeds in spruce or spruce-deciduous forests interspersed with open bogs or wet meadows (Elphick and Klima 2002).

References

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

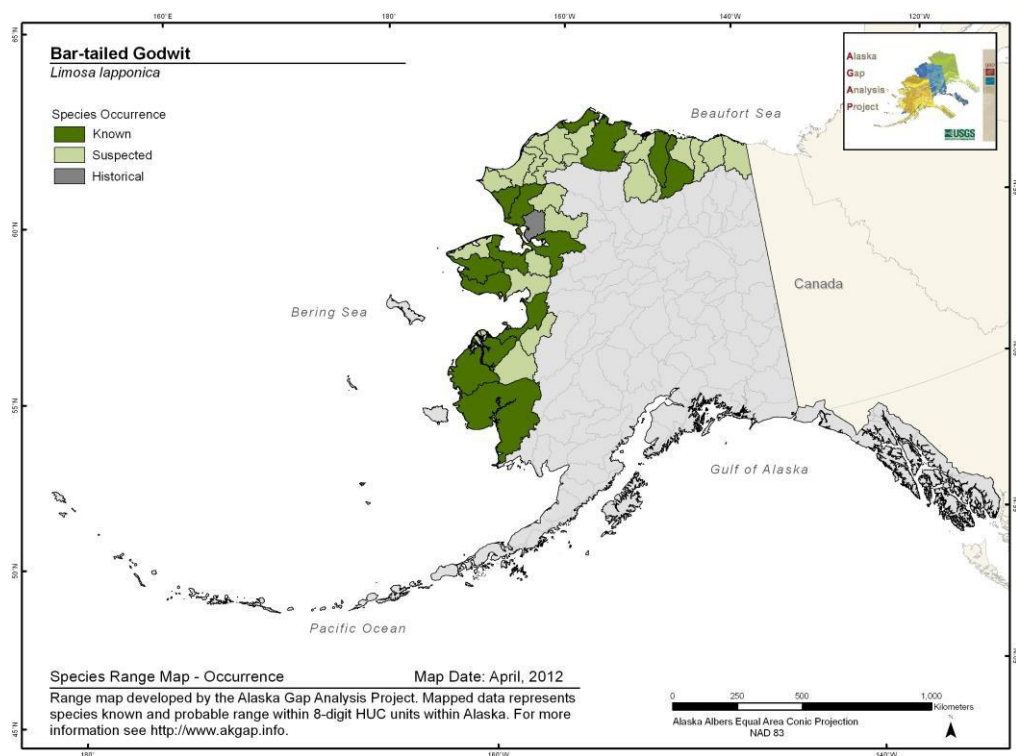
Elphick, C. S. and J. Klima. 2002. Hudsonian Godwit (*Limosa haemastica*). In *The Birds of North America*, No.629 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Bar-tailed Godwit

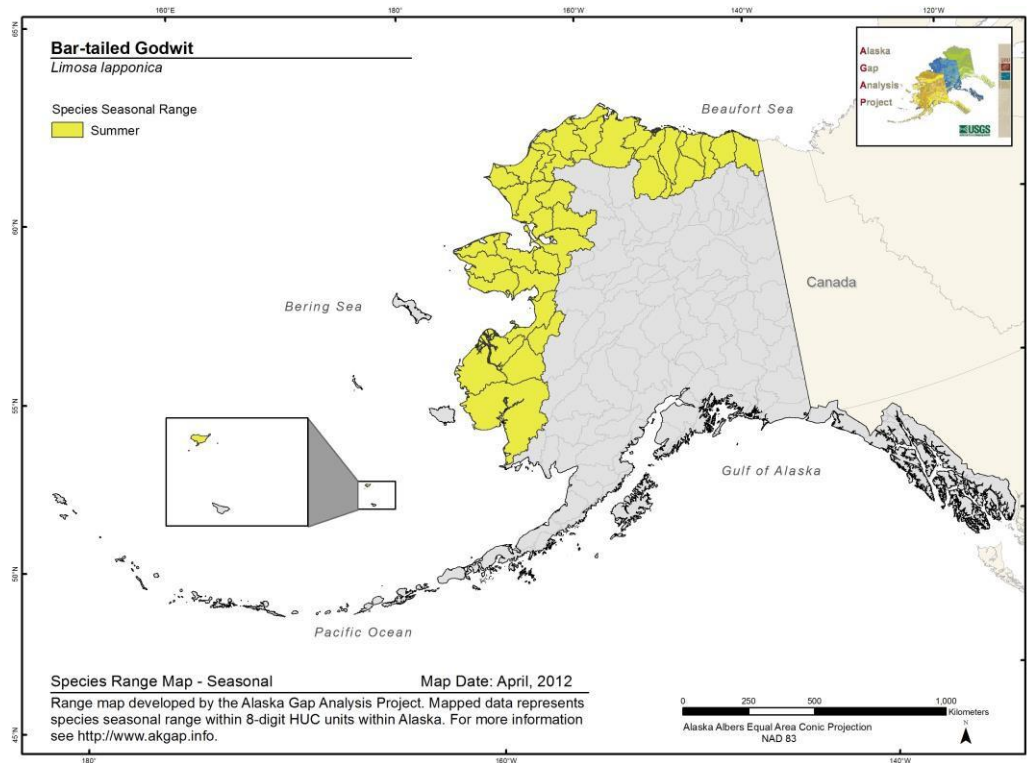
Limosa lapponica

Range Map and Distribution Model Summary

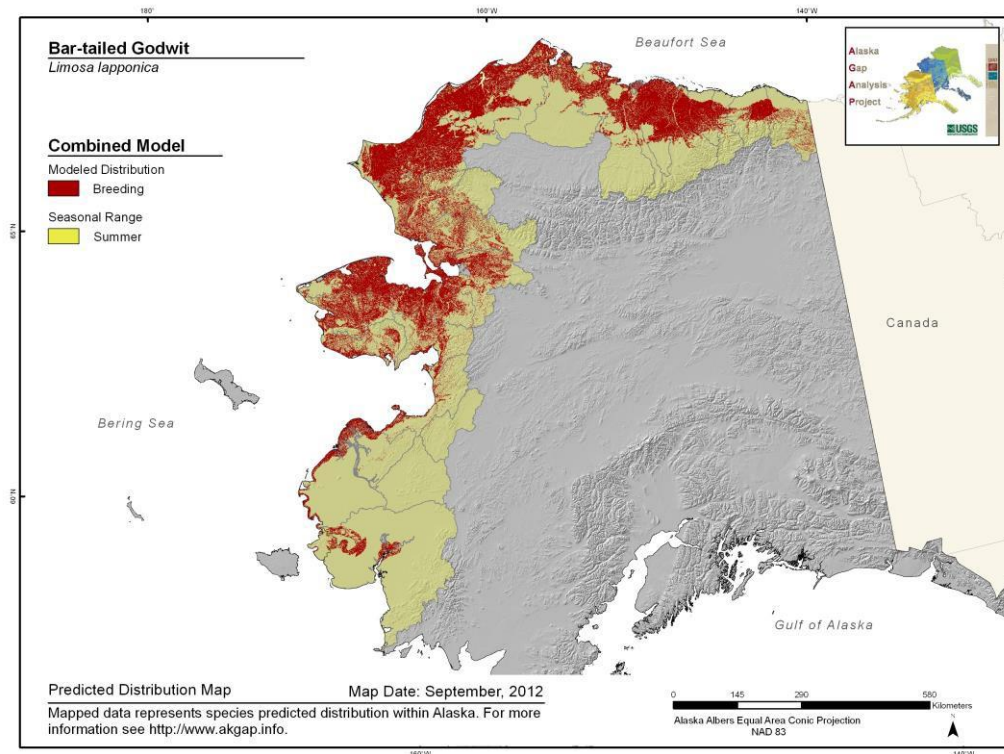
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.51**

**Model Quality
Summary:**
Low

Habitat Description

Breeds on coastal tundra and sedge-dwarf shrub tundra of foothills from subarctic to arctic. Found breeding in wet sedge meadows with hummocks covered by dwarf shrubs and moss and gently sloping dwarf shrub and graminoid meadows (AOU 1983, Field 1993, McCaffery and Gill 2001).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Field, R. 1993. Bird-habitat associations on the coastal plain of northcentral Alaska. Unpubl. Rep., USFWS, Anchorage, AK.

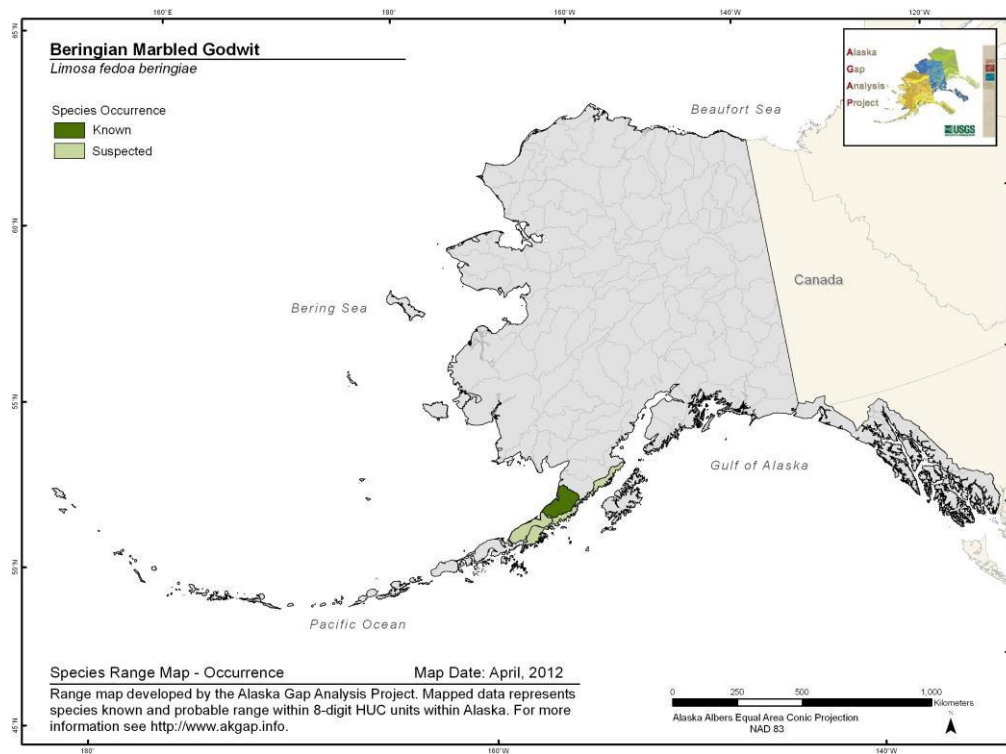
McCaffery, B. J. and R. Gill. 2001. Bar-tailed Godwit (*Limosa lapponica*). In: A. Poole and F. Gill, eds. The Birds of North America, No. 581. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C. 28pp.

Beringian Marbled Godwit

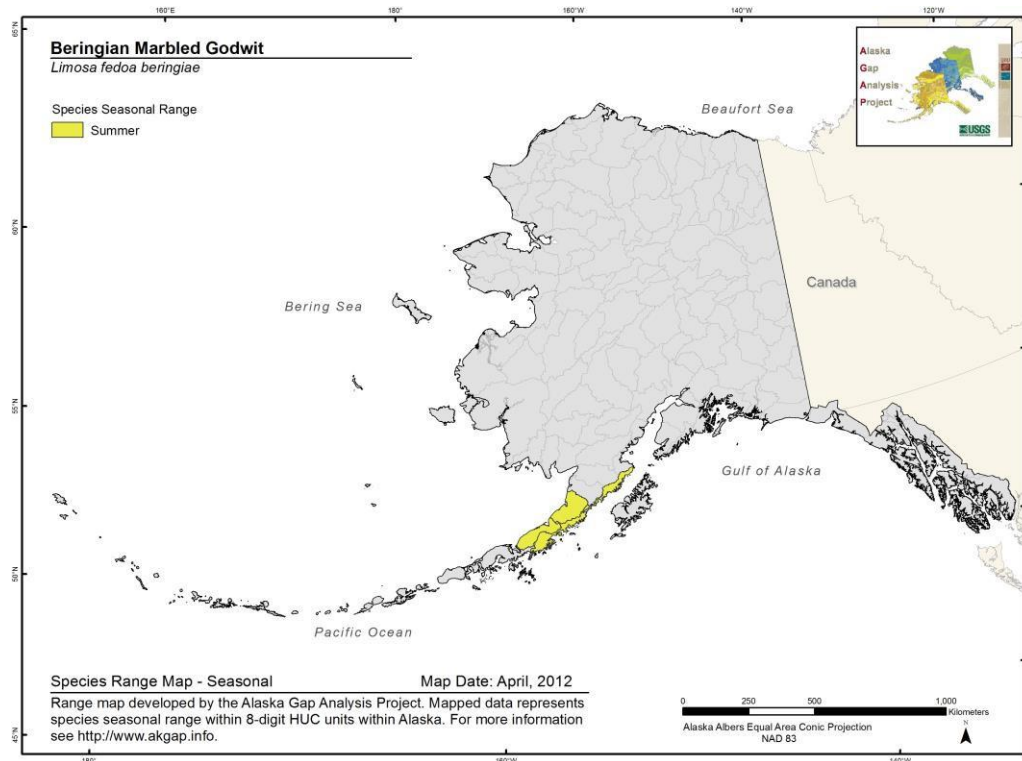
Limosa fedoa beringiae

Range Map and Distribution Model Summary

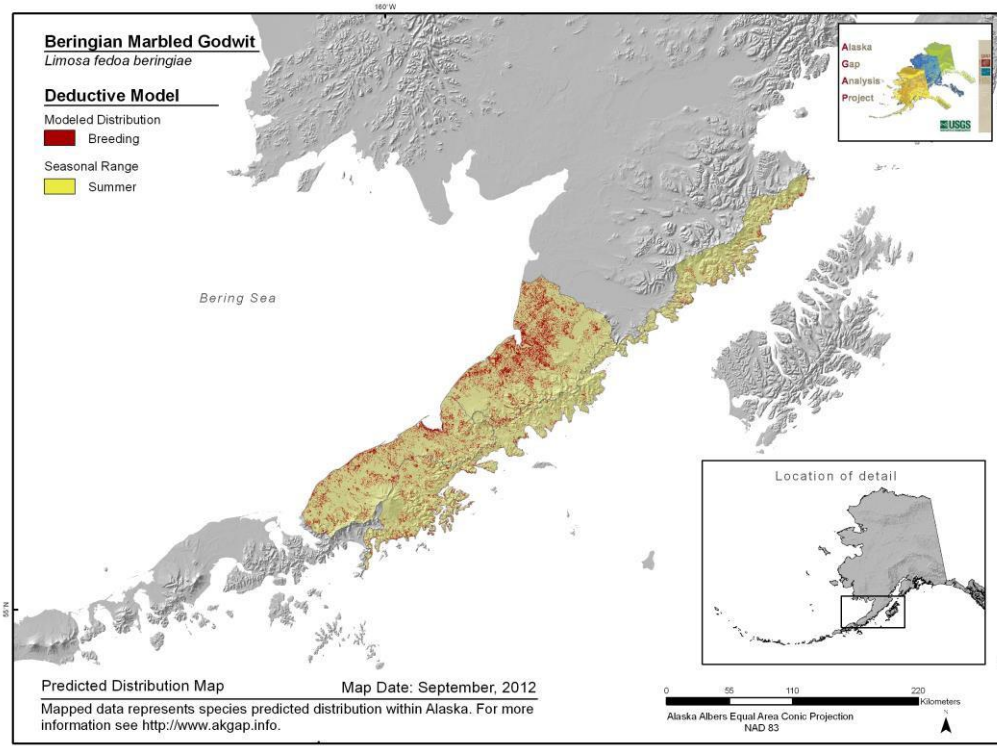
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.754**

**Model Quality
Summary:**
Moderate

Habitat Description

Preference for moist bluejoint habitat within Alaska. Breeds in marsh/very wet bog and wet bog/wet meadow habitats dominated by moist bluejoint, moist-sedge meadows, scattered willows 1-2 m tall, and scattered ponds. Apparently not found in shrub-graminoid habitat that predominates in this region. Entire breeding population thought to move to intertidal habitats of Alaska Peninsula estuaries after breeding (Morrison et al. 1976, Gratto-Trevor 2000).

References

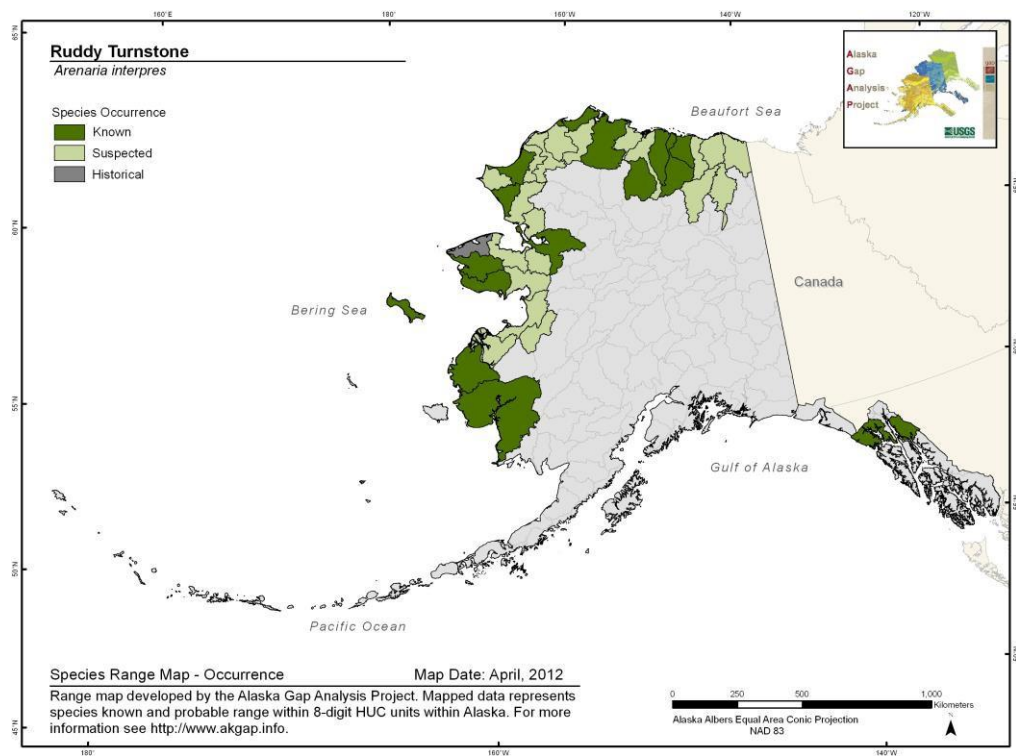
Gratto-Trevor, C.L. 2000. Marbled godwit (*Limosa fedoa*). Birds of North America, No. 492; 24pp.

Morrison, R. I. G., T. H. Manning, and J. A. Hagar. 1976. Breeding of the Marbled Godwit, (*Limosa fedoa*), in James Bay. Canadian Field-Naturalist 90: 487-790.

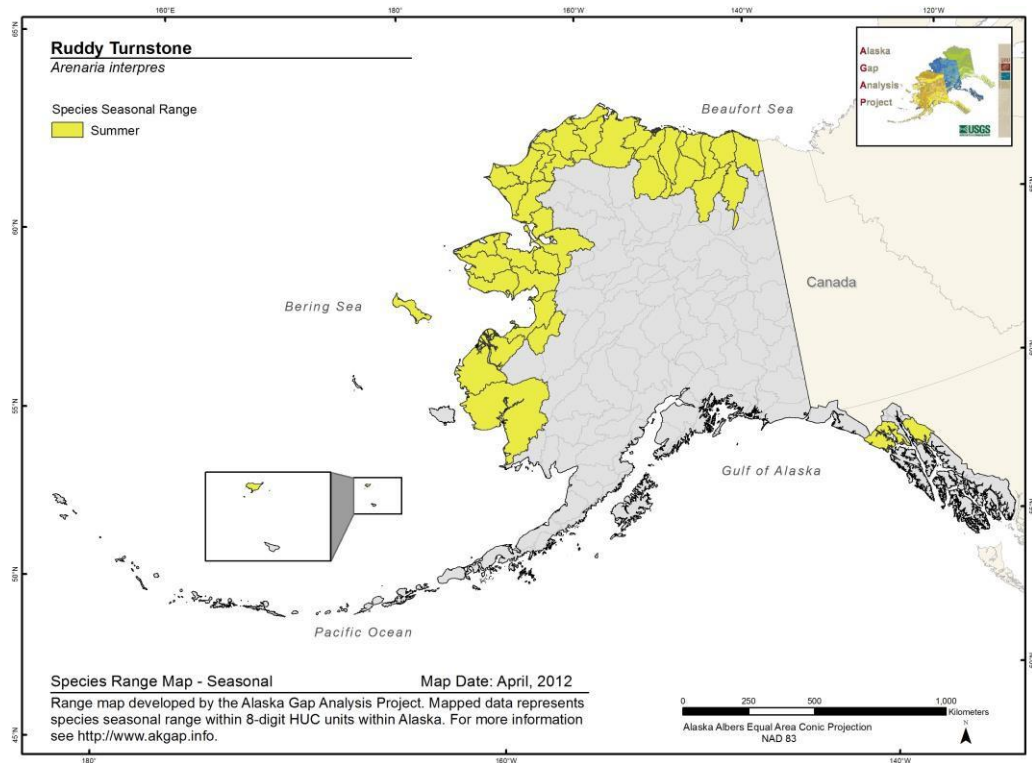
Ruddy Turnstone *Arenaria interpres*

Range Map and Distribution Model Summary

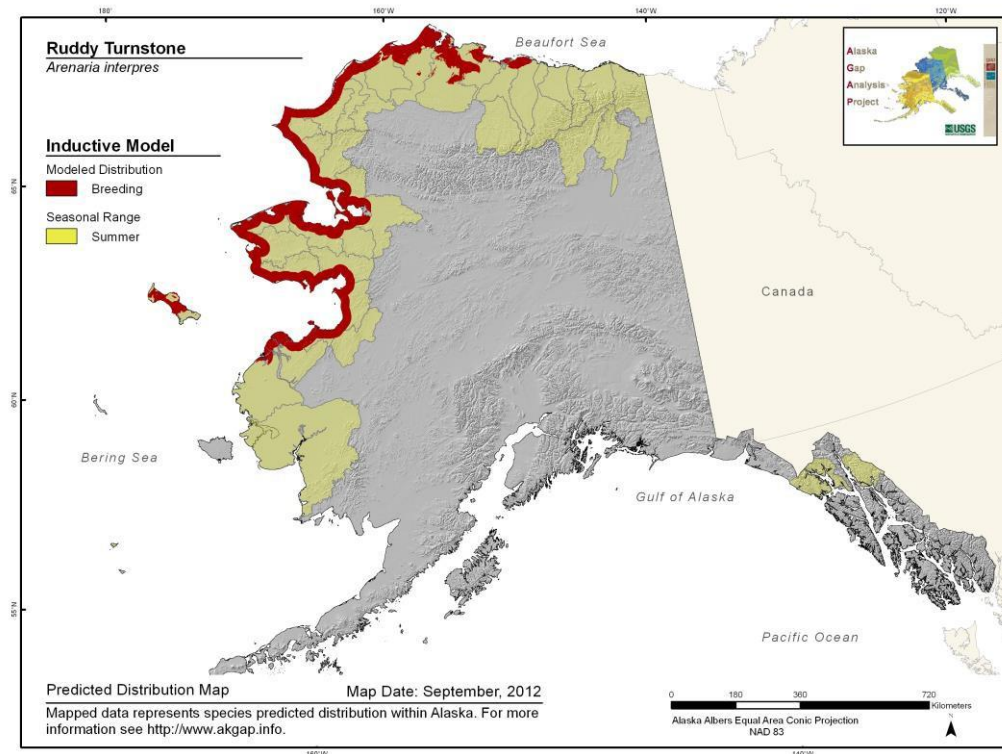
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nests in dry, dwarf-shrub tundra, usually near water, such as ponds, streams, or tidal flats and beaches (AOU 1983); various habitats ranging from wet mud or barren peat to dense vegetation, though appears to favor barren habitats. In the Yukon, favors dry tundra and forages on gravel beaches (Alexander et al. 2003).

References

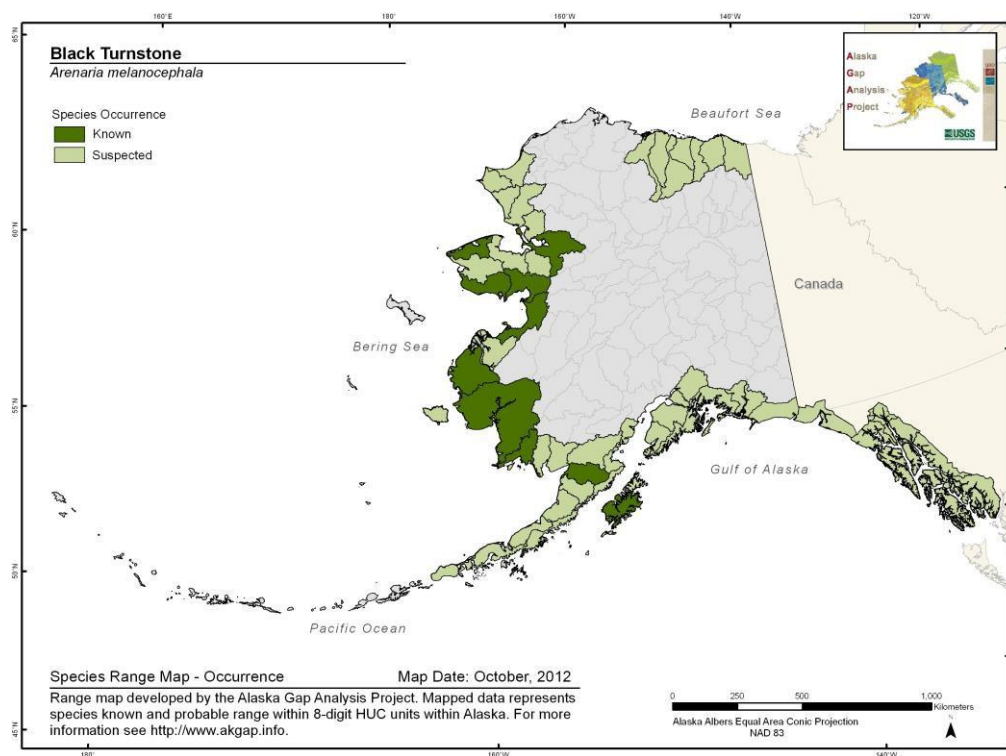
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

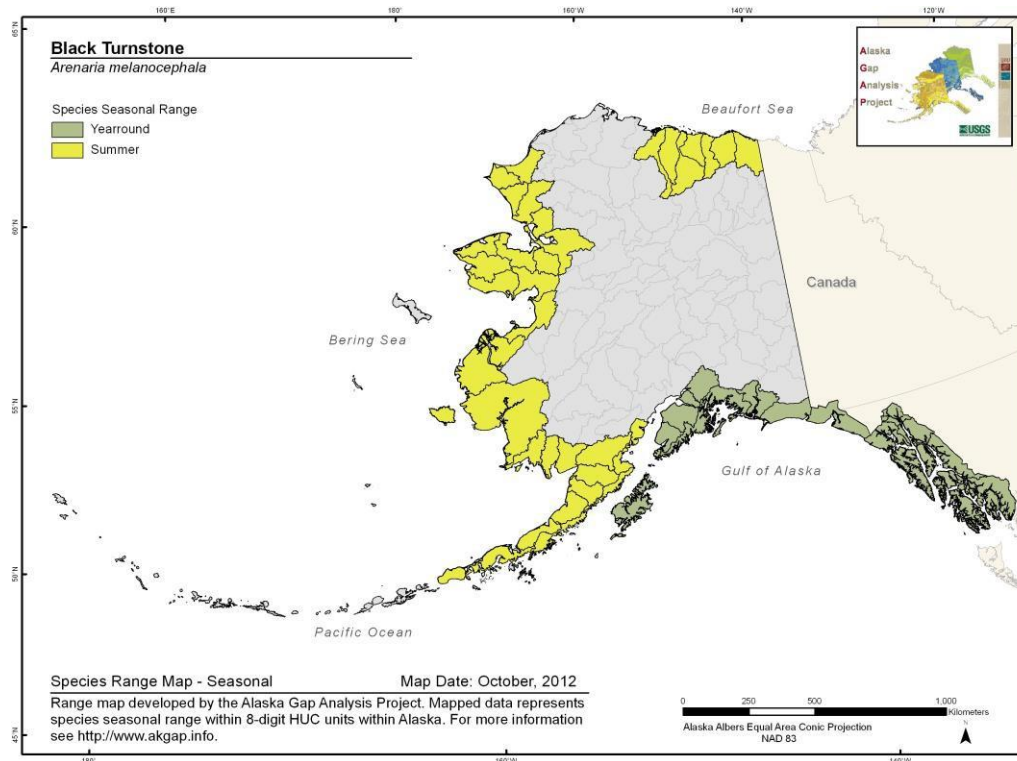
Black Turnstone *Arenaria melanocephala*

Range Map and Distribution Model Summary

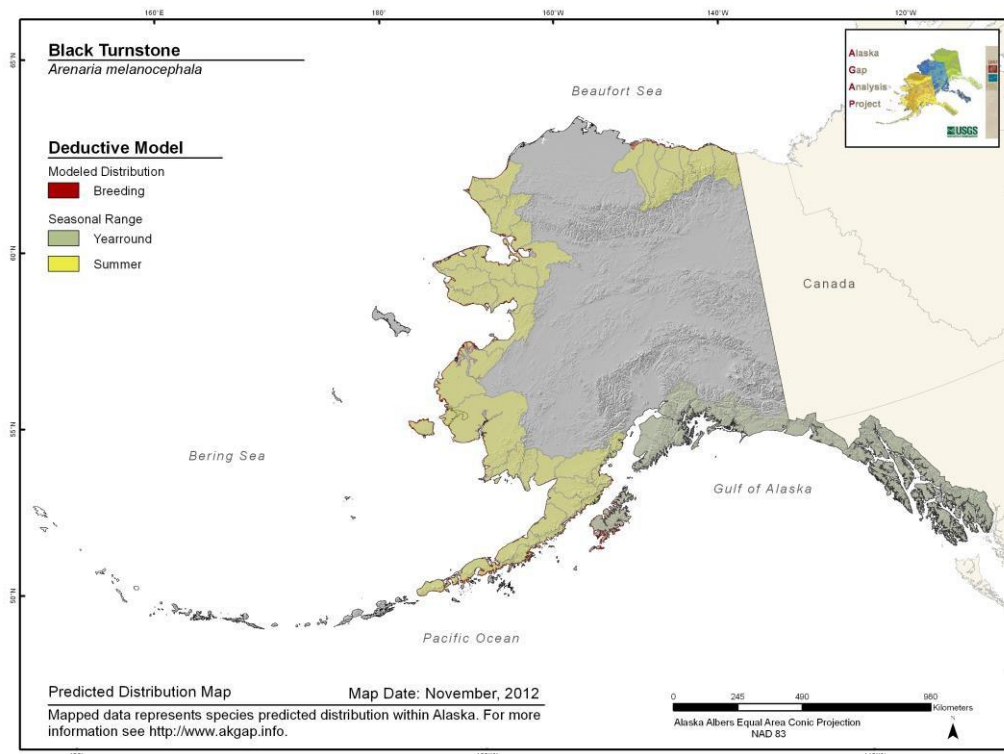
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.719**

**Model Quality
Summary:**
Moderate

Habitat Description

Areas are typically dominated by beach rye and sedges with an adjacent band of graminoid meadow and small brackish ponds and sloughs nearby (Harris 1966, Holmes and Black 1973, Kessler 1979, Handel and Gill 1992). Nests mainly in salt-grass tundra; breeds along the coast or on offshore islands. Most of the breeding population is concentrated in a narrow band of salt grass, graminoid, and dwarf shrub meadows within 2 km of the coast; highest breeding densities occur in coastal salt grass meadows and lowest densities in dwarf shrub mat tundra; breeding densities in mixed graminoid and dwarf shrub meadows decline significantly with distance from the coast (Handel and Gill 1992). Nesting densities decrease as move inland (Handel and Gill 1992).

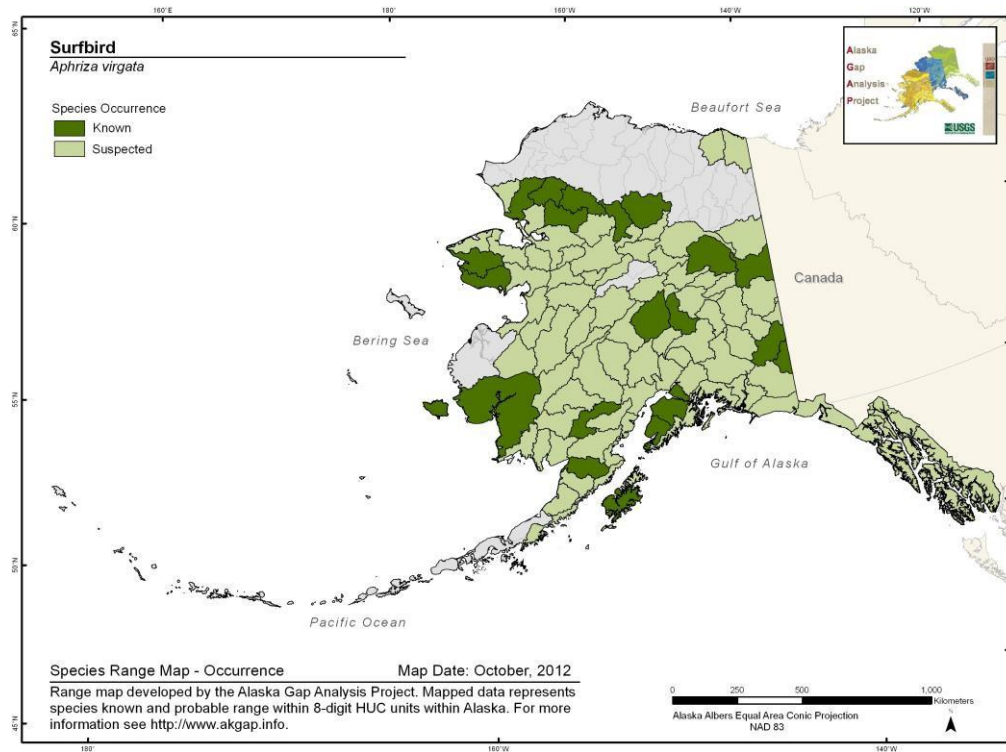
References

- Handel, C. M. and R. E. Gill, Jr. 1992. Breeding distribution of the Black Turnstone. *Wilson Bulletin* 104:122-135.
- Harris, S. W. 1966. Summer birds of the lower Kashunuk River, Yukon-Kuskokwim Delta, Alaska. *Murrelet* 47:57-65.
- Holmes, R. T. and C. P. Black. 1973. Ecological distribution of birds in the Kolomak River-Askinuk Mountain region, Yukon-Kuskokwim Delta, Alaska. *Condor* 75:150-163.
- Kessler, W.B. 1979. Bird population responses to clearcutting in the Tongass National Forest of Southeast Alaska. USDA, USFS, Tongass National Forest, Ketchikan, AK. Alaska Region report No. 71.

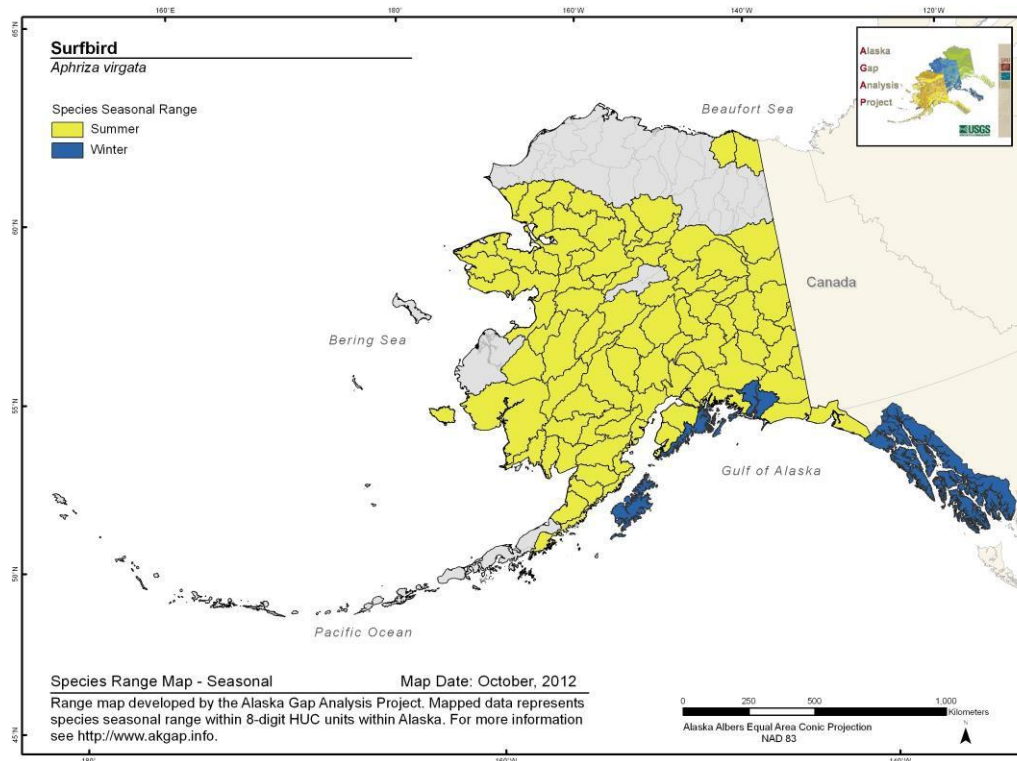
Surfbird *Aphriza virgata*

Range Map and Distribution Model Summary

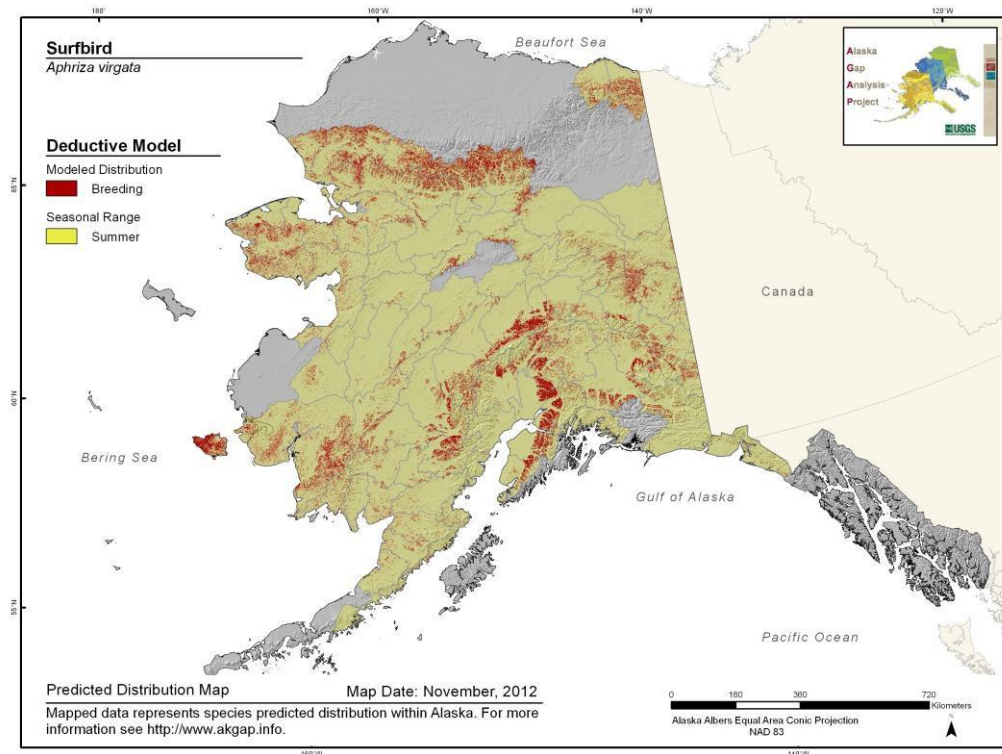
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.609**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in alpine tundra along mountain ridges in interior mountains. Dry frequently stony alpine tundra with lichens, dwarf shrubs, scree or rock fields. Mostly, occupies habitat on summits and upper slopes of steep ridges. Also, may breed near coastal areas. Nests in rocky areas with clumps of vegetation. In the Yukon, found between 800 and 1,800 m in elevation in lichen, moss, avens, heather, interspersed with sedge and grass (Frisch 1978).

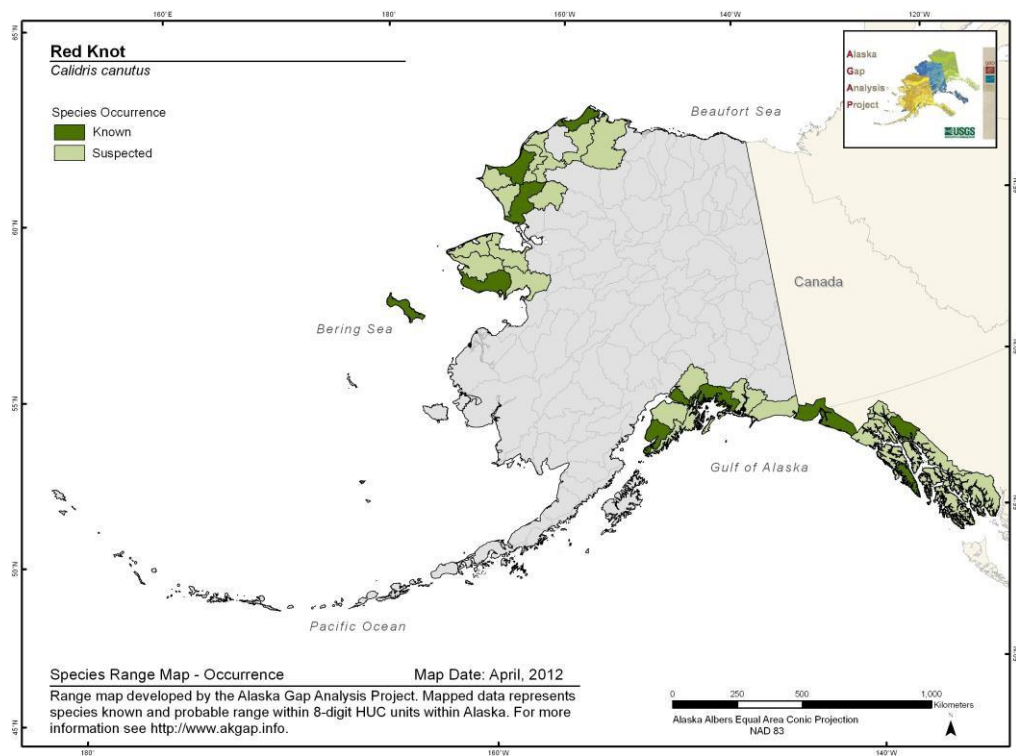
References

Frisch, R. 1978. Surfbirds in Ogilvie and Richardson mountains, Yukon Territory. Can. Field-Nat. 92:401-403.

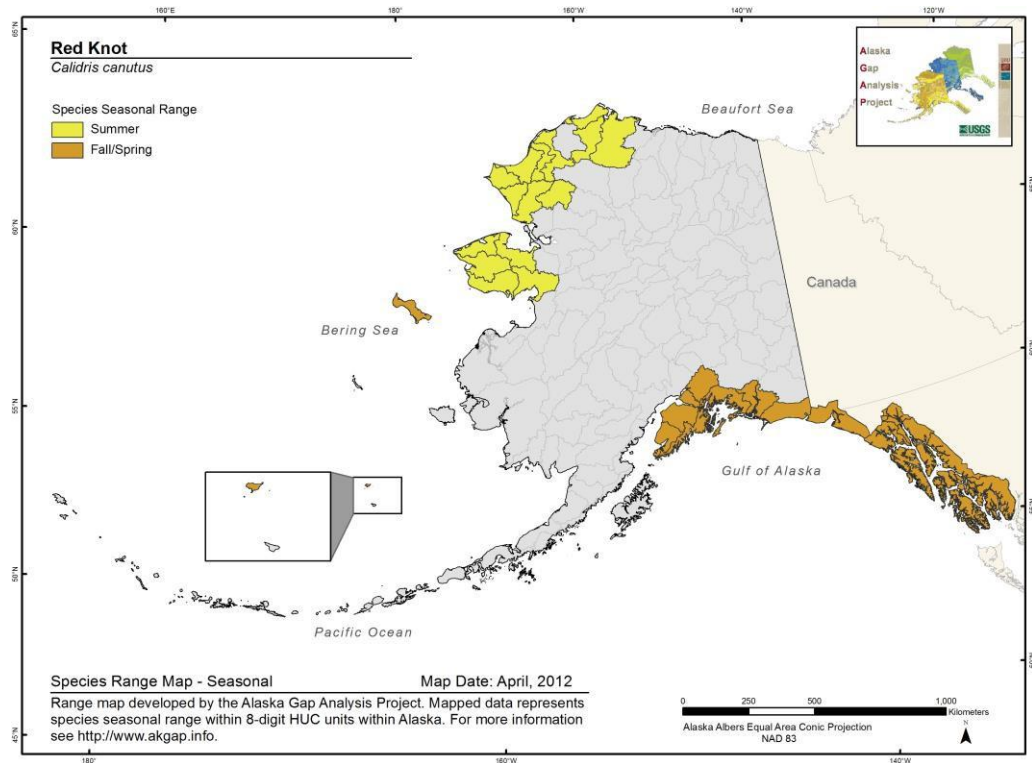
Red Knot *Calidris canutus*

Range Map and Distribution Model Summary

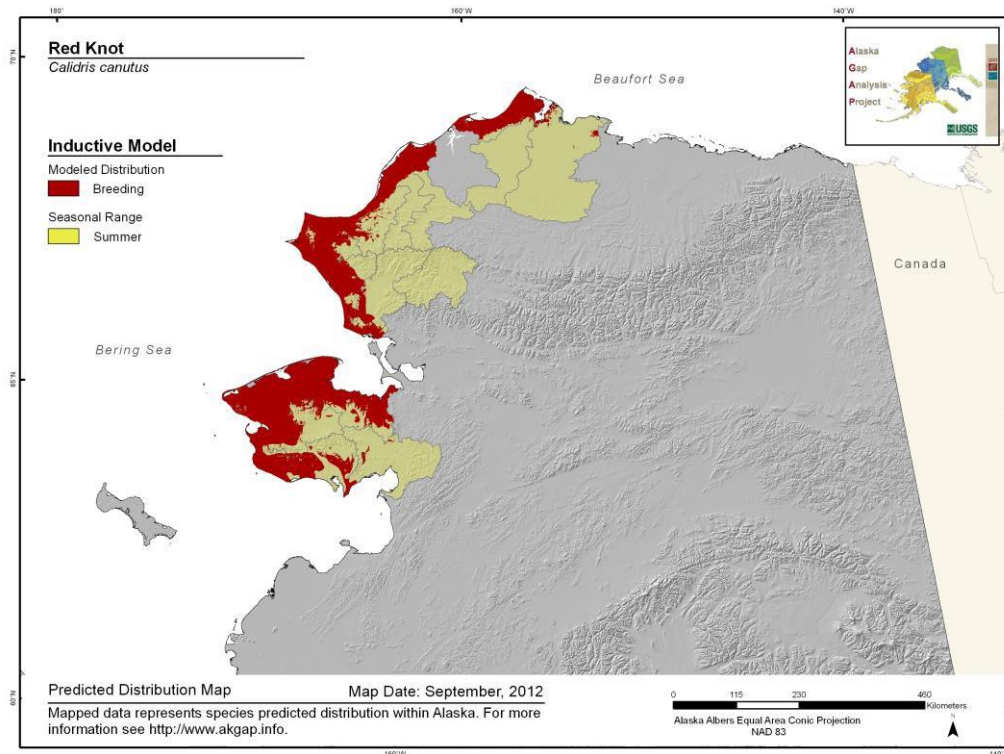
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Well drained moist alpine tundra habitats near arctic coasts used for nesting and foraging (Cramp and Simmons 1983). Often nests on ridges or slopes dominated by stunted willow or dryas (Harrington 2001).

References

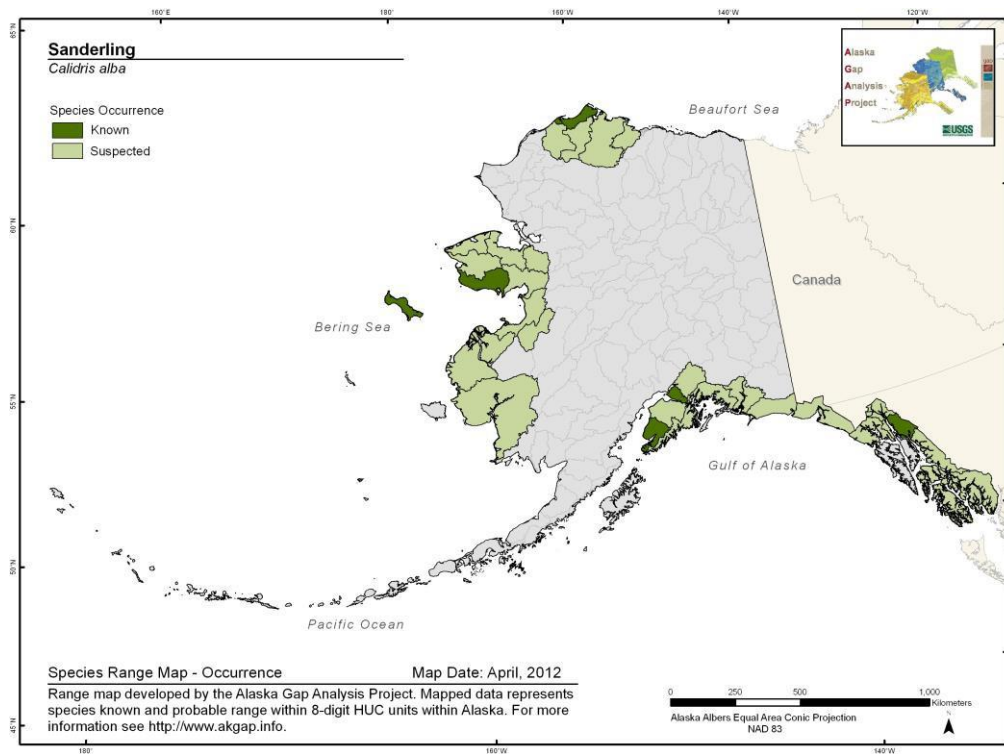
Cramp, S. and K. E. L. Simmons, eds. 1983. The Birds of the Western Palearctic. Vol. 3. Oxford University Press, Oxford.

Harrington, B. A. 2001. Red Knot (*Calidris canutus*). In The Birds of North America, No. 563 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

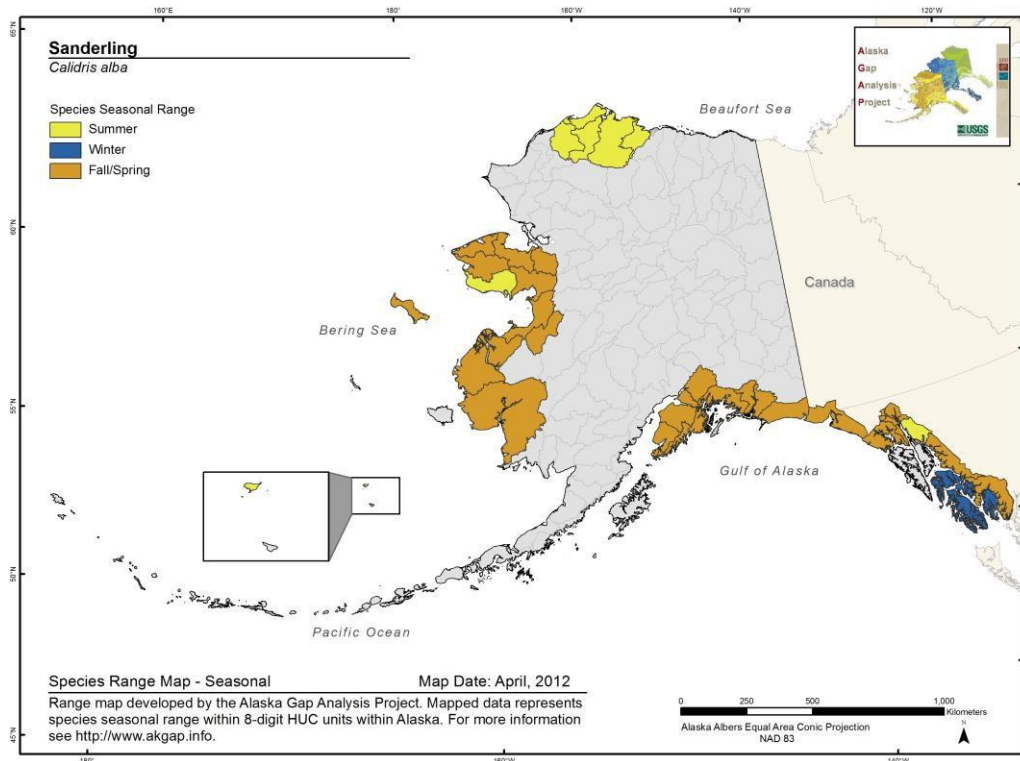
Sanderling *Calidris alba*

Range Map and Distribution Model Summary

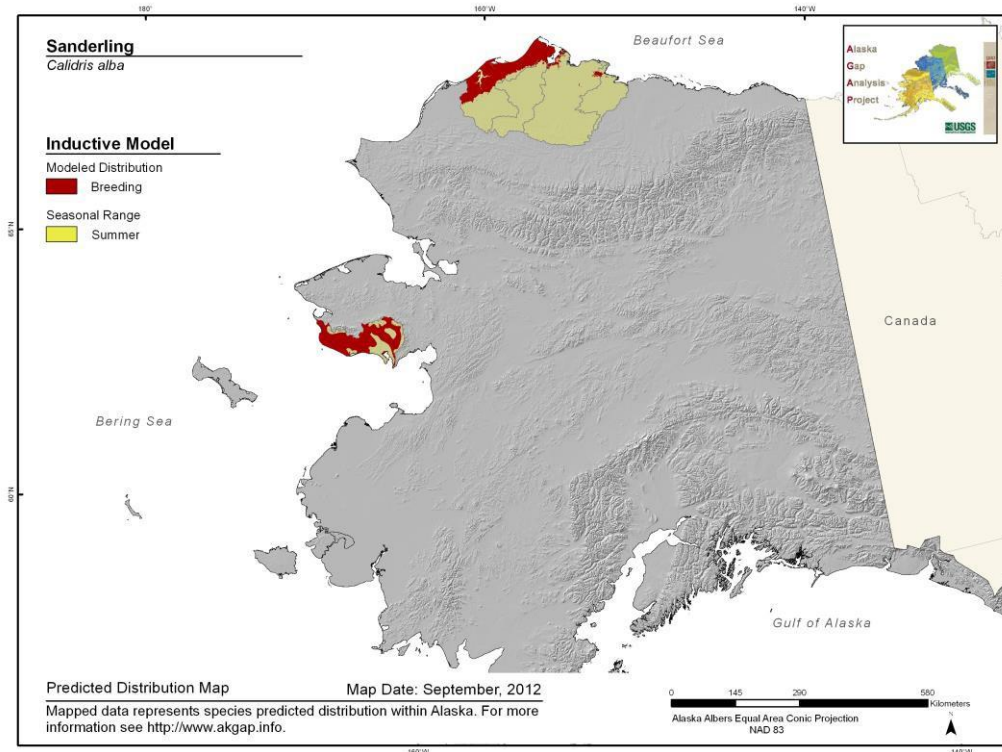
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.6**

**Model Quality
Summary:**
Low

Habitat Description

Nests on ground in exposed, well-drained sites, or areas with low vegetation on islands, peninsulas and coastal tundra often near wet tundra and near ponds or lakes (Macwhirter et al. 2002).

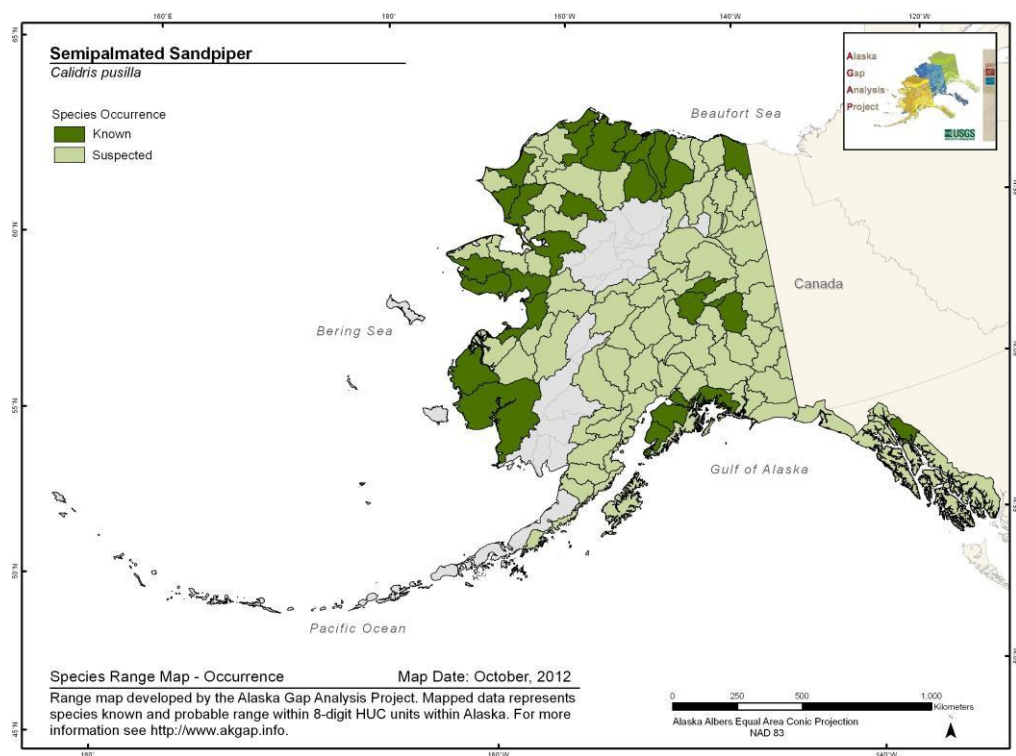
References

MacWhirter, B., P. Austin-Smith, Jr., and D. Kroodsma. 2002. Sanderling (*Calidris alba*). In *The Birds of North America*, No.653 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

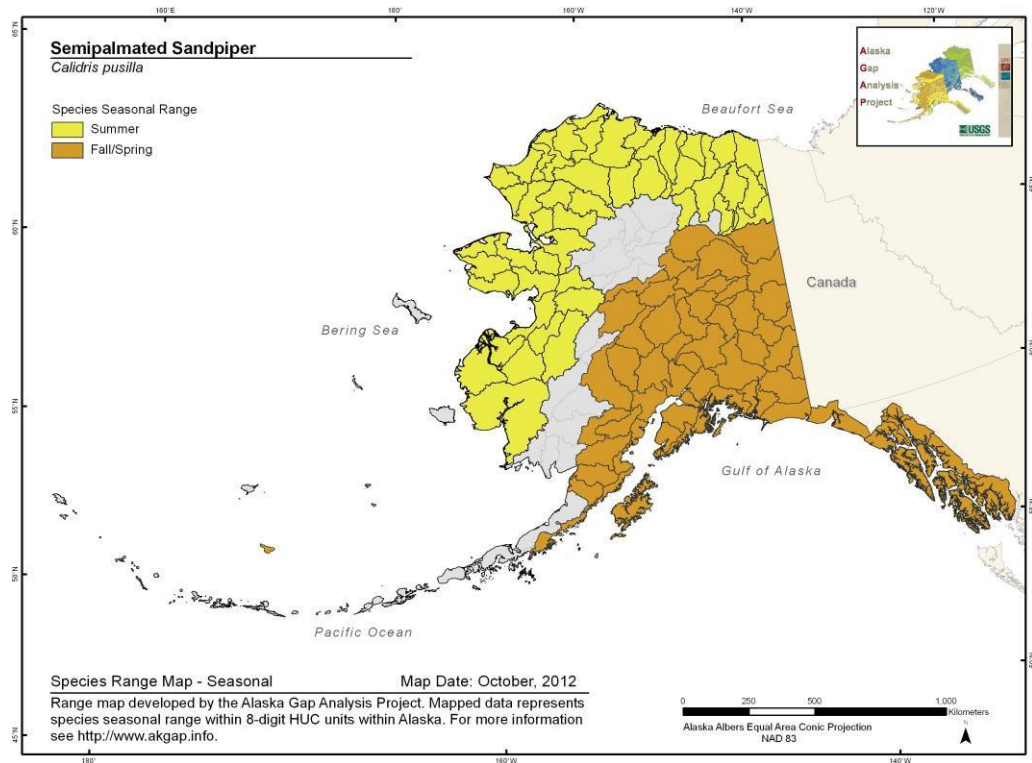
Semipalmated Sandpiper *Calidris pusilla*

Range Map and Distribution Model Summary

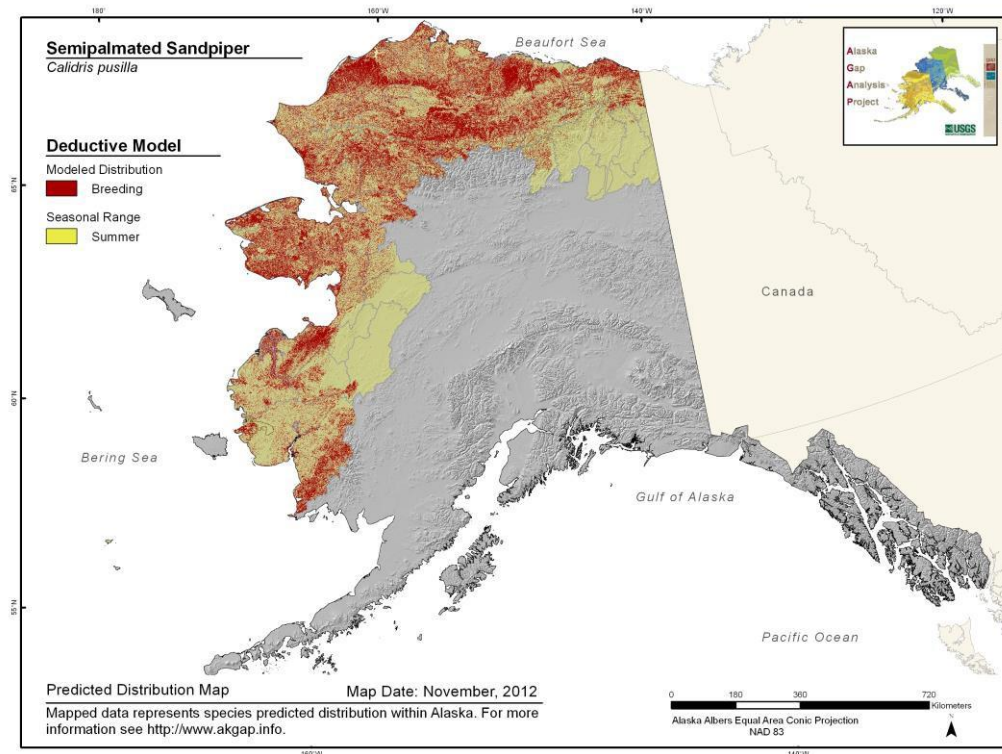
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.569**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in wet tundra and short grass in sand dunes (Armstrong 1995) near water. Found nesting in river deltas in dry shrubby areas of *Salix brachycarpa* or *Betula glandulosa* and mixed sedges and grasses (Gratto et al. 1983), variably drained upland tundra with low vegetation (Holmes and Pitelka 1968), moist or wet sedge-grass or heath tundra, sandy areas along rivers, and pond-dotted sand dunes (Godfrey 1986). In northern Alaska, favored areas with well-drained ridges for nesting and adjacent wet tundra for feeding (see Johnson and Herter 1989).

References

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Gratto, C. L., F. Cooke, and R. I. G. Morrison. 1983. Nesting success of yearling and older breeders in the Semipalmated Sandpiper *Calidris pusilla*. Canadian Journal of Zoology 61:1133-1137.

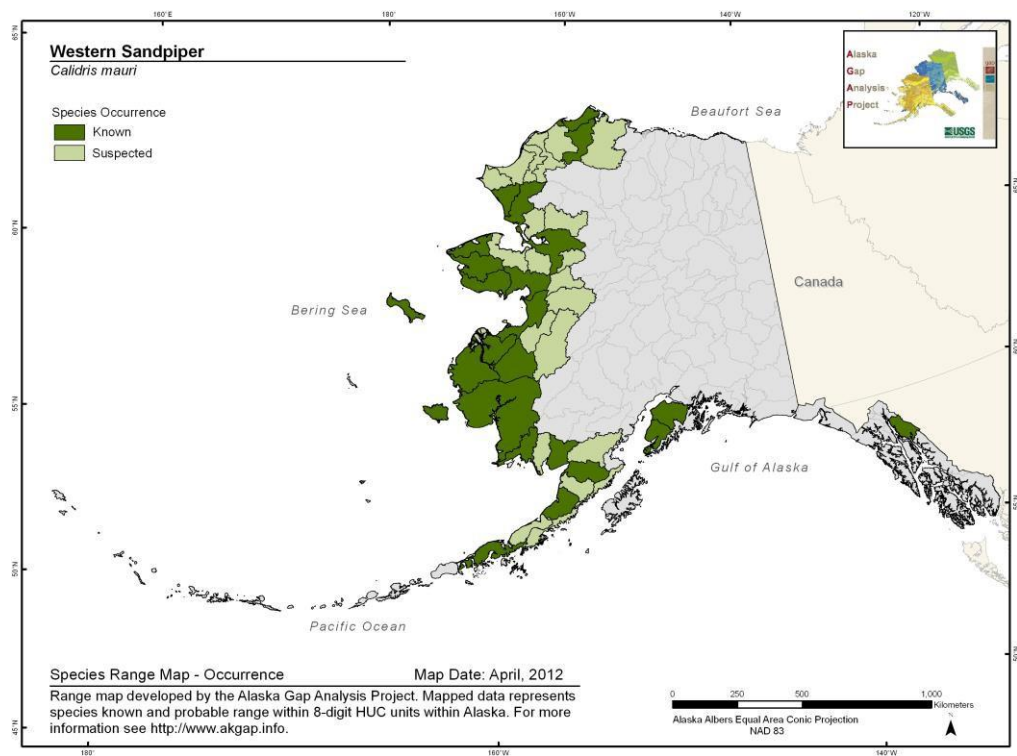
Holmes, R. T. and F. A. Pitelka. 1968. Food overlap among coexisting sandpipers on northern Alaskan tundra. Syst. Zool. 17:305-318.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

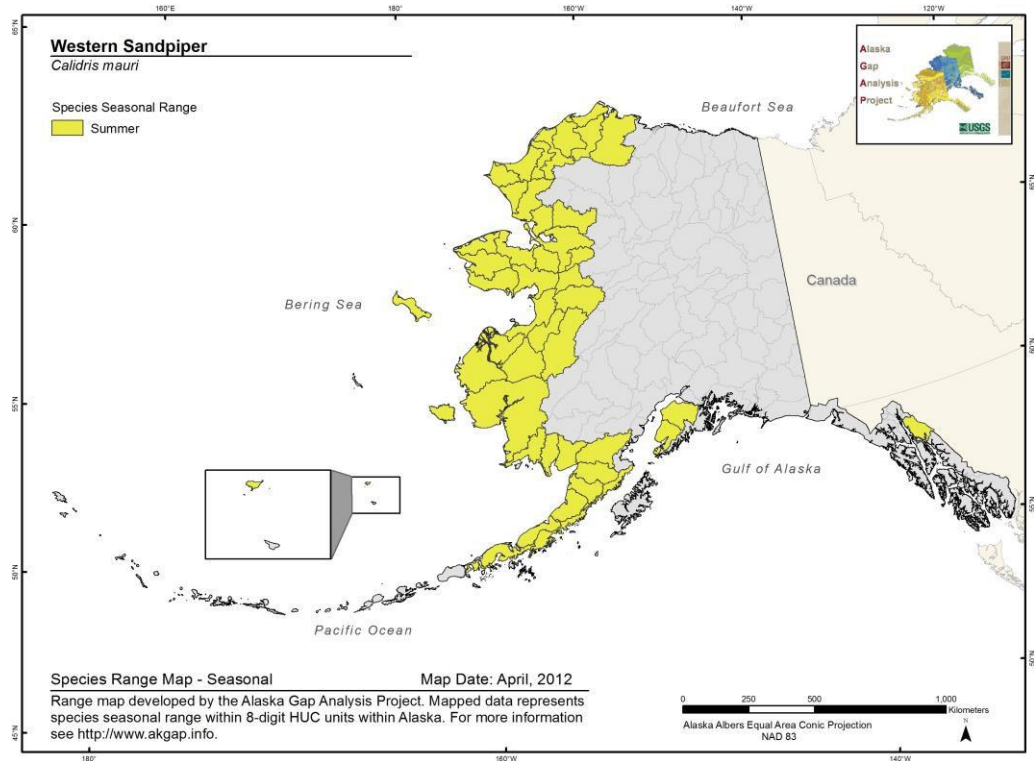
Western Sandpiper *Calidris mauri*

Range Map and Distribution Model Summary

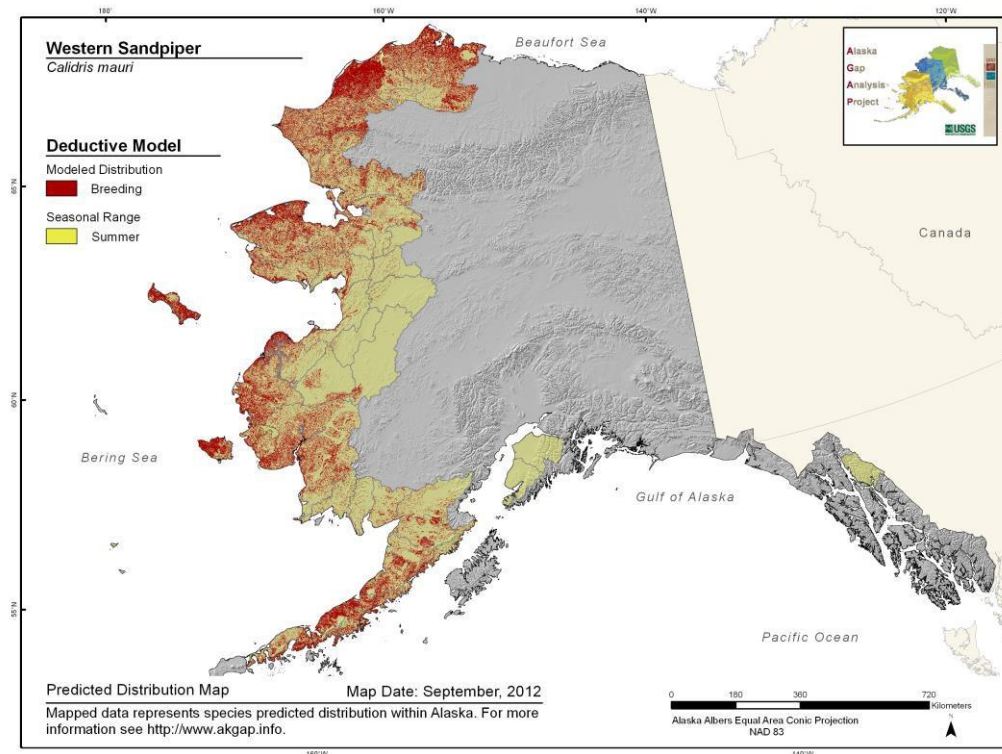
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.654**

**Model Quality
Summary:**
Low

Habitat Description

Breeds from coast to uplands in subarctic and low-arctic (Bent 1927, Holmes 1971a) in proximity to wetlands for feeding and elevated areas for nesting. Habitat is typically dominated by dwarf birch, dwarf willow, crowberry, ericaceous shrubs, tussock grasses, and bryophytes (Wilson 1994).

References

Bent, A. C. 1927. Life histories of North American shorebirds (Part 1). Bull. U. S. Natl. Mus. No. 142.

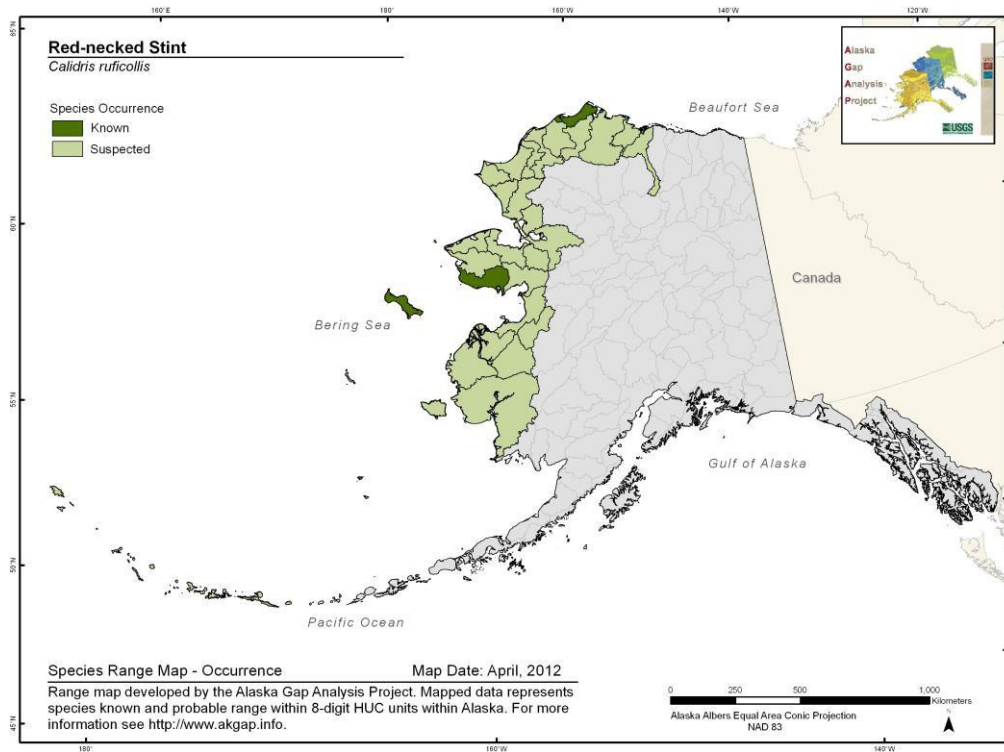
Holmes, R. T. 1971a. Density, habitat, and the mating system of the Western Sandpiper (*Calidris mauri*). *Oecologia* 7:191-208.

Wilson, W. H. 1994. Western Sandpiper (*Calidris mauri*). In *The Birds of North America*, No. 90 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

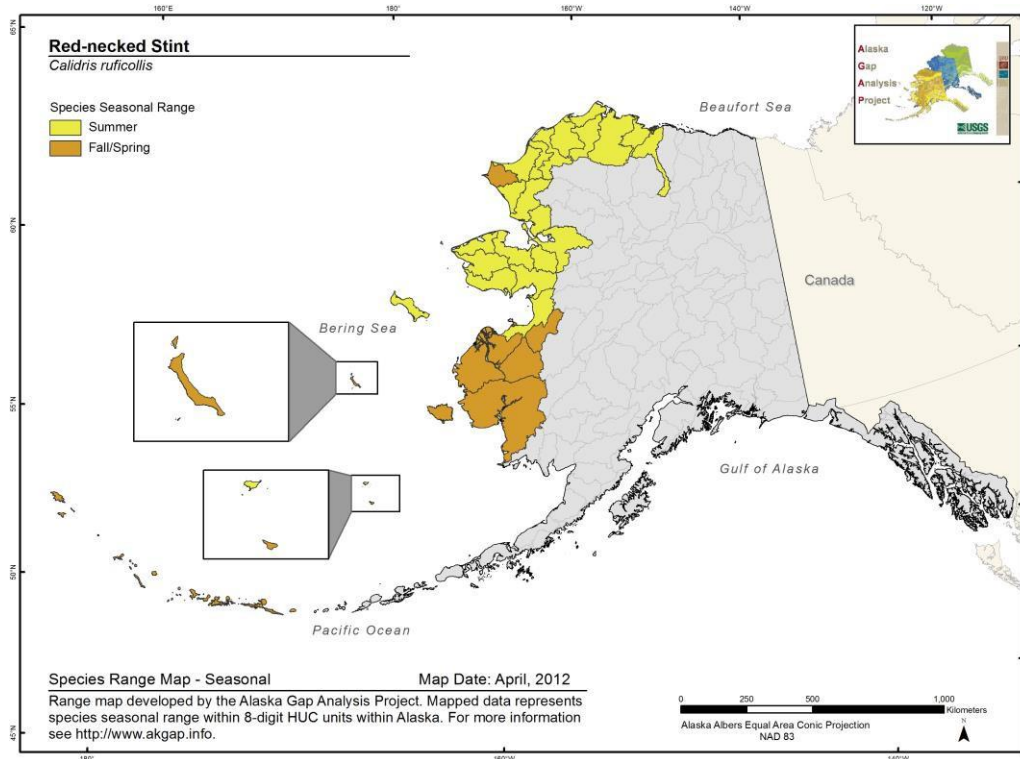
Red-necked Stint *Calidris ruficollis*

Range Map and Distribution Model Summary

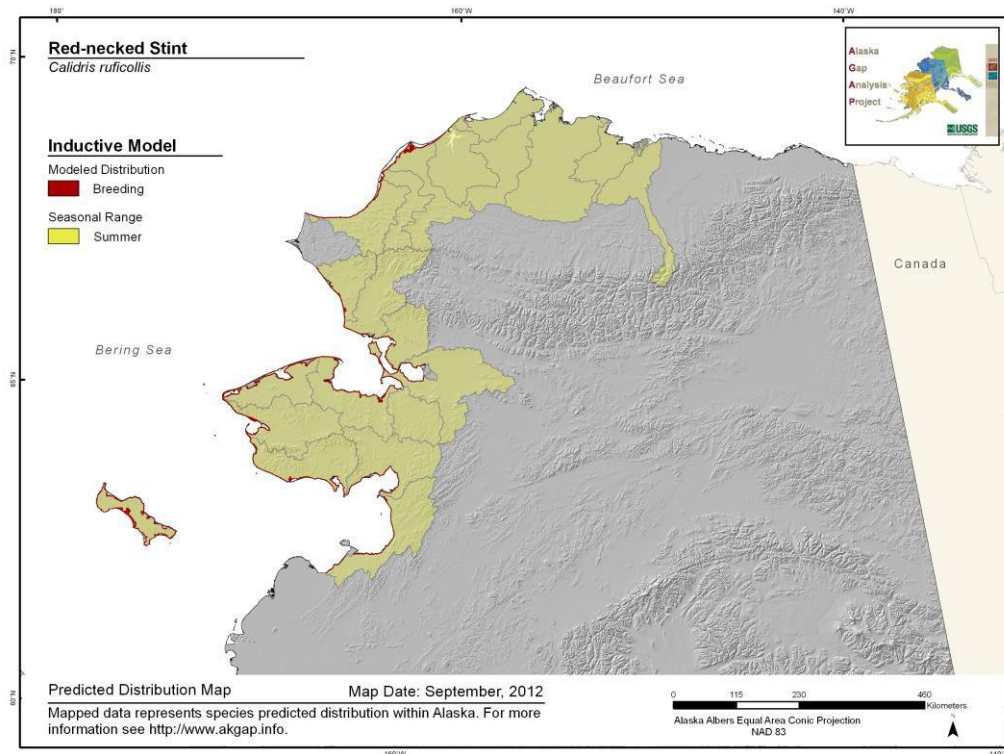
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Swampy or mossy tundra, especially with scattered willow scrub (AOU 1983).

References

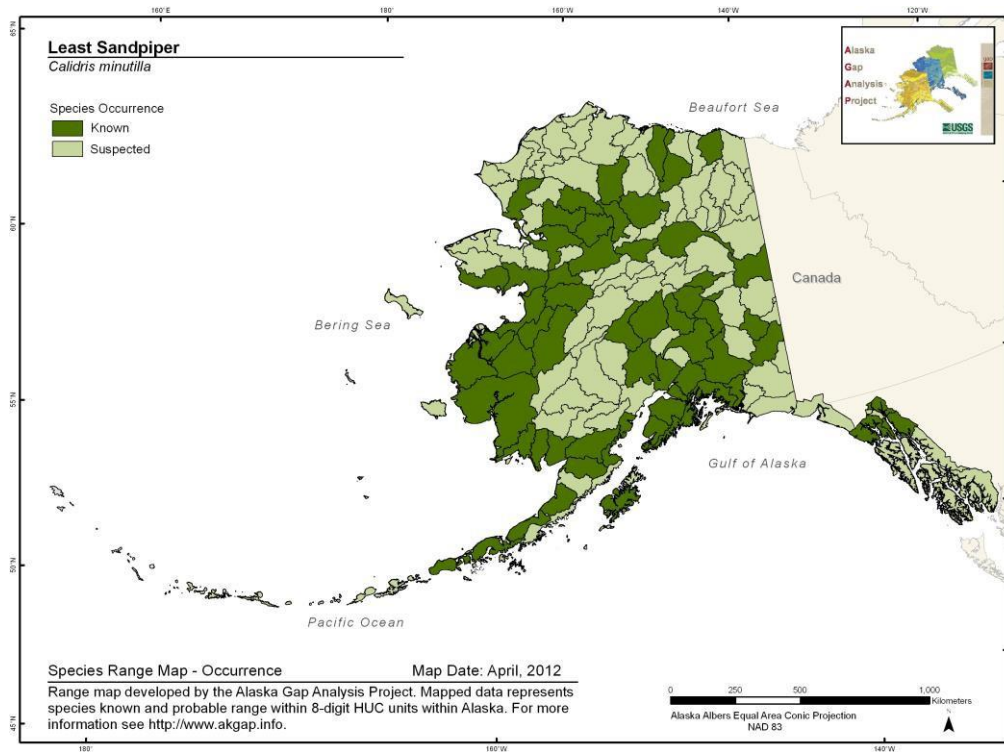
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Least Sandpiper

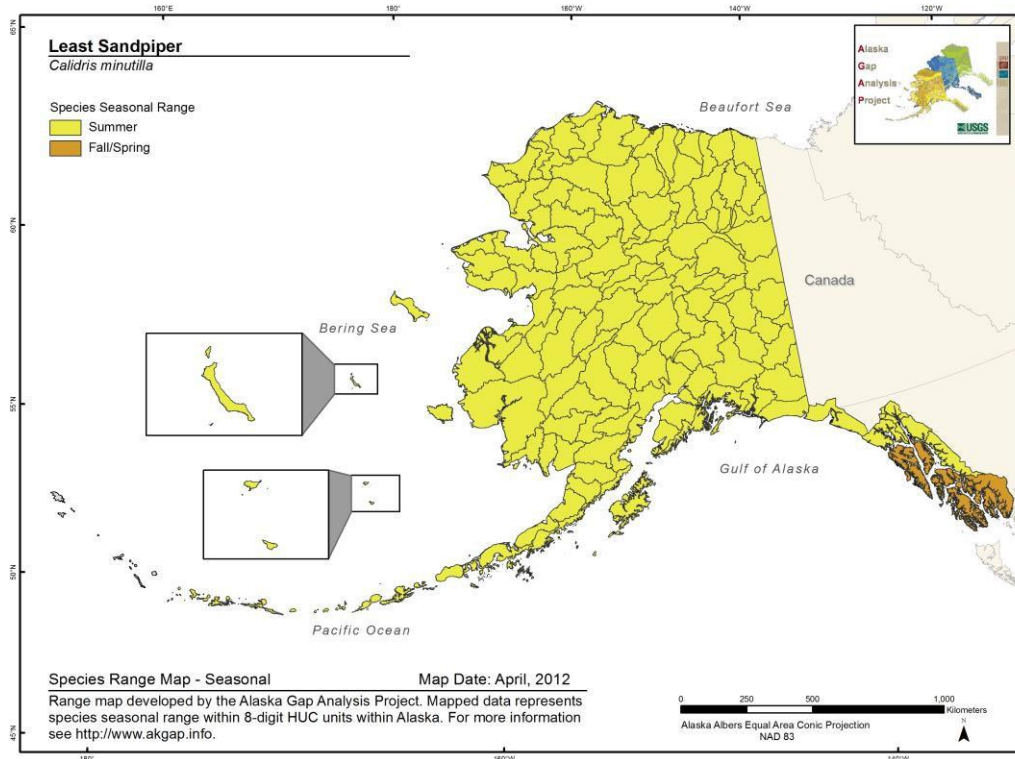
Calidris minutilla

Range Map and Distribution Model Summary

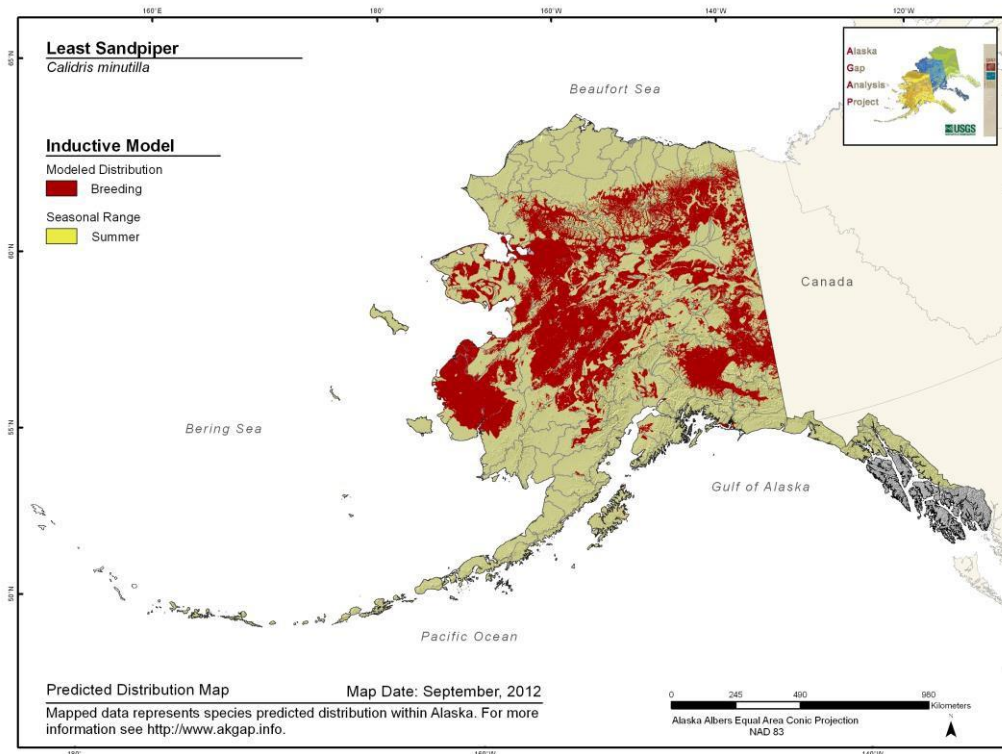
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.658**

Model Quality Summary:
Low

Habitat Description

Nests in mossy or wet grassy tundra, in lush vegetation near ponds, occasionally in drier areas with sparse vegetation or scattered bushes (NatureServe 2007b). In B.C., nests are built in areas away from taller woody vegetation on moss or sedge covered swampy ground or on hummocks if ground is extremely swampy. Young are reared in well vegetated, swampy grounds. Breeds from sea level to 1,200 m in B.C. (Campbell et al. 1990).

References

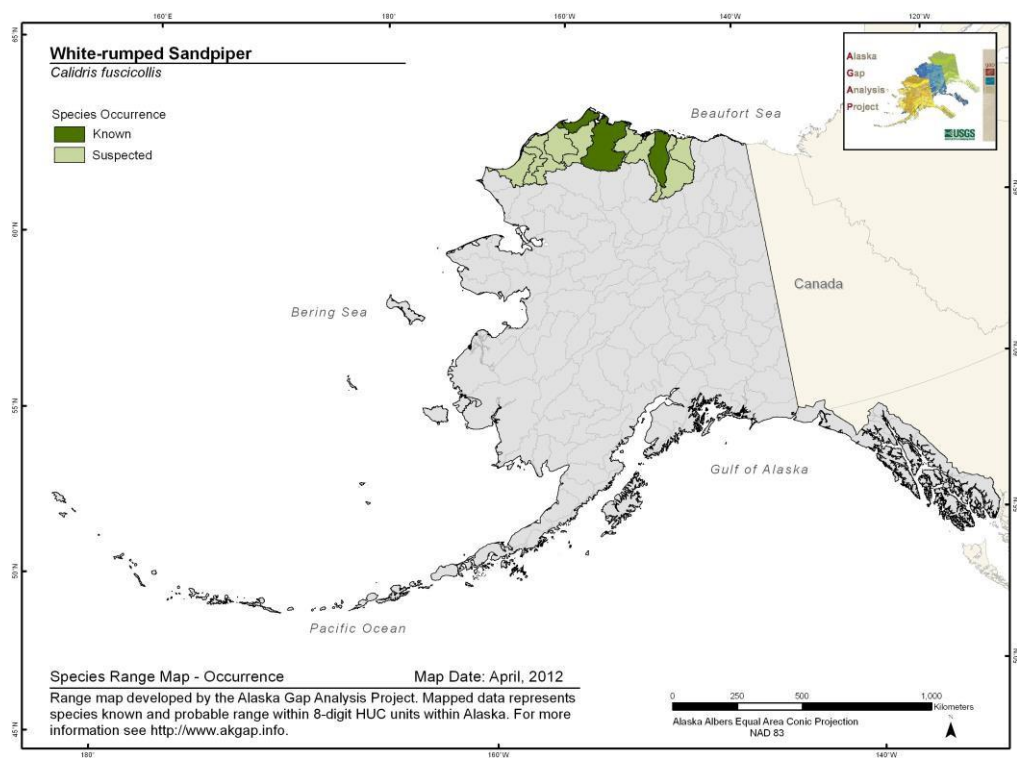
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

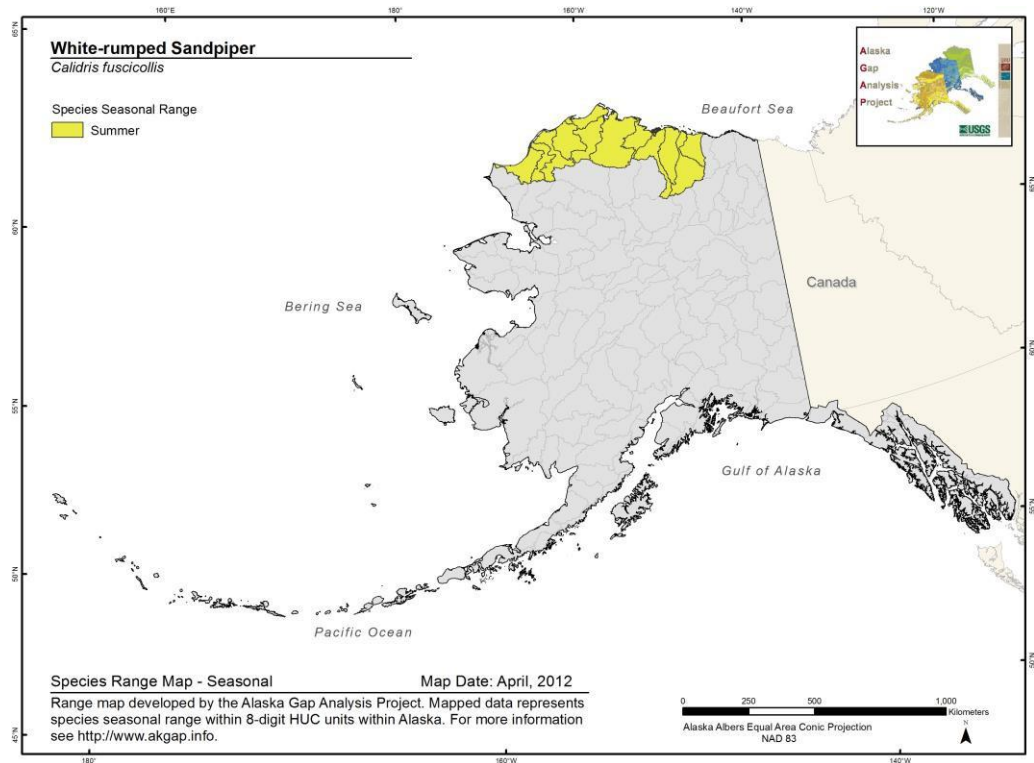
White-rumped Sandpiper *Calidris fuscicollis*

Range Map and Distribution Model Summary

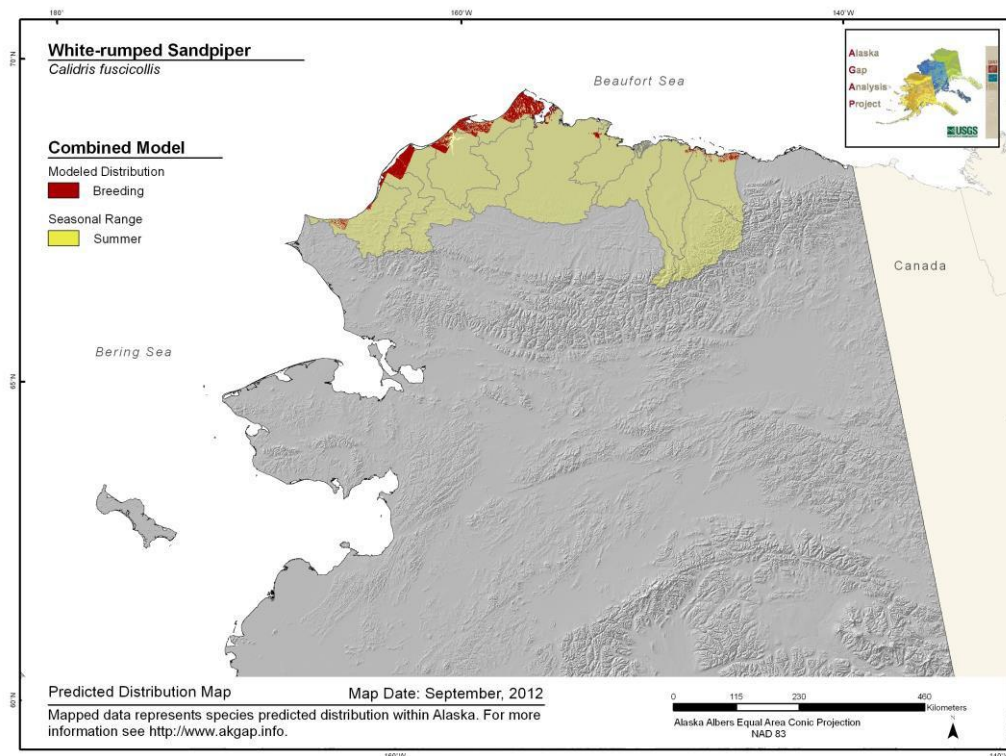
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.513**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat well-vegetated, permanently or semi-wet tundra from wet meadow to dwarf shrub meadow typically near marshy ponds, lakes, or streams (Parmalee 1992). In Alaska, also breeds on high, well-drained ridges (Holmes and Pitelka 1962). Nonbreeding includes grassy marshes, mudflats, sandy beaches, flooded fields, and shores of ponds and lakes (AOU 1983).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

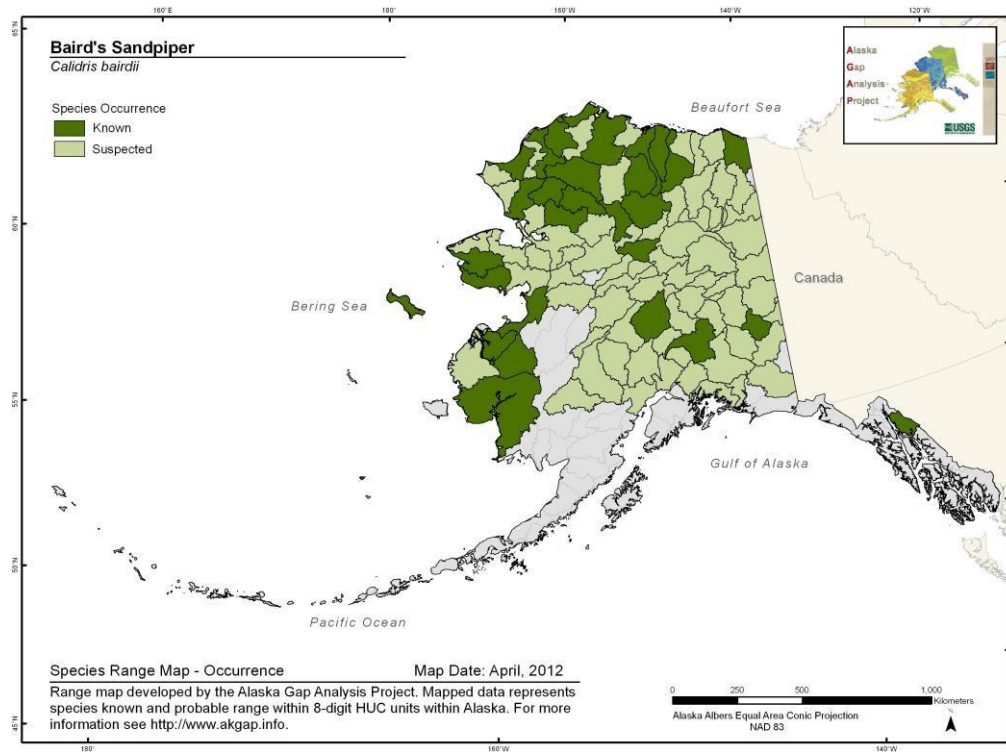
Holmes, R. T. and F. A. Pitelka. 1962. Behavior and taxonomic position of the White-rumped Sandpiper. Proc. Alaska. Sci. Conf. 12: 19-20.

Parmalee, D. F. 1992. White-rumped Sandpiper (*Calidris fuscicollis*). In The Birds of North America, No. 29 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

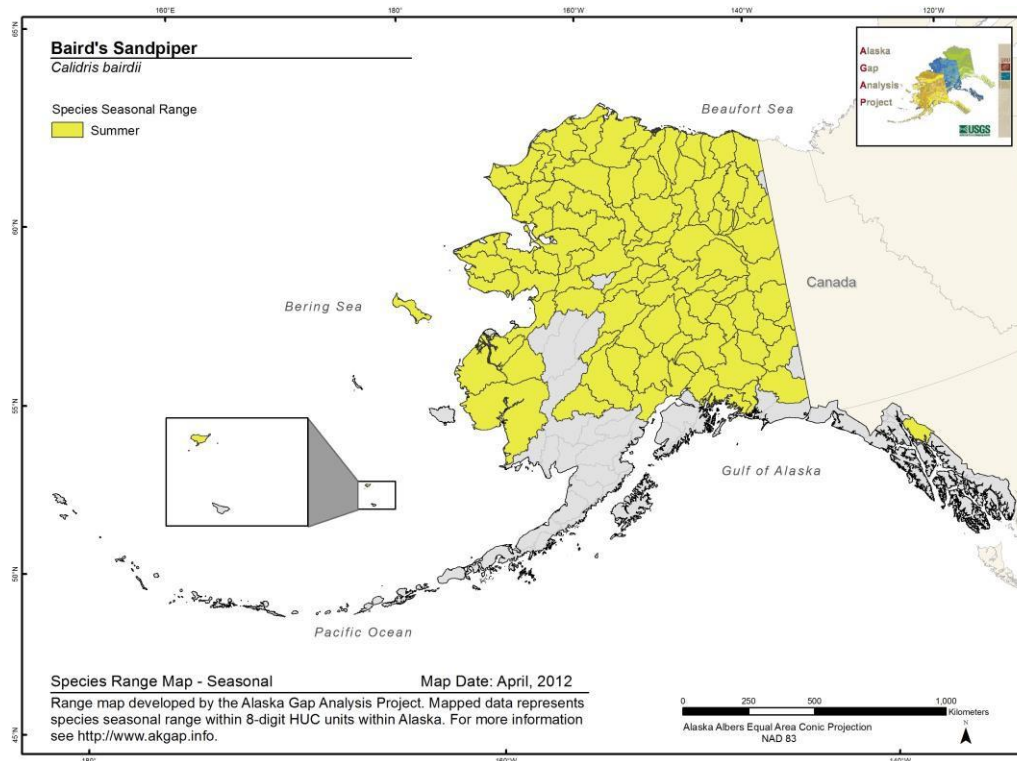
Baird's Sandpiper *Calidris bairdii*

Range Map and Distribution Model Summary

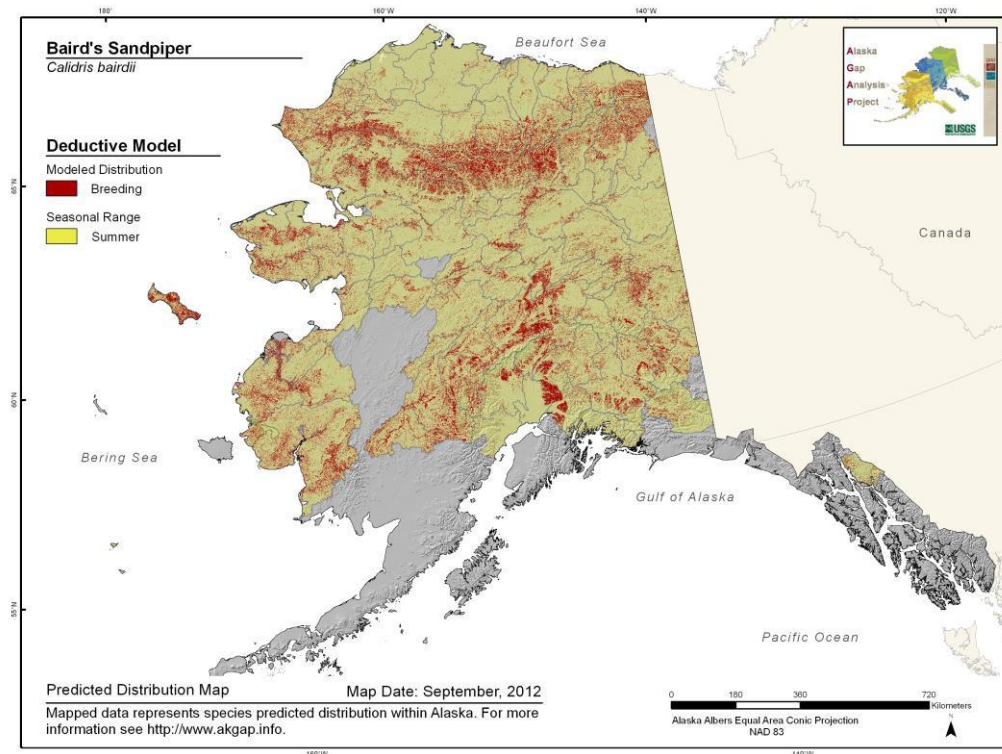
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.762**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in dry coastal and alpine tundra (AOU 1983); favors well-drained, often stony ridges, low mountaintops, river terraces, coastal barrens and bluffs (Johnson and Herter 1989). Nests under a grass tuft or among rocks. Avoids wet sedge meadows (Myers et al. 1982). On the Seward Peninsula nests in alpine habitats, slopes, and terraces (Kessel 1989).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

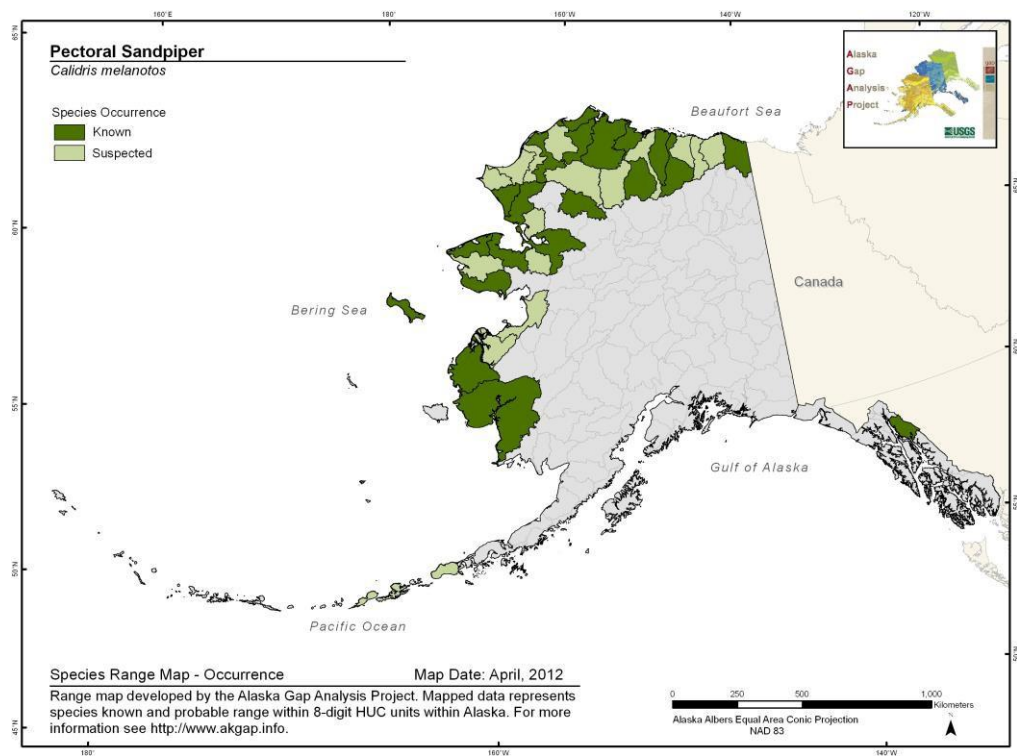
Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

Myers, J. P., O. Hilden, and P. Tomkovich. 1982. Exotic *Calidris* species of the Siberian tundra. *Ornis Fenn.* 59:175-182.

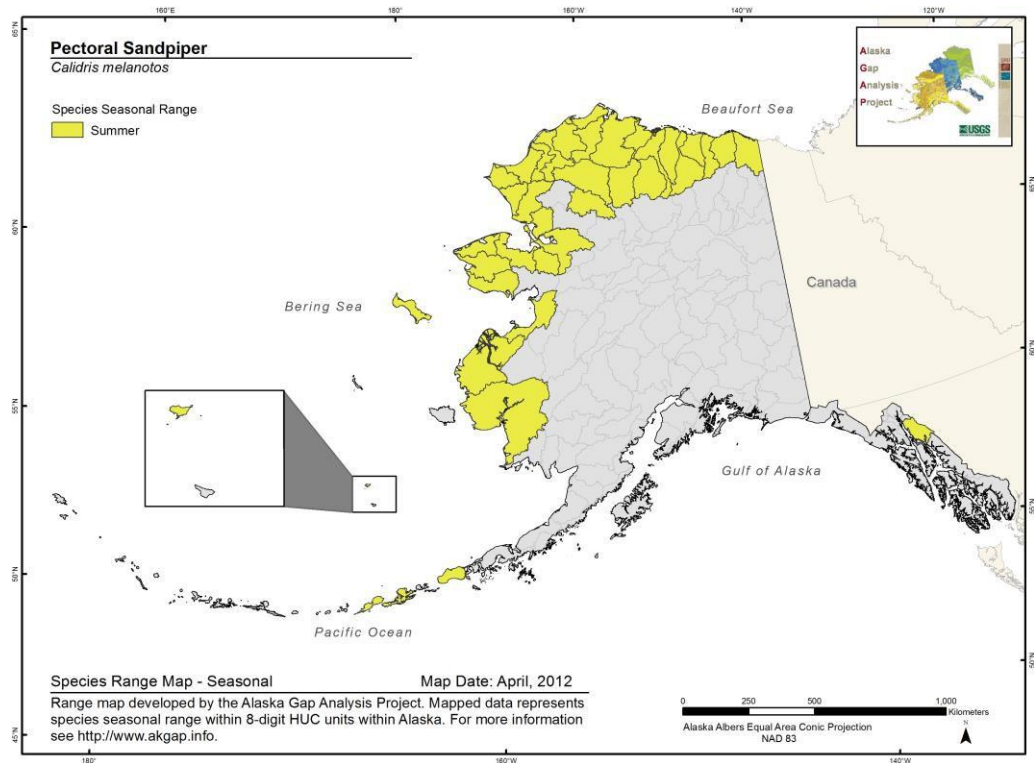
Pectoral Sandpiper *Calidris melanotos*

Range Map and Distribution Model Summary

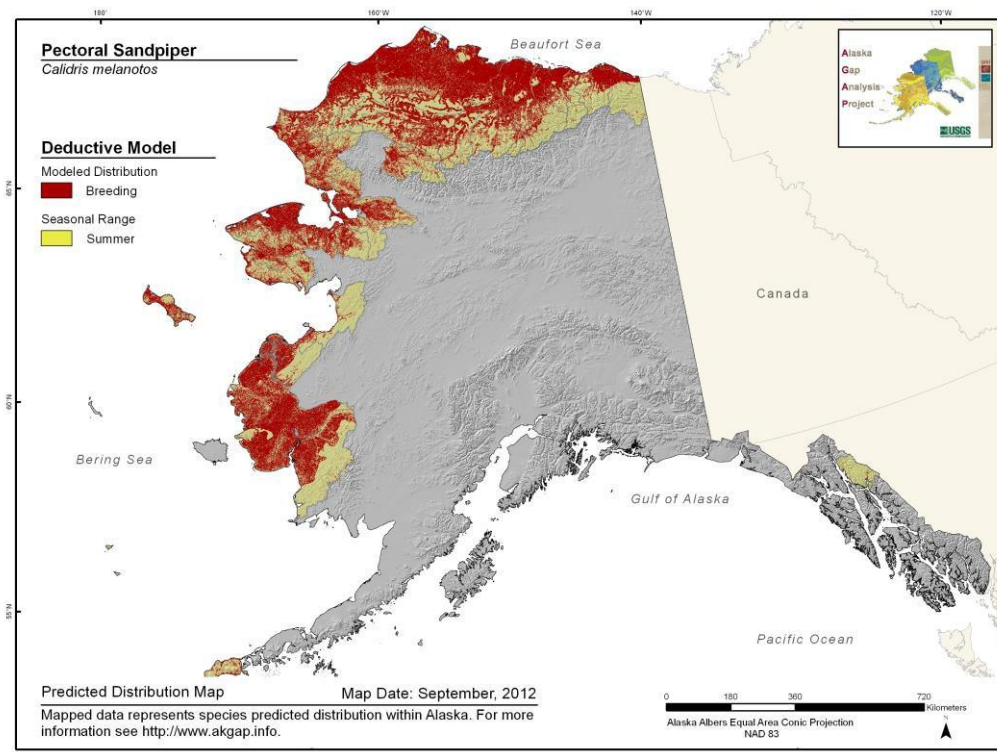
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Usually breeds on relatively flat and marshy tundra vegetated by sedges and grasses (Pitelka 1959, Portenko 1981, Johnsgard 1981). In northern Alaska, breeds on arctic coastal plains in sites with low lying ponds and marshy ground or with a mosaic of raised hummocks interspersed with marshy areas (Pitelka 1959, Troy 1994); almost entirely absent from dry coastal tundra (Troy 1994). Also occurs inland from arctic coast in areas with cotton grass tussock-dwarf shrub tundra (Pitelka 1959, Troy 1994). In the Yukon, nests on wet tundra at edges of low centered wet sedge polygons (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Johnsgard, P. A. 1981. The plovers, sandpipers, and snipes of the world. Univ. of Nebraska Press, Lincoln.

Pitelka, F. A. 1959. Numbers, breeding schedule, and territoriality in Pectoral Sandpipers of northern Alaska. Condor 61: 233-264.

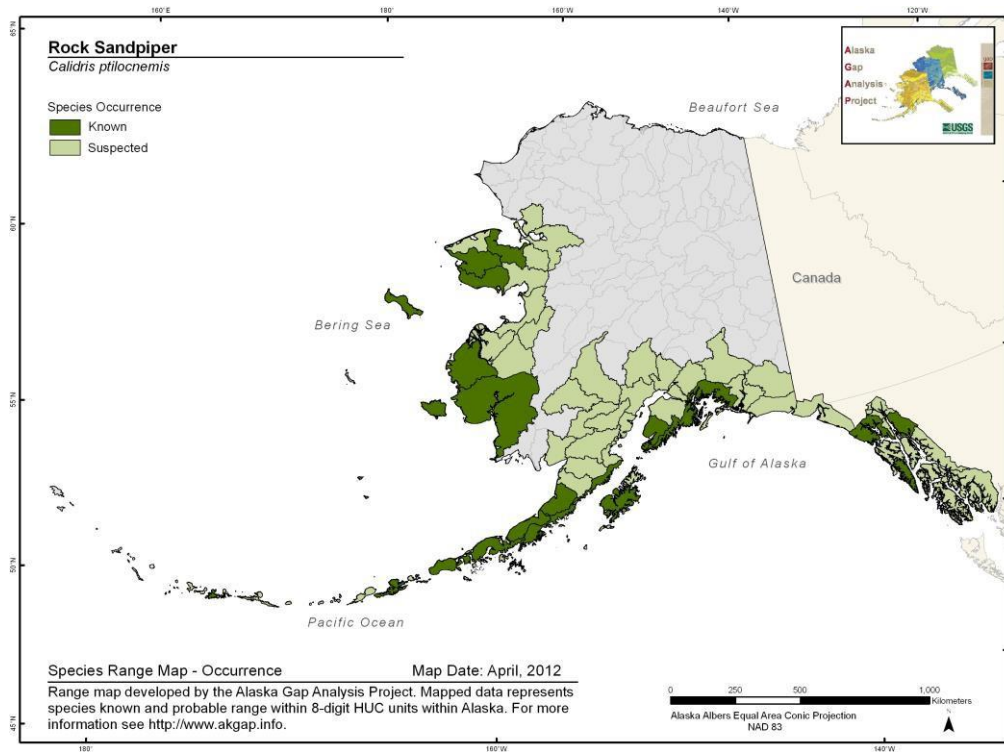
Portenko, L. A. 1981. Birds of the Chukchi Peninsula and Wrangell Island. Vol. 1. Smithsonian. Inst. And Nat. Sci. Found., Washington, D.C.

Troy, D. M. 1994. Bird use of coastal tundra at Prudhoe Bay, Alaska: 1991-1992. Report by Troy Research Associates for BP Exploration (Alaska Inc.).

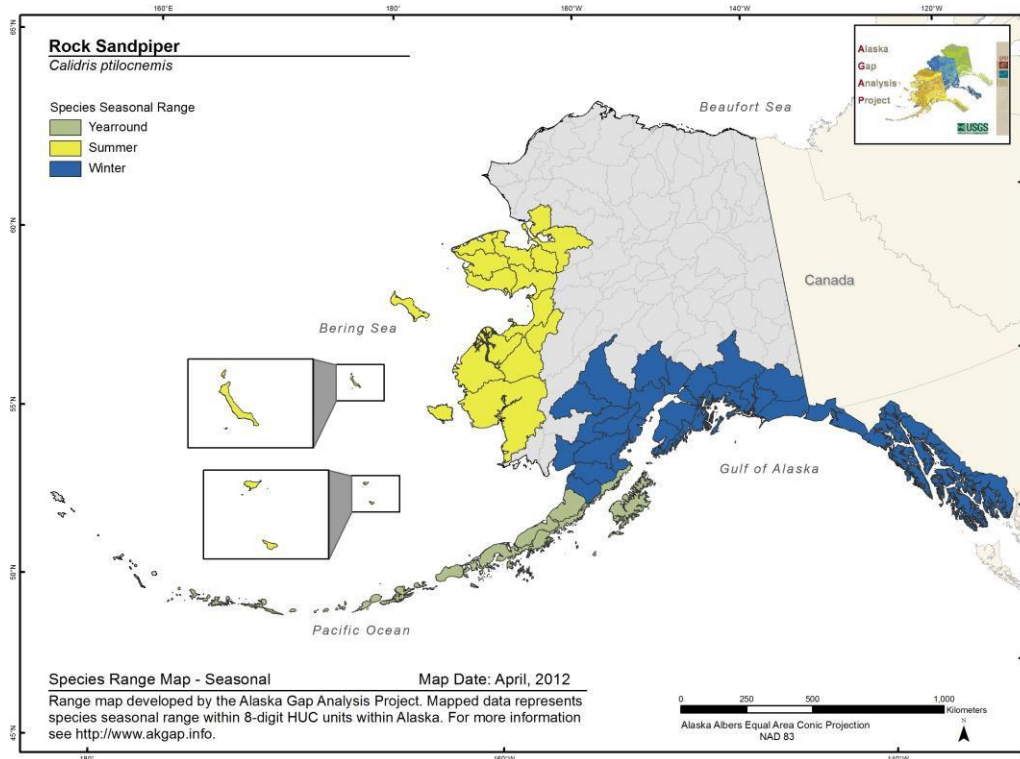
Rock Sandpiper *Calidris ptilocnemis*

Range Map and Distribution Model Summary

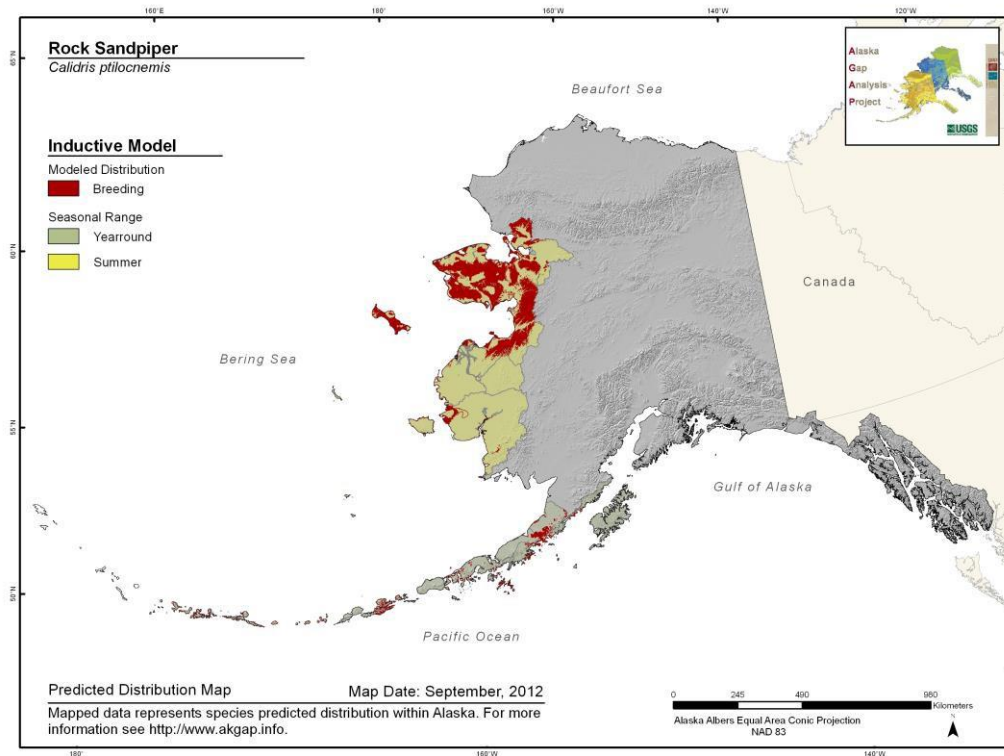
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.95**

**Model Quality
Summary:**
High

Habitat Description

Grassy or mossy tundra in coastal or montane areas with vegetation mostly ankle high (AOU 1983). Seldom found far inland or at elevations greater than a few hundred meters above sea level (Tomkovich and Sorokin 1983).

References

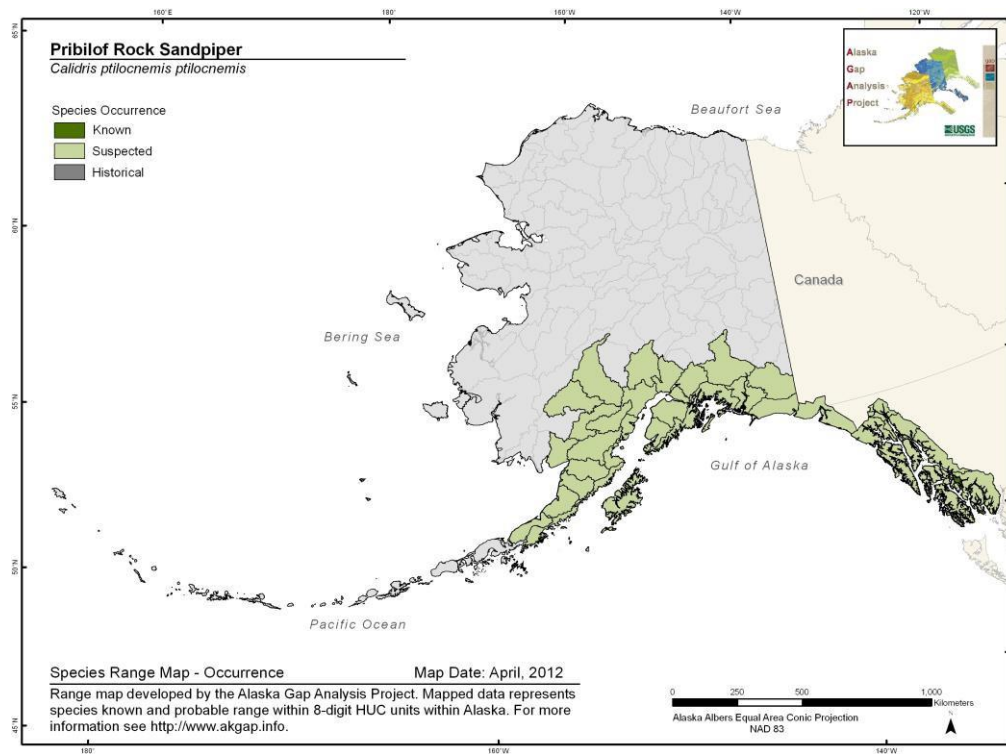
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Tomkovich, P. S. and A. G. Sorokin. 1983. Fauna of birds in Eastern Chukotka. Archives Mus. Moscow State Univ. 21: 77-159 [In Russian].

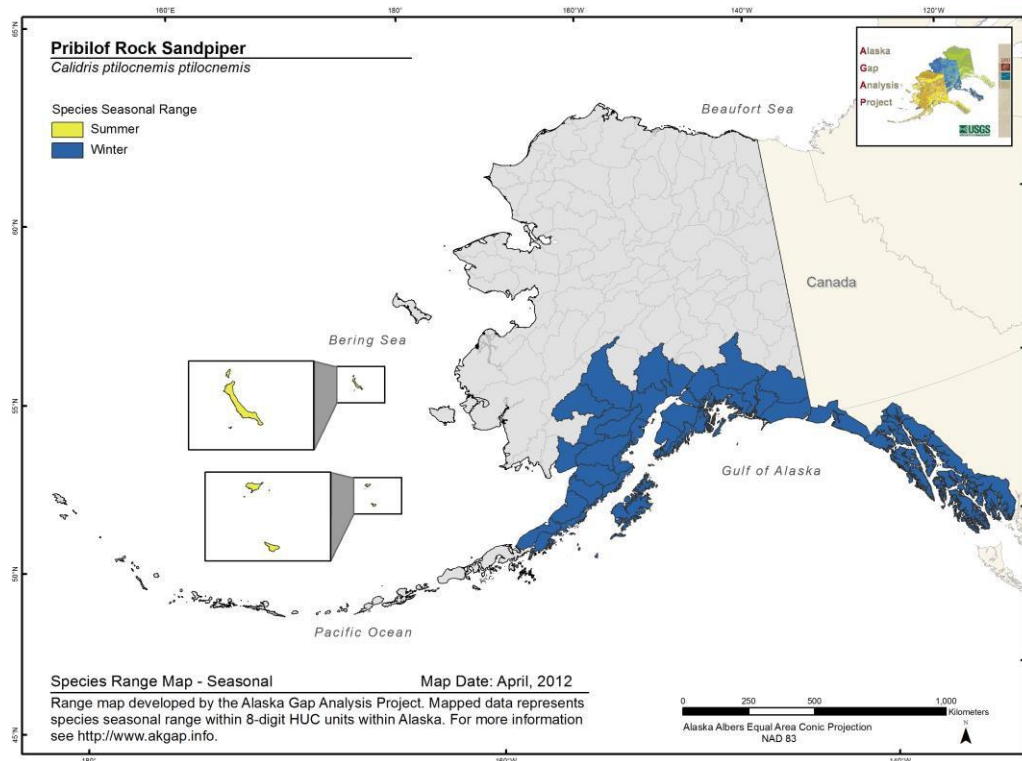
Pribilof Rock Sandpiper *Calidris ptilocnemis ptilocnemis*

Range Map and Distribution Model Summary

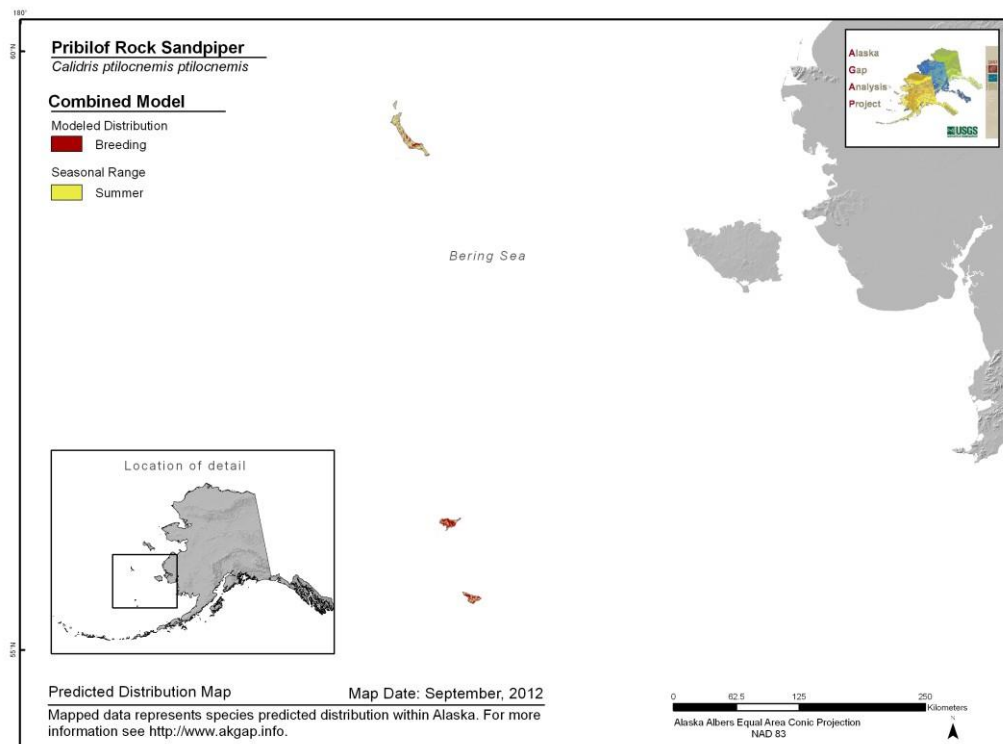
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.575**

**Model Quality
Summary:**
Low

Habitat Description

Occurs on a variety of coastal lowland tundra or montane subarctic tundra; vegetation is ankle high; seldom found at elevations greater than a few hundred meters above sea level or far inland (Gill et al. 2002); will also nest on disturbed habitats (around airports and on reclaimed/ revegetated land), mostly on Bering Sea Islands (Gill et al. 2002). On Pribilof Islands, breeds on high upland tundra (Nelson 1887, Hanna 1921, Preble and McAtee 1923) while on St. Matthew Island utilizes lowlands often just back from the driftwood lines (Hanna 1921). Associated with forb and forb-sedge tundra, rocky shrub tundra/ uplands, crowberry meadows, sedge meadows, beach ridges and dunes (Gill et al. 2002). Nest site generally in upland heath meadows; most nests placed directly on substrate underlain by moss. Nest sites on the Pribilof Islands had little cover when nests were initiated, but those positioned in forb-sedge tundra were probably well-concealed by the time of hatch (Gill et al. 2002).

References

Gill, R. E., P. S. Tomkovich, and B. J. McCaffery. 2002. Rock sandpiper (*Calidris ptilocnemis*). In *The Birds of North America*, Vol. 18, No. 686 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Hanna, G. D. 1921. The Pribilof Sandpiper. *Condor* 23:50-57.

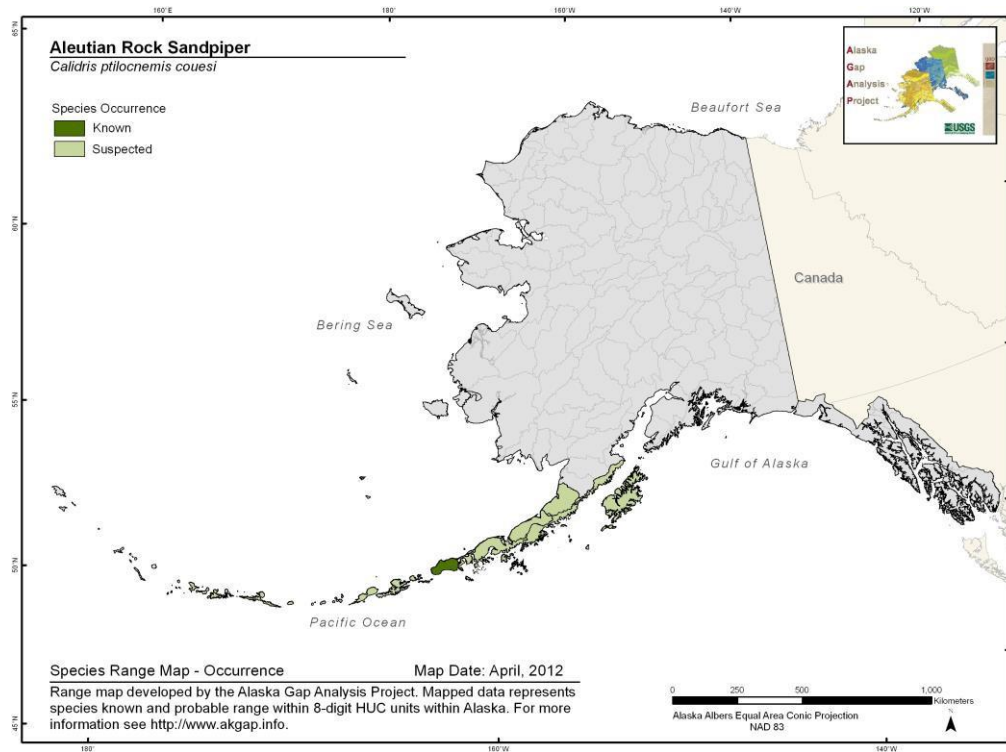
Nelson, E. W. 1887. Birds of Alaska with a partial bibliography of Alaska ornithology. Pp. 19-226 in *Report upon natural history collections made in Alaska between the years 1877 and 1881* (H. W. Henshaw, ed.) Signal Service, U. S. Army, Arctic Ser. Publ. 3. U. S. Gov. Printing Office, Washington, D. C.

Preble, E. A. and W. L. McAtee. 1923. Birds and mammals of the Pribilof Islands, Alaska. In *A biological survey of the Pribilof Islands, Alaska*. N. Am. Fauna. 46:1-28, 245-255.

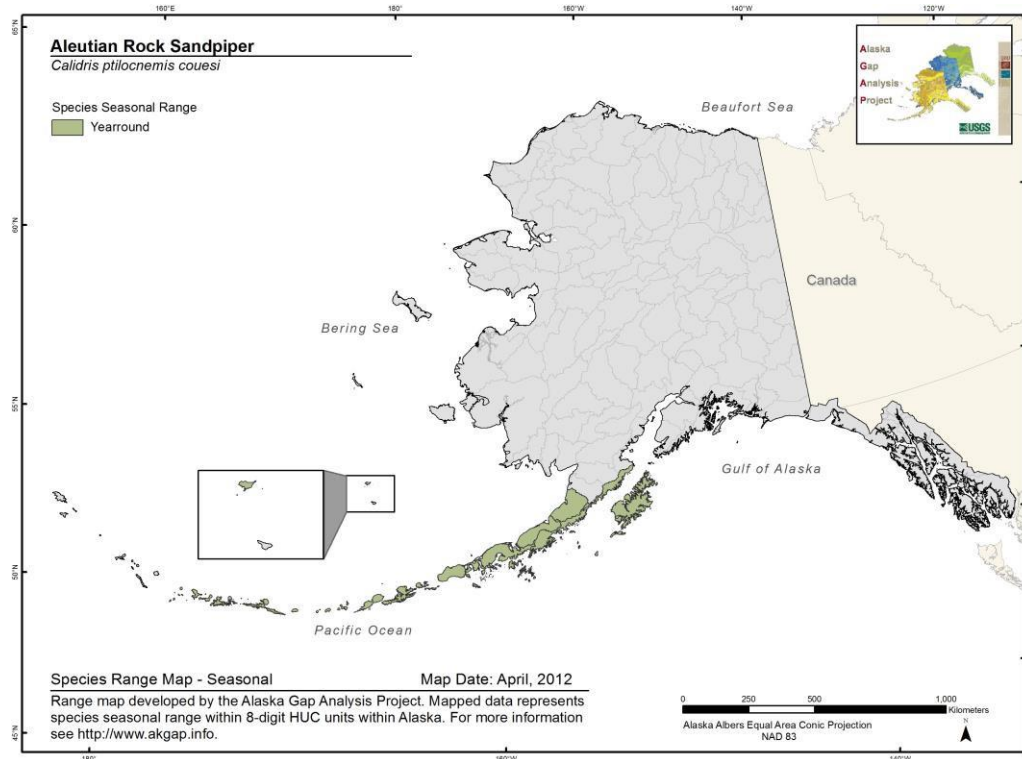
Aleutian Rock Sandpiper *Calidris ptilocnemis couesi*

Range Map and Distribution Model Summary

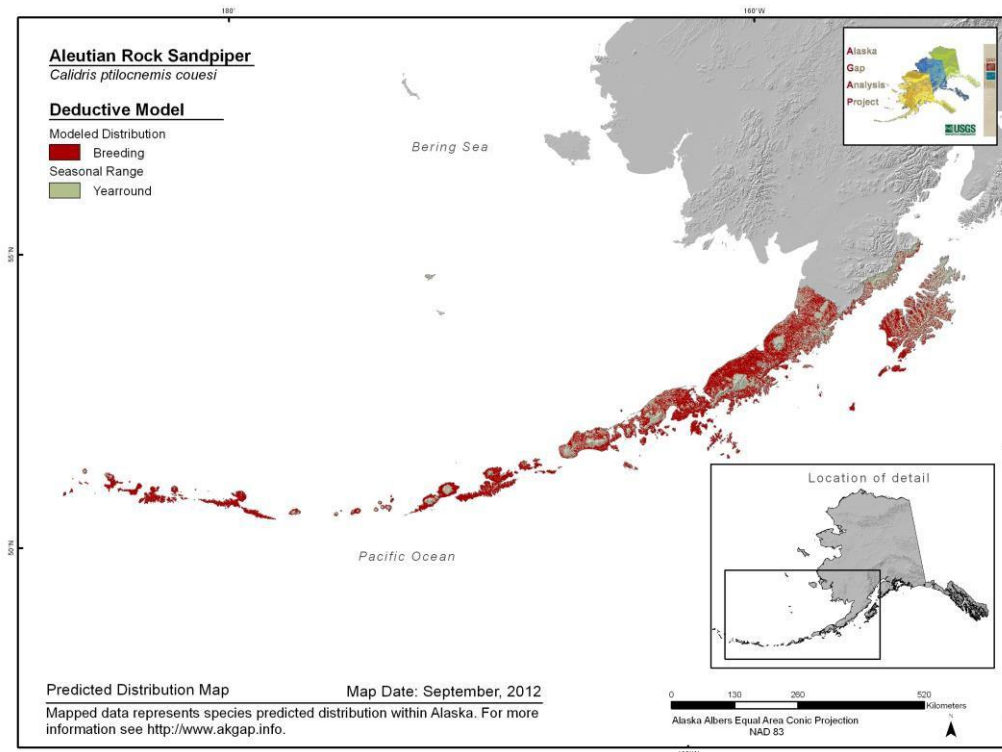
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

Model Evaluation Statistic (AUC): No AUC

Model Quality Summary:
Not validated

Habitat Description

Breeds on coastal lowland tundra. On Amchitka Island (and likely other low-lying, nonvolcanic Aleutian Islands), nests in Empetrum-Cladonia tundra, sedge-meadow tundra found in lakes and pond regions with little relief, and riparian meadow characterized by dense lush stands of herbaceous vegetation. In early autumn, birds reported in heath tundra of Amchitka Island (Gill et al. 2002).

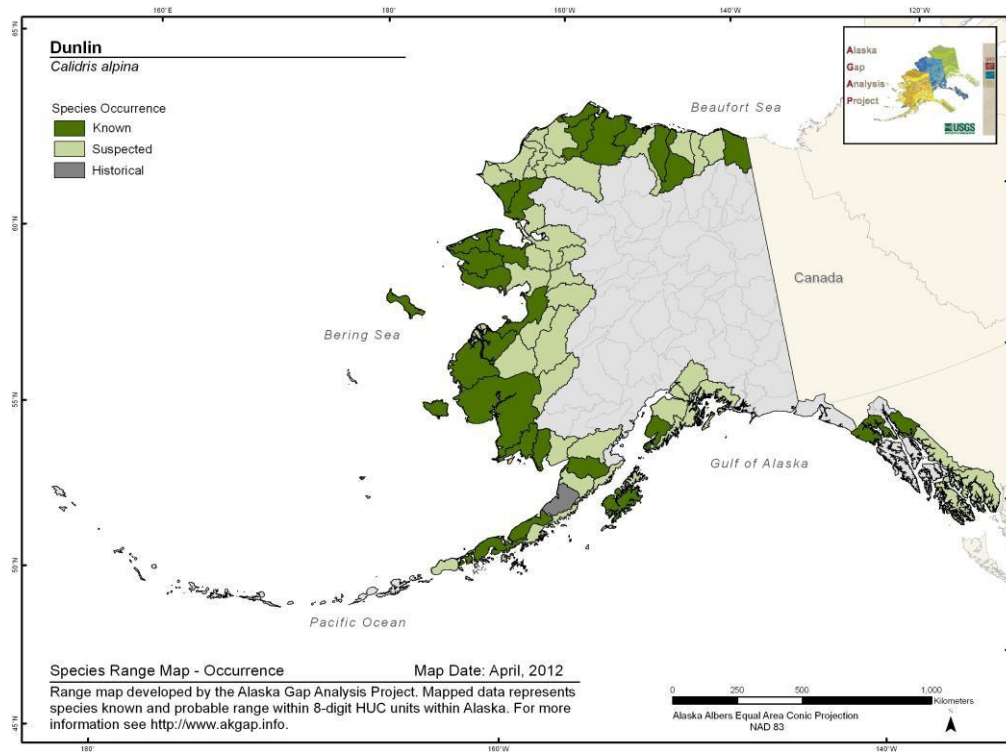
References

Gill, R. E., P. S. Tomkovich, and B. J. McCaffery. 2002. Rock sandpiper (*Calidris ptilocnemis*). In *The Birds of North America*, Vol. 18, No. 686 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

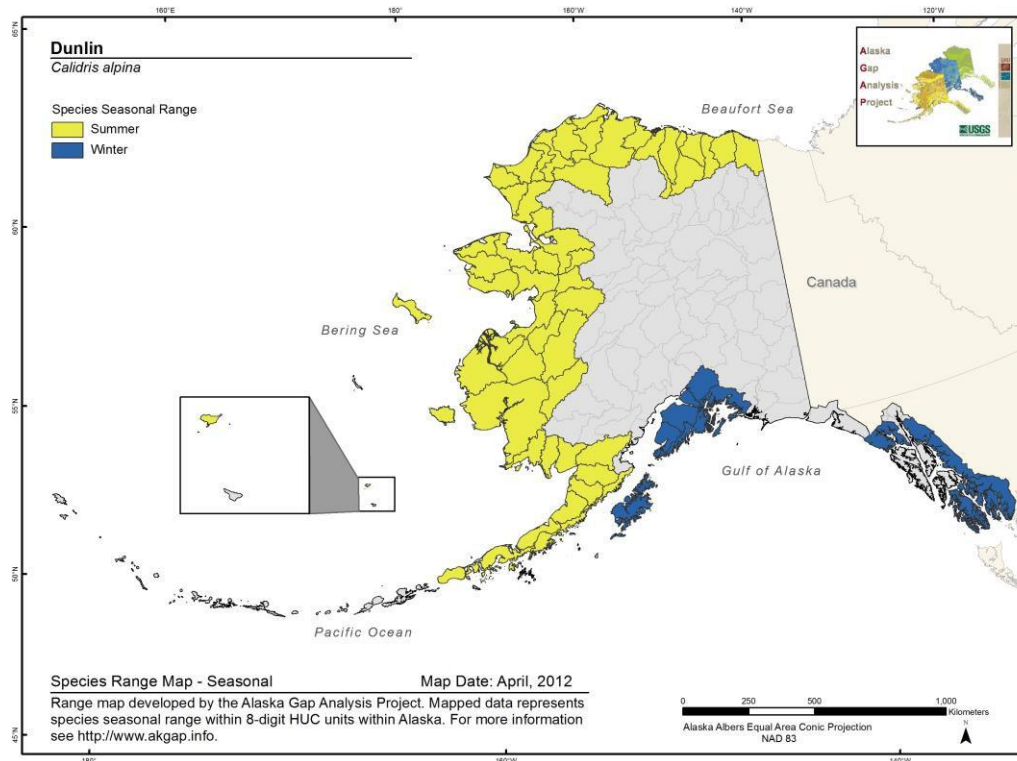
Dunlin *Calidris alpina*

Range Map and Distribution Model Summary

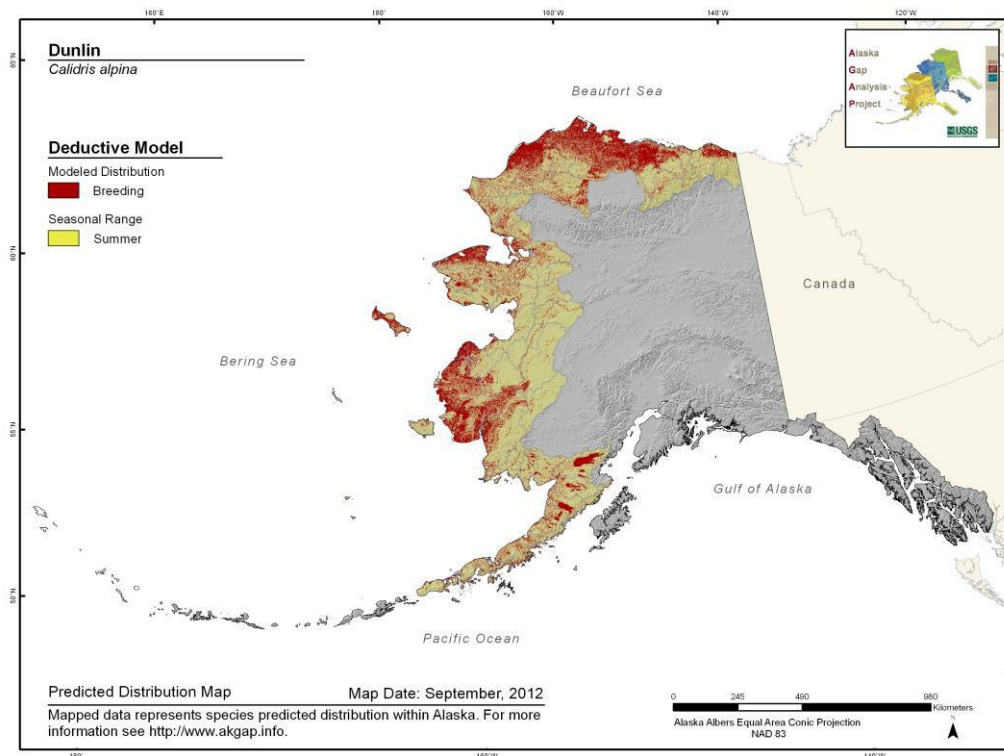
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.626**

**Model Quality
Summary:**
Low

Habitat Description

In Prudhoe Bay, breeds on moist-wet tundra, often in areas with ponds, polygons, strangs (short, sinuous ridges), and recently formed landscapes, such as drained thaw lakes (D. M. pers. Comm. In Warnock and Gill 1996, Meehan 1986). Shoreline silt barrens important for post breeding birds (Andres 1989). On the Y-K Delta, breeds in coastal sedge graminoid meadows dominated by *Carex ramenskii*, *C. deshampsioides*, and *C. rariflora*, and having numerous shallow ponds and tidal distributaries (Holmes 1970). Post breeding birds found on unvegetated intertidal flats (Gill and Handel 1990).

References

Andres, B. A. 1989. Littoral zone use by post-breeding shorebirds on the Colville River delta, Alaska. Master's thesis, Ohio State Univ., Columbus.

Gill, R. E. and C. M. Handel. 1990. The importance of subarctic intertidal habitats to shorebirds: a case study of the central Yukon-Kuskokwim delta, Alaska. *Condor* 92: 709-725.

Holmes, R. T. 1970. Differences in population density, territoriality, and food supply of Dunlin on arctic and subarctic tundra. Pp. 303-319 In: *Animal populations in relation to their food resources* (A. Watson, ed.). Oxford Univ. Press, Oxford.

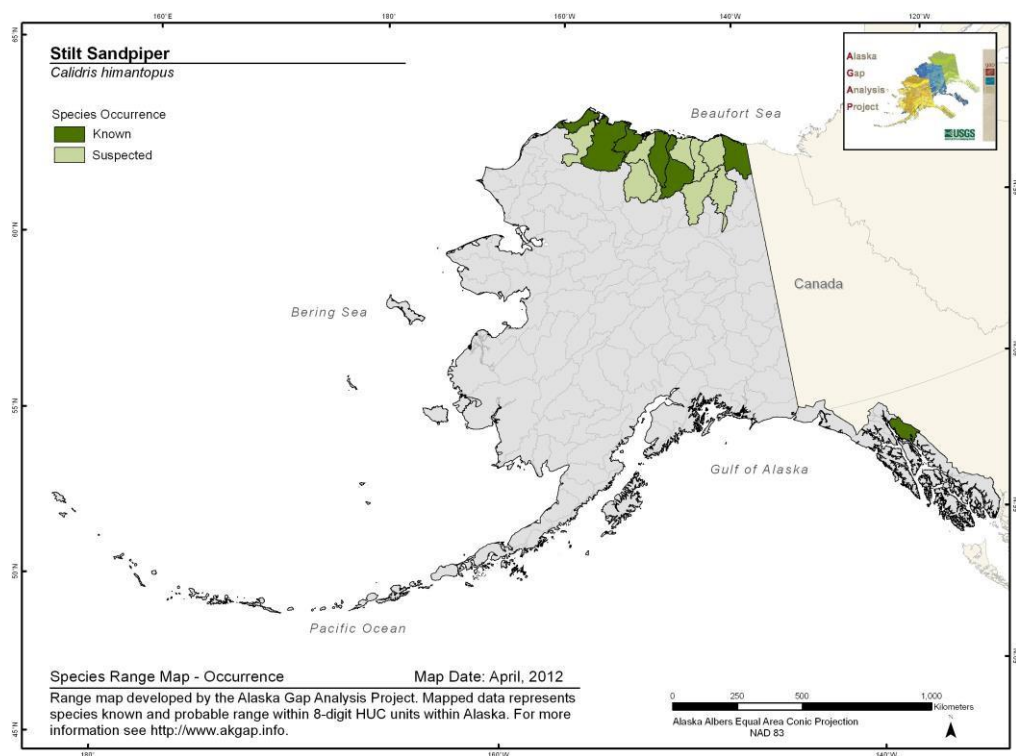
Meehan, R. H. 1986. Impact of oilfield development on shorebirds, Prudhoe Bay, Alaska. Ph. D. diss., Univ. of Colorado, Boulder.

Warnock, N. D. and R. E. Gills. 1996. Dunlin (*Calidris alpina*). In *The Birds of North America*, Vol. 6, No. 203 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

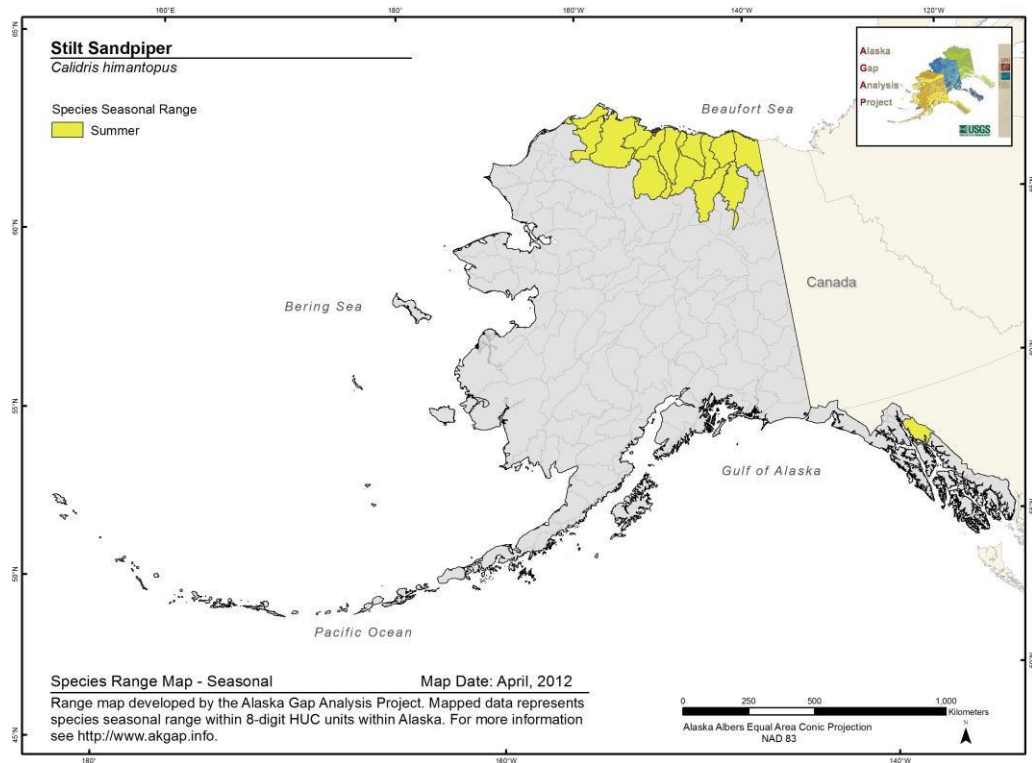
Stilt Sandpiper *Calidris himantopus*

Range Map and Distribution Model Summary

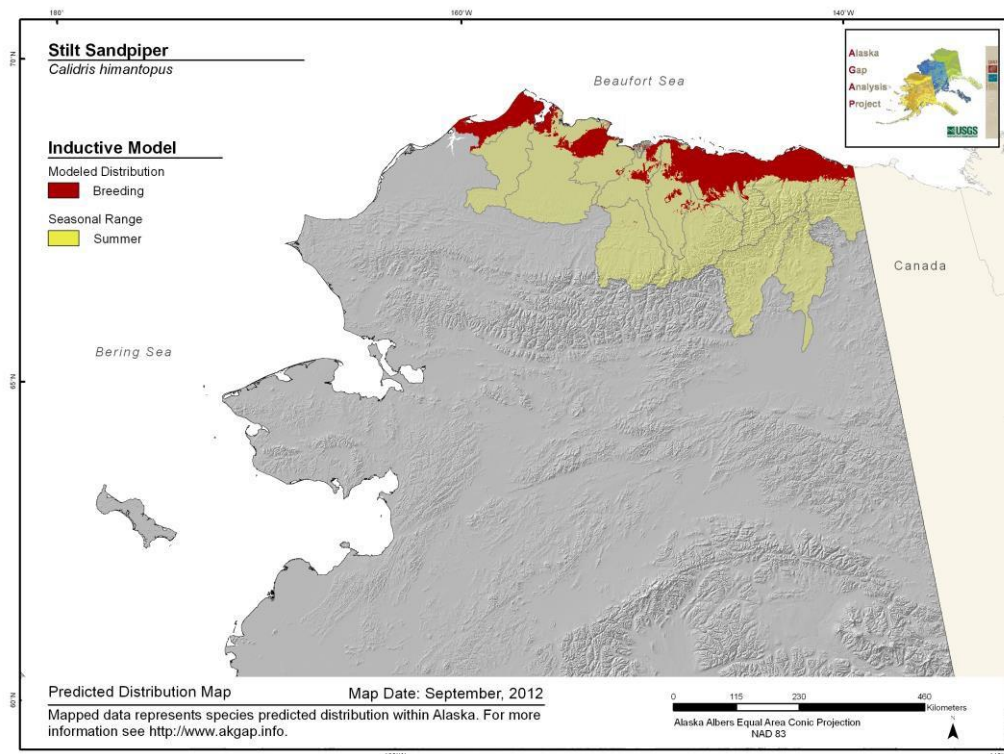
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in relatively open, dry tundra north of treeline (Armstrong 1995). At Prudhoe Bay, breeds in wet poorly drained wetlands in association with low ridges and incompletely formed polygynal terrain (Troy, personal communication in Klima and Jehl 1998). Nests in sedge tundra near water, often near wooded borders of the taiga (AOU 1983), on the ground in a shallow scrape, often on a slightly raised site (e.g., atop small sedge hummock or on low well-drained gravel ridge crossing sedge meadow).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

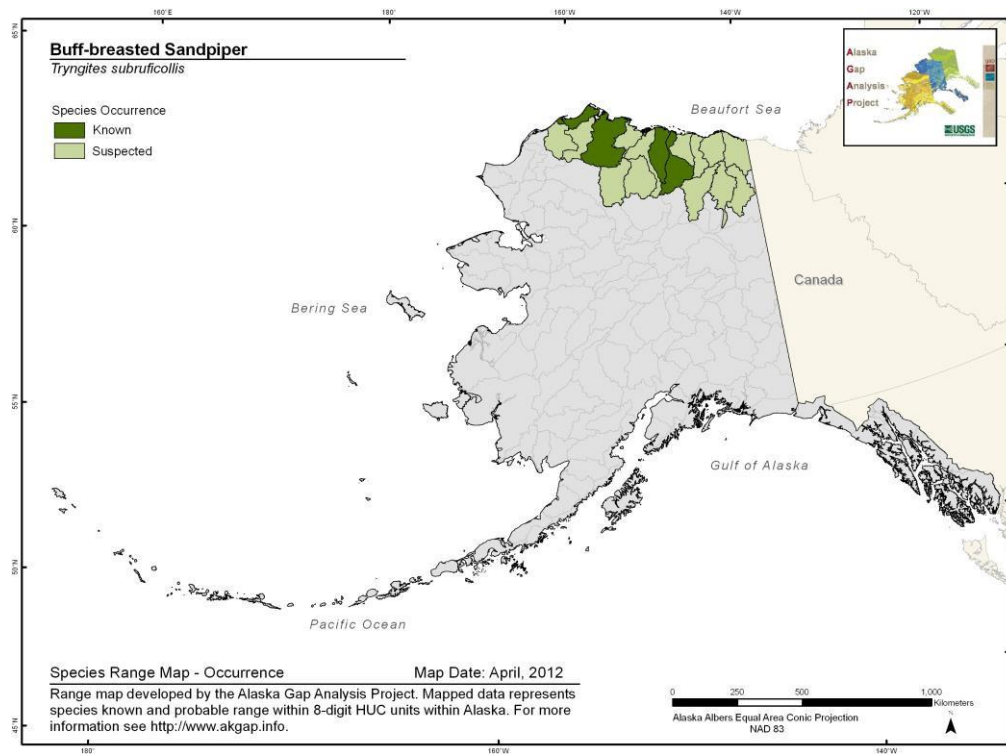
Klima, J. and J. R. Jehl. 1998. Stilt Sandpiper (*Calidris himantopus*). In The Birds of North America, No. 341 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Buff-breasted Sandpiper

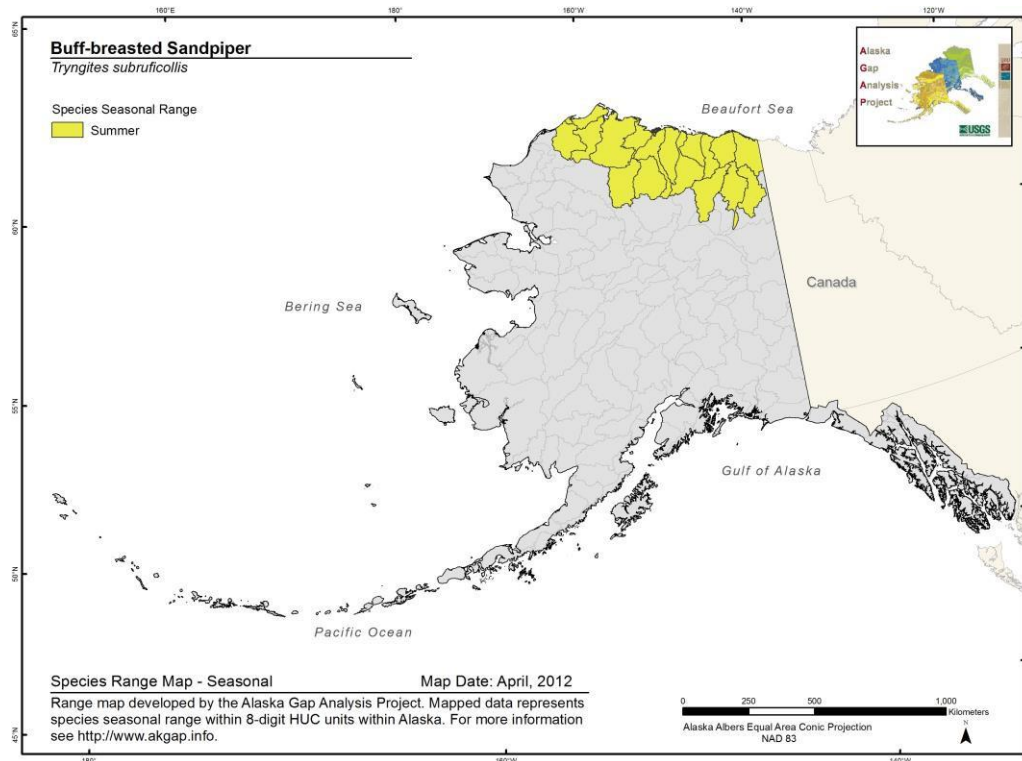
Tryngites subruficollis

Range Map and Distribution Model Summary

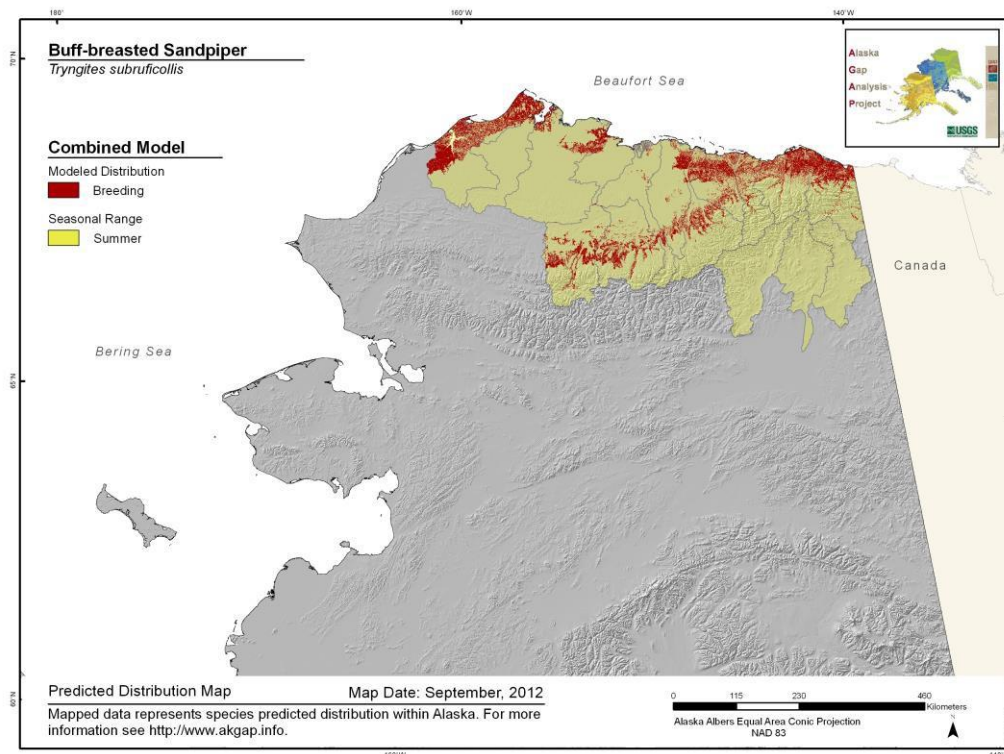
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.646**

**Model Quality
Summary:**
Low

Habitat Description

Nest on dry slopes with sedge tussocks, on grass tundra with mosses and willows, in moist or wet sedge-grass meadows, in well-drained sandy areas with scant vegetation, and on well-vegetated hummocky ground near marshy ponds (Johnsgard 1981, Cramp and Simmons 1983, Godfrey 1986, Johnson and Herter 1989, Lanctot 1995). Females with broods inhabit moist and emergent vegetation along wetlands and stream beds (Lanctot 1995). Display areas tend to be on nonpatterned ground with closely spaced tussocks about 20 cm high and 25-50 cm in diameter, often with dwarf willow thickets (*Salix glauca* and *S. lanata*; ADF&G 2005a). Vegetation at leks dominated by moist graminoid and wet, graminoid meadows (Lanctot and Slater 1992).

References

ADF&G. 2005a. Our wealth maintained: a strategy for conserving Alaska's diverse wildlife and fish resources, a Comprehensive Wildlife Conservation Strategy emphasizing Alaska's nongame species. Submitted to USFWS, Anchorage, AK.

Cramp, S. and K. E. L. Simmons, eds. 1983. The Birds of the Western Palearctic. Vol. 3. Oxford University Press, Oxford.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Johnsgard, P. A. 1981. The plovers, sandpipers, and snipes of the world. Univ. of Nebraska Press, Lincoln.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

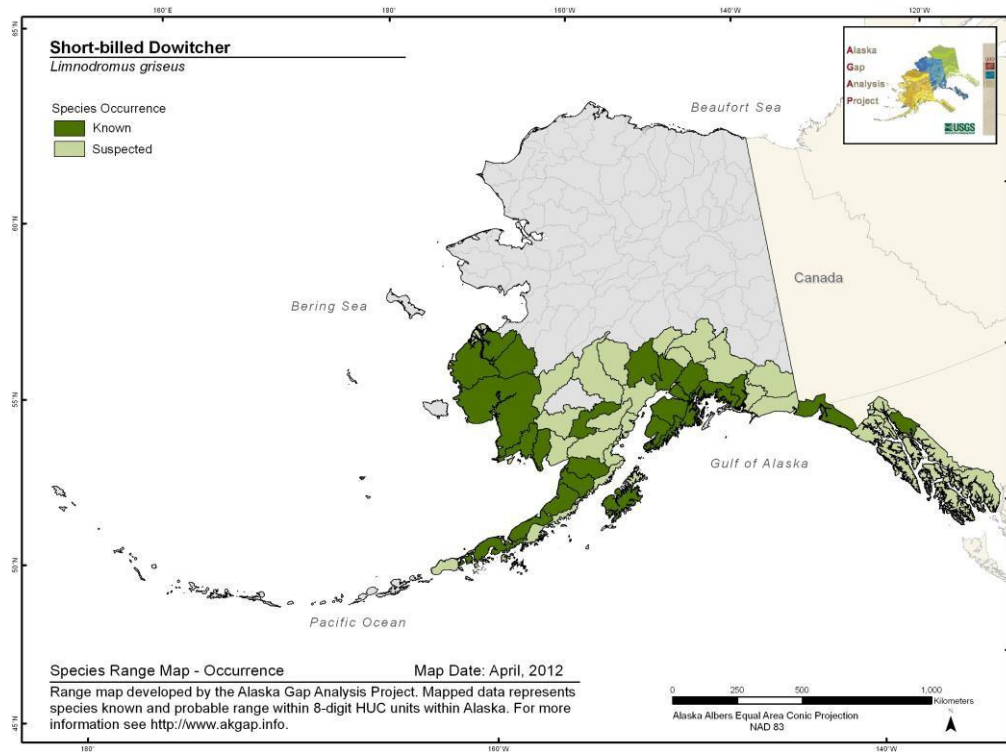
Lanctot, R. B. 1995. A closer look: Buff-breasted Sandpiper. *Birding* 27:384-390.

Lanctot, R. R. and C .L. Slater. 1992. Breeding biology and habitat use of Buff-breasted Sandpipers (*Tryngites subruficollis*) on the Prudhoe Bay oil fields, Alaska. Unpubl. Report, prepared for BP Exploration (Alaska), Inc. and USFWS, Anchorage, Alaska.

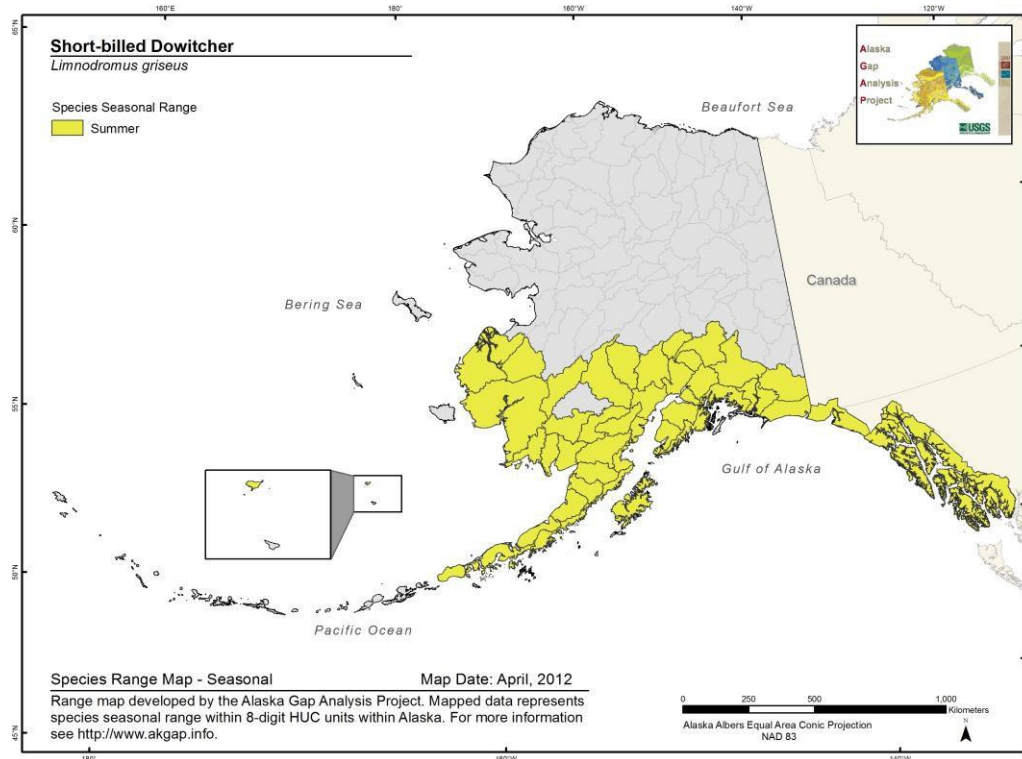
Short-billed Dowitcher *Limnodromus griseus*

Range Map and Distribution Model Summary

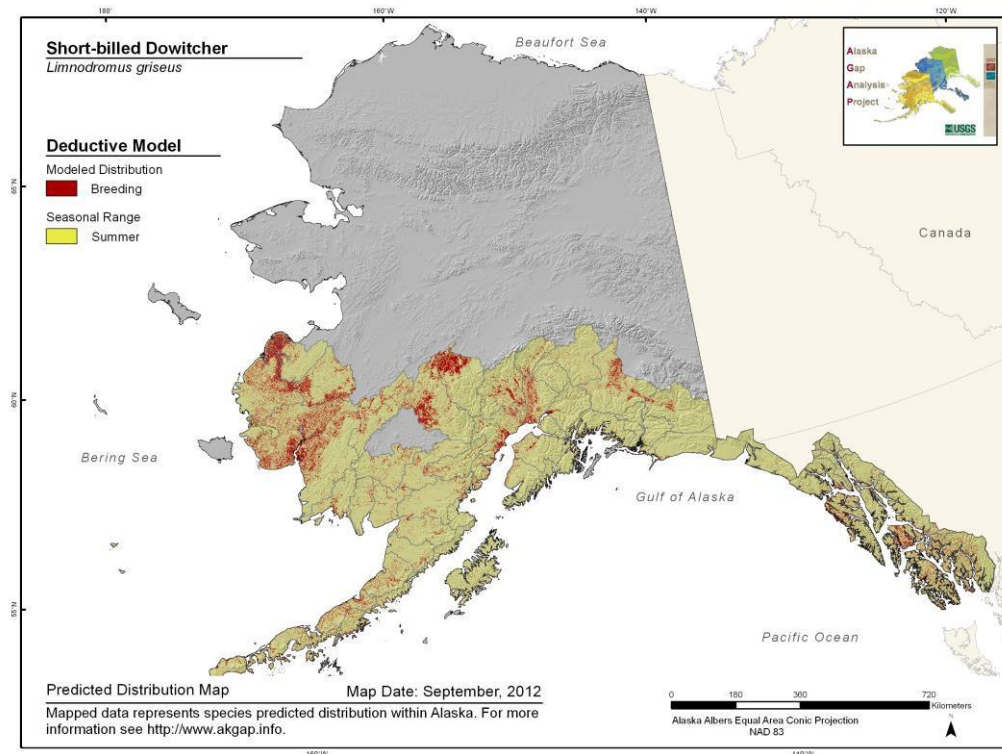
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.537**

**Model Quality
Summary:**
Low

Habitat Description

Nests in muskegs (Gabrielson and Lincoln 1959). Additionally, nests in sedge meadow, sedge-hummock, moss-grass on Copper River Delta and bogs in floodplains of major rivers in western Alaska commonly (Mickelson et al. 1980, B. McCaffery, personal communication in Jehl et al. 2001).

References

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

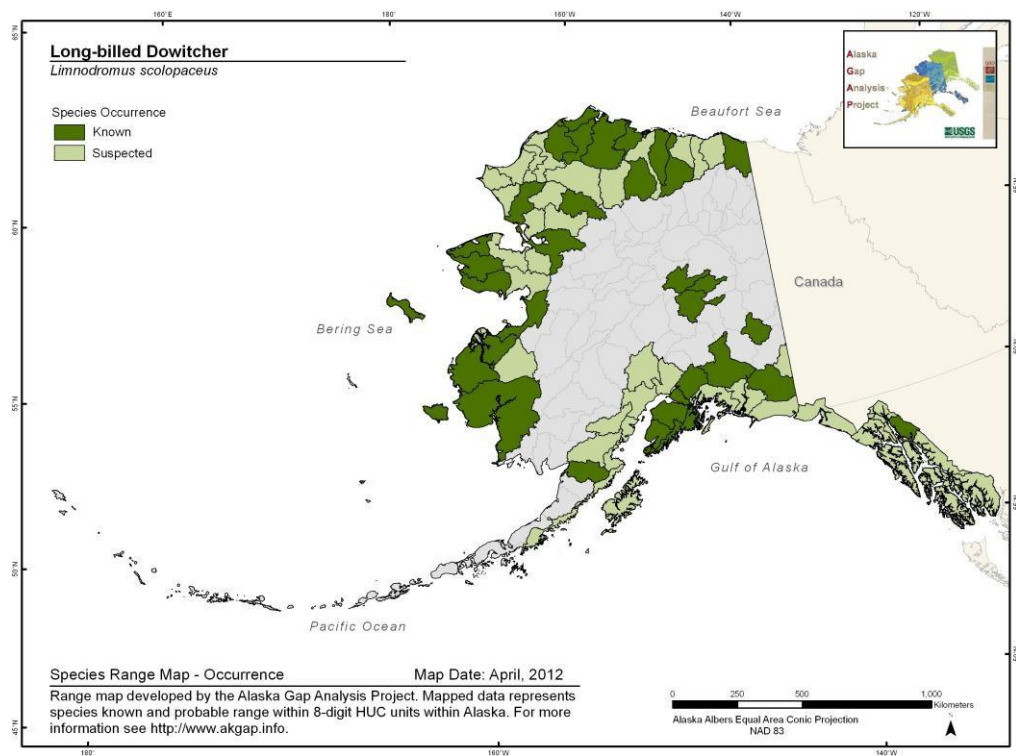
Jehl, J. R., Jr., J. Klima, and R. E. Harris. 2001. Short-billed Dowitcher (*Limnodromus griseus*). In The Birds of North America, No. 564 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Mickelson, P.G., J.S. Hawkins, D.R. Herter, and S.M. Murphy. 1980. Habitat use by birds and other wildlife on the eastern Copper River delta, Alaska. Unpubl. rep. Univ. of Alaska, Alaska Cooperative Wildlife Research Unit, Fairbanks, AK. 189 pp.

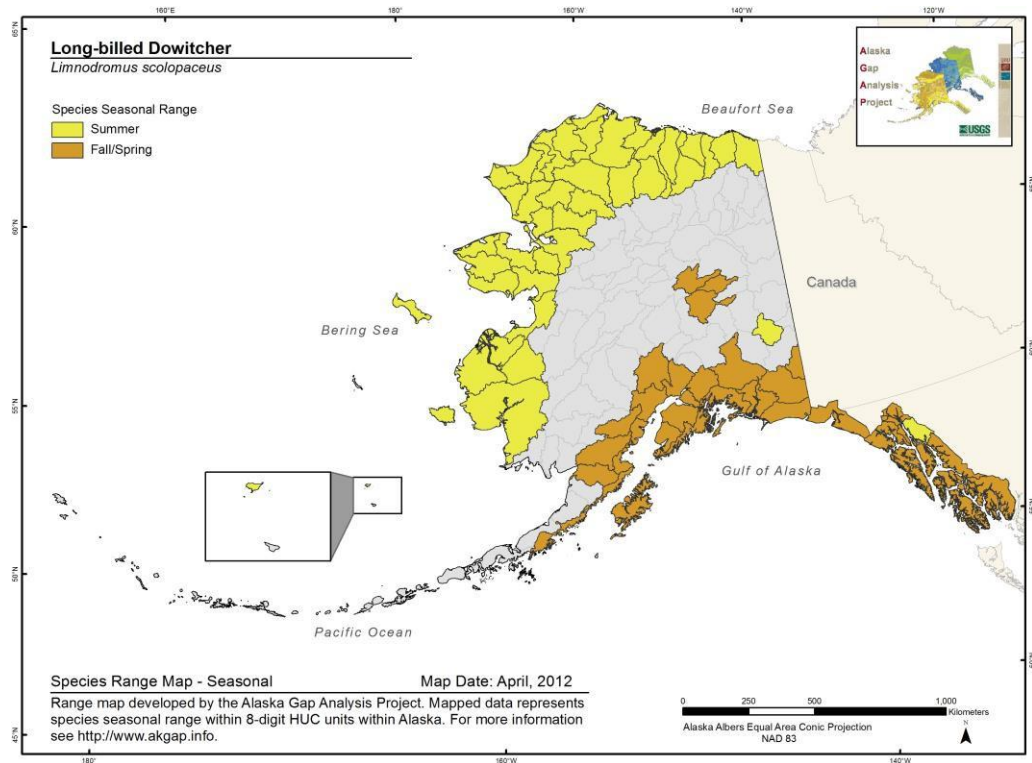
Long-billed Dowitcher *Limnodromus scolopaceus*

Range Map and Distribution Model Summary

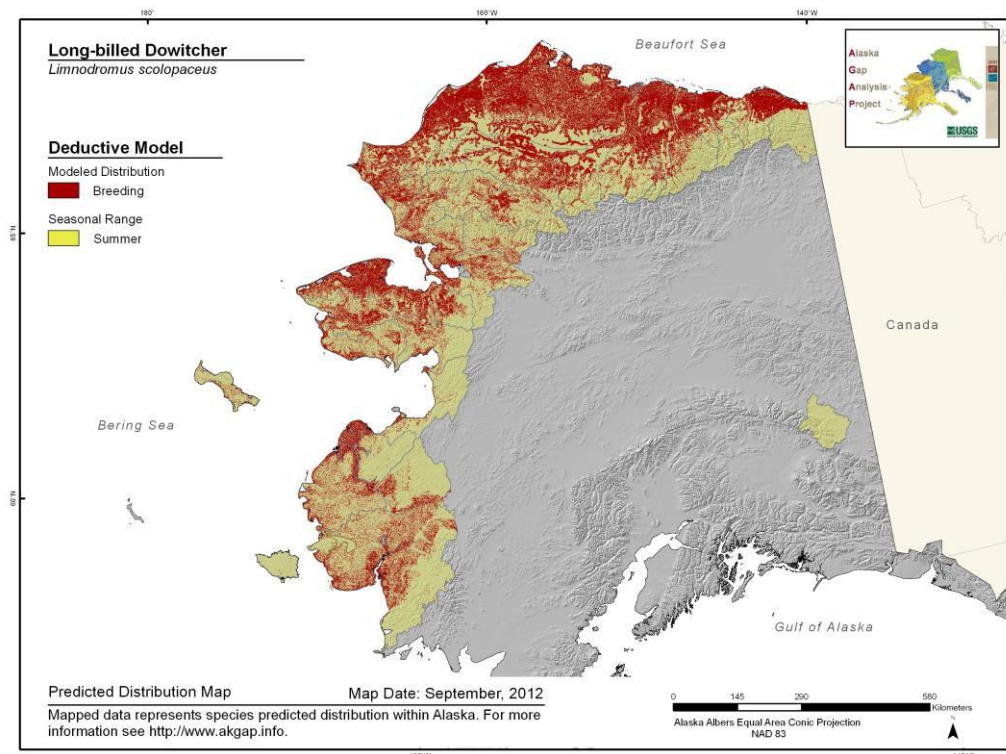
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.775**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests in wet, grassy meadows (Conover 1926, Brandt 1943). On the Seward Peninsula, breeds in wet meadows located on extensive flats with freshwater ponds (Kessel 1989). In the Pitmegea River region (northwest AK), breed in sedge willow, wet meadow or sedge marsh along drainages near ponds (Childs 1969). In the northwestern foothills of the Brooks Range, this species is restricted to *Carex* marshes near upland lakes and river bends (Maher 1959) and in the Y-K Delta, breeds in moist upland freshwater meadows (Brandt 1943).

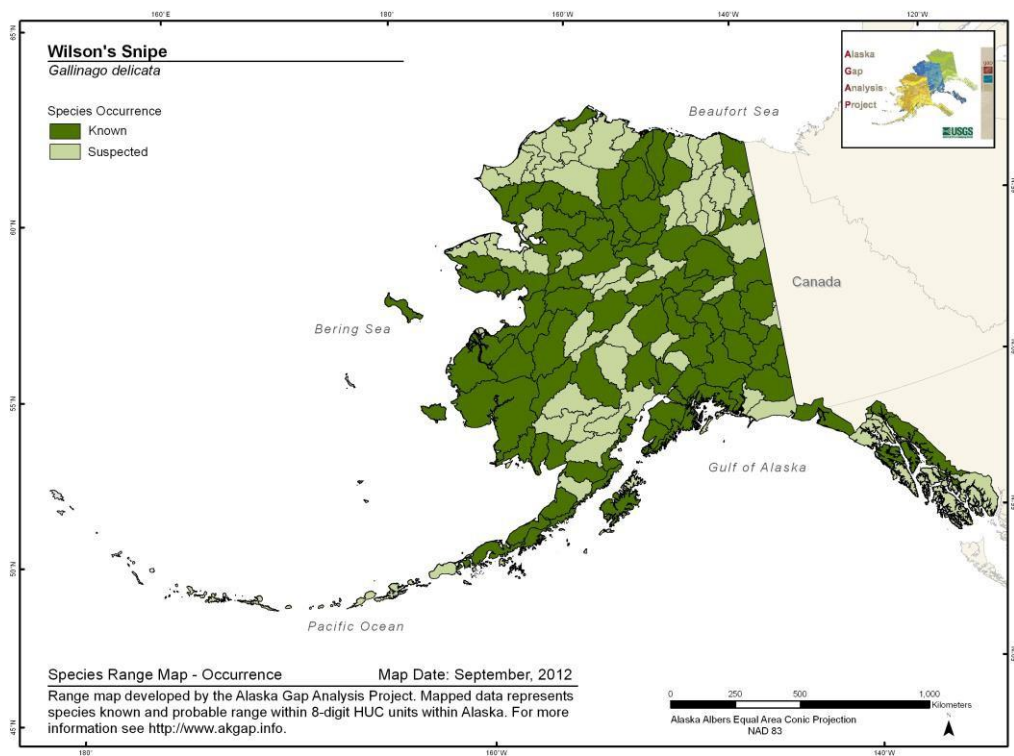
References

- Brandt, H. 1943. Alaska bird trails. Bird Res. Foundation, Cleveland, OH.
- Childs, H. E., Jr. 1969. Birds and mammals of the Pit-megea River region, Cape Sabine, northwestern Alaska. Biol. Pap. Univ. Alsk. 10: 1-76.
- Conover, H. B. 1926. Game birds of the Hooper Bay region, Alaska. Auk 26: 303-318.
- Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.
- Maher, W. K. 1959. Habitat distribution of birds breeding along the upper Kaolak River, northern Alaska. Condor 61: 351-368.

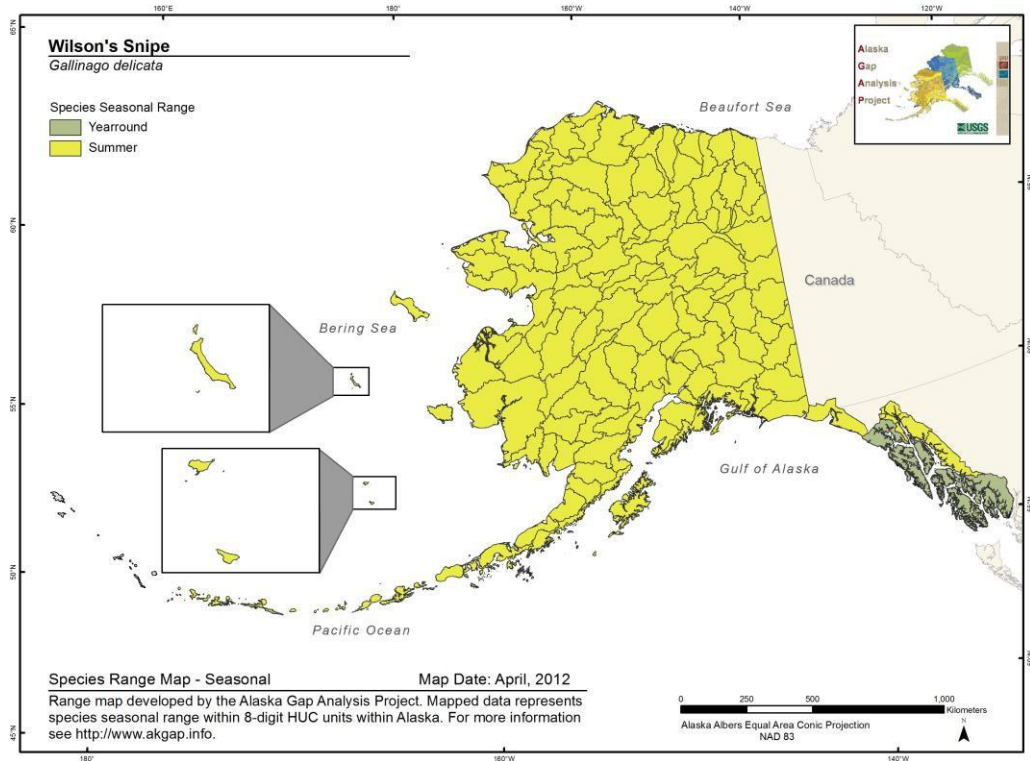
Wilson's Snipe *Gallinago delicata*

Range Map and Distribution Model Summary

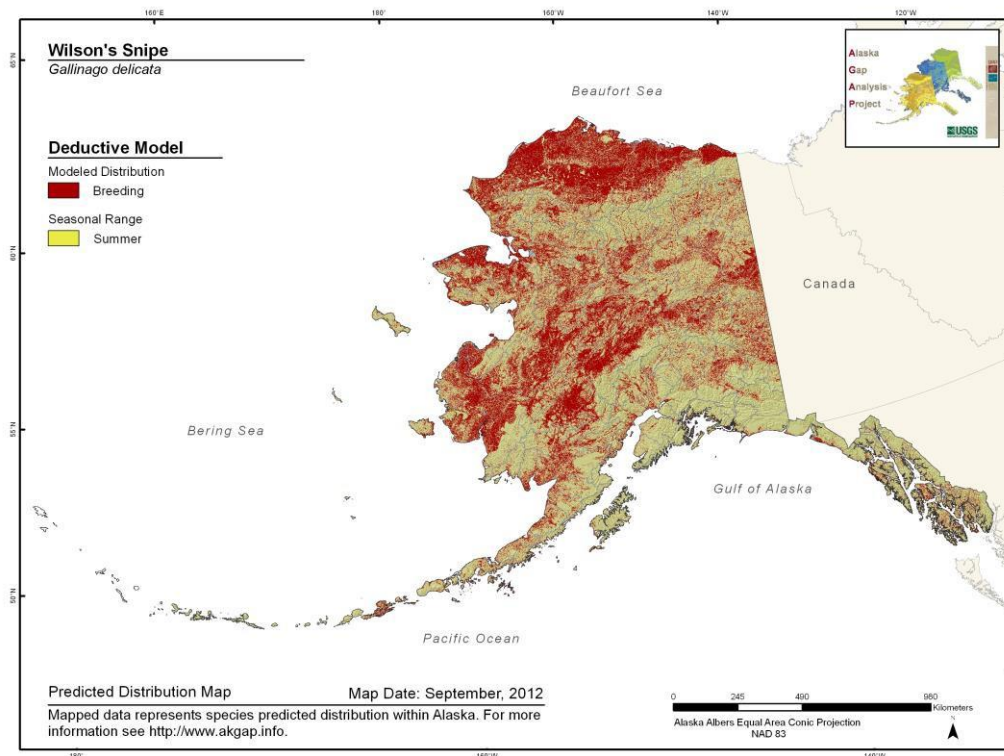
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.562**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in sedge bogs, fens, willow and alder swamps, marshy edges of ponds, rivers, and brooks. Require wet organic soils rich in food with clumps of cover throughout the year (Tuck 1972).

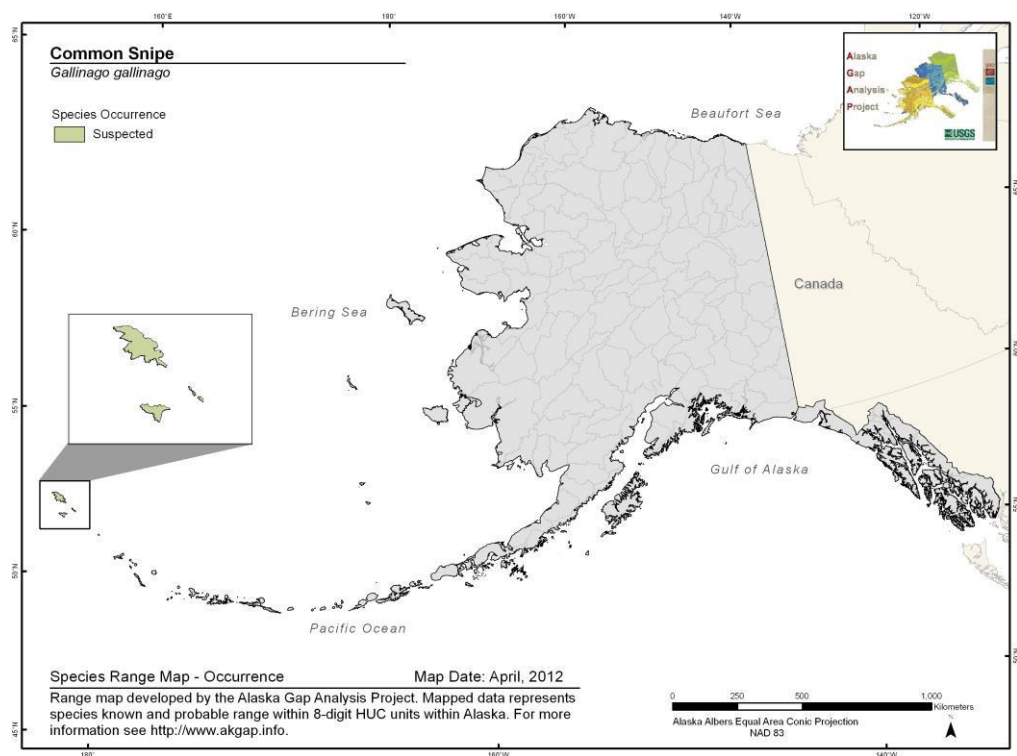
References

Tuck, L. M. 1972. The snipes: a study of the genus *Capella*. Can. Wildl. Serv. Monogr. Ser., No. 5.

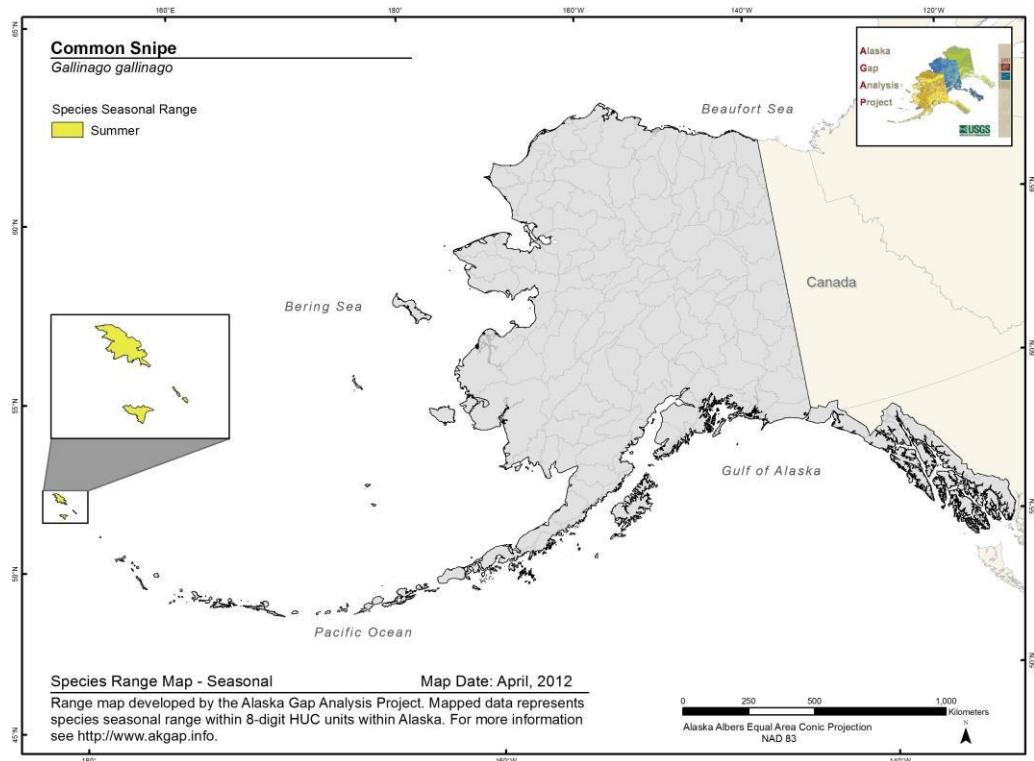
Common Snipe *Gallinago gallinago*

Range Map and Distribution Model Summary

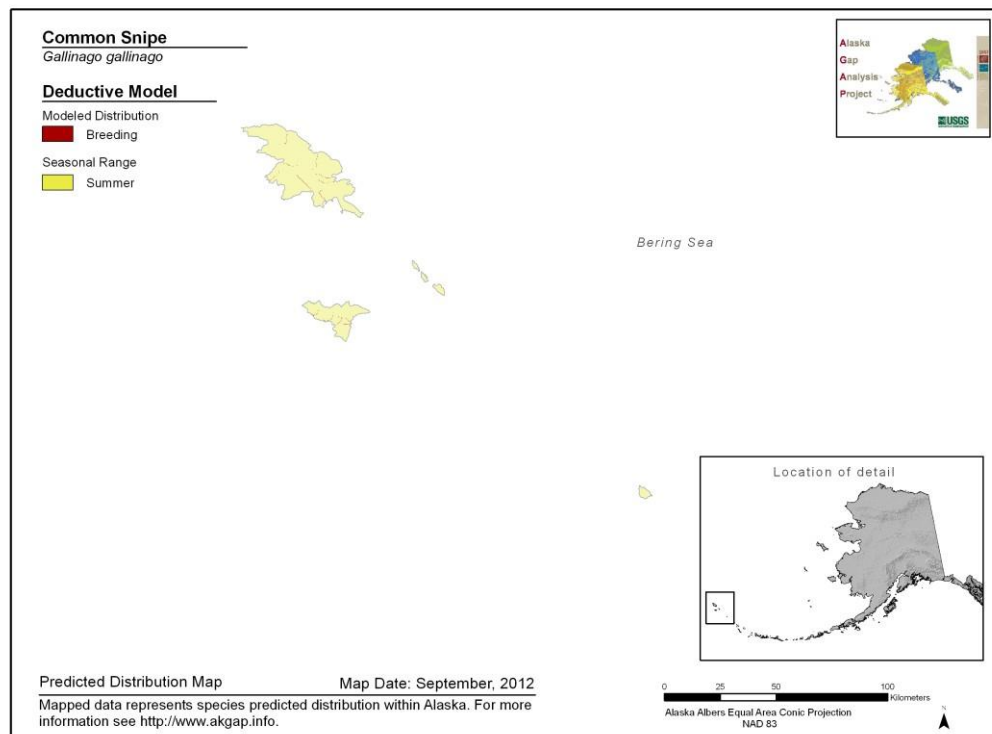
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in sedge bogs, fens, willow and alder swamps, and marshy edges of ponds, rivers, and brooks. Avoids marshes with tall, dense vegetation (cattails, reeds) (Tuck 1972).

References

Tuck, L. M. 1972. The snipes: a study of the genus *Capella*. Can. Wildl. Serv. Monogr. Ser., No. 5.

Range Map and Distribution Model Summary

Red-necked Phalarope
Phalaropus lobatus

Species Occurrence

- Known
- Suspected

Map Date: April, 2012

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species known and probable range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

Alaska Albers Equal Area Conic Projection
NAD 83

0 250 500 1,000 Kilometers

Red-necked Phalarope
Phalaropus lobatus

Species Seasonal Range
Summer

Map Date: April, 2012

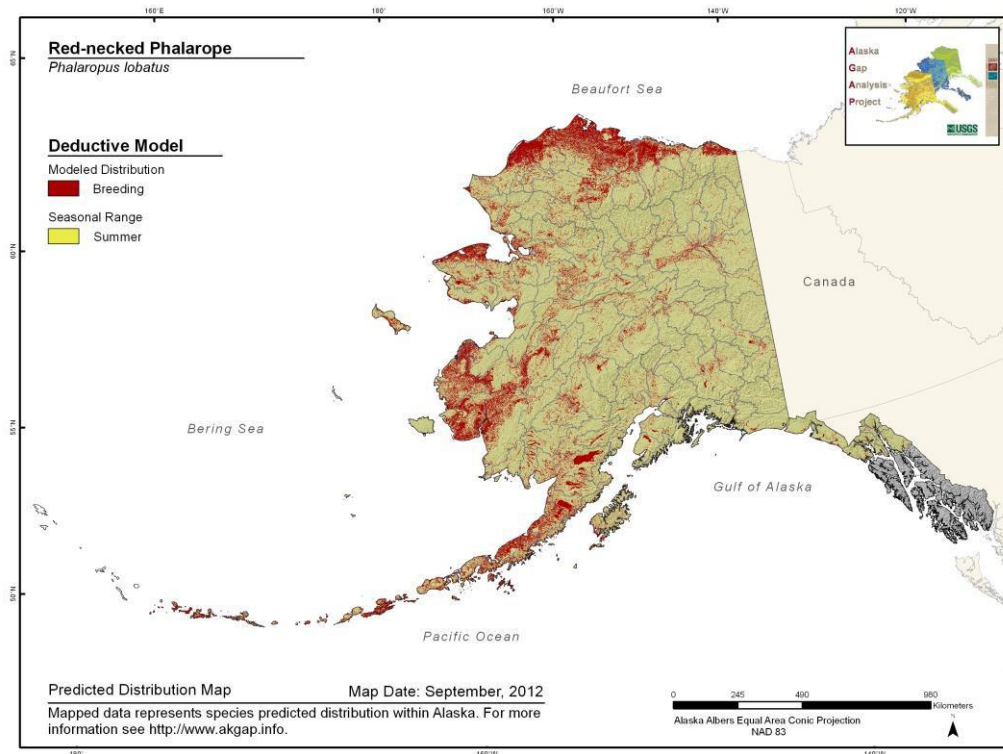
Range map developed by the Alaska Gap Analysis Project. Mapped data represents species seasonal range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

Alaska
Gap
Analysis
Project
USGS

Beaufort Sea
Canada
Gulf of Alaska
Pacific Ocean
Bering Sea

0 250 500 1,000
kilometers
Alaska Albers Equal Area Conic Projection
NAD 83

Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in tundra or tundra-forest transition areas near freshwater lakes, pools, bogs, and marshes, streams, or on marine or riverine islands with freshwater (Hilden and Vuolanto 1972, Reynolds 1987). Found in heath covered slopes above willow-alder zone on Y-K Delta (Cramp and Simmons 1983); and in areas with water, low relief, a high percentage of grass, and a low percentage of shrubs near Prudhoe Bay (Rodrigues 1994).

References

Cramp, S. and K. E. L. Simmons, eds. 1983. The Birds of the Western Palearctic. Vol. 3. Oxford University Press, Oxford.

Hilden, O. and S. Vuolanto. 1972. Breeding biology of the Red-necked Phalarope *Phalaropus lobatus* in Finland. *Ornis Fenn.* 49:57-85.

Reynolds, J. D. 1987. Mating system and nesting biology of the Red-necked Phalarope *Phalaropus lobatus*: What constrains polyandry? *Ibis* 129:225-242.

Rodrigues, R. 1994. Microhabitat variables influencing nest-site selection by tundra birds. *Ecological Applications* 4:110-116.

Range Map and Distribution Model Summary

Red Phalarope
Phalaropus fulicarius

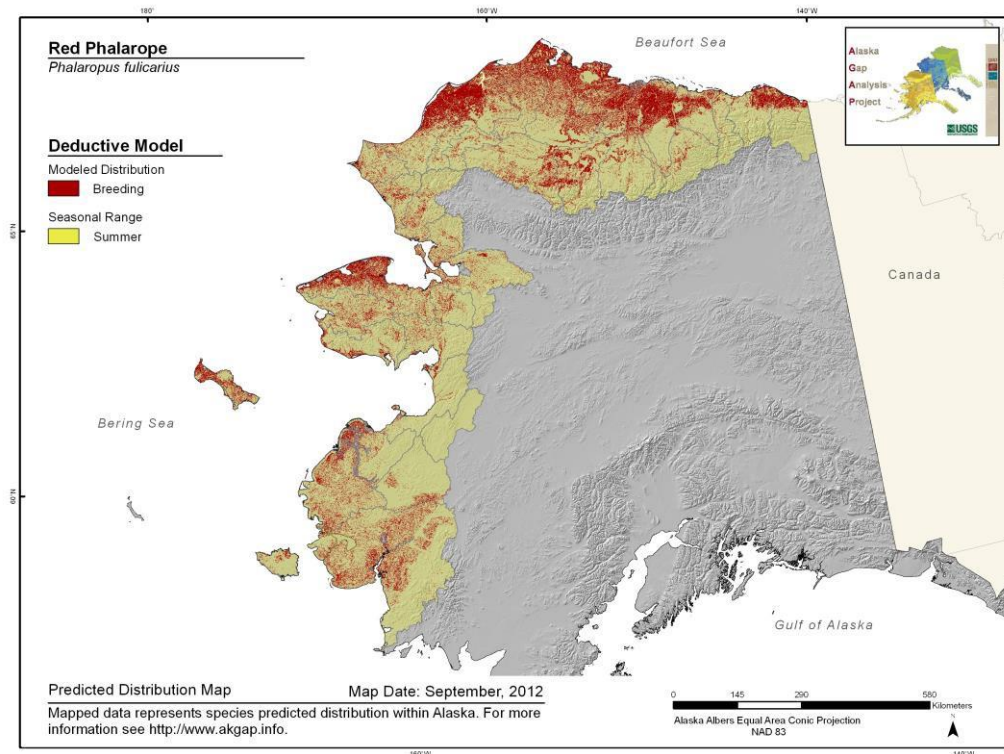
Species Seasonal Range
Summer

Map Date: April, 2012

Range map developed by the Alaska Gap Analysis Project. Mapped data represents species seasonal range within 8-digit HUC units within Alaska. For more information see <http://www.akgap.info>.

0 250 500 1,000
kilometers
NAD 83

Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nests on coastal tundra; level terrain, poorly drained hummocky moss-sedge tundra interspersed with numerous ponds; wet unpatterned tundra with strangmoor ridges for nesting (Parmelee et al. 1967, Andersson 1973). Nonsaline marshes for breeding, saline habitats for foraging.

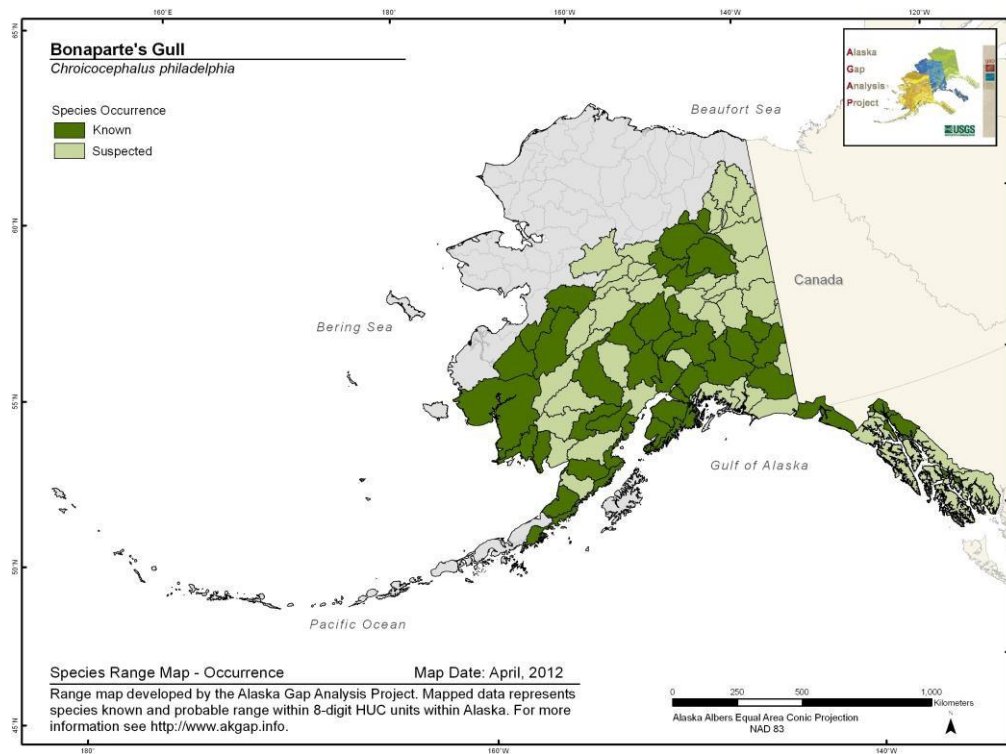
References

Andersson, M. 1973. Birds of Nuvagapak Point, northeastern Alaska. *Arctic* 26: 186-197.

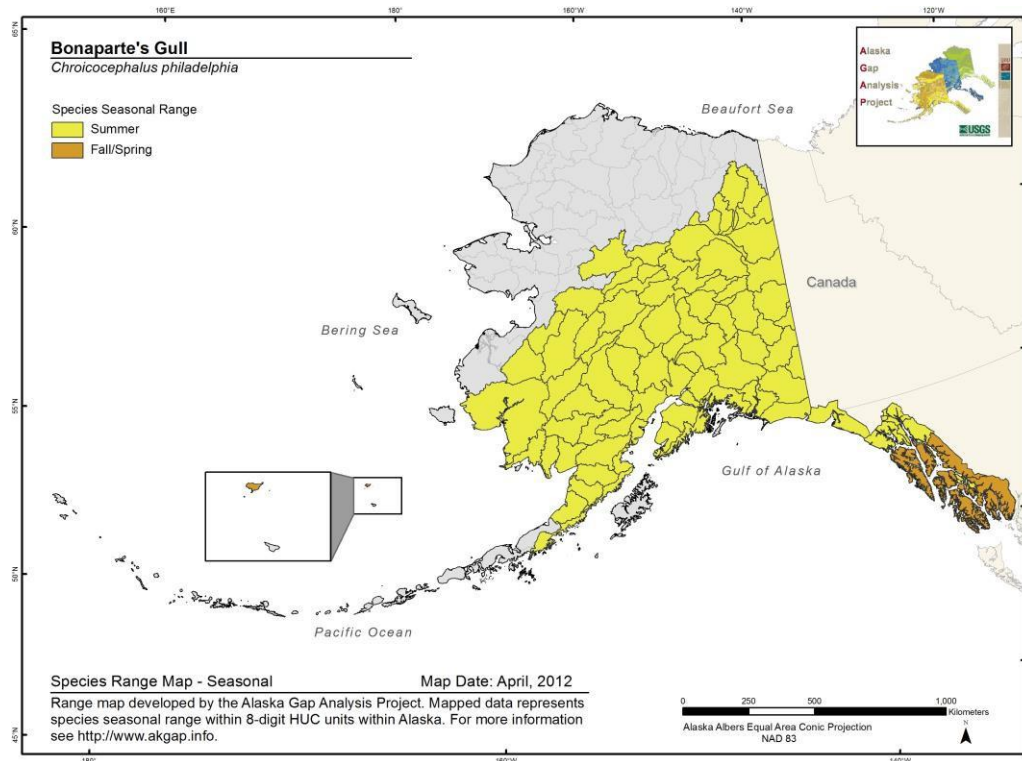
Parmelee, D. F., H. A. Stephens, and R. H. Schmidt. 1967. The birds of Southeastern Victoria Island and adjacent small islands. *National Museum Canadian Bulletin* no. 222.

Bonaparte's Gull
Chroicocephalus philadelphia
Range Map and Distribution Model Summary

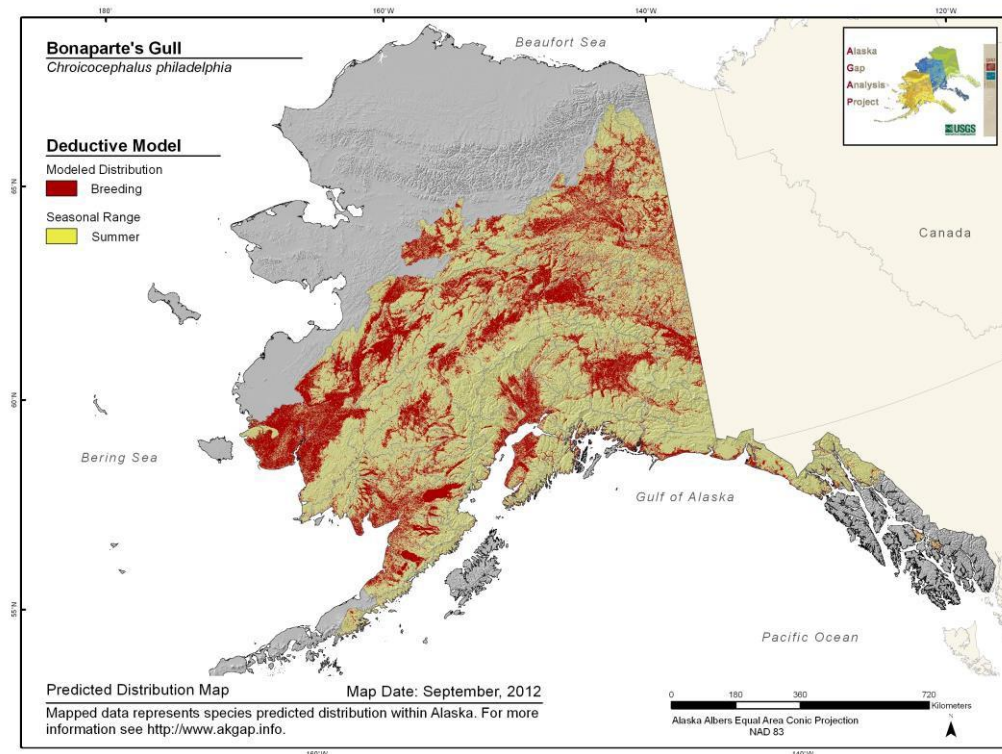
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.589**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat is in wetland openings in and along edges of boreal forests, particularly around lakes, muskegs, and marshes (Godfrey 1986). Nests are usually <100 m from water (Peck and James 1983) and in conifer trees, often scattered trees on islands in lakes (Campbell et al. 1990). In B.C. breeds from 305 to 1,318 m in elevation (Campbell et al. 1990).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

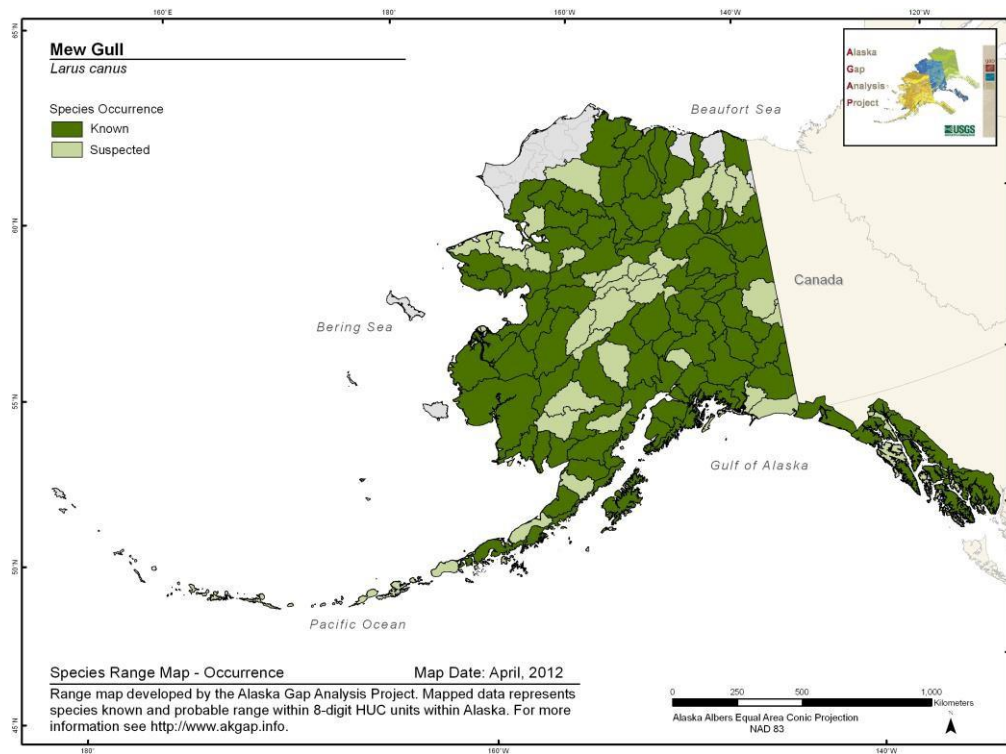
Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Peck, G. K. and R. D. James. 1983. Breeding birds of Ontario: nidology and distribution. Vol. 1: nonpasserines. R. Ontario Mus. Life. Sci. Misc. Publ., Toronto.

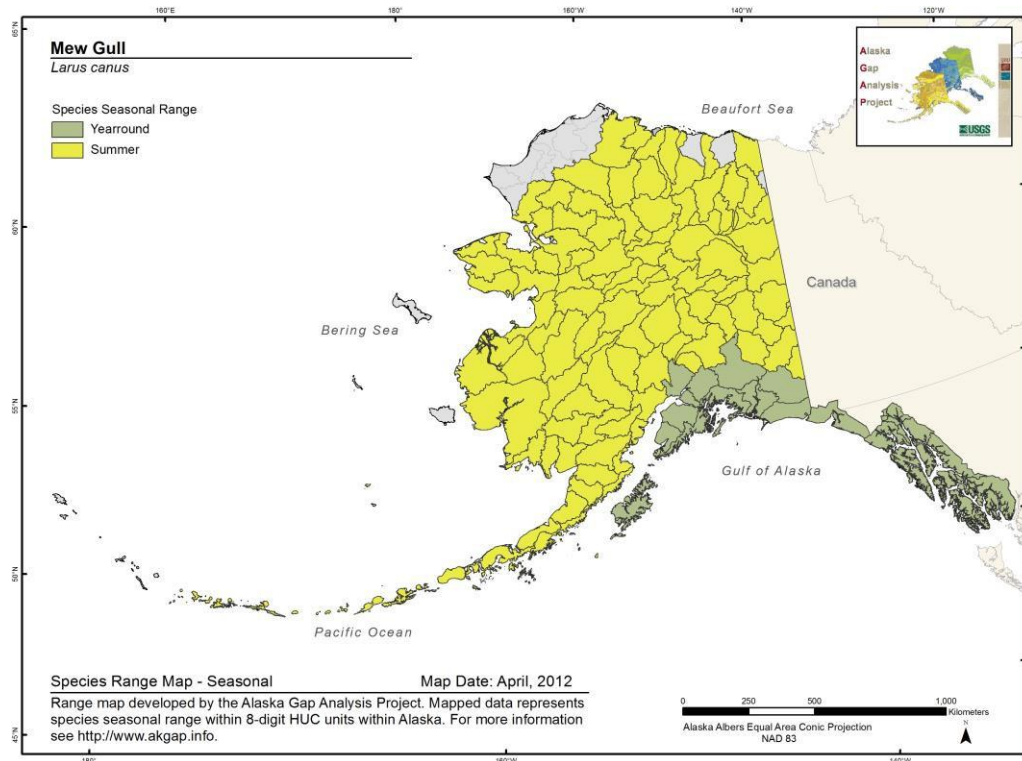
Mew Gull *Larus canus*

Range Map and Distribution Model Summary

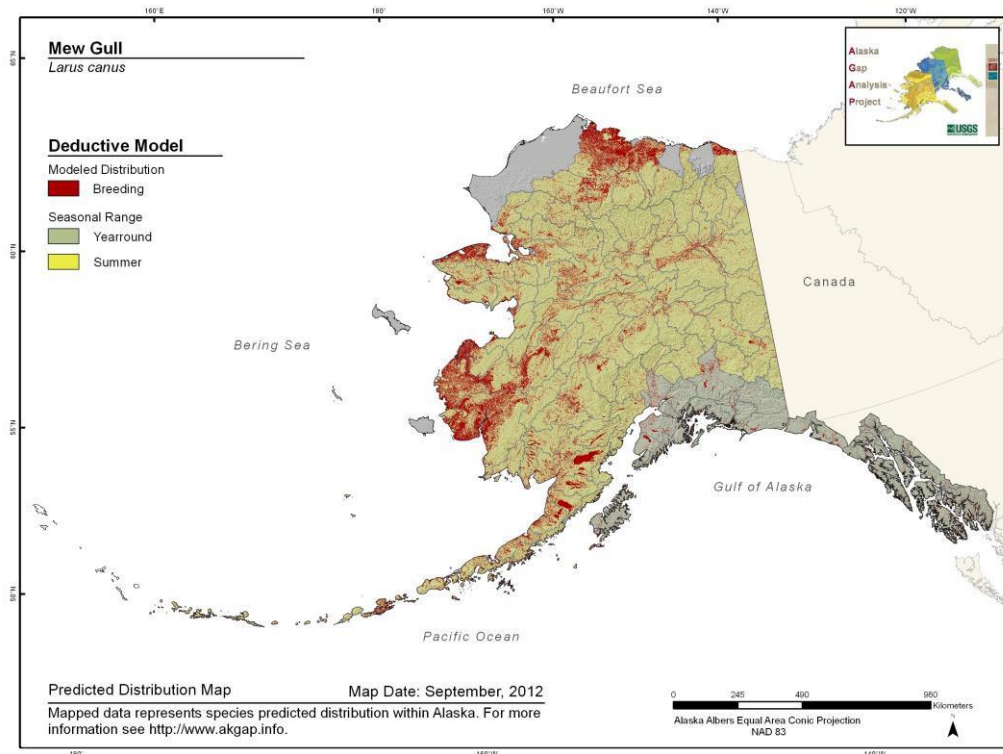
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.669**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, breed in tundra, marshy areas, ponds, lakes, rivers, streams, islands, and coastal cliffs (Semenchuk 1992, Burger and Gochfeld 1996). In Anchorage, colonies also use meadows (Adamson 1988). Adult and young frequently gather along streams, lakeshores, and coastal mudflats (Bent 1921).

References

Adamson, C. I. 1988. The breeding biology and food habits of Mew Gulls (*Larus canus*) nesting in Anchorage, Alaska. Master's thesis, Humboldt State Univ., Arcata, CA.

Bent, A. C. 1921. Life histories of North American gulls and terns. U.S. Natl. Mus. Bull. 113.

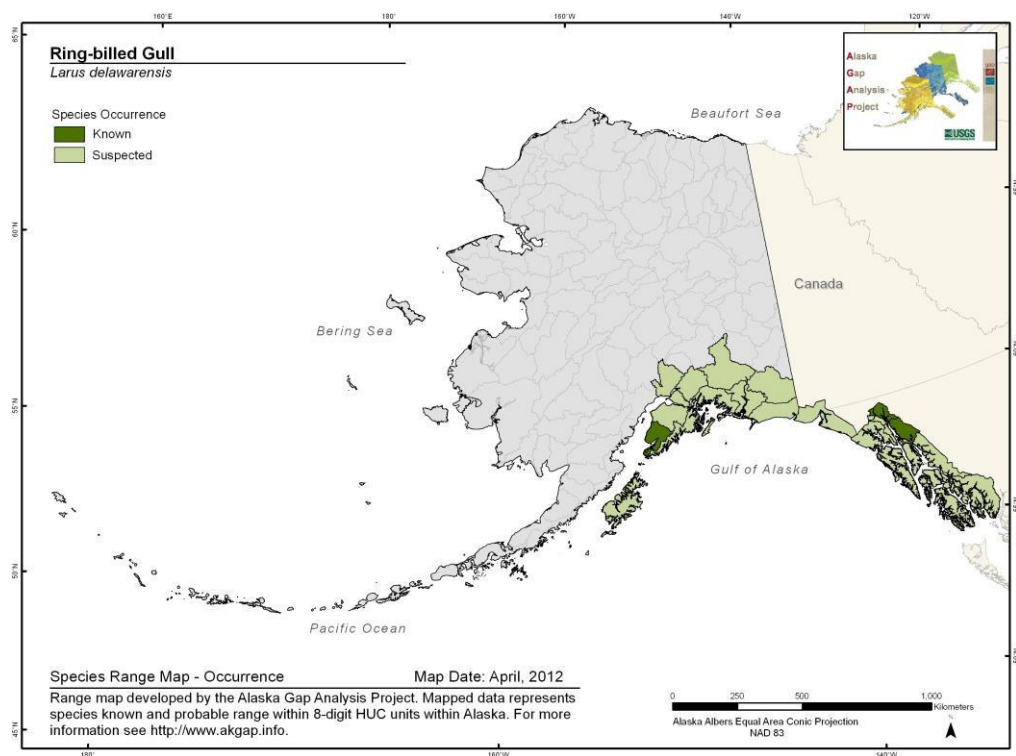
Burger, J. and M. Gochfeld. 1996. Family Laridae (gulls). Pp. 572-623 In: Handbook of the birds of the world. Vol. 3 (J. del Hoyo, A. Elliott, and J. Sargatal, eds.). Lynx Edicions, Barcelona, Spain.

Semenchuk, G. P., ed. 1992. The atlas of breeding birds of Alberta. Fed. Of Alberta Nat., Edmonton.

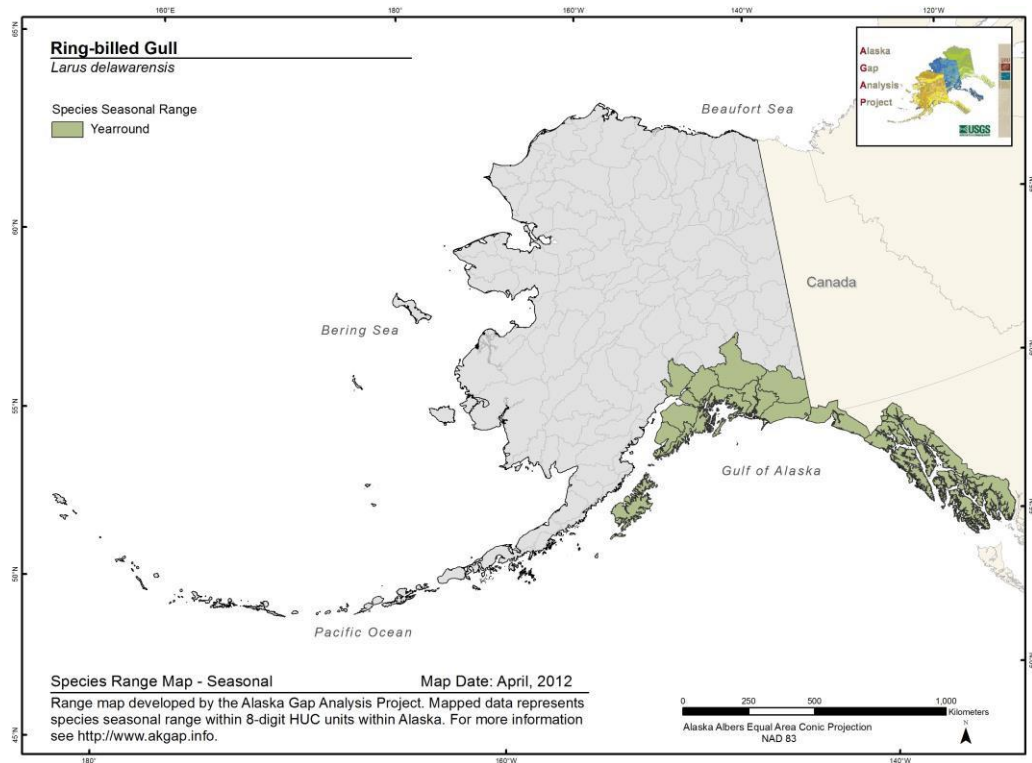
Ring-billed Gull *Larus delawarensis*

Range Map and Distribution Model Summary

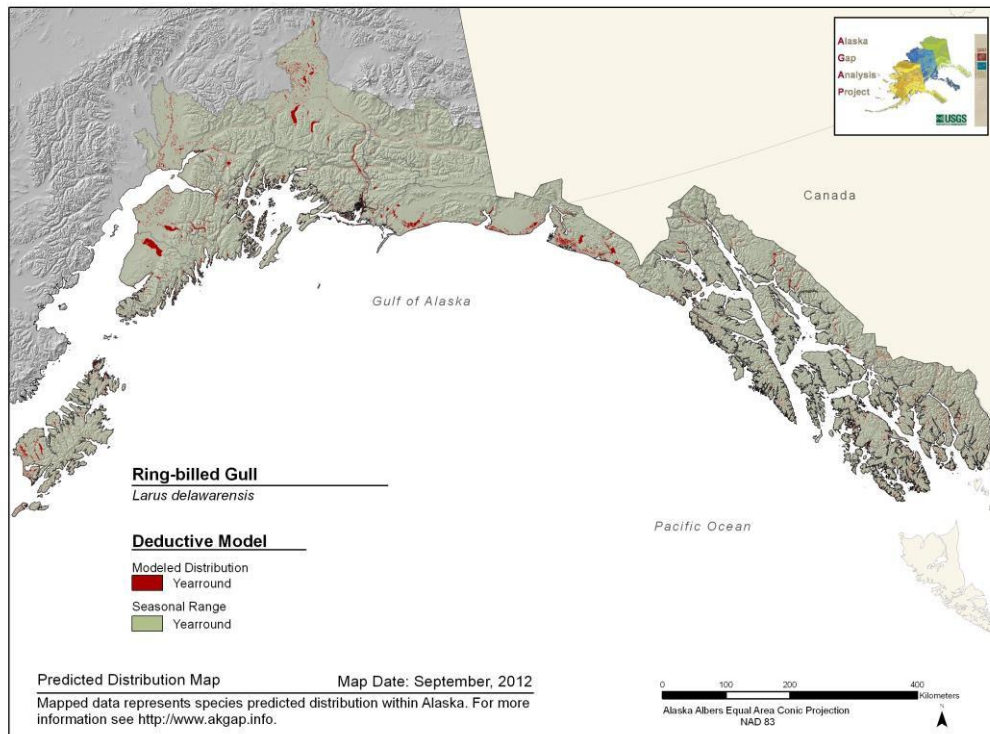
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.513**

**Model Quality
Summary:**
Low

Habitat Description

Nests on islands with sparse or woody vegetation in large lakes and occasionally on mainland peninsulas on near-shore oceanic islands. Occurs inland near landfills, golf courses, farm fields and on coast in estuaries, beaches, mudflats. During winter, near coasts and inland on lakes, ponds, reservoirs, streams, landfills, and metropolitan centers (Ryder 1993). An experiment in Edmonton, Canada demonstrated preference for areas with little to no vegetation (Vermeer 1970).

References

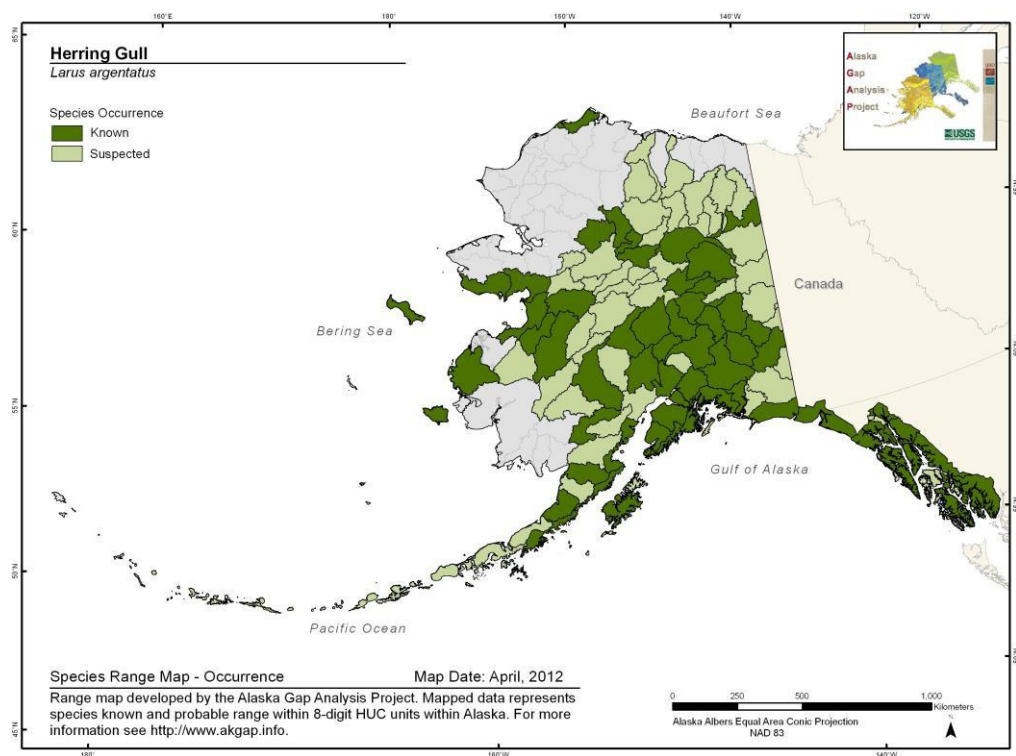
Ryder, J. P. 1993. Ring-billed Gull (*Larus delawarensis*). In *The Birds of North America*, No.33 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Vermeer, K. 1970. Breeding biology of California and ring-billed gulls. Canadian Wildlife Service Report Series Number 12. Ottawa.

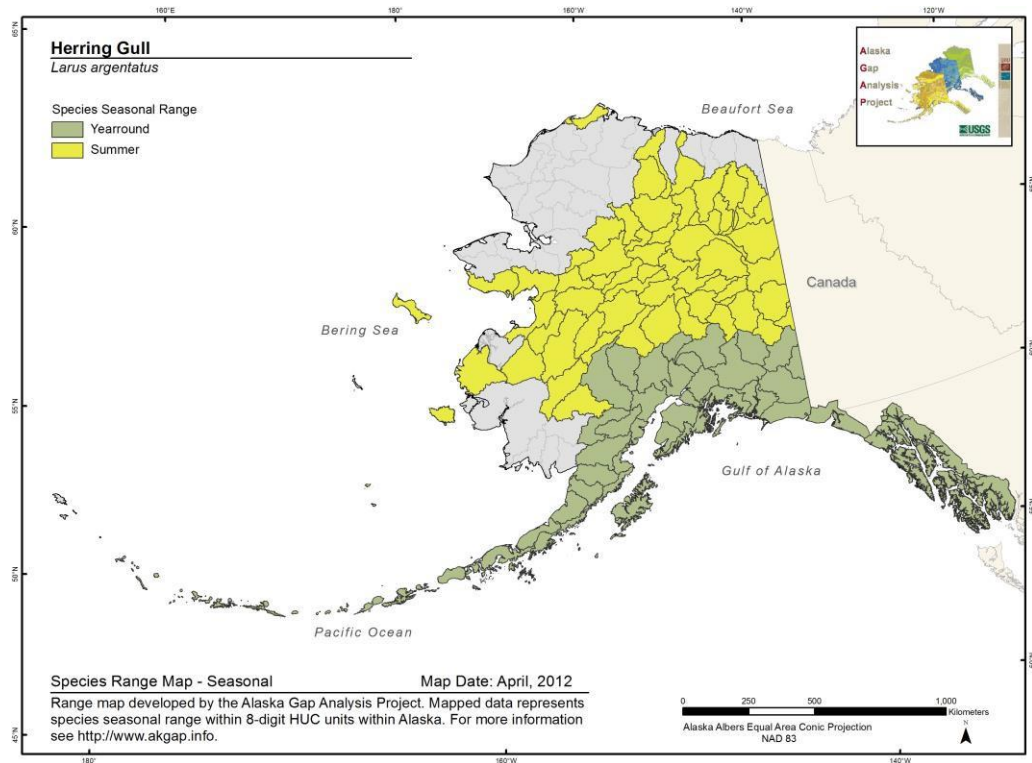
Herring Gull *Larus argentatus*

Range Map and Distribution Model Summary

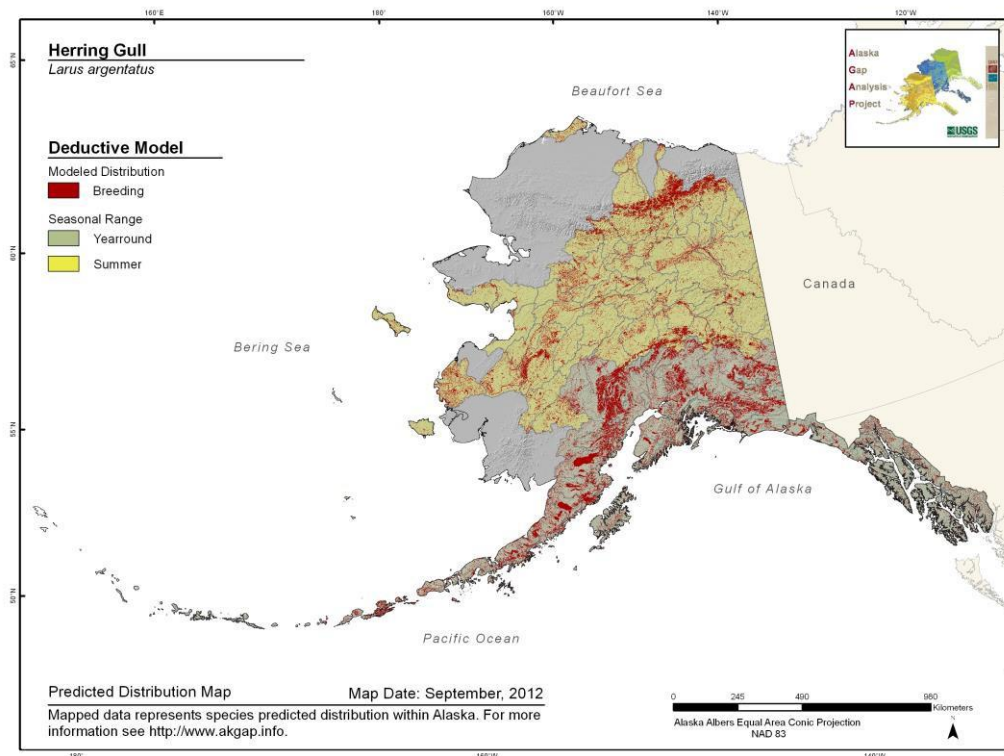
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.58**

**Model Quality
Summary:**
Low

Habitat Description

Breeds along rocky and sandy coasts, on tundra, on islands in larger lakes and rivers, or on sea cliffs. Most colonies are on low, rocky, grassy, or sandy islands with low sparse vegetation, but may nest in wide variety of habitats (NatureServe 2007b). Will nest in urban areas. Foraging habitat usually spatially separate from nesting habitat and includes the sea, intertidal areas, sandy beaches, mudflats, fields, and dumps (Pierotti and Good 1994).

References

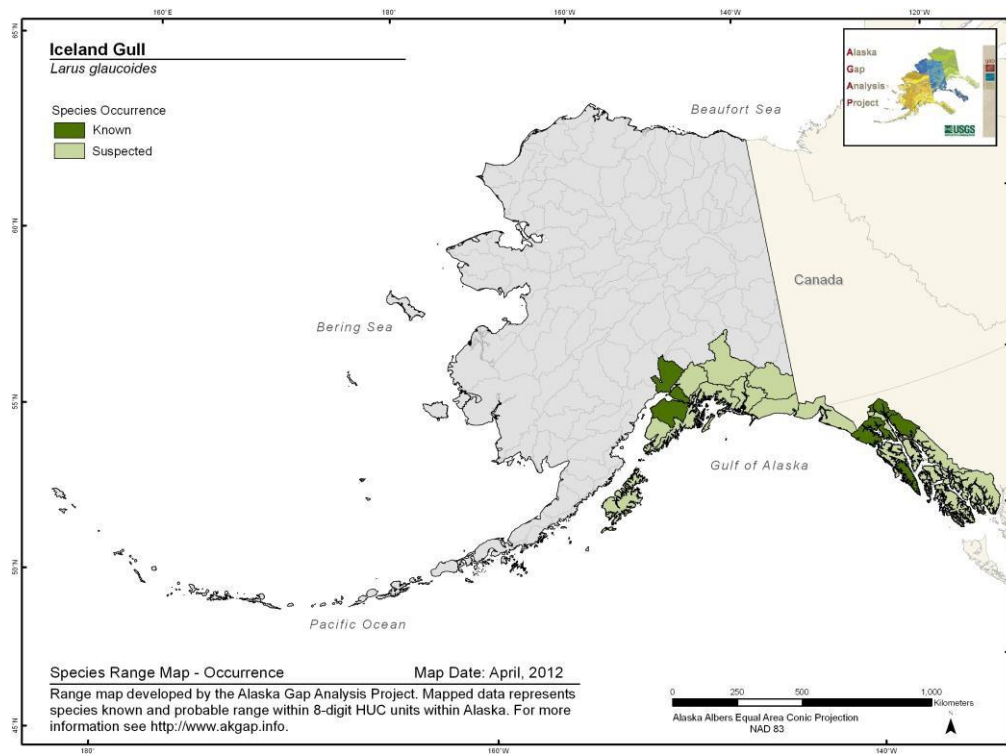
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Pierotti, R. J. and T. P. Good. 1994. Herring Gull (*Larus argentatus*). In *The Birds of North America*, Vol. 4, No. 124 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

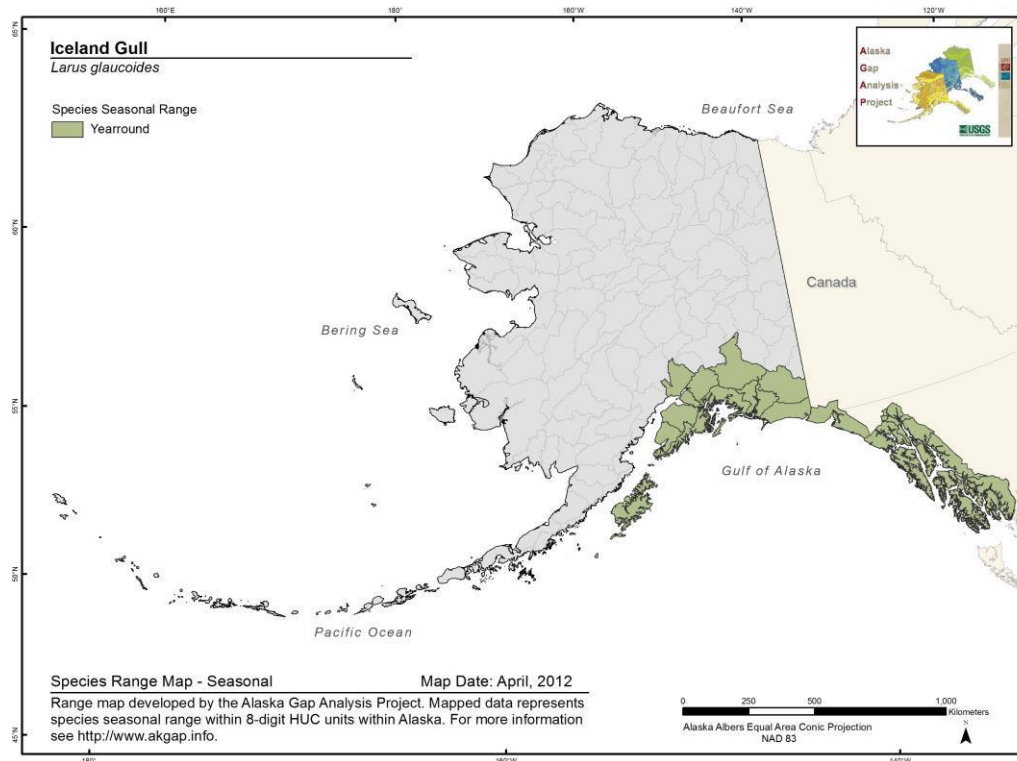
Iceland Gull *Larus glaucoides*

Range Map and Distribution Model Summary

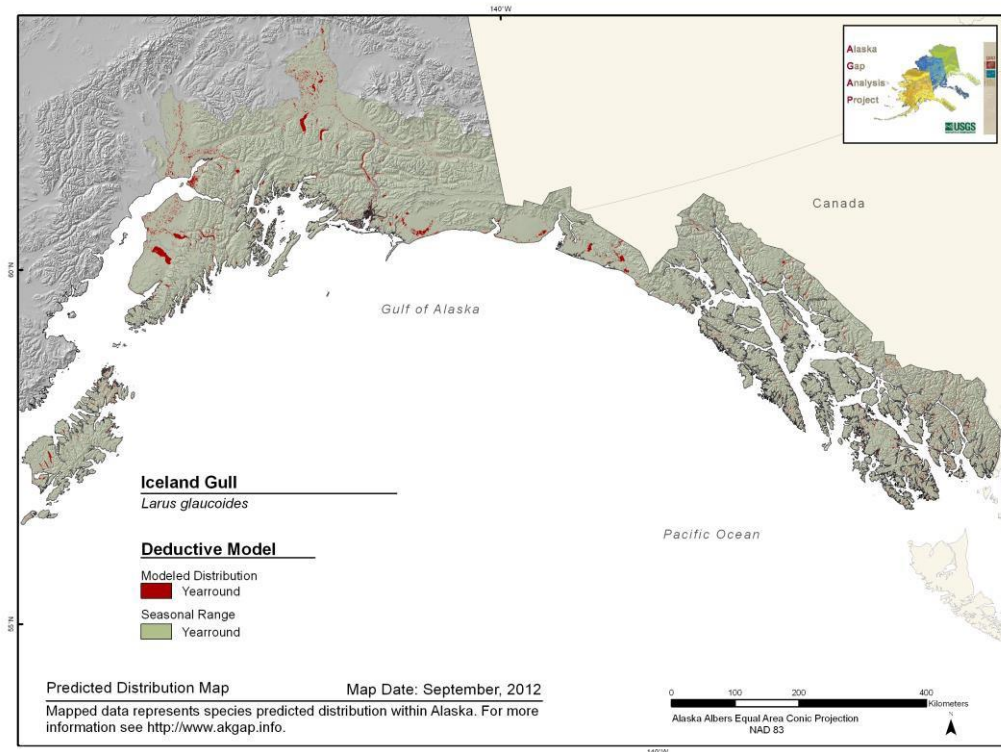
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.516**

**Model Quality
Summary:**
Low

Habitat Description

Found along seacoasts, estuaries, bays, and dumps, less commonly on large inland lakes and rivers (AOU 1983). In winter will roost with other wintering gulls on offshore rocky islets, agricultural fields, beaches and spits (Campbell et al. 1990). Usually nests on cliffs facing sounds on arctic islands.

References

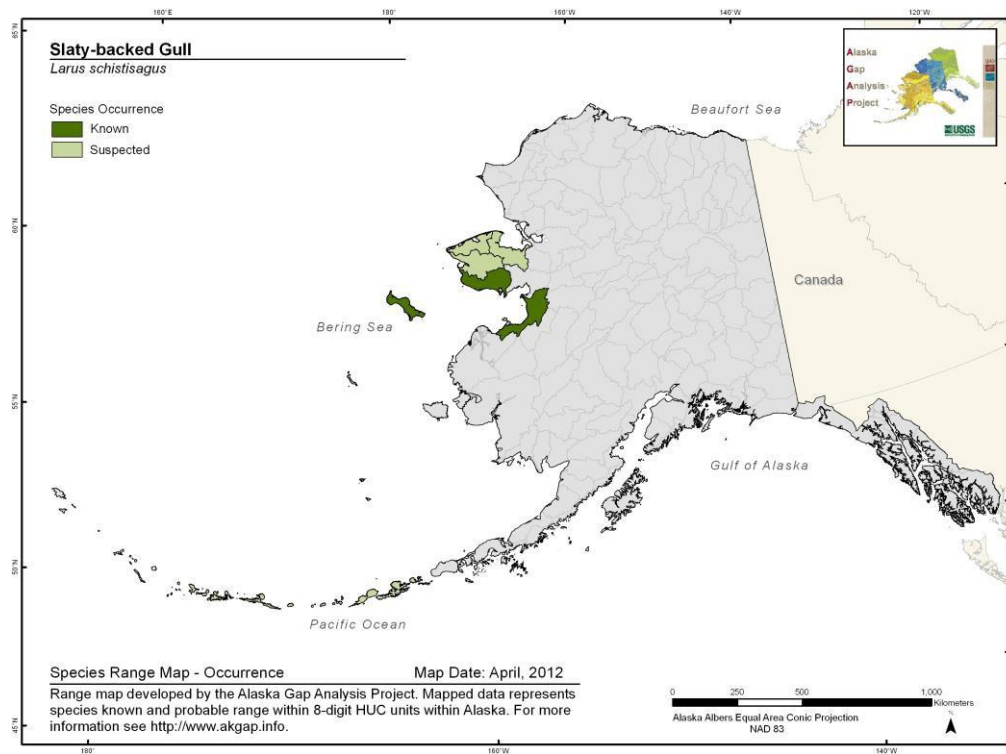
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

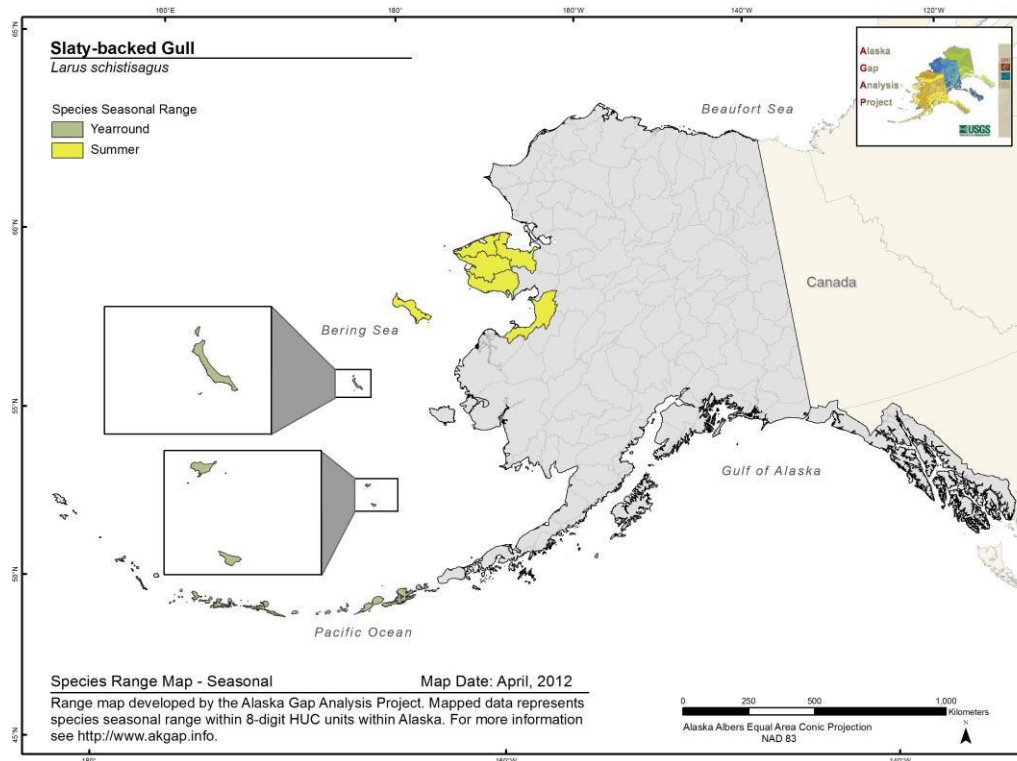
Slaty-backed Gull *Larus schistisagus*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

Model

Evaluation

Statistic

(AUC): No

AUC

Model Quality

Summary:

Not validated

Habitat Description

Nests on cliffs and rocky islands, occasionally on flat sandy shores with scattered bushes (AOU 1983).

References

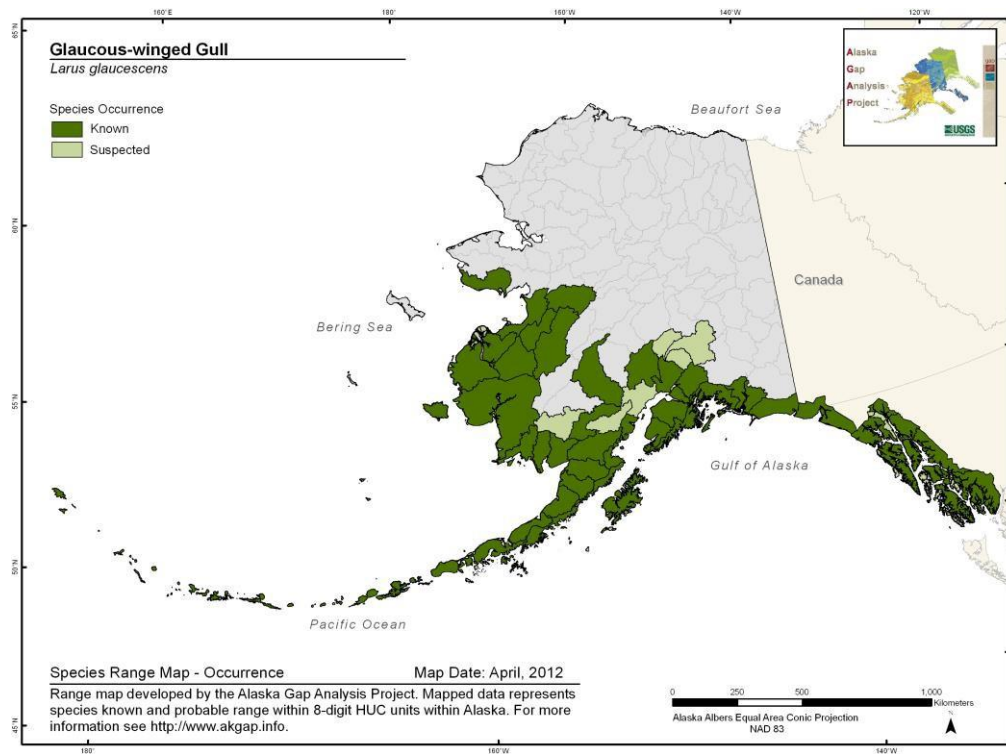
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Glaucous-winged Gull

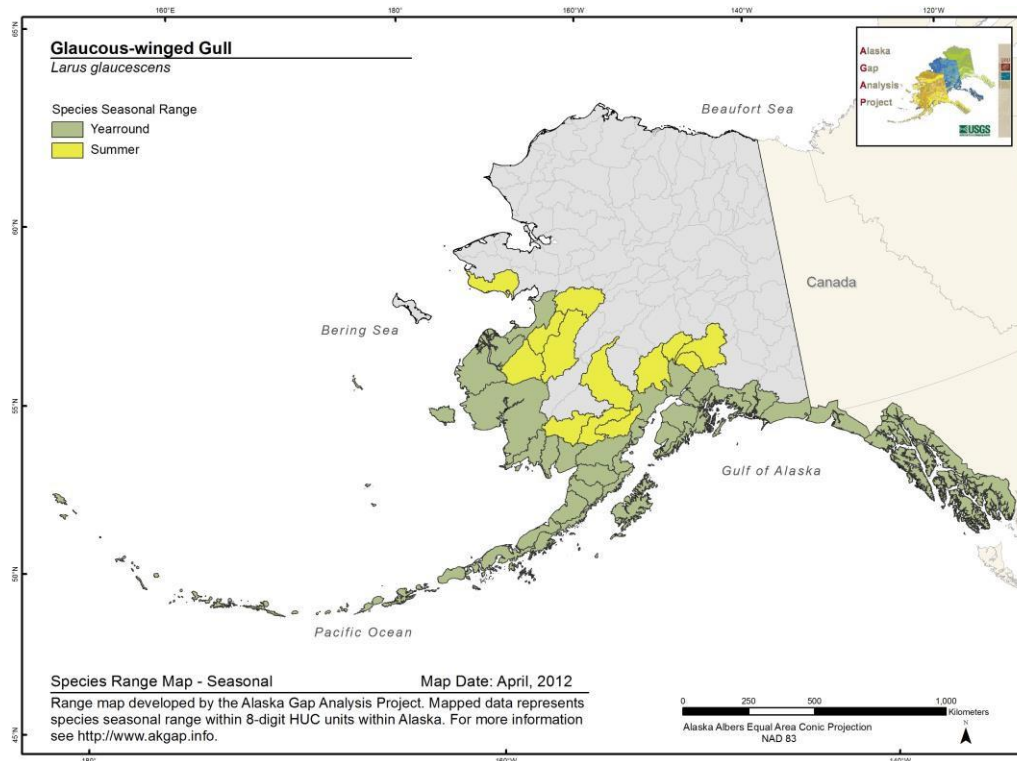
Larus glaucescens

Range Map and Distribution Model Summary

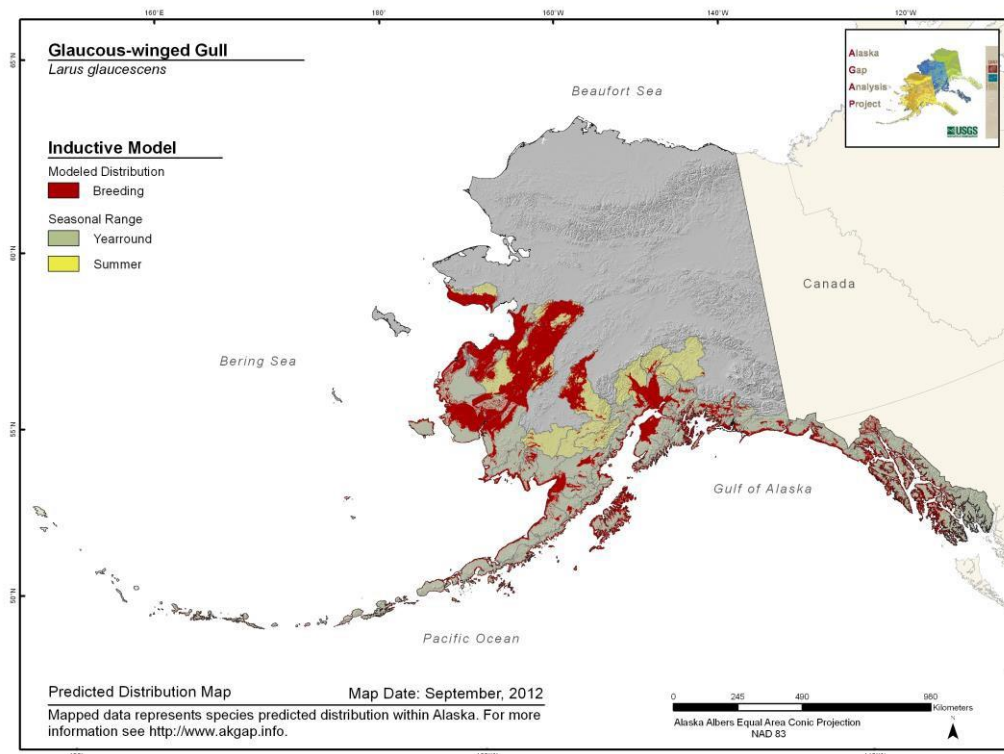
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.881**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in salt and brackish water on shores, barren islands, bays, estuaries, cliffs, rock ledges, mud flats, grassy slopes, beaches, harbors of coastal cities, and dumps (Verbeek 1993, NatureServe 2007b). Nests coastally, on cliffs, rocks, grassy slopes, mostly on offshore rocks and islands; preference for sandbar islands, flat tops of rugged islands, or beaches (NatureServe 2007b). In B.C., all major breeding colonies are on islands less than 25 ha in size and 100m in height (Campbell et al. 1990).

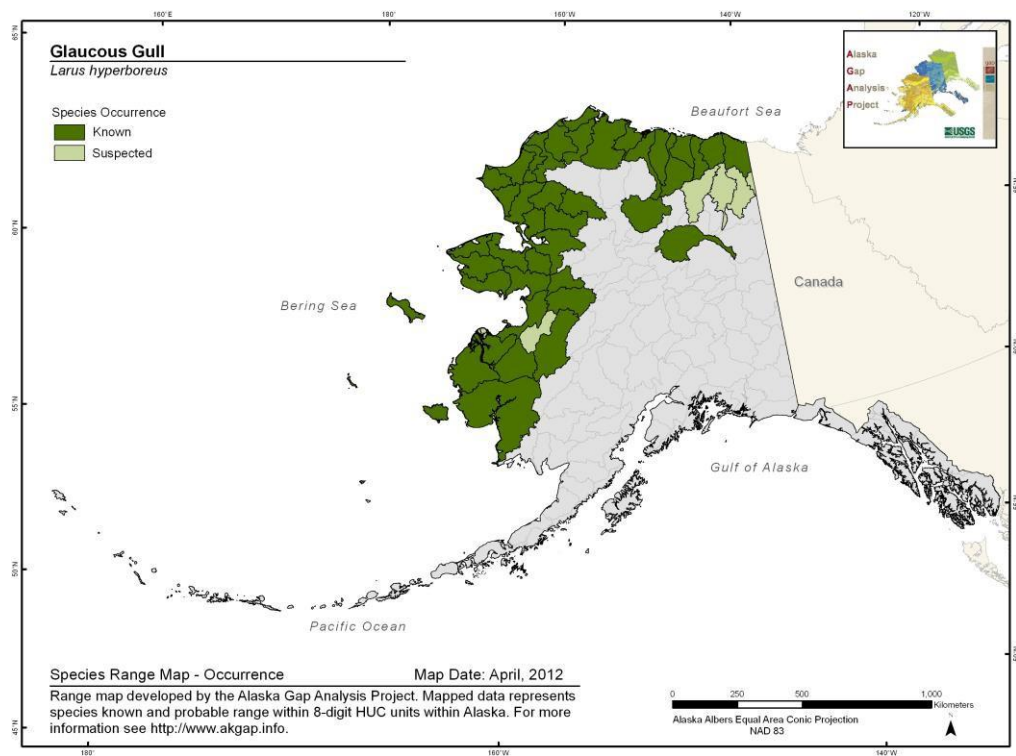
References

- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.
- NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- Verbeek, N. A. M. 1993. Glaucous-winged Gull (*Larus glaucescens*). In The Birds of North America, Vol. 2, No. 59 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union..

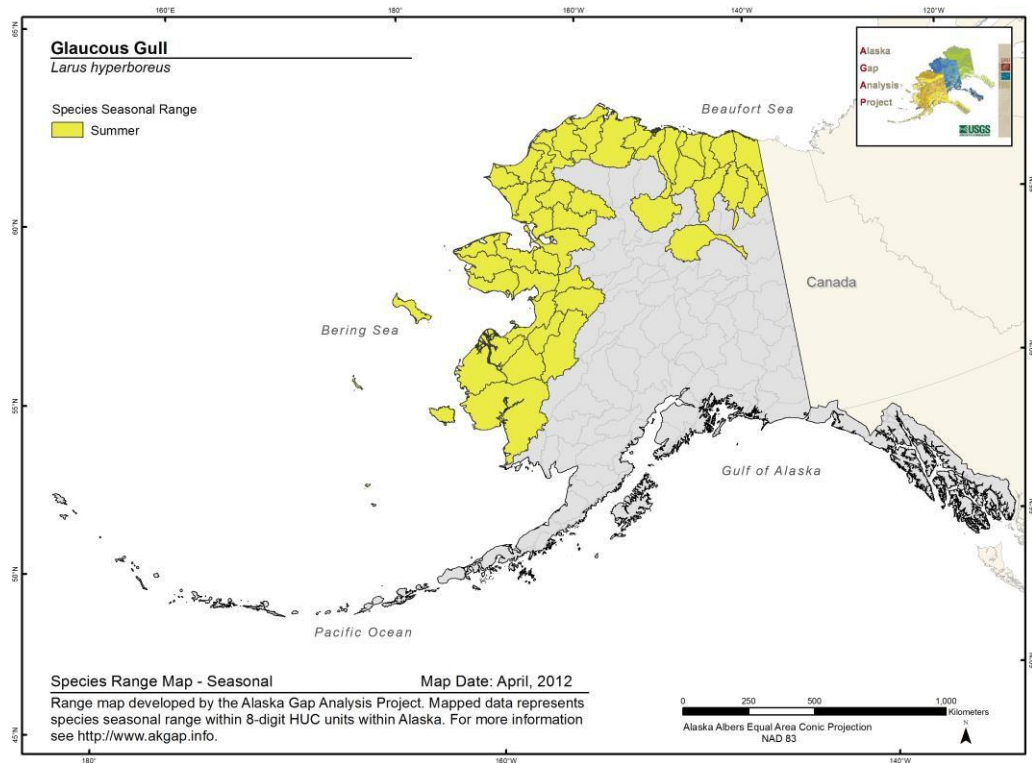
Glaucous Gull *Larus hyperboreus*

Range Map and Distribution Model Summary

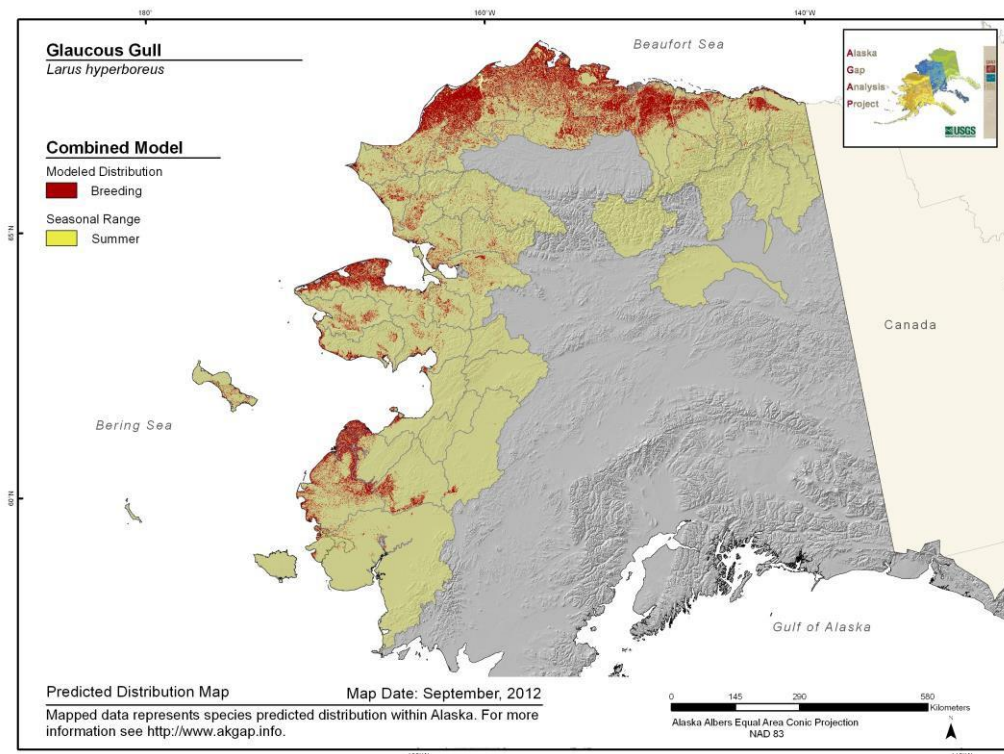
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.651**

**Model Quality
Summary:**
Low

Habitat Description

Marine and freshwater coasts, tundra, offshore islands or islands in lakes or rivers, cliffs, shorelines, ice edges during breeding season (Sage 1974, Gilchrist 2001). Nests on cliffs, rocky coasts, islets in and borders of tundra lakes, coastal dunes. Also low islands and sandbars usually on or near coast; inland river bars; most common on barrier islands immediately offshore from rivers that flood in spring and thereby isolate the island from foxes (Johnson and Herter 1989). At inland sites, prefer to nest on large ponds (Gilchrist 2001).

References

Gilchrist, H. G. 2001. Glaucous Gull (*Larus hyperboreus*). In *The Birds of North America*, No.573 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

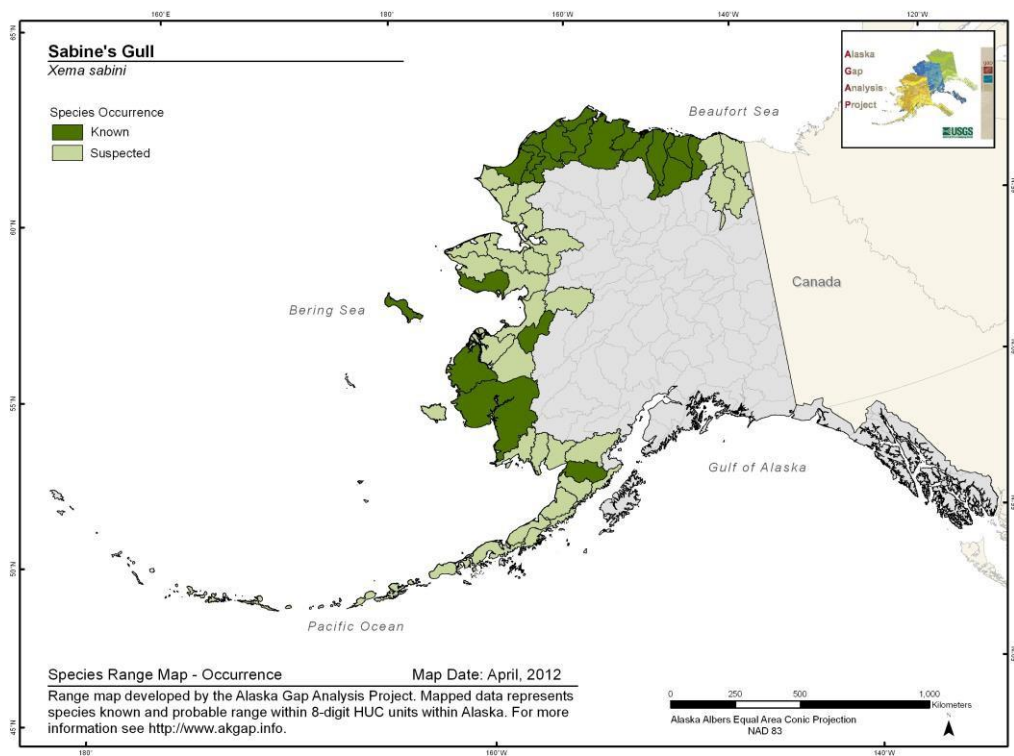
Johnson, S. R. and D. R. Herter. 1989. *The Birds of the Beaufort Sea*. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

Sage, B. L. 1974. Ecological distribution of birds in the Atigun and Sagavanirktok River Valleys, arctic Alaska. *Canadian Field-Naturalist* 88:281-291.

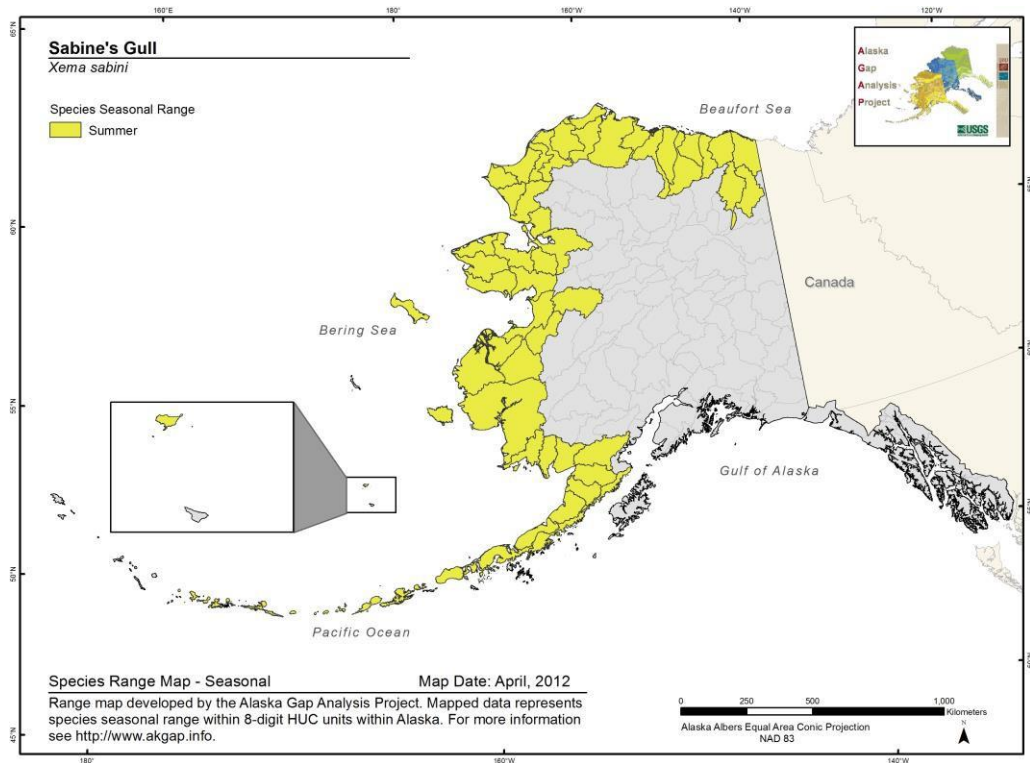
Sabines Gull *Xema sabini*

Range Map and Distribution Model Summary

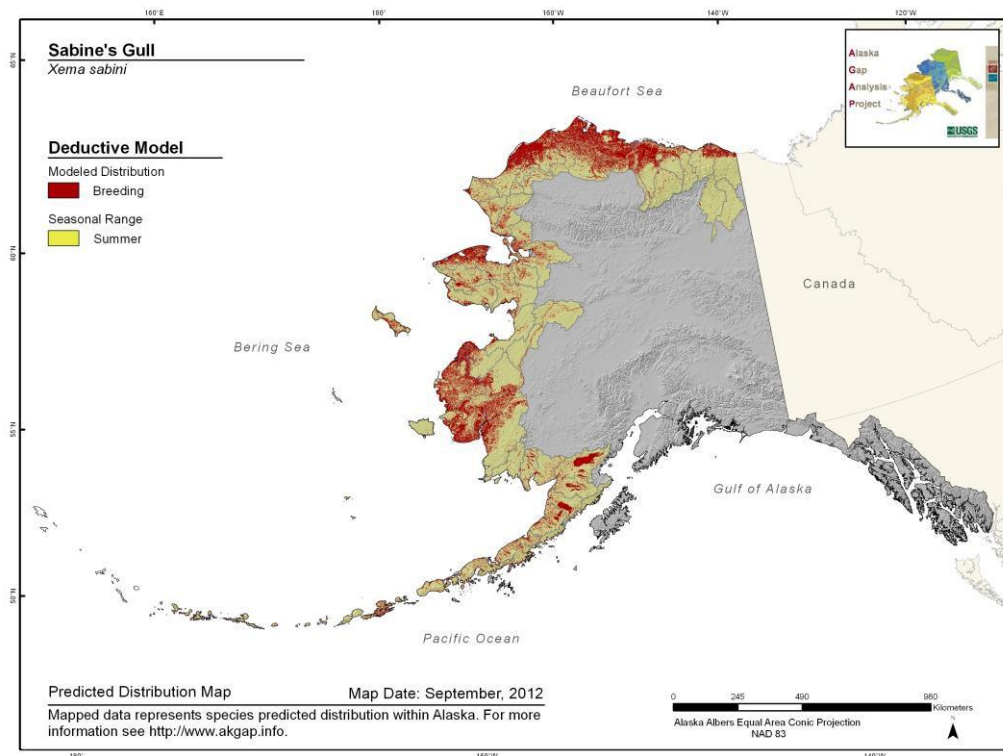
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.844**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests on moist ground within tundra zone, usually near freshwater. In southwestern and western Alaska, nests along shorelines of tidally affected ponds, both in tidal sedge flats near coastlines and grass flats slightly inland from there. Also nests along tidal sloughs, in wet meadows bordering small ponds, tundra ponds, on lakes or on very small islands within lakes or ponds; and on narrow peninsulas sticking into small ponds in pond/marsh complexes (Day et al. 2001). Lakes may be up to 200 m in diameter and 1 m deep (Nelson et al. in Bent 1921) and nests on the Y-K Delta are typically within 50 km of the coastline (Brown et al. 1967). In northern Alaska, nests in basin-wetland complexes, which occur in drained lake-basins, and contain extensive wetlands intermixing ponds, lakes, marshes, islets, and peninsulas, are vegetated with *Carex aquatilis* and *Arctophila fulva*, and are vegetated on land with mosses, prostrate willows, low forbs, and sedges. Also nest in marshes near oxbow lakes, on small islands in medium to large lakes, in salt marshes, along estuarine lagoons, edges of deep open lakes without islands or with polygonized margins, on rims of low-centered polygons, in wet-sedge/moss meadows, and on drained mudflats at receded edges of lake shorelines (Day et al. 2001). More common coastally than inland.

References

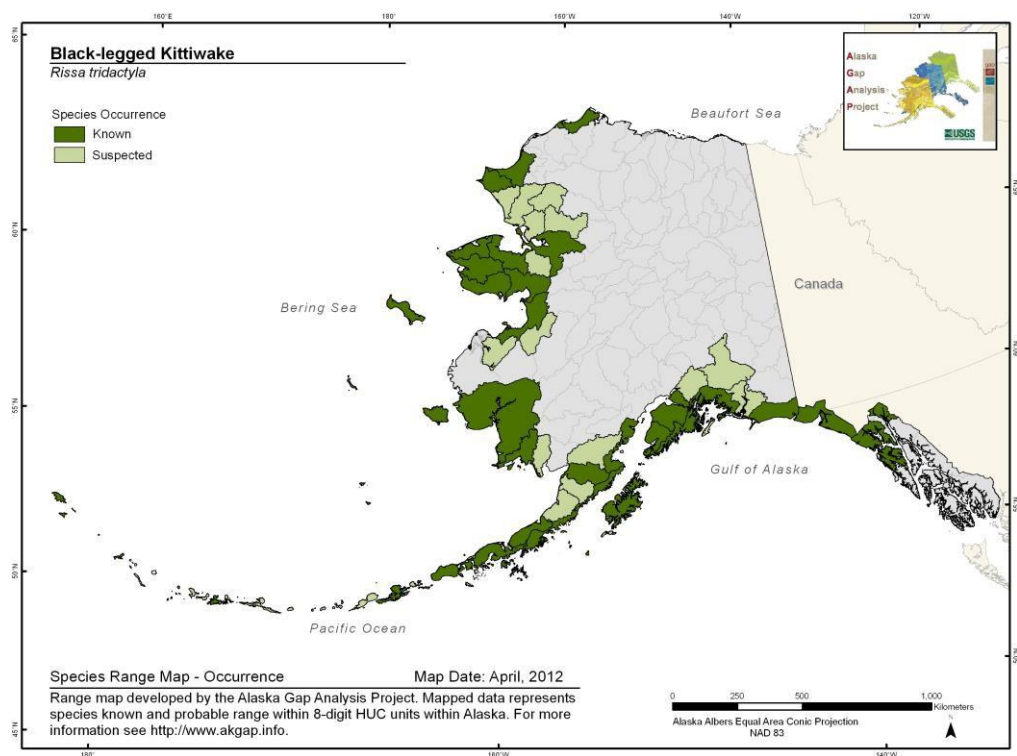
- Bent, A. C. 1921. Life histories of North American gulls and terns. U.S. Natl. Mus. Bull. 113.
- Brown, R. G. B., N. G. Blurton Jones, and D. J. T. Hussell. 1967. The breeding behaviour of Sabine's Gull, *Xema sabini*. Behaviour 28: 110-140.
- Day, R. H., I. J. Stenhouse, and H. G. Gilchrist. 2001. Sabines's gull (*Xema sabini*). In The Birds of North America. Vol. 15, No. 593 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Black-legged Kittiwake

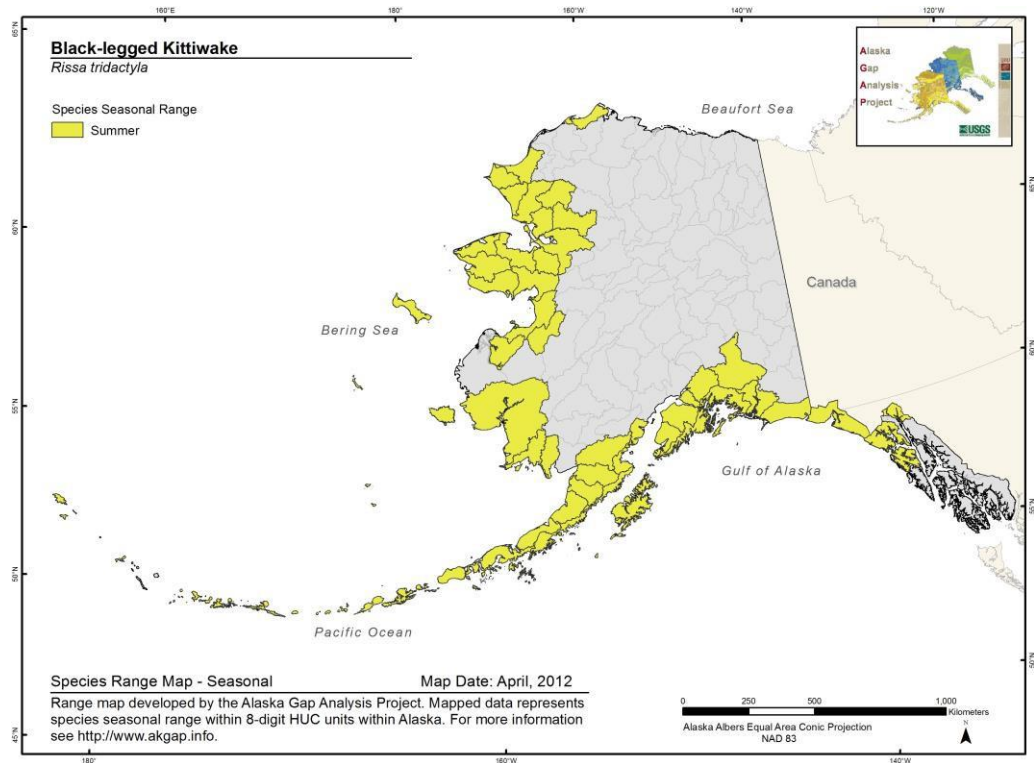
Rissa tridactyla

Range Map and Distribution Model Summary

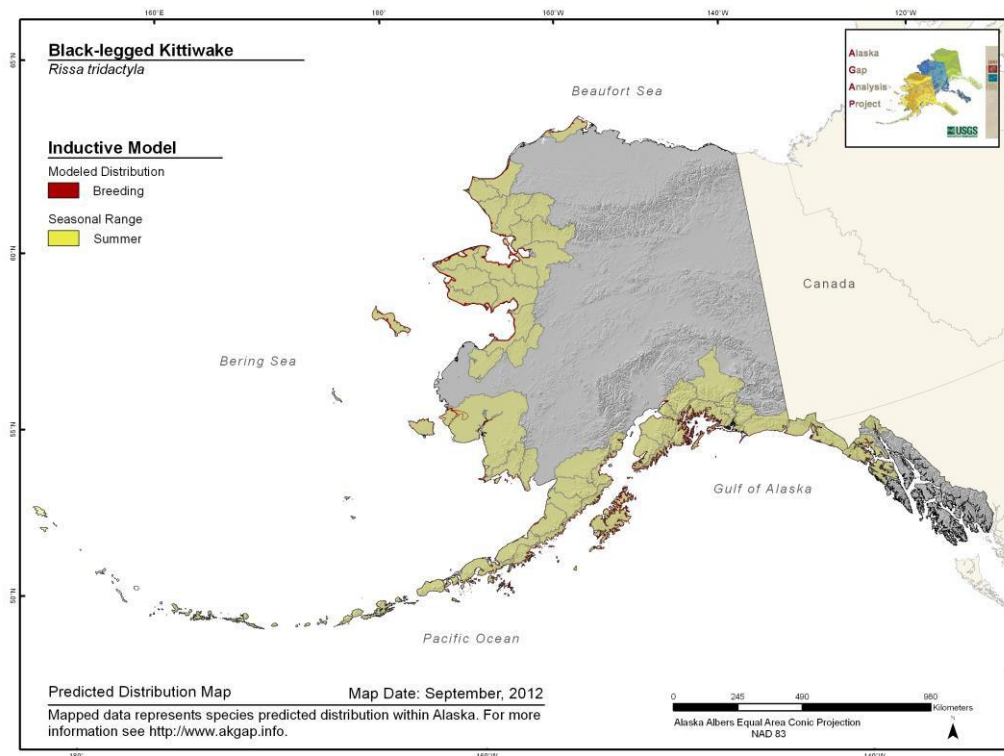
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.883**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests on steep narrow ledges of cliffs on offshore islands, sea stacks, or inaccessible areas on coastal mainland (Baird 1994). Forages at upwellings or oceanic fronts not far from colonies (Baird and Moe 1978, Hunt et al. 1981, Schneider et al. 1990). Distances range from 1 km to >40 km from colonies (Biderman et al. 1978, Hunt et al. 1981).

References

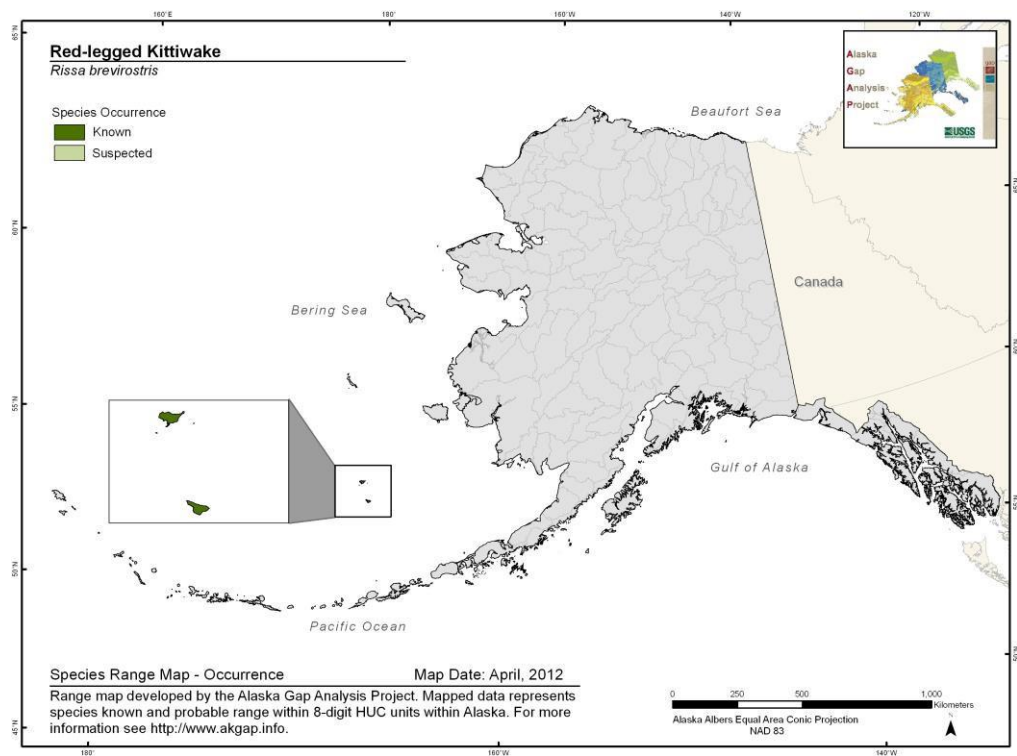
- Baird, P. H. 1994. Black-legged Kittiwake (*Rissa tridactyla*). In *The Birds of North America*, No. 92 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Baird, P. H. and A. Moe. 1978. The breeding biology and feeding ecology of marine birds in the Sitkalidak Strait area, Kodiak Island, 1977. Pp. 313-524 in *Environmental assessment of the Alaska Continental Shelf Annual Report of Princ. Investigators*, vol. 3. NOAA Environ. Res. Lab, Bolder, CO.
- Biderman, J. O., W. H. Drury, S. Hinckley, and J. B. French, Jr. 1978. Ecological studies in the Northern Bering Sea: Birds of coastal habitats on the south shore of Seward Peninsula, Alaska. *Annual Reports of Principal Investigators*. OCSEAP, Boulder, CO.
- Hunt, G. L., P. J. Gould, D. J. Forsell, and H. Peterson. 1981. Pelagic distribution of marine birds in the eastern Bering Sea. Pp. 689-718 In: *The eastern Bering Shelf: oceanography and resources* (D. W. Hood and J. A. Calder, eds.). Natl. Oceanic Atmos. Admin., Washington, D.C.
- Schneider, D., N. Harrison, and G. Hunt, Jr. 1990. Seabird diet at a front near the Pribilof Islands, Alaska. *Studies in Avian Biology* 14:61-66.

Red-legged Kittiwake

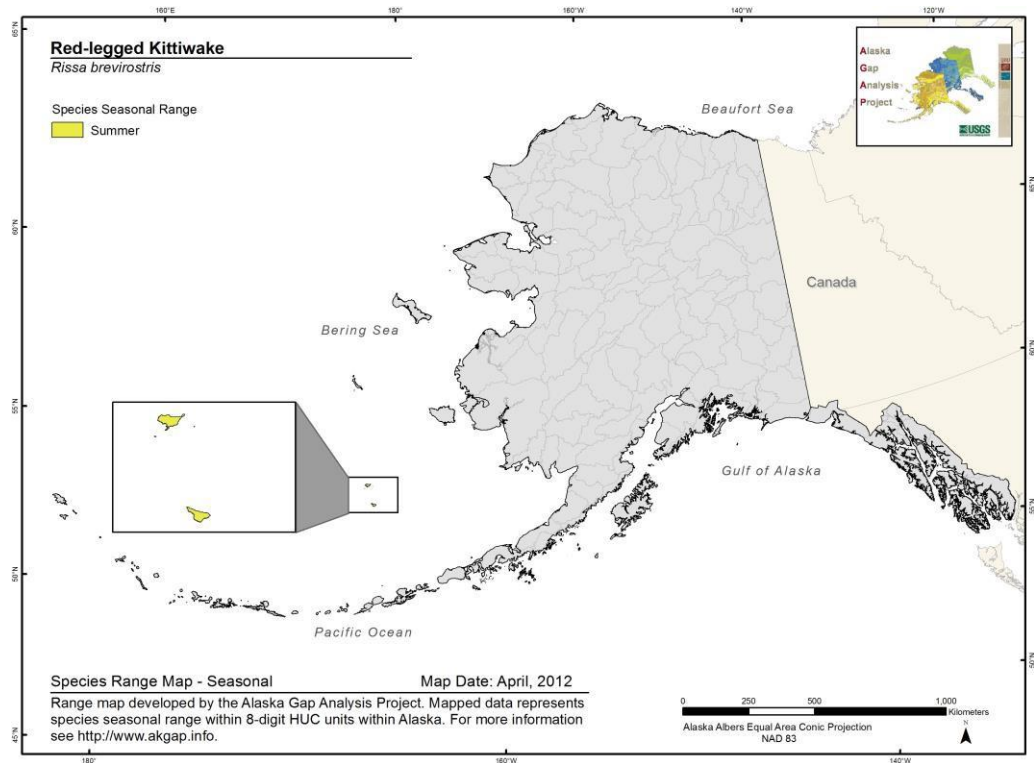
Rissa brevirostris

Range Map and Distribution Model Summary

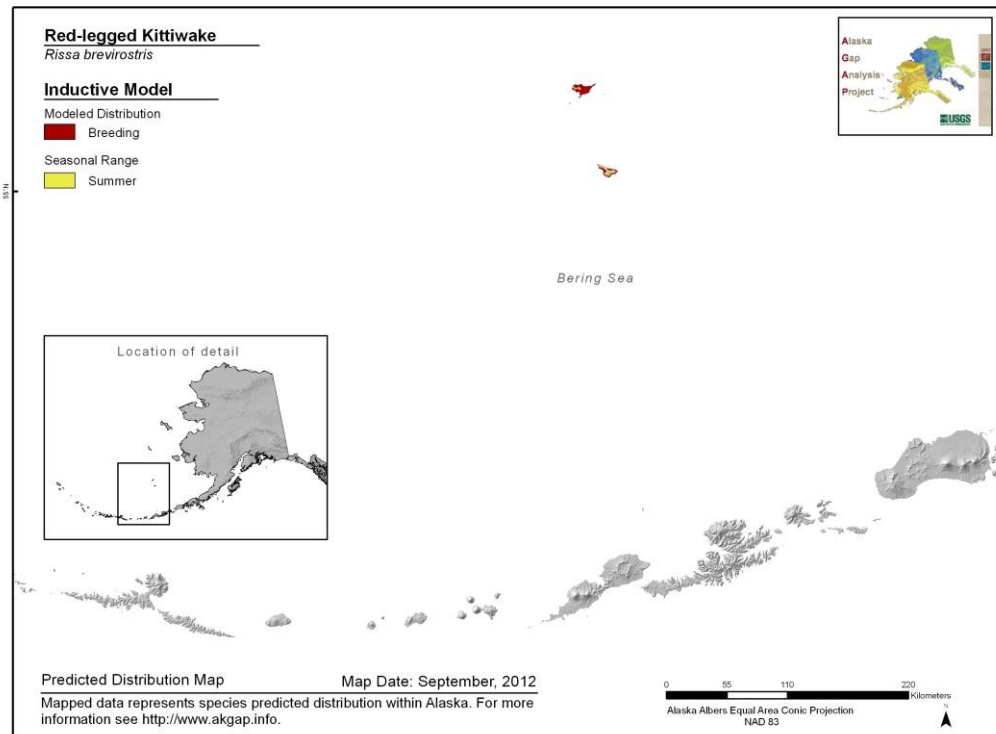
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nest colonies occur on ledges of vertical sea cliffs up to 300m high, often in association with Black-legged Kittiwakes and murres. Feeds at sea within 150 km of colony. In summer, highest concentrations over deep water, from edge of continental shelf (200 m) to water 2,000 m deep (Byrd and Williams 1993a).

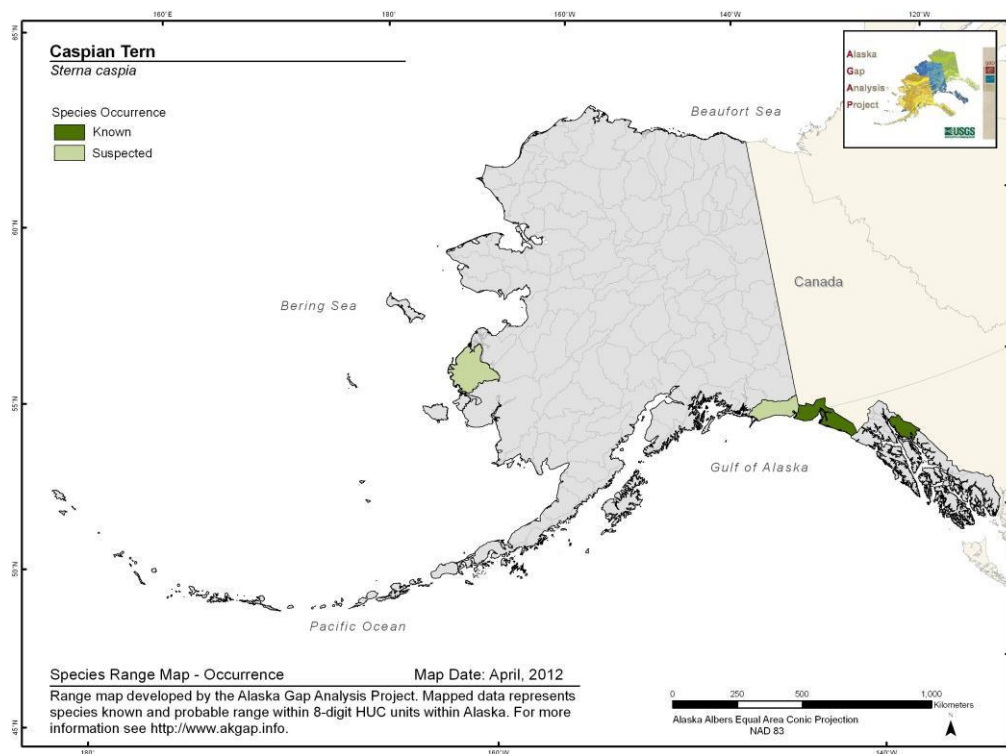
References

Byrd, G. V. and J. C. Williams. 1993a. Red-legged Kittiwake (*Rissa brevirostris*). In *The Birds of North America*, No. 60 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

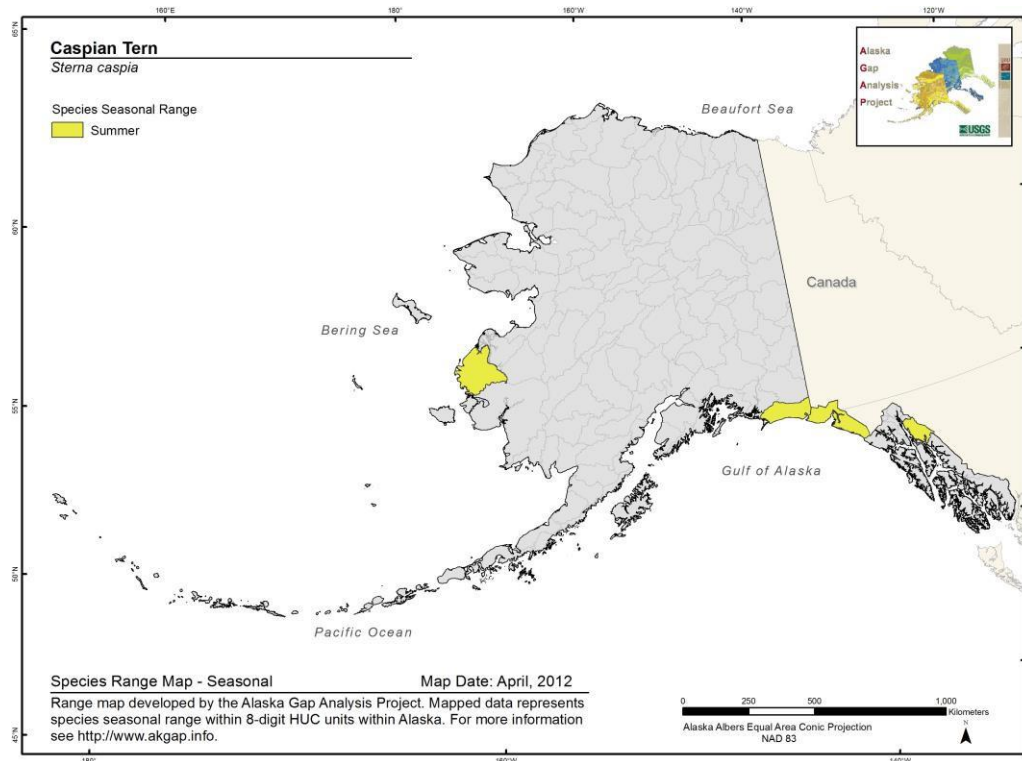
Caspian Tern *Sterna caspia*

Range Map and Distribution Model Summary

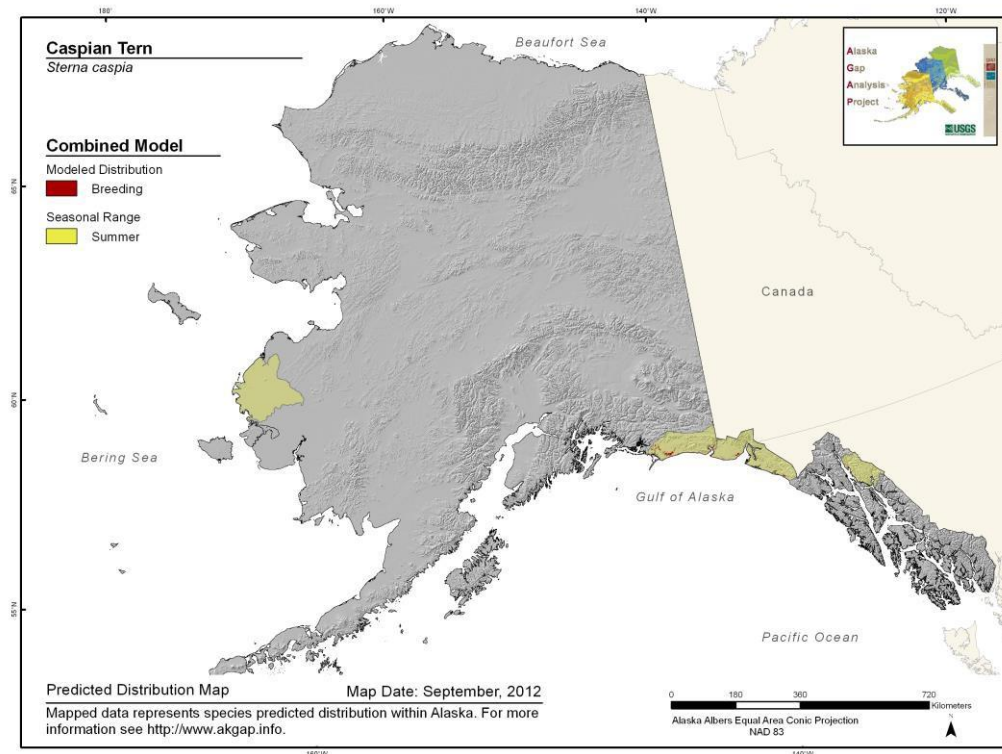
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.562**

**Model Quality
Summary:**
Low

Habitat Description

Wide variety of habitats for breeding, but very specific requirements due to vulnerability to predators. Habitats include coastal estuarine, salt marsh, and barrier Islands. Nests on flat rocky islands, beaches, and sandy shores, sparsely vegetated and littered with driftwood (Cuthbert and Wires 1999).

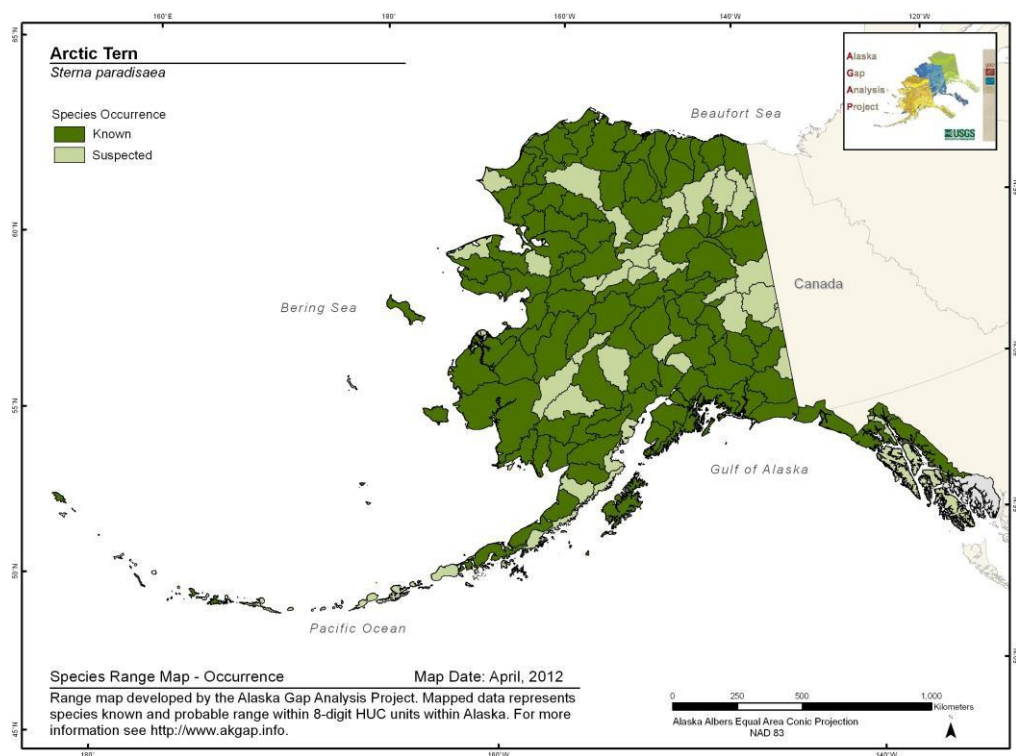
References

Cuthbert, F. J. and L. R. Wires. 1999. Caspian Tern (*Sterna caspia*). In *The Birds of North America*, No. 403 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

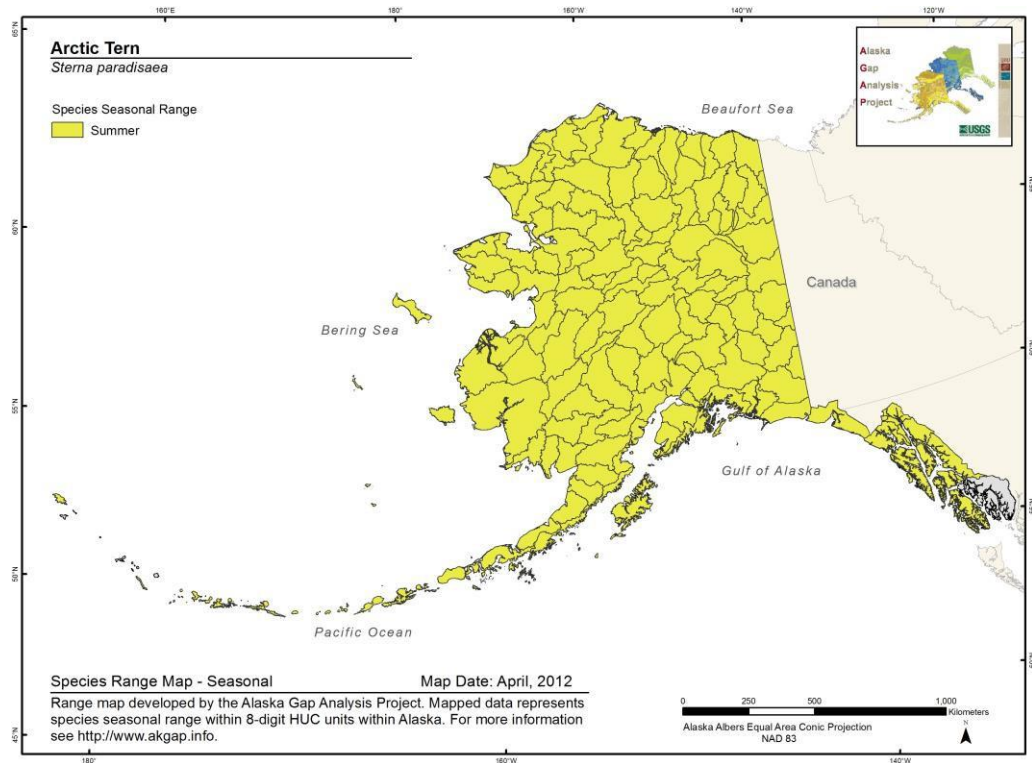
Arctic Tern *Sterna paradisaea*

Range Map and Distribution Model Summary

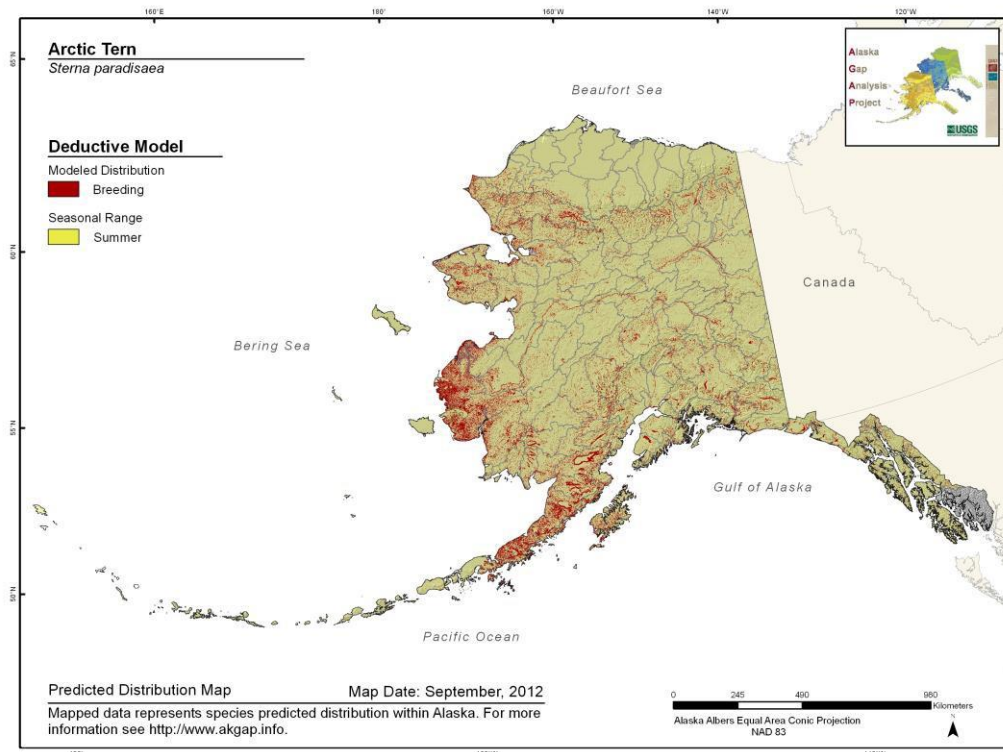
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.526**

**Model Quality
Summary:**
Low

Habitat Description

Nests on ground in wide variety of open, usually treeless terrain types, often with no vegetation or with low or scattered plant cover. Generally nests close to water, frequently on small rocky, gravelly, grassy or peaty islands; also barrier beaches and sand or gravel pits, gravel bars in rivers, or glacial moraines, as well as marshes, bogs, and grassy meadows (Hatch et al. 1978, Mickelson et al. 1980, Baird 1983, Rosenberg 1986, Kessel 1989, Petersen et al. 1991, Hatch 2002).

Forages over open water where prey is available in surface waters; generally within 20 km of colony. Foragers visit rocky shores, shallow bays, tidal flats, shoals, ice edges and faces of tidewater glaciers, tide rips, ocean fronts and upwellings. Inland, principally forages at streams, rivers, and lakes (Hatch 2002).

References

Baird, P. A. 1983. Terns (*Sterna* spp.). Pp. 204-234 in: Baird, P.A. and P.J. Gould (Eds.). The breeding biology and feeding ecology of marine birds in the Gulf of Alaska. USFWS and NOAA. OCSEAP Final Report 45.

Hatch, J. J. 2002. Arctic Tern (*Sterna paradisaea*). In The Birds of North America, No. 707 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Hatch, S. A., D. R. Nysewander, A. R. DeGange, M. R. Petersen, P. A. Baird, K. D. Wohl, and C. J. Lensink. 1978. Population dynamics and trophic relationships of marine birds in the Gulf of Alaska and southern Bering Sea. In: Environmental assessment of the Alaskan Continental Shelf, Annual reports of principal investigators for the year ending March 1978: Volume III. Receptors – Birds. OCSEAP Report.

Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

Mickelson, P.G., J.S. Hawkins, D.R. Herter, and S.M. Murphy. 1980. Habitat use by birds and other wildlife on the eastern Copper River delta, Alaska. Unpubl. rep. Univ. of Alaska, Alaska Cooperative Wildlife Research Unit, Fairbanks, AK. 189 pp.

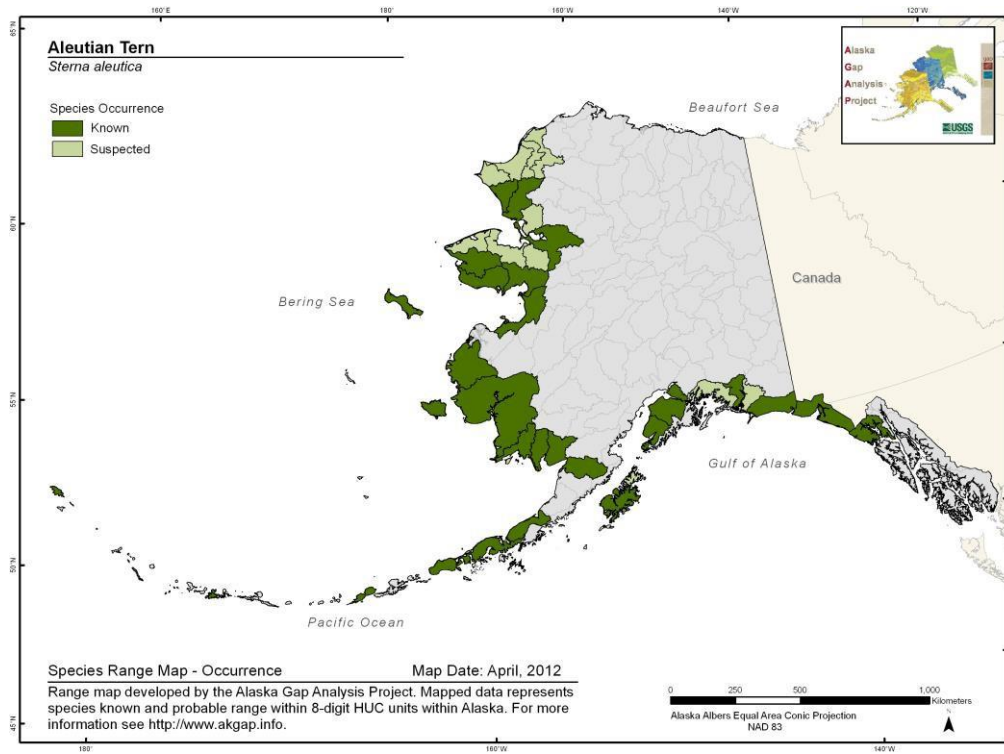
Petersen, M. R., D. N. Weir, and M. H. Dick. 1991. Birds of the Kilbuck and Ahklun Mountain Region, Alaska. North American Fauna 76. 158 pp.

Rosenberg, D. H. 1986. Wetland types and bird use of Kenai lowlands. USFWS, Region 7, Special Studies, Anchorage, AK, 189 pp.

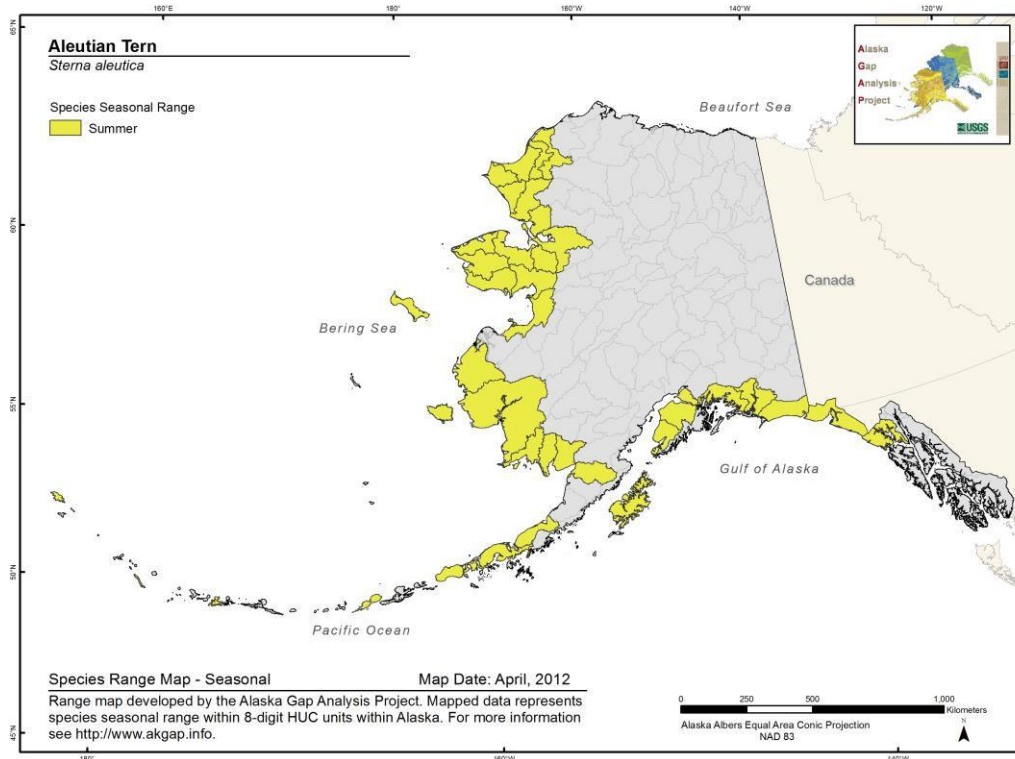
Aleutian Tern *Sterna aleutica*

Range Map and Distribution Model Summary

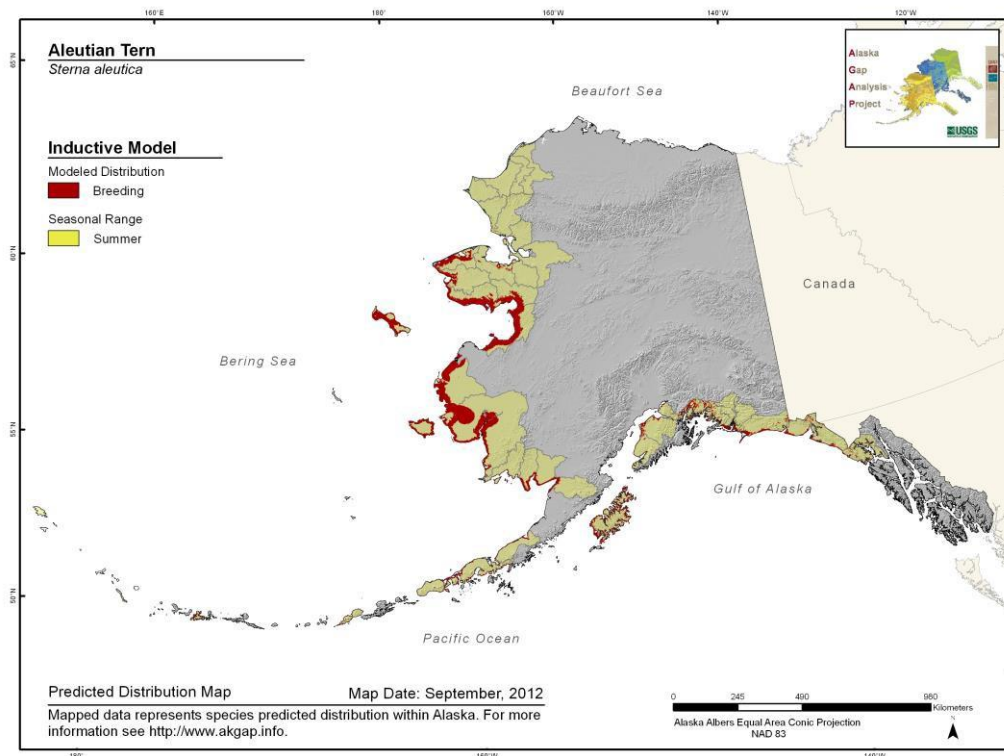
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.85**

**Model Quality
Summary:**
Moderate

Habitat Description

Colonies restricted to coastal sites, typically located at heads of bays, reefs, permanent and ephemeral islands, estuaries in lagoons and at river mouths. Nests usually on grassy or mossy flats, sand spits, sandbars, sand dunes, pebbly seacoasts, vegetated summits of flat-topped islands, reticulate and string bogs, wet coastal marshes, or tundra (Haney et al. 1991, North 1997, Rosenberg 1986).

References

Haney, J.C., J.M. Andrew, and D.S. Lee. 1991. A closer look: Aleutian tern. *Birding*, Dec. 1991, pp. 347-351.

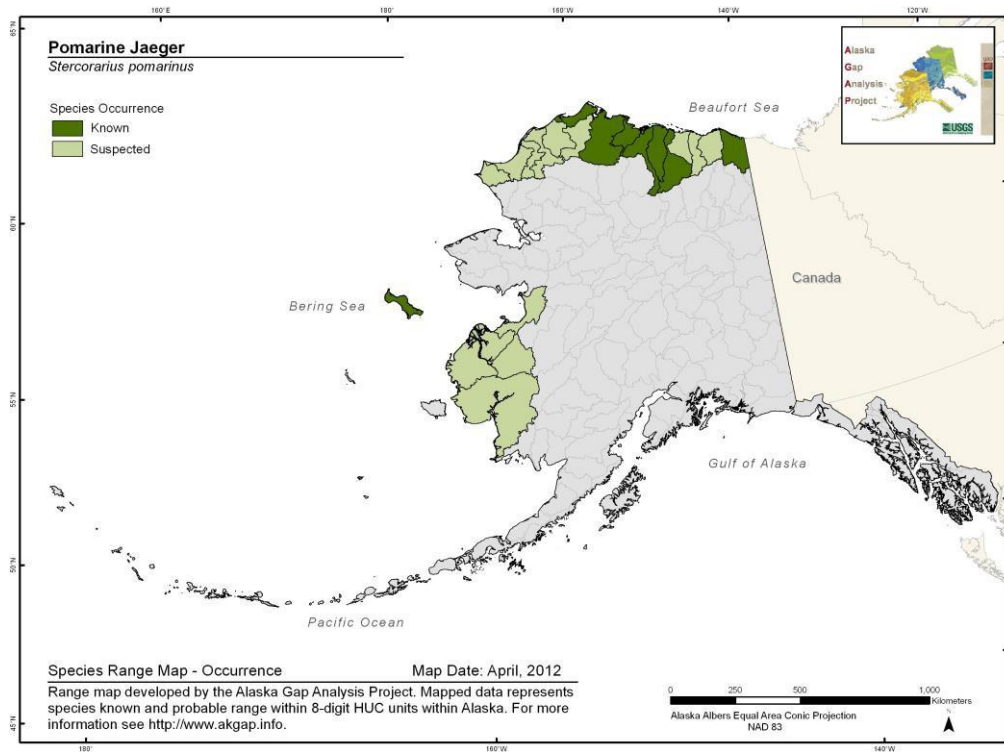
North, M. R. 1997. Aleutian Tern (*Sterna aleutica*). In *The Birds of North America*, No.291 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Rosenberg, D. H. 1986. Wetland types and bird use of Kenai lowlands. USFWS, Region 7, Special Studies, Anchorage, AK, 189 pp.

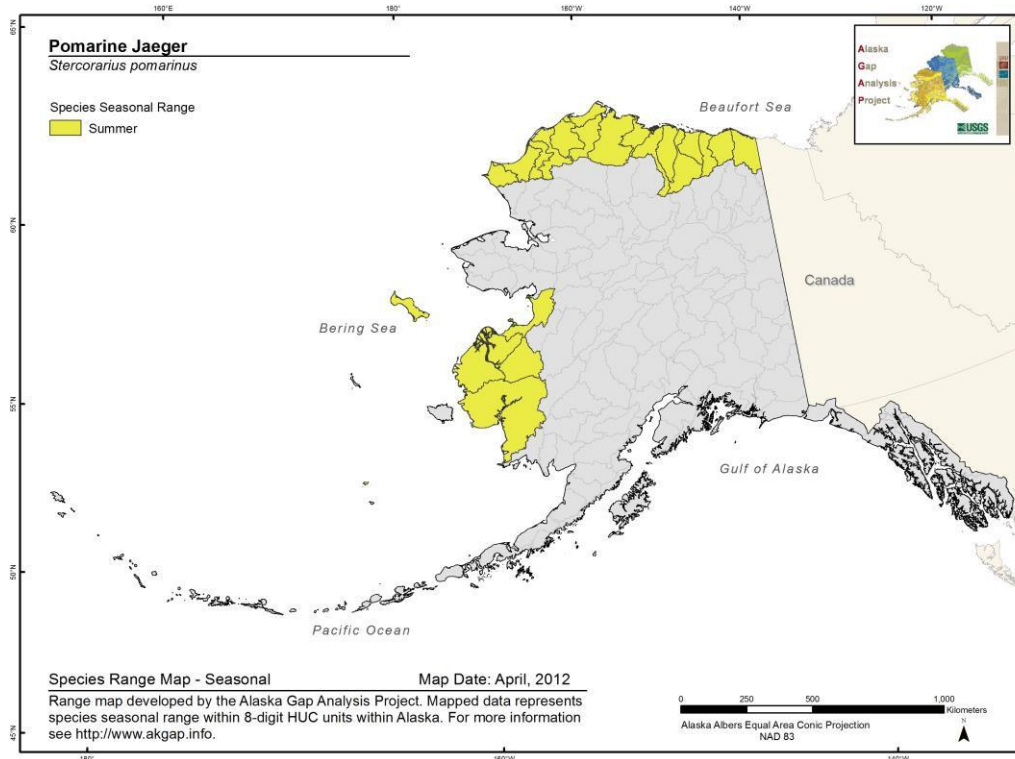
Pomarine Jaeger *Stercorarius pomarinus*

Range Map and Distribution Model Summary

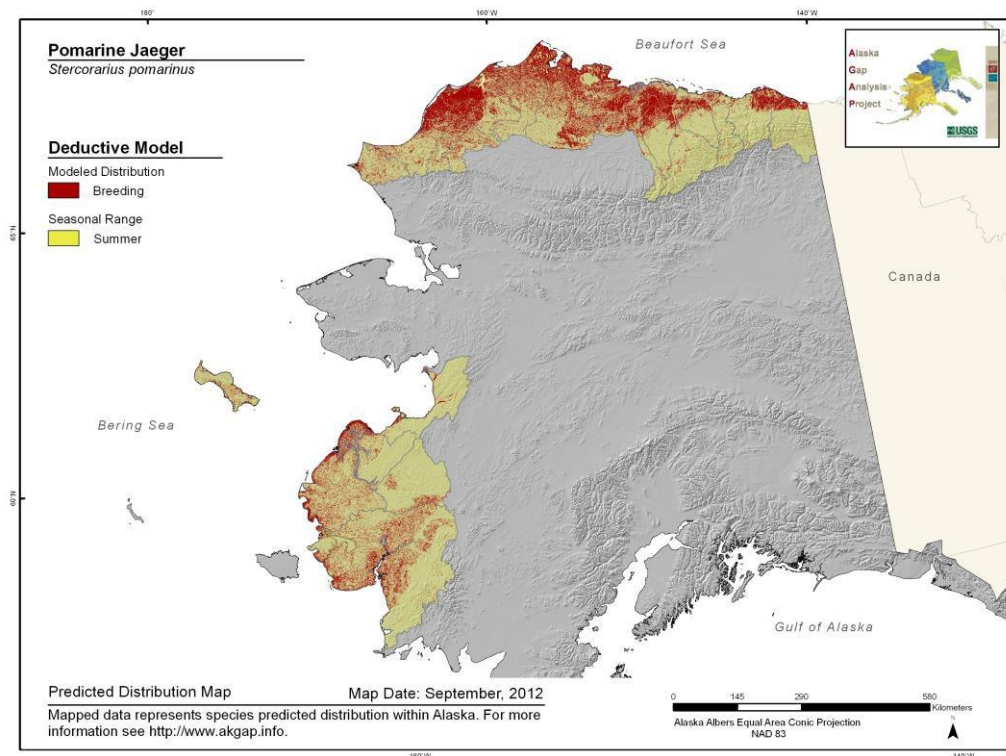
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in low-lying wet coastal tundra, usually marshy areas with numerous small lakes. In northern Alaska, breeding habitat includes marshes, wet polygonal tundra, well-drained but mesic tundra, and marshy swales between low ridges (Maher 1974). Suitable habitat extends along coast in a narrow strip about 8 km wide, except around Barrow, where it extends 40 km south to the Inaru River. The vegetation is less than 15 cm high and sedge marshes and shallow water comprise most of the area. In slightly higher areas on low ridges and borders of tundra polygons, there is sparse tussock-heath tundra with low sedges and grasses mixed with prostrate willows, heaths, mosses, and lichens (Wiley and Lee 2000).

References

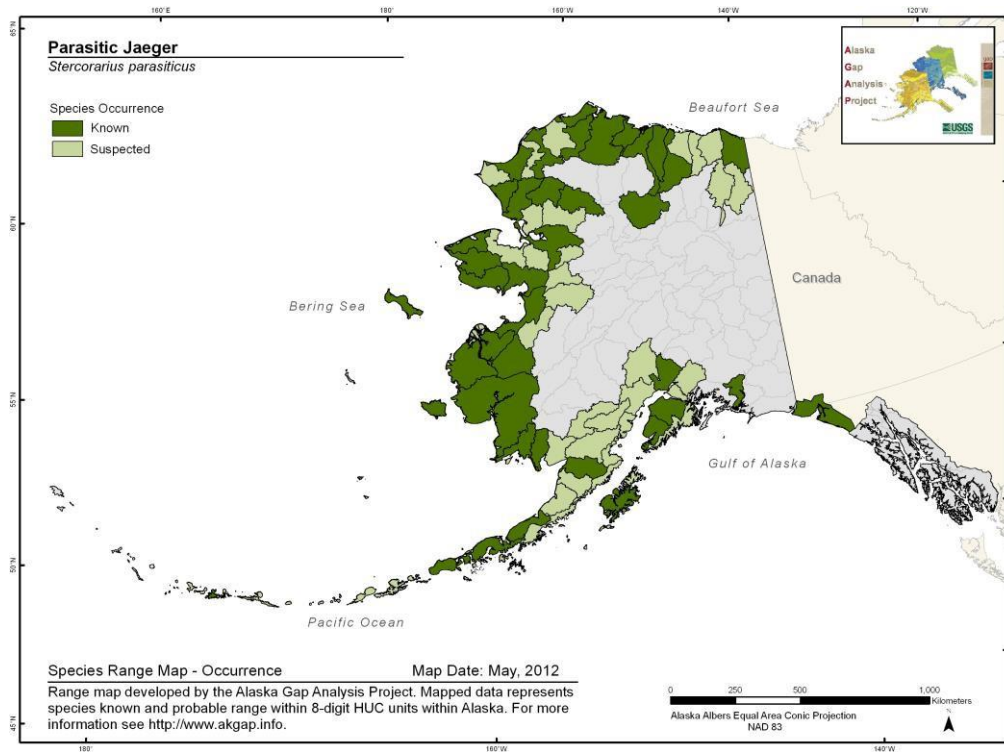
Maher, W. K. 1974. Ecology of Pomarine, Parasitic, and Long-tailed jaeger s in northern Alaska. Pacific Coast Avifauna 37.

Wiley, R. H. and D. S. Lee. 2000. Pomarine jaeger (*Stercorarius pomarinus*). In The Birds of North America, Vol. 13, No. 483 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

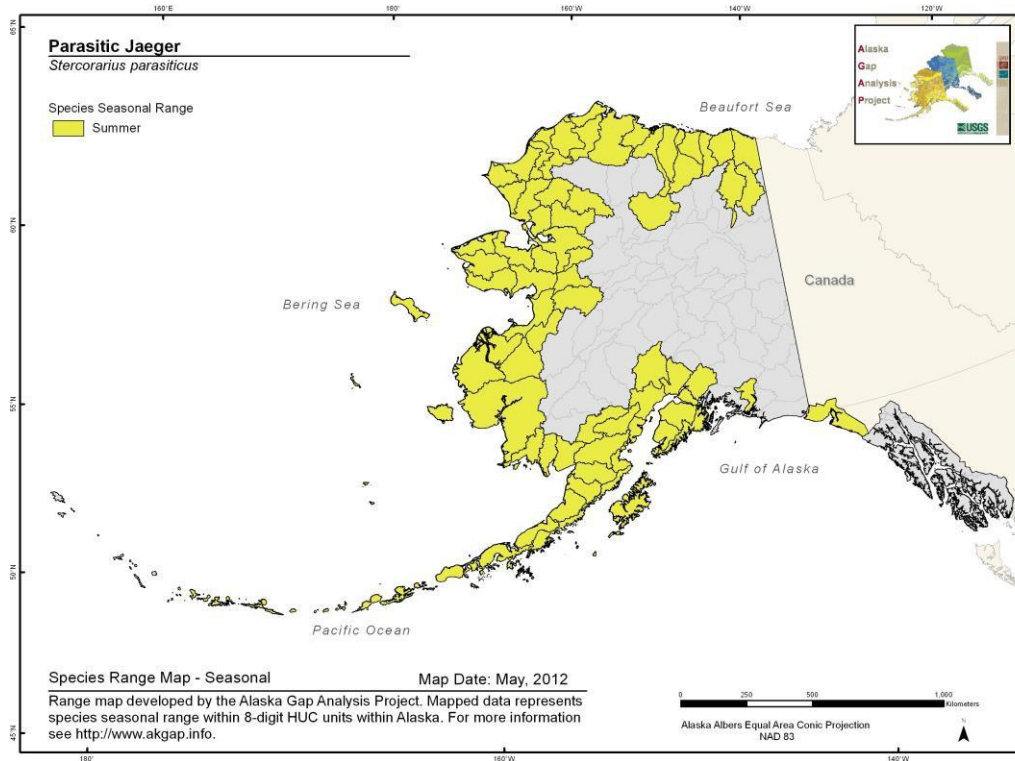
Parasitic Jaeger *Stercorarius parasiticus*

Range Map and Distribution Model Summary

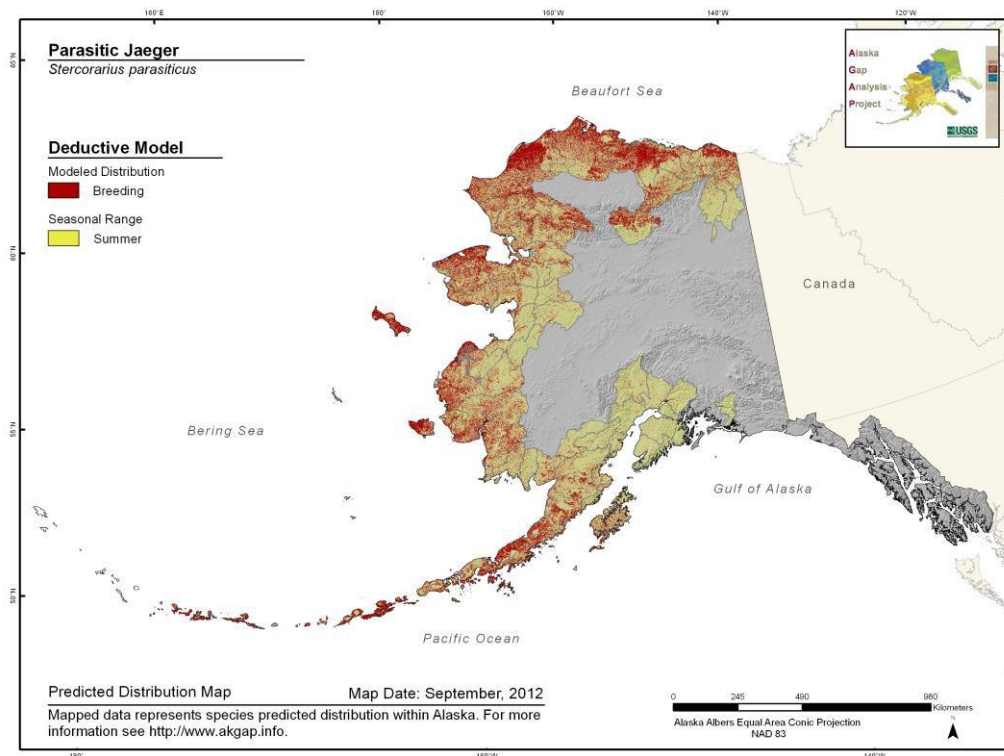
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

In northern Alaska, breeds in both low-lying marshy tundra and drier tussock-heath tundra, near the coast and inland to foothills and passes of the Brooks Range (Maher 1970, 1974). Nest usually places in low-lying marshy tundra, with sedge meadows, low-center polygons, and sphagnum or frost mounds, often near a lake, river, or coast (Brandt 1943, Parmelee et al. 1967, Maher 1974, Taylor 1974, Portenko 1989). In coastal tundra of northern Yukon, this species is found at lakes (Salter et al. 1980) and in late summer, it is found in riparian vegetation dominated by shrubby willows (Maher 1974).

References

Brandt, H. 1943. Alaska bird trails. Bird Res. Foundation, Cleveland, OH.

Maher, W. J. 1970. The Pomarine jaeger as a brown lemming predator in northern Alaska. Wilson Bull. 82: 130-157.

Maher, W. K. 1974. Ecology of Pomarine, Parasitic, and Long-tailed jaeger s in northern Alaska. Pacific Coast Avifauna 37.

Parmelee, D. F., H. A. Stephens, and R. H. Schmidt. 1967. The birds of Southeastern Victoria Island and adjacent small islands. National Museum Canadian Bulletin no. 222.

Portenko, L. A. 1989. Birds of the Chukchi Peninsula and Wrangell Island. Vol. 2. Amerind Publ. Co., New Delhi (Russian ed., 1973).

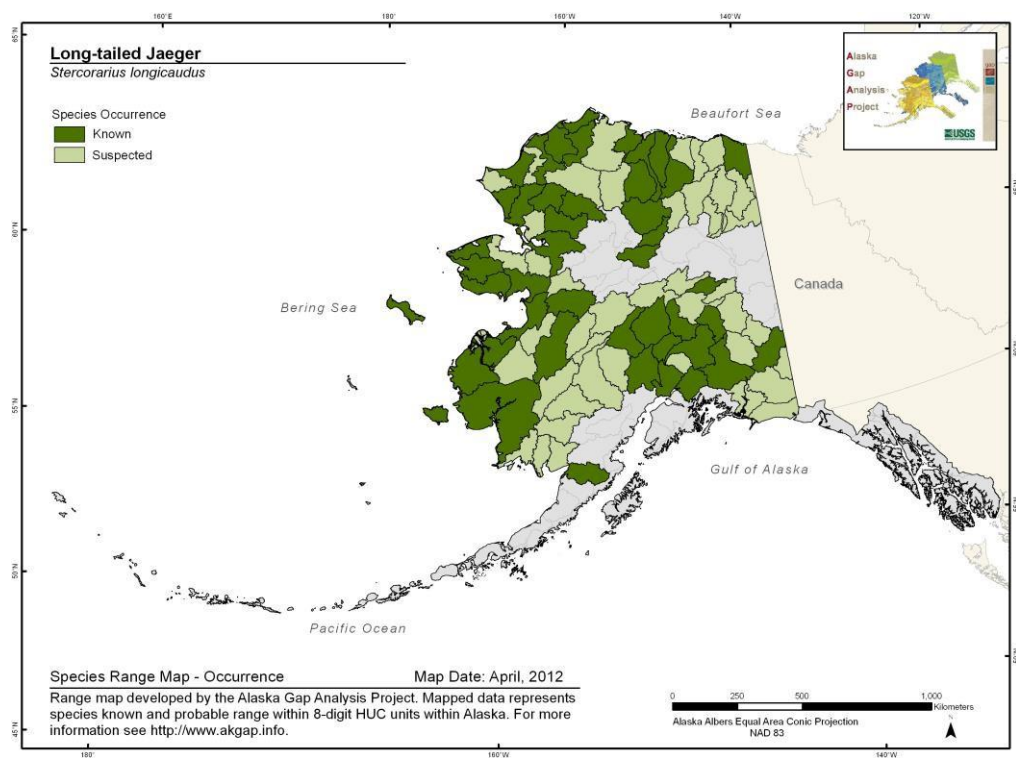
Salter, R. E., M. A. Gollop, S. R. Johnson, W. R. Koski, and C. E. Tull. 1980. Distribution and abundance of birds on the arctic coastal plains of the Northern Yukon and adjacent Northwest Territories, 1971-1976. Can. Field-Nat. 94: 219-238.

Taylor, P. S. 1974. Summer populations and food ecology of jaegers and snowy owls on Bathurst Island, N.W.T. Unpubl. Thesis, Univ. of Alberta, Edmonton.

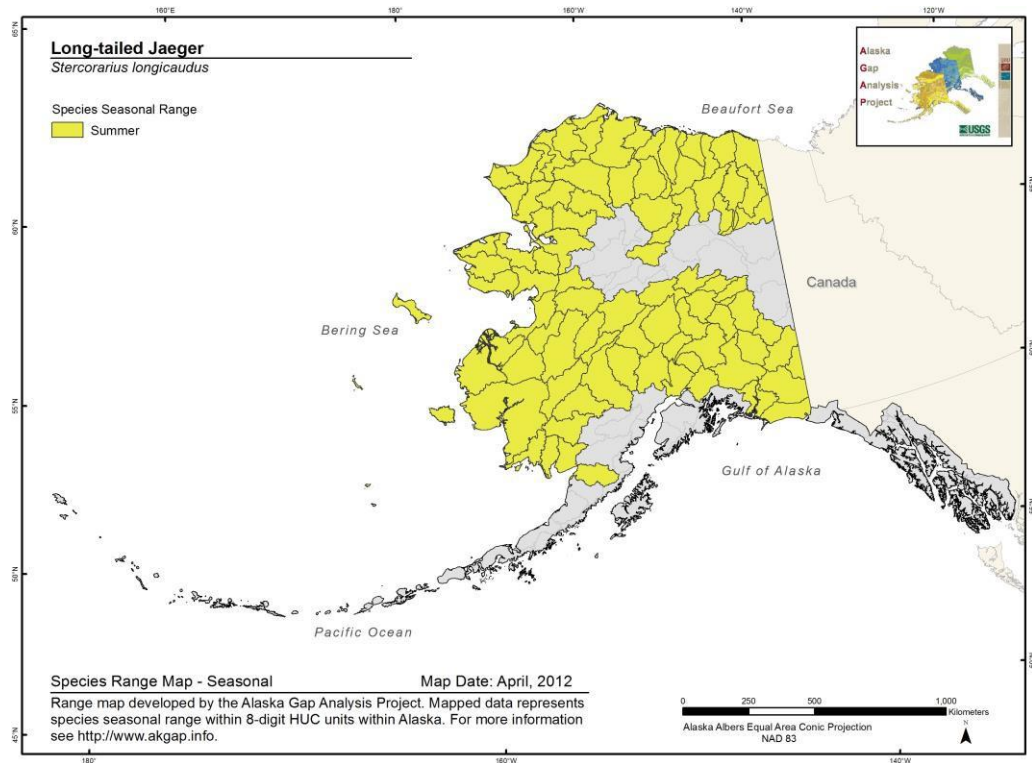
Long-tailed Jaeger *Stercorarius longicaudus*

Range Map and Distribution Model Summary

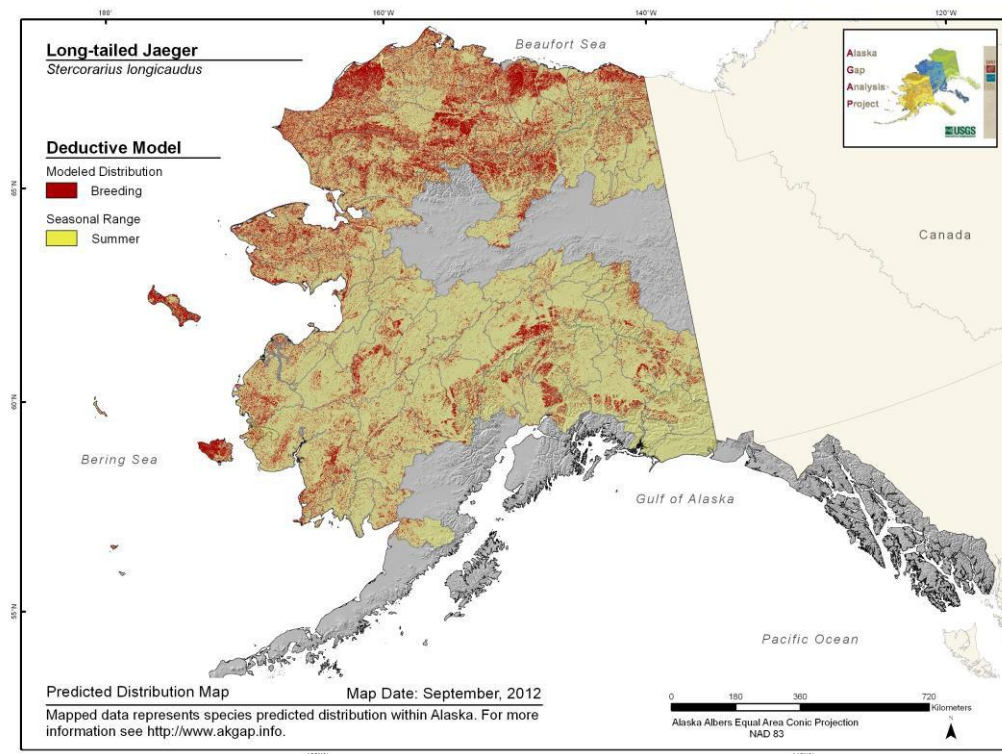
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.558**

**Model Quality
Summary:**
Low

Habitat Description

Nests in arctic and alpine tundra, often far from sea. In northern Alaska, prefers tussock-heath tundra dominated by cotton sedge (*Eriophorum vaginatum*; Maher 1974). In southwest Yukon and presumably south Alaska, breeds in alpine tundra dominated by shrubs and sedges (Price 1969). In northern and central Yukon, commonly nests on rolling open tussock tundra in areas with wet sedge, as well as *Dryas* terraces (Alexander et al. 2003). Most often in well-drained upland areas, also in dry tundra in low-lying areas; nest usually on mound or hummock (Johnson and Herter 1989).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

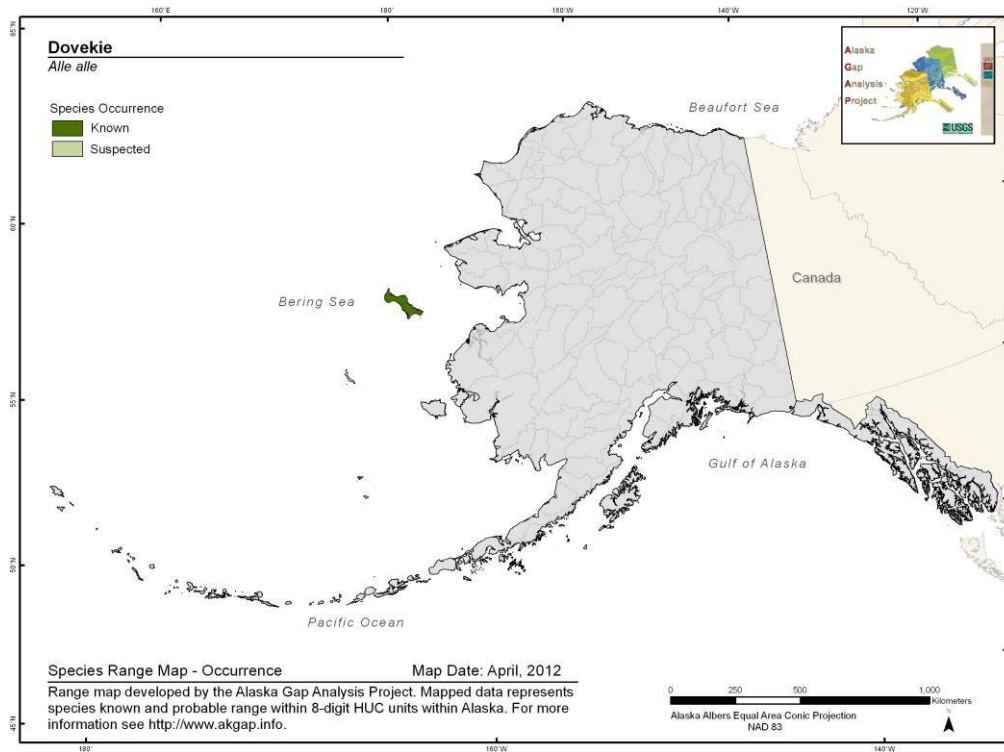
Maher, W. K. 1974. Ecology of Pomarine, Parasitic, and Long-tailed jaeger s in northern Alaska. Pacific Coast Avifauna 37.

Price, L. W. 1969. Nesting of the Long-tailed jaeger in southwest Yukon Territory - an extension of the known breeding grounds. Can Field-Nat. 83: 138-141.

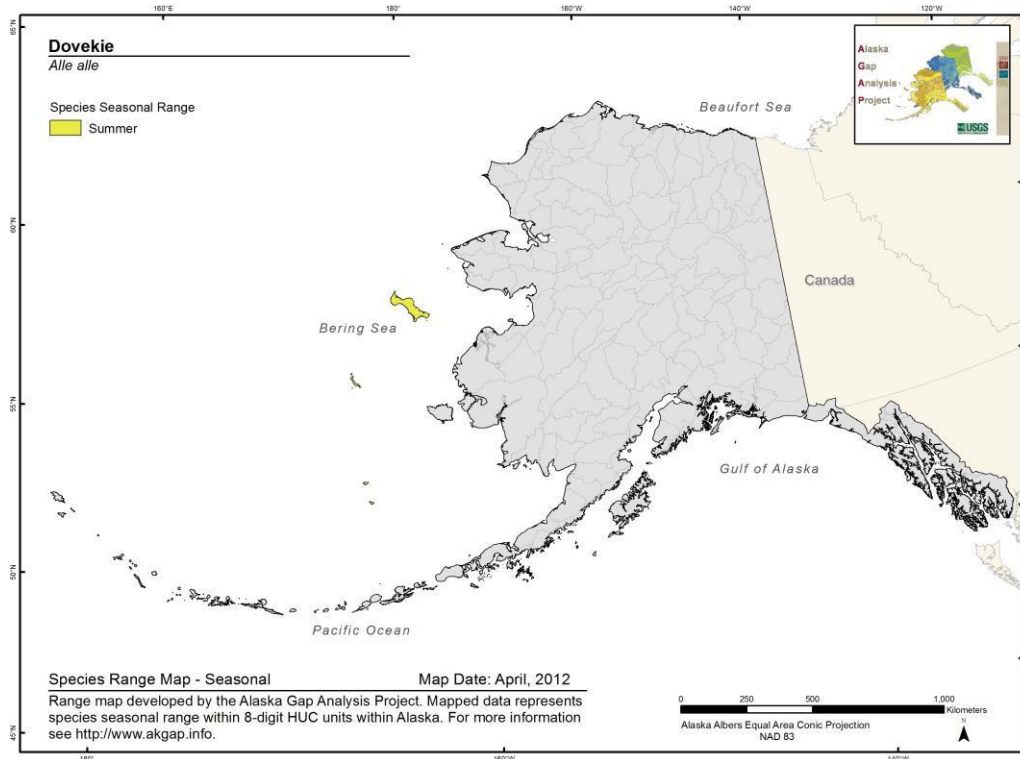
Dovekie *Alle alle*

Range Map and Distribution Model Summary

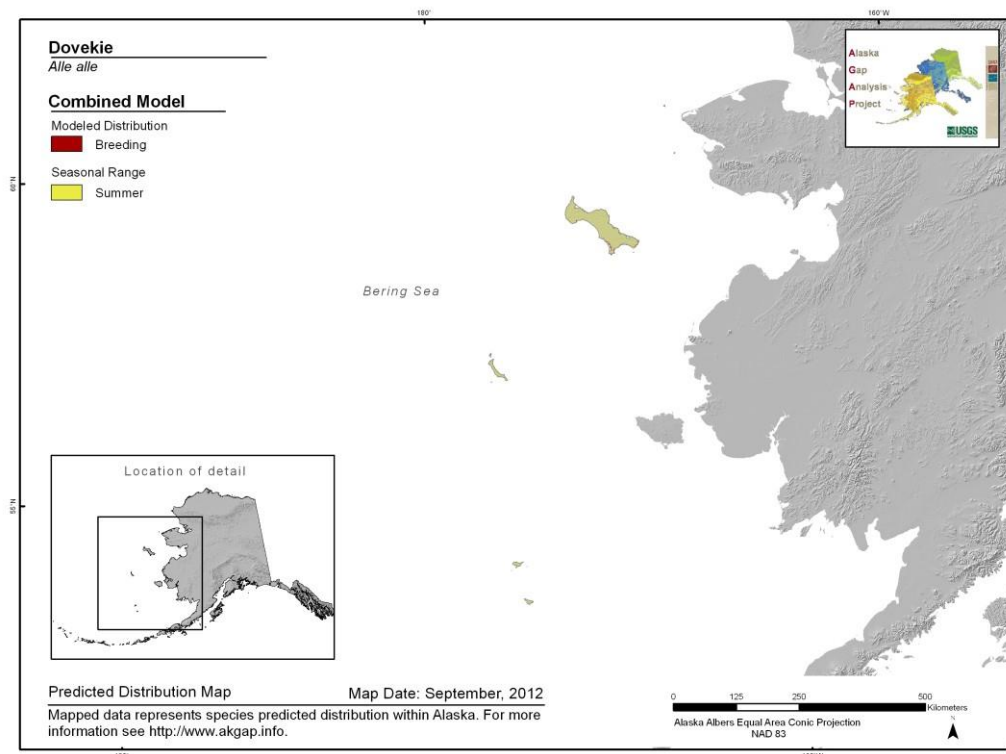
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Nests among talus slopes, scree, and rubble in rock crevice, cliff rubble, or in a burrow at the foot of cliffs or coastal mountains or on rocky outcrops surrounded by glaciers (Norderhaug et al. 1977, Roby et al. 1981, Harris and Birkhead 1985, Boertmann 1994, Stempniewicz 1995, Boertmann and Mosbech 1998). Prefers areas of early snowmelt, sheltered from high winds. Nests usually on coast but locally inland in some areas.

References

Boertmann, D. 1994. An annotated check list to the birds of Greenland. Meddelelser om Gronland, Bioscience 38.

Boertmann, D. and A. Mosbech. 1998. Distribution of Little Auk (*Alle alle*) breeding colonies in Thule District, northwest Greenland. Polar Biol. 19:206-210.

Harris, M. P., and T. R. Birkhead. 1985. Breeding ecology of the Atlantic Alcidae. Pages 155-204 in Nettleship, D. N., and T. R. Birkhead, eds. The Atlantic Alcidae. Academic Press, N.Y.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Norderhaug, M., E. Brun, and G. U. Uleberg. 1977. Seabird resources of the Barents Sea. Nor. Polarinst. Medd. 104 (translated by R. G. Brown).

Roby, D. D., K. L. Brink, and D. N. Nettleship. 1981. Measurements, chick meals and breeding distribution of Dovekies (*Alle alle*) in Northwest Greenland. Arctic 34: 241-248.

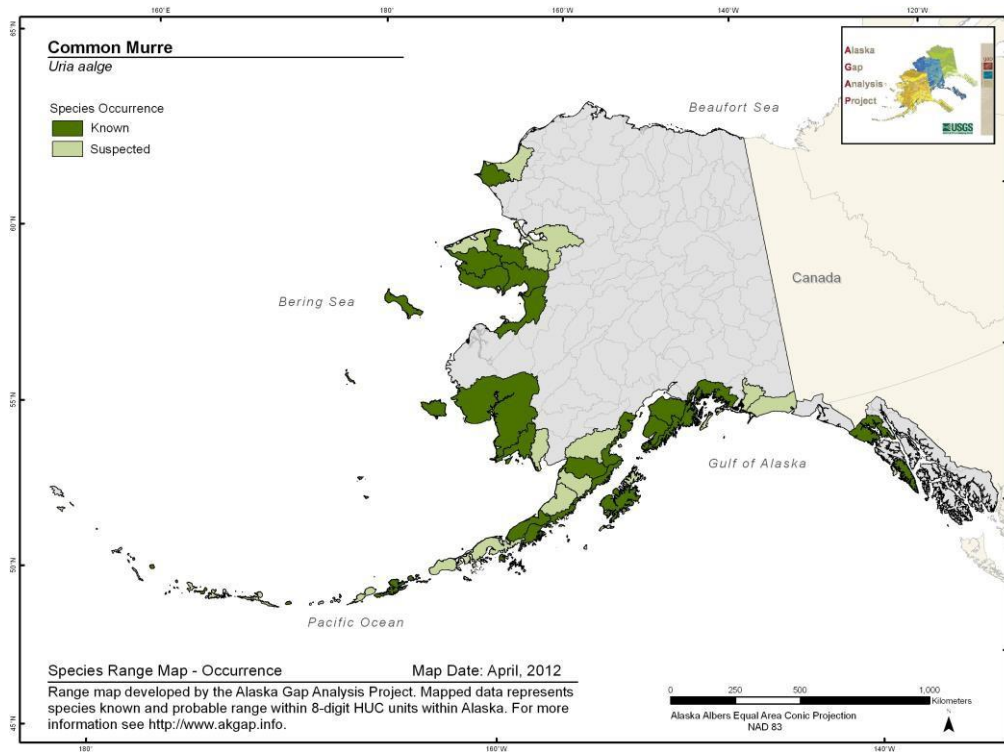
Stempniewicz, L. 1995. Predator-prey interactions between Glaucous Gull (*Larus hyperboreus*) and Little Auk (*Alle alle*) in Svalbard. Ornis Scandinavica 18:152-155.

Common Murre

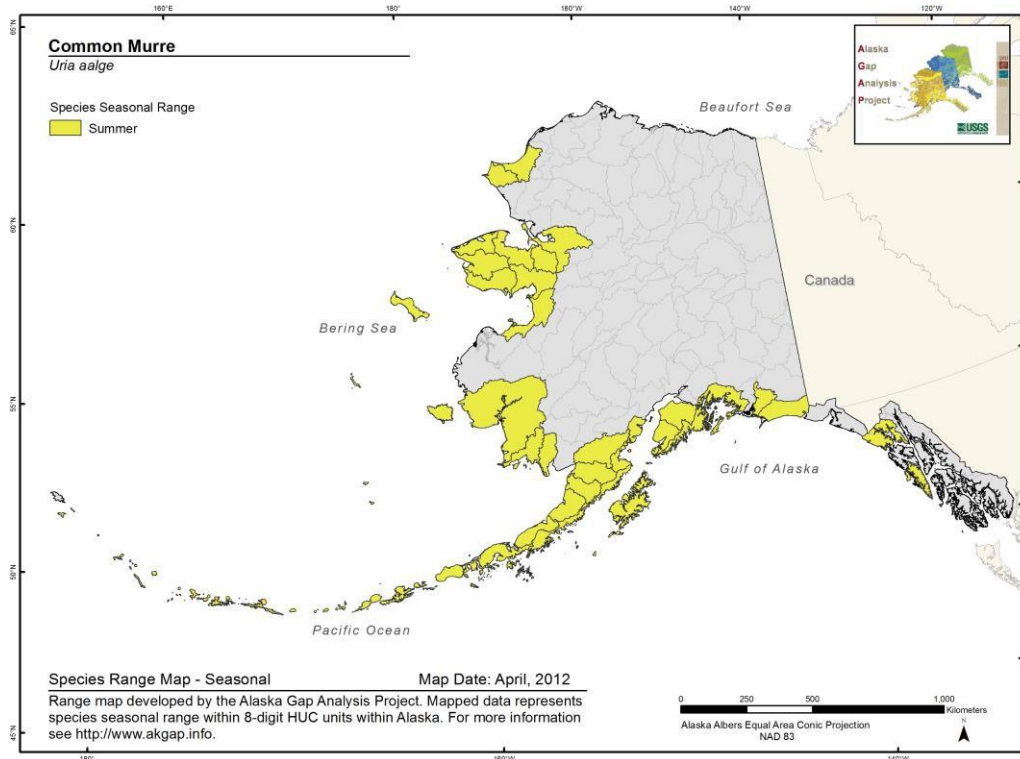
Uria aalge

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**

Not validated

Habitat Description

Nests on cliff ledges, slopes, and on flat, rocky, low lying islands (Harris and Birkhead 1985, USFWS 2006a).
Forages on continental shelf and slope waters (Brown 1985, Ainley et al. 1996, Springer et al. 1999).

References

Ainley, D. G., L. B. Spear, S. G. Allen, and C. A. Ribic. 1996. Temporal and spatial patterns in the diet of the Common Murre in California waters. *Condor* 98:691-705.

Brown, R. G. B. 1985. The Atlantic Alcidae at sea. Pages 383-426 in Nettleship, D. N., and T. R. Birkhead, eds. *The Atlantic Alcidae*. Academic Press, N.Y.

Harris, M. P., and T. R. Birkhead. 1985. Breeding ecology of the Atlantic Alcidae. Pages 155-204 in Nettleship, D. N., and T. R. Birkhead, eds. *The Atlantic Alcidae*. Academic Press, N.Y.

Springer, A. M., J. F. Piatt, V. P. Shuntov, G. B. Van Vliet, V. L. Vladimirov, A. E. Kuzin, and A. S. Perlov. 1999. Marine birds and mammals of the subarctic gyres. *Progr. Oceanogr.* 43:443-487.

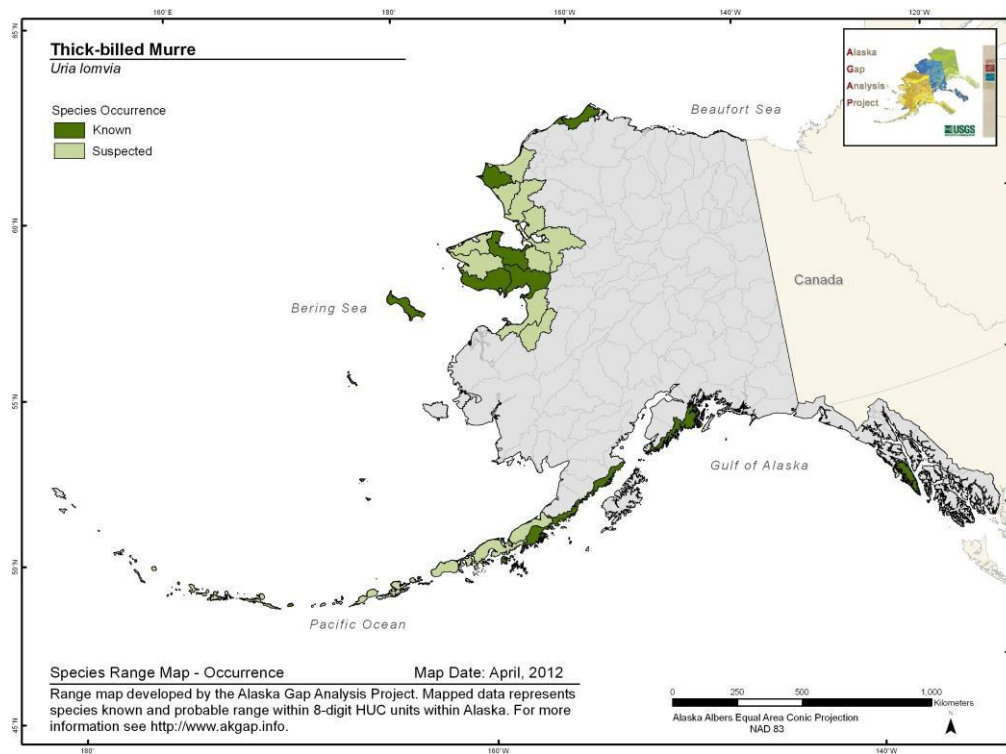
USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger. USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

Thick-billed Murre

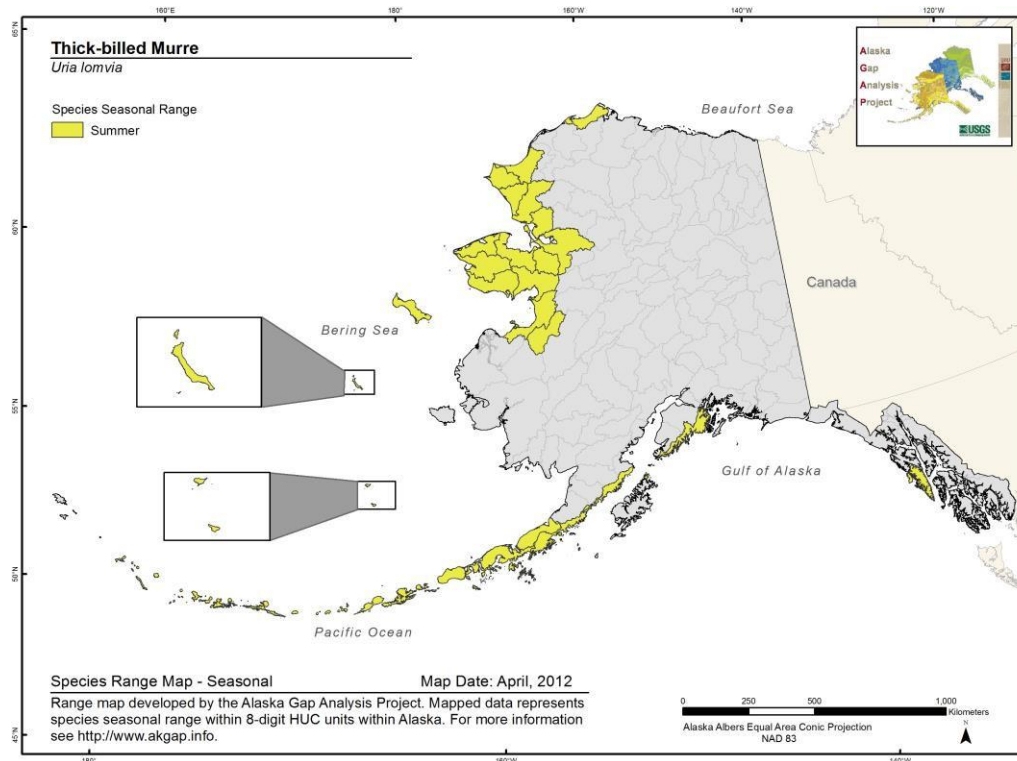
Uria lomvia

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

Model

Evaluation

Statistic

(AUC): No

AUC

Model Quality

Summary:

Not validated

Habitat Description

Nests on narrow ledges or, less often, in crevices and caves, on steep sea cliffs and offshore islands (Harris and Birkhead 1985); generally more abundant on islands than on mainland coasts (Johnsgard 1987). Eggs are laid on bare rock (USFWS 2006a). Forages along coastal and continental shelf waters and slope in water >30 m deep (Cairns and Schneider 1990, Piatt et al. 1991).

References

Cairns, D. K. and D. C. Schneider. 1990. Hot spots in cold water: feeding habitat selection by Thick-billed Murres. *Studies in Avian Biology* 14:52-60.

Harris, M. P., and T. R. Birkhead. 1985. Breeding ecology of the Atlantic Alcidae. Pages 155-204 in Nettleship, D. N., and T. R. Birkhead, eds. *The Atlantic Alcidae*. Academic Press, N.Y.

Johnsgard, P.A. 1987. *Diving birds of North America*. Univ. Nebraska Press, Lincoln, NE. 292 pp.

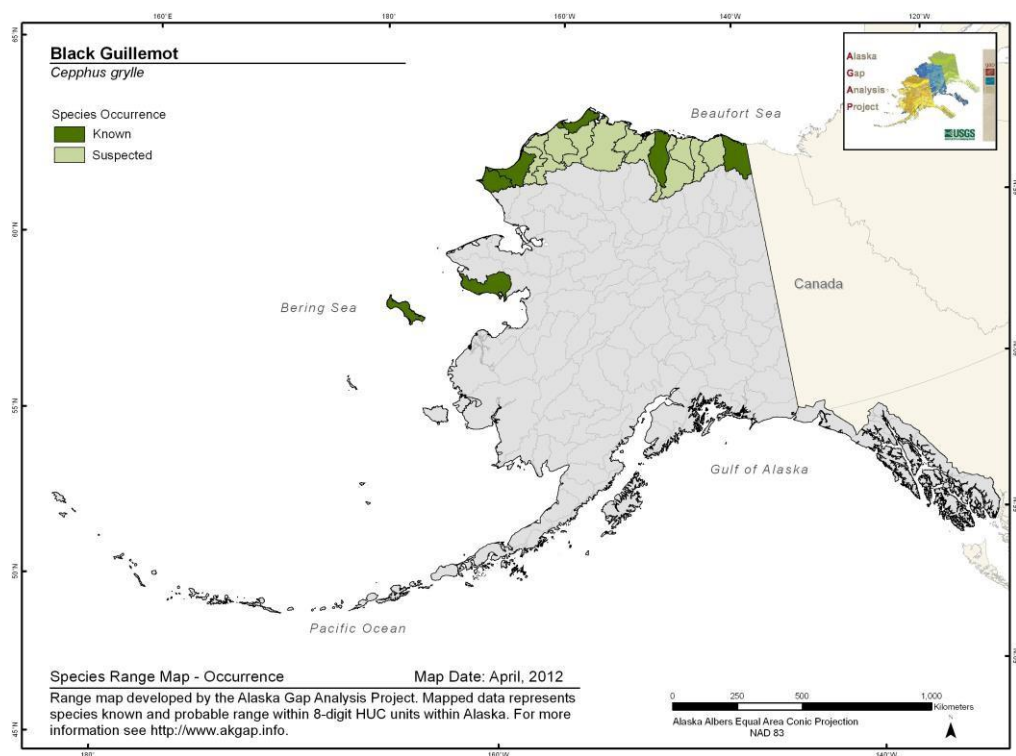
Piatt, J. F., J. L. Wells, A. MacCharles, and B. S. Fadely. 1991. The distribution of seabirds and fish in relation to ocean currents in the Southeastern Chukchi Sea. *Can. Wildl. Serv. Occas. Pap.* No. 68: 21-31.

USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger. USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

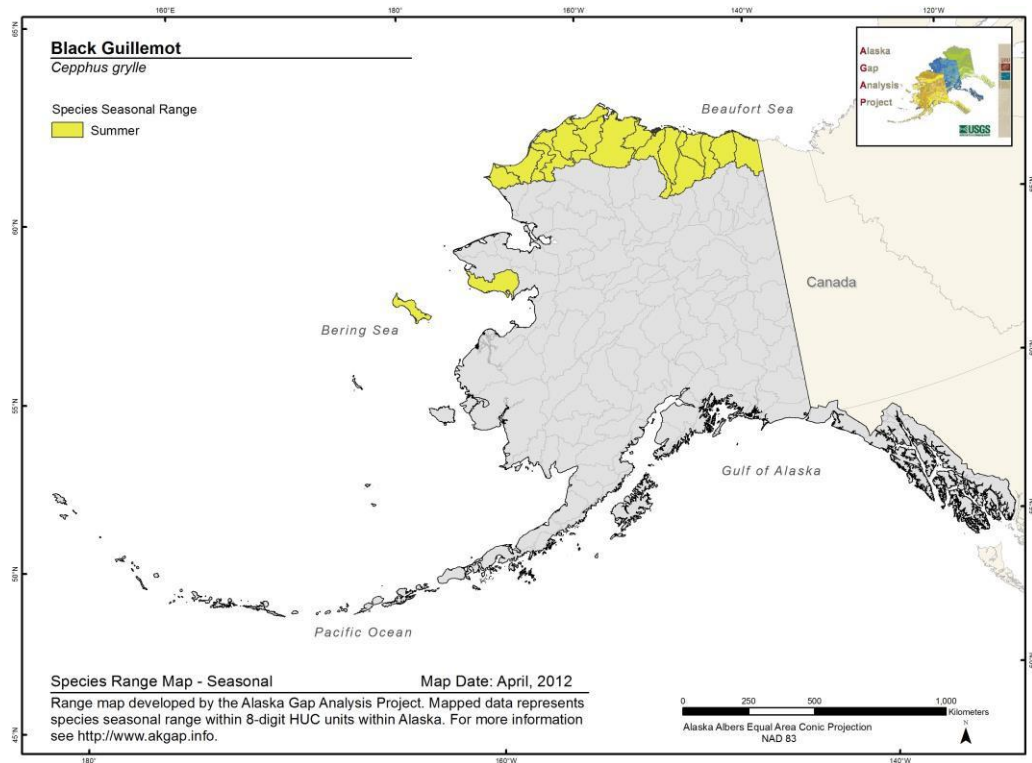
Black Guillemot *Cephus grylle*

Range Map and Distribution Model Summary

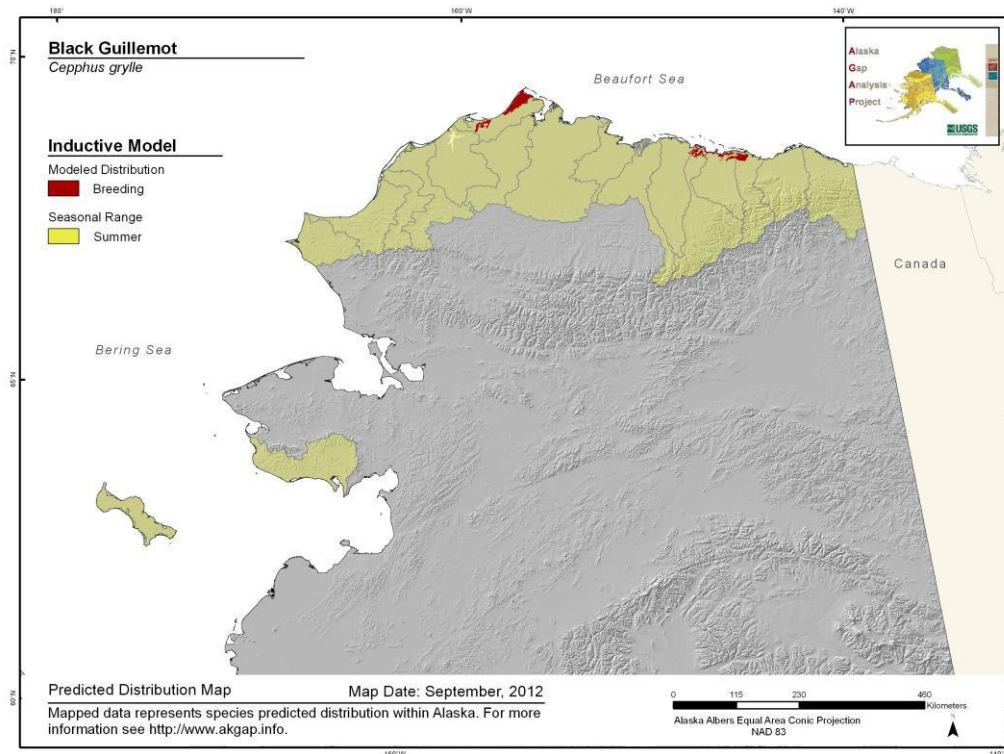
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Ice-dependent species tied to arctic pack ice. Concentrate at ice edges to feed (Butler and Buckley 2002). Nests in crevices on rocky sea cliffs or in cavities found on rocky shorelines or headlands. In northern Alaska, where there are low coastal tundra bluffs, the species nests in driftwood piles and manmade structures. They require at least 80 snow-free days from egg laying to fledglings leaving the nest.

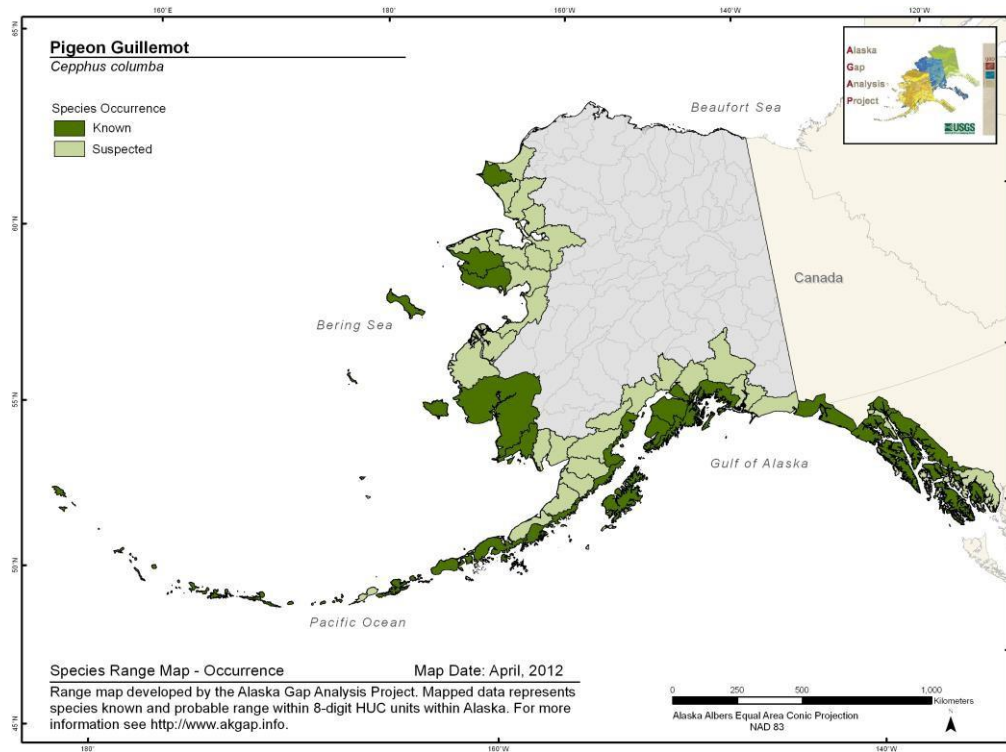
References

Butler, R. G. and D. E. Buckley. 2002. Black Guillemot (*Cepphus grylle*). In *The Birds of North America*, No. 675 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

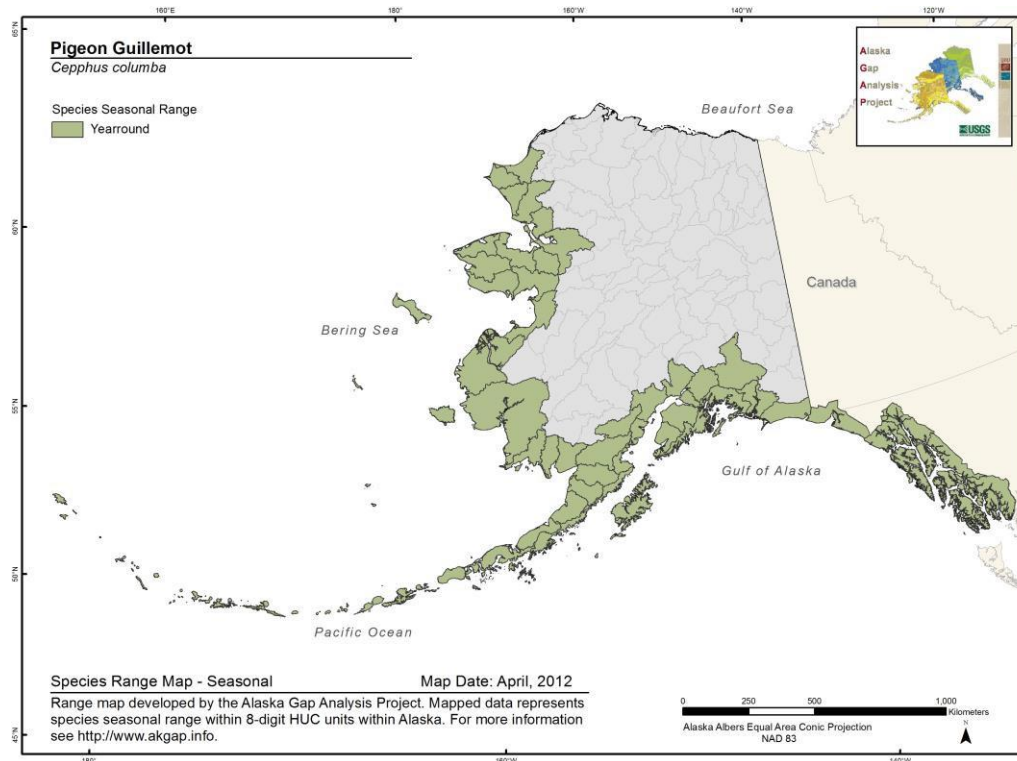
Pigeon Guillemot *Cephus columba*

Range Map and Distribution Model Summary

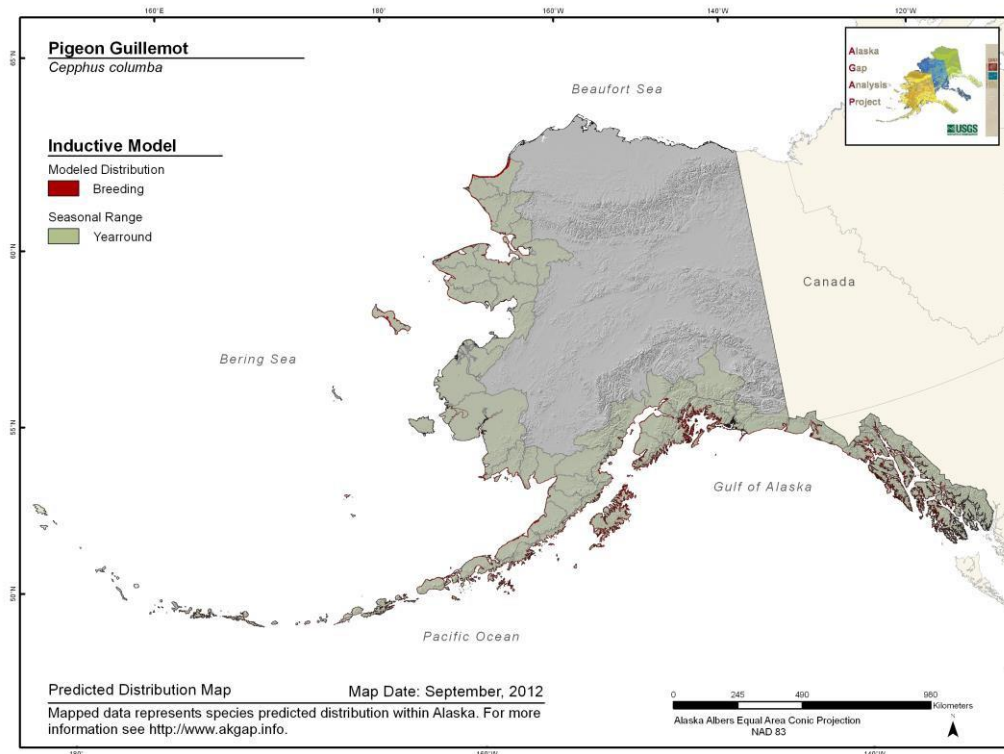
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.963**

**Model Quality
Summary:**
High

Habitat Description

Found along coastal areas, especially rocky stretches, including bays, inlets, channels, surge narrows, sounds, coves, and harbors (Campbell et al. 1990). Breeds along rocky coasts in cavities or burrows adjacent to shallow water foraging areas (Sanger 1987a, Ainley and Boekelheide 1990). Colonies found on large rocky islands and headlands (Campbell et al. 1990). Winters in sheltered inshore waters (Scott 1973, Oakley 1981, Ainley and Boekelheide 1990).

References

Ainley, D. G. and R. J. Boekelheide. 1990. Seabirds of the Farallon Islands. Stanford University Press, Stanford, CA.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Oakley, K. L. 1981. Determinants of population size of Pigeon Guillemots on Naked Island, Prince William Sound, Alaska, M. S. thesis. University of Alaska, Fairbanks.

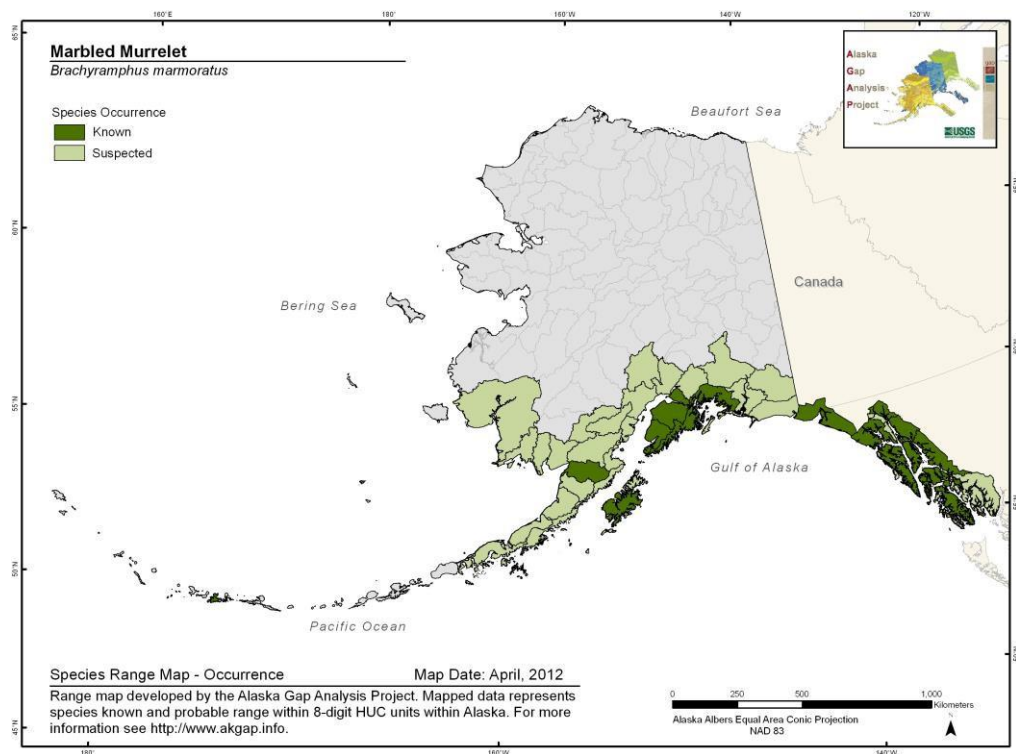
Sanger, G.A. 1987a. Trophic levels and trophic relationships of seabirds in the Gulf of Alaska. Chapter 10 in: Croxall, J.P. (Ed.). Seabirds: feeding, ecology and role in marine ecosystems. Cambridge University Press, Cambridge, U.K.

Scott, J. M. 1973. Resource allocation in four synoptic species of marine diving birds. Ph. D. diss., University of Oregon.

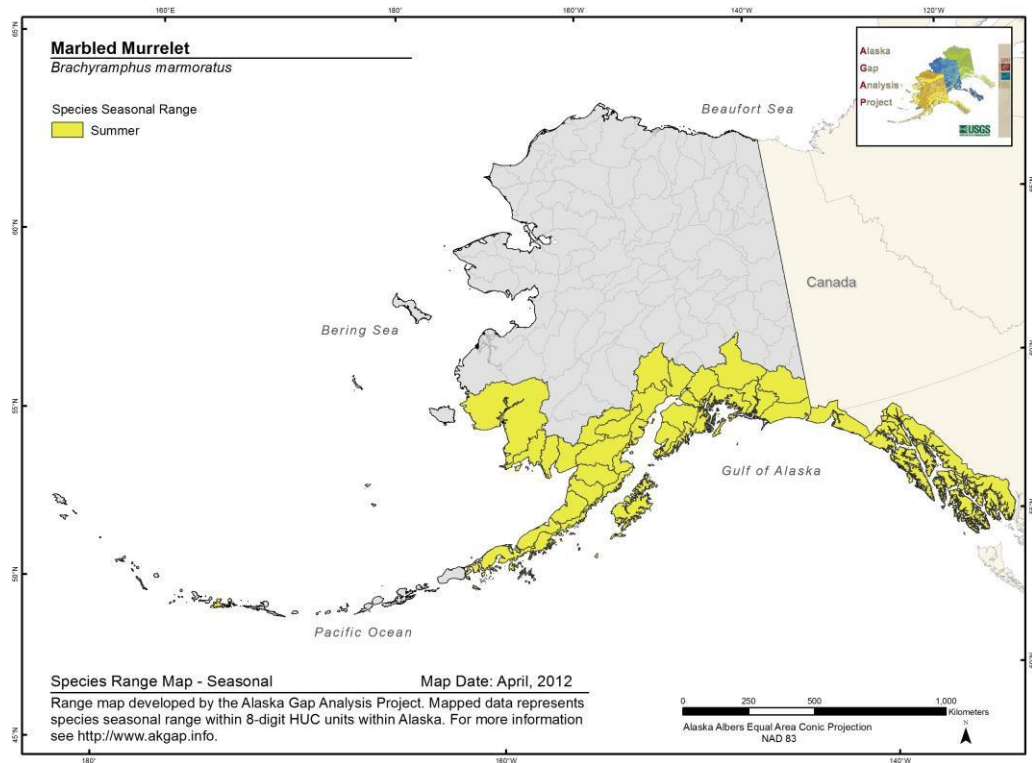
Marbled Murrelet *Brachyramphus marmoratus*

Range Map and Distribution Model Summary

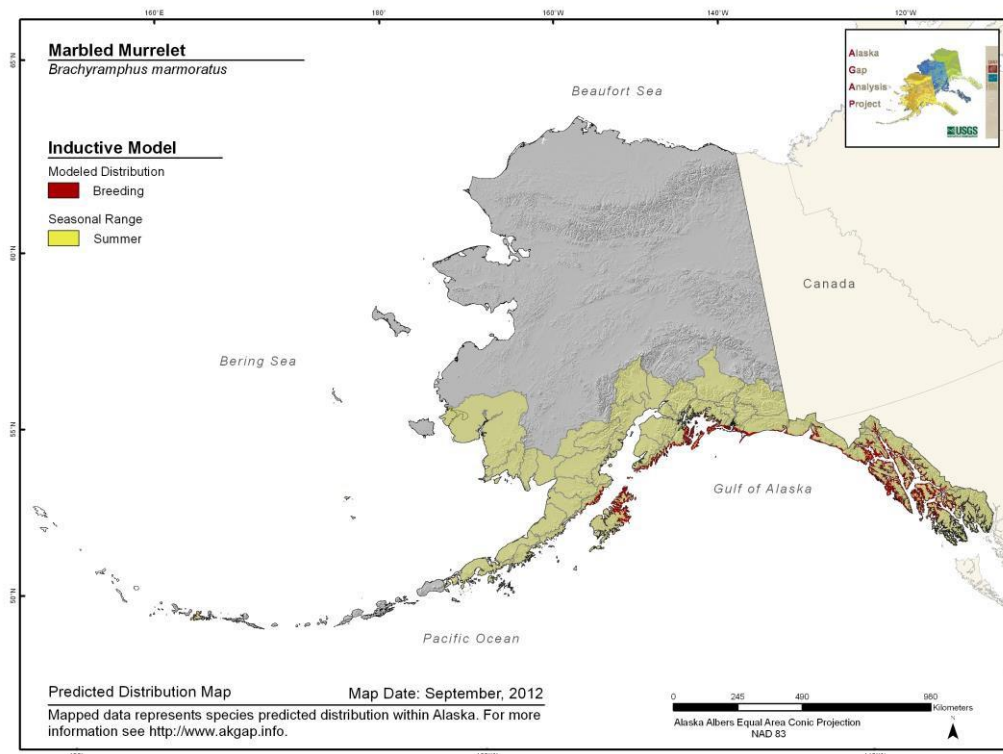
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.838**

**Model Quality
Summary:**
Moderate

Habitat Description

Nest in old-growth trees in forested areas or on ground on islands and along coasts near sea-facing talus slopes or cliffs (USFWS 2006a, Nelson 1997). Require available platforms with moss or thick substrate (Nelson 1997). Nest associated variables in Alaska were heads of bays, percent epiphyte on trees, tree diameter, presence of nesting platform, and percent cover of old-growth trees (Kuletz et al. 1995). In Prince William Sound, nests were at low elevations near heads of bays with extensive cover of large old-growth trees (Kuletz et al. 1995, Naslund et al. 1995). Along the Kenai coast, however, heads of bays were recently deglaciated and murrelet activity was highest on outer peninsulas, where forest cover was greatest (Kuletz et al. 1995). On Naked, Kodiak, and Afognak Islands, all nests were in old-growth forests on moss-covered platforms of western hemlock (*Tsuga heterophylla*), mountain hemlock (*T. mertensiana*) and Sitka Spruce (*Picea sitchensis*) (Naslund et al. 1995). Ford (1995) reported a cliff-top nest in old-growth forest in southeastern Alaska.

References

Ford, C. 1995. Unusual marbled murrelet nest. *Wilson Bull.*, 107(1):178-179.

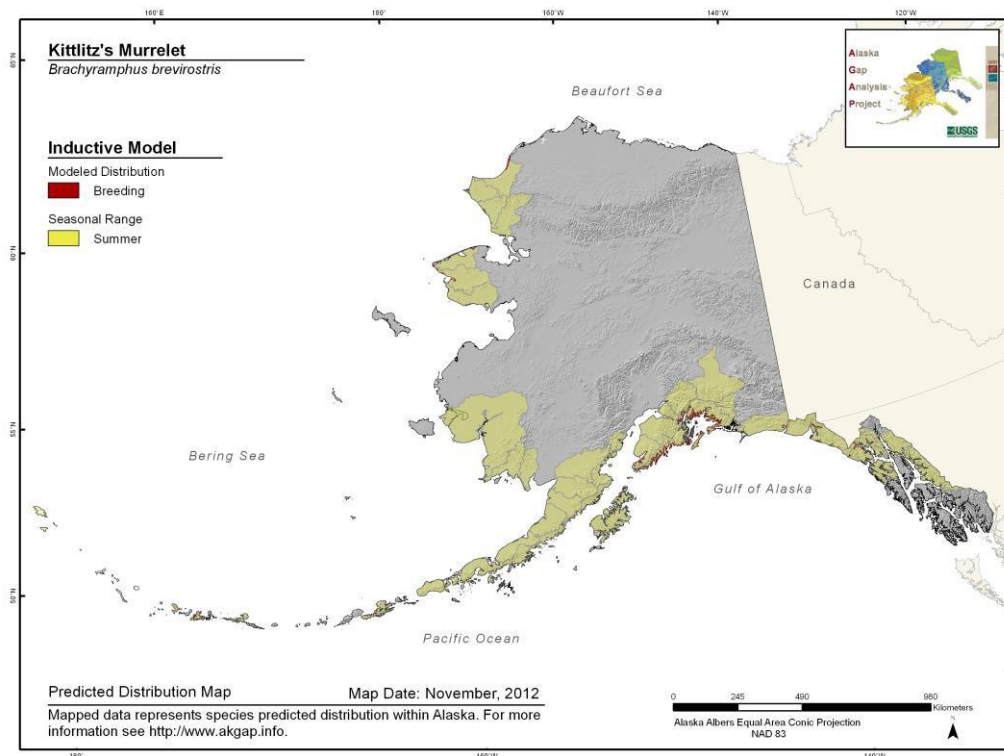
Kuletz, K. J., D. K. Marks, N. L. Naslund, N. J. Goodson, and M. B. Cody. 1995. Inland habitat suitability for Marbled Murrelets in southcentral Alaska. Pp. 141-150 in *Ecology and conservation of the Marbled Murrelet* (C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, and J. F. Piatt, eds.). USDA, USFS Gen. Tech. Rep. PSW 152, Albany, CA.

Naslund, N. L., K. J. Kuletz, M. B. Cody, and D. K. Marks. 1995. Tree and habitat characteristics and reproductive success at marbled murrelet tree nests in Alaska. *Northwestern Naturalist* 76:12-15

Nelson, S. K. 1997. Marbled Murrelet (*Brachyramphus marmoratus*) In *The Birds of North America*, No.276 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger. USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.6**

**Model Quality
Summary:**
Low

Habitat Description

Nests on coastal cliffs, and barren ground, rock ledges, and talus above timberline in coastal mountains, generally near glaciers (AOU 1983), 0.25 to 75 kilometers inland (Piatt et al. 1999). Nests generally on ground on barren scree slopes, short distance below peak or ridge (Day et al. 1983, Day 1995, Piatt et al. 1999). Breeding generally occurs in high elevation alpine areas, with little or no vegetative cover. When present, vegetation is primarily comprised of lichens and mosses (Day et al. 1993).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Day, R.H. 1995. New information on Kittlitz's Murrelet nests. *The Condor* 97:271-273.

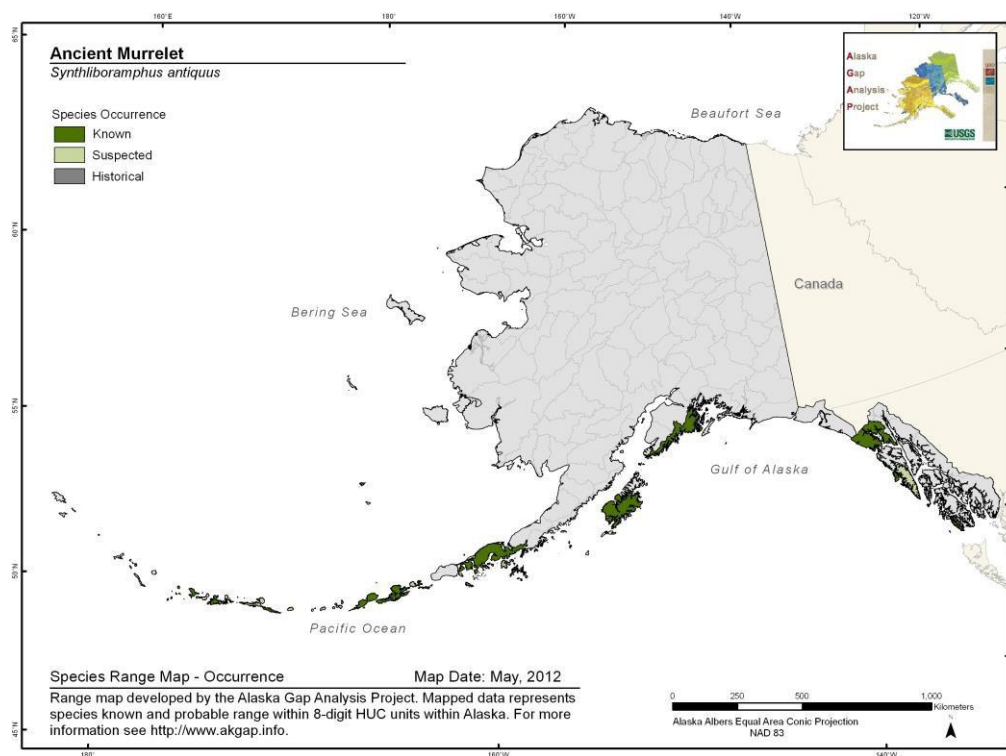
Day, R.H., K.L. Oakley and D.R. Barnard. 1983. Nest sites and eggs of Kittlitz's and Marbled Murrelets. *Condor* 85(3):265-273.

Piatt, J. F., N. L. Naslund and T. I. van Pelt. 1999. Discovery of a new Kittlitz's Murrelet nest: clues to habitat selection and nest-site fidelity. *Northwest Nat.* 80:8-13.

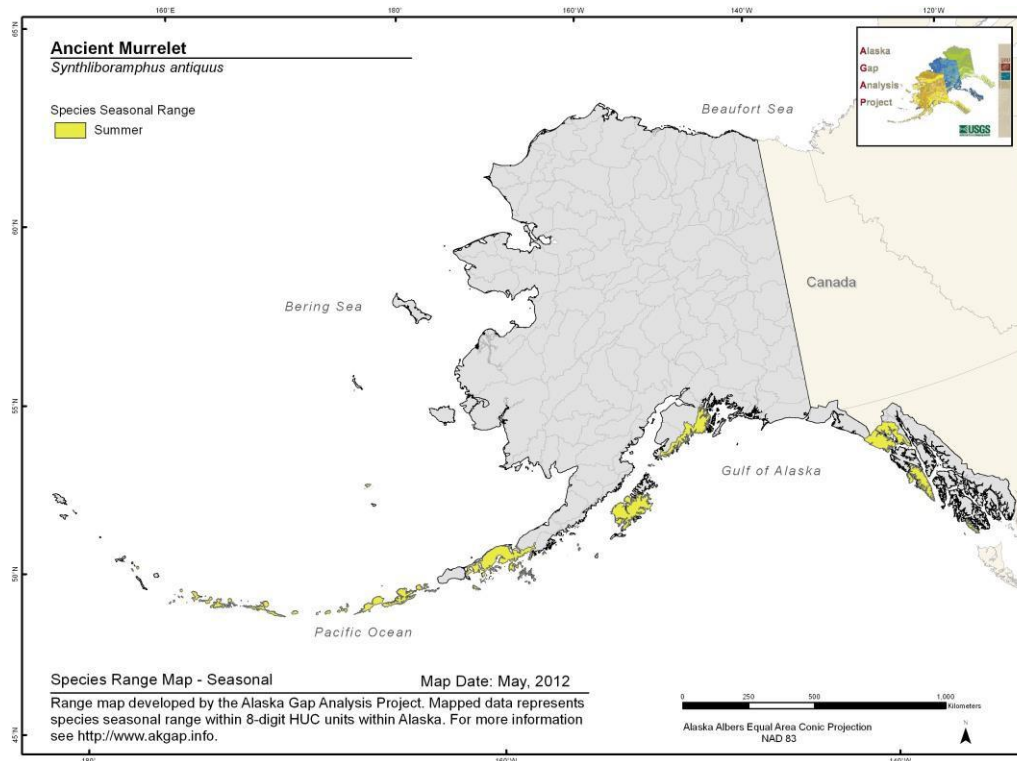
Ancient Murrelet *Synthliboramphus antiquus*

Range Map and Distribution Model Summary

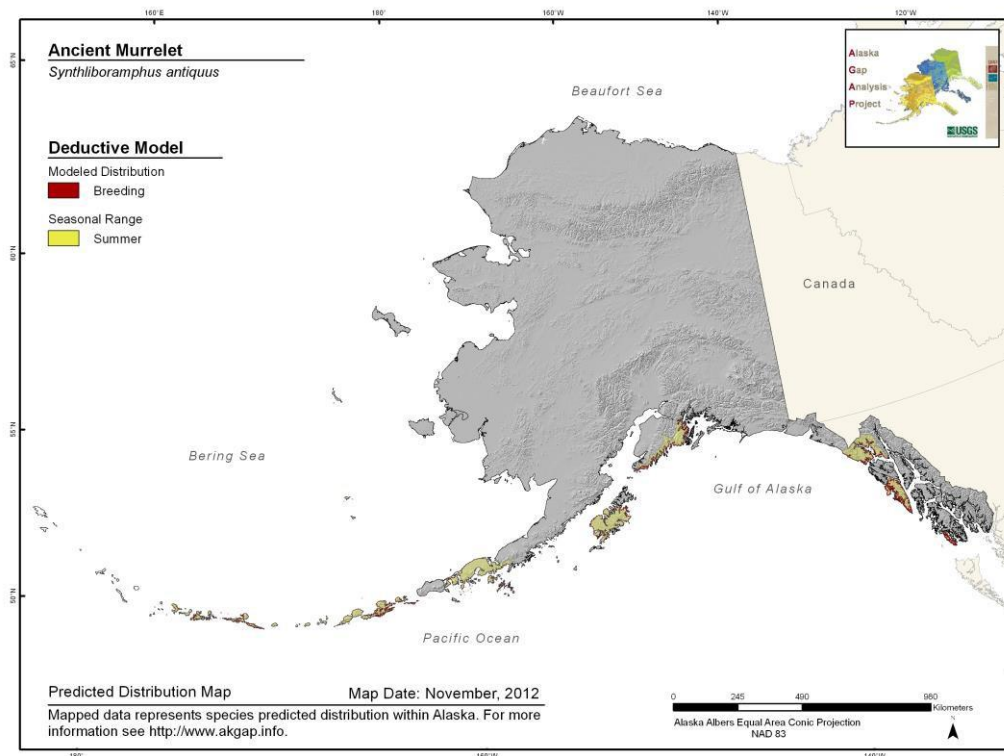
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Breed in colonies on forested islands or islands covered with grass or forbs. In British Columbia, nests under Sitka spruce, western hemlock, and western redcedar and nests farther inland than any other colonial alcid in the province (Campbell et al. 1990).

Rears chicks entirely at sea (USFWS 2006a). Forages off Continental Shelf or slope waters and sometimes inshore waters (Bent 1919, Gaston 1992).

References

Bent, A. C. 1919. Life histories of North American diving birds. U. S. National Museum Bulletin No. 107.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

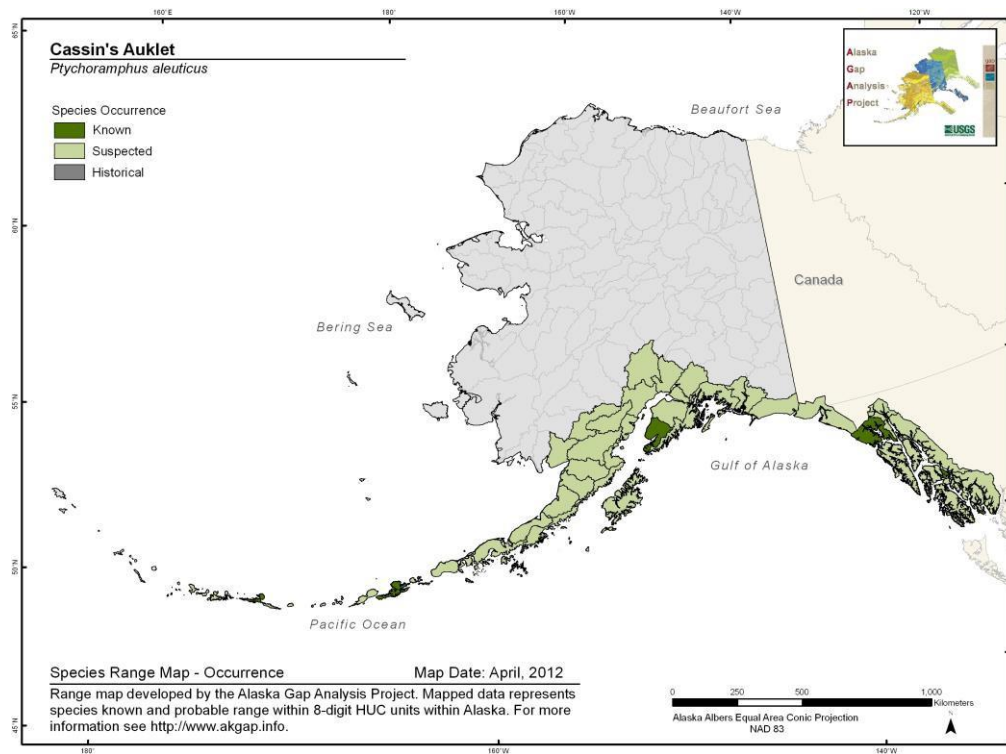
Gaston, A. J. 1992. The Ancient Murrelet: a natural history in the Queen Charlotte Islands. T. & A. D. Poyser, London.

USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger. USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

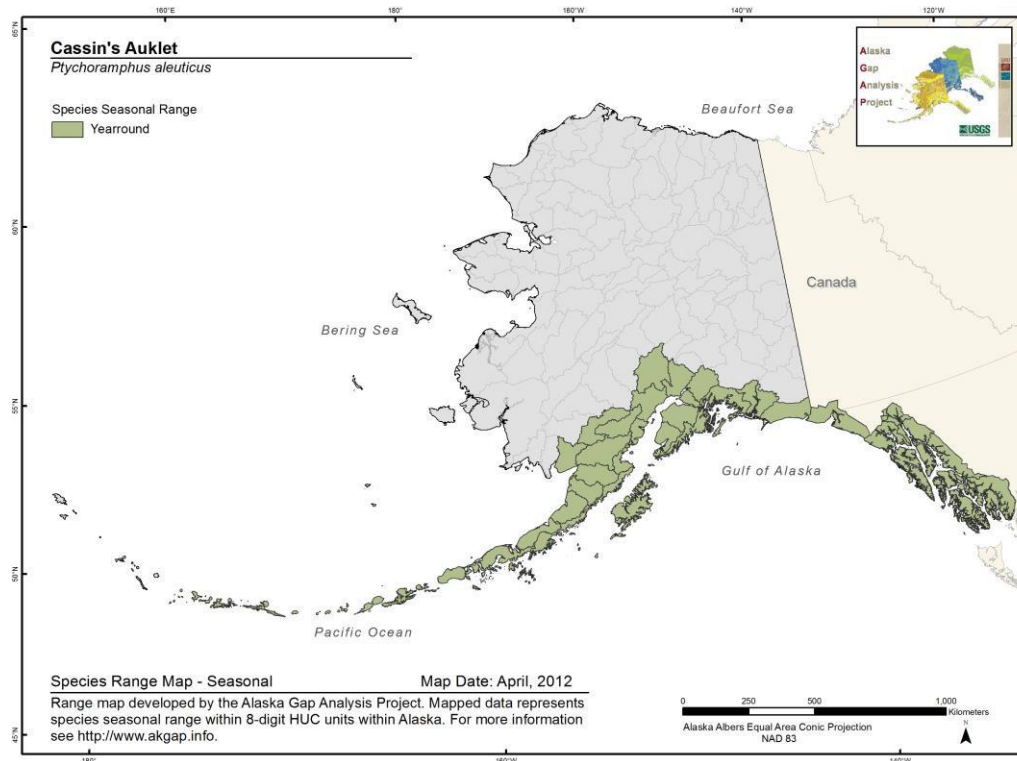
Cassin's Auklet *Ptychoramphus aleuticus*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

**Model
Evaluation
Statistic
(AUC): No
AUC**

Model Quality**Summary:**

Not validated

Habitat Description

Breeds on almost any type of island, including steep cliffs, leveled areas, and slopes areas. Islands may be treeless or covered by trees. In B.C., this species breeds in grasses and shrubs on some islands, and in Sitka spruce, western hemlock, and western redcedar forests on other island (Campbell et al. 1990). In the winter this species is pelagic and in B. C. is only rarely seen close to shore (Campbell et al. 1990).

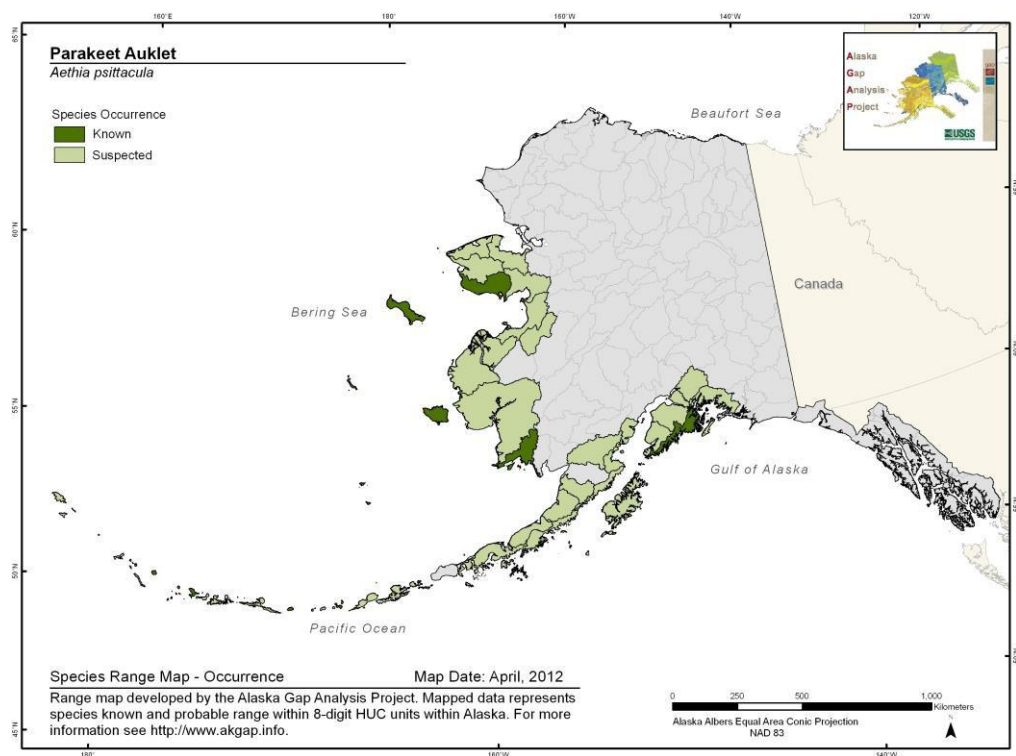
References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

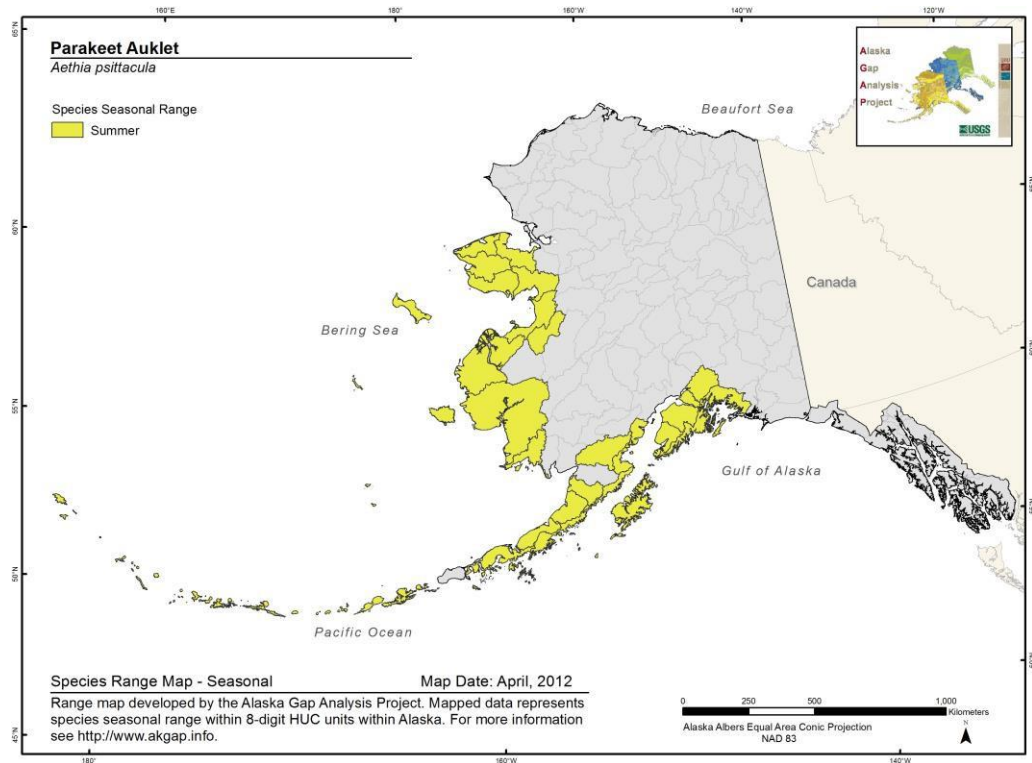
Parakeet Auklet *Aethia psittacula*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:
Rejected all models

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nests in crevices or holes in rocky cliffs, under loose piles of water-worn boulders on high rocky islands, among boulders on beaches, and on turf-covered rock slopes (Terres 1980, AOU 1983, Harrison 1978). Disperses more widely over deep offshore marine waters compared to other auklet species, feeding over stratified mixed and shelf water and avoiding turbulence and upwellings (Hunt et al. 1993, 1998).

References

AOU. 1983. Check-list of North American birds. 6th ed.American Ornithologists' Union, Washington D. C.

Harrison, C. 1978. A Field Guide to the Nests, Eggs and Nestlings of North American Birds. Collins, Cleveland, Ohio.

Hunt, G. L., N. M. Harrison, and J. F. Piatt. 1993. Diets and the selection of foraging habitat by planktivorous auklets in the Bering Sea. Status and conservation of seabirds in the North Pacific. Proc. Pac. Seabird Group Symp., Victoria, B.C.

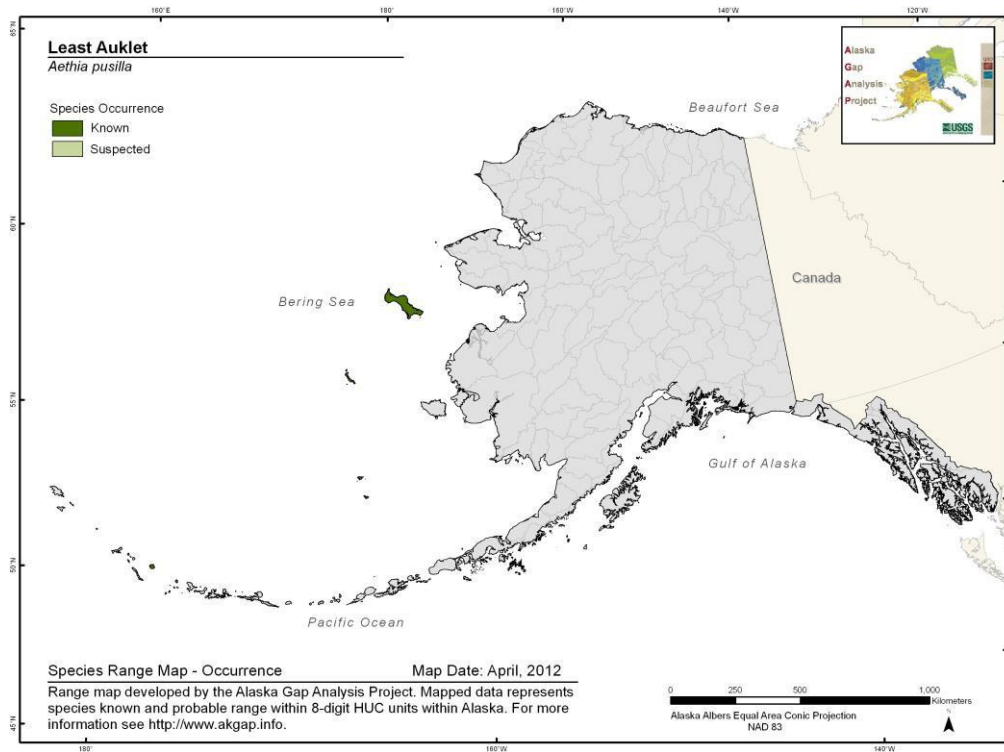
Hunt, G. L., Jr., R. W. Russell, K. O. Coyle, and T. Weingartner. 1998. Comparative foraging ecology of planktivorous auklets in relation to ocean physics and prey availability. Mar. Ecol. Prog. Ser. 167: 241-259.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

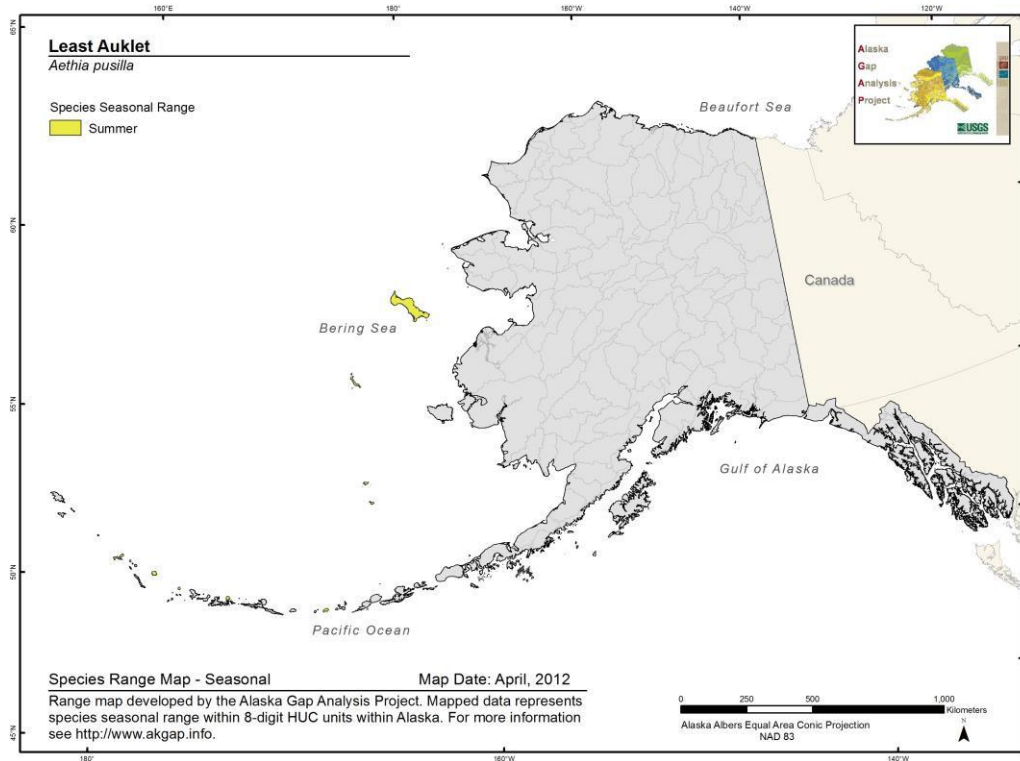
Least Auklet *Aethia pusilla*

Range Map and Distribution Model Summary

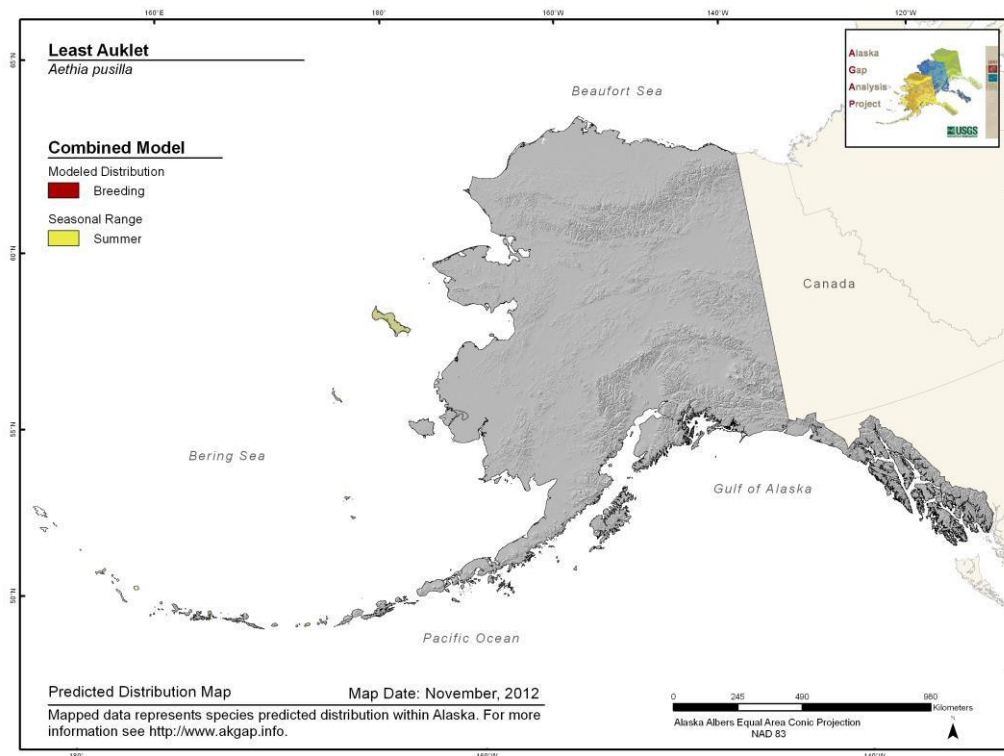
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.533**

**Model Quality
Summary:**
Low

Habitat Description

Nest in rock crevices on rocky beaches, sea-facing talus slopes, cliffs, boulder fields, and lava flows. Typically on unvegetated talus. Forages on open ocean (Hunt and Harrison 1990, Hunt et al. 1993). All colonies, with the exception of one on St. Mathew Island, are located on volcanic islands adjacent to deep water (USFWS 2006a).

References

Hunt, G. L. and N. M. Harrison. 1990. Foraging habitat and prey taken by Least Auklets at King Island, Alaska. Mar. Ecol. Prog. Ser. 65: 141-150.

Hunt, G. L., N. M. Harrison, and J. F. Piatt. 1993. Diets and the selection of foraging habitat by planktivorous auklets in the Bering Sea. Status and conservation of seabirds in the North Pacific. Proc. Pac. Seabird Group Symp., Victoria, B.C.

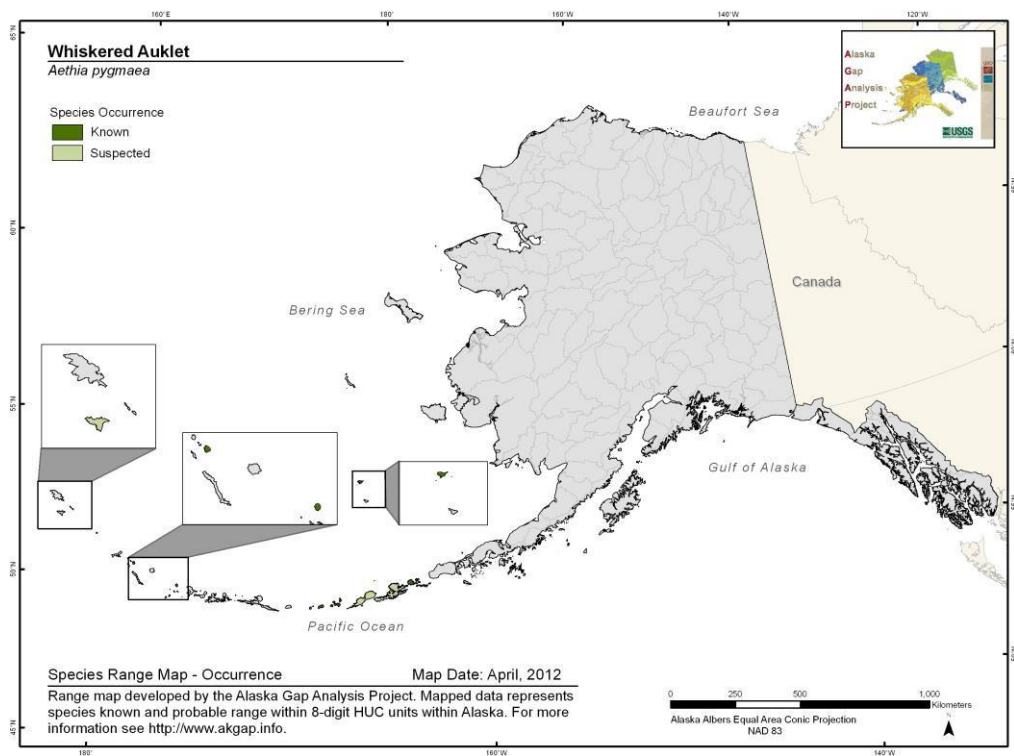
USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger. USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

Whiskered Auklet

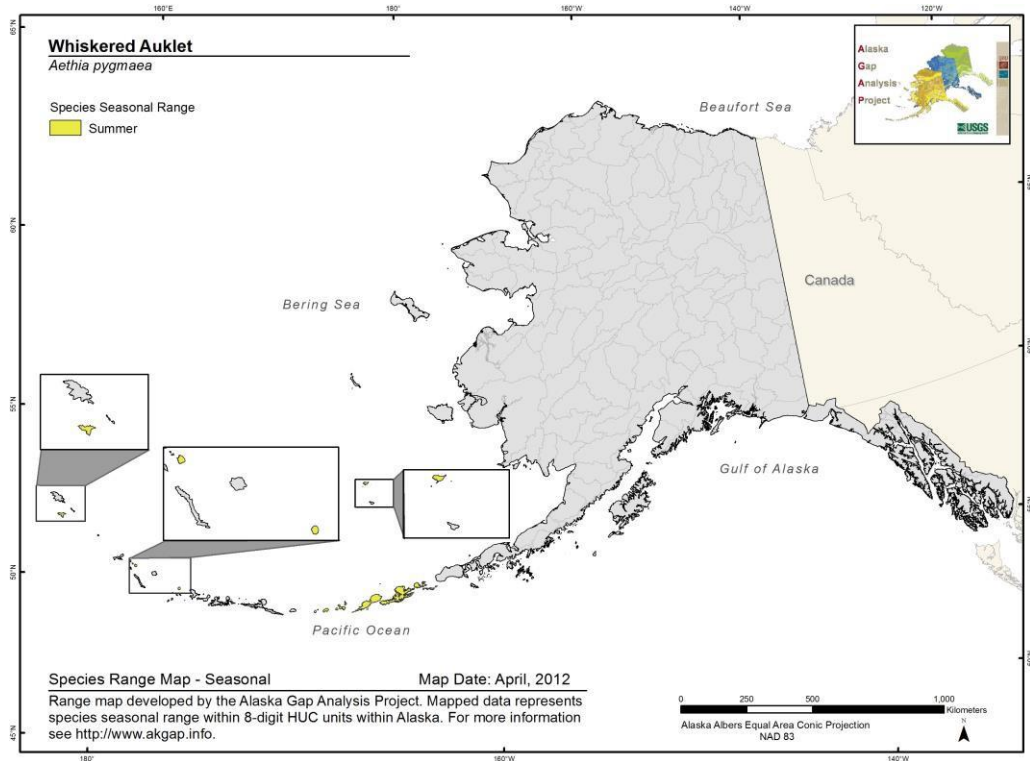
Aethia pygmaea

Range Map and Distribution Model Summary

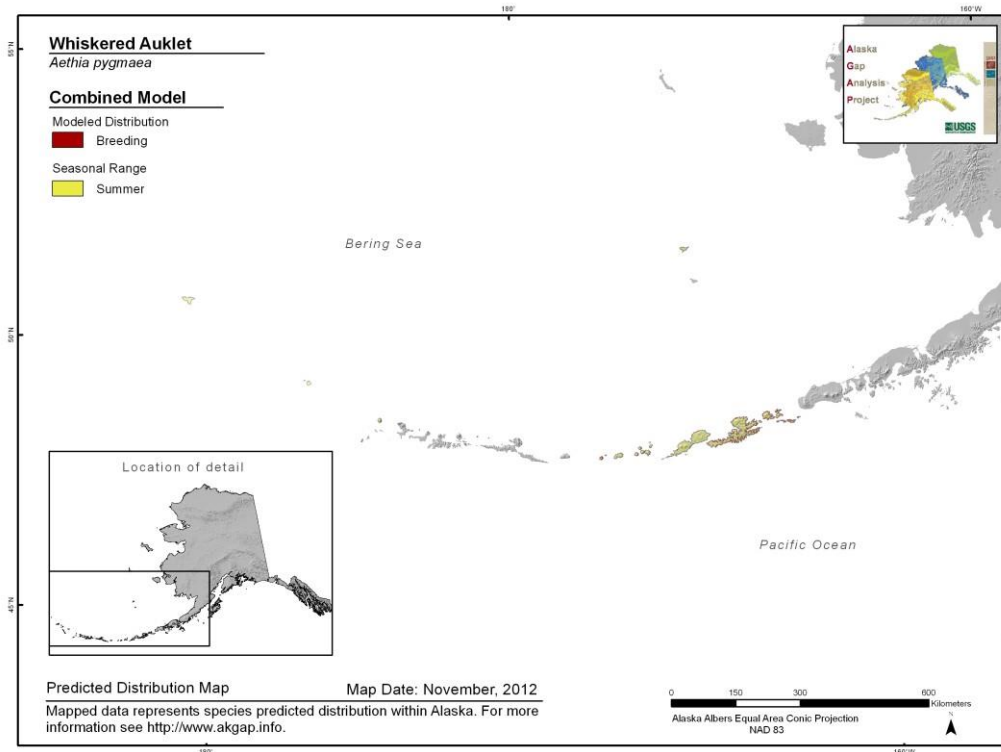
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.5**

Model Quality Summary:
Low

Habitat Description

Lays egg in small crevice on cliff face, talus slope, grassy slope with rocky outcrops, on cobble-boulder beach (USFWS 2006a), or on lava flows on high slopes (AOU 1983).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

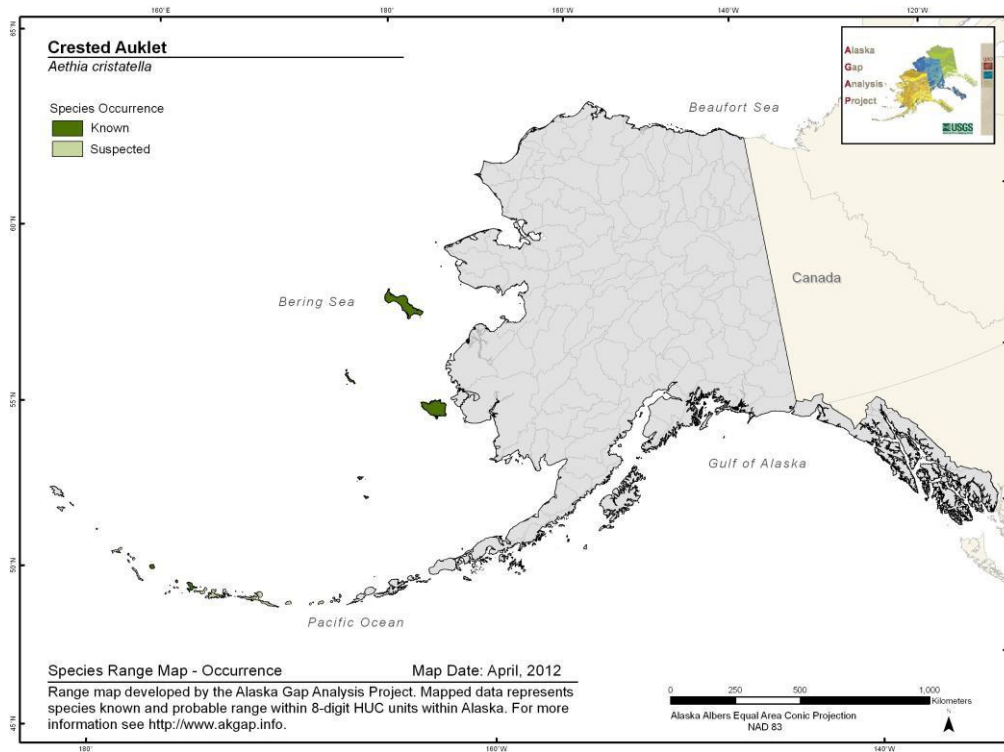
USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger.

USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

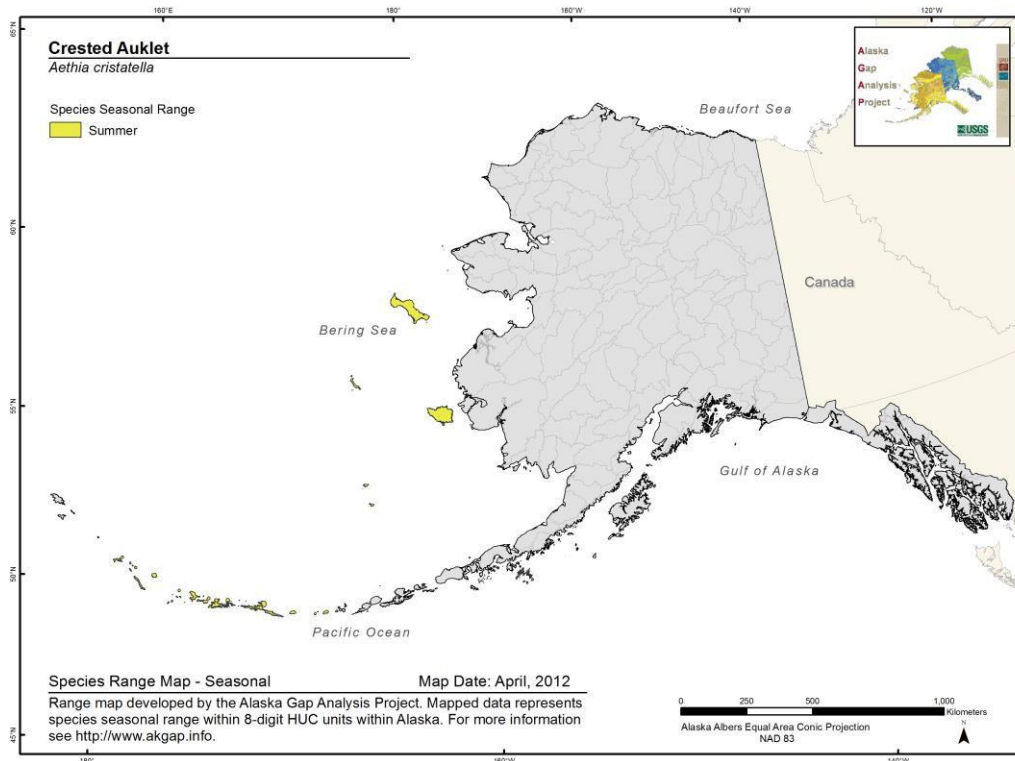
Crested Auklet *Aethia cristatella*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

**Model
Evaluation
Statistic
(AUC): No
AUC**

**Model Quality
Summary:**

Not validated

Habitat Description

Breeding colonies located on sea-facing talus slopes, cliffs, boulder fields, and lava flows with abundant rock crevices. Almost all breeding colonies on volcanic islands adjacent to deep water or where deep oceanic water is transported passed colonies (Knutson and Byrd 1982, Jones 1993, USFWS 2006a).

References

Knutson, E. P. and G. V. Byrd. 1982. Breeding biology of crested, least, and whiskered auklets on Buldir Island, Alaska. Condor 84: 197-202.

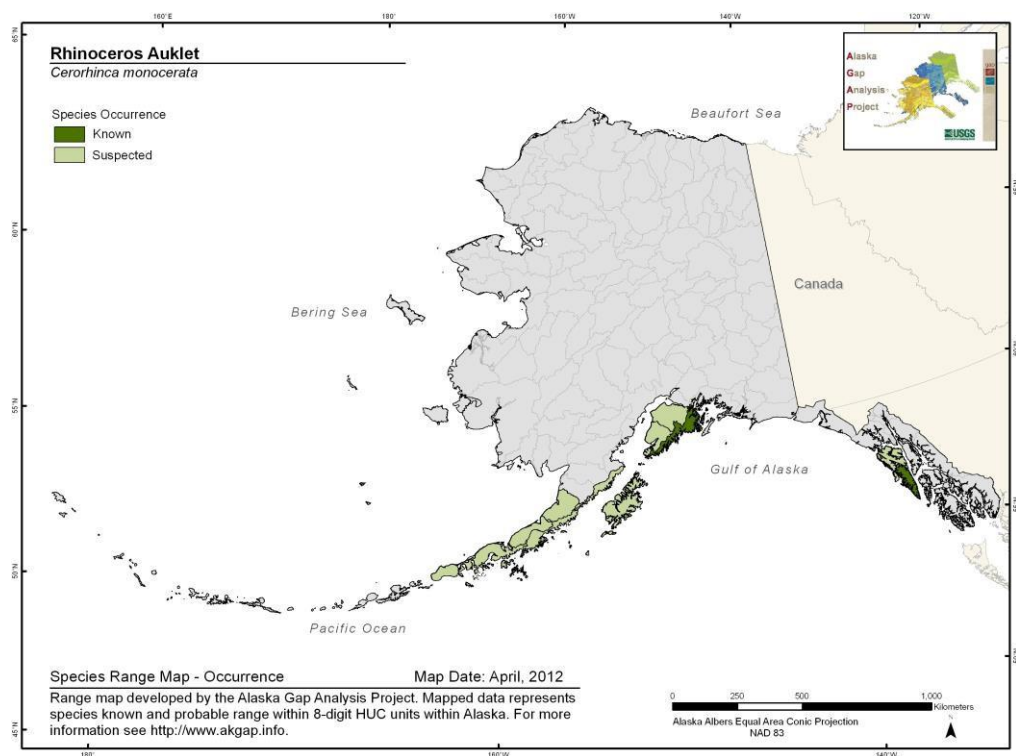
Jones, I. L. 1993. Crested Auklet (*Aethia cristatella*). In: A. Poole and F. Gill, (eds.). The Birds of North America, No.70. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

USFWS. 2006a. Alaska Seabird Information Series (ASIS) Draft report. Compiled by Lynn Denlinger. USFWS, Migratory Bird Management, Nongame Program, Anchorage, AK. Available online at: <http://alaska.fws.gov/mbmp/mbm/seabirds/species.htm>.

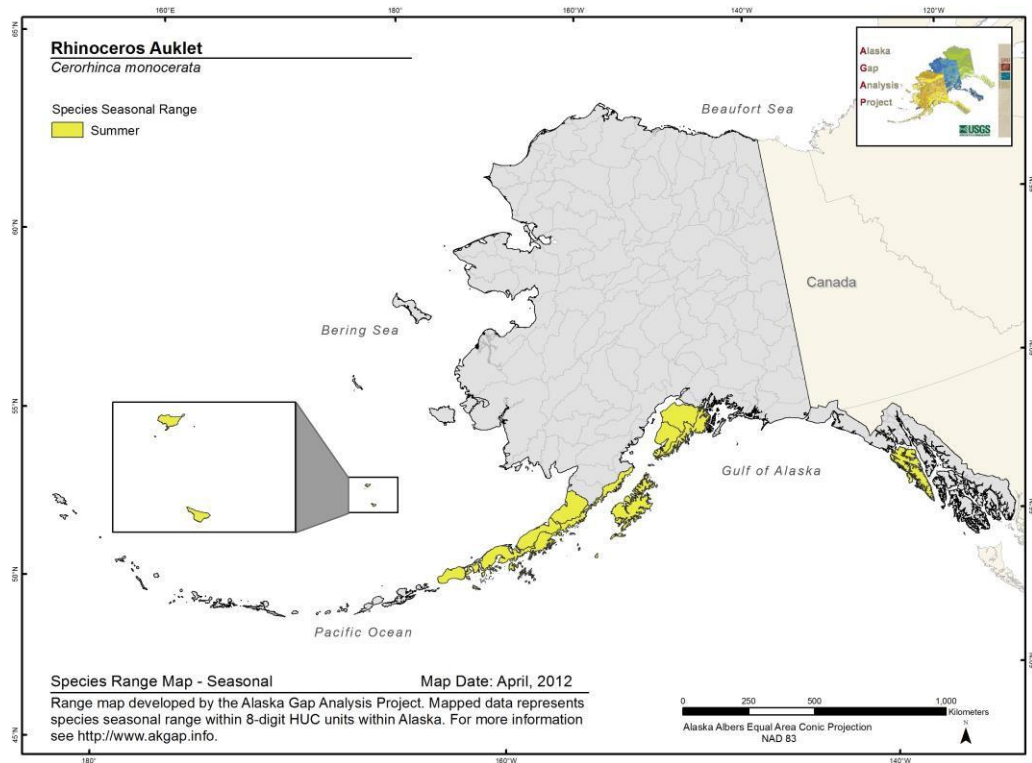
Rhinoceros Auklet *Cerorhinca monocerata*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

Model**Evaluation****Statistic**

(AUC): No

AUC

Model Quality**Summary:**

Not validated

Habitat Description

In B.C., this species breeds primarily on forested islands (Sitka spruce, western hemlock, and western redcedar) and less frequently on islands covered by grasses and shrubs. Burrows are typically within 100 m of the shoreline on a range of slopes from nearly level to more than 45 degrees (Campbell et al. 1990).

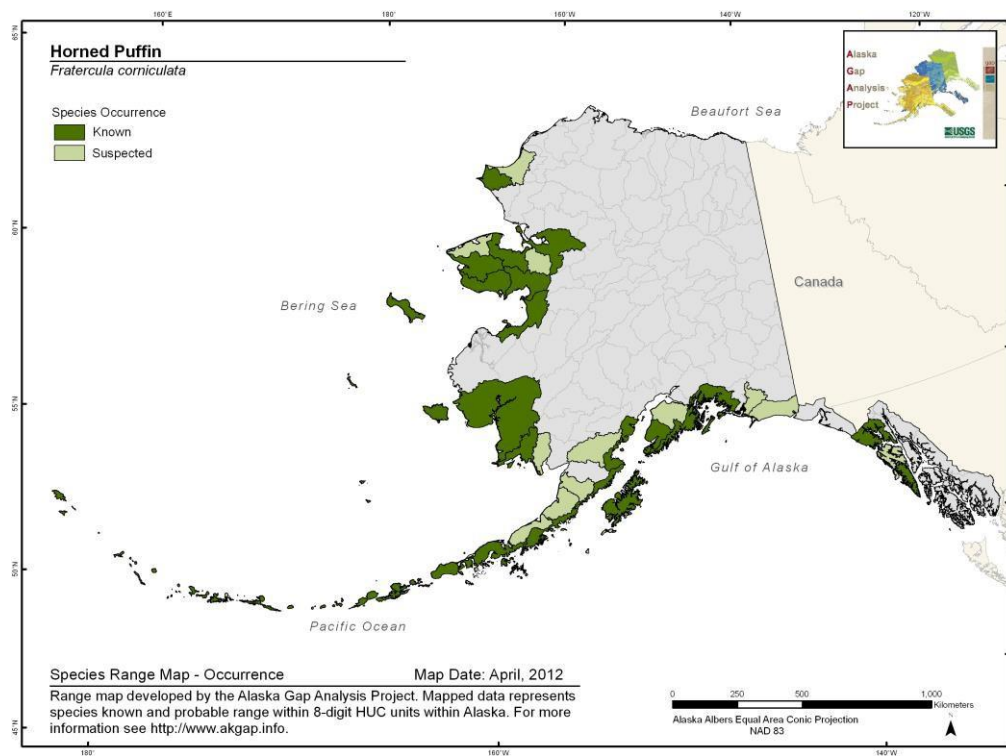
References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

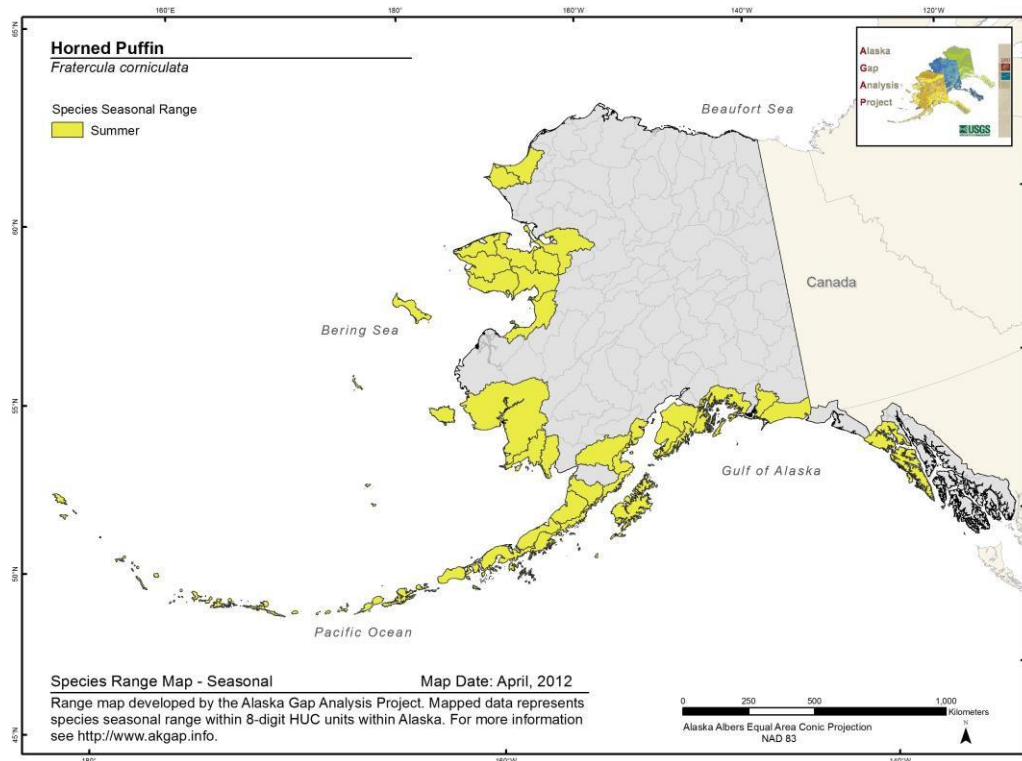
Horned Puffin *Fratercula corniculata*

Range Map and Distribution Model Summary

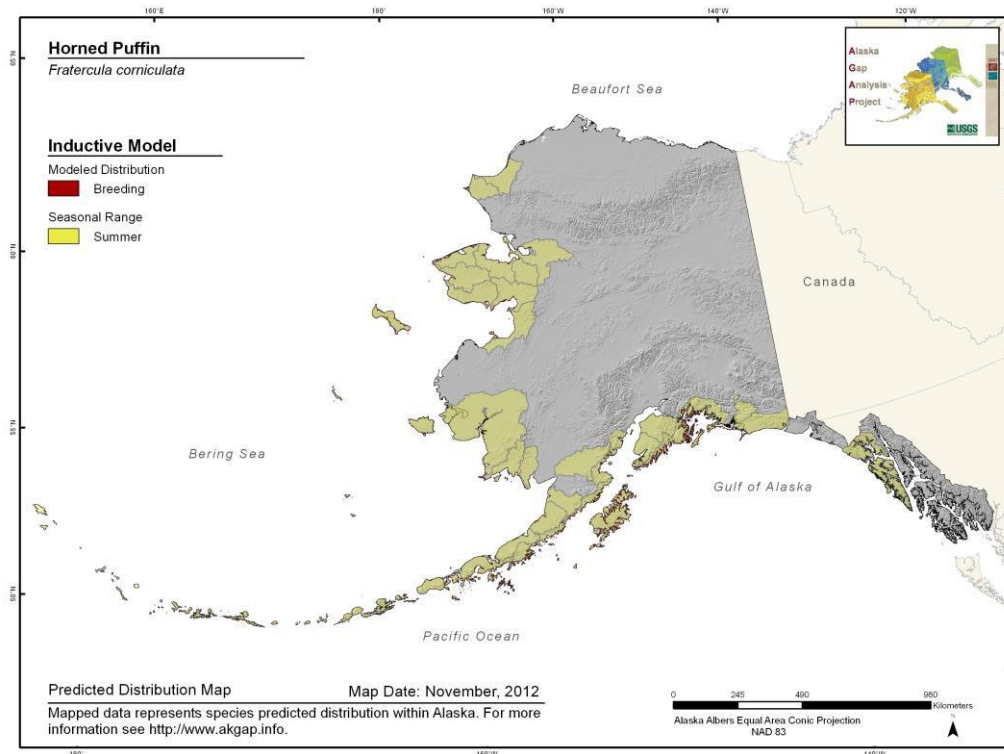
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.75**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds on barren islands and mainland cliffs (Piatt and Kitaysky 2002). Nests in cliff crevices and among boulders, rarely in ground burrows (AOU 1983). Forages offshore within 100 km of colony (Piatt and Kitaysky 2002).

References

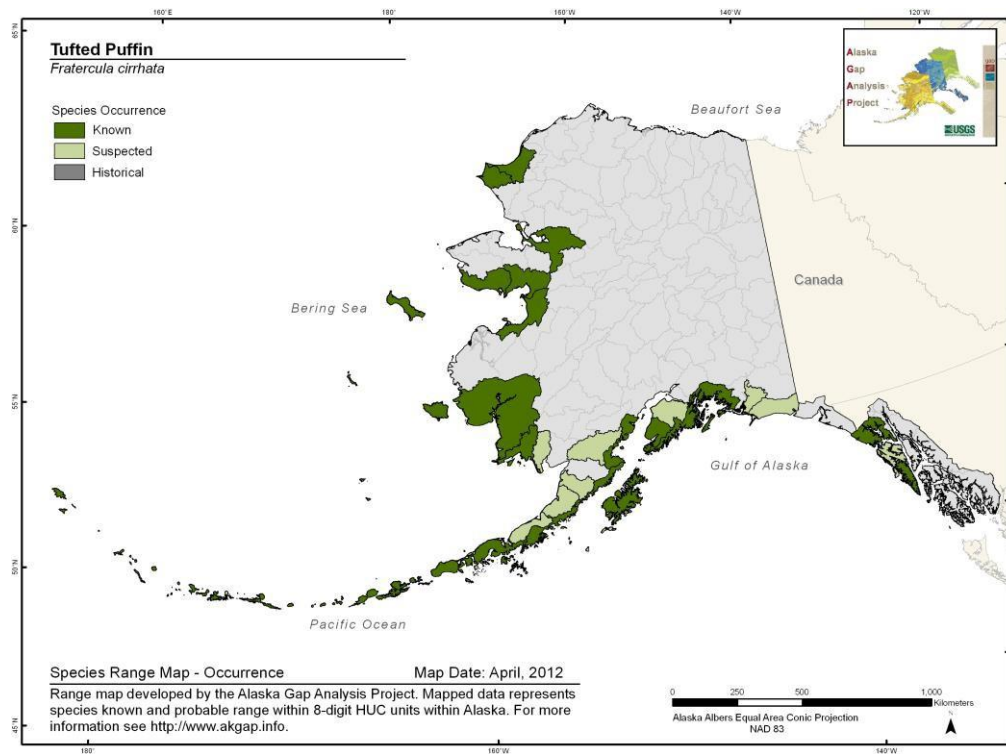
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Piatt, J. F. and A. S. Kitaysky. 2002. Horned puffin (*Fratercula corniculata*). In *The Birds of North America*, Vol. 16, No. 603 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

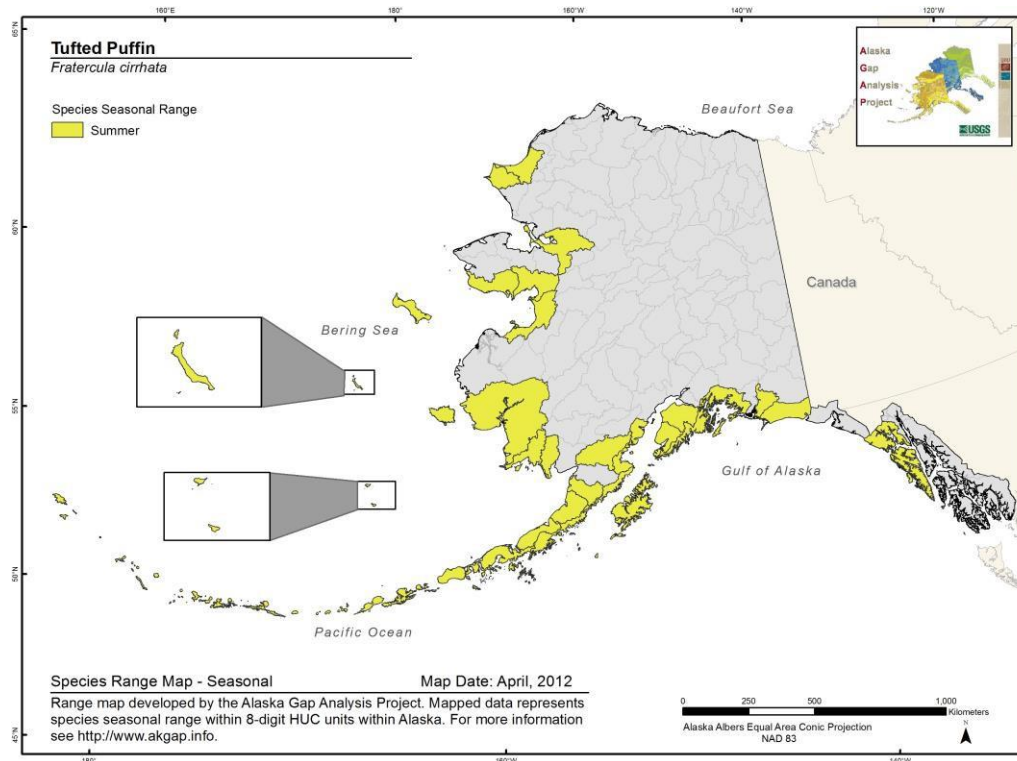
Tufted Puffin *Fratercula cirrhata*

Range Map and Distribution Model Summary

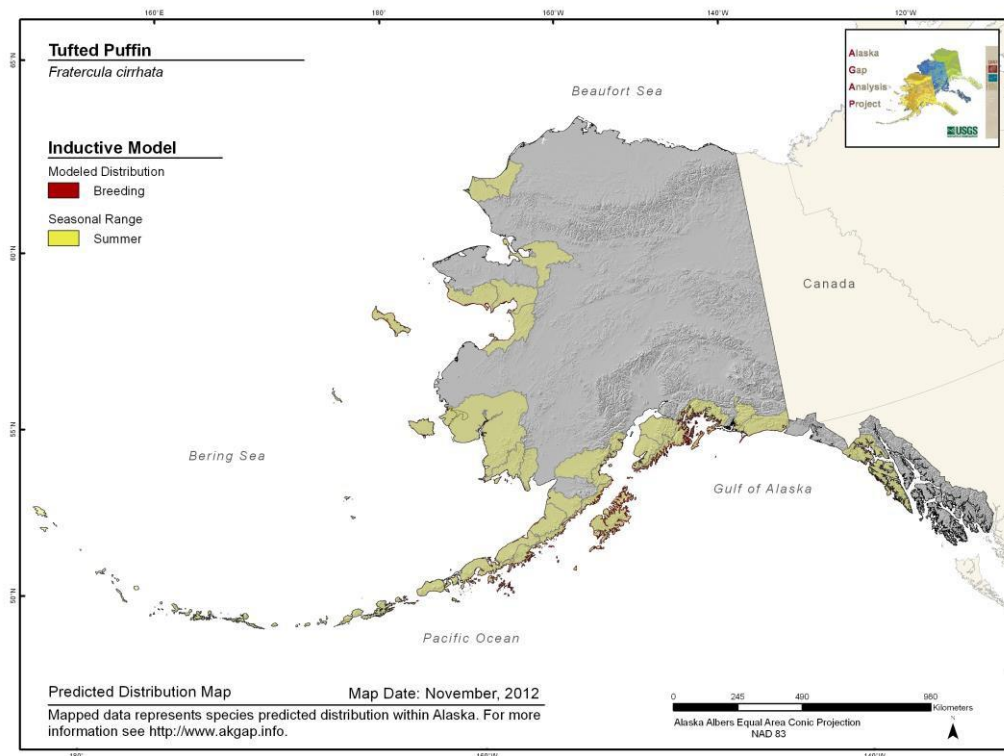
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.833**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests on offshore islands or along the coast. Islands are typically treeless and shrubless, and densely covered with grass tussocks (Campbell et al. 1990). Nests on slopes, preferably steep, in ground burrows, sometimes under boulders and piles of rocks, occasionally under dense vegetation (AOU 1983); also recorded nesting in sandy estuarine islands along north-central Alaska Peninsula (Spendelov and Patton 1988). In B.C. colonies range from 8 to 130 m above sea level (Campbell et al. 1990). Forages within 100 km of colonies in bay, shelf, and shelf-edge habitats (Hunt et al. 1981, Gould et al. 1982, Harrison 1982, Piatt et al. 1990, 1992, Piatt 1993, 2002).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Gould, P. J., D. J. Forsell, and C. J. Lensink. 1982. Pelagic distribution and abundance of seabirds in the Gulf of Alaska and eastern Bering Sea. U.S. Dep. Int., Fish Wildl. Serv., Biol. Serv. Prog., OBS 82/48.

Harrison, C. S. 1982. Spring distribution of marine birds in the Gulf of Alaska. Condor 84: 245-254.

Hunt, G. L., P. J. Gould, D. J. Forsell, and H. Peterson. 1981. Pelagic distribution of marine birds in the eastern Bering Sea. Pp. 689-718 In: The eastern Bering Shelf: oceanography and resources (D. W. Hood and J. A. Calder, eds.). Natl. Oceanic Atmos. Admin., Washington, D.C.

Piatt, J. F. 1993. Oceanic, shelf, and coastal seabird assemblages at the mouth of a tidally-mixed estuary (Cook Inlet, Alaska). Fin. Rep. for Mineral Management Service (OCS Study MMS 93-0015). Anchorage, AK.

Piatt, J. F., ed. 2002. Response of seabirds to fluctuations in forage fish density. Fin. Rep. to Exxon Valdez Oil Spill Trustee Council (Restoration Project 00163M) and Minerals Management Service (Alaska OCS Region). Alaska Sci. Center, U.S. Geol. Surv., Anchorage, AK.

Piatt, J. F., J. L. Wells, A. MacCharles, and B. Fadely. 1990. The distribution of seabirds and their prey in relation to ocean currents in the southeastern Chukchi Sea. Can Wildl. Serv. Occas. Pap. 68: 21-31.

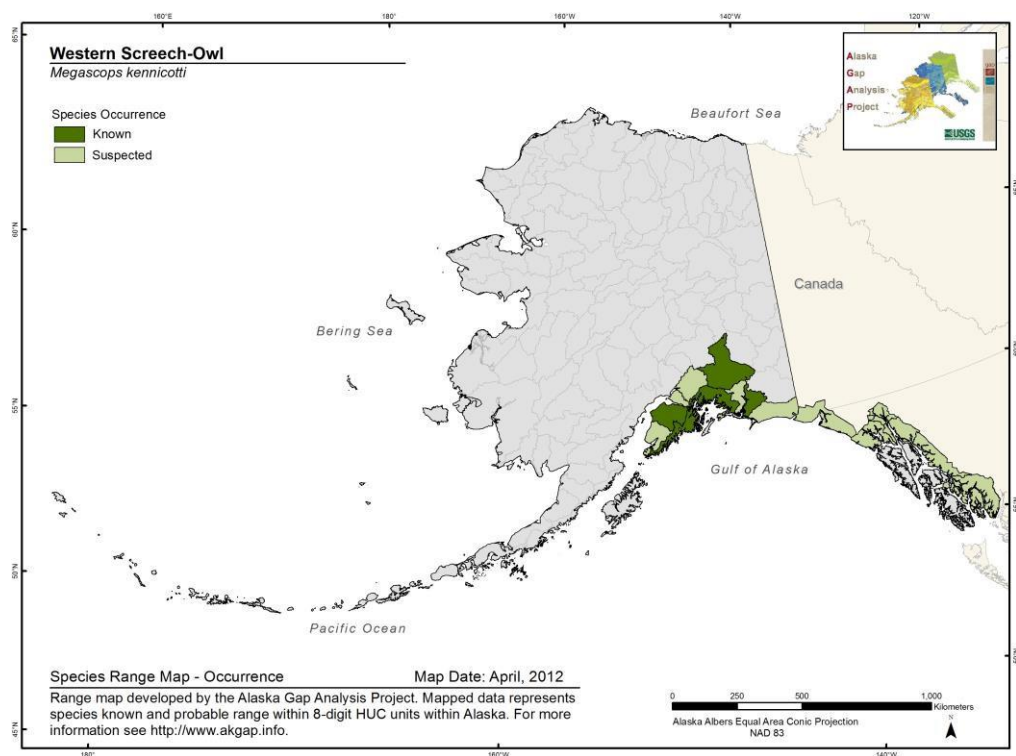
Piatt, J. F., A. Pinchuk, A. Kitaisky, A. M. Springer, and S. A. Hatch. 1992. Foraging distribution and feeding ecology of seabirds at the Diomed Islands. Fin. Rep. for Minerals Management Service (OCS Study MMS 92-041). Anchorage, AK.

Spendelov, J. A. and S. R. Patton. 1988. National Atlas of Coastal Waterbird Colonies in the Contiguous United States: 1976-1982. USFWS, Biological Report 88(5). X + 326 pp.

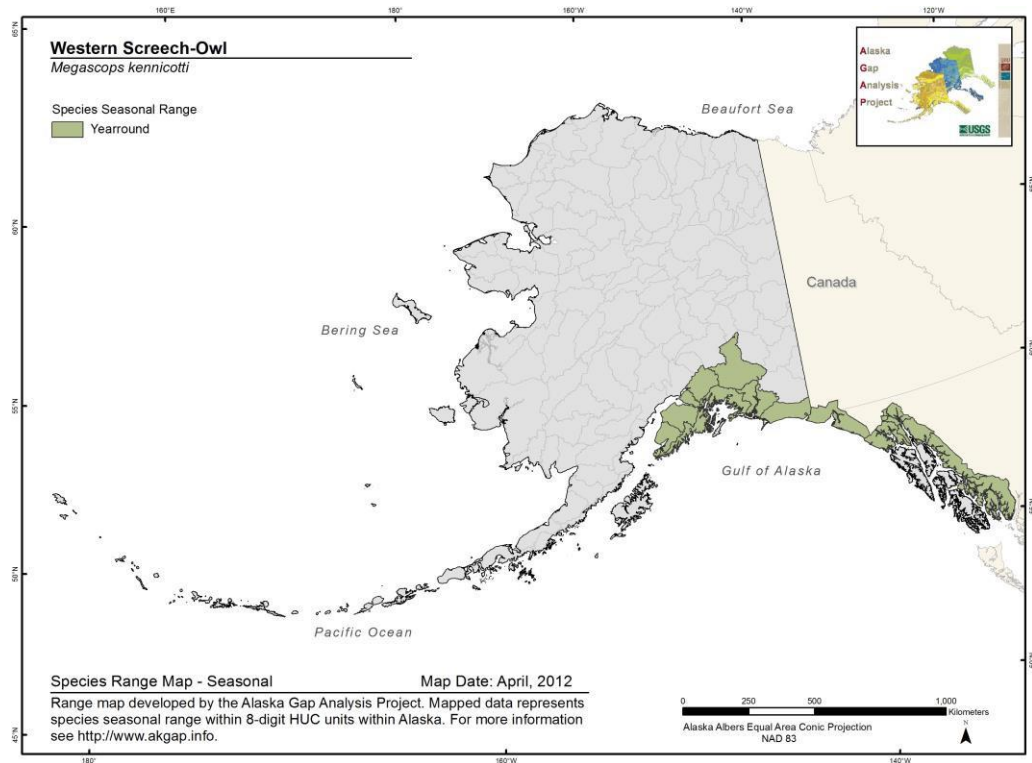
Western Screech-Owl *Megascops kennicottii*

Range Map and Distribution Model Summary

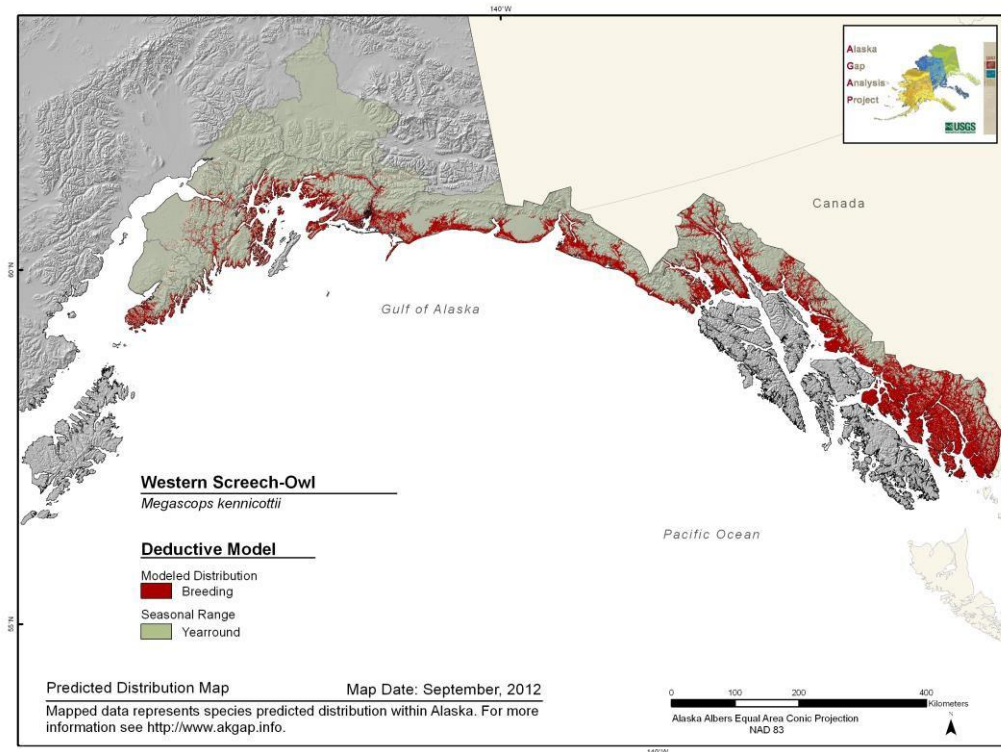
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.533**

**Model Quality
Summary:**
Low

Habitat Description

Diverse habitat requirements. Associated with riparian habitats and deciduous trees. Pacific Coast, including Alaska, found in mixed forests of big-leaf maple, red alder, Douglas fir, western hemlock and western red cedar. Nest in tree cavities either excavated by Northern Flickers or woodpeckers, natural cavities, or nest boxes. Nests near water. In Yakutat, favors riparian Spruce (Cannings and Angell 2001).

References

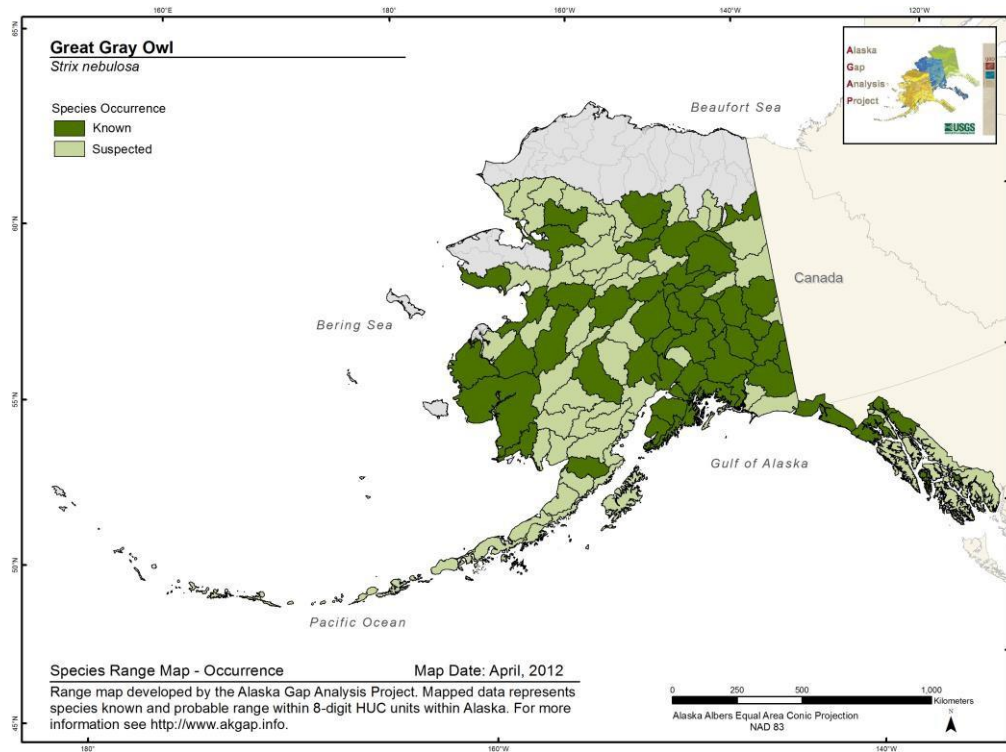
Cannings, R. J. and T. Angell. 2001. Western Screech-owl. In: The Birds of North America, No. 597 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Great Horned Owl

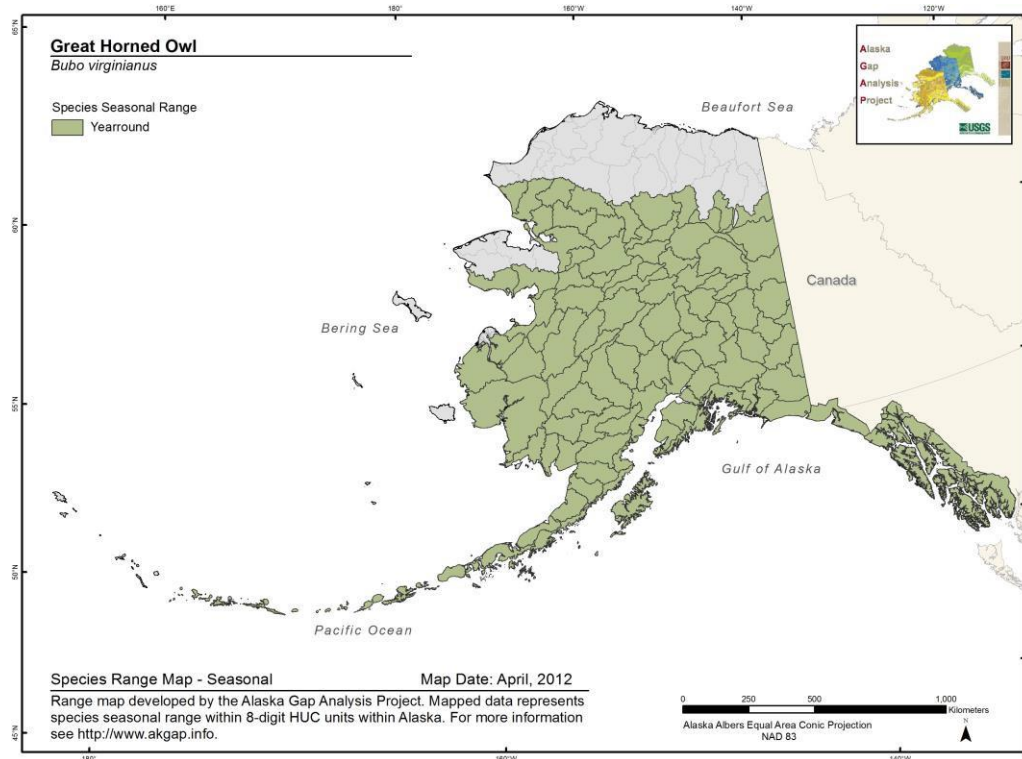
Bubo virginianus

Range Map and Distribution Model Summary

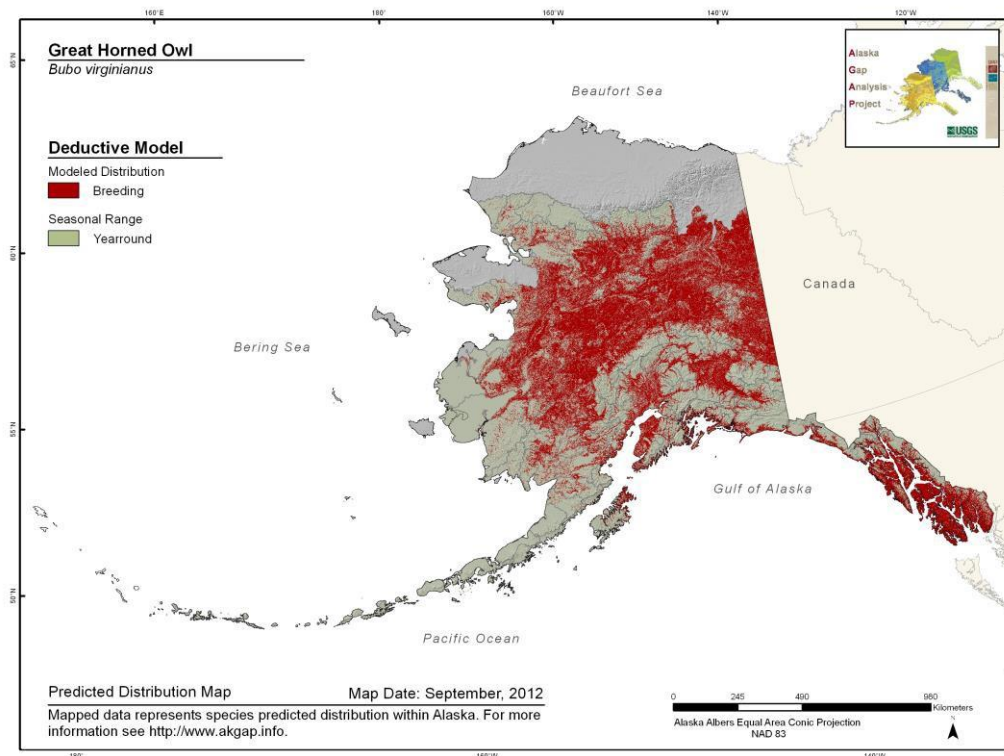
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.621**

**Model Quality
Summary:**
Low

Habitat Description

Wide variety of habitats, including deciduous, mixed, or conifer forests. Prefers open and secondary growth woodlands, swamps, agricultural areas, and orchards (Houston et al. 1998). Uses existing tree nests of a variety of species or may nest in cavities of trees, snags, cliffs, buildings, artificial nests, or on ground (Houston et al. 1998). In the Yukon, typically nests in mature spruce forest, but uses whatever habitat snowshoe hares (main prey) are plentiful in (Alexander et al. 2003).

References

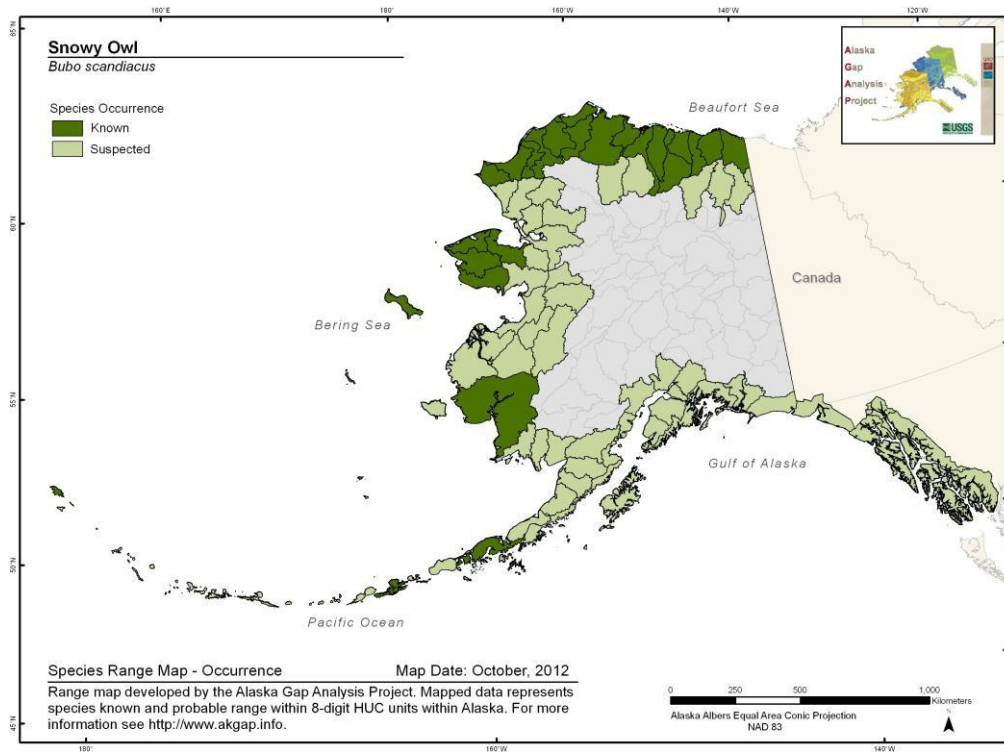
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Houston, C. S., D. G. Smith, and C. Rohner. 1998. Great Horned Owl (*Bubo virginianus*). In *The Birds of North America*, Vol. 7, No. 372 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

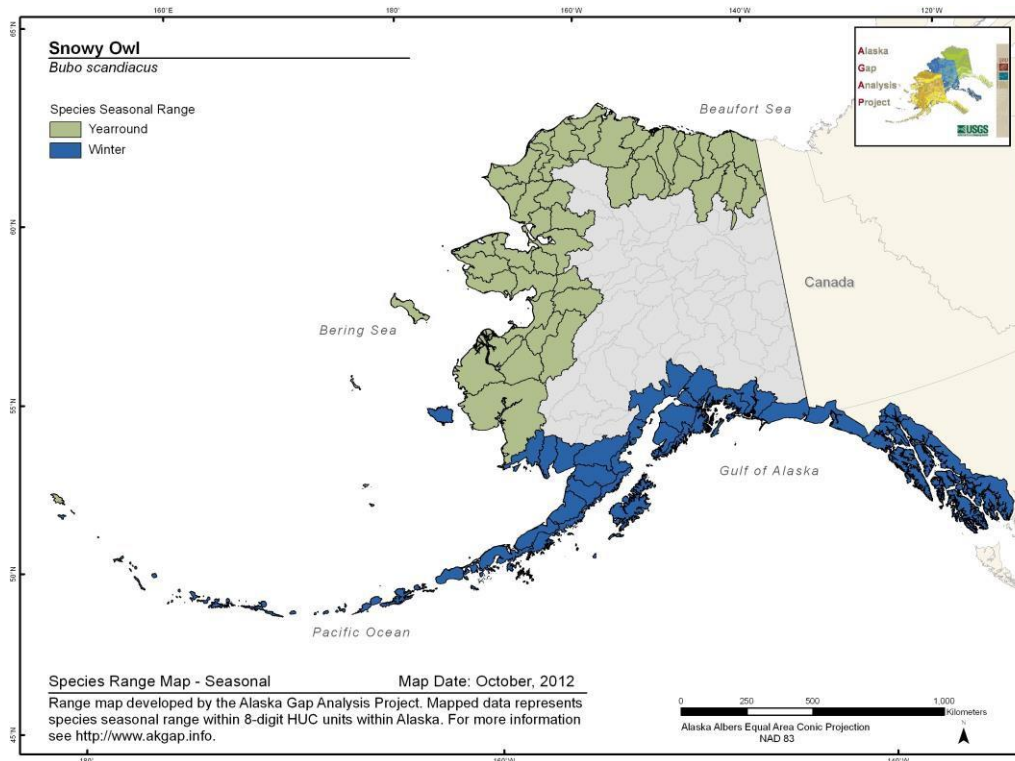
Snowy Owl *Bubo scandiacus*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

**Model
Evaluation
Statistic
(AUC): No
AUC**

Model Quality

Summary:

Not validated

Habitat Description

Breeding habitat is on open tundra from near treeline to edges of polar seas. Prefers areas with mounds, hillocks or rocks that serve as perches and nest sites, also sparse, low vegetation and dwarf shrubs and lichen (Holt et al. 1999). In the Yukon, this species inhabits tussock tundra on the coastal plain (Alexander et al. 2003). Winter habitat includes open country such as prairie, marshes, fields, pastures and sand dunes (AOU 1983) or tidal shores where prey is most available. Hunts in lowland salt grass meadows or poorly drained freshwater meadows (Parmelee 1992).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

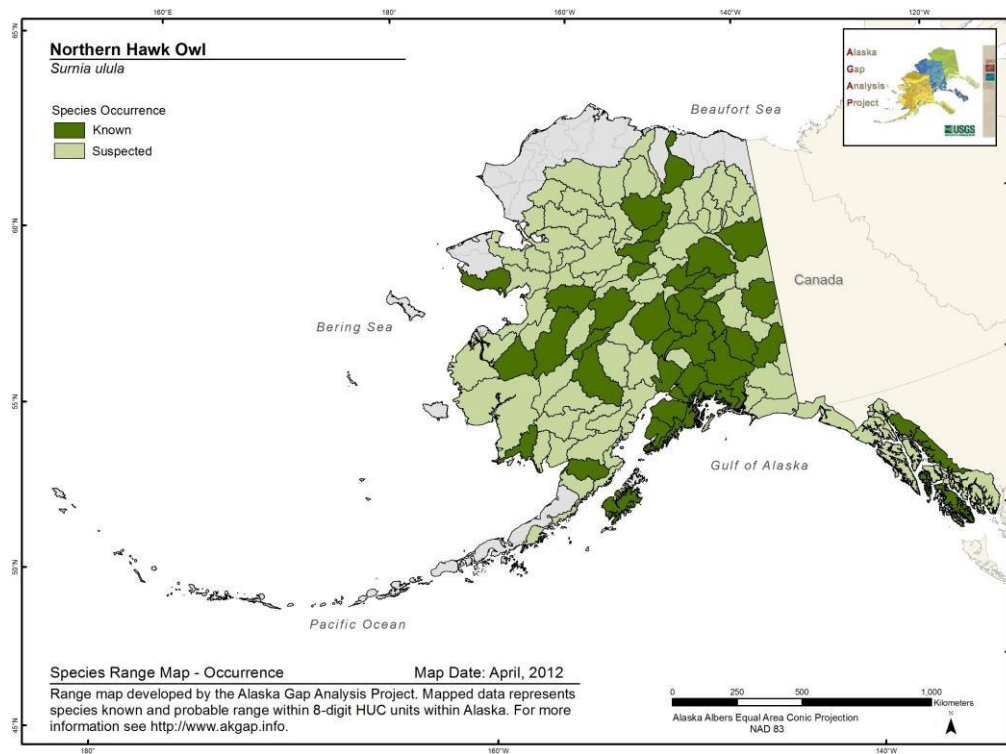
Holt, D. W., R. Berkeley, C. Deppe, P. L. Enriques-Rocha, P. D. Olsen, J. L. Peterson, J. L. Rangel-Salazar, K. P. Segars, and K. Wood. 1999. Family Strigidae. Pp. 153-242 in: del Hoyo, J., A. Elliott, and J. Sargatal (Eds.). Handbook of the birds of the world. Volume 5: Barn-owls to hummingbirds. Lynx Edicions, Barcelona, Spain. 759 pp.

Parmelee, D. F. 1992. White-rumped Sandpiper (*Calidris fuscicollis*). In The Birds of North America, No. 29 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

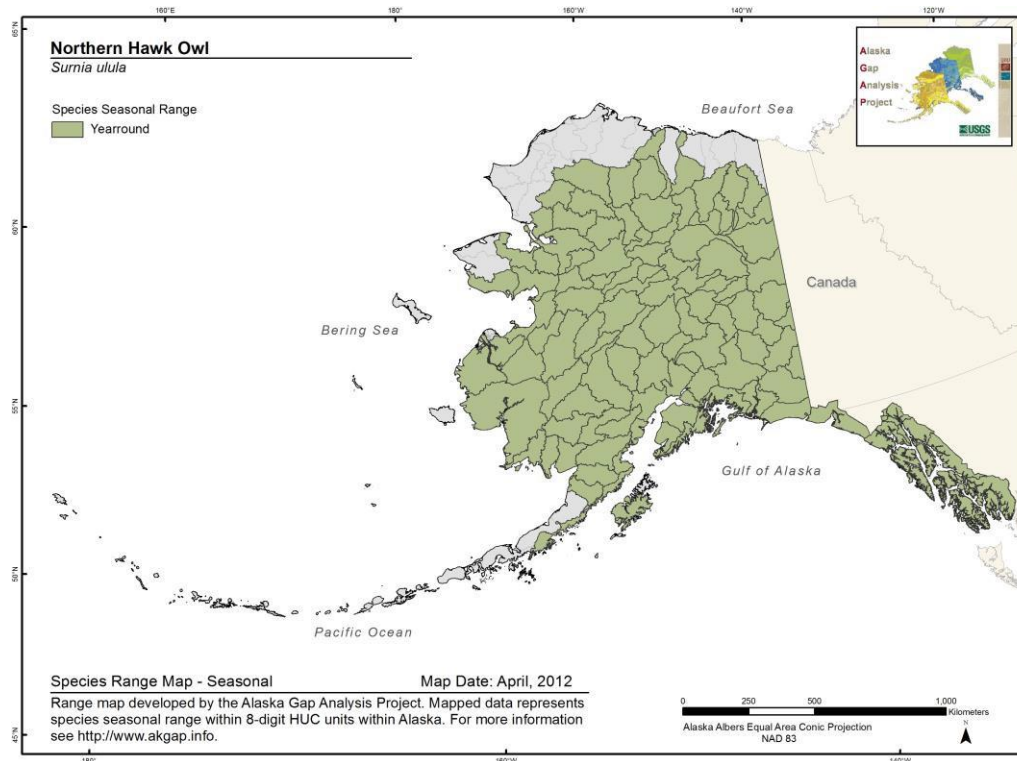
Northern Hawk Owl *Surnia ulula*

Range Map and Distribution Model Summary

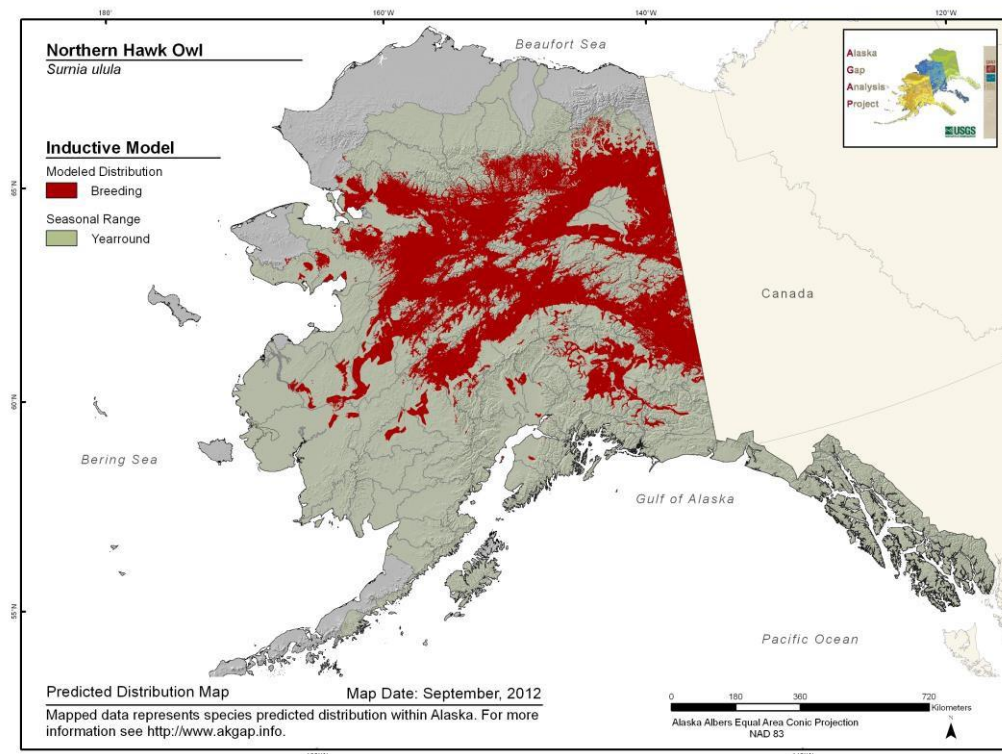
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.774**

**Model Quality
Summary:**
Moderate

Habitat Description

Moderately dense coniferous or mixed coniferous-deciduous forests near marshes or open areas with suitable perches for hunting (Duncan and Duncan 1998). Open areas may be muskegs, scrubby spruce, forest glades, swamps, meadows, burned areas, or logged areas (Mikkola 1983, Cramp 1985, Voous 1988). Extends to tree line, including taiga/tundra ecotone (Duncan and Duncan 1998). In Alaska, occurs in open-canopy forests or forest edges (Meehan and Ritchie 1982) and old mature spruce stands (de la Torres 1990). Nests in dead tree stubs or woodpecker holes (Duncan and Duncan 1998). Fire may play an important role in providing nesting sites and increasing open hunting habitat (Ball 1954, Mindell 1983, Peck and James 1983).

References

- Ball, S. C. 1954. Additional birds from Eastern Gaspé. *Canadian Field-Naturalist* 68:103-108.
- Cramp, S. (ed.). 1985. *The Birds of the Western Palearctic*. Vol. 4. Oxford Univ. Press, Oxford, U.K.
- de la Torre, J. 1990. *Owls: Their life and behavior*. Crown Publ., NY.
- Duncan, J. R. and P. A. Duncan. 1998. Northern Hawk Owl (*Surnia ulula*). In *The Birds of North America*, Vol. 7, No. 356 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Meehan, R. H. and R. J. Ritchie. 1982. Habitat requirements of Boreal and Hawk Owls in interior Alaska. Pp. 188-196 in *Raptor management and biology in Alaska and western Canada: Symposium and workshop, February 17-20, 1981, Anchorage, AK* (W. N. Ladd, and P. F. Schempf, eds.). Anchorage, AK.
- Mikkola, H. 1983. *Owls of Europe*. Buteo Books, Vermillion, SD.

Mindell, D. P. 1983. Nesting raptors in southwestern Alaska: status, distribution, and aspects of biology. USDI, BLM, Alaska Tech. Rep. 8. Anchorage, AK.

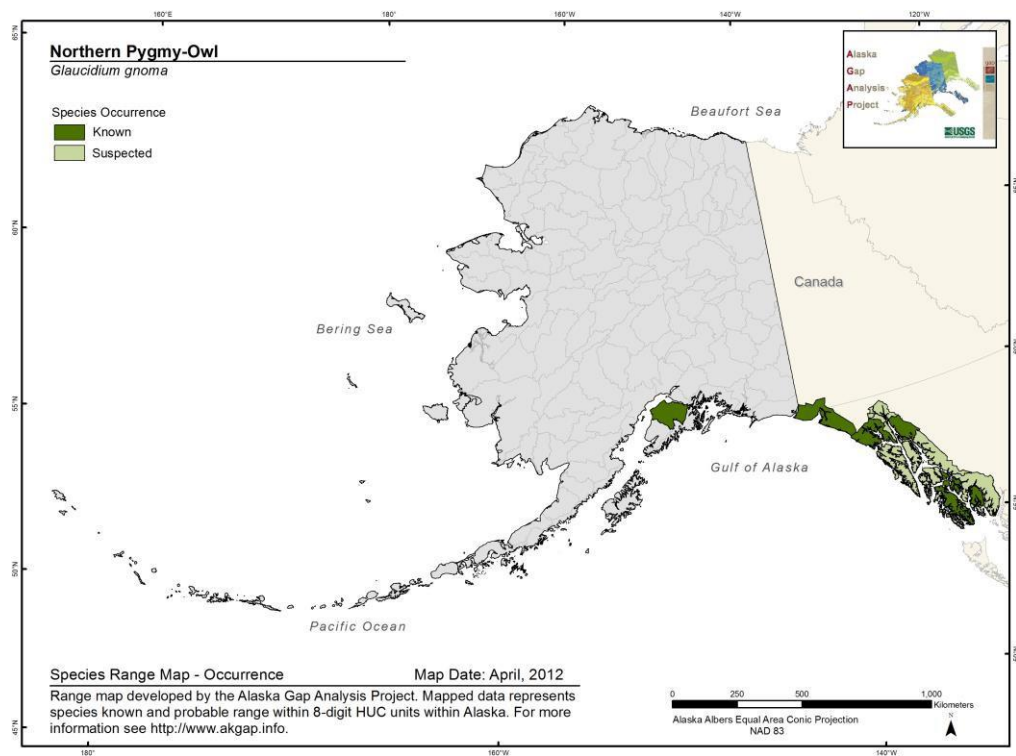
Peck, G. K. and R. D. James. 1983. Breeding birds of Ontario: nidiology and distribution. Vol. 1: nonpasserines. R. Ontario Mus. Life. Sci. Misc. Publ., Toronto.

Voous, K. H. 1988. Owls of the northern hemisphere. MIT Press, Cambridge, MA.

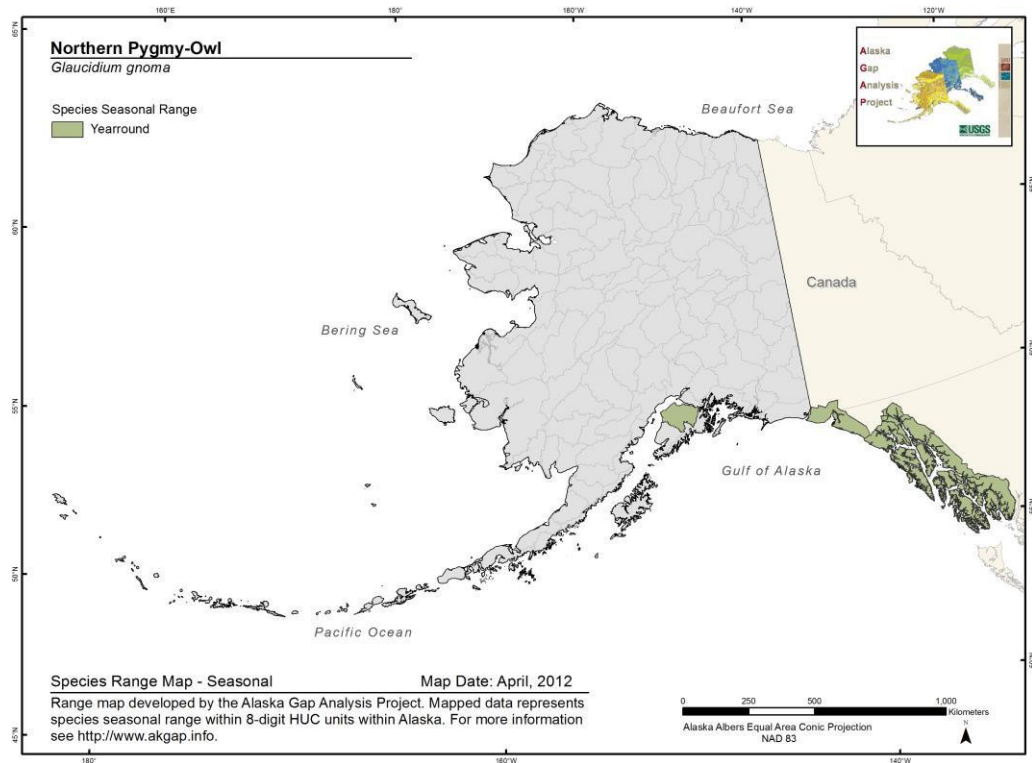
Northern Pygmy-Owl *Glaucidium gnoma*

Range Map and Distribution Model Summary

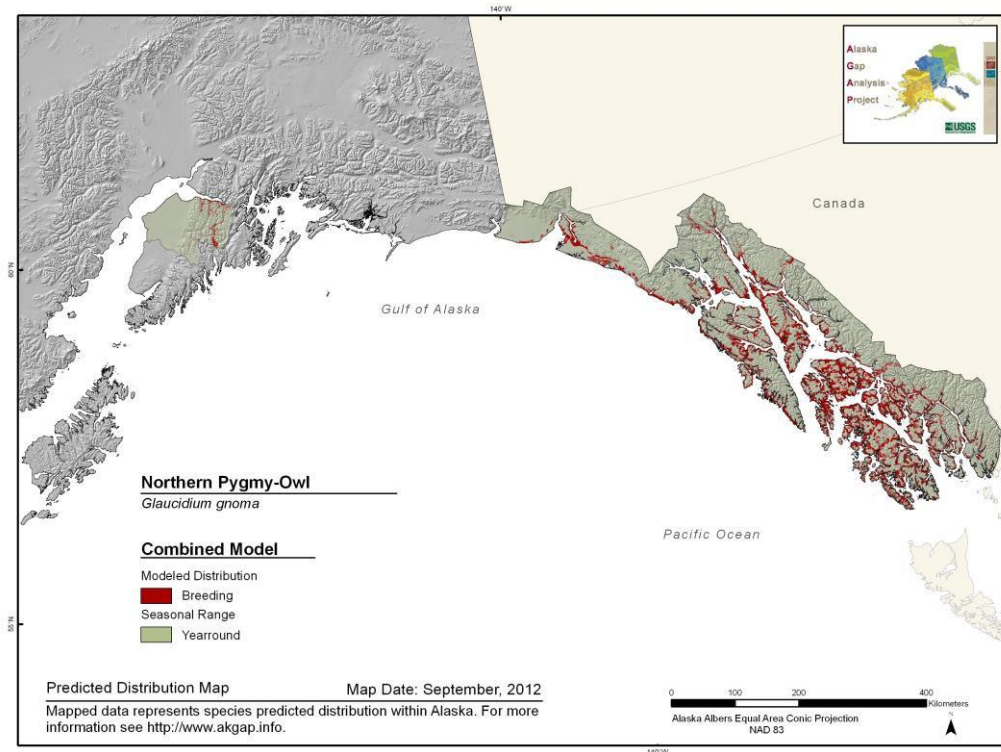
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.858**

**Model Quality
Summary:**
Moderate

Habitat Description

Habitats range from deciduous bottomlands to high elevation coniferous forests. Nests in natural and woodpecker cavities, often on steep hillsides, precipitous talus slopes, or steep ravines not far from water (Campbell et al. 1990). Considered tolerant of mixed-age forest types. A study in Alberta found preference for stands >81 years old. Also, preference for forest edges and variable terrain due to increased hunting visibility.

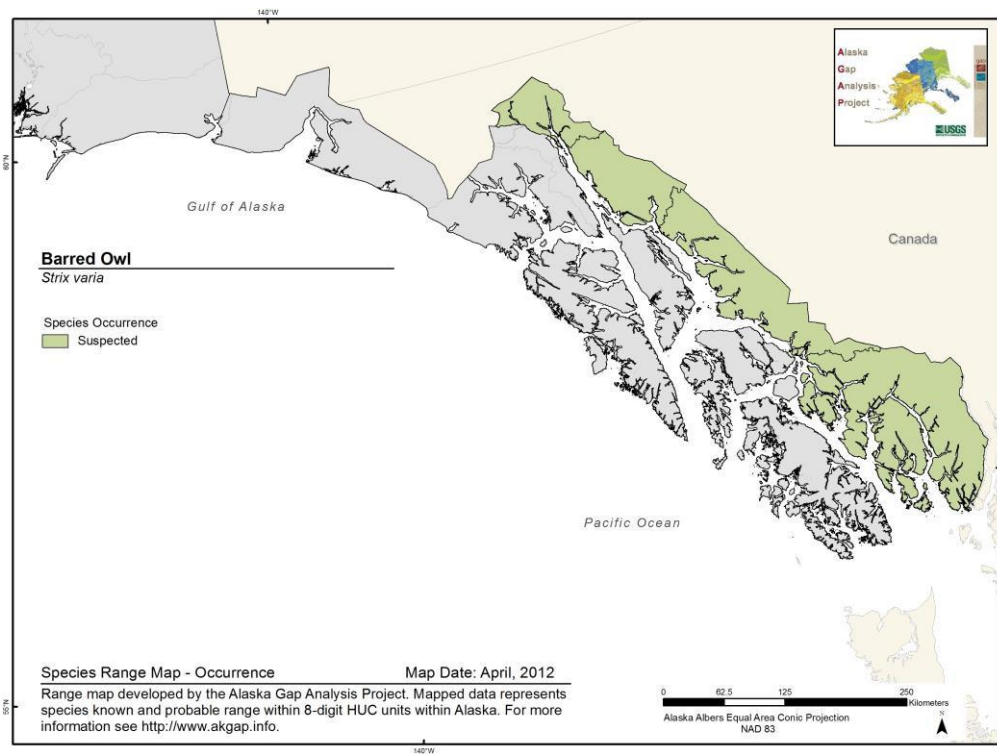
References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

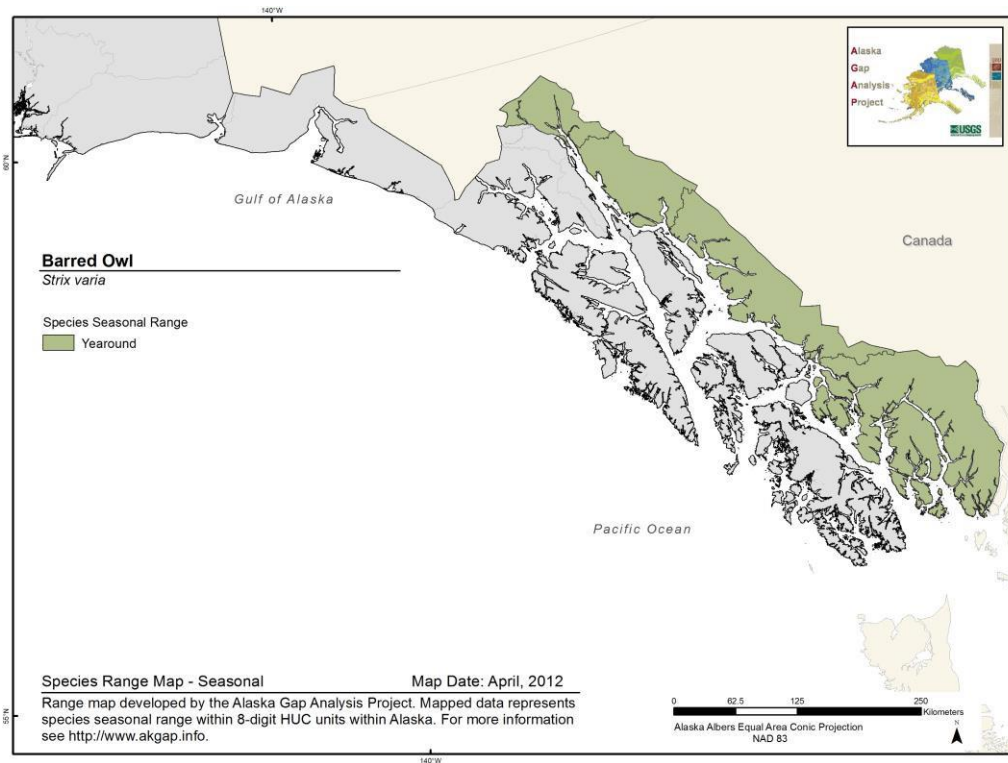
Barred Owl *Strix varia*

Range Map and Distribution Model Summary

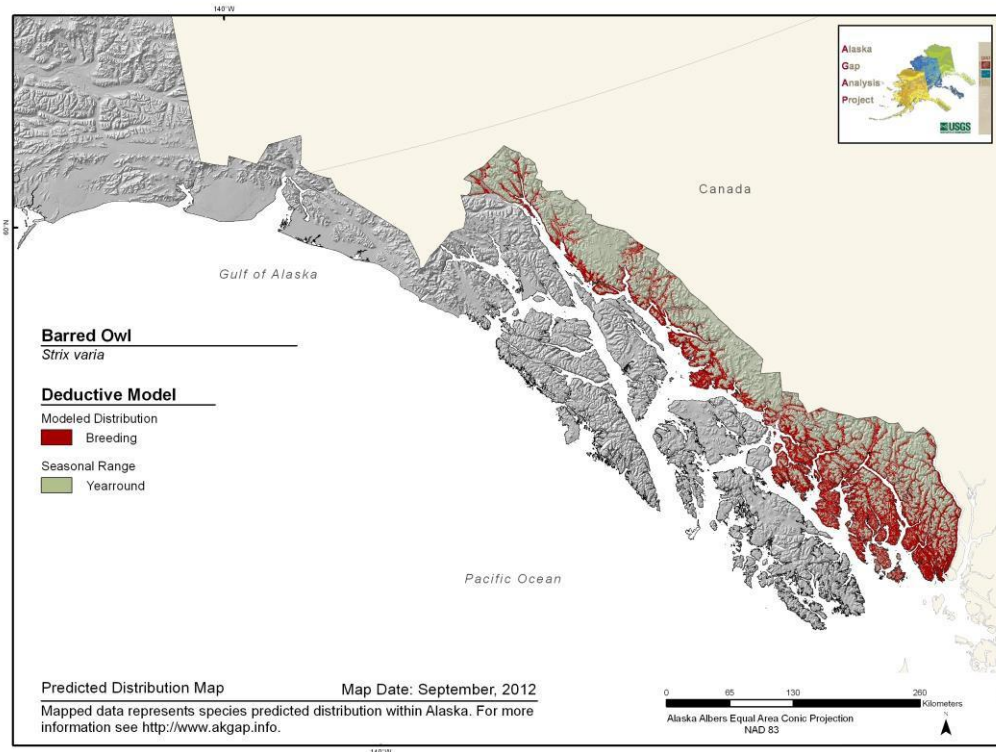
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Nest in cavities within heavy, mature coniferous or deciduous forests (Johnsgard 1988). Relies on secondary tree nest cavities and is most often associated with old forests, but may also nest in mature second-growth forests (Mazur and James 2000). Prey availability also thought to be higher in older growth forests (Mazur et al. 1998). Associated with water (Laidig and Dobkin 1995). Nonbreeding birds seen in urban areas. In B.C., occurs from sea level to 1,250 m in elevation (Campbell et al. 1990).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Johnsgard, P. A. 1988. North American owls: biology and natural history. Smithsonian, Washington, D.C. 295 pp.

Laidig, K. J. and D. S. Dobkin. 1995. Spatial overlap and habitat associations of Barred Owls and Great Horned Owls in southern New Jersey. Journal of Raptor Research 29:151-157.

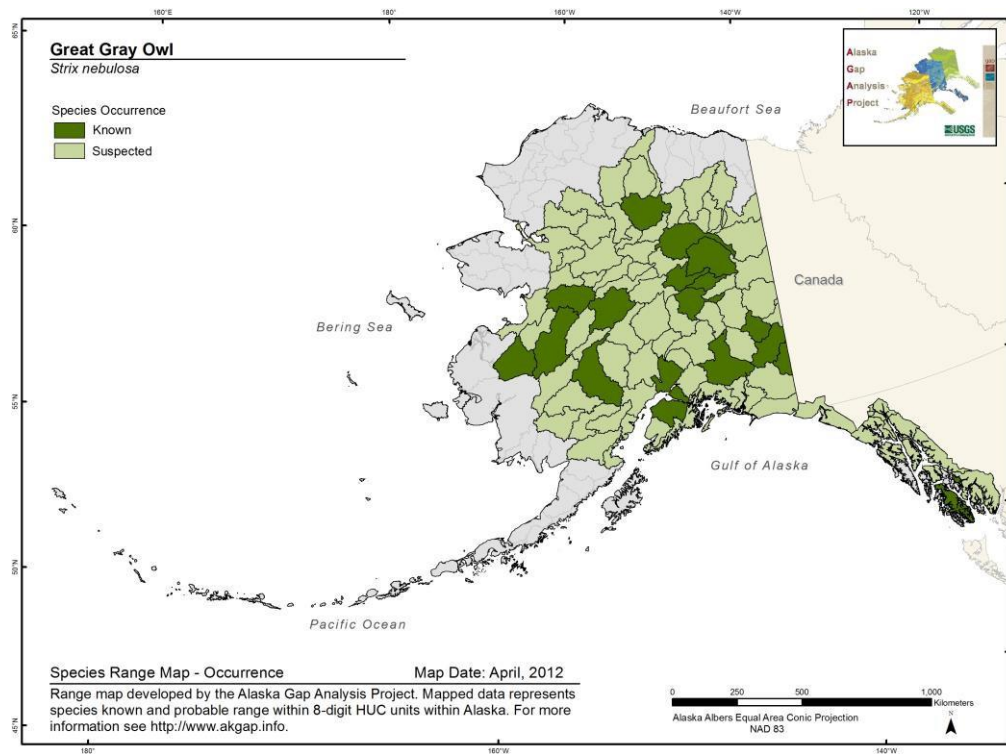
Mazur, K. M. and P. C. James. 2000. Barred Owl. (*Strix nebulosa*). In The Birds of North America, No. 508. (A. Poole and F. Gill, eds). The Birds of North America Inc., Philadelphia, PA.

Mazur, K. M., S. D. Frith, and P. C. James. 1998. Barred Owl home range and habitat selection in the boreal forest of central Saskatchewan, Canada. Auk 115: 746-754.

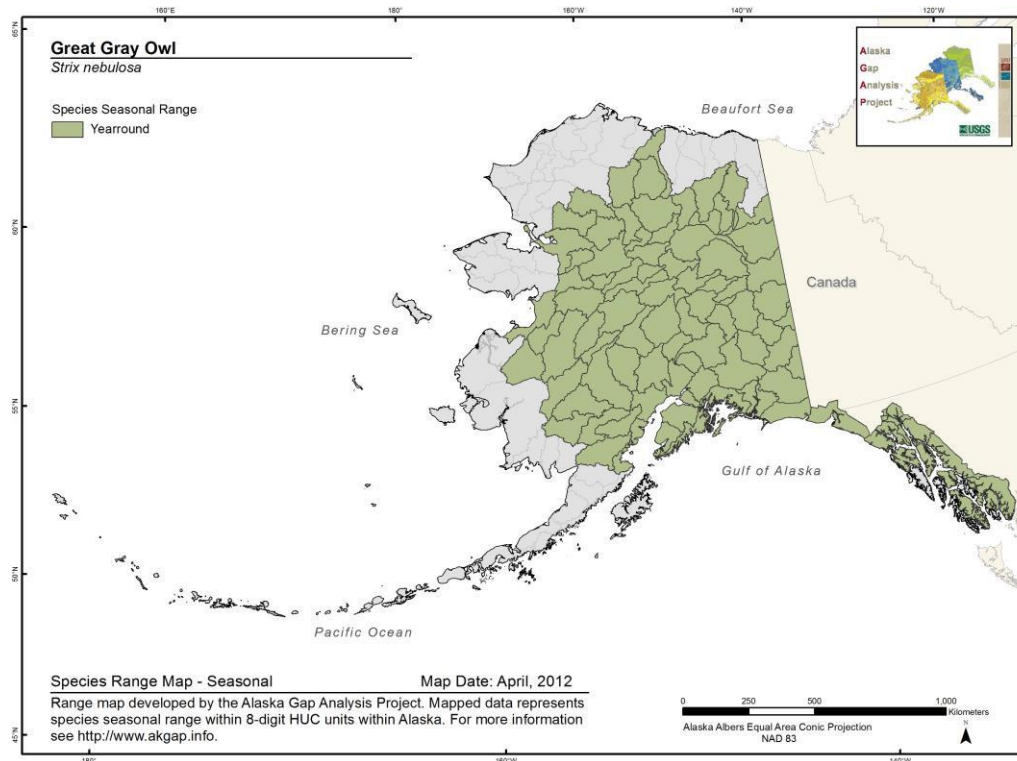
Great Gray Owl *Strix nebulosa*

Range Map and Distribution Model Summary

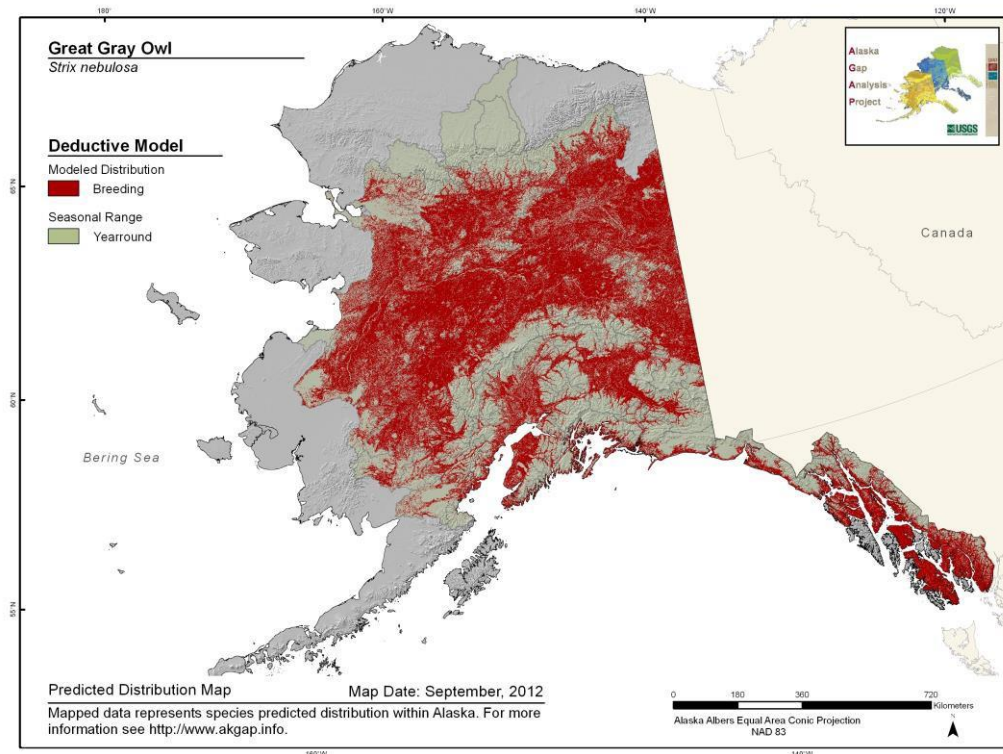
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.598**

**Model Quality
Summary:**
Low

Habitat Description

Nest in coniferous or deciduous forests. Forage in open habitats, such as bogs and meadows, with low ground cover interspersed with perches (Cramp 1985, Johnsgard 1988). Inhabits extensive taiga interspersed with bogs, muskegs, and other open spaces in Canada (Nero 1980, Godfrey 1986, Voous 1988). In Alaska these owls prefer goshawk nests but also use raven nests or broken-off rotten tree tops (ADF&G 2007).

References

ADF&G. 2007. 2007-2008 Alaska hunting regulations: fur animals, small game, unclassified game and deleterious exotic wildlife.

Cramp, S. (ed.). 1985. The Birds of the Western Palearctic. Vol. 4. Oxford Univ. Press, Oxford, U.K.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Johnsgard, P. A. 1988. North American owls: biology and natural history. Smithsonian, Washington, D.C. 295 pp.

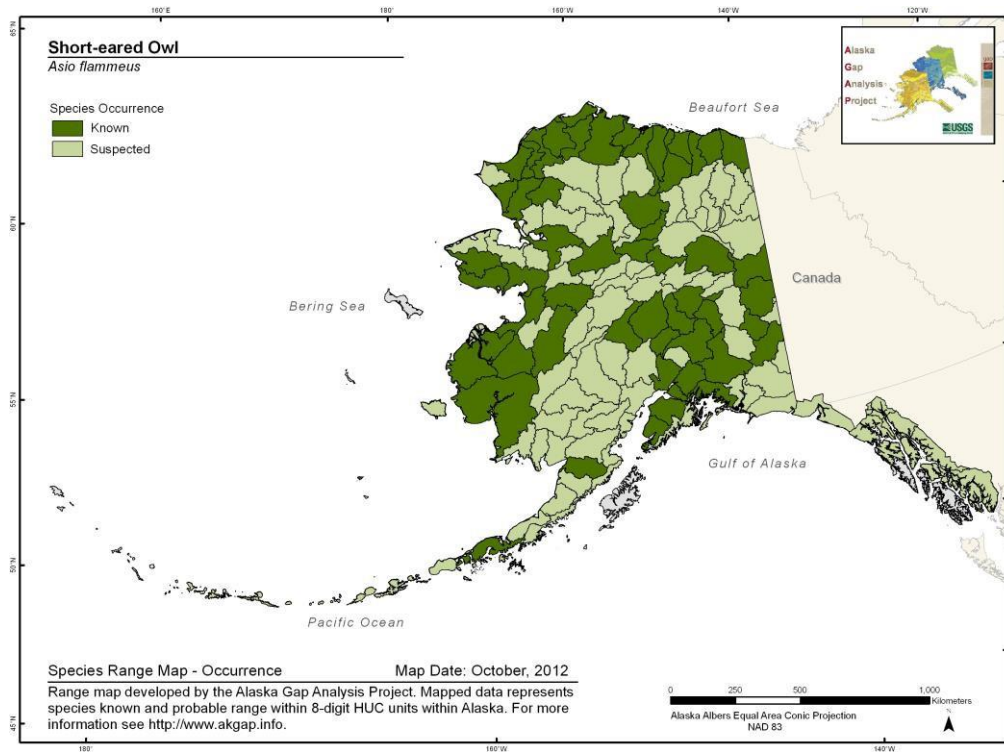
Nero, R. W. 1980. The great gray owl: phantom of the northern forest. Smithsonian Institution Press, Blue Ridge Summit, PA. 168 pp.

Voous, K. H. 1988. Owls of the northern hemisphere. MIT Press, Cambridge, MA.

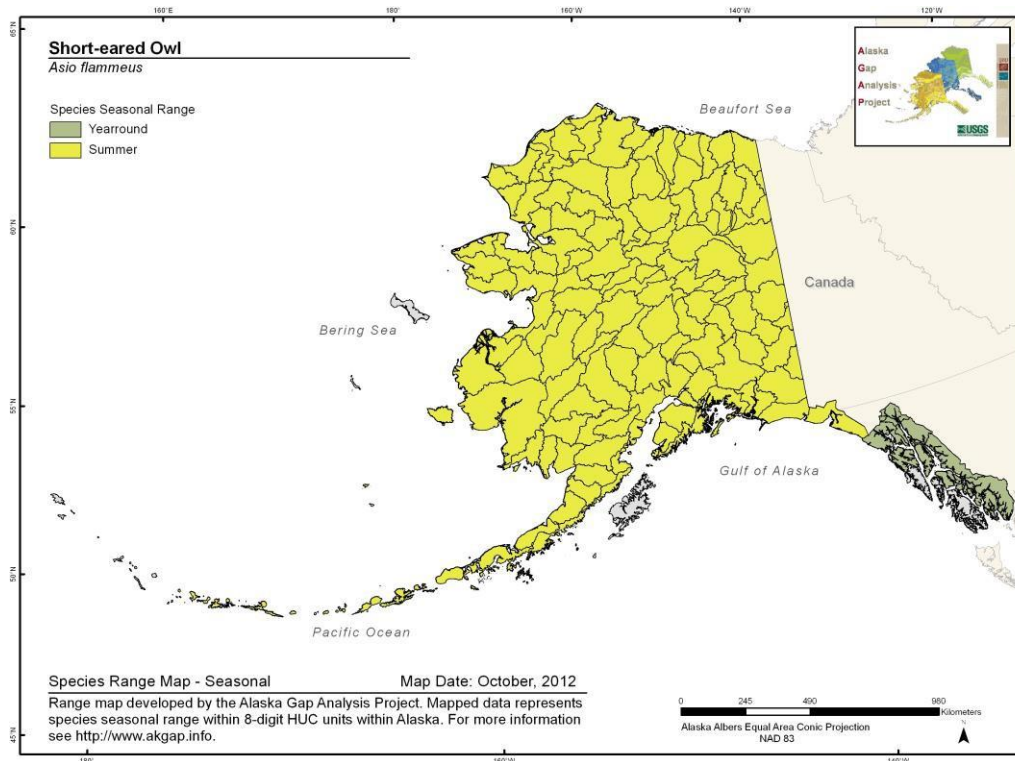
Short-eared Owl *Asio flammeus*

Range Map and Distribution Model Summary

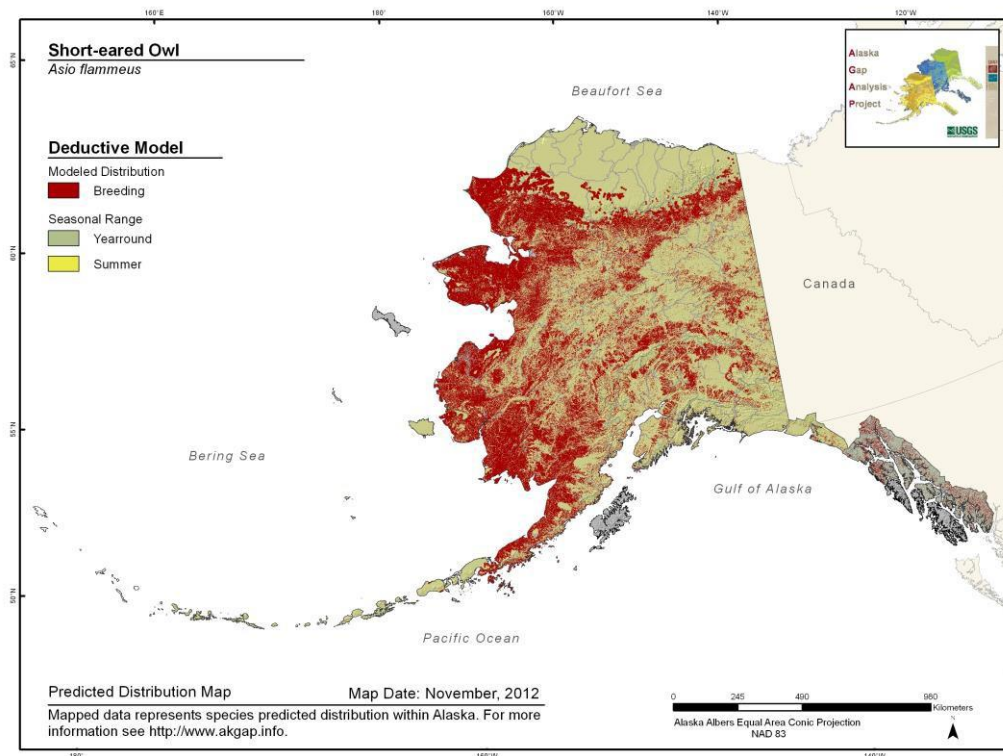
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.557**

**Model Quality
Summary:**
Low

Habitat Description

Broad expanses of open land with low vegetation for nesting and foraging are required. Habitat types frequently mentioned as suitable include fresh and saltwater marshes, bogs, dunes, prairies, grassy plains, old fields, tundra, moorlands, river valleys, meadows, savanna, open woodland, and heathland (Dement'ev et al. 1951, Clark 1975, Mikkola 1983, Holt and Melvin 1986). In general, any area that is large enough, has low vegetation with some dry upland for nesting, and that supports suitable prey may be considered potential breeding habitat, although many will not have breeding Short-eared Owls. Nests on ground, generally in slight depression (Terres 1980), often beside or beneath a bush or clump of grass. Many nests are near water but are generally on dry sites.

References

Clark, R. J. 1975. A field study of the short-eared owl (*Asio flammeus*) Pontoppidan in North America. *Wildlife Monographs* 47:1-67.

Dement'ev, G.P., N.A. Gladkov, and E.P. Spangenberg. 1951. *Birds of the Soviet Union*. Israel Prog. for Sci. Translations, Russian translation, Jerusalem, Israel.

Holt, D.W., and S.M. Melvin. 1986. Population dynamics, habitat use, and management needs of the short-eared owl in Massachusetts: summary of 1985 research. Massachusetts Division of Fish and Wildlife, Natural Heritage Program, Boston, Massachusetts.

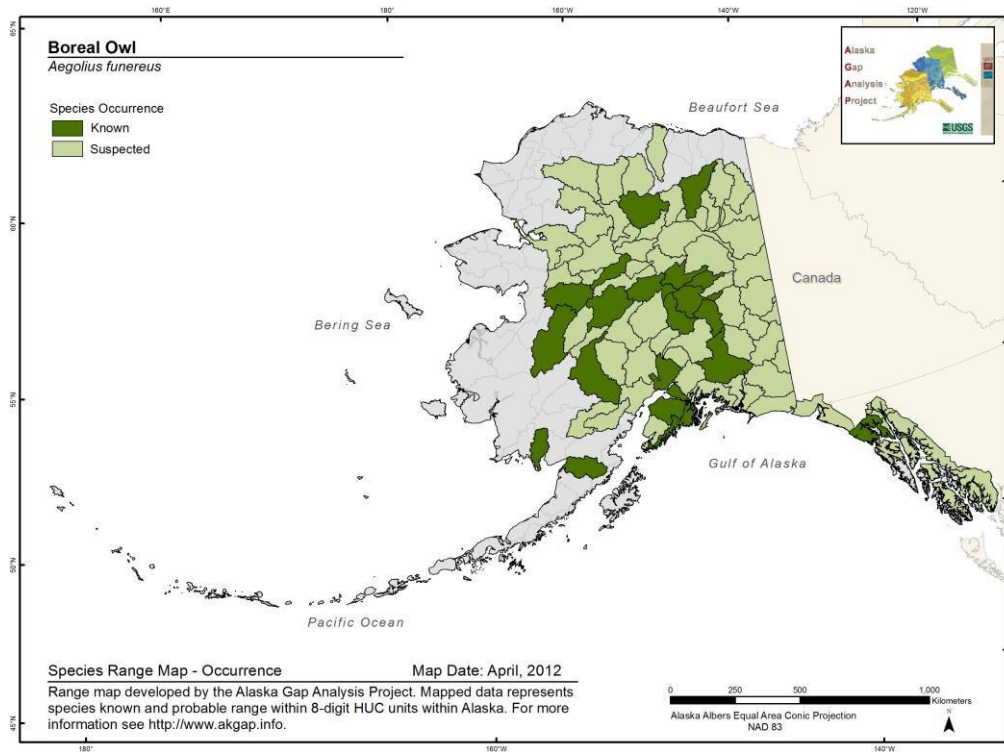
Mikkola, H. 1983. *Owls of Europe*. Buteo Books, Vermillion, SD.

Terres, J. K. 1980. *The Audubon Society encyclopedia of North American birds*. Alfred A. Knopf, New York, NY.

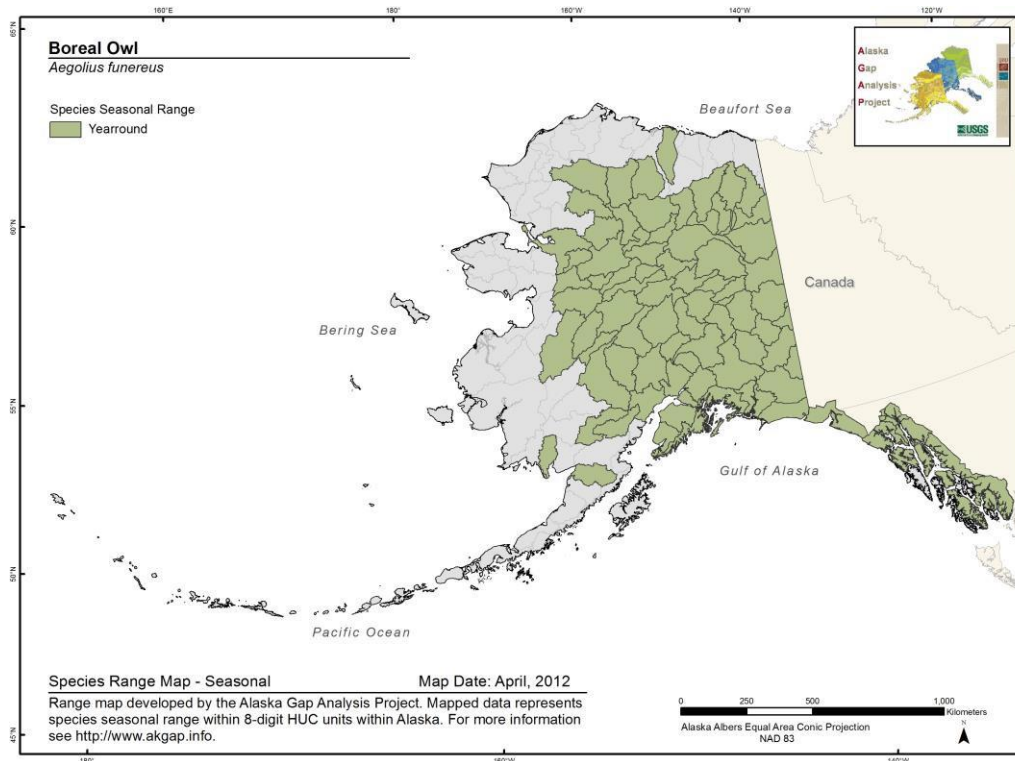
Boreal Owl *Aegolius funereus*

Range Map and Distribution Model Summary

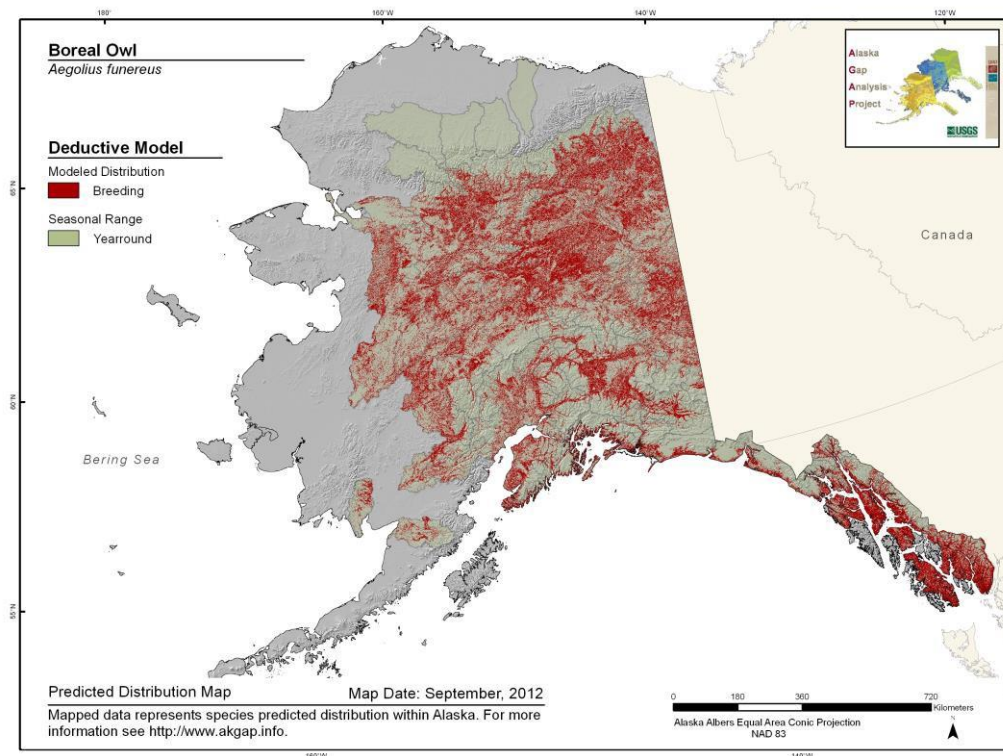
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.648**

**Model Quality
Summary:**
Low

Habitat Description

Dense coniferous forest, mixed forest, thickets of alder, aspen, or stunted spruce, most commonly in proximity to open grassy situations (AOU 1983); muskeg bogs. Breed, roost, and forage, in boreal forests of Alaska characterized by black and white spruce, aspen, poplar, birch, and balsam fir (Bondrup-Nielson 1978, Meehan and Ritchie 1982). Primarily mature or old-growth forests. Nests in natural cavities or those excavated by Pileated Woodpeckers and Northern Flickers. Will use nest boxes (Hayward and Hayward 1993). Nests in Fairbanks within closed canopy, deciduous or mixed forest (Meehan and Ritchie 1982). May forage in openings as well (Korpimäki 1988a).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Bondrup-Nielson, S. 1984. Vocalization of the Boreal Owl, *Aegolius funereus richardsoni*, in North America. Canadian Field-Naturalist 98:191-197.

Hayward, G. D. and P. H. Hayward. 1993. Boreal Owl (*Aegolius funereus*). In The Birds of North America, Vol. 7, No. 63 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Korpimäki, E. 1988a. Effects of territory quality on occupancy, breeding performance and breeding dispersal in Tengmalm's Owl. Journal of Animal Ecology 57: 97-108.

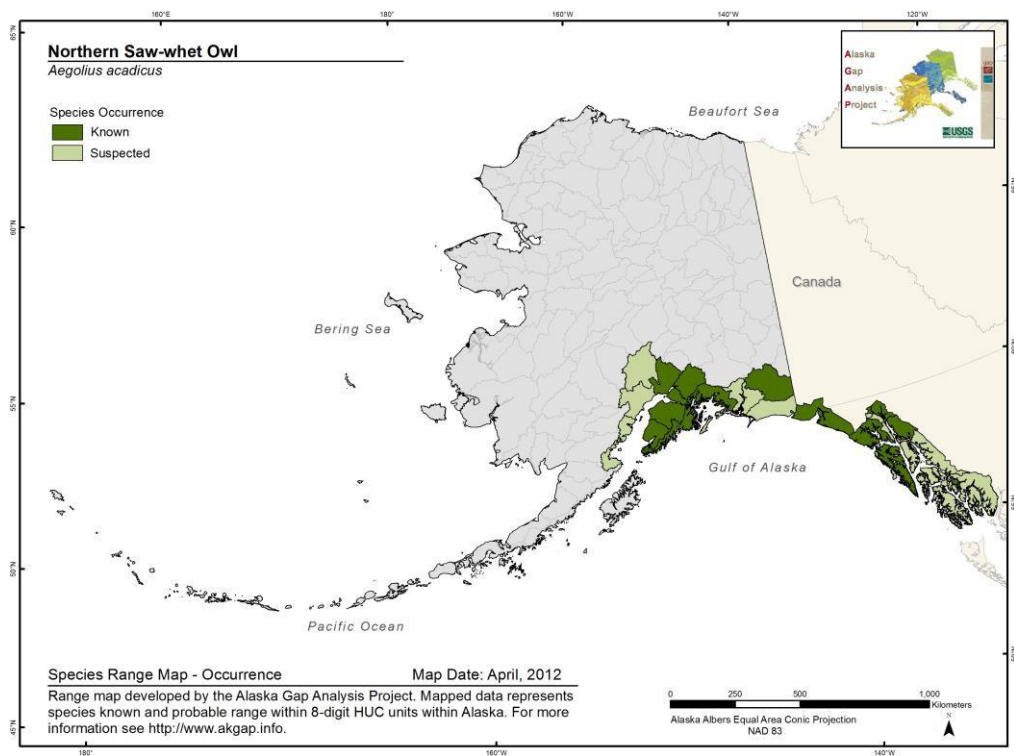
Meehan, R. H. and R. J. Ritchie. 1982. Habitat requirements of Boreal and Hawk Owls in interior Alaska. Pp. 188-196 in Raptor management and biology in Alaska and western Canada: Symposium and workshop, February 17-20, 1981, Anchorage, AK (W. N. Ladd, and P. F. Schempf, eds.). Anchorage, AK.

Northern Saw-whet Owl

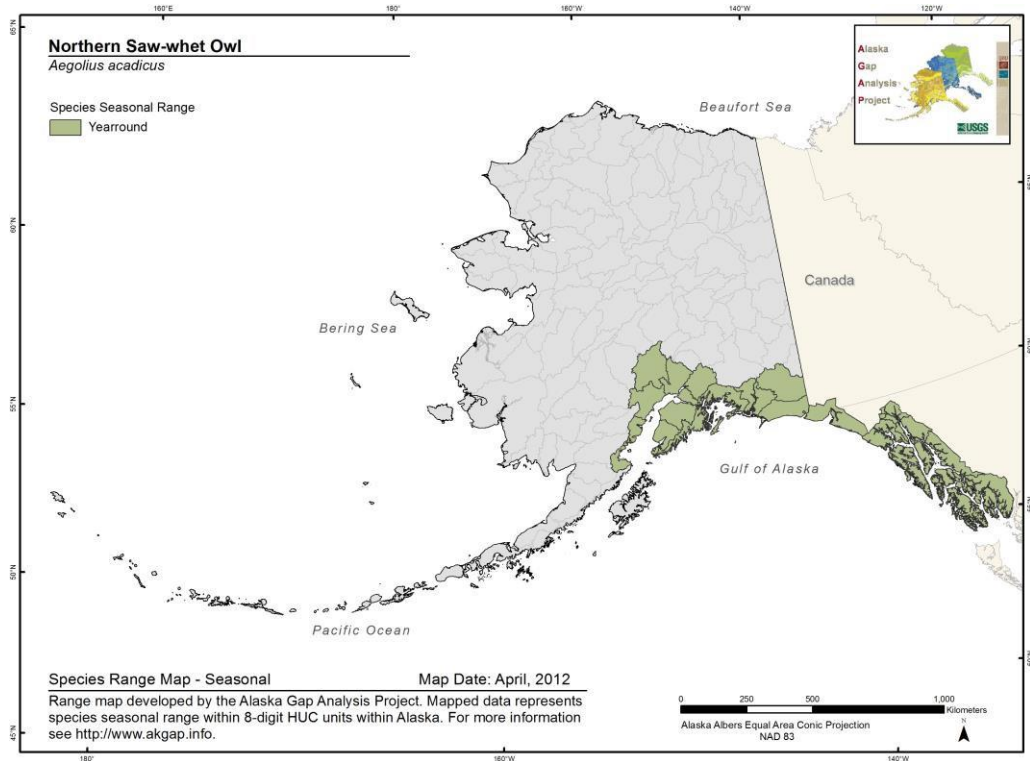
Aegolius acadicus

Range Map and Distribution Model Summary

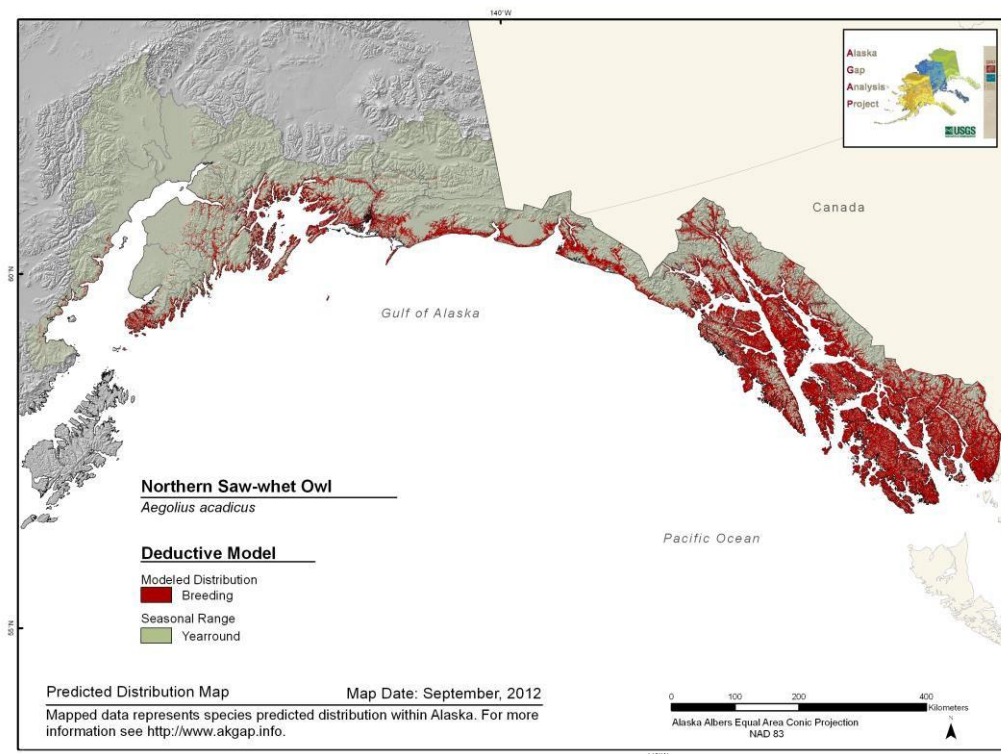
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.667**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in coniferous and mixed-coniferous forests with highest densities occurring in coniferous forests at moderate elevations. Nests in Northern Flicker or natural cavities in snags, but will use nest boxes. Favors mature and old-growth stands. Dense forests important for roosting (Cannings 1993). In B.C., nonbreeding birds are found in a variety of habitats, including pure and mixed coniferous and deciduous thickets, dense forests, woodlands, and among tall shrubs (Campbell et al. 1990)

References

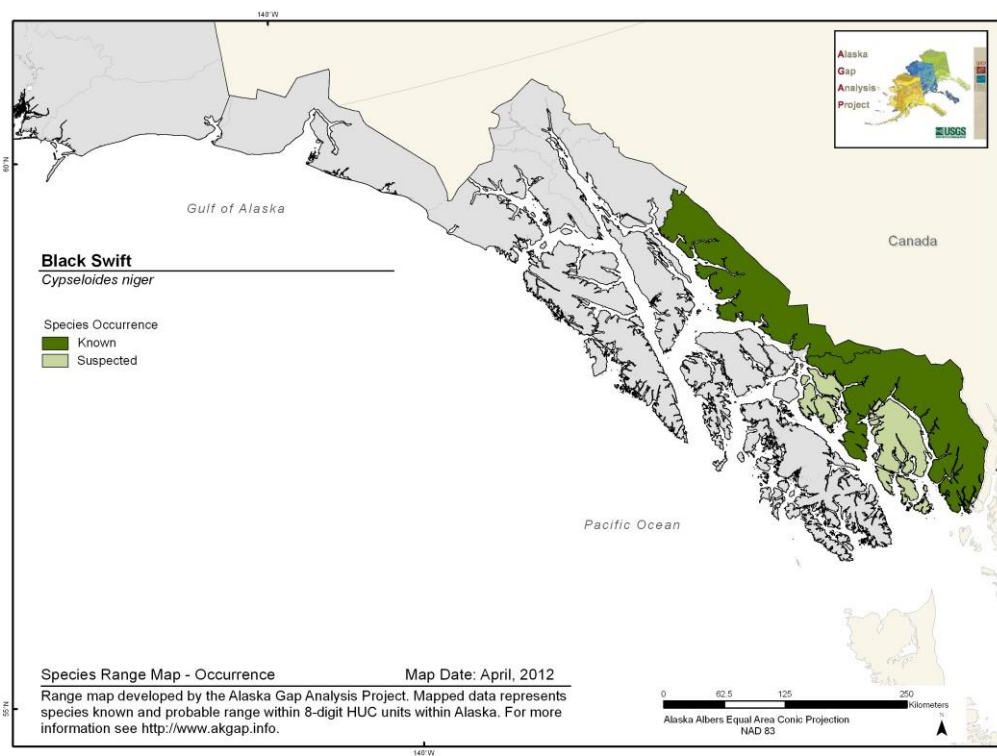
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Cannings, R. J. 1993. Northern Saw-whet Owl (*Aegolius acadicus*). In The Birds of North America. Vol. 7, No. 42 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

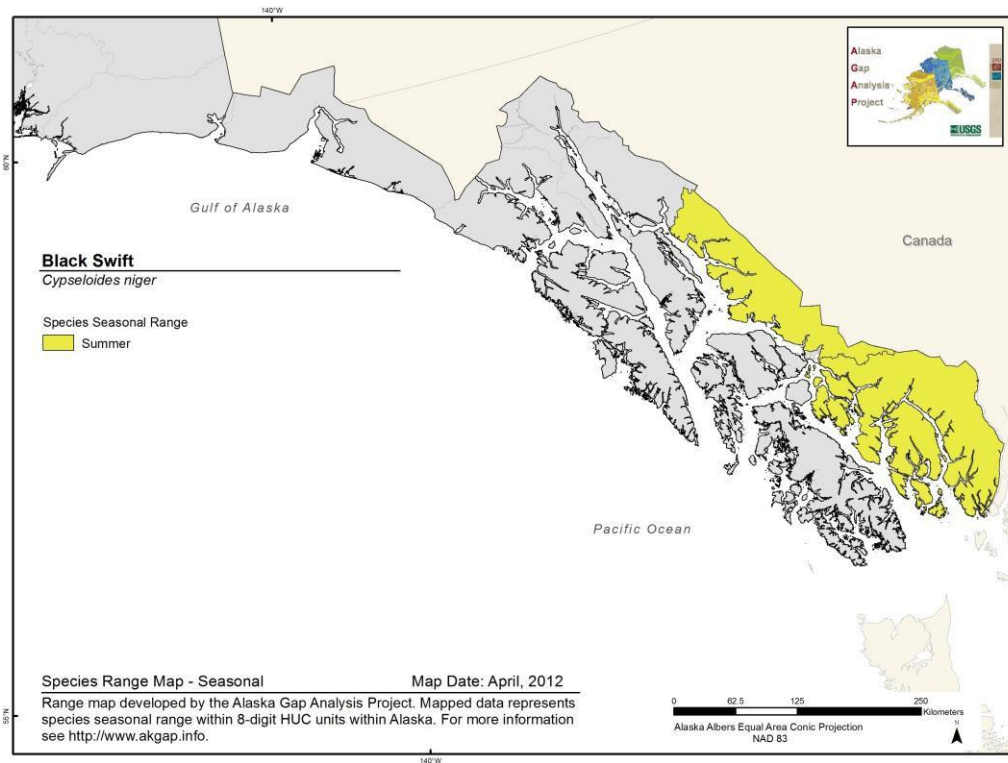
Black Swift *Cypseloides niger*

Range Map and Distribution Model Summary

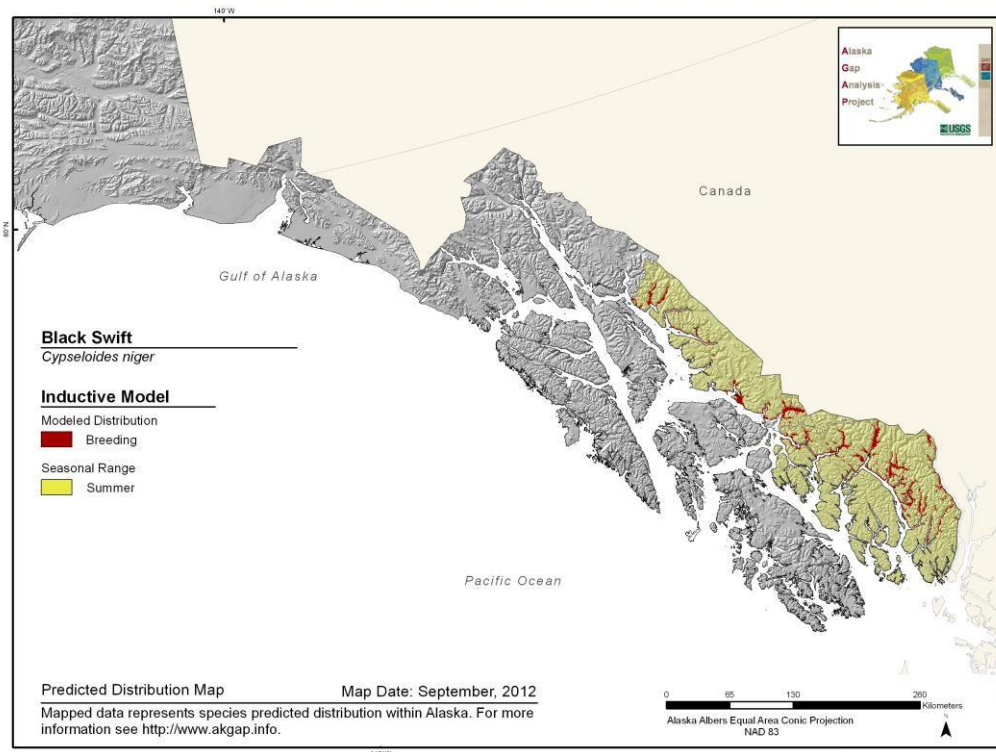
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Most likely to nest along river valleys with steep unvegetated cliffs (Andres 1999b). In other areas, nests on ledges or shallow caves in steep rock faces and canyons, usually near of behind waterfalls and in sea caves (AOU 1998). Presence of water, high relief, inaccessibility to ground-dwelling predators, darkness, and unobstructed flyways were found to be important nest site characteristics in a study in the Rockies (Knorr 1961). Forages over open areas and forested areas in montane habitats (AOU 1998) and in Alaska observed foraging over mainland rivers, lakes, shores and associated wetlands (Baluss 2006).

References

Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

AOU. 1998. Check-list of North American birds. Seventh edition. American Ornithologists' Union, Washington, D.C. 829 pp.

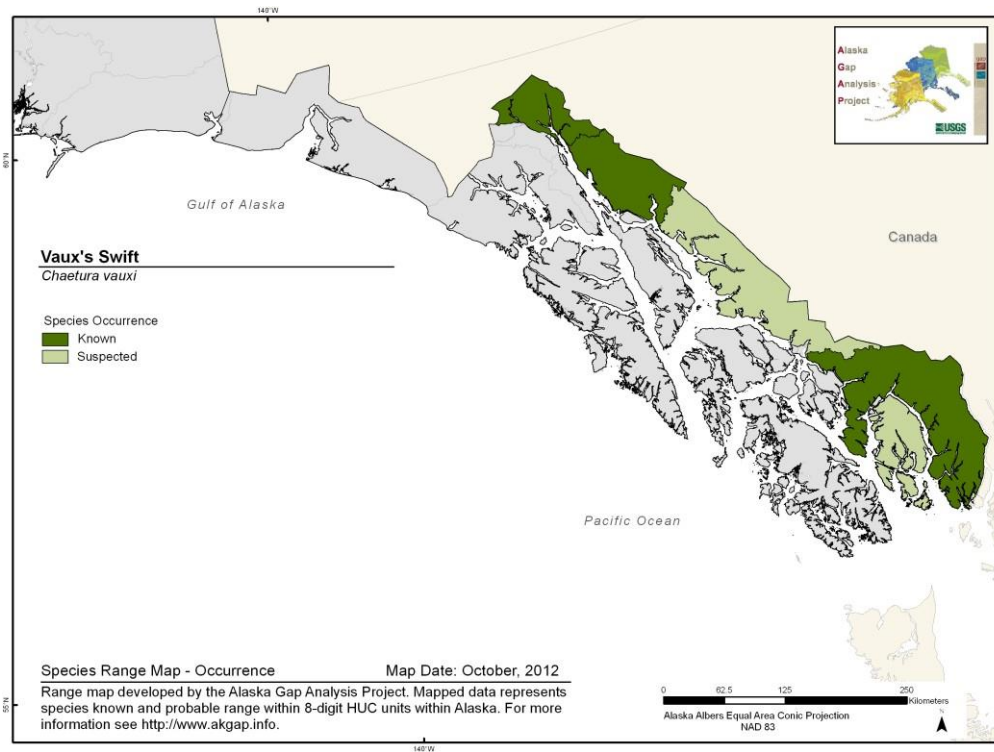
Baluss, G. 2006. Black Swift distribution in Alaska; 2005 annual summary of landbird projects for Boreal Partners in Flight (C. Harwood, ed.), Boreal Partners in Flight, Anchorage, AK.

Knorr, O. A. 1961. The geographical and ecological distribution of the black swift in Colorado. Wilson Bulletin 73:155-170.

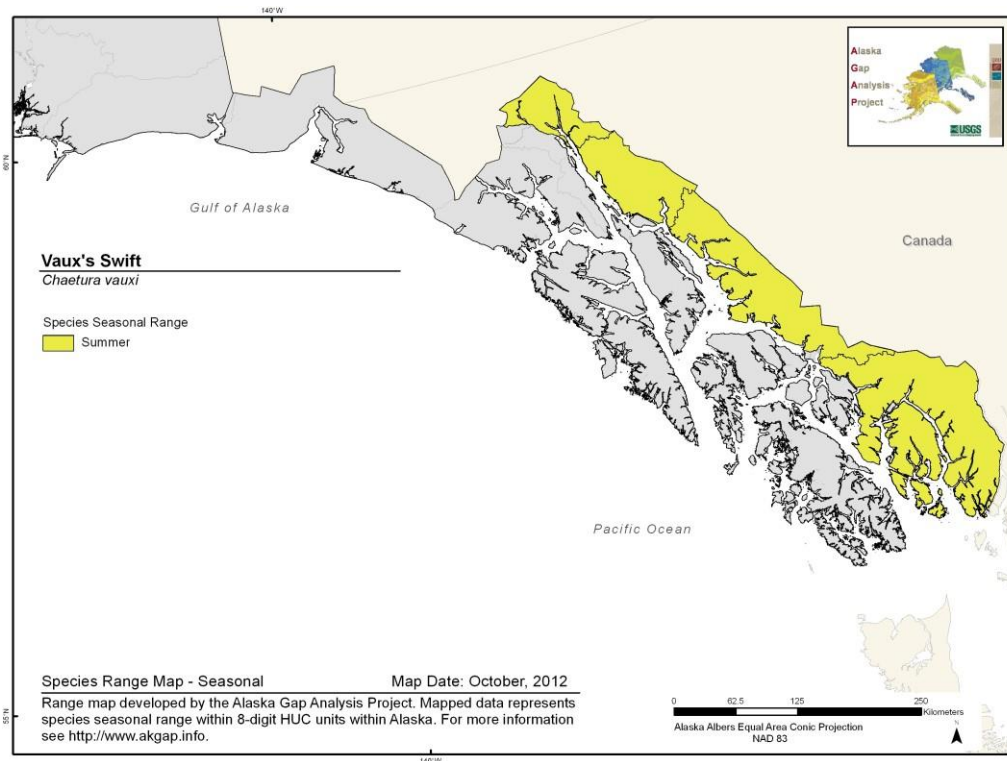
Vaux's Swift *Chaetura vauxi*

Range Map and Distribution Model Summary

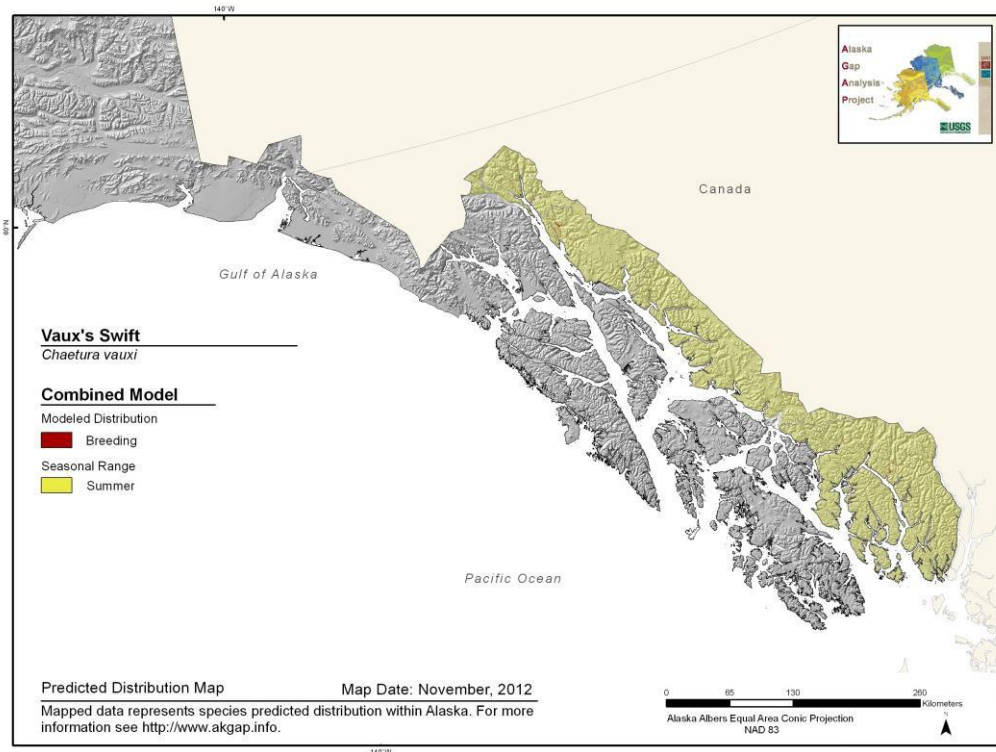
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Nests in coniferous and mixed forests, especially in old growth. Trees are large diameter. Forages over lakes, rivers, open areas, and clearcuts (Andres 1999b).

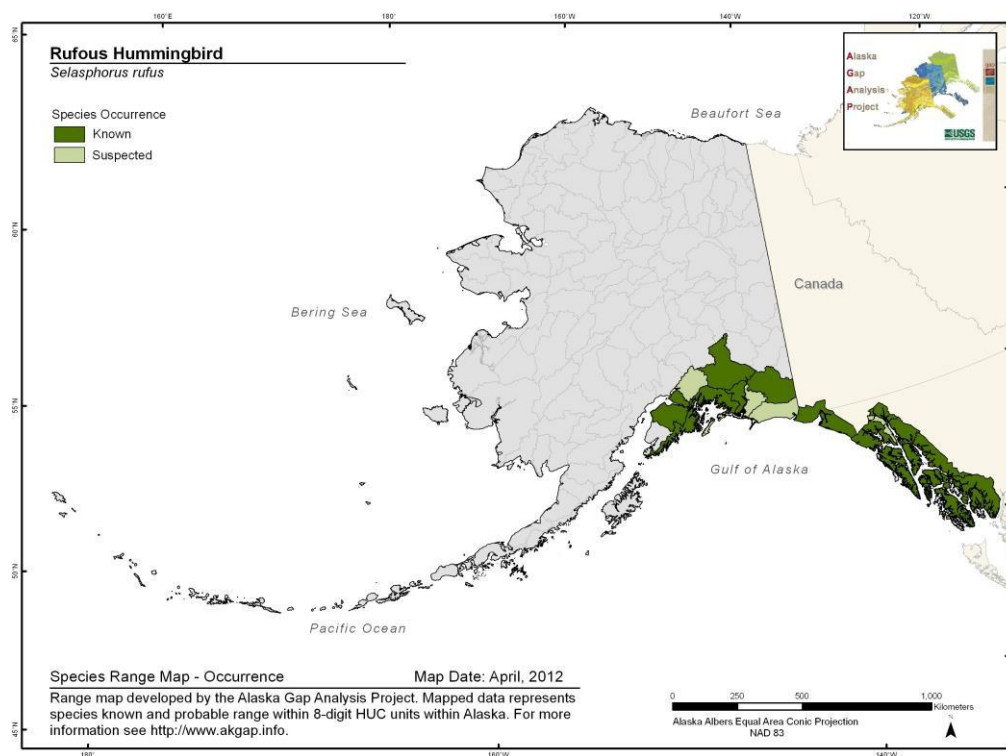
References

Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

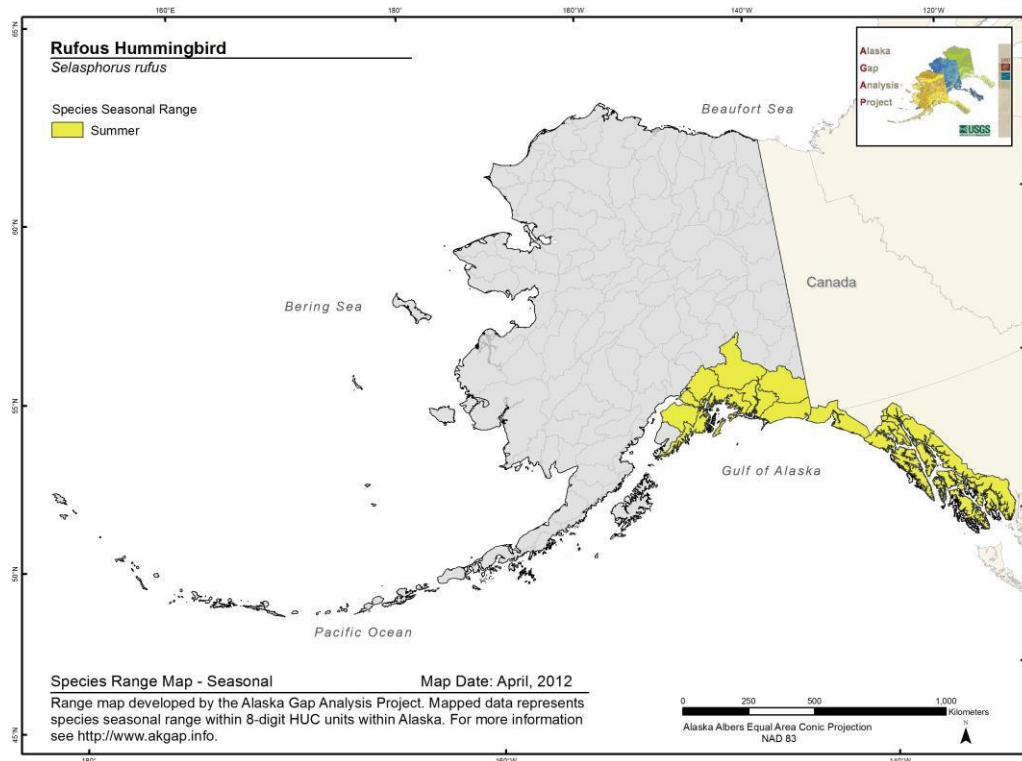
Rufous Hummingbird *Selasphorus rufus*

Range Map and Distribution Model Summary

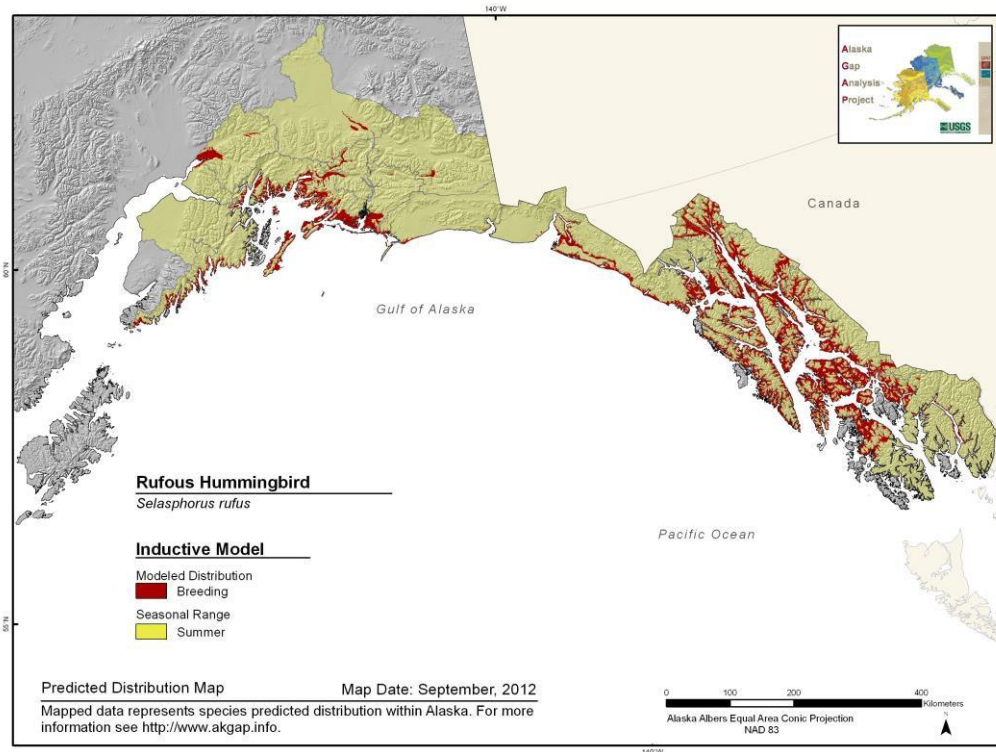
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.837**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabit old growth, second growth, thickets, and shrubby hillsides (AOU 1983). Nests in tree, shrubs, or vine, about 1-15 meters (usually less than 5 meters) above ground (e.g., in blackberry bush, huckleberry bush, overhanging vine, alder, drooping branch of conifer, among roots of fallen tree, crown of deciduous tree; Johnsgard 1983). In Southeast, found in hemlock spruce forests (early successional to old growth), deciduous woodlands, muskeg forests, riparian shrubs, and scrub forests (Pogson et al. 1997).

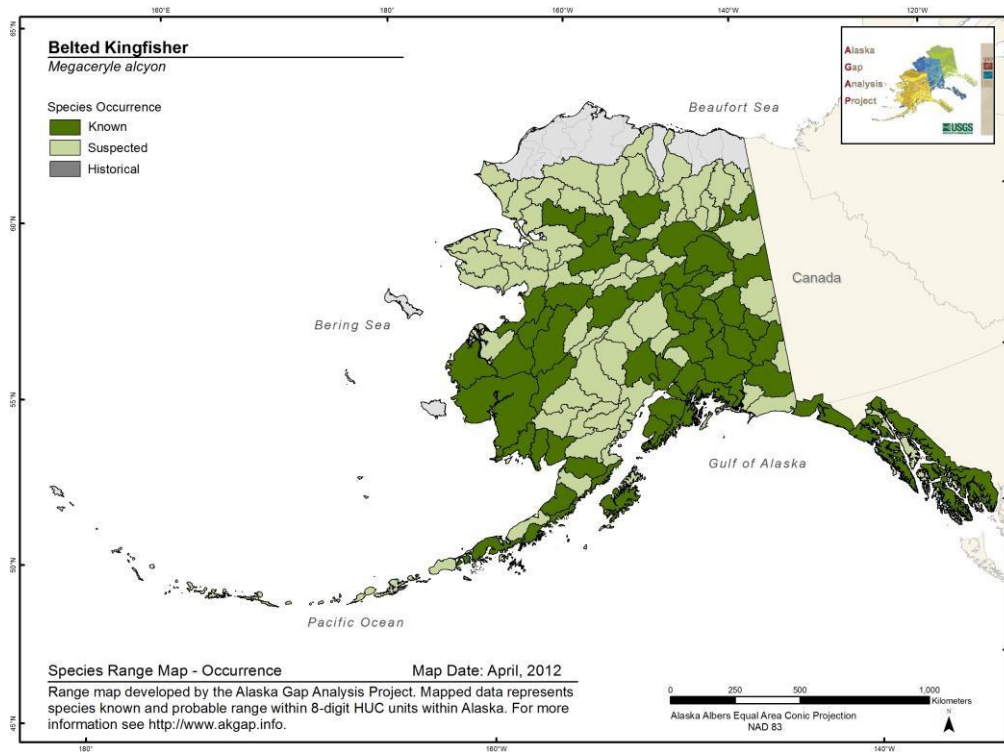
References

- AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.
- Johnsgard, P. A. 1983. Hummingbirds of North America. Smithsonian Institution Press, Washington, D.C. 304 pp.
- Pogson, T. H., S. E. Quinlan, and B. Lehnhausen. 1997. A manual of selected neotropical migrant birds of Alaska national forests. USDA, USFS, Juneau, AK.

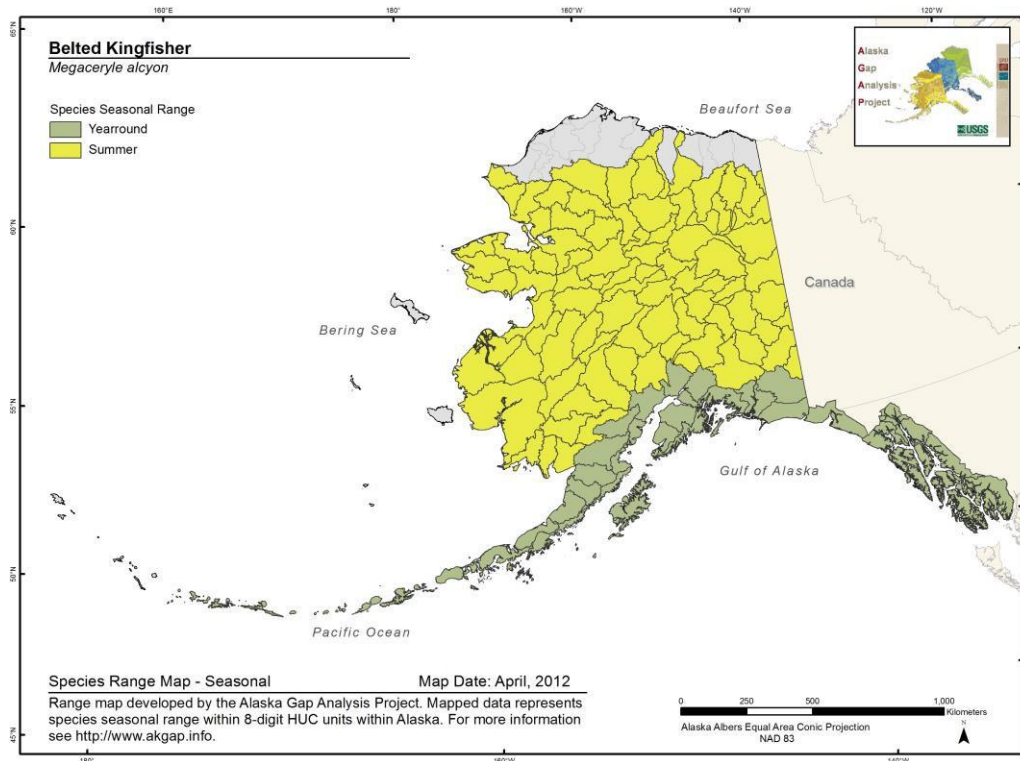
Belted Kingfisher *Megaceryle alcyon*

Range Map and Distribution Model Summary

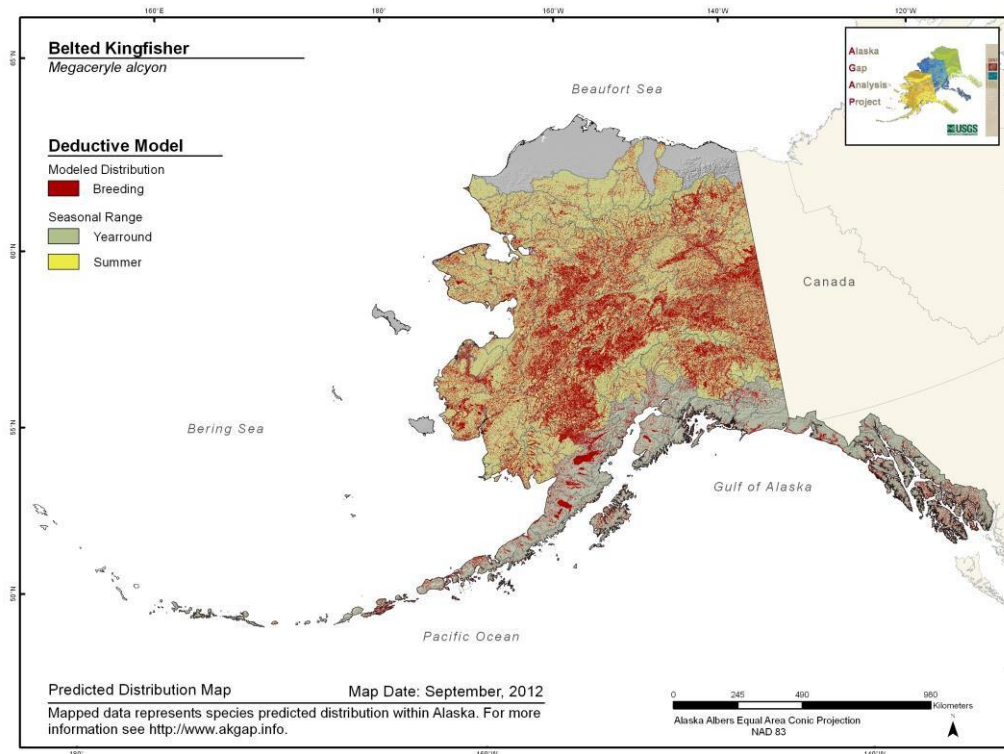
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.572**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits streams, rivers, ponds, lakes (sheltered coves or shallow bays, small lakes) and estuaries or calm marine waters (Davis 1982) without overgrown vegetation or masses of floating or emergent macrophytes (White 1953). Territories associated with running waters (Hamas 1991) and stream riffles (Davis 1982). Nests in burrows in sandy, clay, or gravelly banks (Armstrong 2008).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Davis, W. J. 1982. Territory size in *Megaceryle alcyon* along a stream habitat. Auk 1999: 353-362.

Hamas, M. J. 1991. Belted Kingfisher. Pp. 258-259 in the atlas of breeding birds of Michigan (R. Brewer, G. A. McPeck, and R. J. Adams, Jr. Eds.). Michigan State Univ. Press, East Lansing.

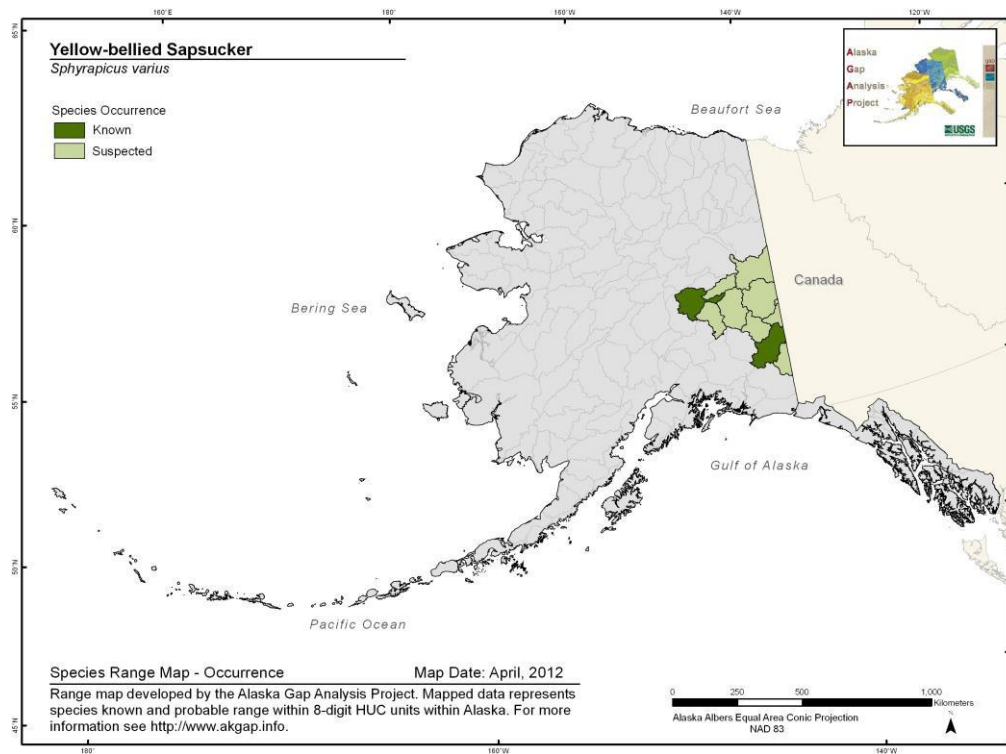
White, H. C. 1953. The eastern Belted Kingfisher in the maritime provinces. Bull. Fish. Res. Board Can., No. 97: 1-44.

Yellow-bellied Sapsucker

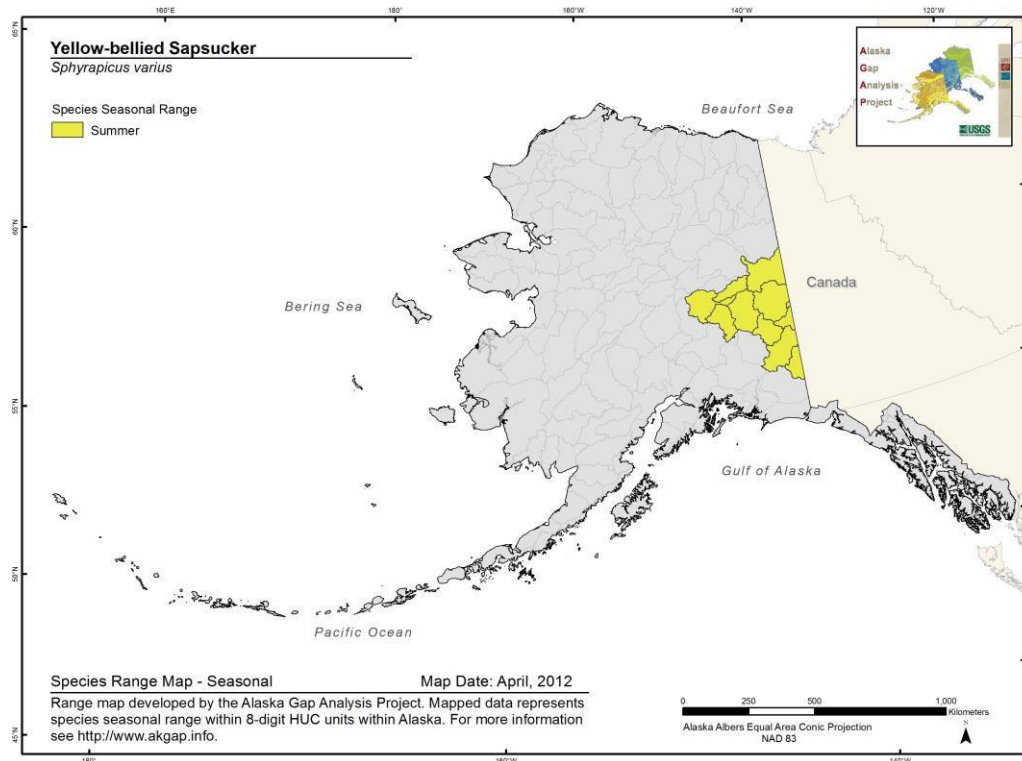
Sphyrapicus varius

Range Map and Distribution Model Summary

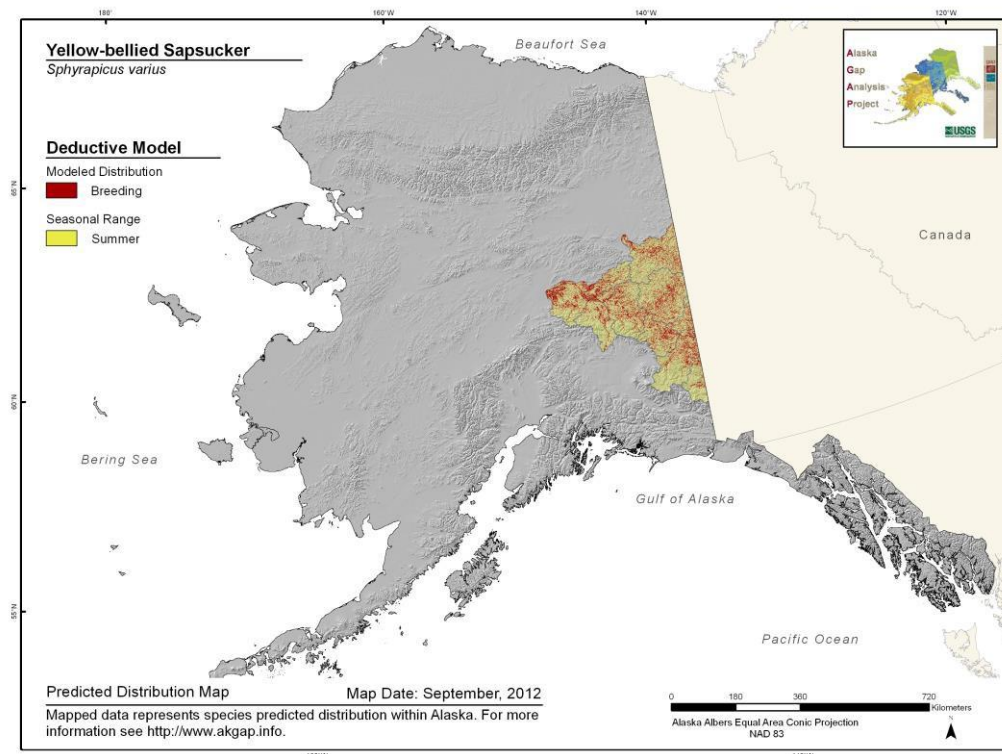
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.844**

**Model Quality
Summary:**
Moderate

Habitat Description

Very specific requirements for early successional trees for nesting and feeding, including aspen, birch, maple, and mixed conifer forests. Prefers riparian zones up to 2000 m, especially in quaking aspen and birch (Short 1982, Eberhardt 1994, Winkler et al. 1995). Many nest sites are on the forest edge adjacent to water bodies, such as lakes, ponds, marshes, and backwater river channels (Campbell et al. 1990).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Eberhardt, L. S. 1994. Sap-feeding and its consequences for reproductive success and communication in Yellow-bellied Sapsuckers (*Sphyrapicus varius*). Ph.D. Dissertation, University of Florida, Gainesville.

Short, L. L. 1982. Woodpeckers of the world. Delaware Mus. Nat. Hist., Monograph Series 4, Greenville, DE.

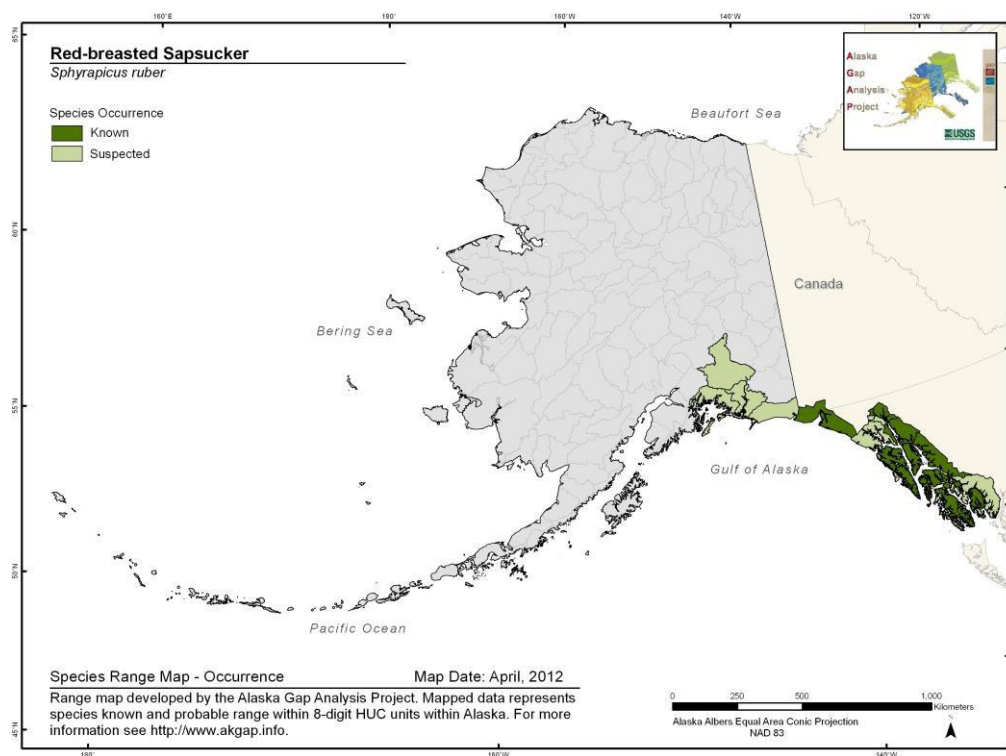
Winkler, H., D. A. Christie, and D. Nurney. 1995. Woodpeckers. An identification guide to the woodpeckers of the world. Houghton Mifflin Co., Boston, MA.

Red-breasted Sapsucker

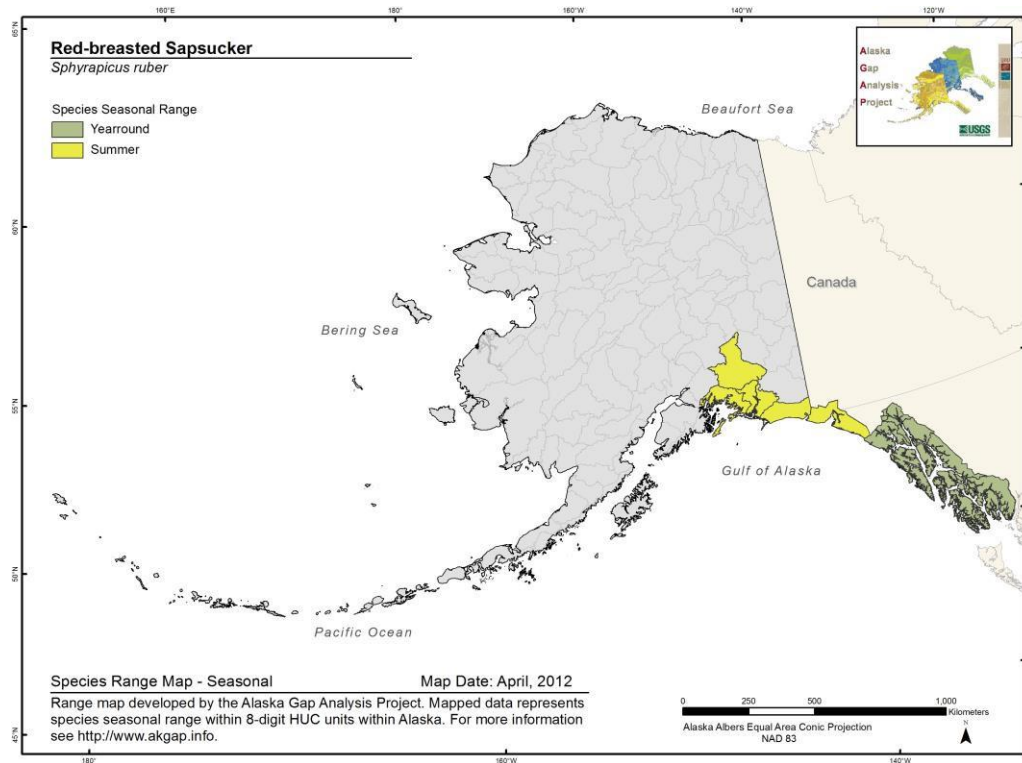
Sphyrapicus ruber

Range Map and Distribution Model Summary

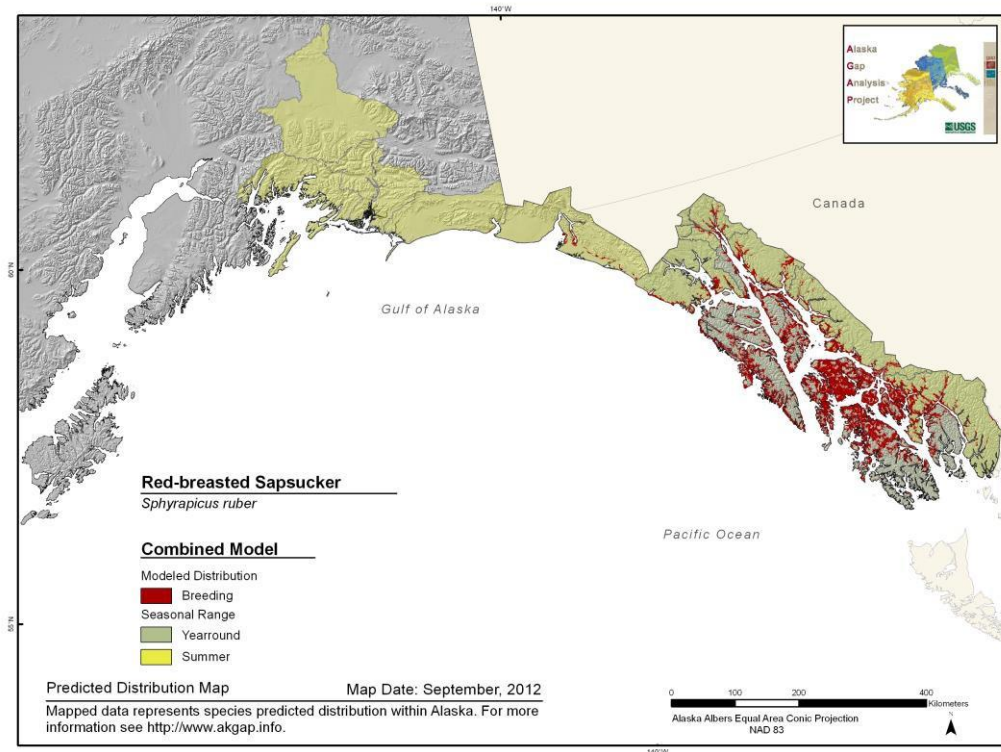
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.854**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabits mature stands, but may not be obligate old-growth species (Andres 1999b). Nests in hemlock/spruce forests in Alaska (Gibson 1976). Often nests at forest edge near marsh, lake or other opening. Research has documented more frequent use of dead trees compared to live trees (Andres 1999b). Nests from sea level to 1,2220 m in British Columbia (Campbell et al. 1990).

References

Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

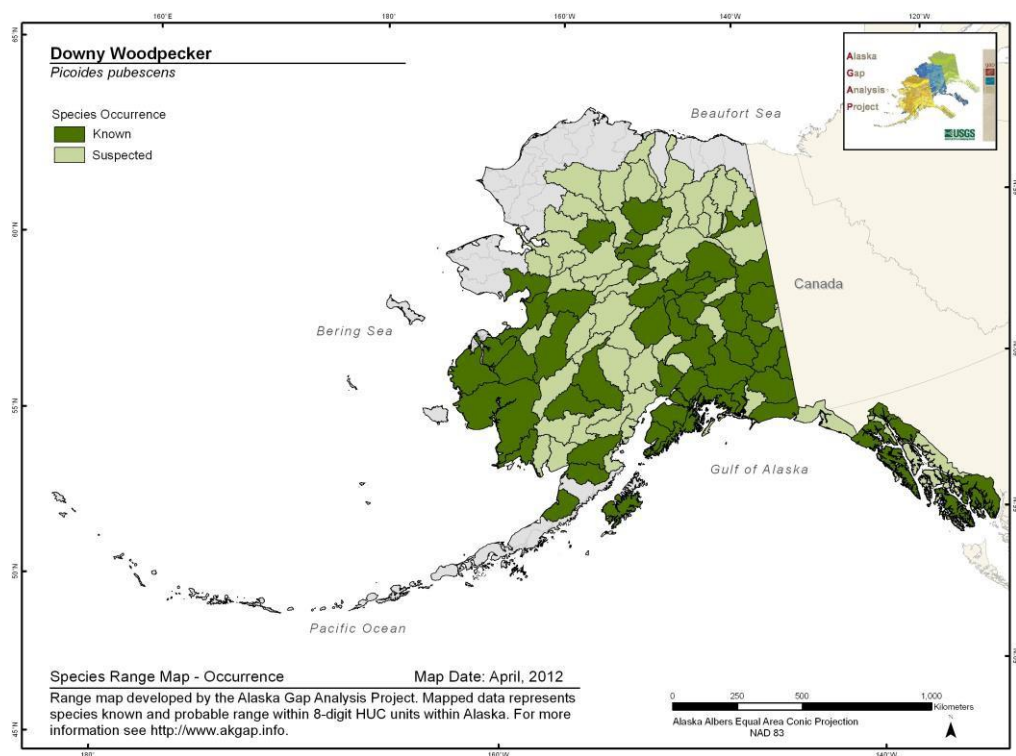
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Gibson, D. D. 1976. Bird species and habitat inventory: Alexander Archipelago, Alaska, summer 1975. University of Alaska Museum Contract Report No. 01-283. U. S. For. Serv. 66pp.

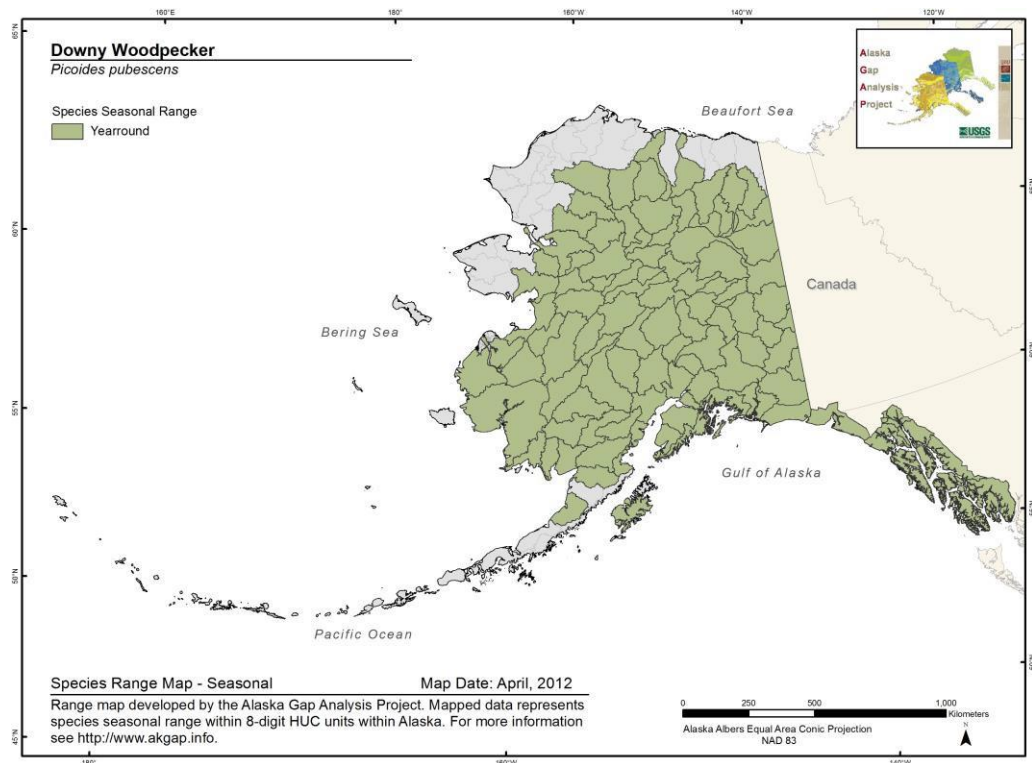
Downy Woodpecker *Picoides pubescens*

Range Map and Distribution Model Summary

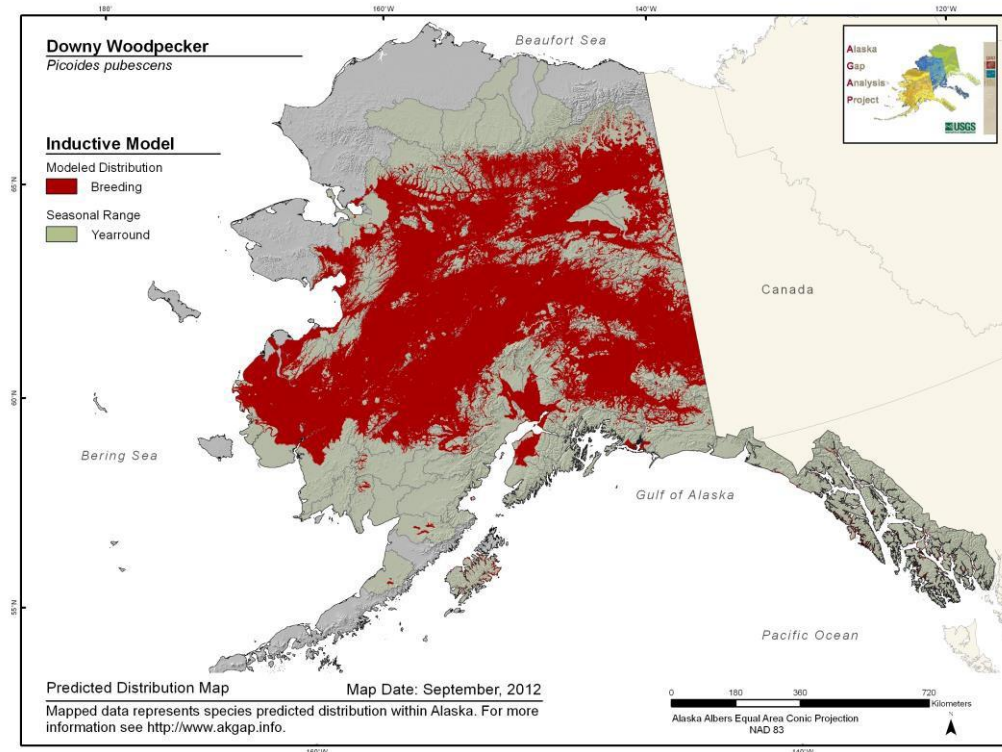
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.756**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in deciduous forests, bottomlands, mixed forests, riparian thickets, forest burns, and logged areas. Inhabits rural and urban parks. Nonbreeding individuals will also utilize coniferous forest edges. In B.C., this species is found from sea level to 1,250 m (Campbell et al. 1990).

References

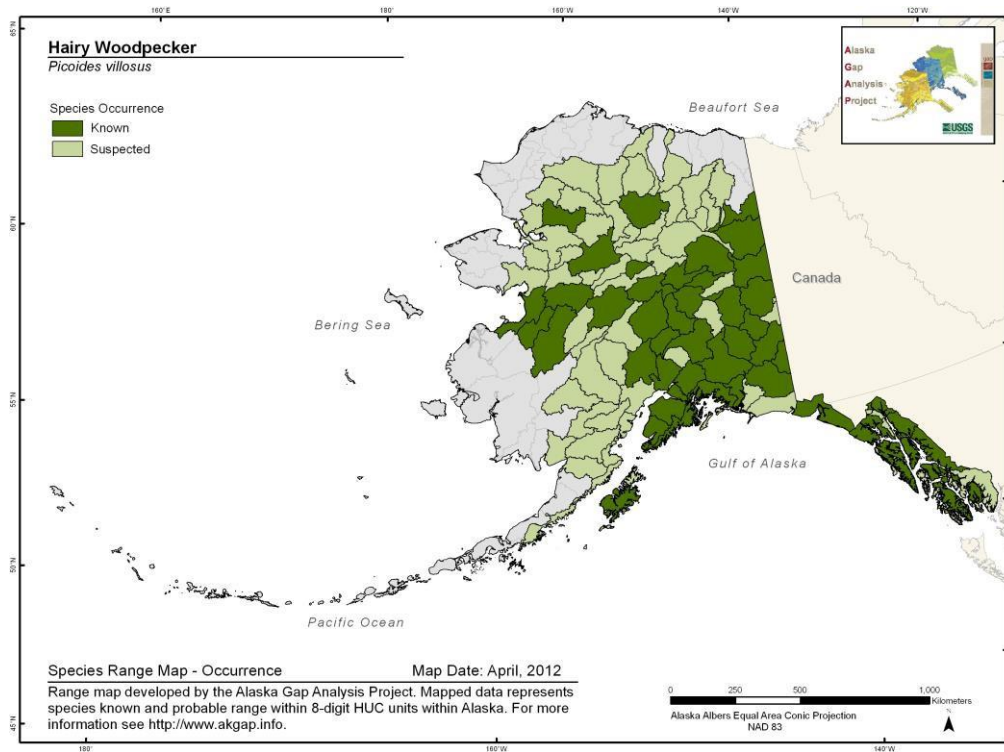
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Hairy Woodpecker

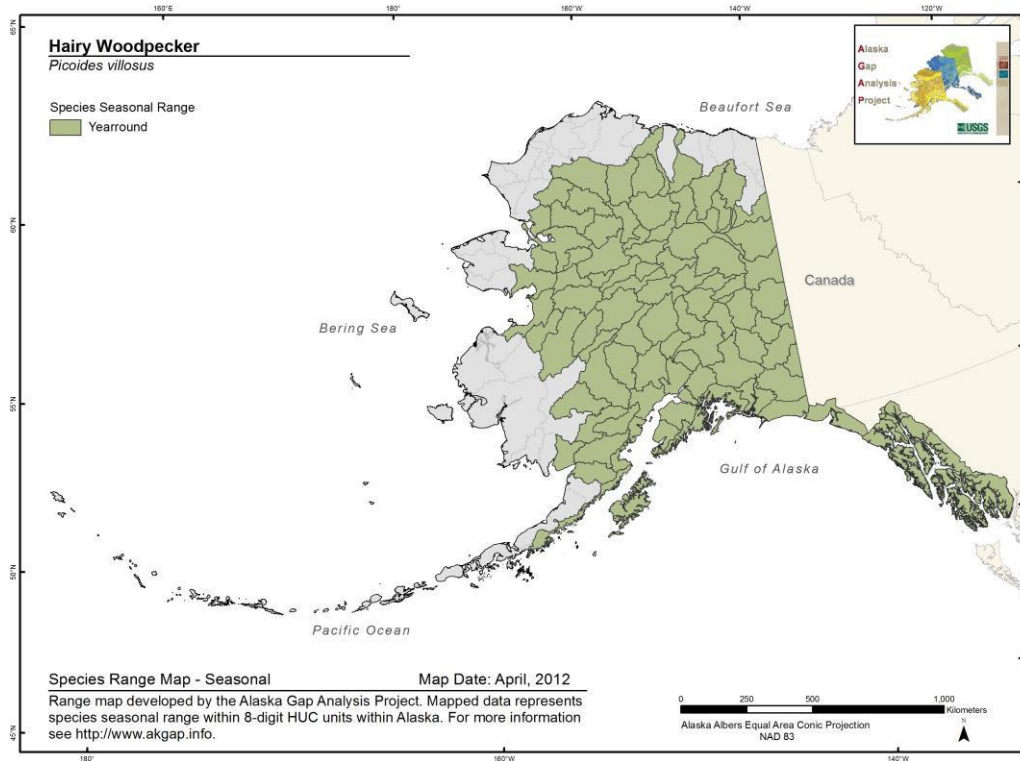
Picoides villosus

Range Map and Distribution Model Summary

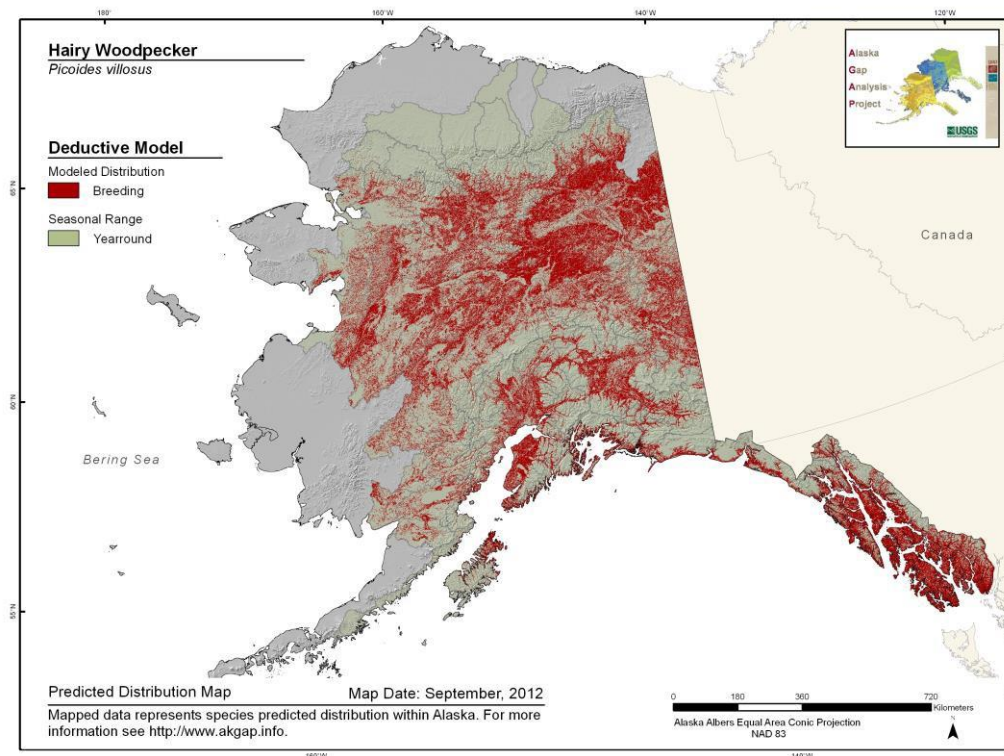
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.707**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabits mature coniferous and deciduous forests during breeding season, but may occur in a wide range of habitat depending on geographic location. In B.C., occurs in all forest types up to 1900 m. Found in mature conifer forests near edges (Campbell et al. 1990). Forest, open woodland, swamps, well-wooded towns and parks, open situations with scattered trees. Most abundant in mature woods with large old trees suitable for cavity nesting; also common in medium-aged forests; prefers woods with a dense canopy (Bushman and Therres 1988 in ADF&G 2005a). Uses tree cavities for roosting and winter cover; may excavate new cavities in fall to be used for roosting (Sousa 1987 in ADF&G 2005a). Nests in self excavated cavity in live or dead tree or stub. In most areas, favors dead or dying parts of live trees, especially where fungal heart rot has softened the heartwood (NatureServe 2007b).

References

ADF&G. 2005a. Our wealth maintained: a strategy for conserving Alaska's diverse wildlife and fish resources, a Comprehensive Wildlife Conservation Strategy emphasizing Alaska's nongame species. Submitted to USFWS, Anchorage, AK.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

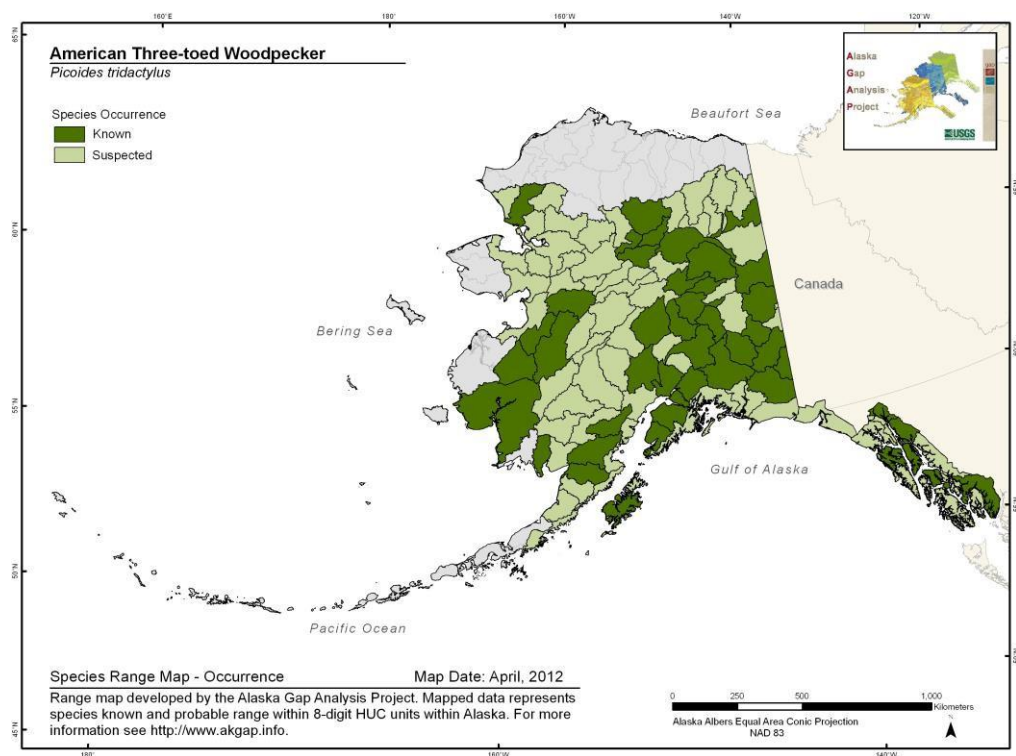
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

American Three-toed Woodpecker

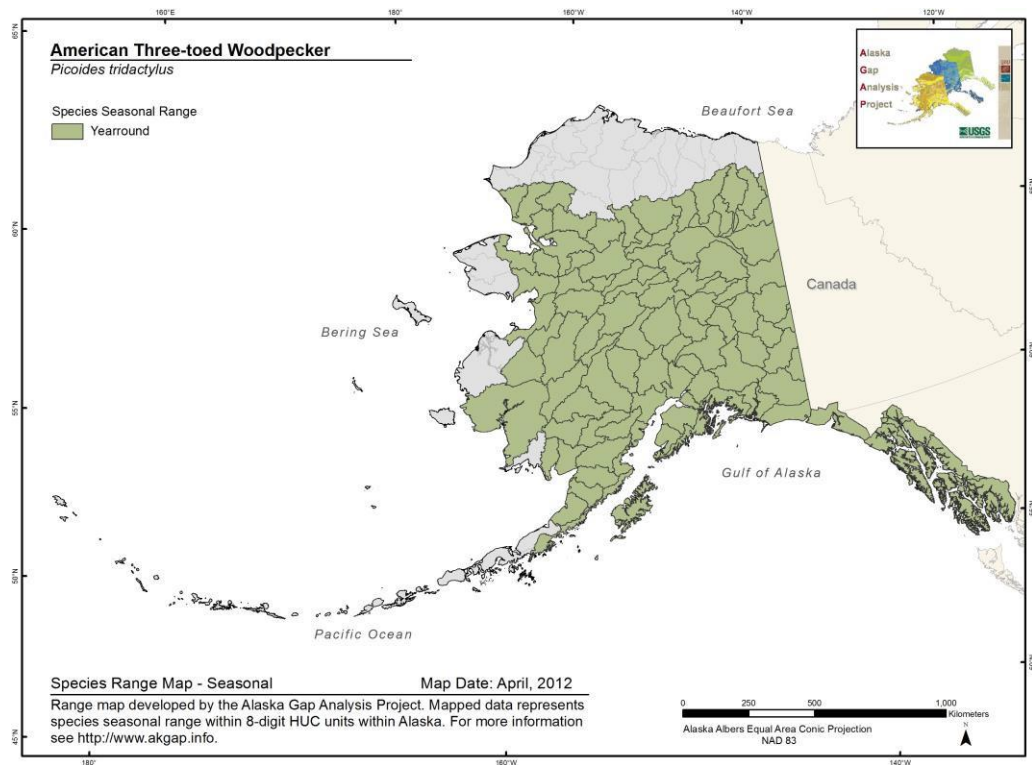
Picoides dorsalis

Range Map and Distribution Model Summary

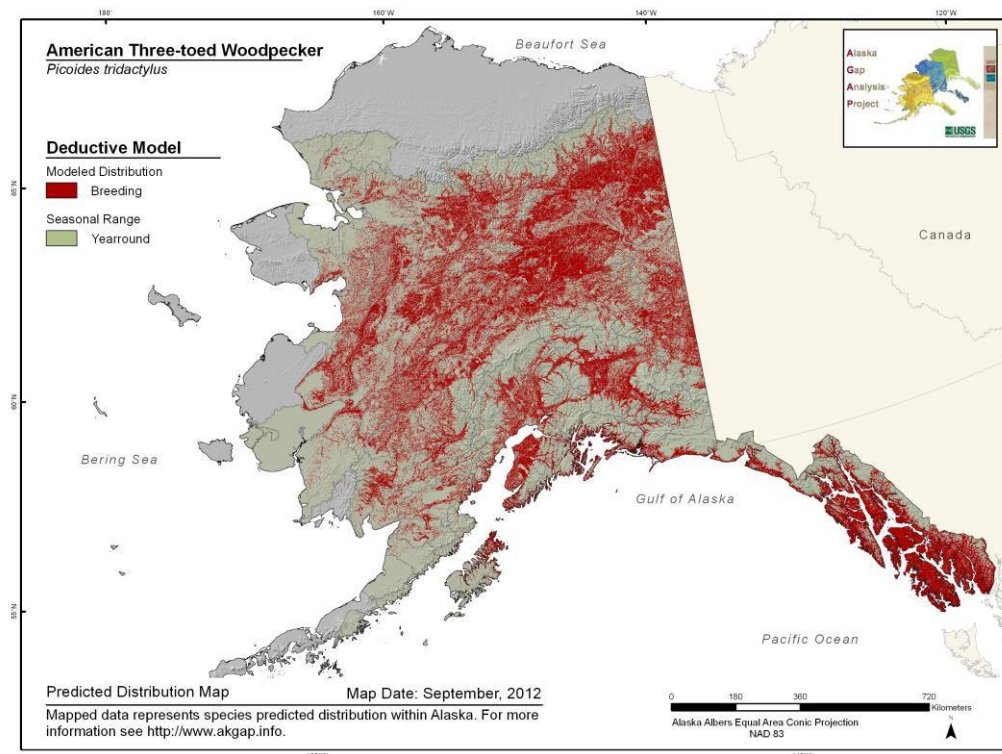
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.588**

**Model Quality
Summary:**
Low

Habitat Description

Mature or old-growth boreal and montane coniferous forests with an abundance of insect-infested snags or dying trees (Winkler et al. 1995, Goggans et al. 1988, Virkkala et al. 1994, Murphy and Lehnhausen 1998, Imbeau et al. 1999). Optimal habitat includes areas with 42-52 snags per 100 acres, with snags occurring in clumps, measuring 12-16 inches dbh and 20-40 feet tall, and mostly with bark still present (Spahr et al. 1991). Cavity nests placed in dead (occasionally live) tree (commonly conifer or aspen). Sometimes nests in utility poles.

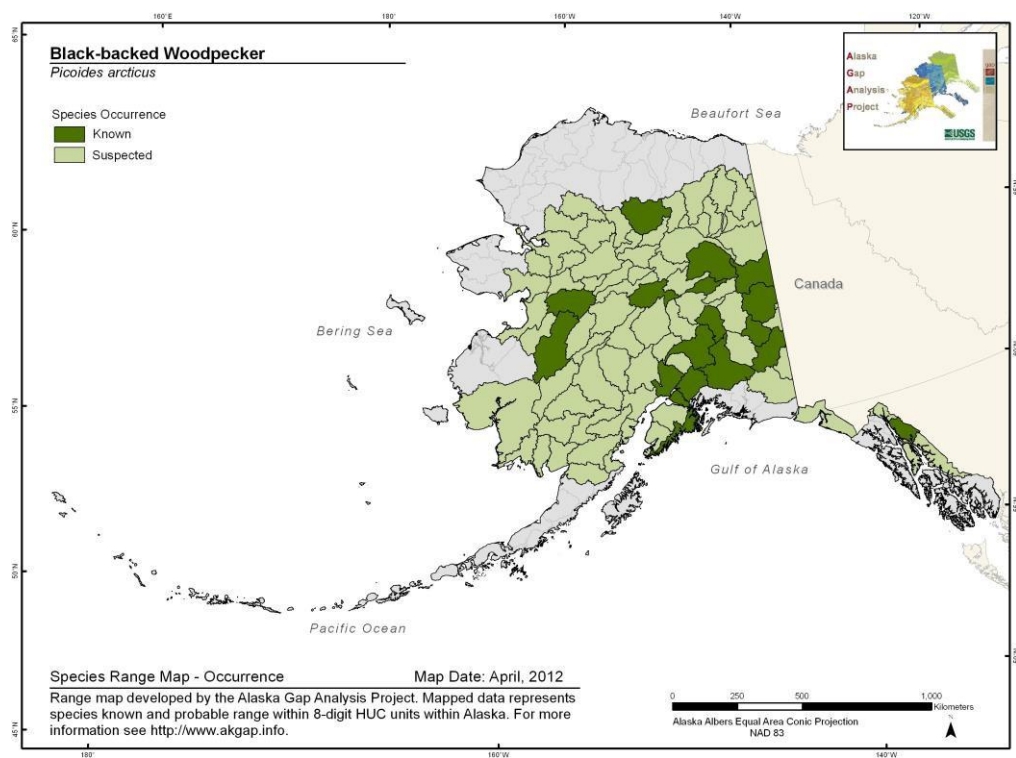
References

- Goggans, R., R. D. Dixon, and L. C. Seminara. 1988. Habitat use by Three-toed and Black-backed woodpeckers. Oregon Dep. Fish and Wildl. Nongame Rep. 87-3-02.
- Imbeau, L., J. L. Savard, and R. Gagnon. 1999. Comparing bird assemblages in successional black spruce stands originating from fire and logging. Canadian Journal of Zoology 77:1850-1860.
- Murphy, E. C. and W. A. Lehnhausen. 1998. Density and foraging ecology of woodpeckers following a stand-replacement fire. Journal of Wildlife Management 62: 1359-1372.
- Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. USDA USFS, Ogden, Utah.
- Virkkala, R., A. Rajasarkka, R. A. Vaisanen, M. Vickholm, and E. Virolainen. 1994. Conservation value of nature reserves: do hole-nesting birds prefer protected forests in southern Finland. Ann. Zool. Fenn. 13:173-186.
- Winkler, H., D. A. Christie, and D. Nurney. 1995. Woodpeckers. An identification guide to the woodpeckers of the world. Houghton Mifflin Co., Boston, MA.

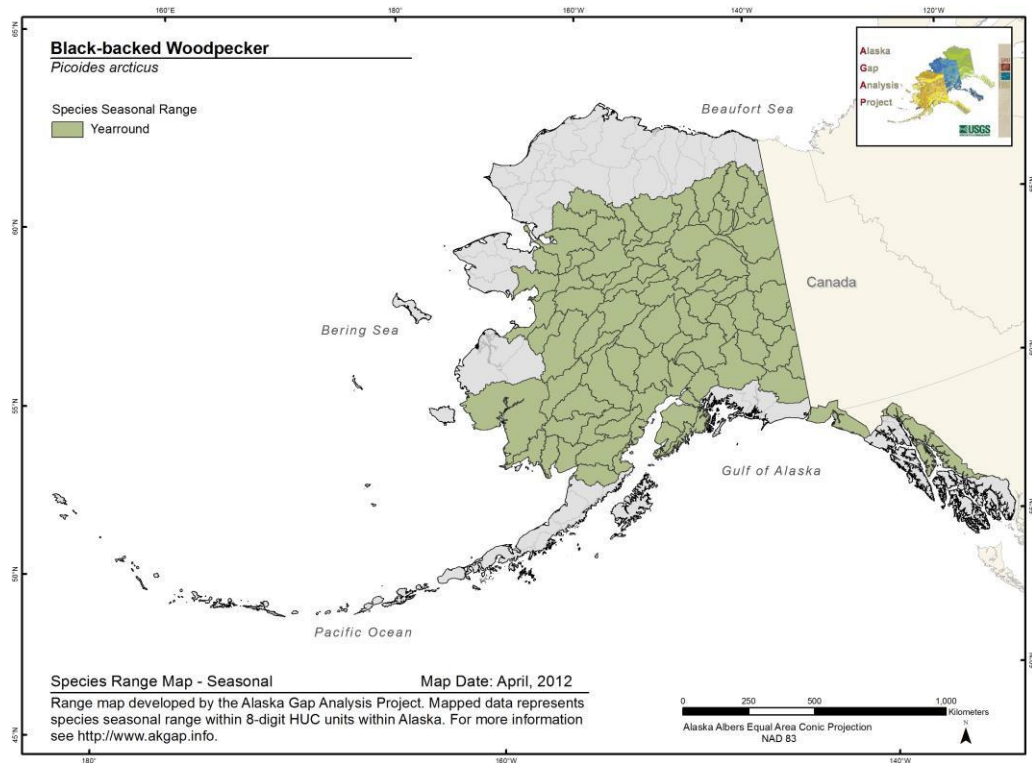
Picoides arcticus

Range Map and Distribution Model Summary

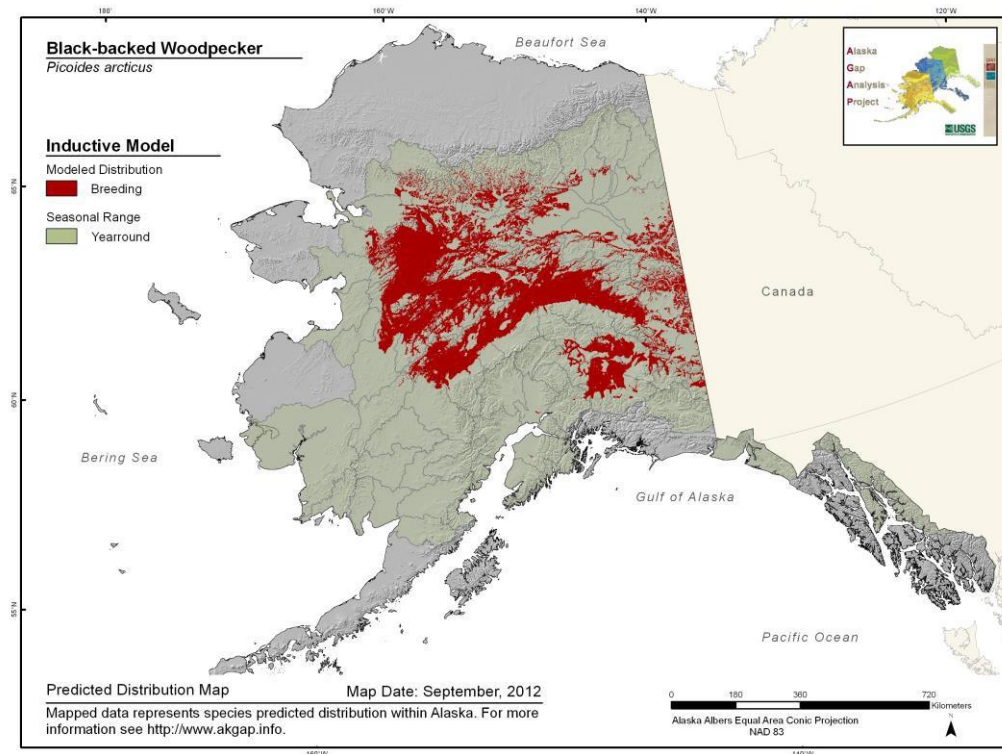
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.75**

**Model Quality
Summary:**
Moderate

Habitat Description

Restricted to burned-over boreal and montane coniferous forests. In Alaska, inhabits burned white-spruce forests within 3 months of fire and up to 2 to 3 years (Murphy and Lehnhausen 1998). Prefers areas with an abundance of dead or dying trees for nest cavities. Also found in areas recently flooded (Andres 1999b).

References

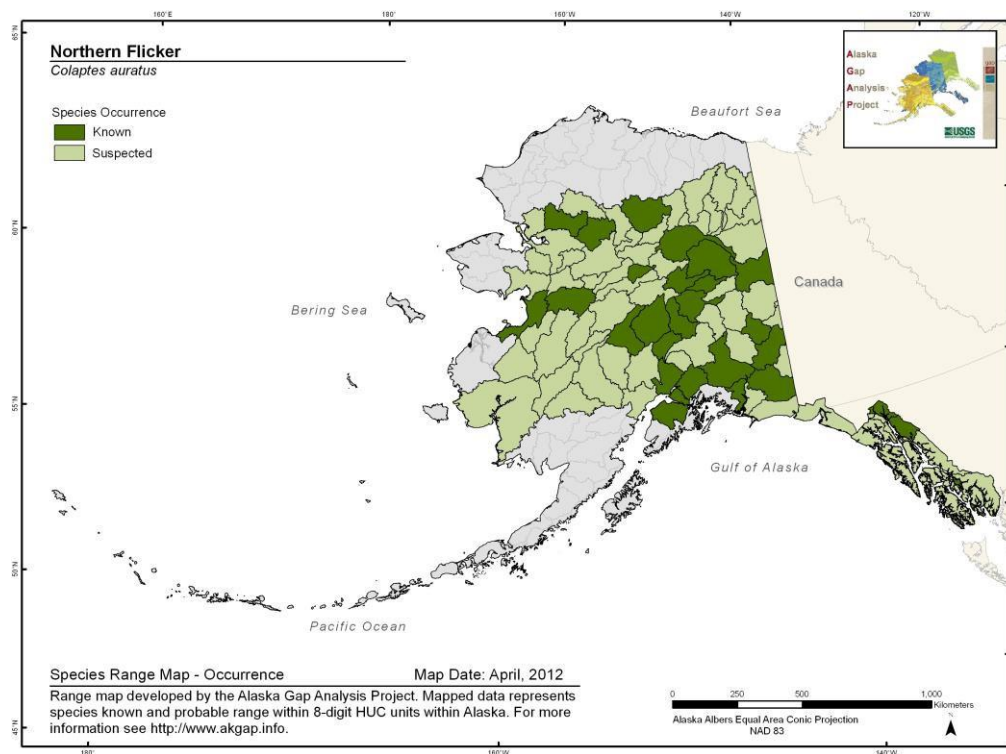
Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

Murphy, E. C. and W. A. Lehnhausen. 1998. Density and foraging ecology of woodpeckers following a stand-replacement fire. *Journal of Wildlife Management* 62: 1359-1372.

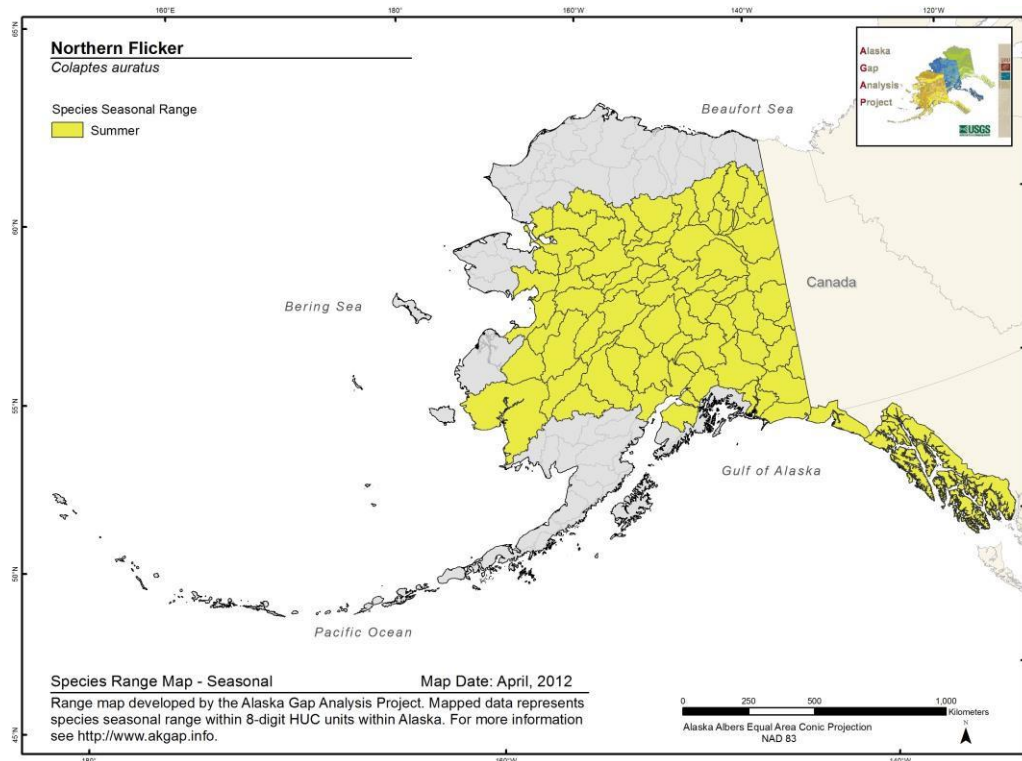
Northern Flicker *Colaptes auratus*

Range Map and Distribution Model Summary

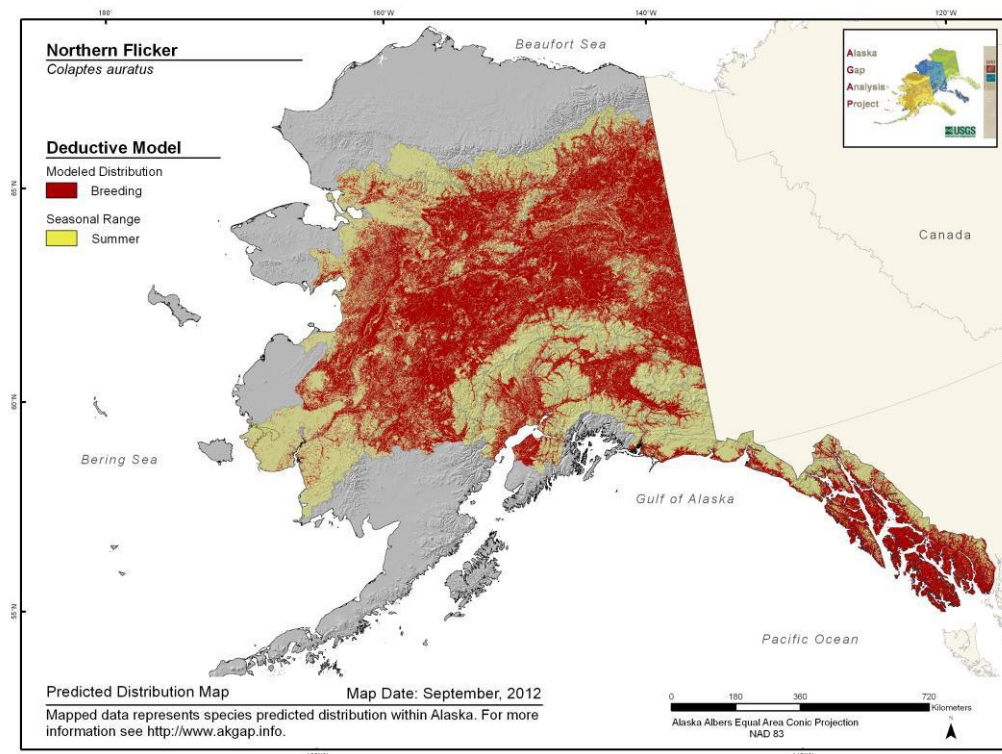
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.674**

**Model Quality
Summary:**
Low

Habitat Description

Requires dead trees, dead limbs, or trees with heart rot to excavate nesting cavities (Moore 1995). In the Yukon, this species inhabits edges of wetlands, mixed forests, coniferous forests, forest openings, shrubs, and edges of rivers and lakes (Alexander et al. 2003) and in B.C., breeds in virtually all forested zones from sea level to 2,100 m (Campbell et al. 1990).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

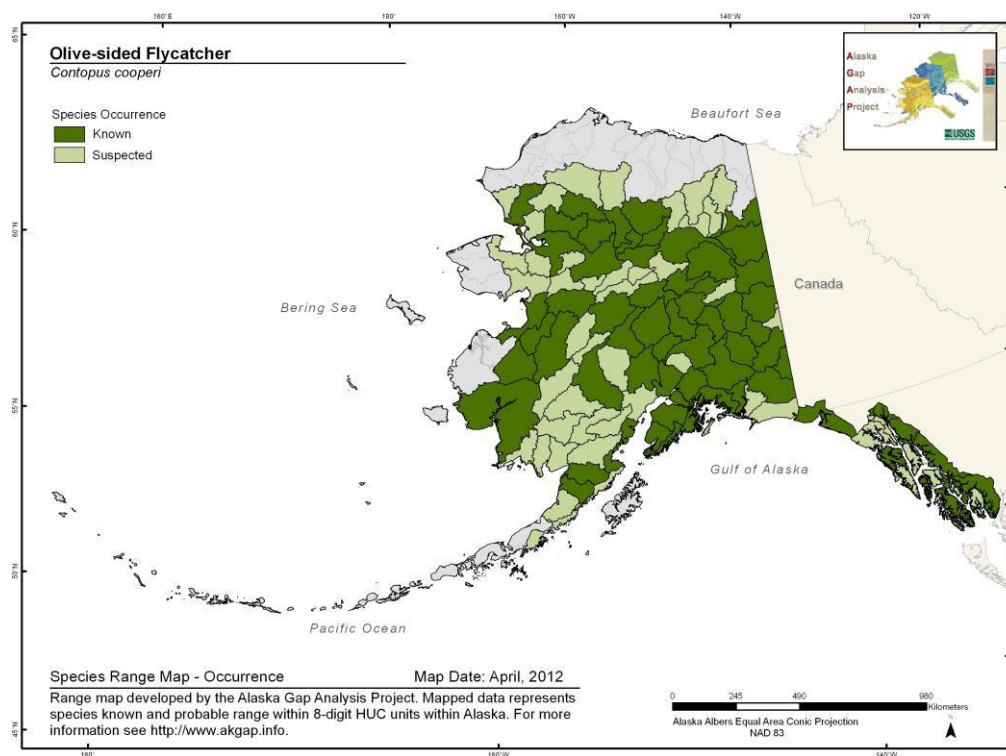
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Vol. 1 and 2, Nonpasserines. UBC Press, Vancouver, B.C.

Moore, W. S. 1995. Northern Flicker (*Colaptes auratus*). In The Birds of North America, No. 166 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

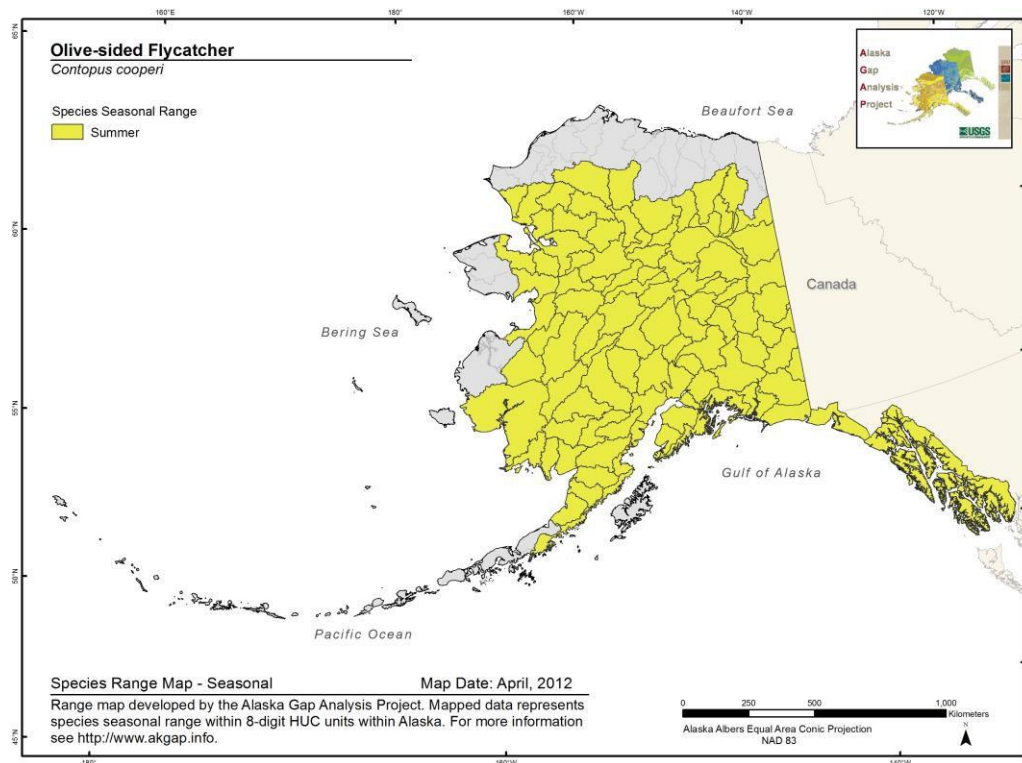
Olive-sided Flycatcher *Contopus cooperi*

Range Map and Distribution Model Summary

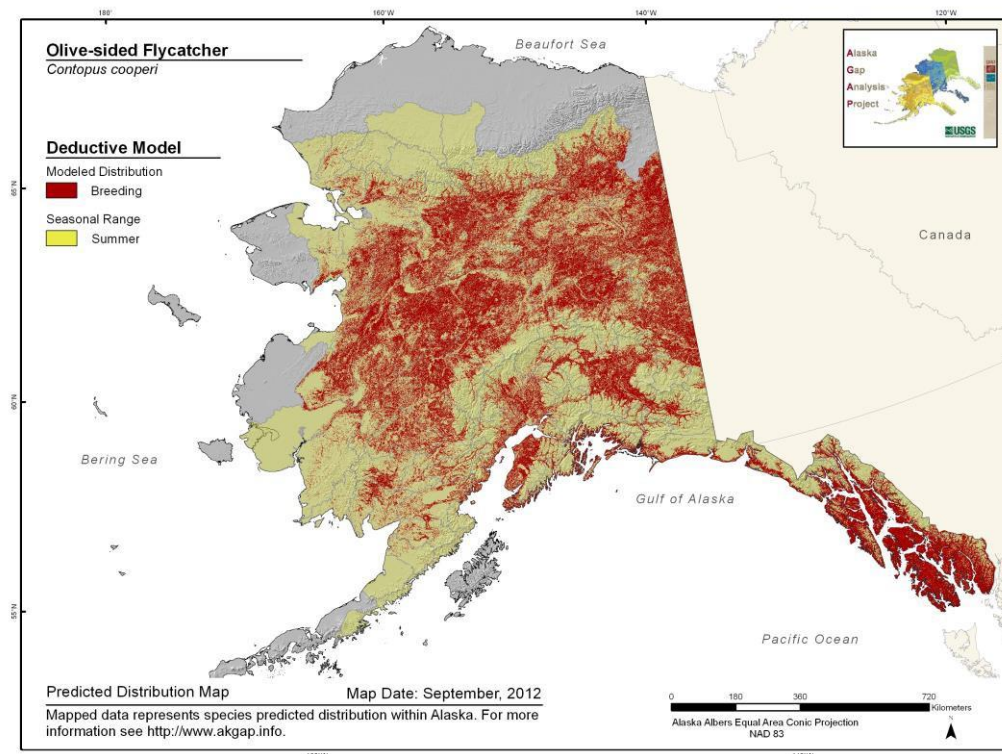
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.551**

**Model Quality
Summary:**
Low

Habitat Description

In forest and woodland, especially in burned-over areas with standing dead trees, in taiga, subalpine coniferous forest and mixed coniferous-deciduous forest (AOU 1983). Preference for forest edges, including harvested areas in southeast, forested habitats in central where forests are naturally open or semi-open. Indicator for coniferous forests, also found in mixed deciduous/coniferous forests. Found in open canopy spruce in Alaska. Associated with openings and water (e.g., bogs, wetlands) and dead standing trees. Closely associated with recently burned areas. In B.C., breeds from near sea level to about 2,200 m elevation (Campbell et al. 1997) and in the Yukon this species is reported from lowland areas up to treeline (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

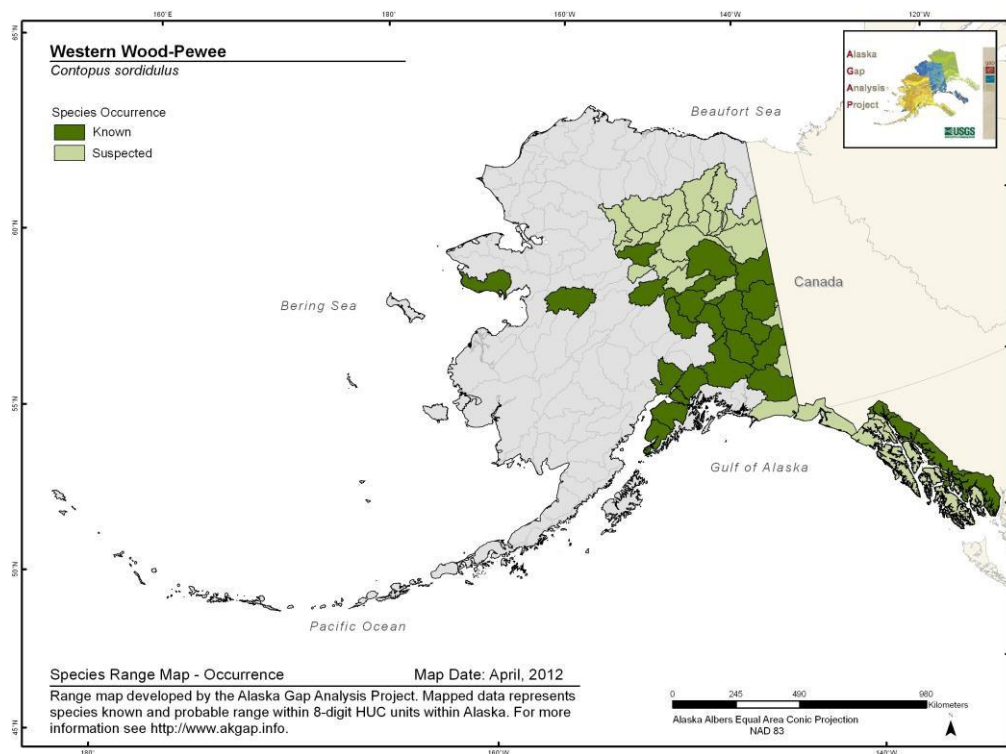
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

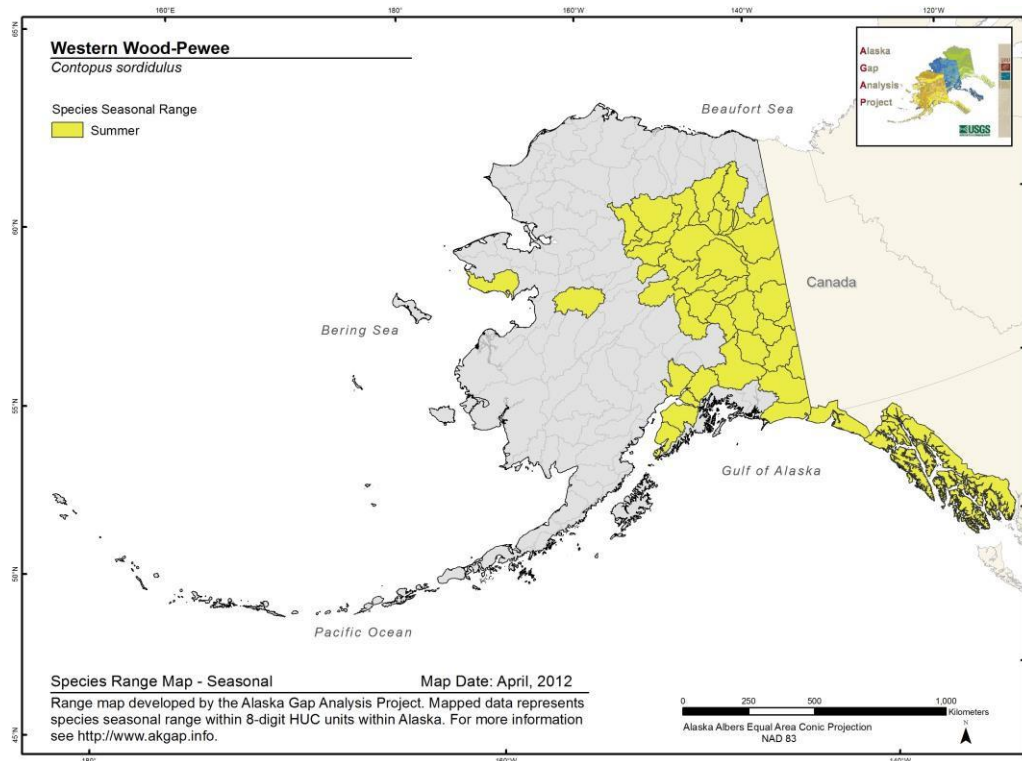
Western Wood-pewee *Contopus sordidulus*

Range Map and Distribution Model Summary

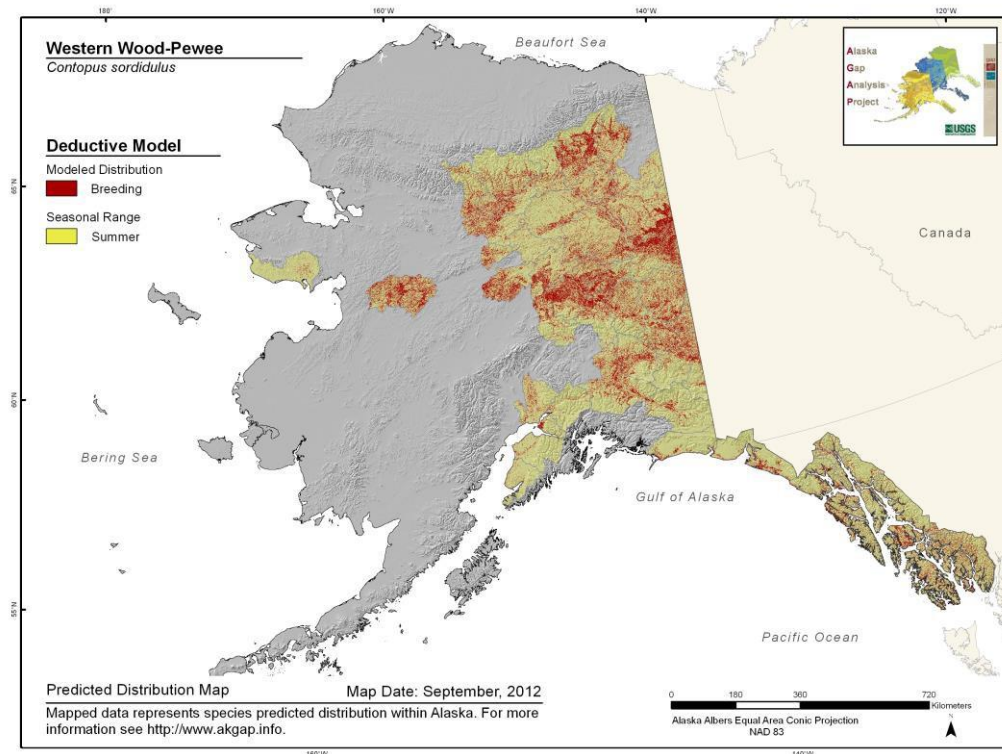
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.643**

**Model Quality
Summary:**
Low

Habitat Description

Variety of wooded habitats, including open forests (conifer and deciduous), forest edges, and riparian zones (Bemis and Rising 1999). Also breeds in human altered habitats, such as gardens, farms, campgrounds, and transmission-line corridors (Campbell et al. 1997). In Alaska, mainly occurs in deciduous stands on forest edges and scrub forests (Kaufman 1996). In B.C., breeds from sea level to 1,700 m elevation (Campbell et al. 1997).

References

Bemis, C., and J. D. Rising. 1999. Western Wood-Pewee (CONTOPUS SORDIDULUS). In The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

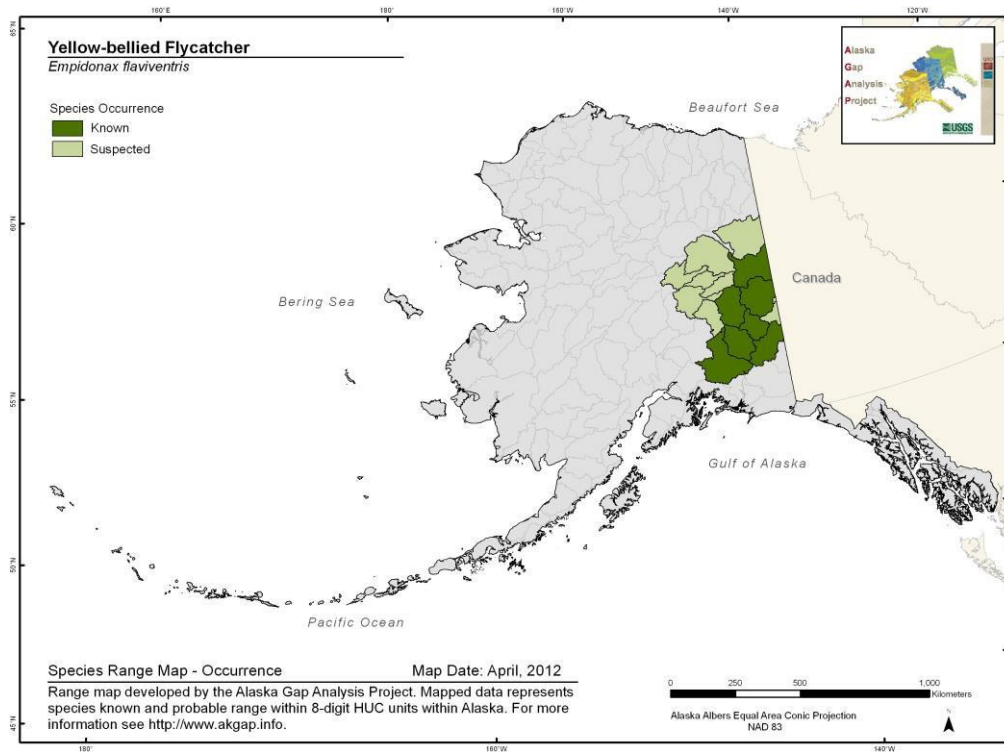
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin, New York. 675 pp.

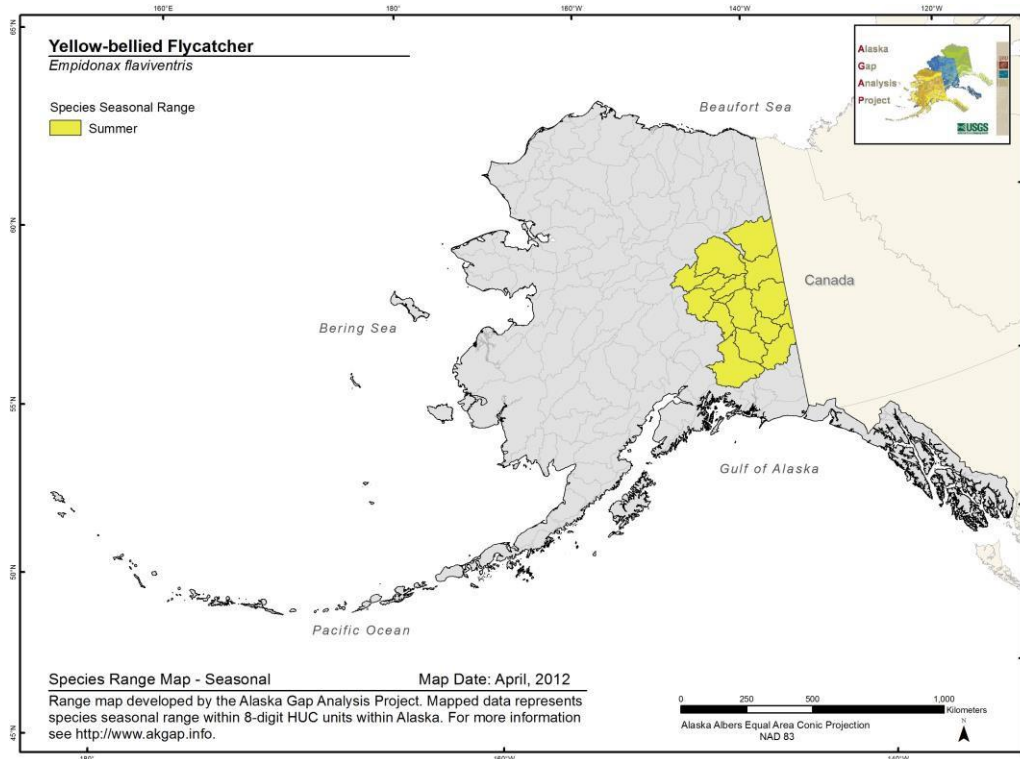
Yellow-bellied Flycatcher *Empidonax flaviventris*

Range Map and Distribution Model Summary

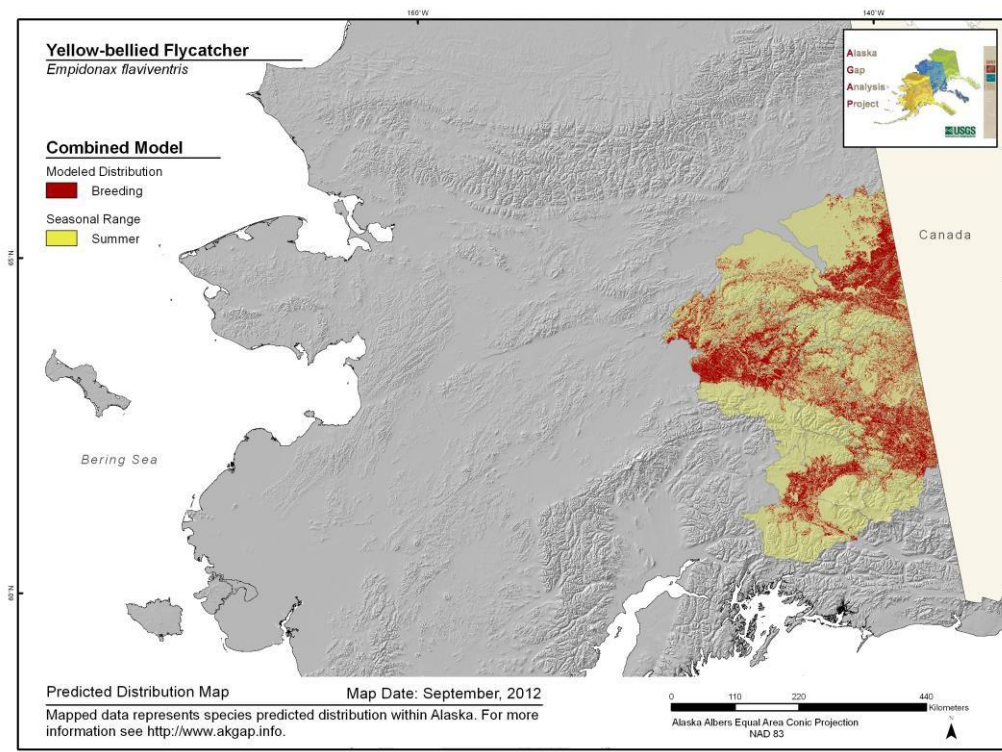
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.526**

**Model Quality
Summary:**
Low

Habitat Description

Nests in cool, moist conifer or mixed forests, bogs, swamps, peatlands, and muskegs. Often in landscapes that are flat or poorly drained (Gross and Lowther 2001). Habitat usually well stratified, with open canopy, saplings and seedlings, shrubs, and abundant thick moss cover (Gross and Lowther 2001). In the Yukon, commonly noted in boggy areas with stunted black spruce and occasionally white spruce with sparse deciduous shrub (Alexander et al. 2003).

References

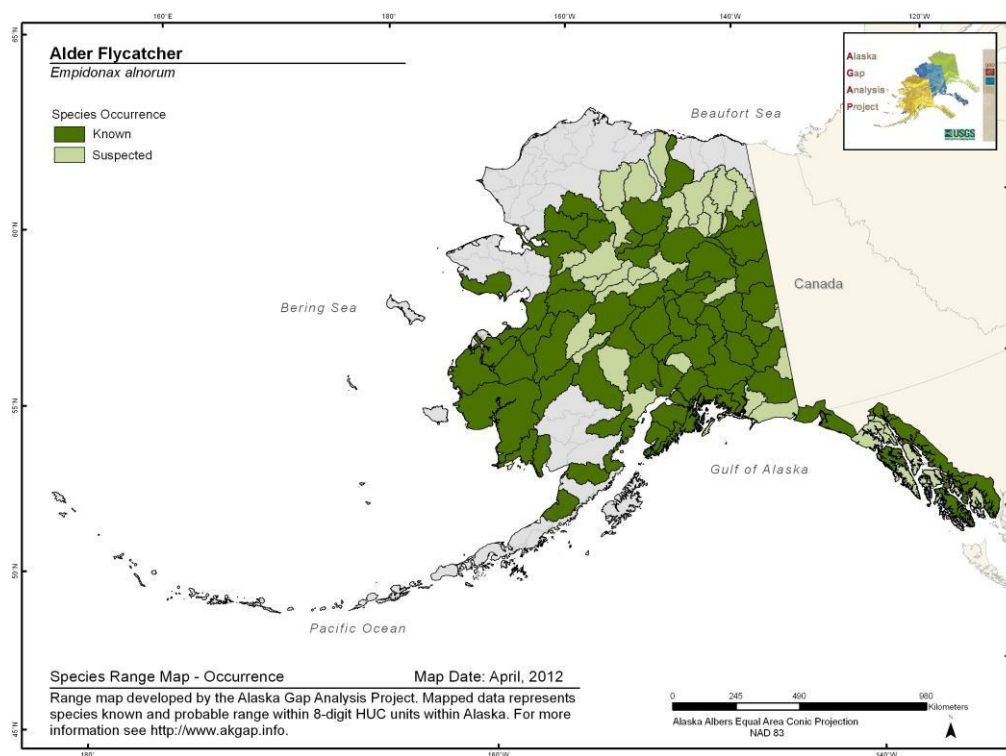
Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Gross, D. A. and P. E. Lowther. 2001. Yellow-bellied Flycatcher (*Empidonax flaviventris*). In The Birds of North America, No. 566 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

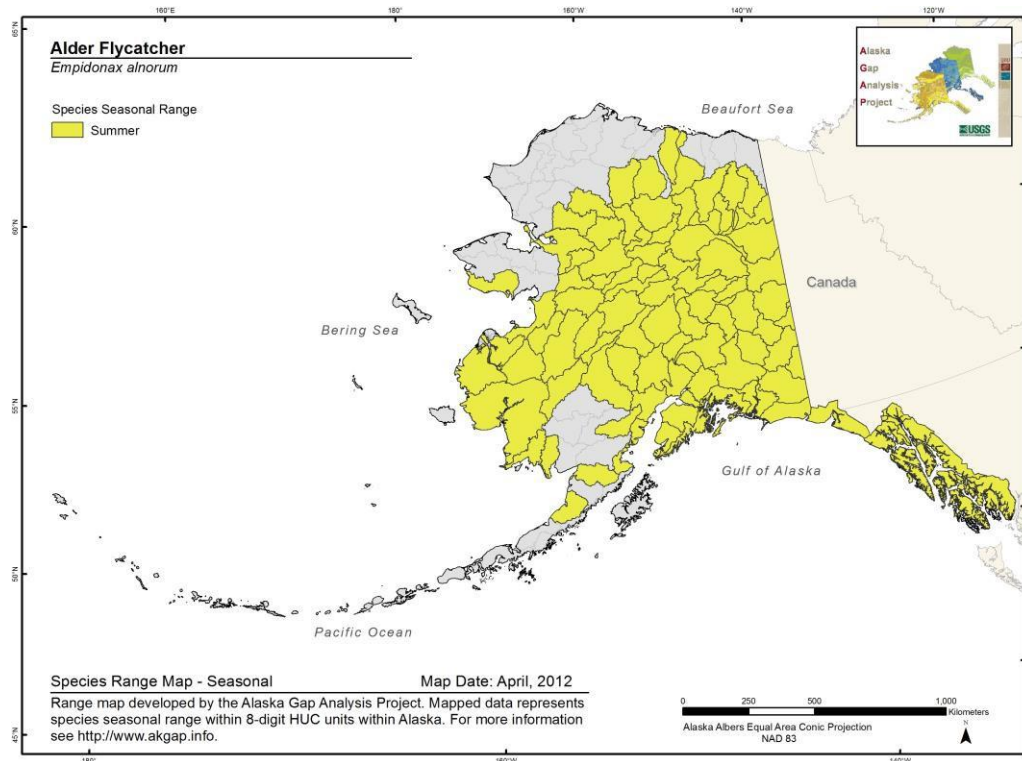
Alder Flycatcher *Empidonax alnorum*

Range Map and Distribution Model Summary

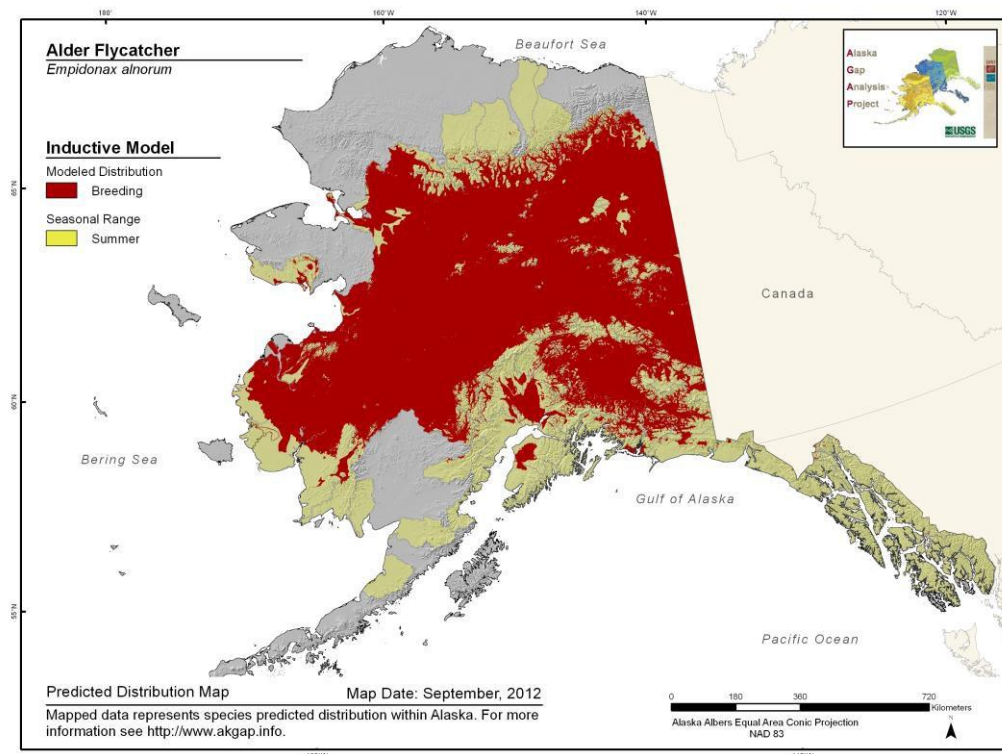
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.731**

**Model Quality
Summary:**
Moderate

Habitat Description

Alder and willow thickets, usually in moist areas (Armstrong 2008). In BC, found breeding at elevations ranging from 340 to 1300 m. Breeding habitat typically consists of shrub thickets and stands of young deciduous trees, usually in close proximity to water, such as lakes, ponds, rivers, floodplains, creeks, swamps, marshes, and sewage lagoons and usually in close to willow, alder, black cottonwood, poplar, and trembling aspen. Four to 8 yr old regenerating cuts preferred nesting sites (Campbell et al. 1997).

References

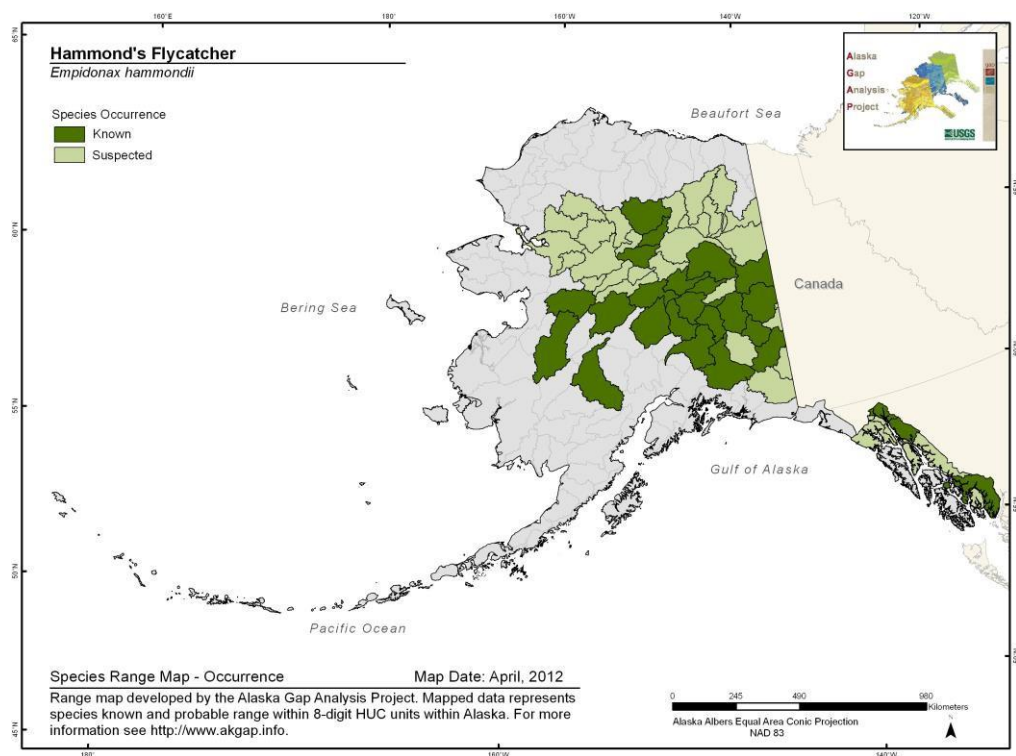
Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

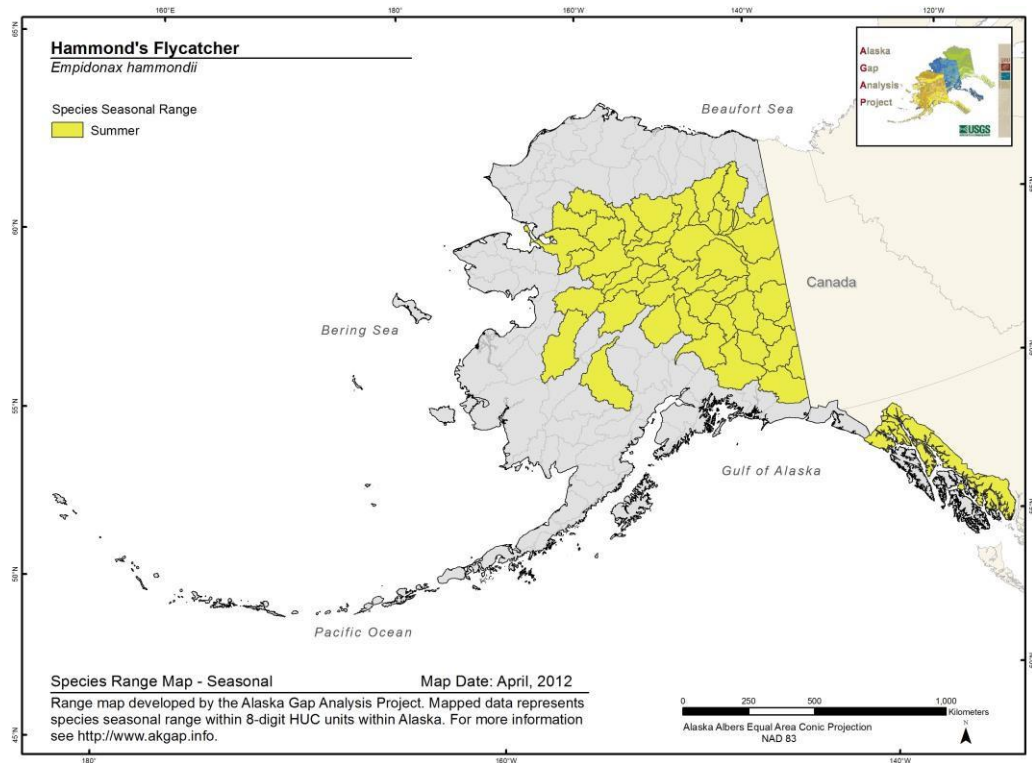
Hammond's Flycatcher *Empidonax hammondi*

Range Map and Distribution Model Summary

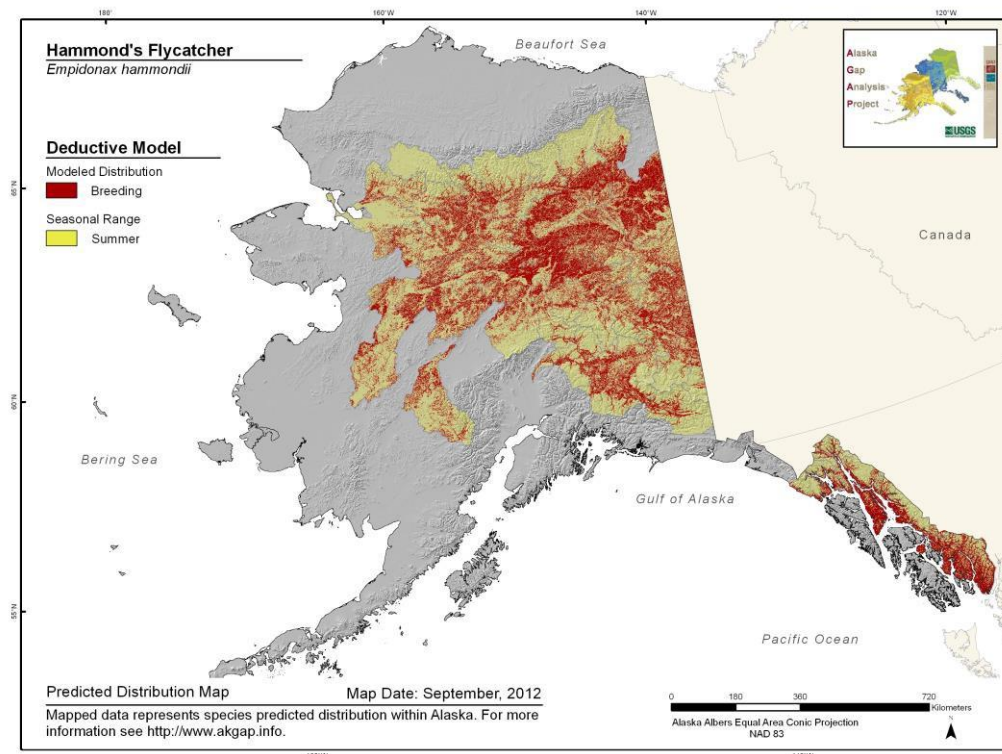
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.602**

**Model Quality
Summary:**
Low

Habitat Description

In central Alaska, mainly inhabit deciduous stands, especially mature aspen (Spindler and Kessel 1980). Occur in riparian deciduous forests in Southeast Alaska (Kessel and Gibson 1978, Armstrong 1995). Throughout the rest of their range, they are primarily found in dense coniferous forests (Sedgwick 1994). Prefers open mature stands (Spindler and Kessel 1980) of at least 10 ha (Sedgwick 1994). In B.C., breeds from sea level to 1,500 m in elevation, and generally nests at higher elevations than other *Empidonax* flycatchers in B.C. (Campbell et al. 1997).

References

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

Kessel, B., and D.D. Gibson. 1978. Status and distribution of Alaska birds. Studies Avian Biology. In: Studies in Avian Biology No. 1. R. J. Raitt, Ed. Cooper Ornithological Society. 1:1-100.

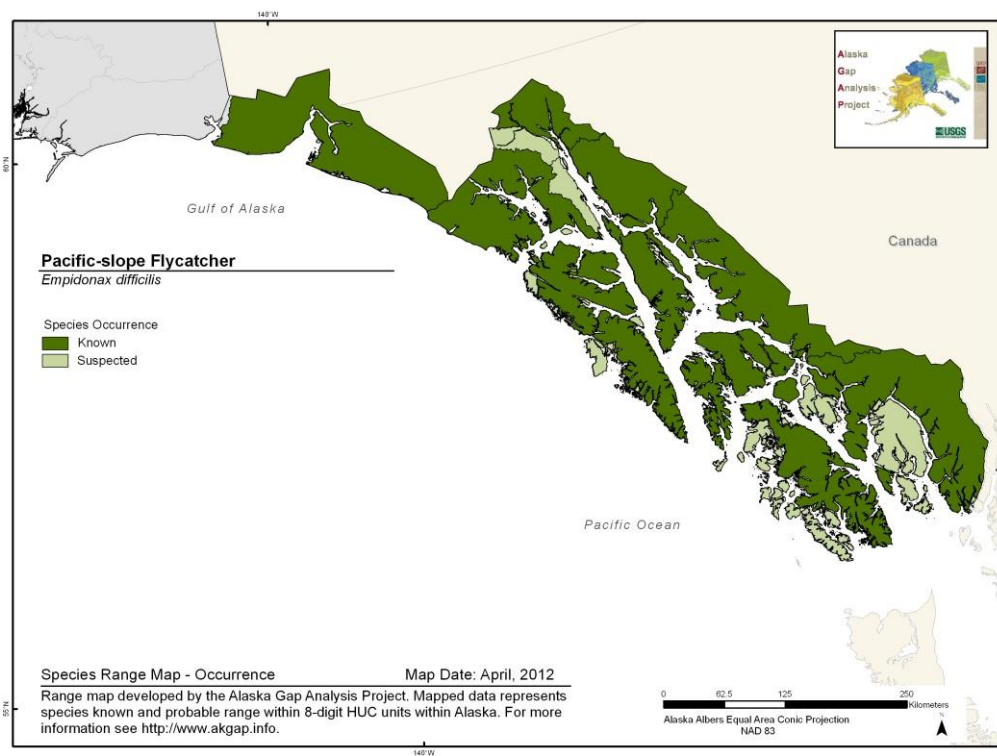
Sedgwick, J. A. 1994. Hammond's Flycatcher (EMPIDONAX HAMMONDII). In The Birds of North America, No. 109 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Spindler, M. A. and B. A. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. *Syesis* 13:61-104.

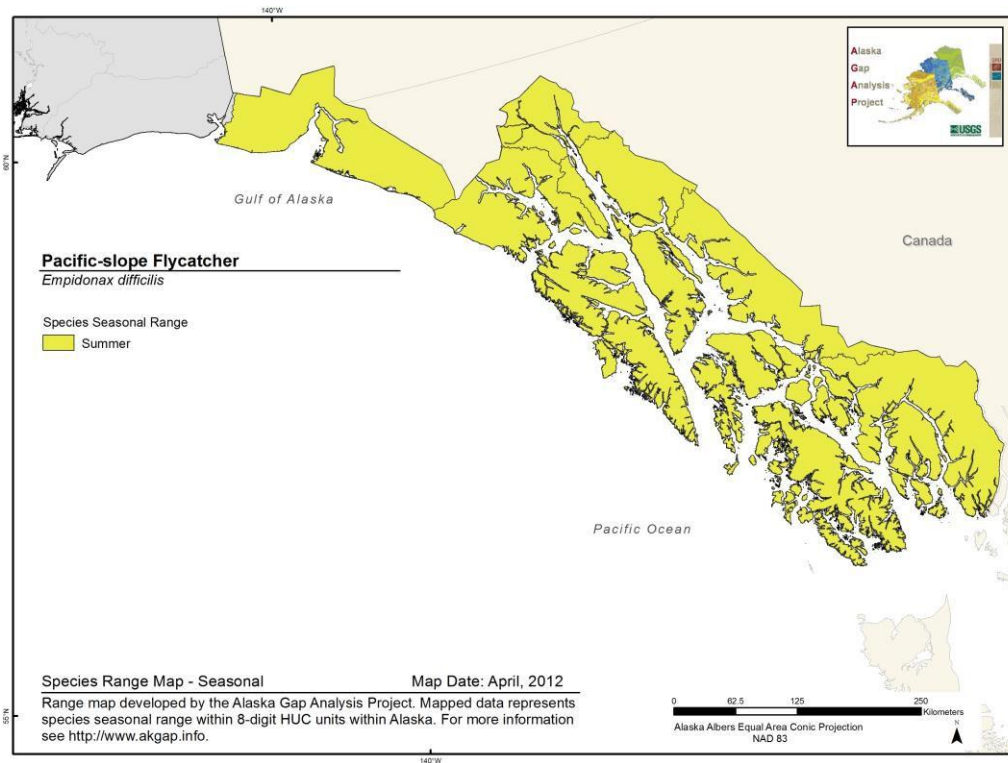
Pacific-slope Flycatcher *Empidonax difficilis*

Range Map and Distribution Model Summary

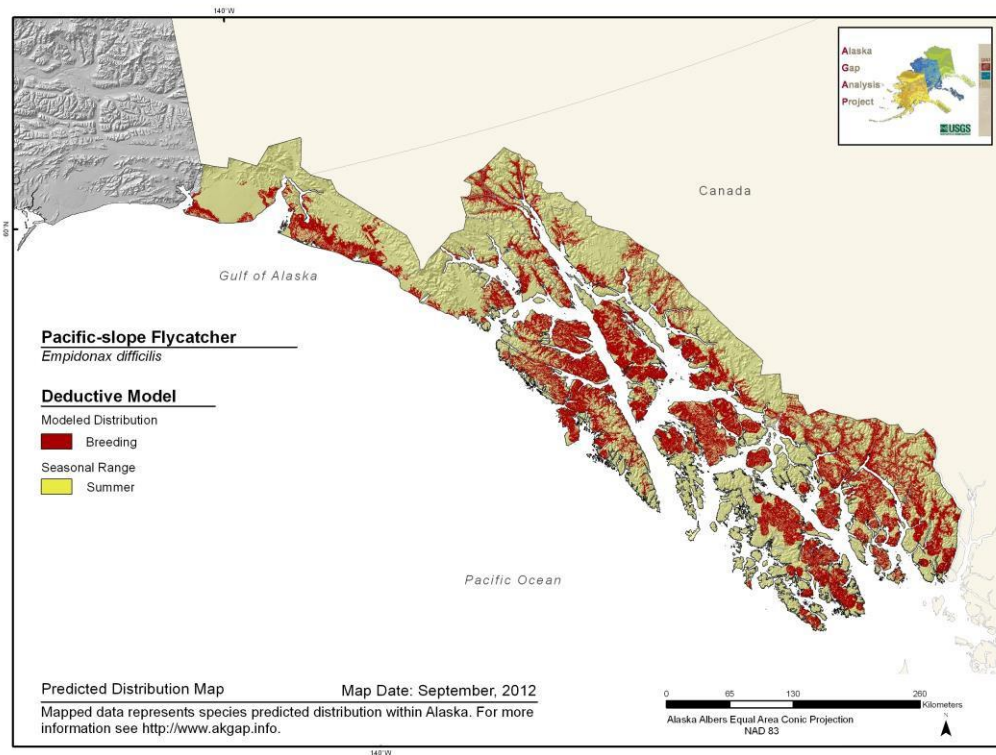
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in humid coniferous forests and dense second-growth woodland (AOU 1998). Associated with streams, ravines, shade, and flight space below the canopy (Johnson 1980, Small 1994). Warm forest and woodland, especially in vicinity of shaded cliffs, stream banks, and human dwellings; in winter mostly in mixed woodland and humid lowland forest (AOU 1989). Nests along streams; flexible in choice of nesting substrate; nests in cliffs, in tree cavities, crotch of branch, earth banks, or on building ledges. In southeast Alaska, highest densities were found in areas with > 60% needleleaf forest cover (Cotter and Andres 2000). In BC, inhabit old-growth and mature second-growth Douglas fir-western hemlock and mixed coniferous-deciduous forests (Campbell et al. 1997).

References

AOU. 1989. Thirty-seventh supplement to the American Ornithologists' Union Checklist of North American birds. Auk 106:532-538.

AOU. 1998. Check-list of North American birds. Seventh edition. American Ornithologists' Union, Washington, D.C. 829 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

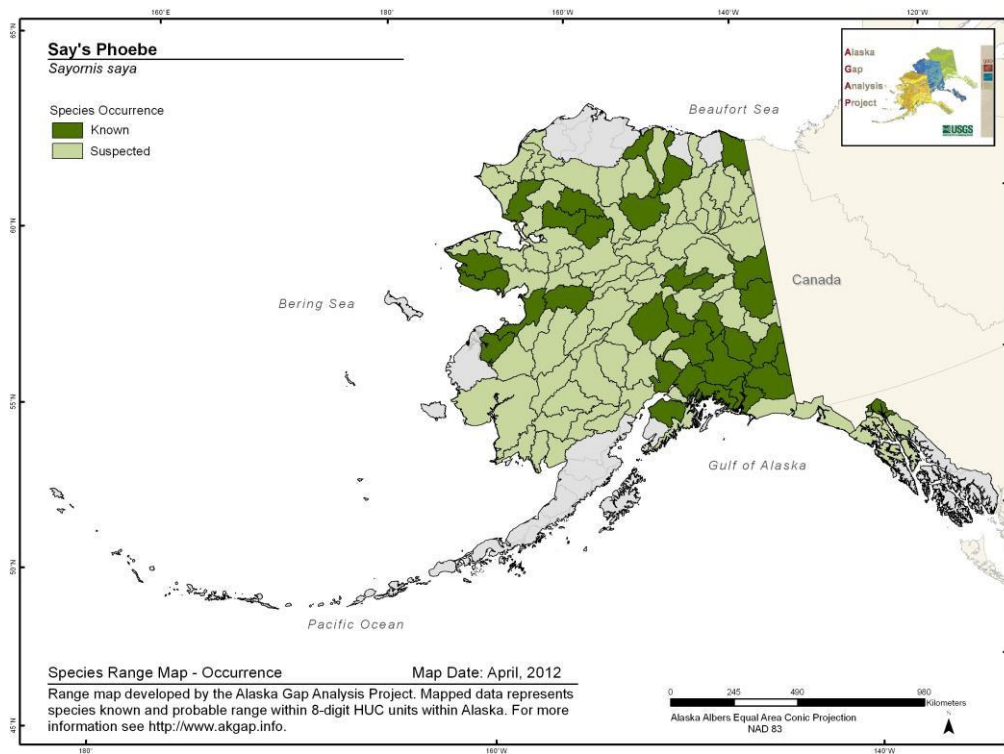
Johnson, N.K. 1980. Character variation and evolution of sibling species in the EMPIDONAX DIFFICILIS-FLAVESCENS complex (Aves: Tyrannidae). Univ. Calif. Publ. Zool. 112. 151 p.

Small, A. 1994. California birds: their status and distribution. Ibis Publ. Co., Vista, CA.

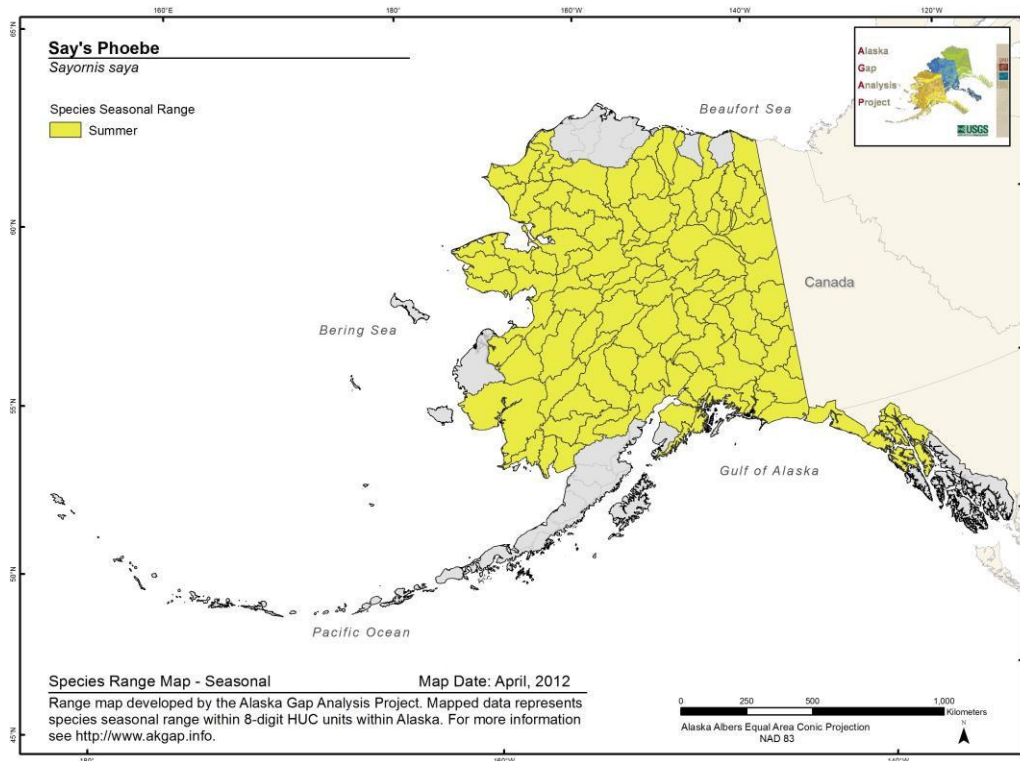
Say's Phoebe *Sayornis saya*

Range Map and Distribution Model Summary

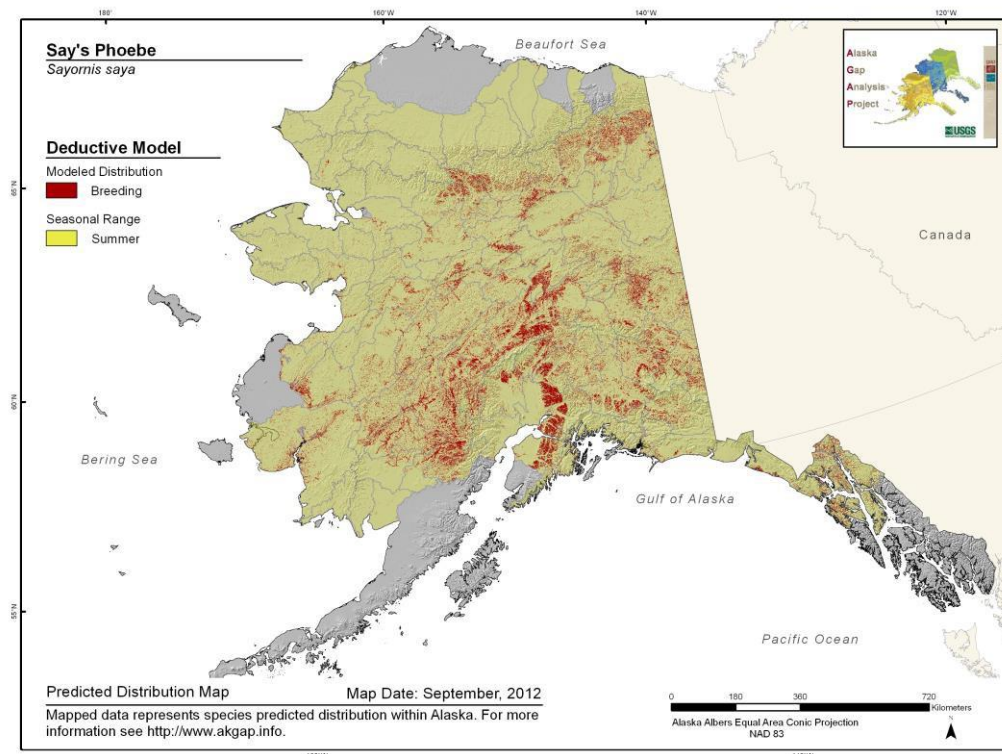
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.689**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in open country, generally avoiding heavily forested land (Bent 1942). Breeding also occurs in or around buildings or other man-made structures (Campbell et al. 1997). In Alaska, found near cliffs in mountains and uplands (Armstrong 2008). Also nests along banks of rivers and lakes, canyons, rocky outcroppings, and mountainsides (Campbell et al. 1997). Usually nests near water (Alexander et al. 2003). In B.C., breeds between 270 and 1,860 m elevation (Campbell et al. 1997).

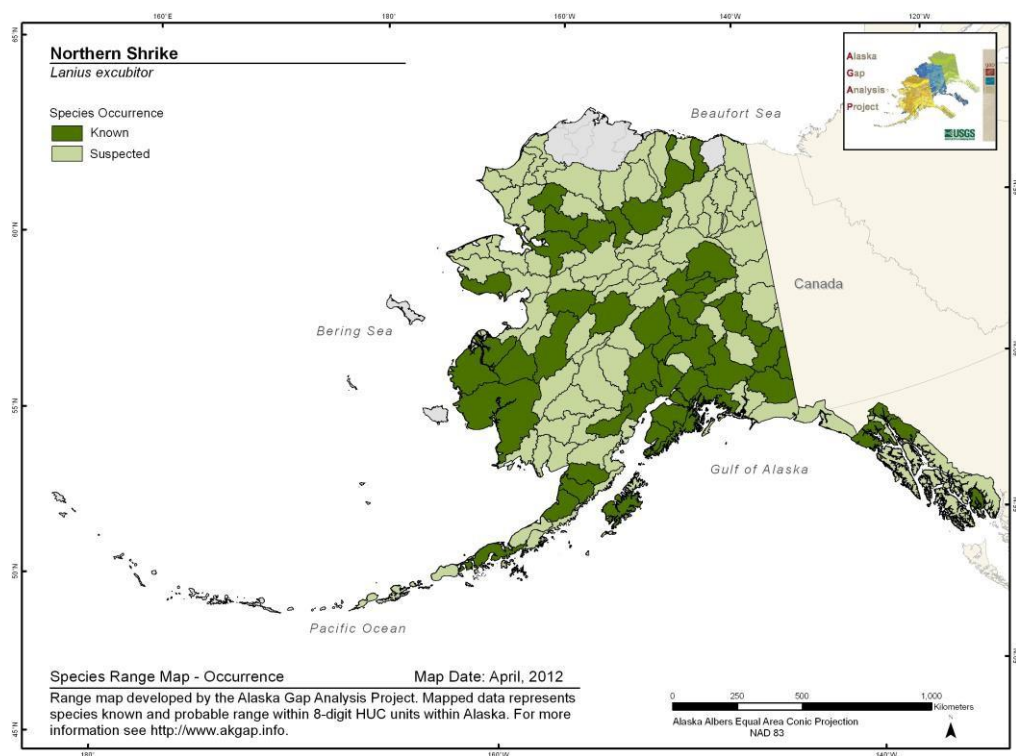
References

- Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.
- Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.
- Bent, A.C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. U.S. Natl. Mus. Bull. 179. Washington, DC.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

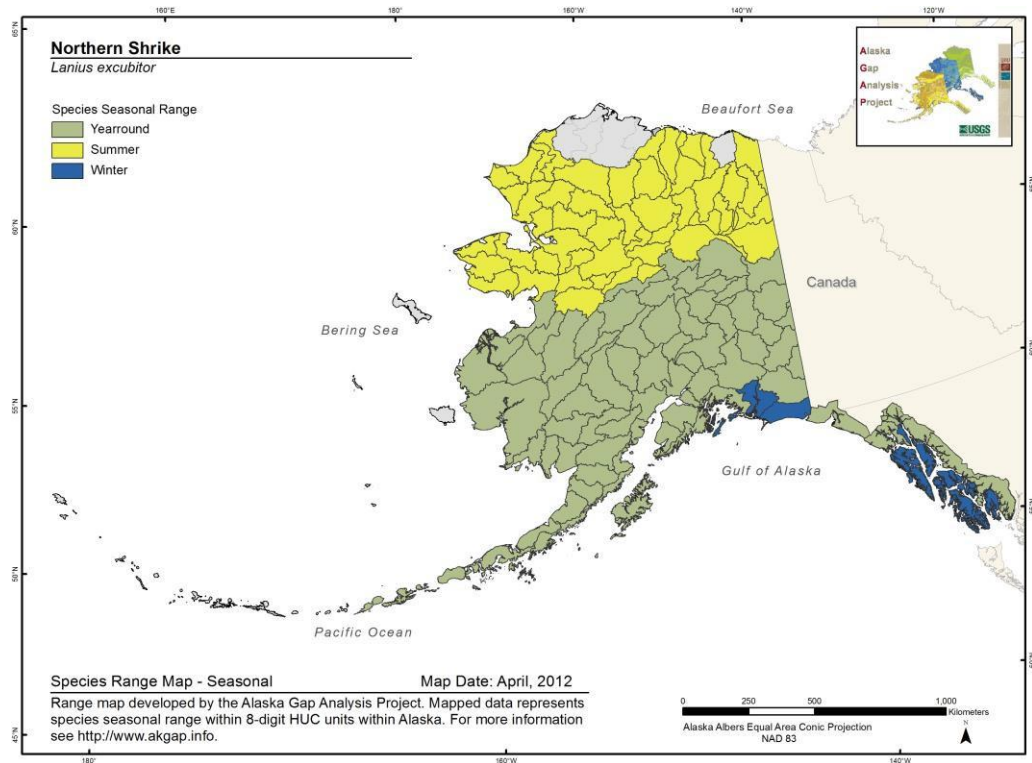
Northern Shrike *Lanius excubitor*

Range Map and Distribution Model Summary

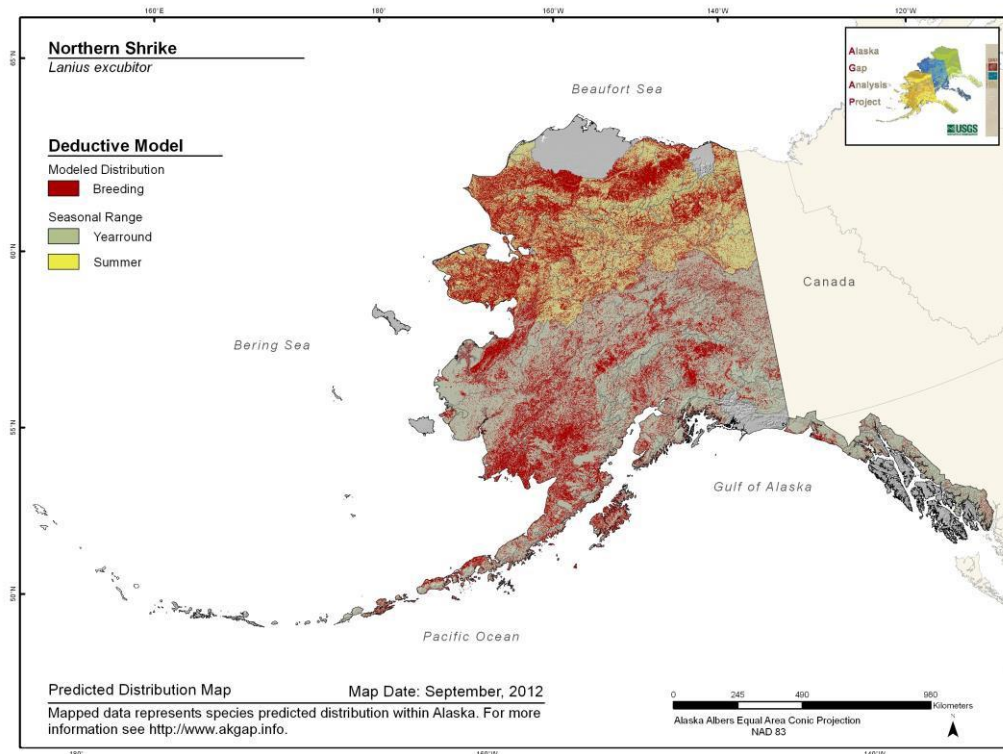
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.503**

**Model Quality
Summary:**
Low

Habitat Description

Nests in taiga and taiga-tundra ecotone, where trees and shrub > 1 m occur with open landscape and in alder, willow, and poplar stands that extend beyond spruce line and into tundra (Cade and Swem 1995). Prefers edges and open willow shrub areas in Alaska (Andres 1999b). Also utilizes open deciduous or coniferous woodland, taiga, thickets, bogs, scrub and, locally, semi-desert (AOU 1983). Occasionally found in urban and suburban areas (Cade and Atkinson 2002). In B.C., breeds from 800 to 1,250 m in elevation (Campbell et al. 1997).

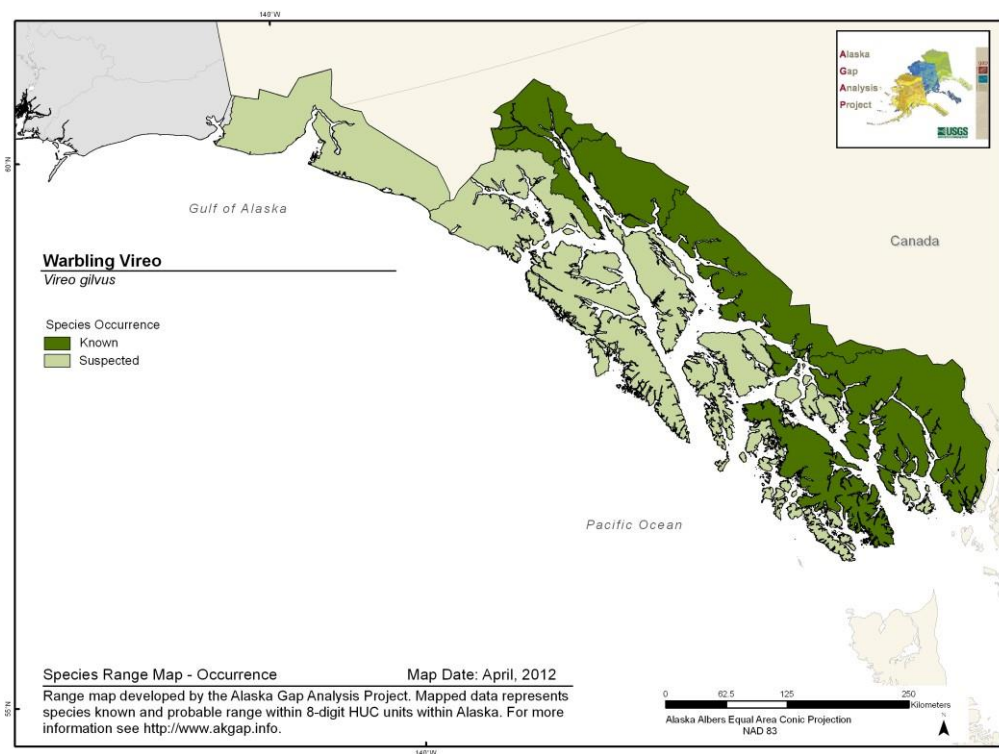
References

- Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.
- AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.
- Cade, T. J. and E. C. Atkinson. 2002. Northern Shrike (*Lanius excubitor*). In: A. Poole and F. Gill, (eds.). In The Birds of North America, No. 671 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Cade, T. J. and T. Swem. 1995. Ecology of Northern Shrikes nesting in arctic Alaska. Proc. West. Cound. Vertebr. Zool. 6 (1):204-214.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

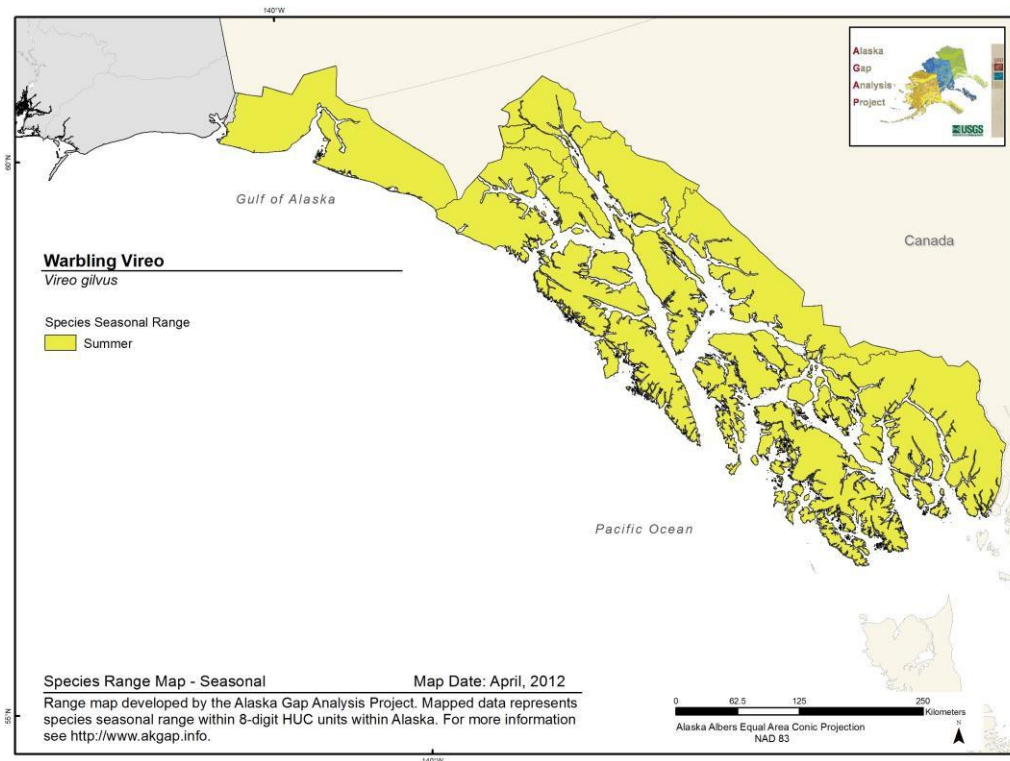
Warbling Vireo *Vireo gilvus*

Range Map and Distribution Model Summary

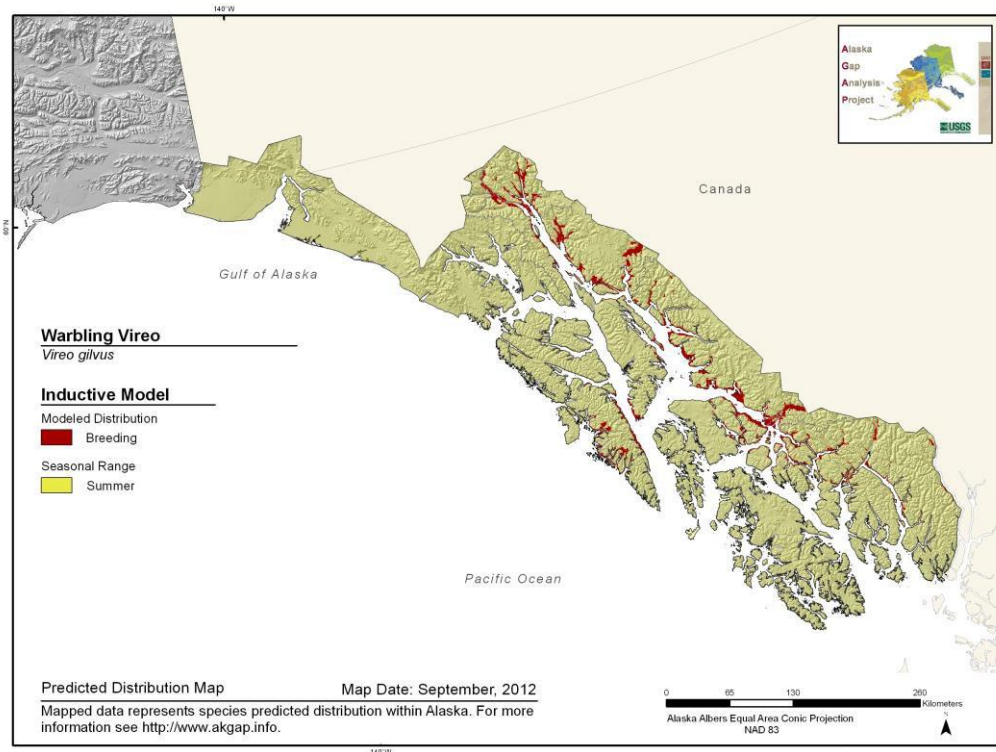
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.818**

**Model Quality
Summary:**
Moderate

Habitat Description

Deciduous trees, primarily along the mainland rivers of southeastern Alaska (Armstrong 2008). Also breeds in mixed forests and sometimes in upland areas away from water (Gardali and Ballard 2000). At lower elevations, prefers taller, larger trees in riparian areas, such as around ponds, sloughs, wet meadows, and lagoons, and at the edge of forest clearings. Also breeds in parks and along treed roads in suburban areas (Campbell et al. 1997).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

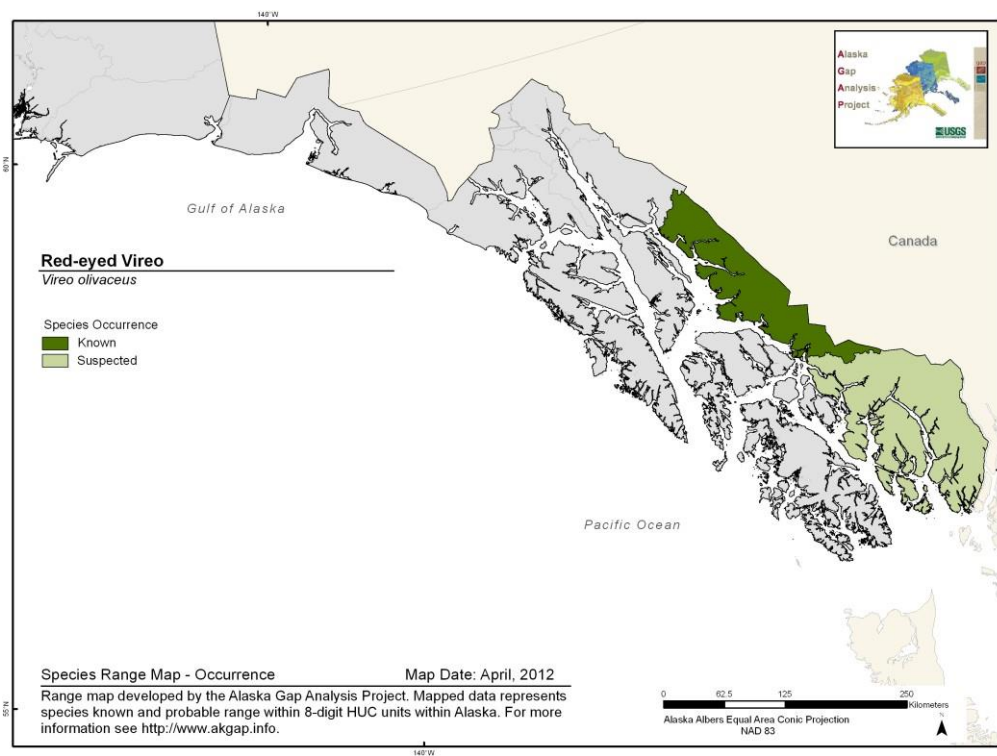
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Gardali, T. and G. Ballard. 2000. Warbling Vireo (*Vireo gilvus*). In The Birds of North America, No. 551 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

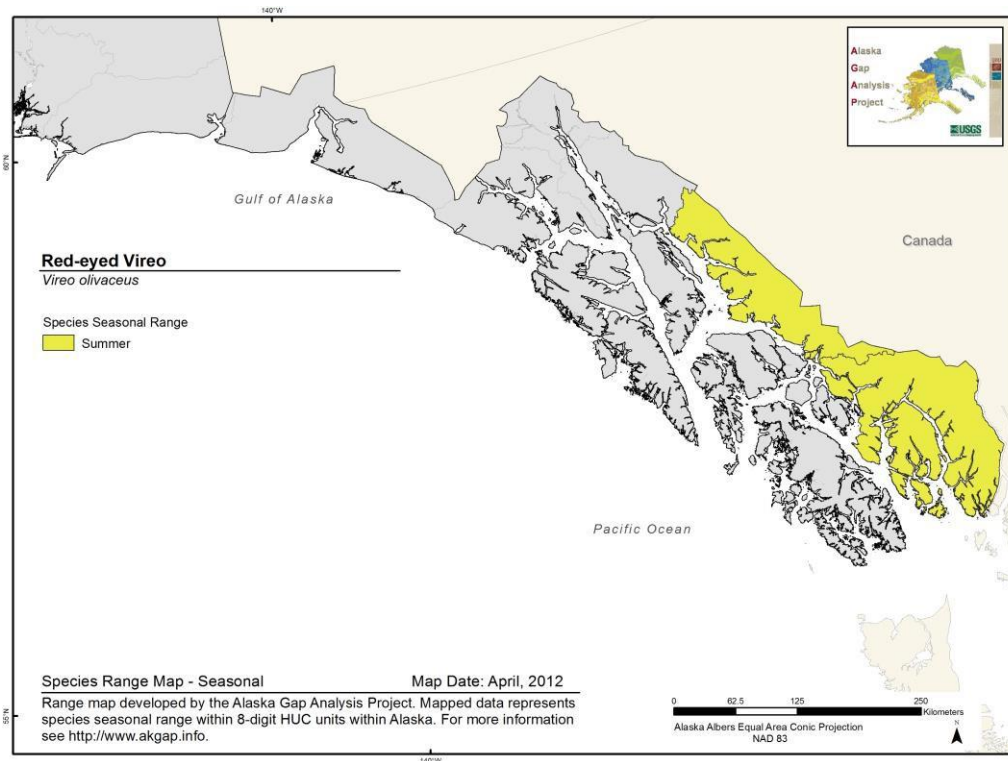
Red-eyed Vireo *Vireo olivaceus*

Range Map and Distribution Model Summary

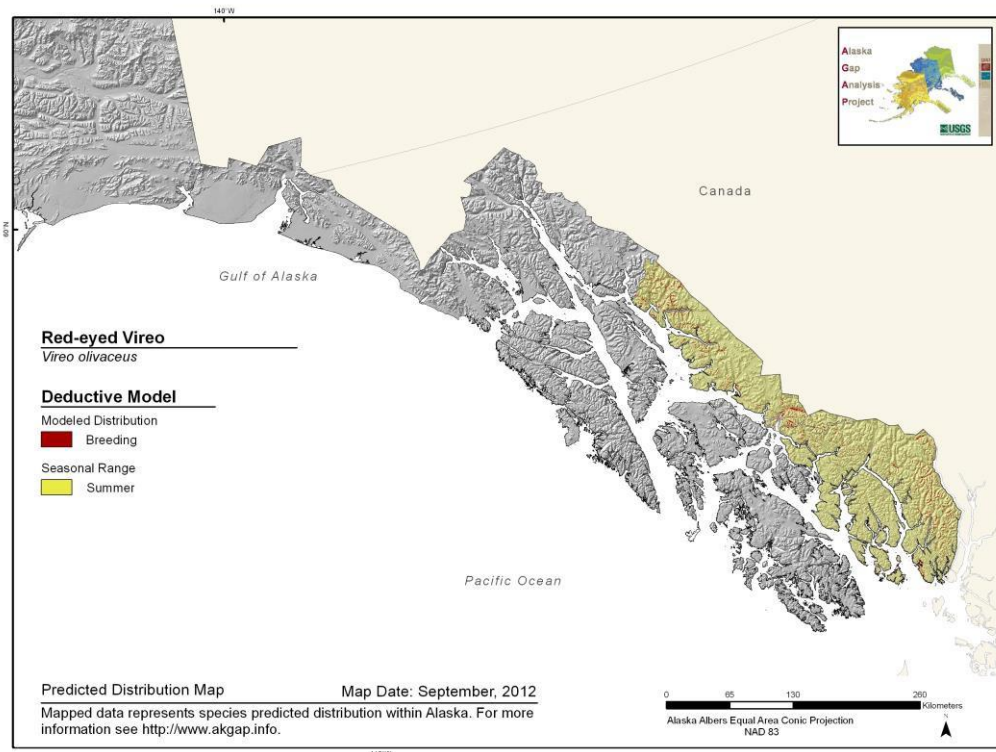
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in deciduous and mixed deciduous-coniferous forests with understory of shrubs (Stewart and Aldrich 1952, Lawrence 1953, Southern 1958, Barlow and Rice 1977, Graber et al. 1985). More abundant in interior forests than forest edges (Graber et al. 1985). Also, breeds in alder and aspen in northern areas (Barlow and Power 1970). May be found in residential areas, city parks, and cemeteries where large trees occur (Tyler 1950, Graber et al. 1985). In Alaska, found in black cottonwood forest groves and riparian alder thickets. Species thought to breed mainly along the large river systems on the mainland and possibly on islands near the mouths. In B.C., this species breeds from sea level to 200 m on the coast and from 300 to 800 m in the interior (Campbell et al. 1997).

References

- Barlow, J. C. and D. M. Power. 1970. An analysis of character variation in Red-eyed and Philadelphia Vireos (Aves: Vireonidae) in Canada. *Can. J. Zool.* 48: 673-694.
- Barlow, J. C. and J. C. Rice. 1977. Aspects of the comparative behavior of Red-eyed and Philadelphia vireos. *Can J. Zool.* 55: 528-541.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. *The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos.* University of British Columbia Press, Vancouver. 693 pages.
- Graber, J. W., R. R. Graber, and E. L. Kirk. 1985. Illinois birds: vireos. *Biol. Notes no. 68.* Illinois Nat. Hist. Surv., Urbana.
- Lawrence, L. K. 1953. Nesting life and behaviour of the Red-eyed Vireo. *Can. Field Nat.* 67: 47-77.

Southern, W. E. 1958. Nesting of the Red-eyed Vireo in the Douglas Lake region, Michigan. *Jack Pine Warbler* 36: 105-130 and 185-207.

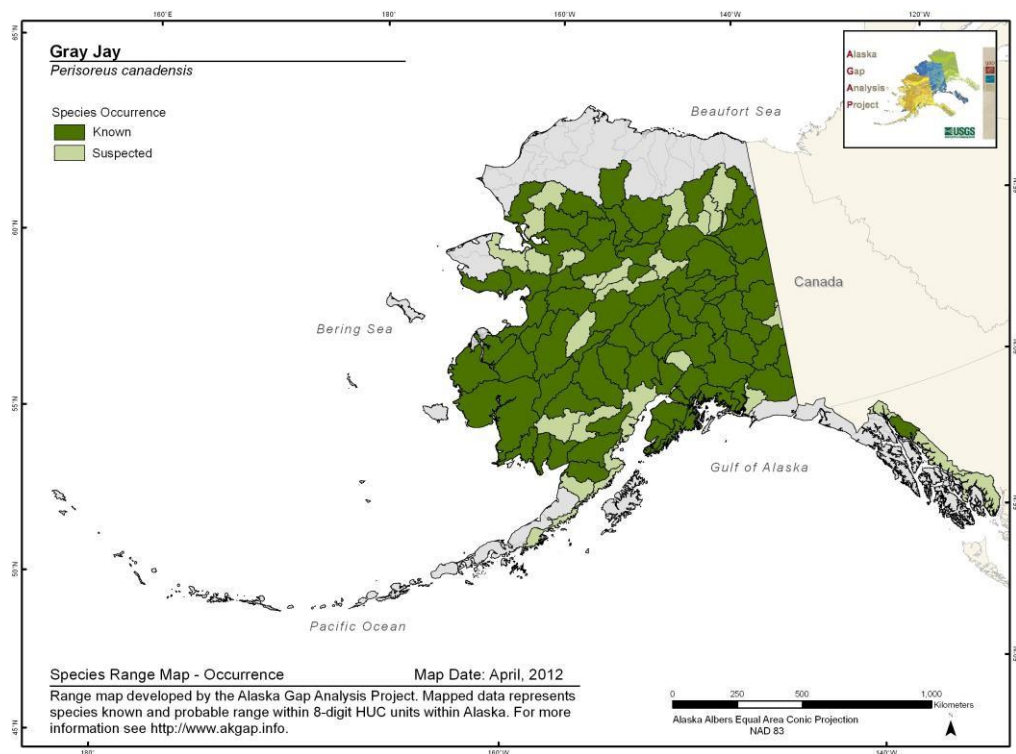
Stewart, R. E. and J. W. Aldrich. 1952. Ecological studies of breeding bird populations in northern Maine. *Ecology* 33: 226-238.

Tyler, W. M. 1950. *Vireo olivaceus* (Linnaeus) Red-eyed Vireo. Pp. 335-348 in *Life histories of North American wagtails, shrikes, vireos, and their allies* (A. C. Bent, ed.). U.S. Natl. Mus. Bull. 197.

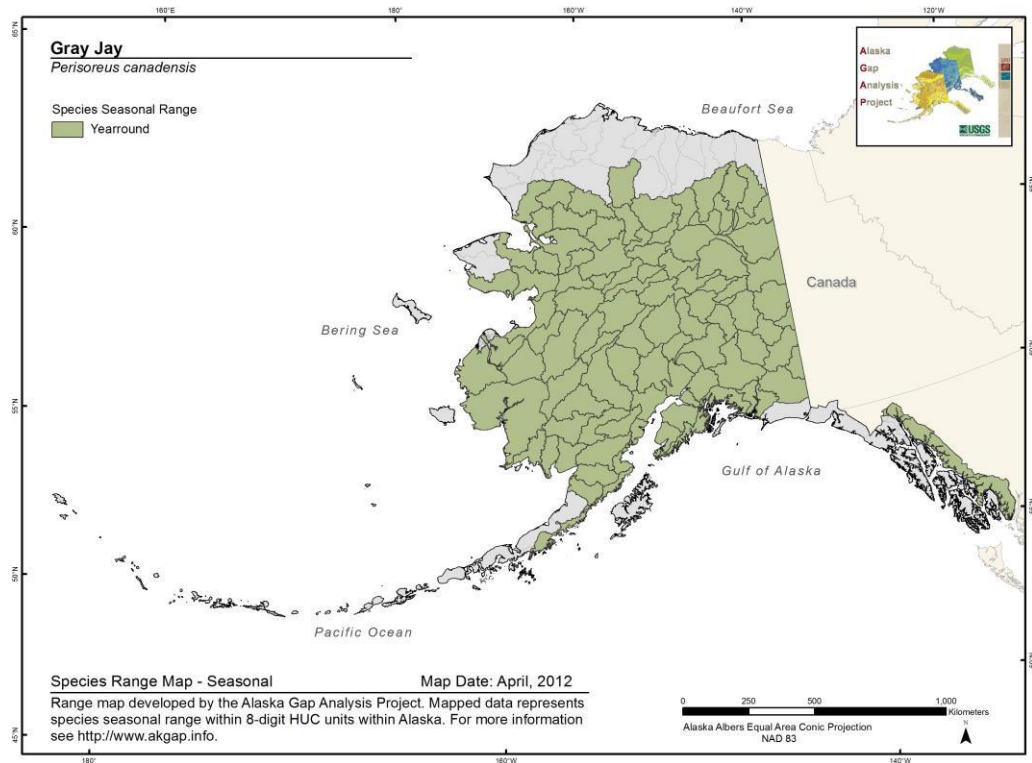
Gray Jay *Perisoreus canadensis*

Range Map and Distribution Model Summary

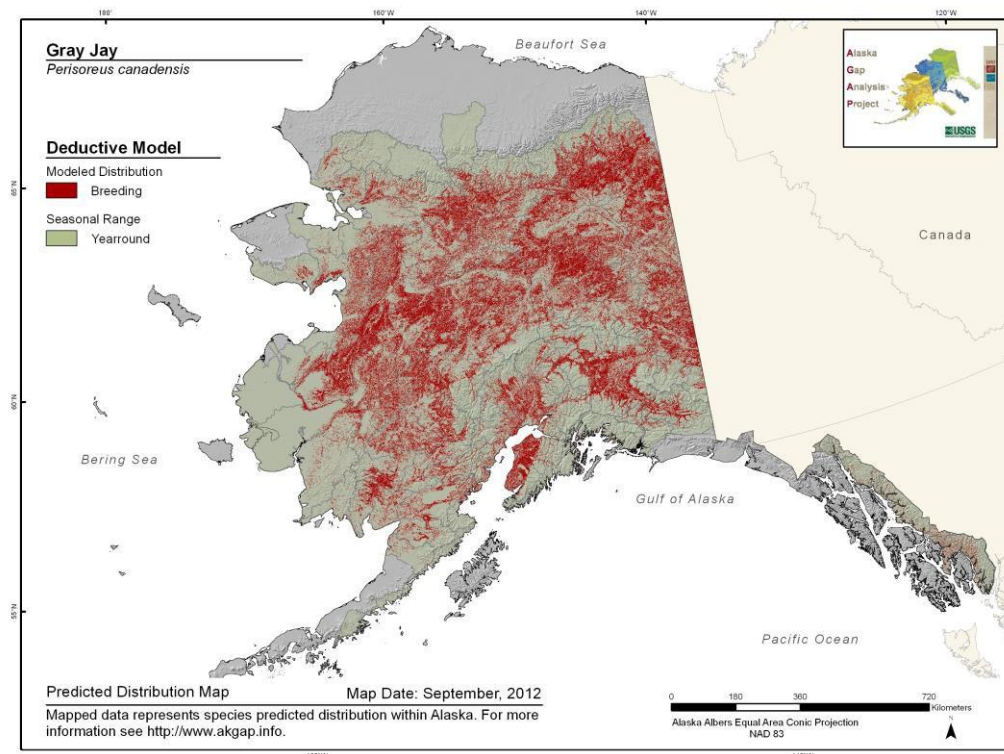
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.534**

**Model Quality
Summary:**
Low

Habitat Description

Coniferous and mixed coniferous-deciduous forest, spruce typically present. Range in Alaska coincides with white spruce (B. Kessel pers. comm. In Strickland and Ouellet 1993), although black spruce is also used (Waite and Reev 1992). Common in campgrounds and other places of human activity, as well as bogs with scattered trees and marsh edges (Alexander et al. 2003). In B.C., gray jays are found along the coast up to timberline, and in interior B.C., this species occupies middle to higher elevations (700 to 2,300 m), ranging well up into the subalpine zone (Campbell et al. 1997).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

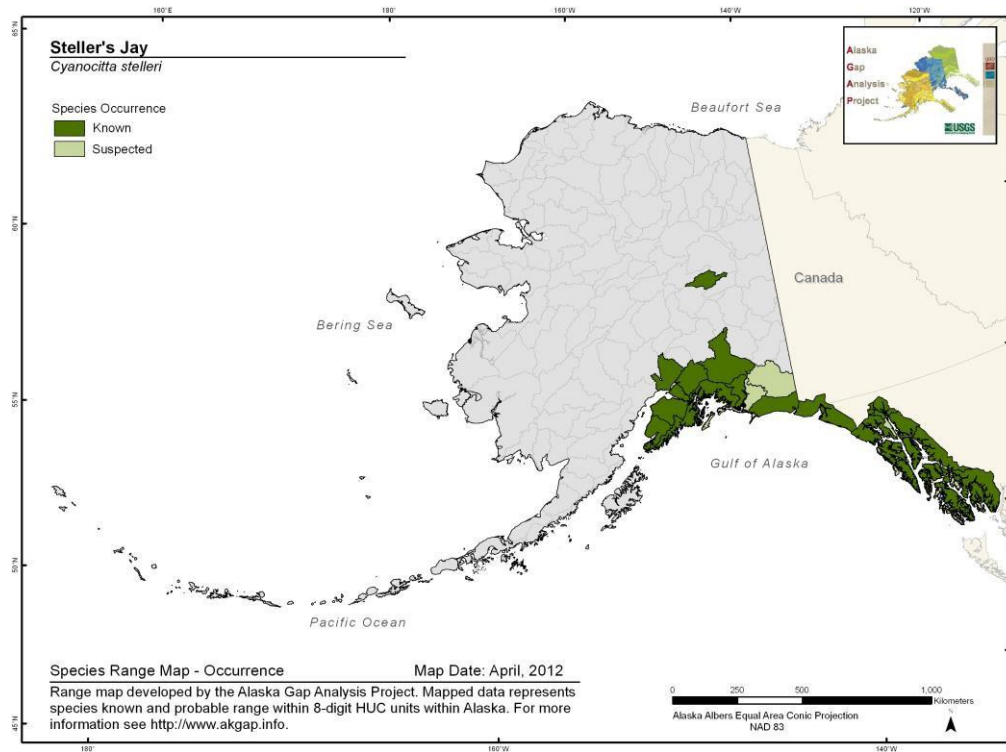
Strickland, D. and H. Ouellet. 1993. Gray Jay (*Perisoreus canadensis*). In The Birds of North America, No. 40 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Waite, T. A. and J. D. Reeve. 1992. Gray jay scatterhoarding behavior, rate maximization, and the effect of local cache density. *Ornis Scand.* 25: 175-182.

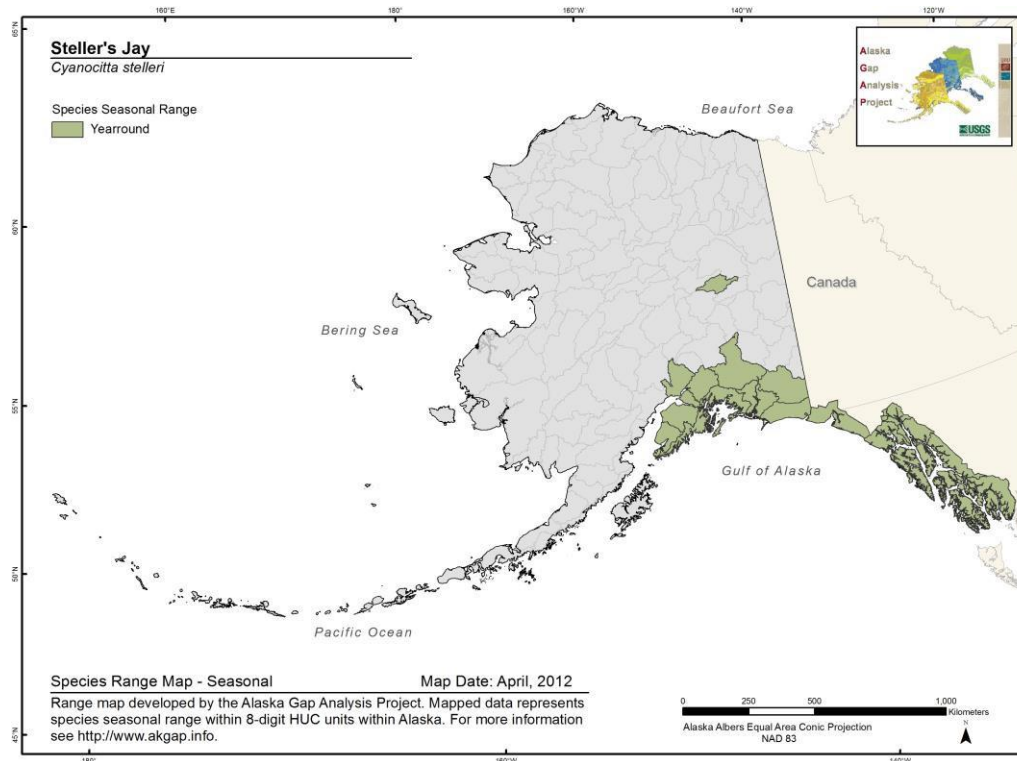
Steller's Jay *Cyanocitta stelleri*

Range Map and Distribution Model Summary

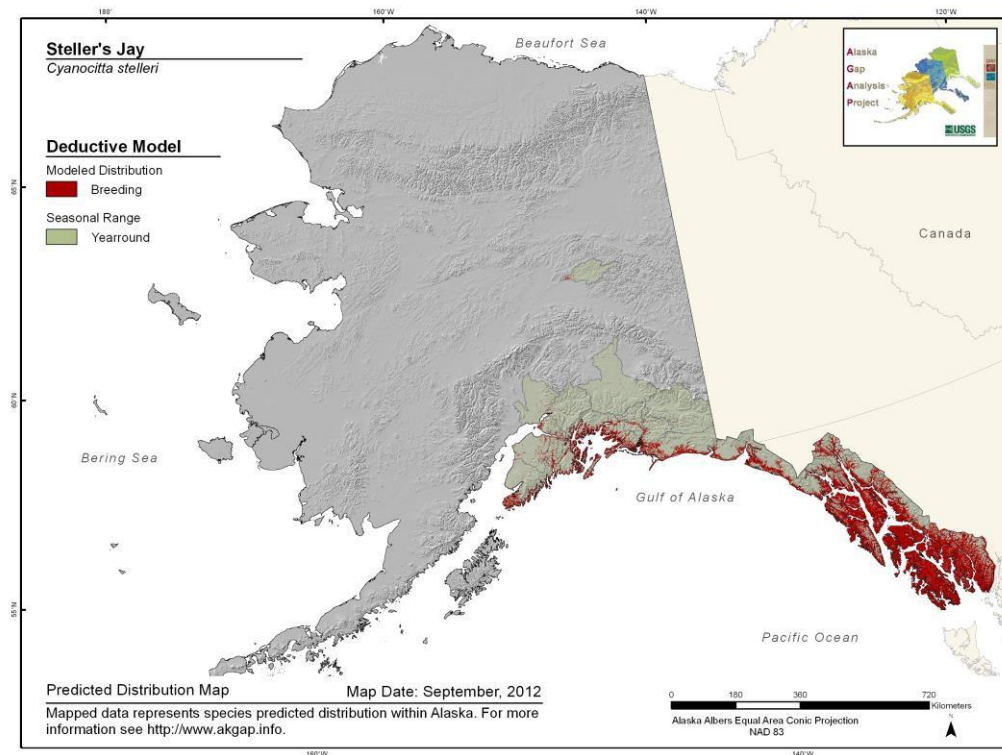
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.84**

**Model Quality
Summary:**
Moderate

Habitat Description

breeds in coniferous and mixed forests, open woodlands. In B.C., breeds in western hemlock, Douglas-fir, amabilis fir, grand fir, western red cedar, and Sitka spruce (Cannings et al. 1987, Stewart and Shepard 1994, R. W. Campbell pers. comm. in Greene et al. 1998). In Alaska, predominantly inhabits coniferous forests with little difference in densities between early seral stages and old-growth forests (Dellasala et al. 1996). Also found in human disturbed habitats, such as residential areas, campgrounds, gardens, and garbage dumps (Campbell et al. 1997). During winter, high-elevation populations typically move to lower elevations (Bent 1946, Stewart and Shepard 1994, R. W. Campbell pers. comm. in Greene et al. 1998).

References

Bent, A.C. 1946. Life histories of North American jays, crows, and titmice. U.S. Natl. Mus. Bull. 191. Washington, DC.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Cannings, R. A., R. J. Cannings, and S. G. Cannings. 1987. Birds of the Okanagan Valley, British Columbia. Royal British Columbia Museum, Victoria. 420pp.

DellaSala, D.A., J.C. Hagar, K.A. Engel, W.C. McComb, R.L. Fairbanks, E.G. Campbell. 1996. Effects of silviculture modifications of temperate rainforest on breeding and wintering bird communities, Prince of Wales Island, Southeast Alaska. Condor: 98: 706-721.

Greene, E., W. Davison, and V. R. Muehter. 1998. Steller's Jay (*Cyanocitta stelleri*). In The Birds of North

America, Vol. 7, No. 343 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

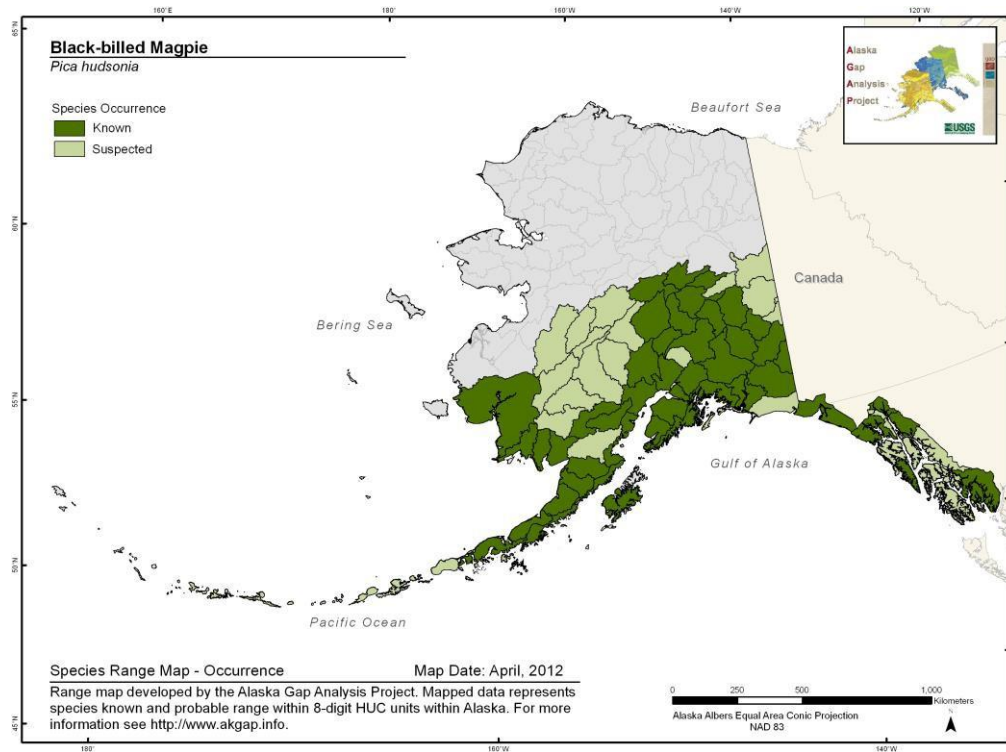
Stewart, A. C. and M. G. Shepard. 1994. Steller's Jay invasion of Southern Vancouver Island, British Columbia. N. Am. Bird Bander 19:90-95.

Black-billed Magpie

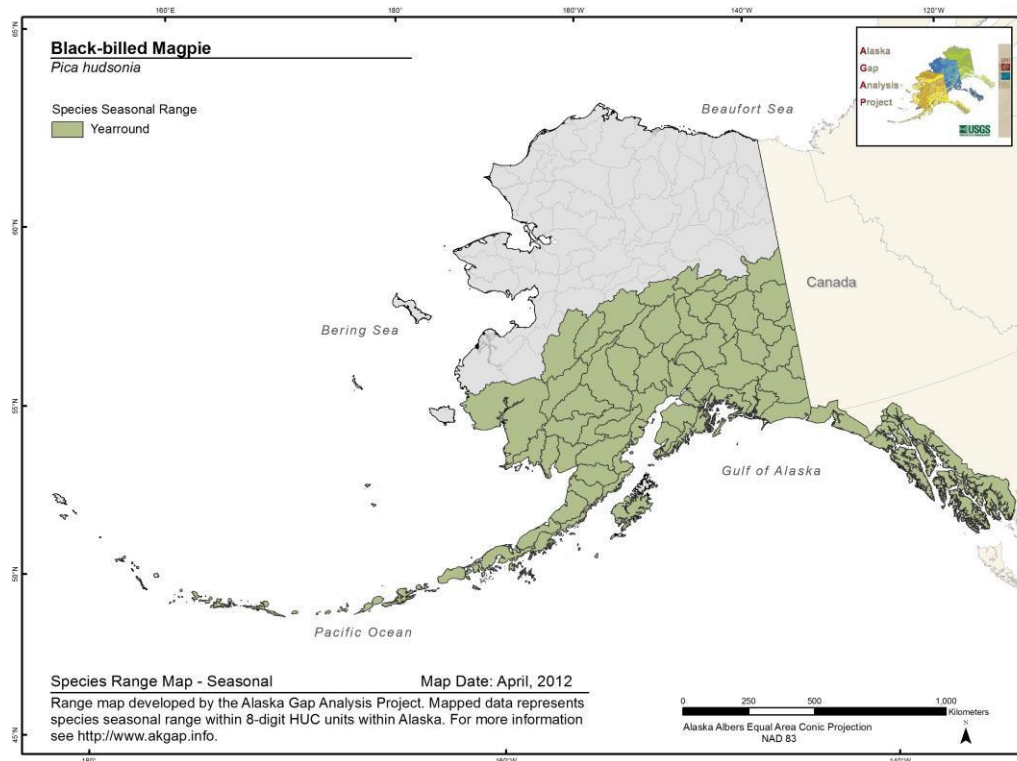
Pica hudsonia

Range Map and Distribution Model Summary

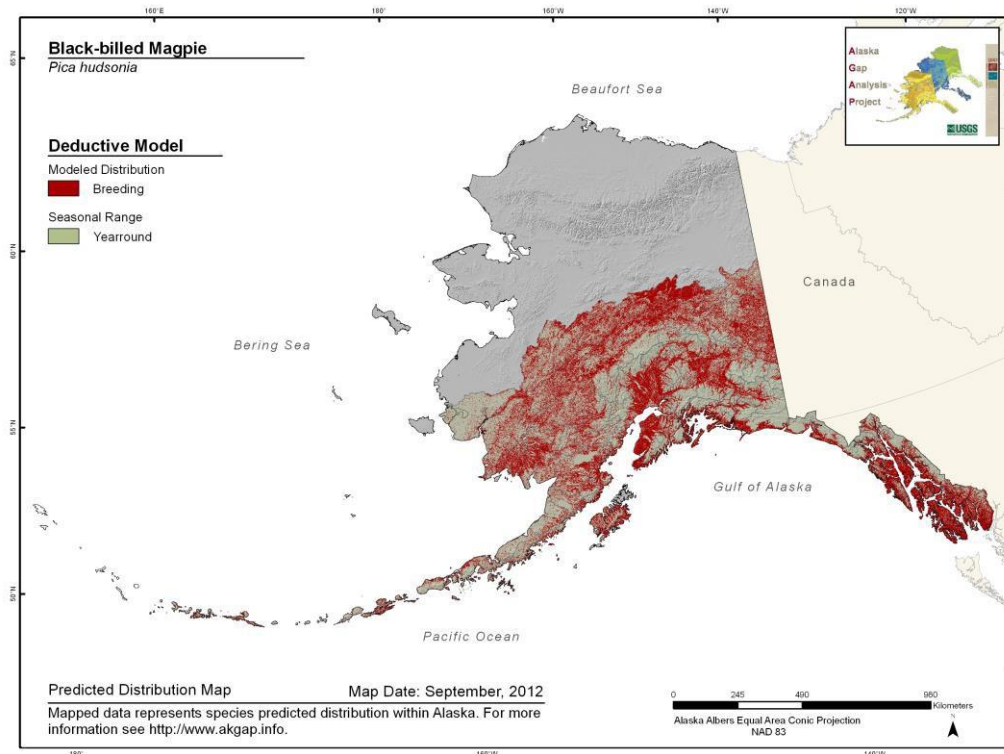
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.572**

**Model Quality
Summary:**
Low

Habitat Description

During breeding season, inhabits thickets in riparian areas associated with open meadows and grasslands for foraging (Bock and Lepthien 1975). During nonbreeding, less specific in habitat requirements frequenting developed areas. Habitats include, open country (including grasslands), open situations with scattered trees, shrubby areas, riparian and open woodland, forest edge and farmlands, in either arid or humid habitats (AOU 1983). Roosts in dense riparian thickets of deciduous trees or scrub, or, especially in north in winter, in dense conifers (Reebs 1987).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

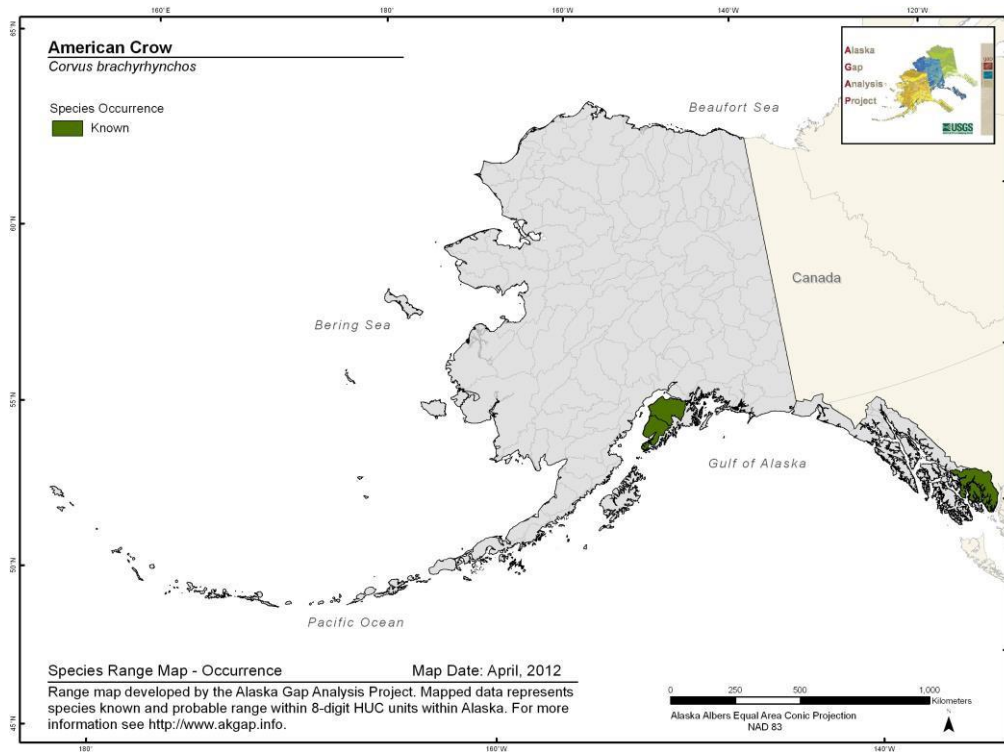
Bock, C. E. and L. W. Lepthien. 1975. Distribution and abundance of Black-billed Magpie (*Pica pica*) in North America. *Great Basin Naturalist* 35: 269-272.

Reebs, S. G. 1987. Roost characteristics and roosting behavior of black-billed magpies, *PICA PICA*, in Edmonton, Alberta. *Canadian Field-Nat.* 101:519-525.

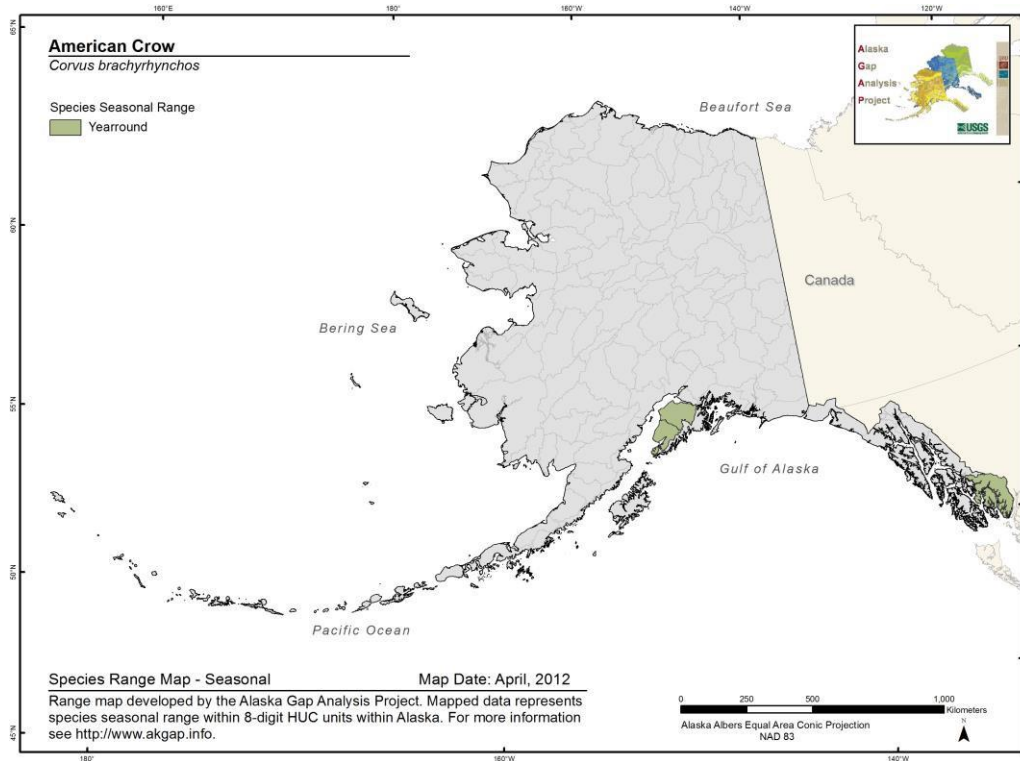
American Crow
Corvus brachyrhynchos

Range Map and Distribution Model Summary

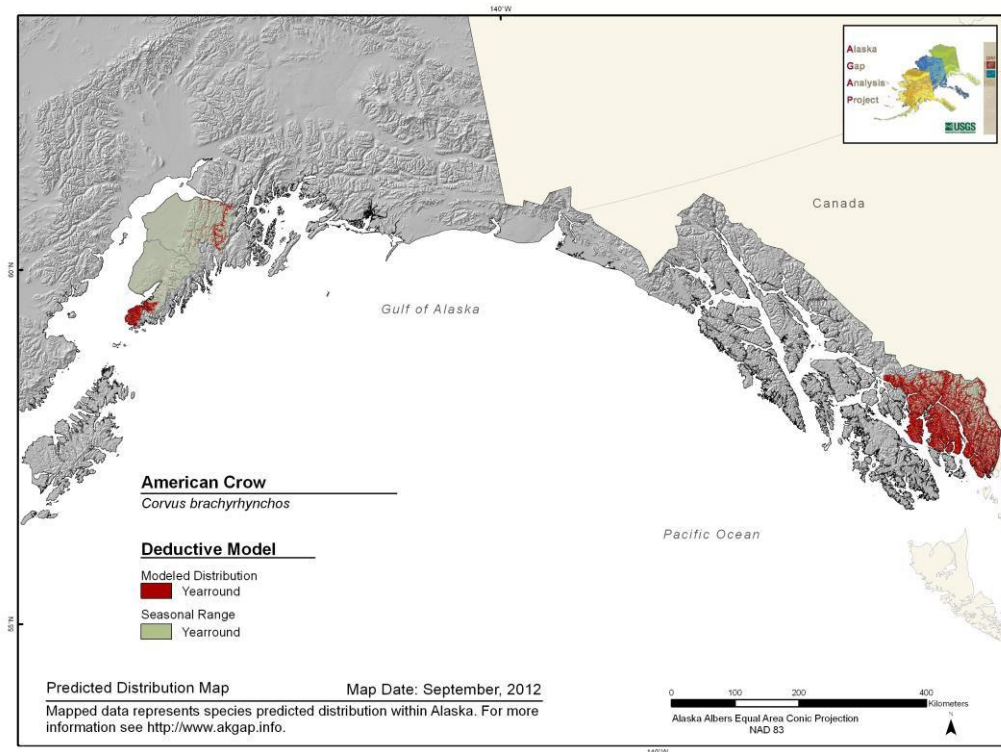
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.504**

**Model Quality
Summary:**
Low

Habitat Description

Meadows, fields and woodlands (Armstrong 2008). Open and partly open country: agricultural lands, suburban areas, orchards, tidal flats, primarily in humid situations, restricted mostly to riparian forest and adjacent areas in arid regions. Generally avoids dense coniferous forest and desert. Nests in open forest and woodland, and in other wooded situations (Nature Serve 2007b).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

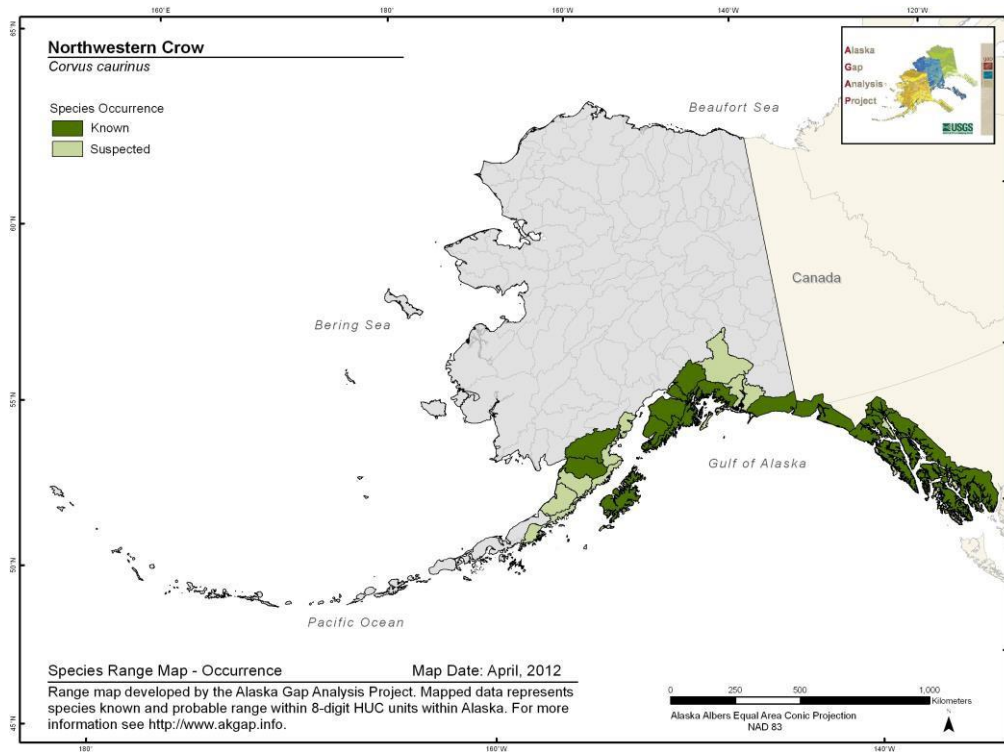
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Northwestern Crow

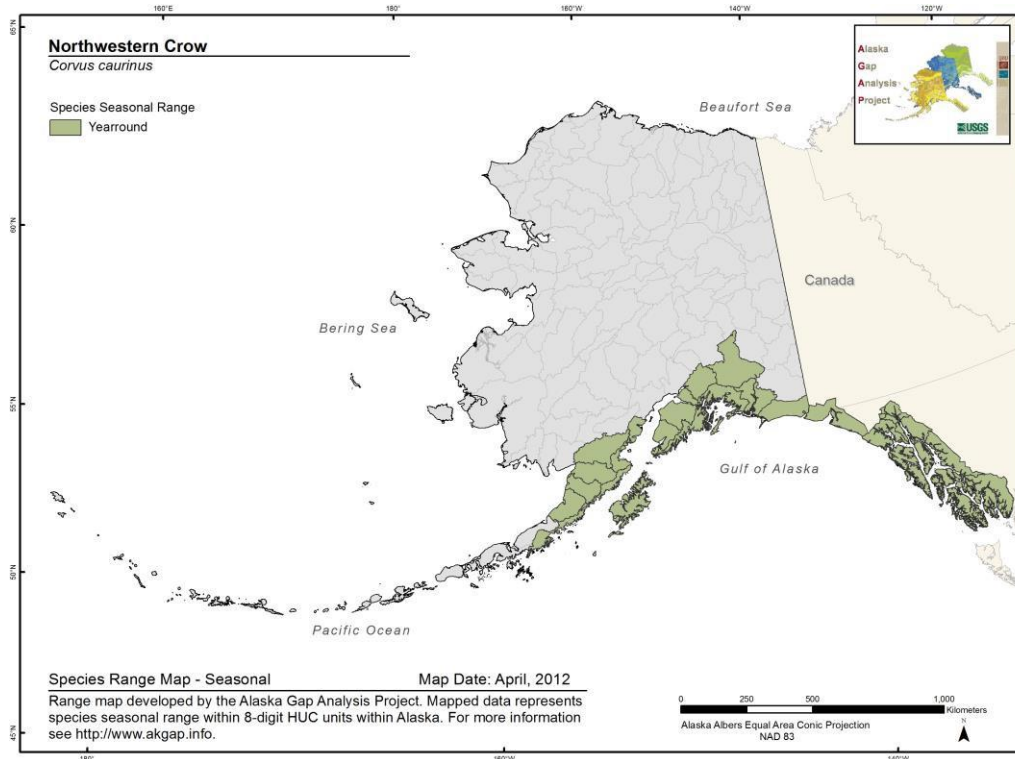
Corvus caurinus

Range Map and Distribution Model Summary

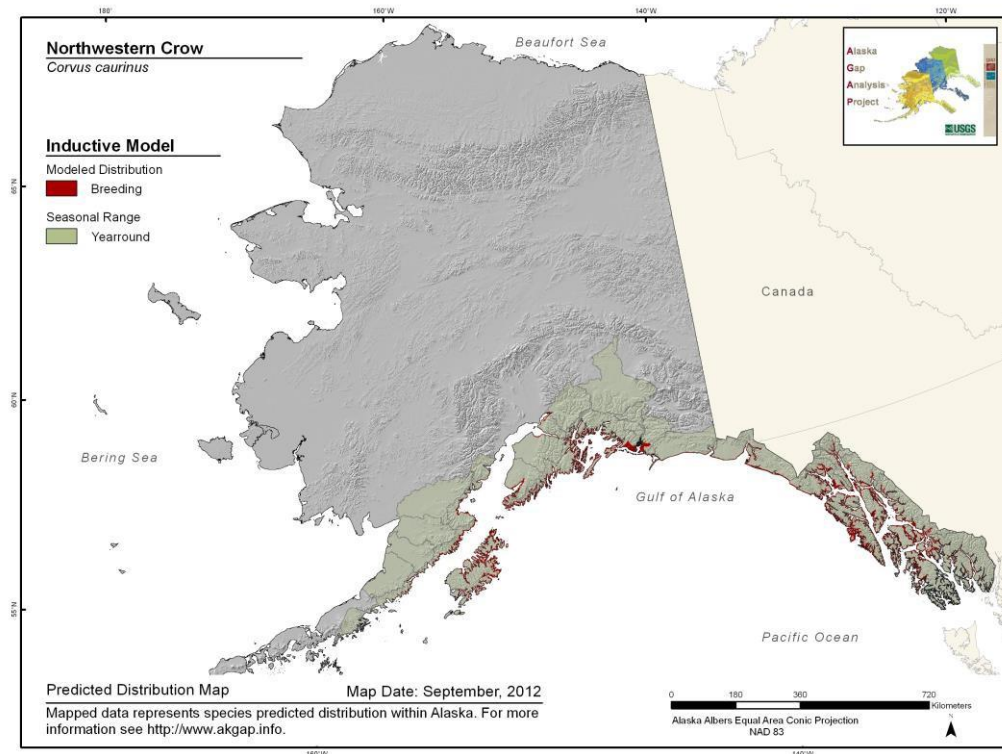
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.875**

**Model Quality
Summary:**
Moderate

Habitat Description

Nests near intertidal zone; coastal bays, river deltas, intertidal shores near forested edges, seabird colonies, and refuse dumps typical of nesting habitat. Feeds in intertidal beaches and reeds, and along tidal pools. Also found in coastal towns, cities, campgrounds, and on agricultural land (Campbell et al. 1997). Obligate tidewater inhabitant (Andres 1999b). Avoids deep forests, but occurs in forest edges (Verbeek and Butler 1999). Winter range similar to breeding range, with flocks from small coastal islands withdrawing to join winter flocks around towns and along beaches (Verbeek and Butler 1999). In B.C., reported from sea level to 1,700 m, but most numerous at lower elevations (Campbell et al. 1997)

References

Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

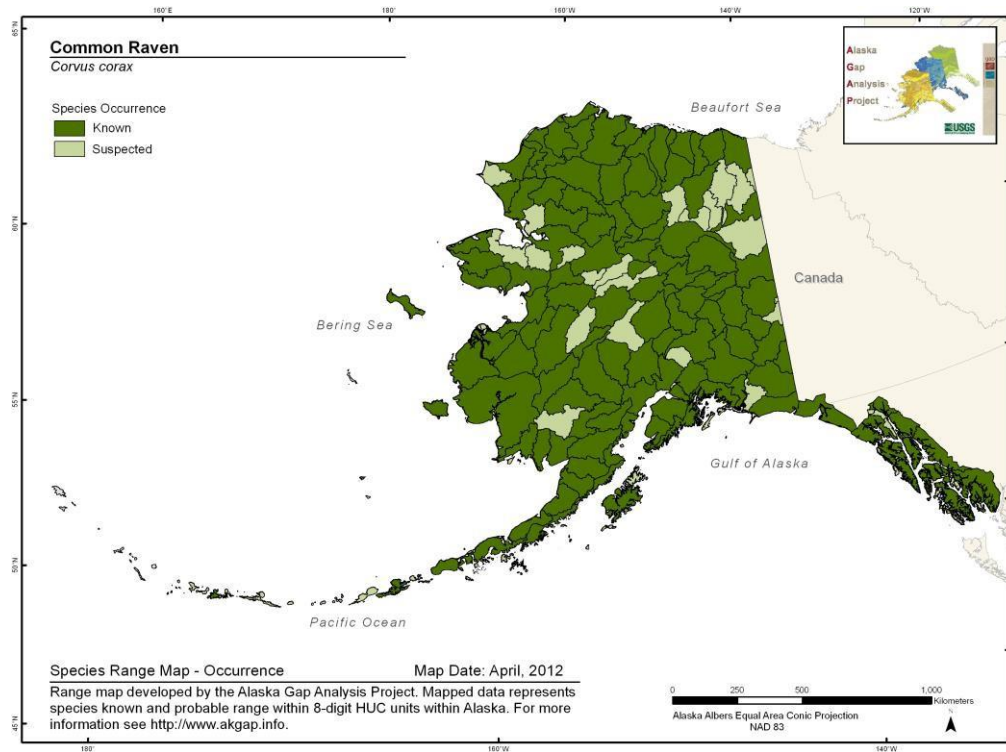
Verbeek, N. A. M. and R. W. Butler. 1999. Northwestern Crow (*Corvus caurinus*). In The Birds of North America, No. 407 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Common Raven

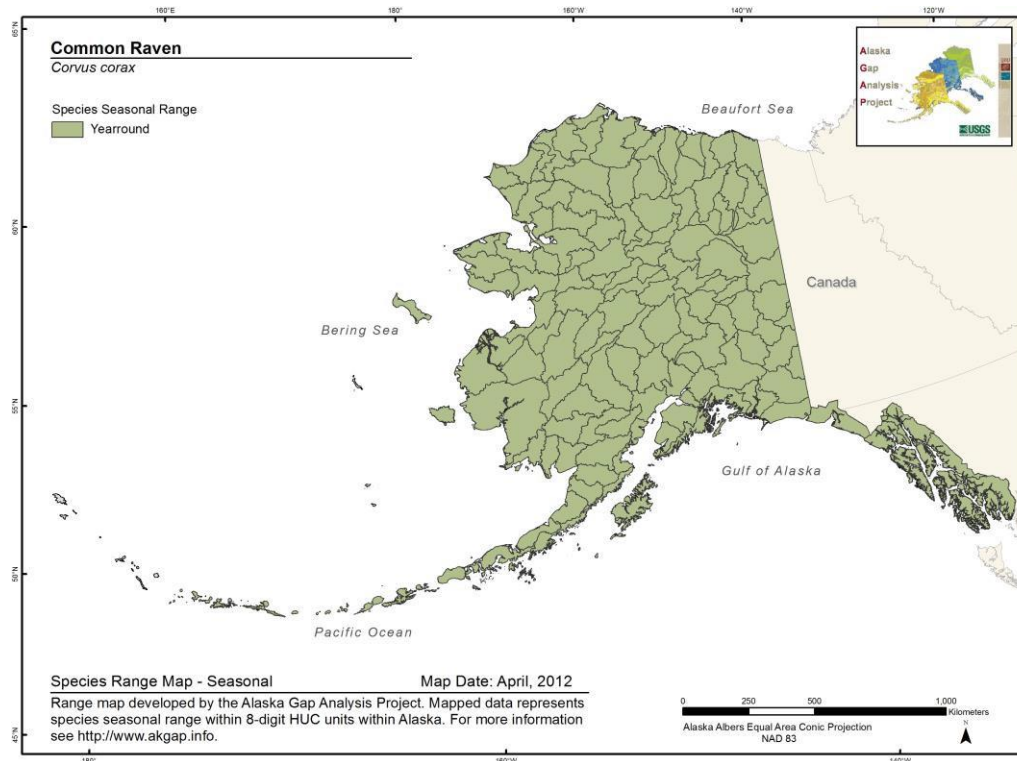
Corvus corax

Range Map and Distribution Model Summary

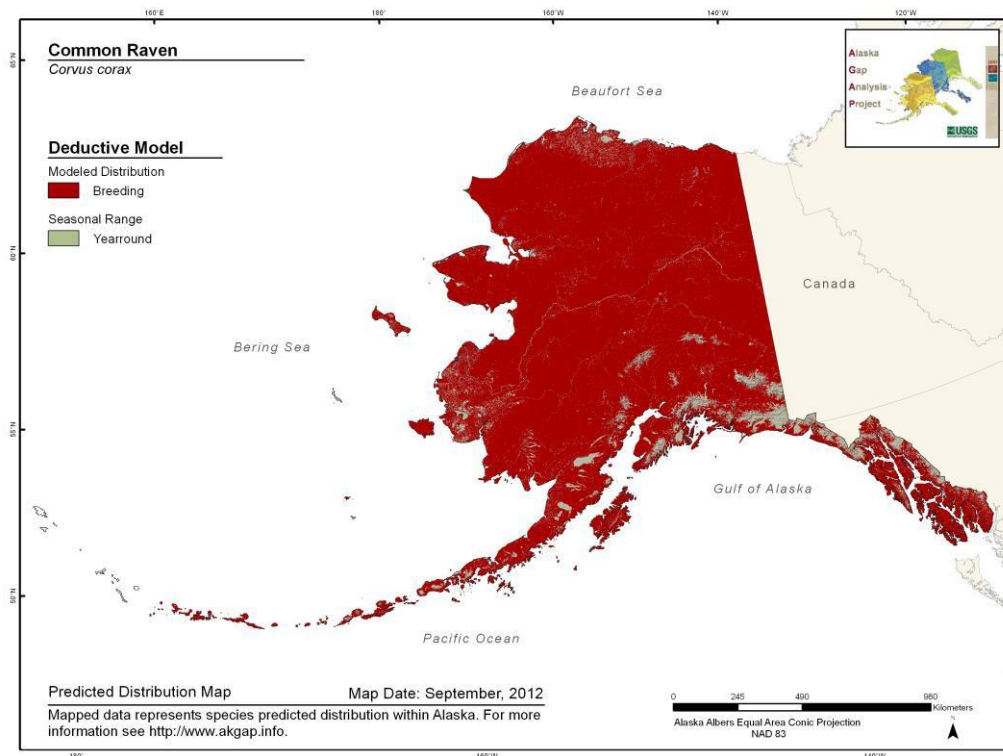
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.537**

**Model Quality
Summary:**
Low

Habitat Description

Occurs from marine shores to mountain ridges (Armstrong 2008) in boreal, conifer, and deciduous forests, tundra, prairies, grasslands, agricultural fields, and developed areas. Prefers areas with cliffs for foraging and nesting (or human structures or trees; Boarman and Heinrich 1999). In B.C., recorded breeding from sea level to 1,320 m. The majority of nests were found in forest habitats primarily mature forest and some second growth. Also found nesting, but to a lesser extent, in industrial sites, residential areas, parks, and burns. Garbage dumps are a major source of food in the winter. Also, use farm fields, highways, logged forests, mine sites, barns, campsites, ski resorts, camps, and urban and suburban areas. Highways also used (Campbell et al. 1997). Nests usually on cliff ledges or in coniferous trees, also on man-made structures (NatureServe 2007b).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Boarman, W. I. and B. Heinrich. 1999. Common Raven (*Corvus corax*). In *The Birds of North America*, Vol. 7, No. 476 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

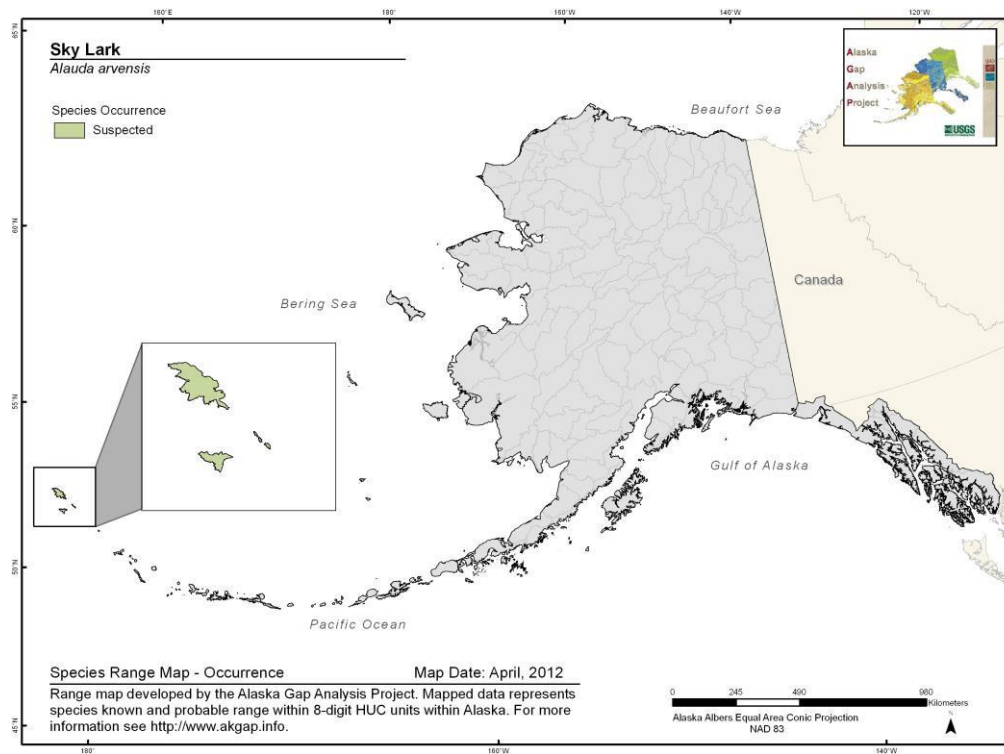
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. *The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos.* University of British Columbia Press, Vancouver. 693 pages.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

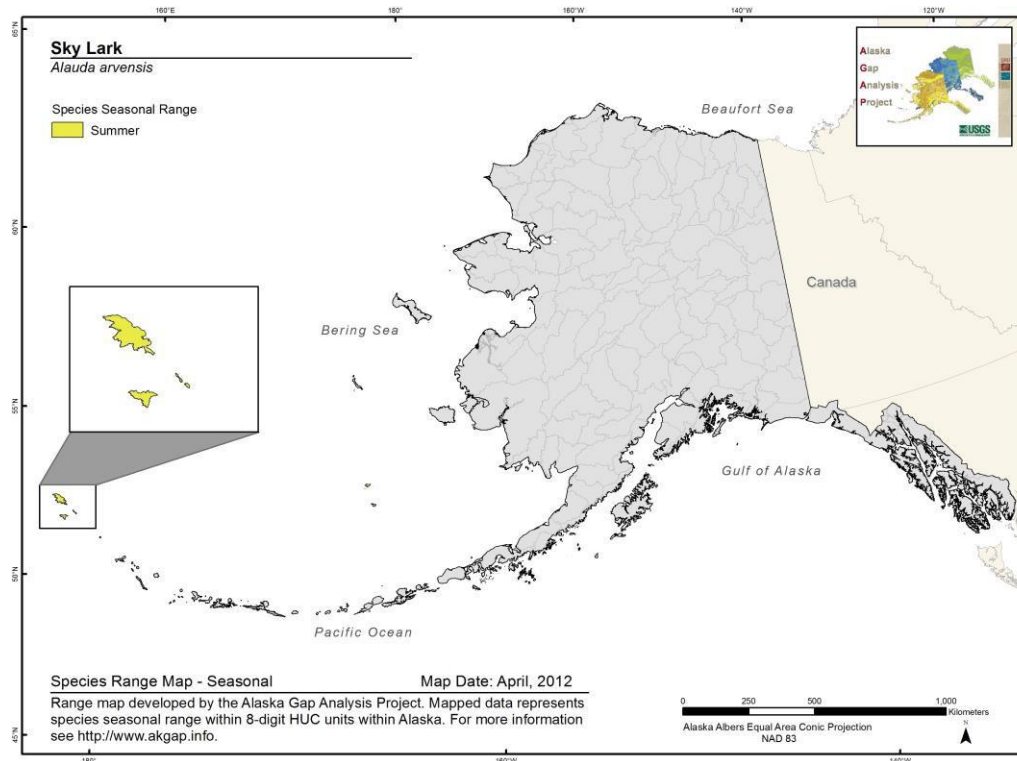
Sky Lark *Alauda arvensis*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:
Rejected all models

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Open country, grasslands, tundra, marshy and sandy areas, and wide forest clearings (AOU 1983). Prefers open habitats, such as agricultural fields, with horizon not obscured. Nests in dry open areas characterized by short to high grass fields cultivated prior to breeding season (Campbell et al. 1997a). Nests in a shallow depression on the ground, lined with roots, grasses, and hair (Nature Serve 2007b). In Alaska, the first documented nest was found in an open grassy area on St. Paul Island (Baicich et al. 1996). Occasionally seen on beaches (Armstrong 2008).

References

AOU. 1983. Check-list of North American birds. 6th ed.American Ornithologists' Union, Washington D. C.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Baicich, P. J., S. C. Heinl, and M. Toochin. 1996. First documented breeding of the Eurasian Skylark in Alaska. *Western Birds* 27:86-88.

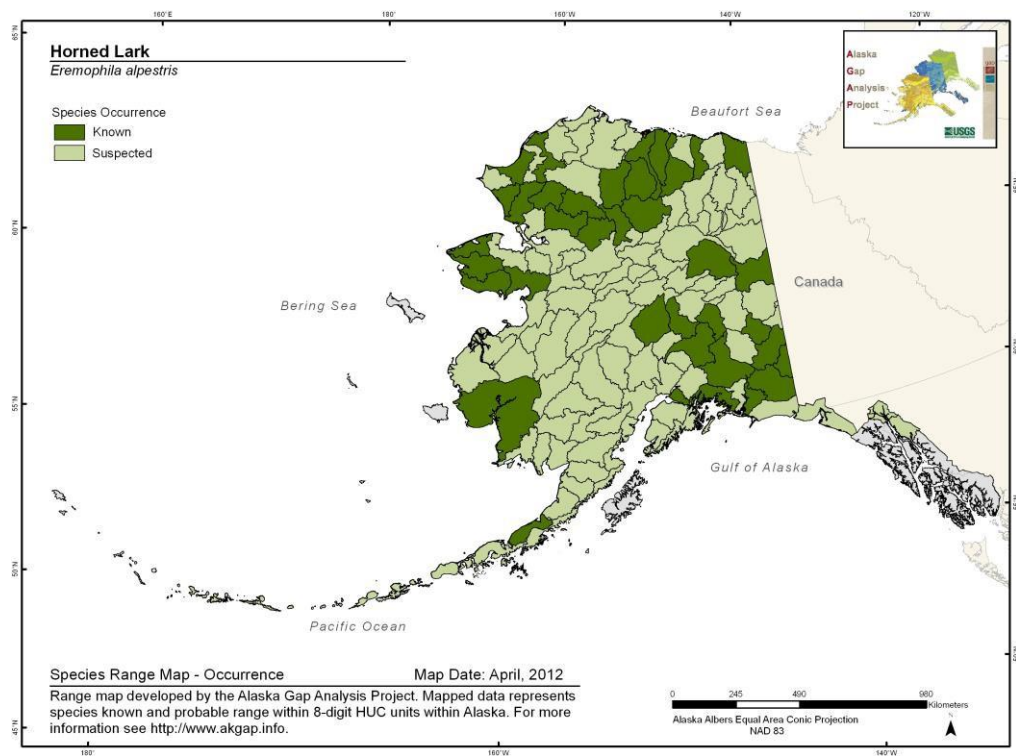
Campbell, R. W., L. M. Van Damme, and S. R. Johnson. 1997. Sky Lark (ALAUDE ARVENSIS). In *The Birds of North America*, No. 286 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

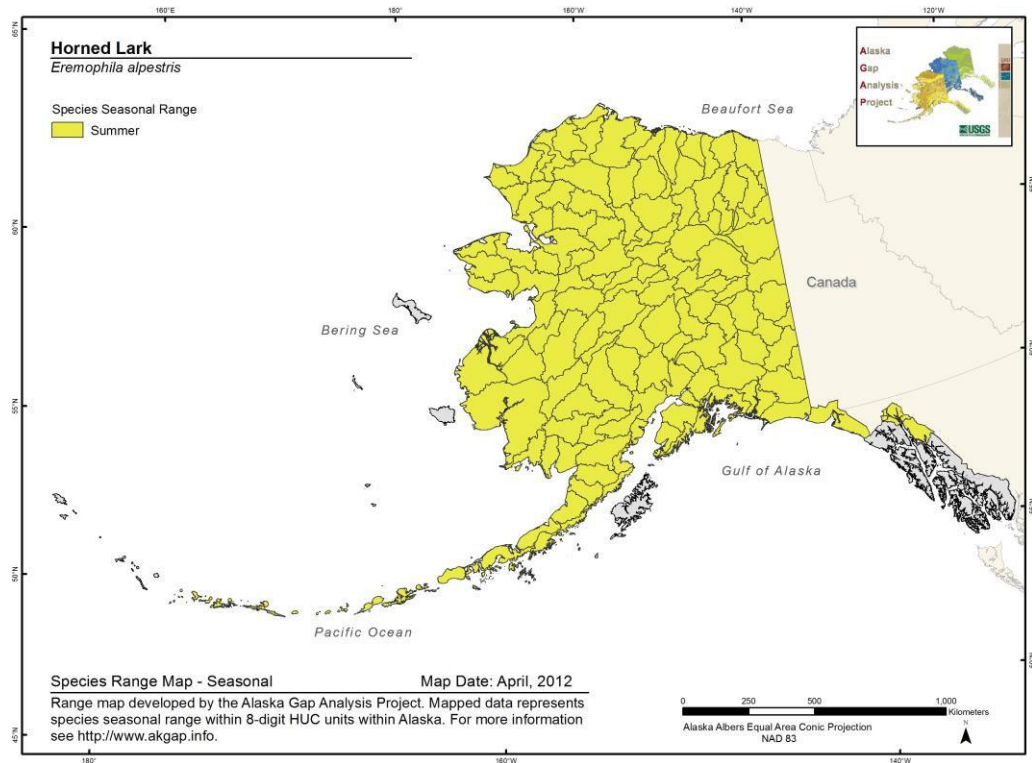
Horned Lark *Eremophila alpestris*

Range Map and Distribution Model Summary

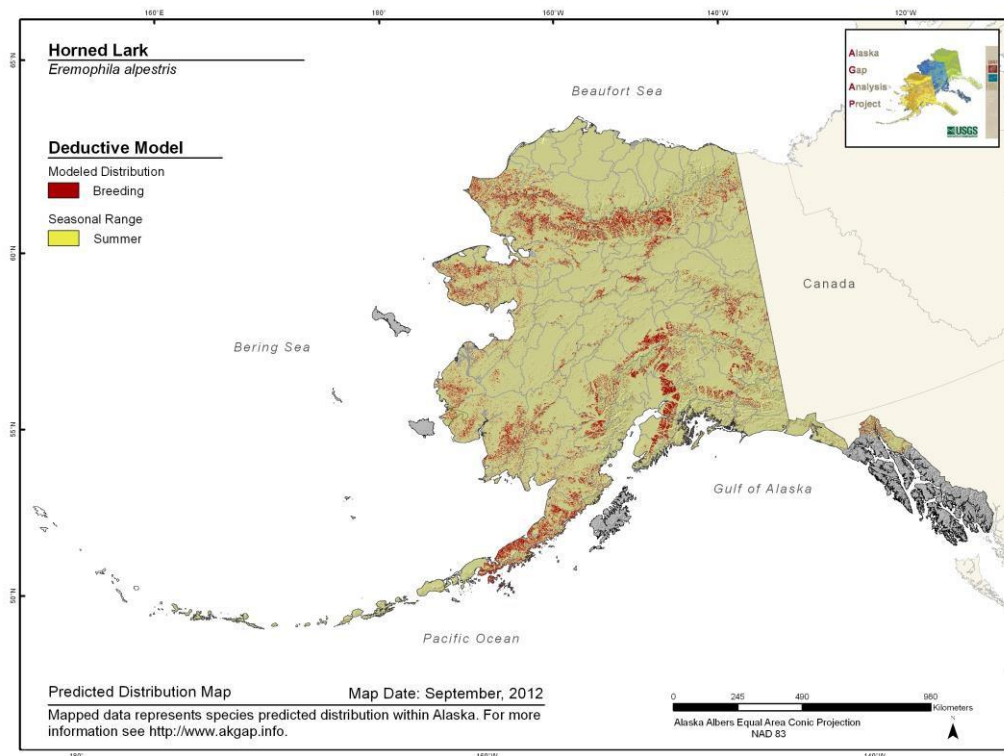
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.647**

**Model Quality
Summary:**
Low

Habitat Description

Open, generally barren country, avoids forests (Beason 1995). In B.C., breeds at elevations up to 2,800 m in open space uncluttered with trees, shrubs, or even tall forbs, typically above timberline in mountainous regions (Campbell et al. 1997). In the Yukon, nests on dry alpine tundra, often near exposed rocky areas or stony heath; or on dry tundra in coastal areas, often on hilltops or ridges where gravel and rock is exposed (Salter et al. 1980, Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Beason, R. C. 1995. Horned Lark (*Eremophila alpestris*). In The Birds of North America, No. 195 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

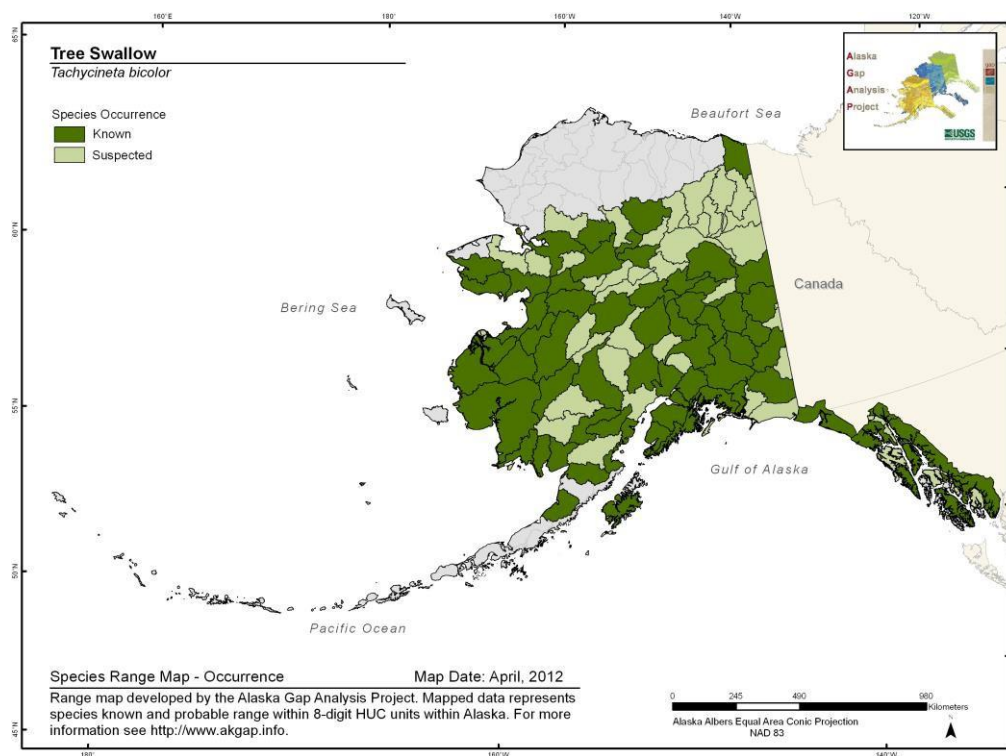
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Salter, R. E., M. A. Gollop, S. R. Johnson, W. R. Koski, and C. E. Tull. 1980. Distribution and abundance of birds on the arctic coastal plains of the Northern Yukon and adjacent Northwest Territories, 1971-1976. Can. Field-Nat. 94: 219-238.

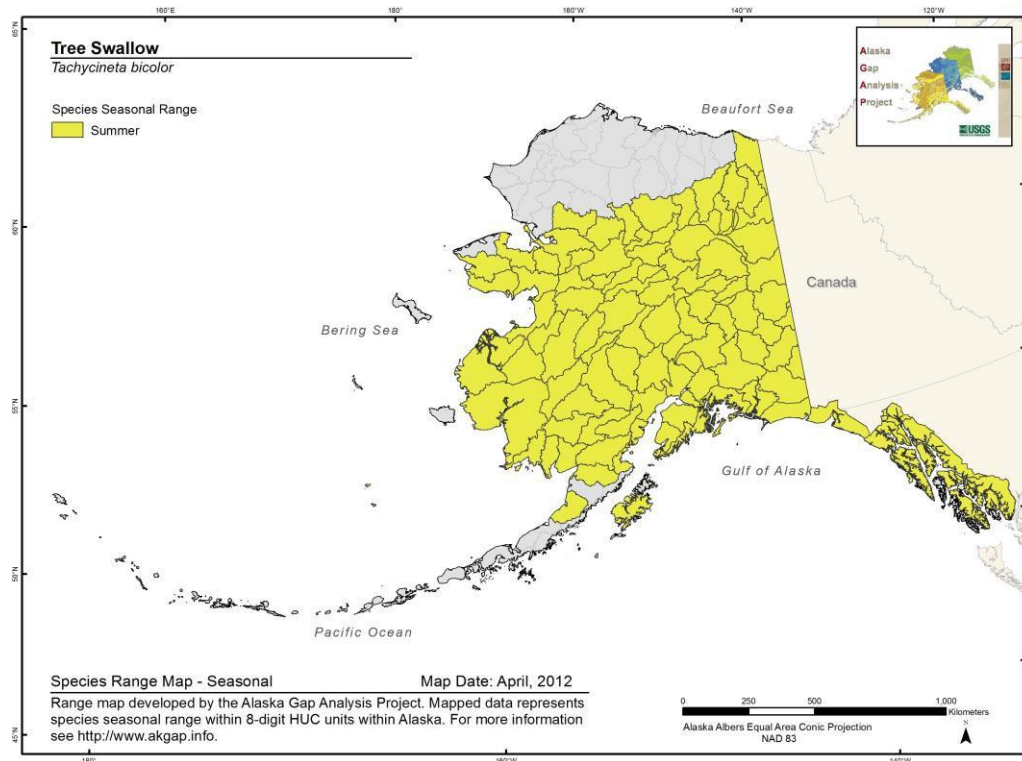
Tree Swallow *Tachycineta bicolor*

Range Map and Distribution Model Summary

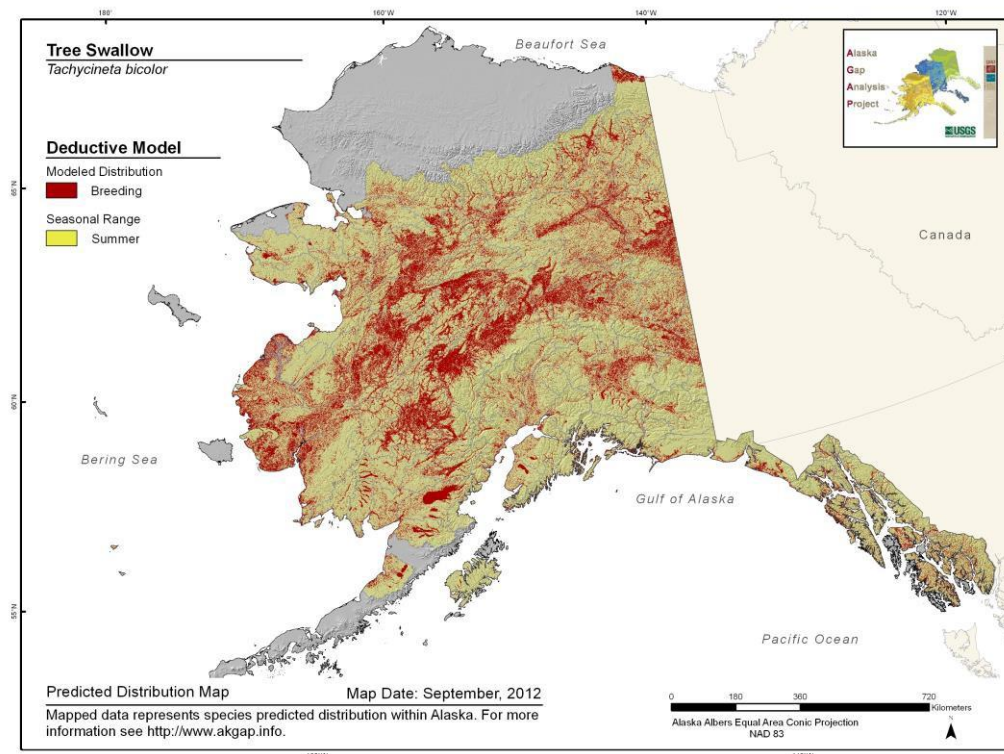
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.641**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits open areas, usually near water, including open fields, marshes, shorelines, and wooded swamps with standing dead trees (Robertson et al. 1992). Standing dead trees that offer nesting cavities are an important habitat component (Alexander et al. 2003). Nests in bird boxes and sometimes buildings (Armstrong 2008). Closely tied to human settlement in tundra areas (Armstrong 2008). Northern breeding limit generally treeline (Erskine 1977). In B.C., breeds from near sea level to 1,450 m elevation (Campbell et al. 1997).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

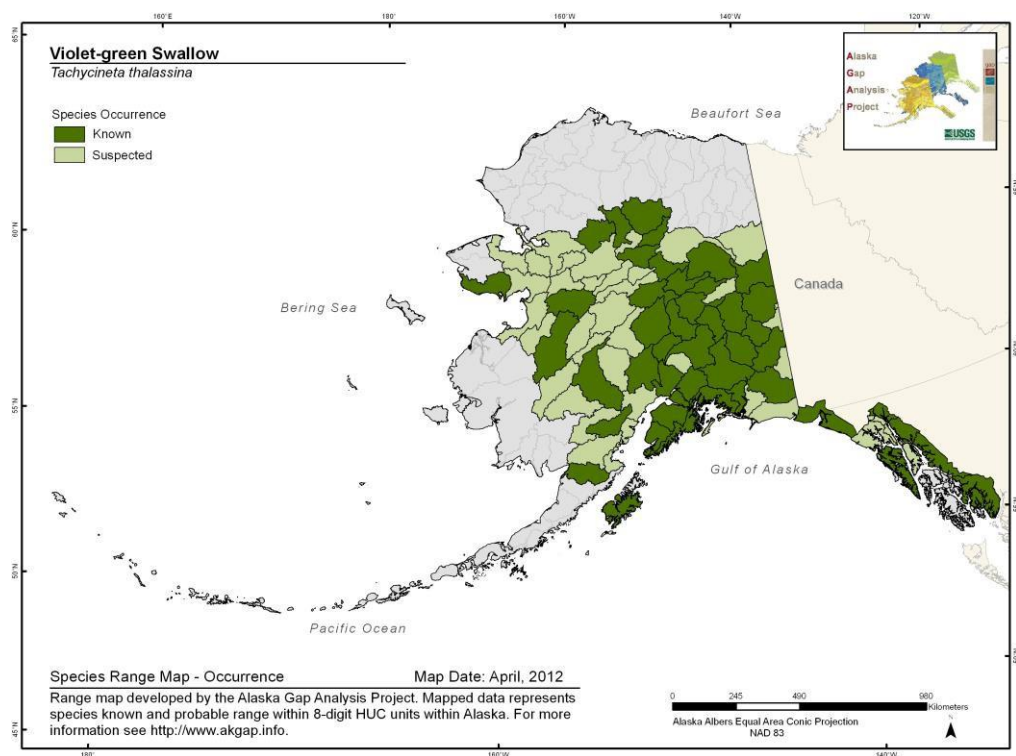
Erskine, A. J. 1977. Birds in boreal Canada. Report 41. Canadian Wildlife Service, Ottawa, Ontario.

Robertson, R. J., B. J. Stutchbury, and R. R. Cohen. 1992. Tree Shallow (*Tachycineta bicolor*). In The Birds of North America, No. 11 (A. Poole, P. Stettenheim, and F. Gill (Eds.)). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

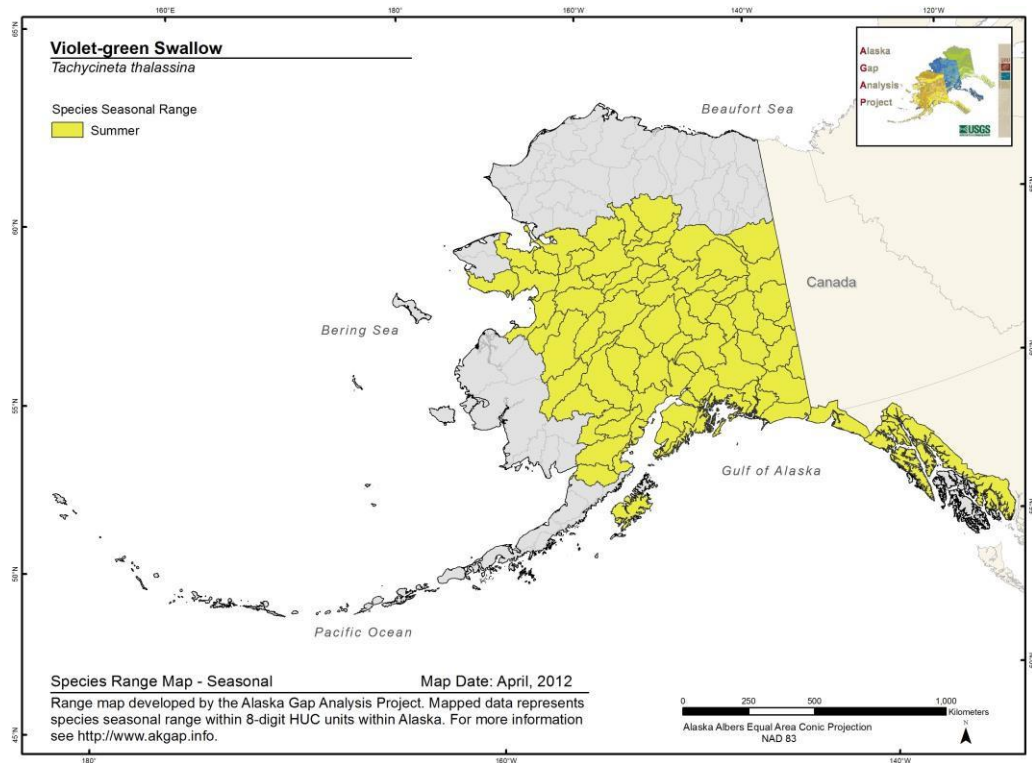
Violet-green Swallow *Tachycineta thalassina*

Range Map and Distribution Model Summary

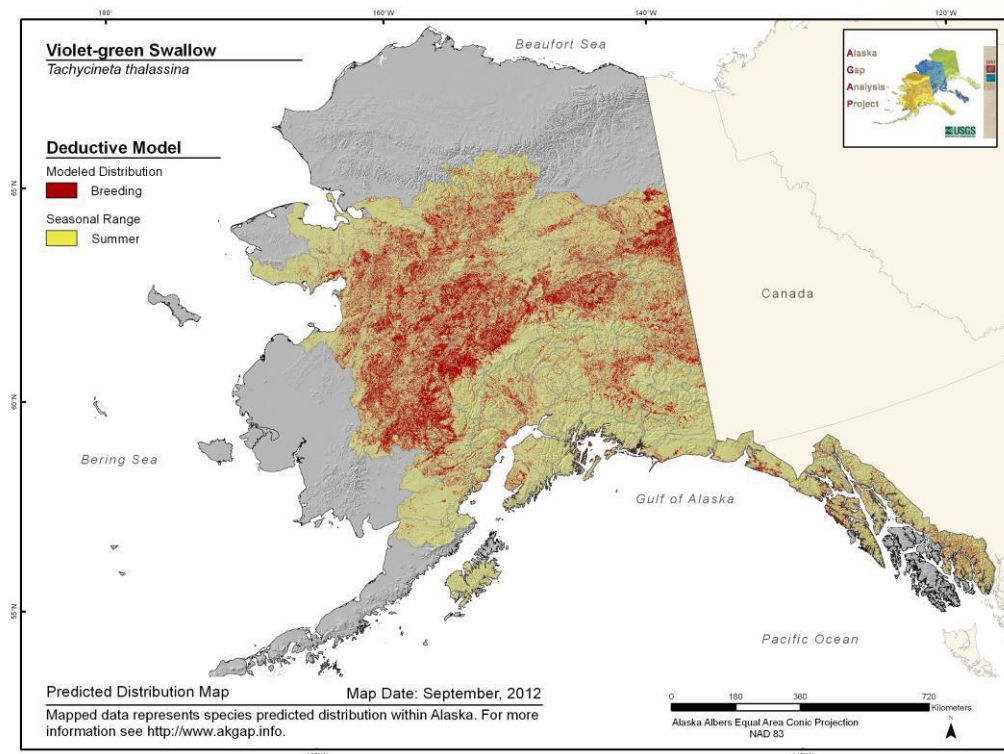
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.504**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits open coniferous, deciduous or mixed forest and woodland, primarily in highlands (frequently at low elevations in north) (AOU 1983). Preferred nest trees are in open areas, e.g. open groves or woodland edges (Brown et al. 1992). Species is a secondary (non-excavating) cavity-nester, may nest in a crevice in a clay or rock cliff, natural tree cavity, woodpecker hole, crevice in building, or bird box; also reported to use old nests of Cliff Swallow (*Hirundo pyrrhonota*) or Bank Swallow (*Riparia riparia*) (Erskine 1979, AOU 1983, Brown et al. 1992, Houston 1999).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Brown, C. R., Knott, A. M. and E. J. Damrose. 1992. Violet-green Swallow. In *The Birds of North America*, No. 14 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Erskine, A. J. 1979. Man's influence on potential nesting sites and populations of swallows in Canada. *The Canadian Field-Naturalist* 93(4):371-377.

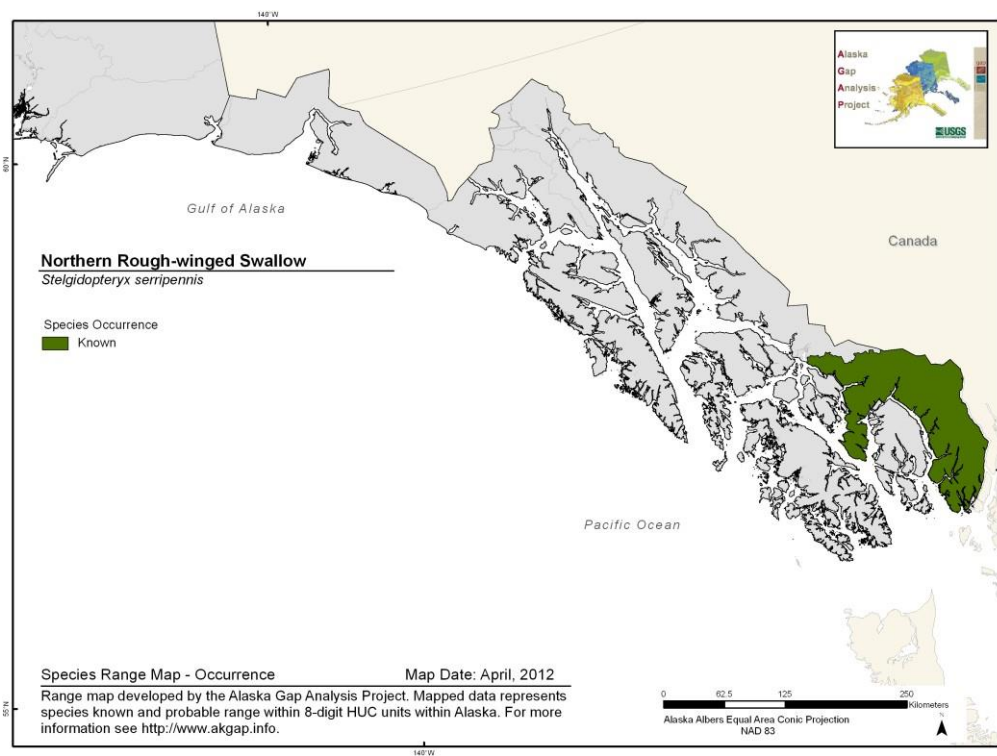
Houston, C.S. 1999. Extension of range of Violet-green Swallow. *Blue Jay* 57(2):116-117.

Northern Rough-winged Swallow

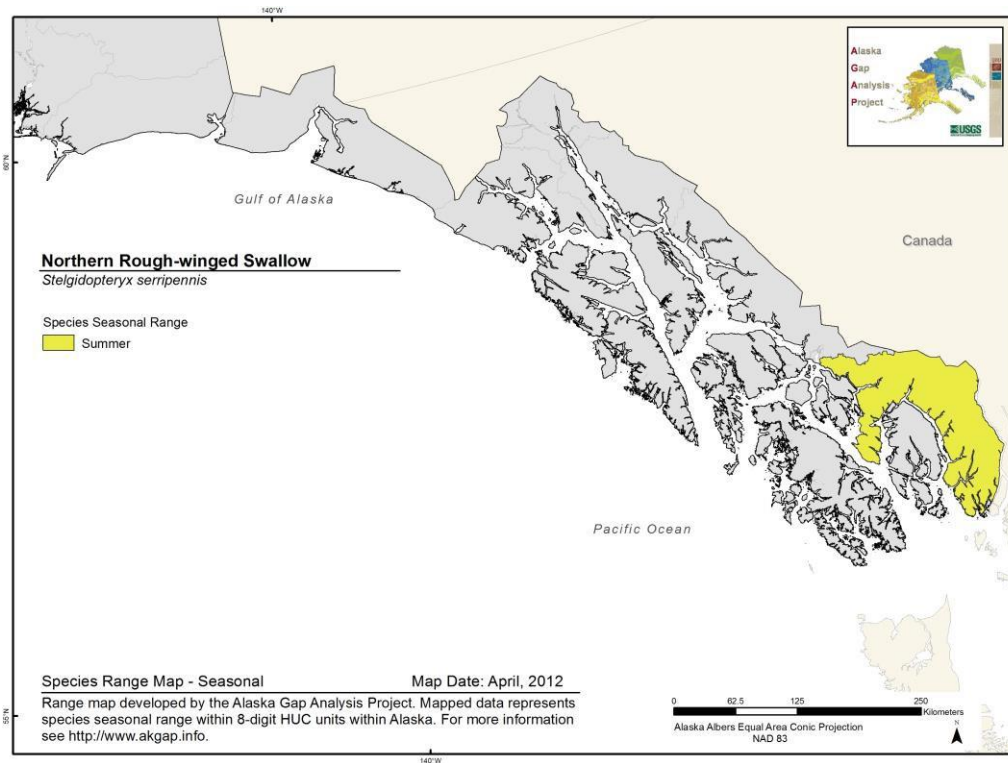
Stelgidopteryx serripennis

Range Map and Distribution Model Summary

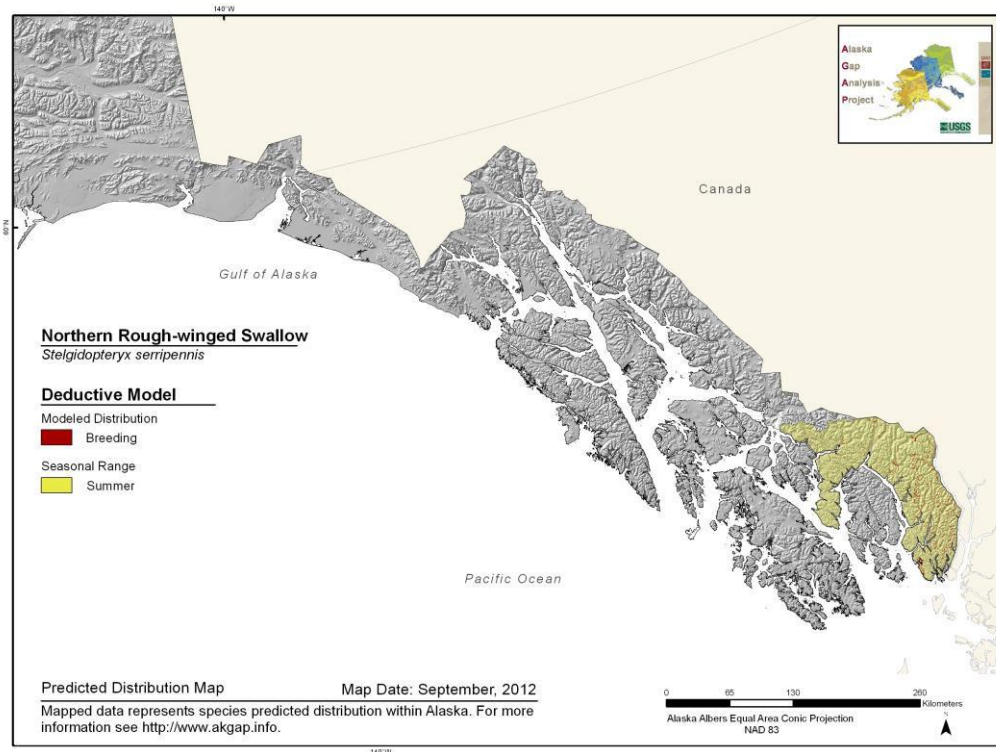
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Prefers open areas, including open woodlands. Nest sites near rocky gorges, shale banks, stony road cuts, railroad embankments, gravel pits, stream margins, and other exposed banks of clay, sand, or gravel, commonly near water (Lunk 1962, Dejong 1996). Nests in burrows in cliffs, riverbanks, roadside cuts, culverts, drain pipes, holes in walls, under bridges; locally in caves and old buildings (NatureServe 2007b). In B.C., this species is found from near sea level to 1,700 m in elevation (Campbell et al. 1997). Nonbreeding birds frequent areas near water, open ploughed fields, meadows, and cliff faces (Campbell et al. 1997).

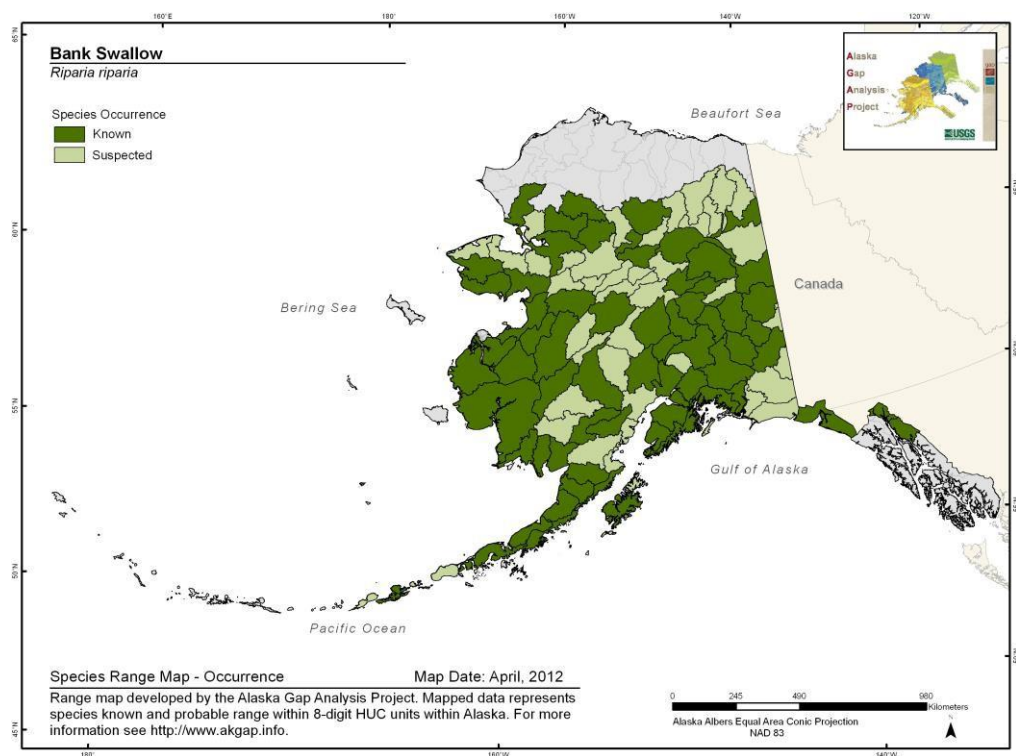
References

- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.
- Dejong, M. J. 1996. Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). In The Birds of North America, No.253 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Lunk, W. A. 1962. The Rough-winged Swallow: a study based on its breeding biology in Michigan. Bulletin Nuttall Ornithol. Club no. 4.
- NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

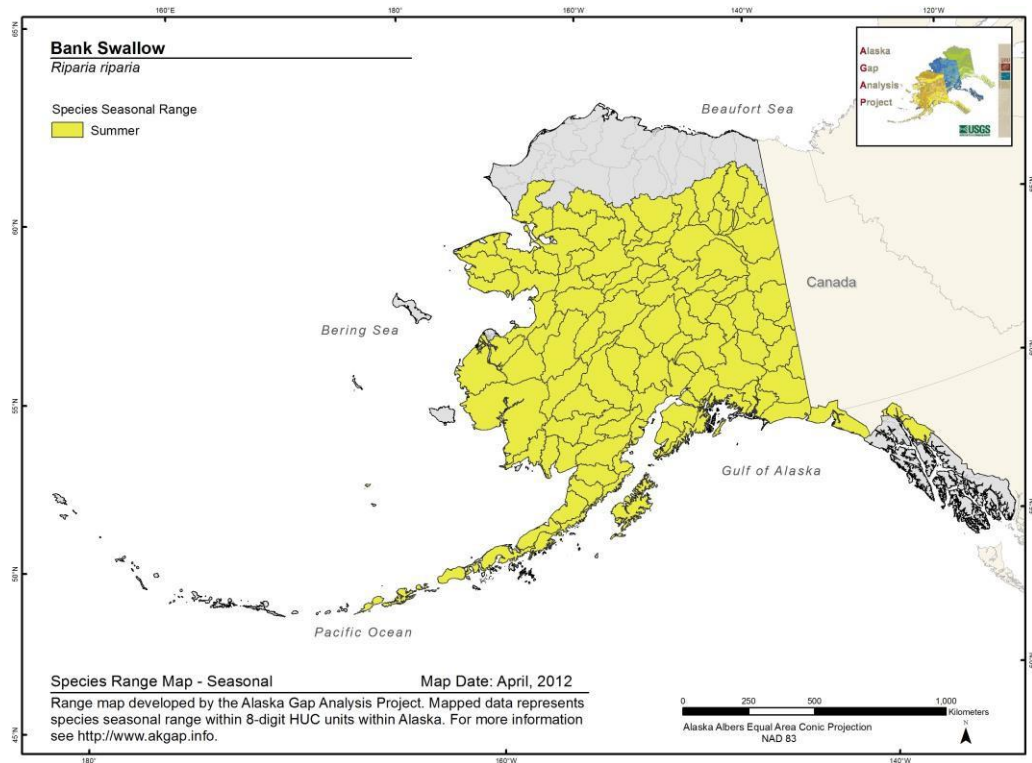
Bank Swallow *Riparia riparia*

Range Map and Distribution Model Summary

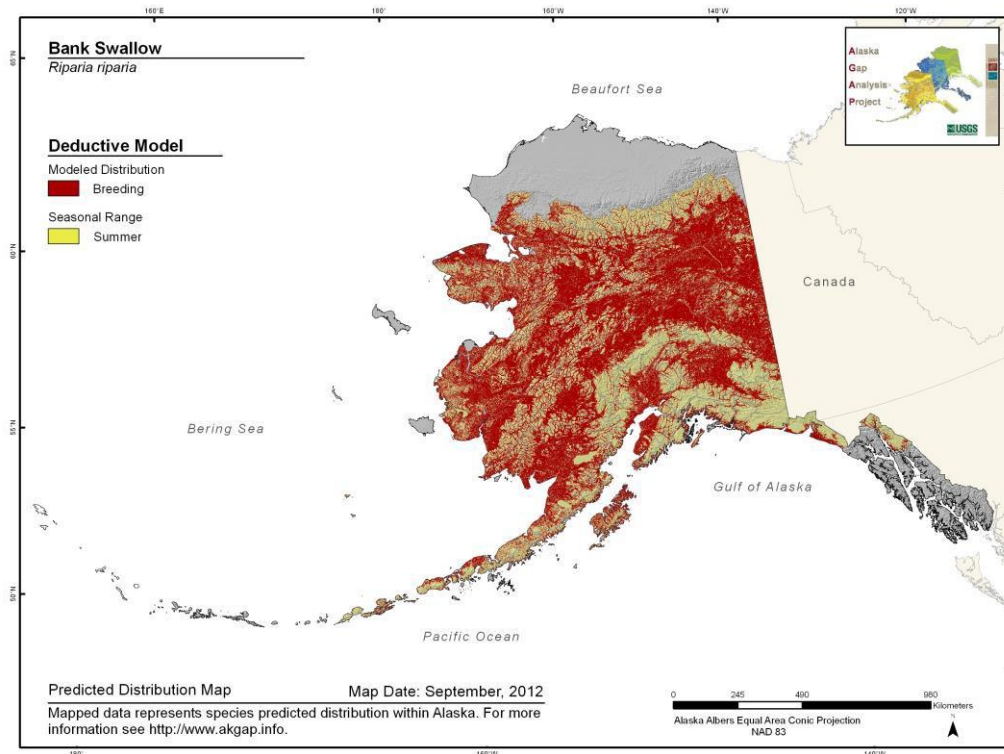
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.504**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in lowland areas along ocean coasts, rivers, streams, lakes, reservoirs, and wetlands (Cramp et al. 1988, Turner and Rose 1989, AOU 1998). Nests located along vertical banks, cliffs, bluffs, and now days in artificial sites such as quarries and road cuts. Forage habitat includes wetlands, open water, grasslands, riparian woodlands, agricultural areas, shrublands, and upland woodlands near nesting habitat (Garrison 1999).

References

AOU. 1998. Check-list of North American birds. Seventh edition. American Ornithologists' Union, Washington, D.C. 829 pp.

Cramp, S. ed. 1988. The Birds of the Western Palearctic. Vol. 5. Oxford University Press, Oxford U.K.

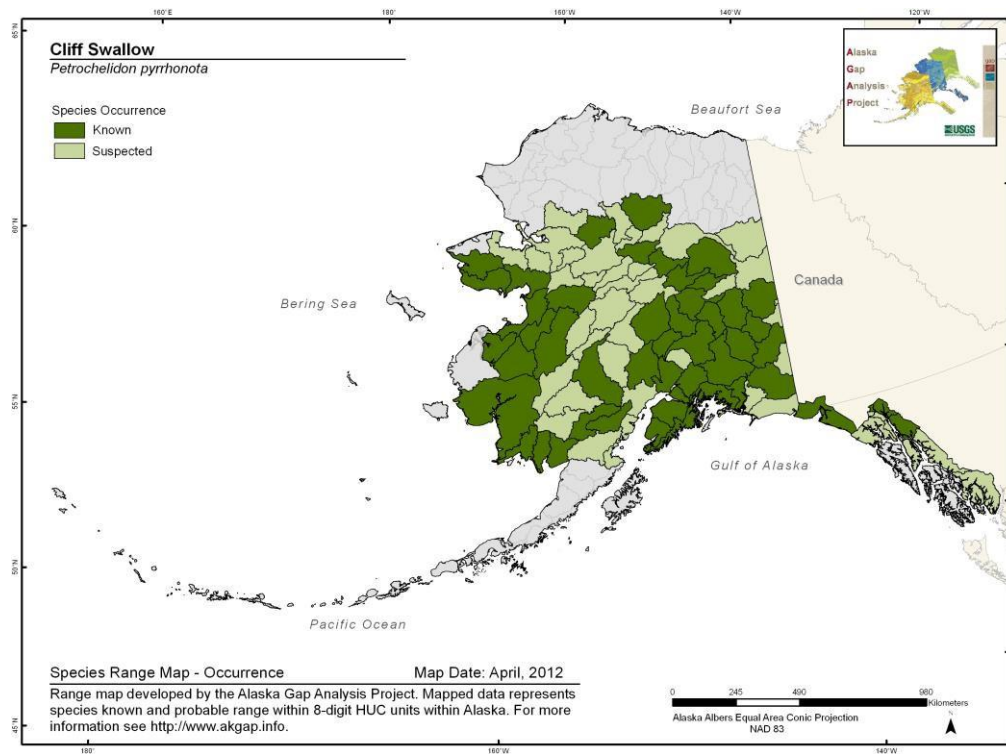
Garrison, B.A. 1999. Bank Swallow (RIPARIA RIPARIA). In The Birds of North America, No. 414 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Turner, A., and C. Rose. 1989. Swallows and martins an identification guide. Houghton Mifflin Co., Boston.

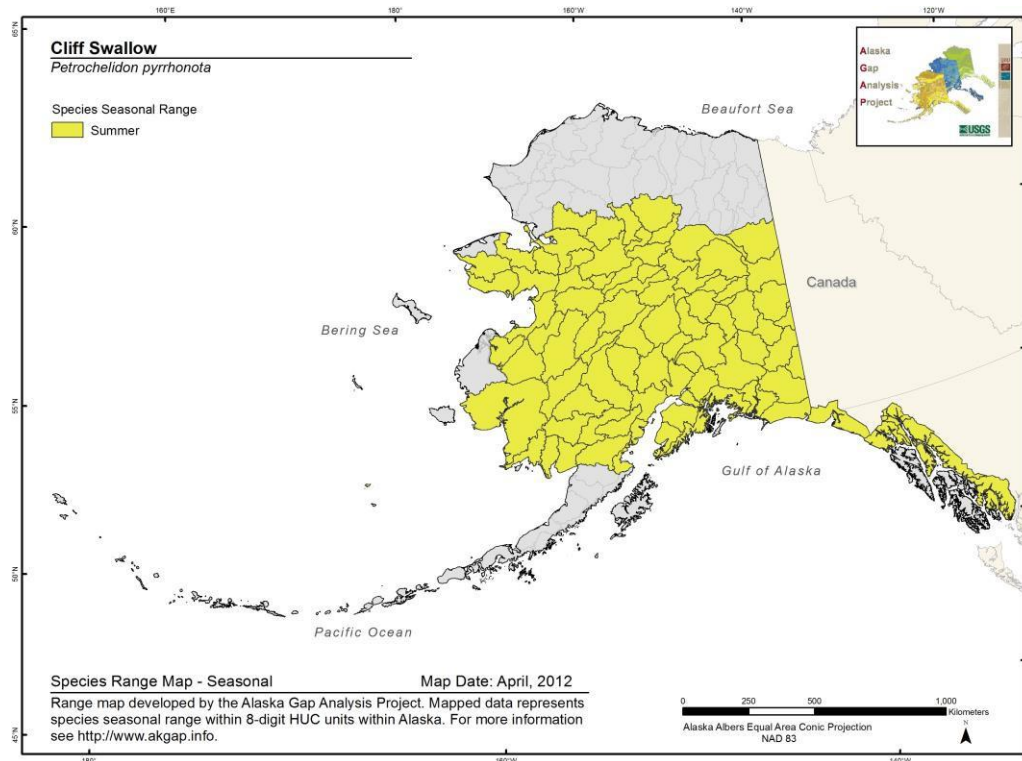
Cliff Swallow *Petrochelidon pyrrhonota*

Range Map and Distribution Model Summary

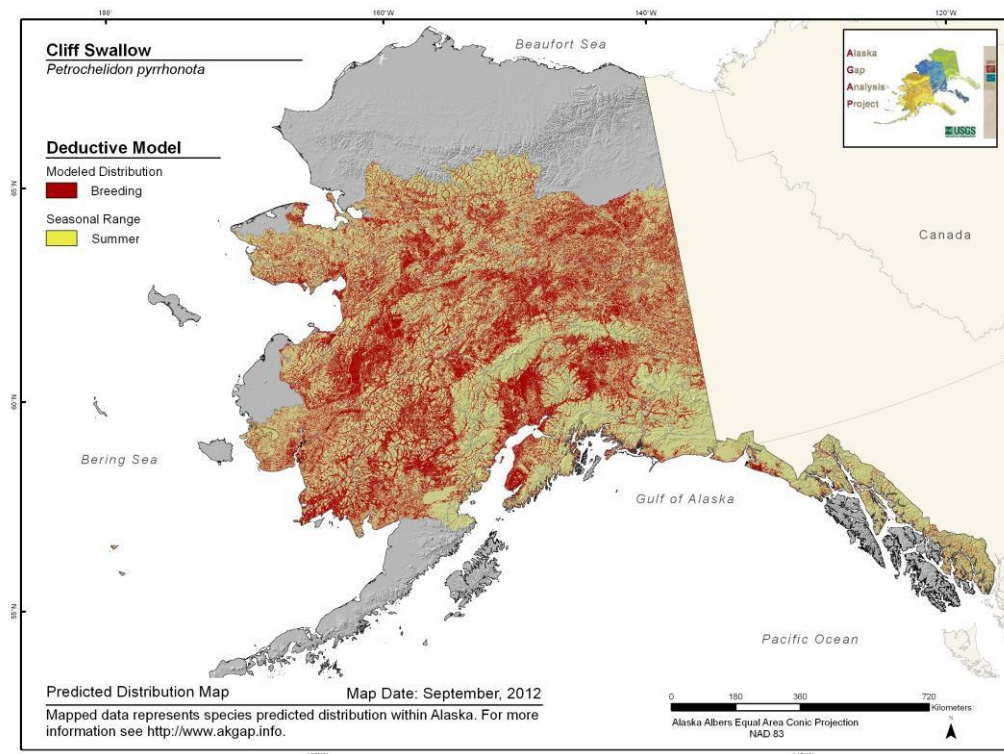
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.648**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits open to semi-wooded habitat, usually well below treeline in cliffs, canyons, farms, near meadows, marshes, and water (NatureServe 2007b). Found in a wide variety of habitats owing to the increase in availability of alternative nest sites. Inhabits grasslands, towns, broken forests, riparian edges. Nest sites are typically located near an open area for foraging, near water, and relatively near a mud source for nest building. Builds bottle shaped mud nest in colonies on cliffs, eaves of buildings, under bridges, etc. Prefers sites with overhang (Brown and Brown 1995, Coffey 1980).

References

Brown, C.R. and M.B. Brown. 1995. Cliff Swallow (*Hirundo pyrrhonota*). In *The Birds of North America*, No. 149 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Coffey, B. B., Jr. 1980. Cliff Swallows nesting a mile from water. *Migrant* 51:11.

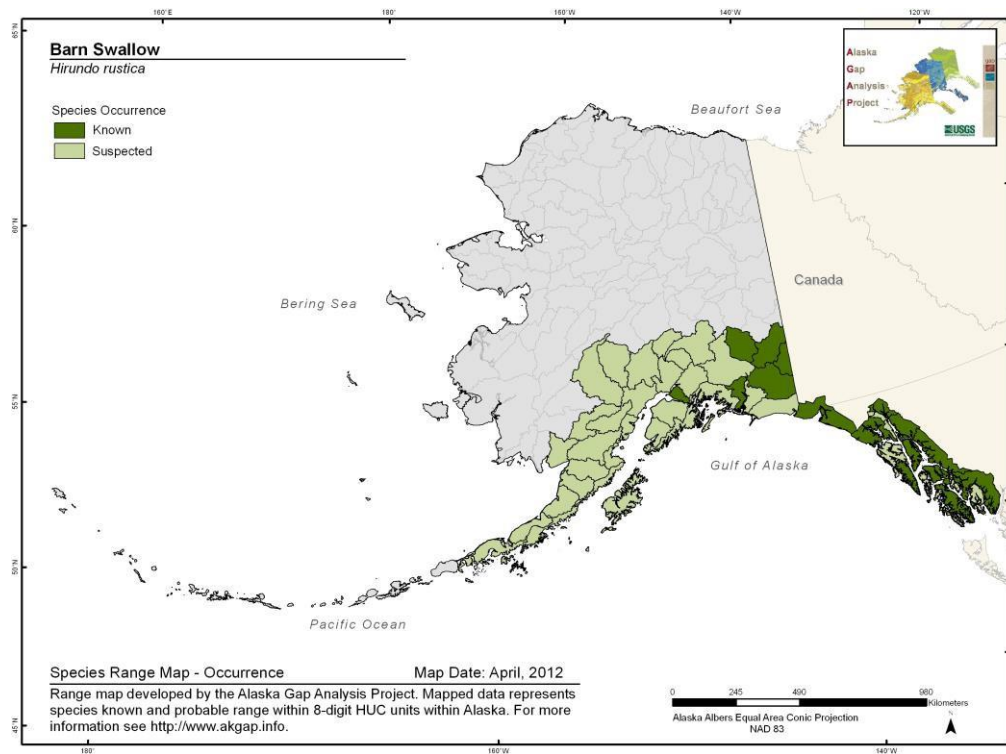
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Barn Swallow

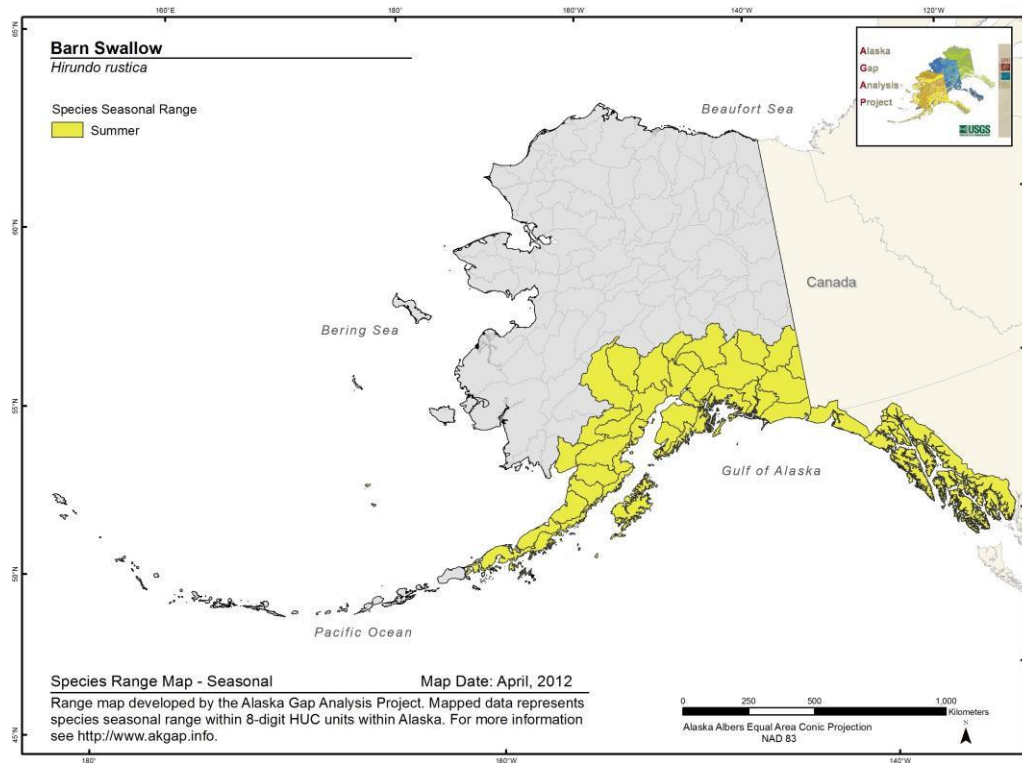
Hirundo rustica

Range Map and Distribution Model Summary

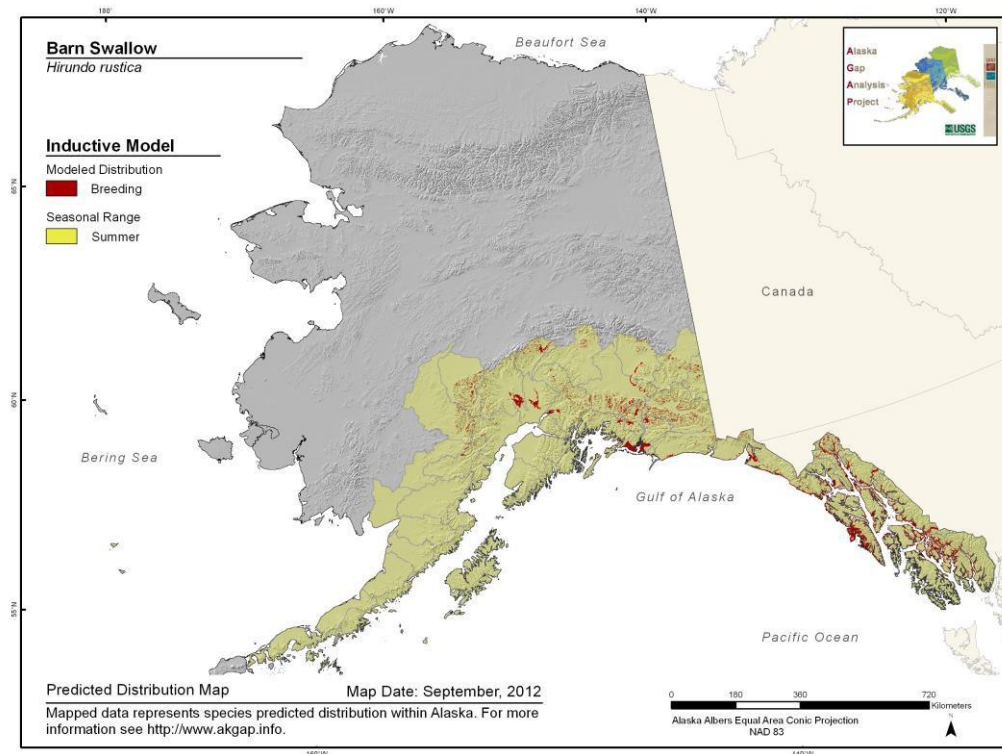
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.636**

**Model Quality
Summary:**
Low

Habitat Description

Historically, breeding habitat consisted of mountainous areas and seacoasts with cave and rock crevices for nesting. Currently, found in agricultural areas, cities, suburbs, and along highways. Breeding habitat typically has an open habitat component for foraging (Brown and Brown 1999), frequently near water (AOU 1983).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

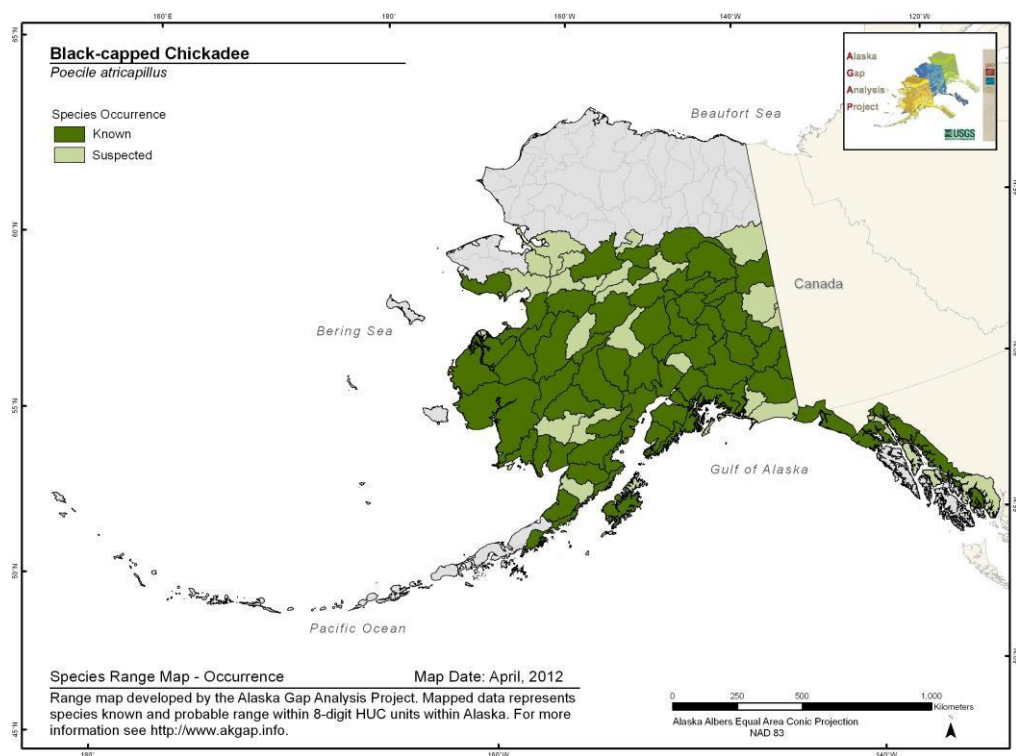
Brown, C. R., and M. B. Brown. 1999. Barn Swallow (HIRUNDO RUSTICA). In The Birds of North America, No. 452, (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Black-capped Chickadee

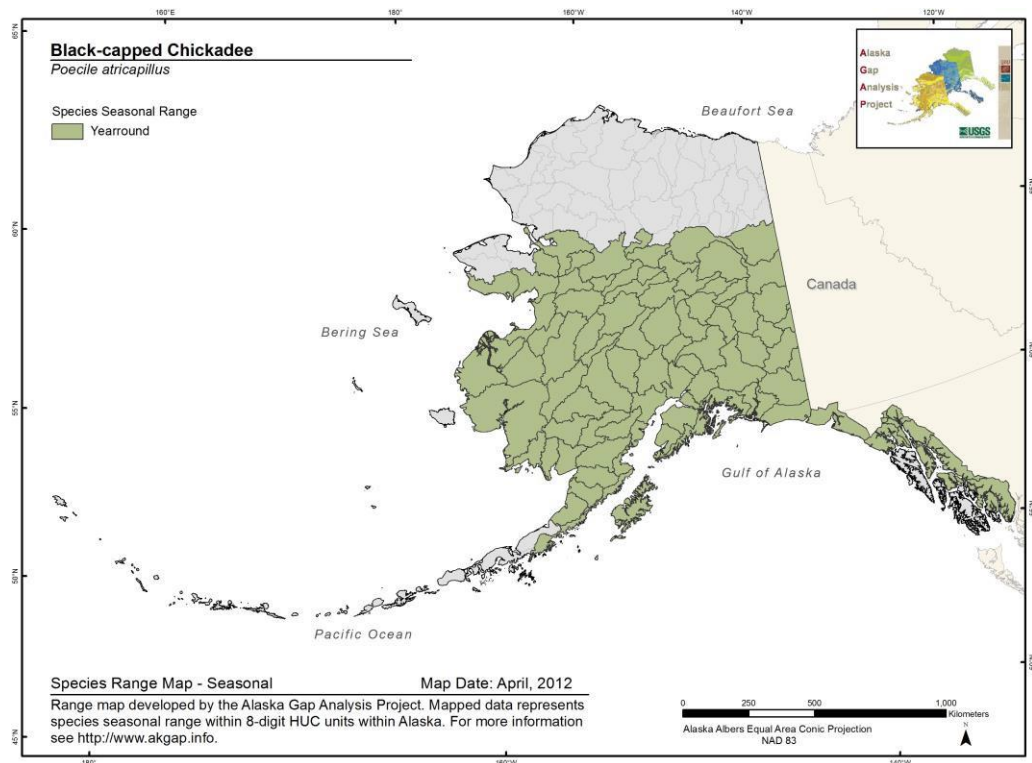
Poecile atricapillus

Range Map and Distribution Model Summary

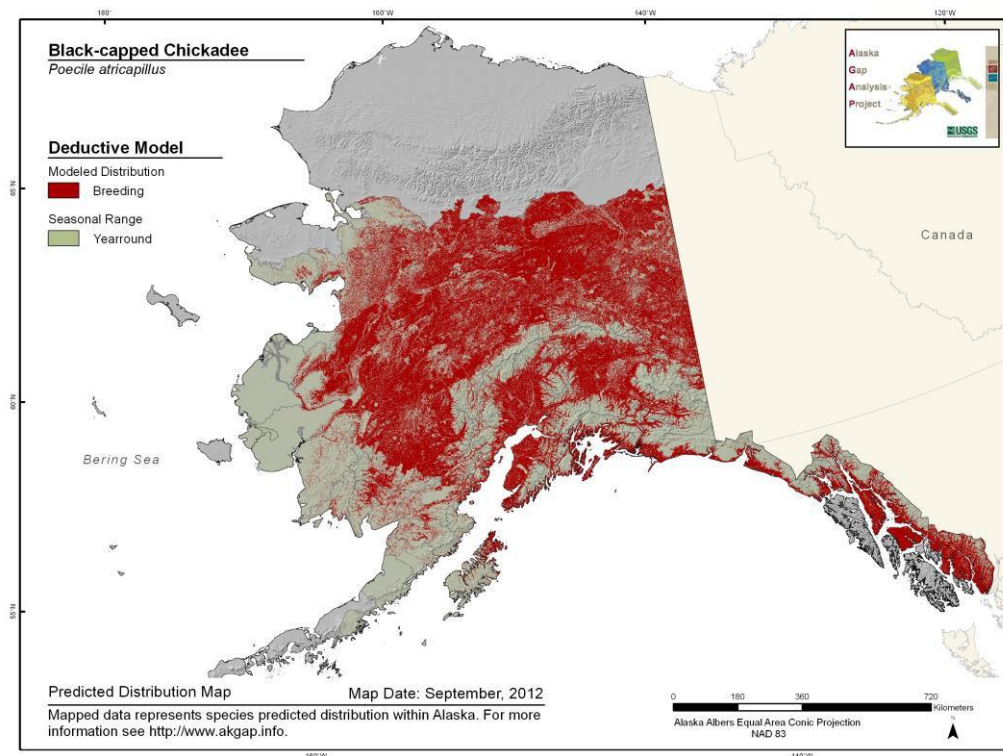
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.557**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in deciduous and mixed forests, open woods and parks, willow thickets and cottonwood groves. Often found in habitat with birch and alder where food and nest sites are both available. Also, inhabits suburban areas and old fields (Smith 1993). Prefers rich understory of brush, and tends to nest near forest edge. In B. C., occurs on coast from sea level to 210 m and interior from 270 to 1,500 m (Campbell et al. 1997). Winter habitat similar, but may inhabit less suitable habitat such as the middle of cities and coastal areas with dense vegetation, usually large shrubs (Smith 1993). In B. C., occurs from sea level to lower mountain slopes on the coast and up to 2,300 in the interior during nonbreeding. Uses deciduous, mixed deciduous/coniferous, and open coniferous forests, shrub thickets and riparian woodlands, especially alder, cottonwood, willow, aspen, and birch stands with a shrub understory. On coast, associated with salmonberry and thimbleberry thickets. In coniferous forests, prefers edges and openings along beaver ponds, lakes, river banks, bogs, swampy areas, meadows, pastures, clearcuts, burned forests, orchards, and other human-made clearings with deciduous habitats. (Campbell et al. 1997).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

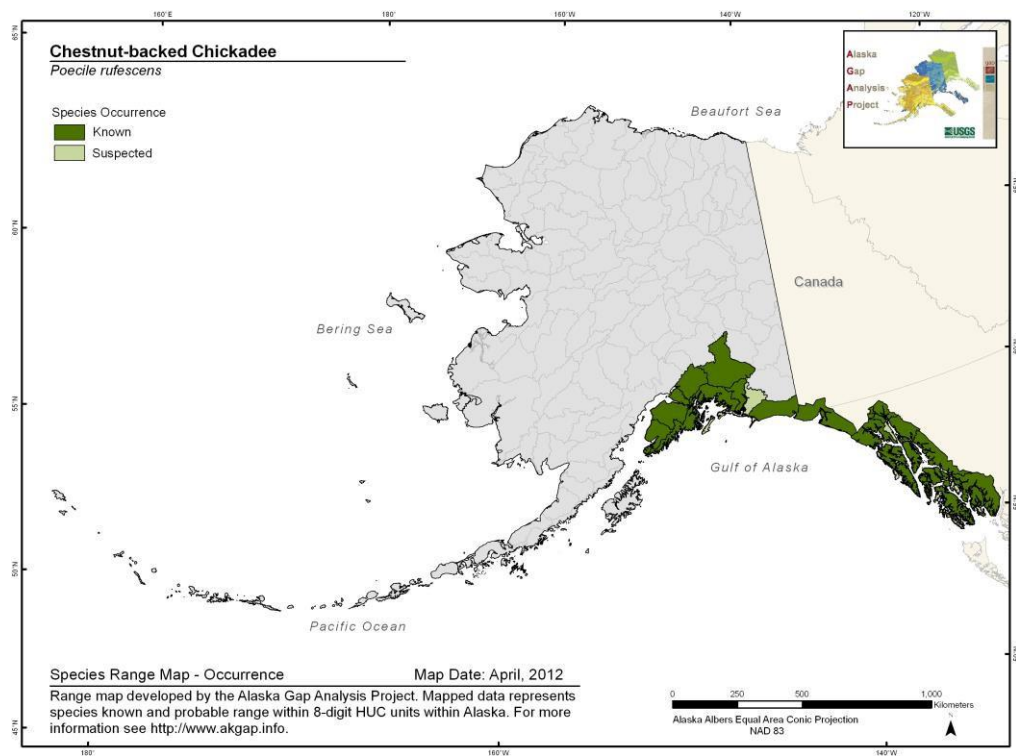
Smith, S. M. 1993. Black-capped Chickadee (*Parus atricapillus*). In The Birds of North America, Vol. 7, No. 39 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Chestnut-backed Chickadee

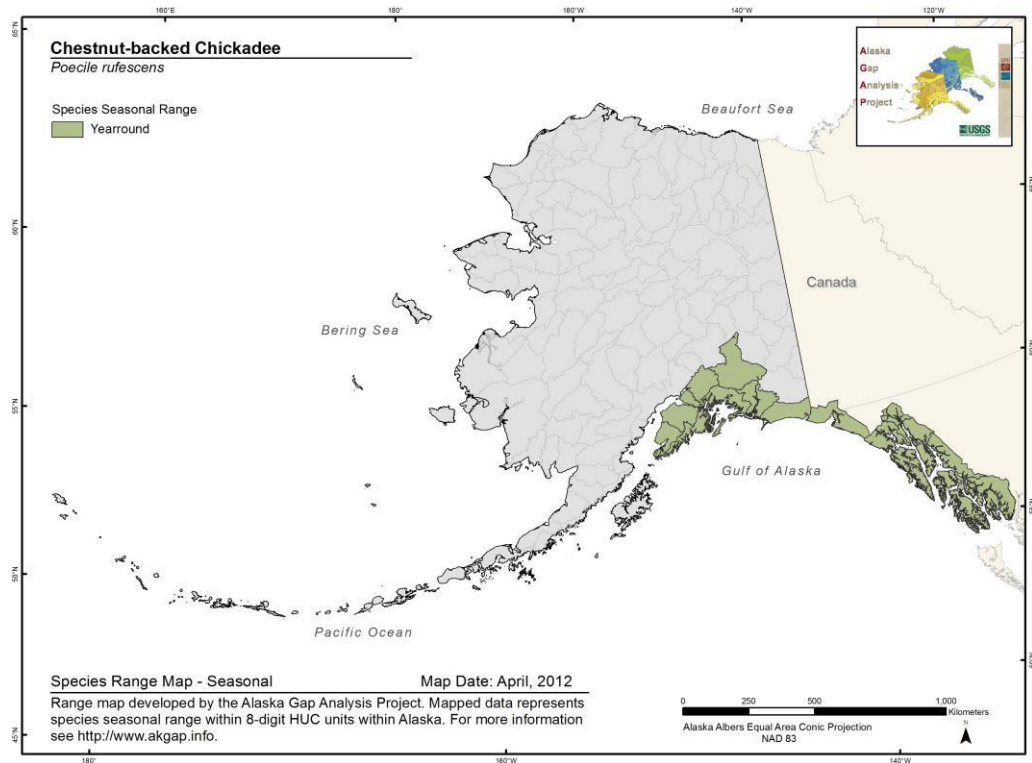
Poecile rufescens

Range Map and Distribution Model Summary

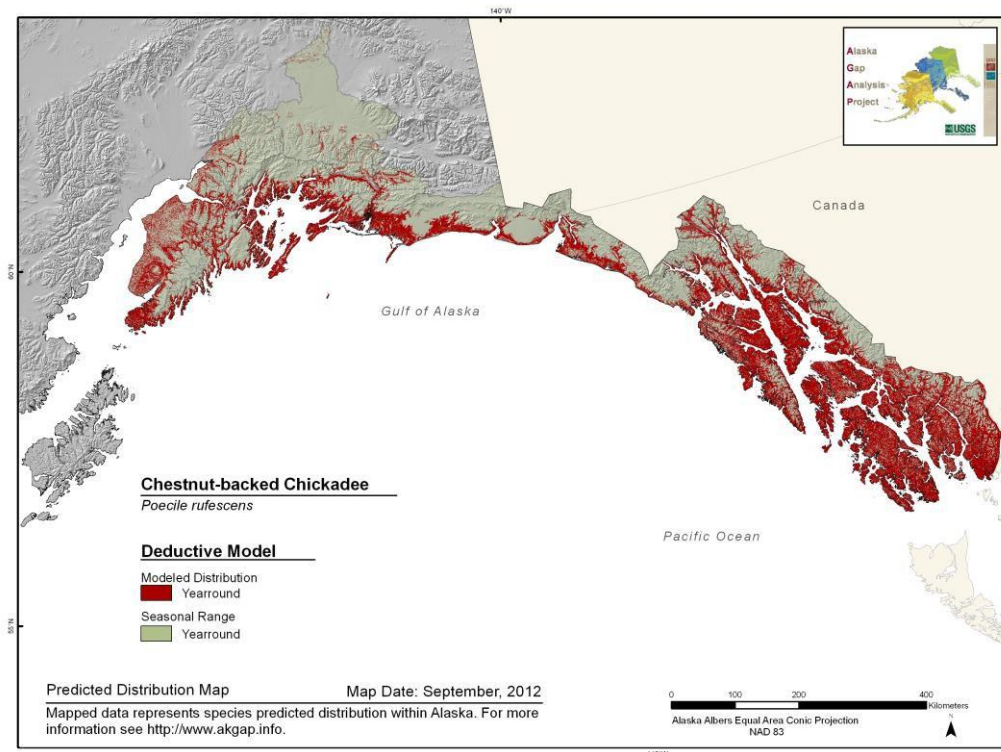
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.799**

**Model Quality
Summary:**
Moderate

Habitat Description

Coniferous and mixed forests in humid regions (AOU 1983). Inhabits dense coniferous forests, including shore pine muskegs, or near forests edges where temperature is even and shade exists along the coastal belt with high rainfall and cloudy weather (Grinnell 1904, Gibson 1976, Gibson and MacDonald 1975). In SE Alaska, occurs in mature hemlock/spruce forests. Also inhabits pole and sawtimber seral stages (Gibson 1976, Gibson and MacDonald 1975). In PWS, found in hemlock/spruce forests (Isleib and Kessel 1973).

References

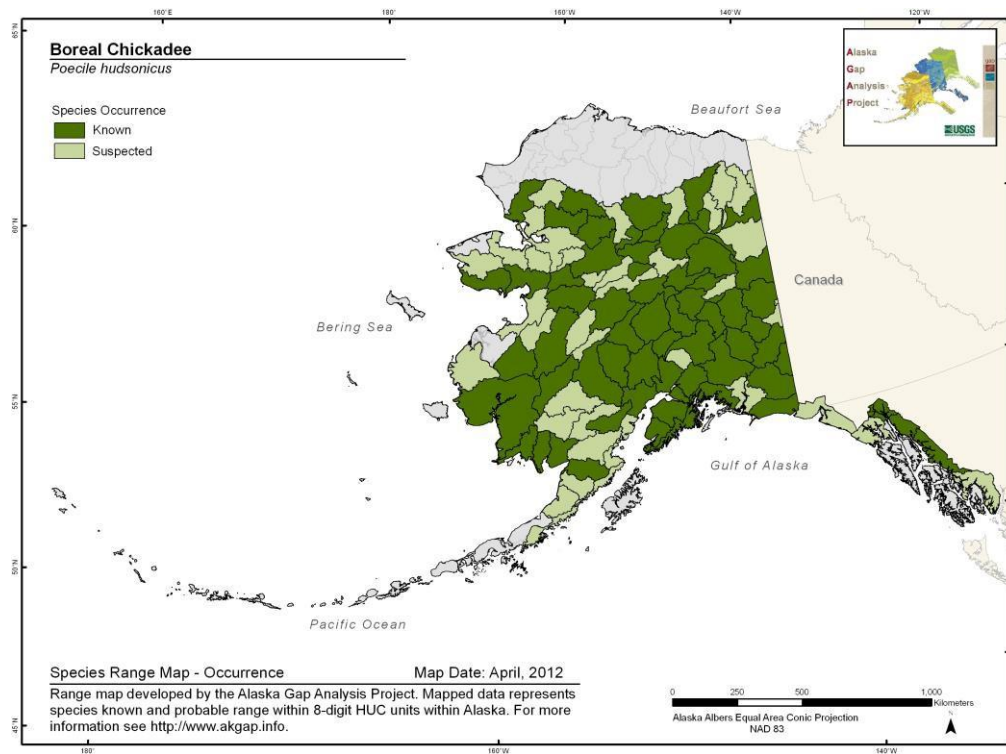
- AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.
- Gibson, D. D. 1976. Bird species and habitat inventory: Alexander Archipelago, Alaska, summer 1975. University of Alaska Museum Contract Report No. 01-283. U. S. For. Serv. 66pp.
- Gibson, D.D. and S.O. MacDonald. 1975. Bird species and habitat inventory, mainland Southeast Alaska, summer 1974. Univ. Alaska Museum report to USDA USFS, no. 01-248. 72 pp.
- Grinnell, J. 1904. The origin and distribution of the Chestnut-backed Chickadee. Auk 21: 364-378.
- Isleib, M.E., and B. Kessel. 1973. Birds of the north Gulf Coast-Prince William Sound region, Alaska. Biological Papers of the Univ. of Alaska 14. Univ. of Alaska Fairbanks, Fairbanks, AK. 149 pp.

Boreal Chickadee

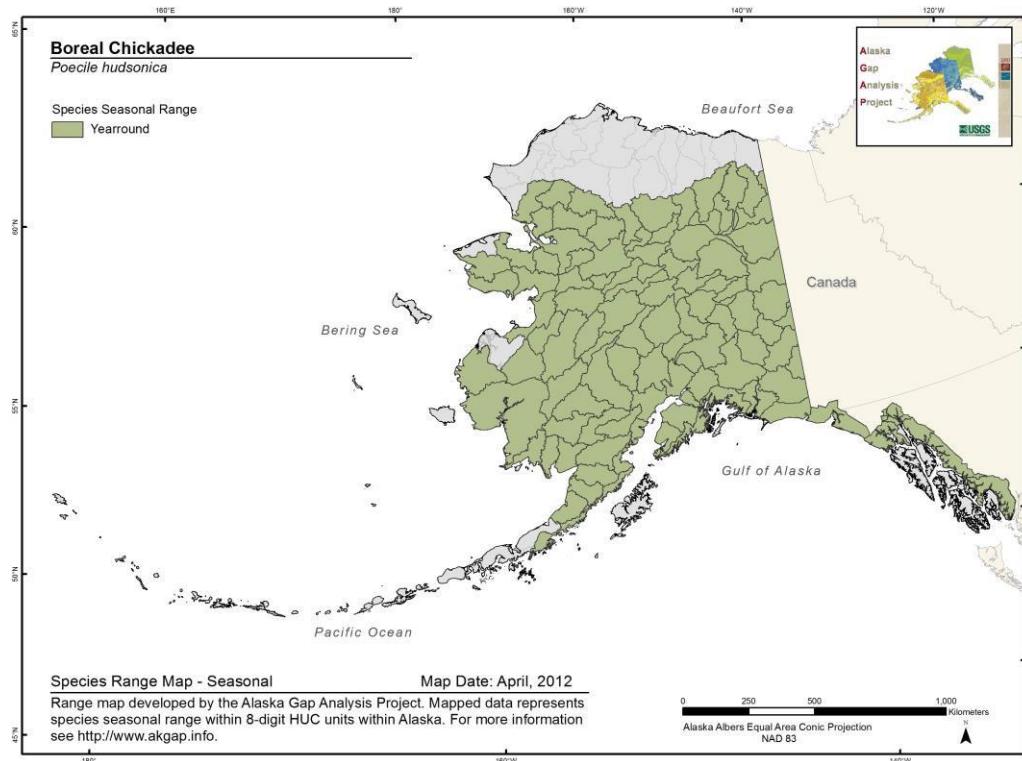
Poecile hudsonicus

Range Map and Distribution Model Summary

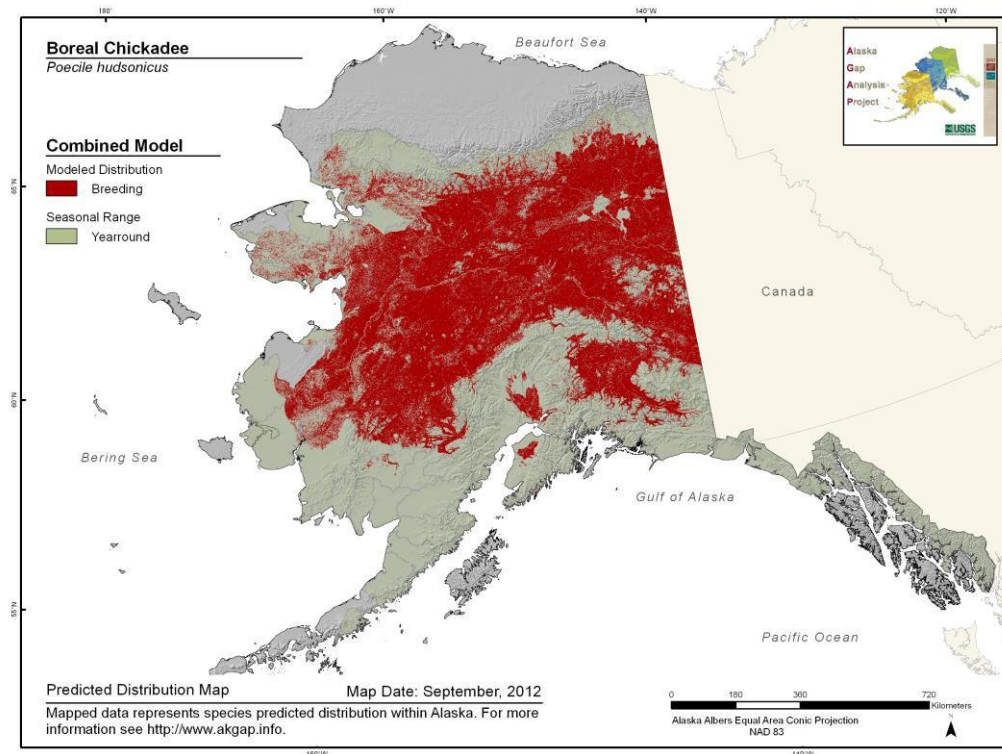
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.575**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits boreal forests, mixed forests, muskeg bogs, birches and streamside willows, including young and mature spruce and sometimes balsam fir. In northern Alaska, occurs in a variety of forests, including spruce, mixed spruce, alder, and willow (Gabrielson and Lincoln 1959, Irving 1960).

References

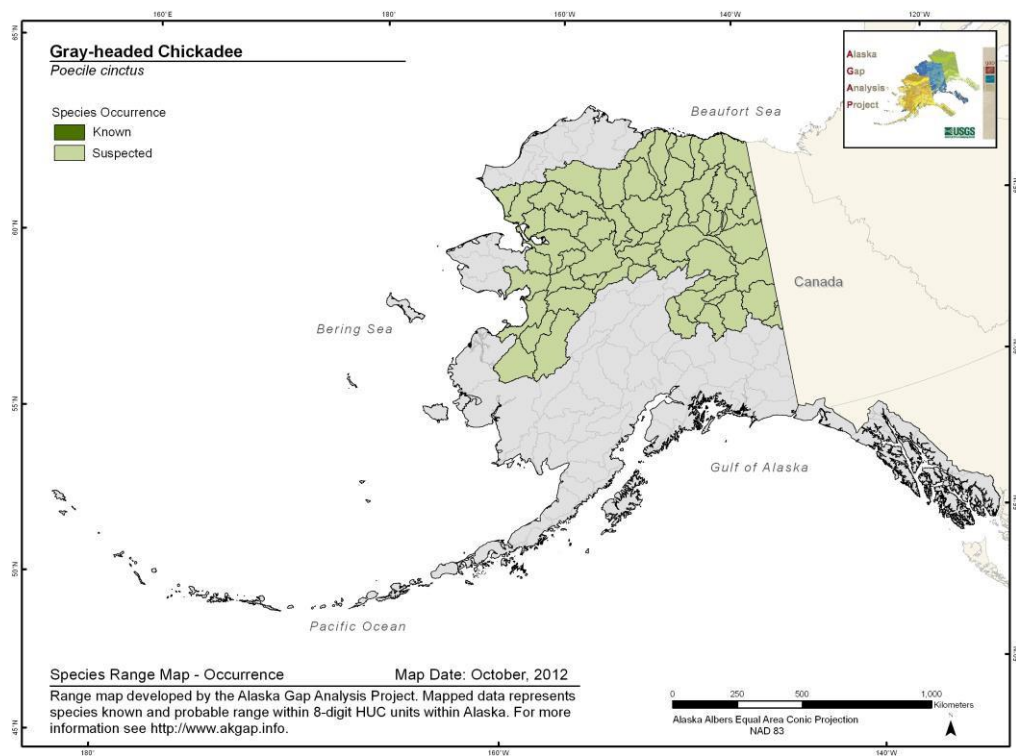
Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

Irving, L. 1960. Birds of Anaktuvuk Pass, Kobuk, and Old Crow. A study in arctic adaptation. United States National Museum Bulletin 217. Smithsonian Institution, Washington, D.C. 409 pp.

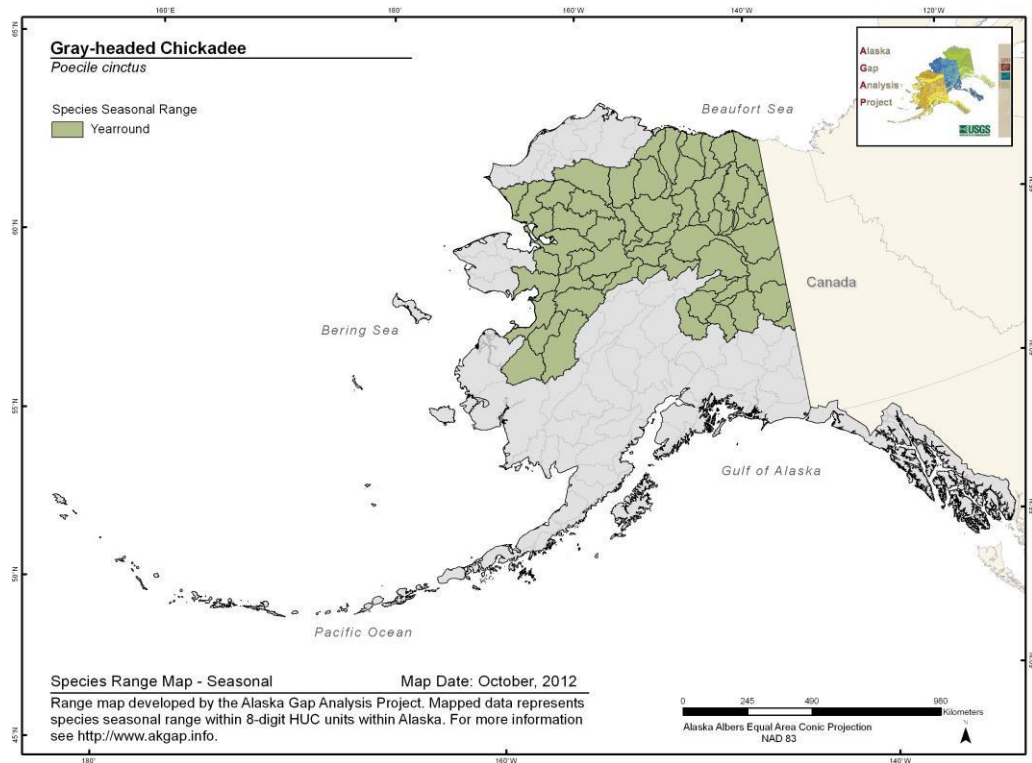
Gray-headed Chickadee *Poecile cinctus*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:
Rejected all models

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Boreal coniferous forest, primarily spruce, most commonly in stream basins, also locally in willow and aspen thickets (AOU 1983). Willows and spruces bordering tundra (NGS 1983). Prefer forest edges (Hailman and Haftorn 1995). Most often found in scattered woodlands with <20% closed canopy and in tall shrubs, which often occurs in Spruce tundra ecotone (Kessel In Hailman and Haftorn 1995). Nests in cavity in tree (conifer, birch, alder, aspen); natural cavity or often an old woodpecker hole, often low, 1-4 m above ground (Harrison 1978).

References

AOU. 1983. Check-list of North American birds. 6th ed.American Ornithologists' Union, Washington D. C.

Hailman, J. P., and S. Haftorn. 1995. Siberian Tit (PARUS CINCTUS). In The Birds of North America, No. 196 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Harrison, C. 1978. A Field Guide to the Nests, Eggs and Nestlings of North American Birds. Collins, Cleveland, Ohio.

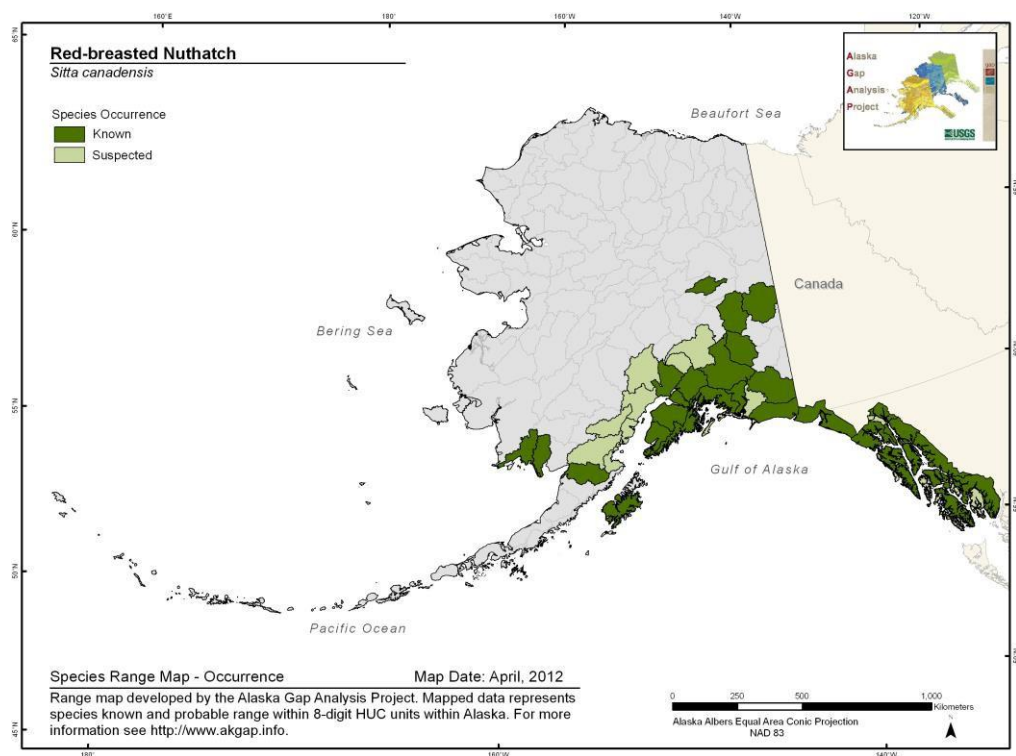
National Geographic Society. 1983. Field guide to the birds of North America. National Geographic Society, Washington, DC.

Red-breasted Nuthatch

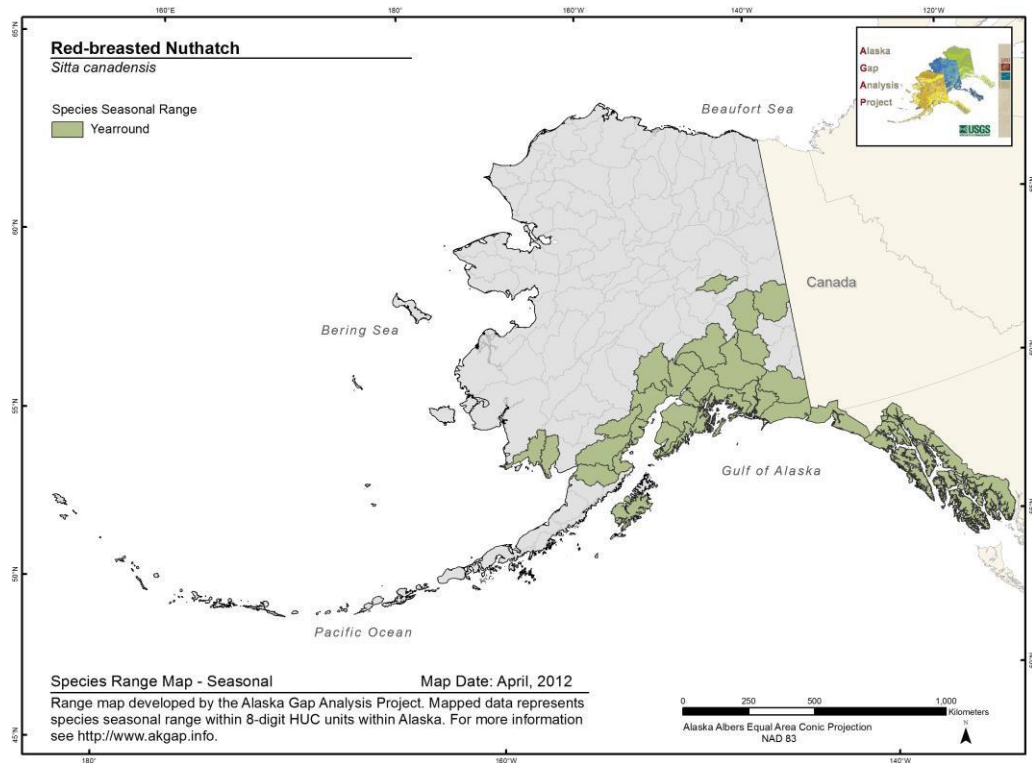
Sitta canadensis

Range Map and Distribution Model Summary

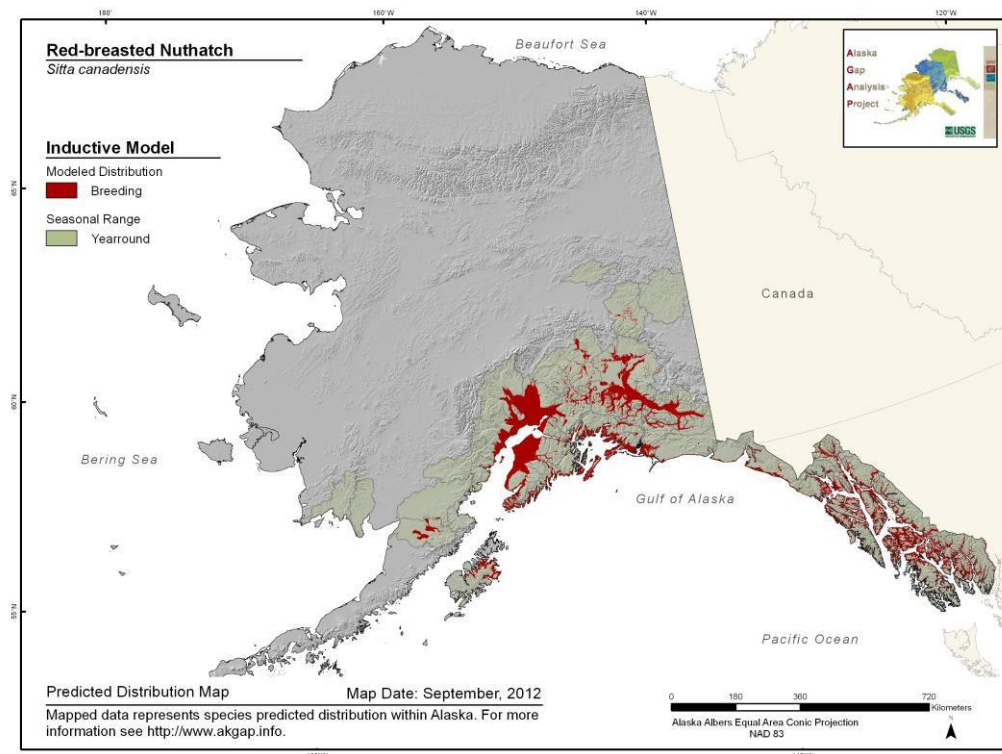
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.726**

**Model Quality
Summary:**
Moderate

Habitat Description

In Alaska, occurs in the boreal forests zone. Primarily breeds in mature and diverse stands of spruce, fir, larch, and cedar (Tyler 1948, Simpson 1976, Adams and Morrison 1993, Harrap and Quinn 1996, Campbell et al. 1997). Excavates own nest in tree snags and rarely uses existing cavities or nest boxes (Ghalambor and Martin 1999). In the Yukon, seldom observed outside of spruce-dominated or mixed forest, and is primarily at lower elevations. Frequents bird feeders in the winter (Alexander et al. 2003).

References

Adams, E. M. and M. L. Morrison. 1993. Effects of forest stand structure and composition on Red-breasted Nuthatches and Brown Creepers. *Journal of Wildlife Management* 57:616-629.

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. *Birds of the Yukon Territory* (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. *The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos.* University of British Columbia Press, Vancouver. 693 pages.

Ghalambor, C. K. and T. E. Martin. 1999. Red-breasted Nuthatch (*Sitta canadensis*). In *The Birds of North America. Vol. 7, No. 459* (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Harrap, S. and D. Quinn. 1996. *Chickadees, tits, nuthatches, and treecreepers.* Princeton University Press, Princeton, NJ.

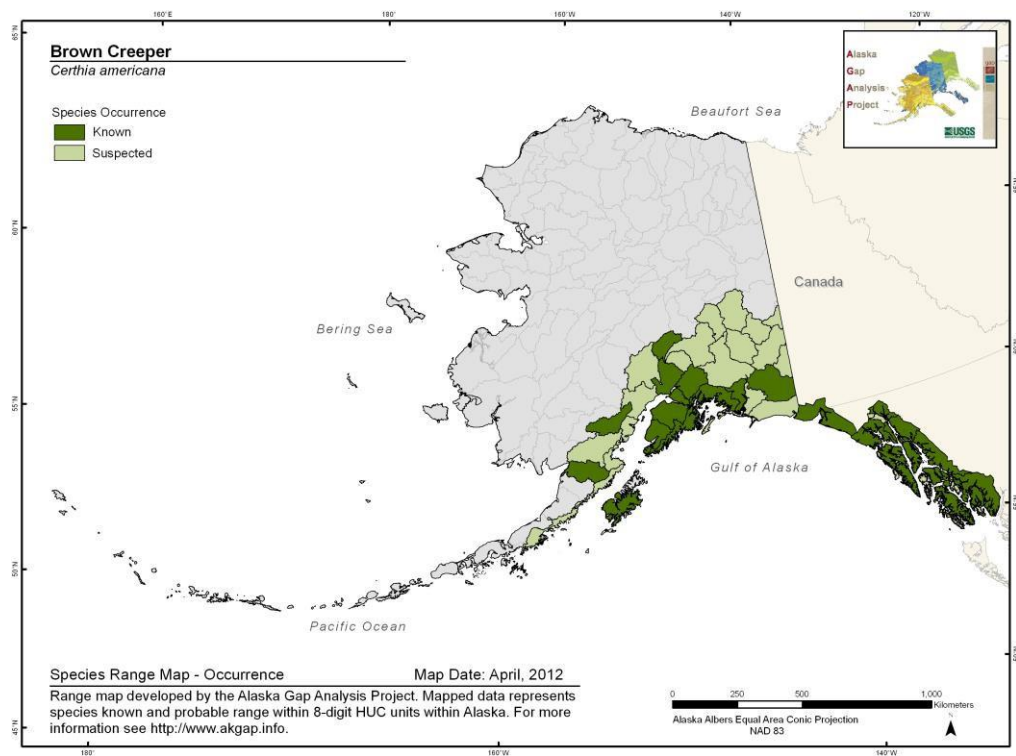
Simpson, M. B., Jr. 1976. Breeding season habitat and distribution of the Red-breasted Nuthatch in the southern Blue Ridge Mountain province. *Chat* 40:23-25.

Tyler, W. M. 1948. Red-breasted Nuthatch. Pp. 22-35 in *Life histories of North American nuthatches, wrens, thrashers, and their allies* (A. C. Bent, ed.). U. S. Natl. Mus. Bull. 195.

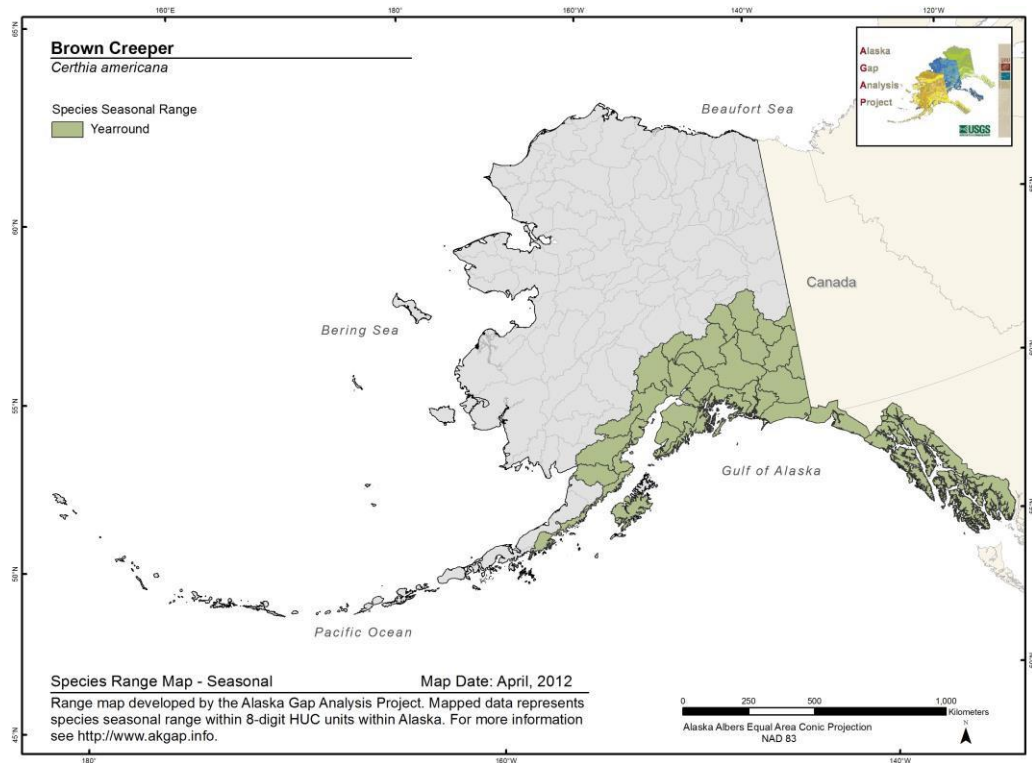
Brown Creeper *Certhia americana*

Range Map and Distribution Model Summary

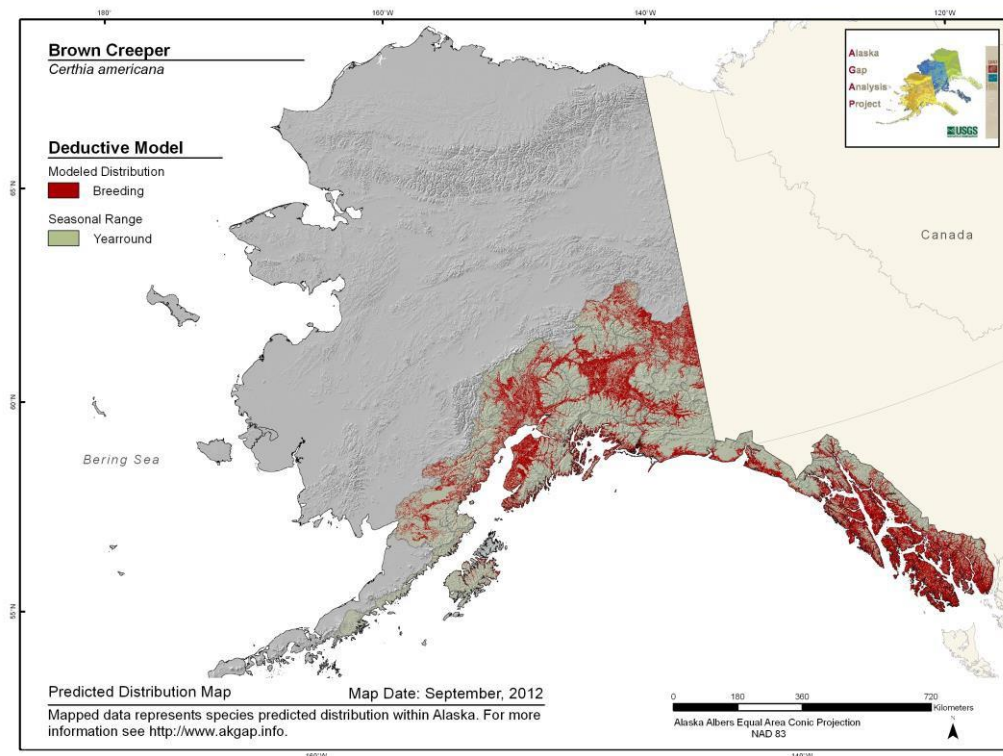
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.776**

**Model Quality
Summary:**
Moderate

Habitat Description

Mainly associated with mid-successional to mature and old growth coniferous and deciduous forests (Kessler and Kogut 1985, Dellasala et al. 1996, Hejl et al. 2002a); rarely observed in logged habitats (Dellasala et al. 1992). Dead trees are an essential component of nesting habitat. In interior Alaska, occurs in upland white spruce (*Picea glauca*) and mixed white spruce-birch (*Betula papyrifera*) forests (Spindler and Kessel 1980) and in cottonwood (*Populus balsamifera*) and mixed white spruce-birch forests (Kessel 1998). In Prince William Sound, found primarily in hemlock (*Tsuga* spp.)-Sitka spruce (*Picea sitchensis*) and mixed deciduous spruce woodlands (Isleib and Kessel 1973). In the Chugach Mountains of the Kenai Peninsula in southcoastal Alaska, the species occurred in forest stands over 100 years old and in a 10-year-old burn area; Brown Creepers were twice as abundant in the older stands (Quinlan 1979). In a study of island habitats in Southeast Alaska, creepers were found only in old growth habitats near saltwater, and were generally uncommon in that habitat (Kessler and Kogut 1985); on the mainland they were uncommon in spruce/hemlock forests (Gibson and MacDonald 1975 in Pogson et al. 1997).

References

DellaSala, D.A., J.C. Hagar, K.A. Engel, W.C. McComb, R.L. Fairbanks, E.G. Campbell. 1996. Effects of silviculture modifications of temperate rainforest on breeding and wintering bird communities, Prince of Wales Island, Southeast Alaska. *Condor*: 98: 706-721.

Hejl, S. J., K. R. Newlon, M. E. McFadzen, J. S. Young, and C. K. Ghalambor. 2002a. Brown Creeper (*Certhia americana*). In *The Birds of North America*, No 669 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Isleib, M.E., and B. Kessel. 1973. Birds of the north Gulf Coast-Prince William Sound region, Alaska. *Biological Papers of the Univ. of Alaska* 14. Univ. of Alaska Fairbanks, Fairbanks, AK. 149 pp.

Kessel, B. 1998. Habitat characteristics of some passerine birds in western North American taiga. University of Alaska Press, Fairbanks, AK.

Kessler, W. B. and T. E. Kogut. 1985. Habitat orientations of forest birds in southeastern Alaska. Northwest Science 59:58-65.

Pogson, T. H., S. E. Quinlan, and B. Lehnhausen. 1997. A manual of selected neotropical migrant birds of Alaska national forests. USDA, USFS, Juneau, AK.

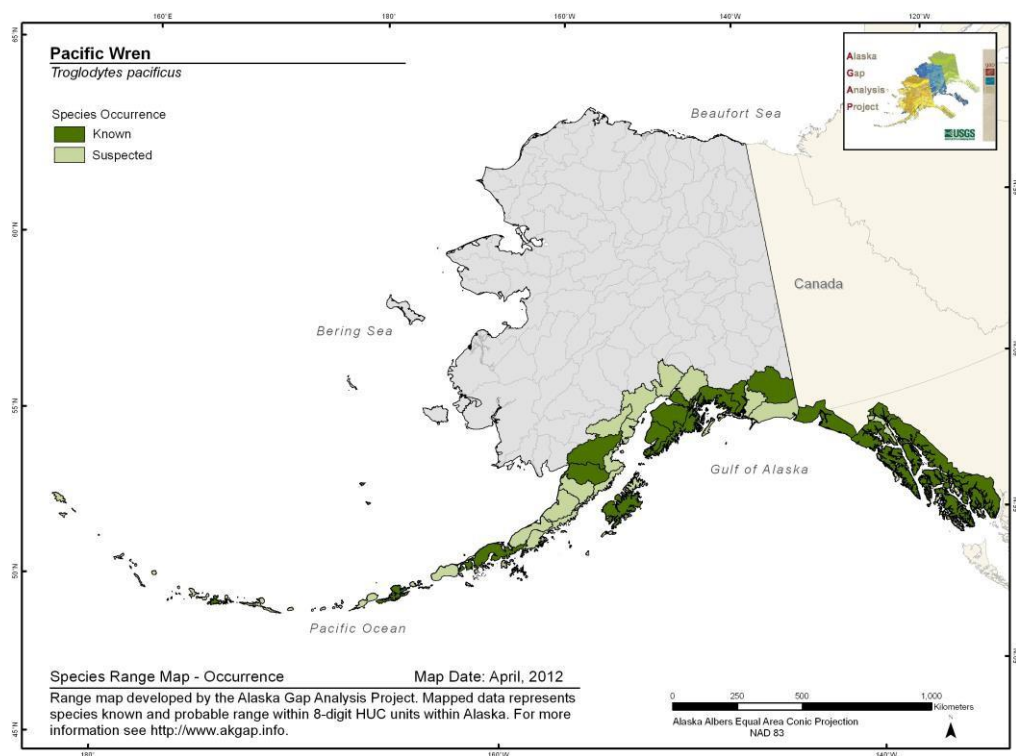
Quinlan, S.E. 1979. Effects of controlled burning and succession of white spruce forests on breeding bird communities, Kenai Peninsula, Alaska. Unpublished report, Chugach National Forest, Seward, AK.

Spindler, M. A. and B. A. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. Syesis 13:61-104.

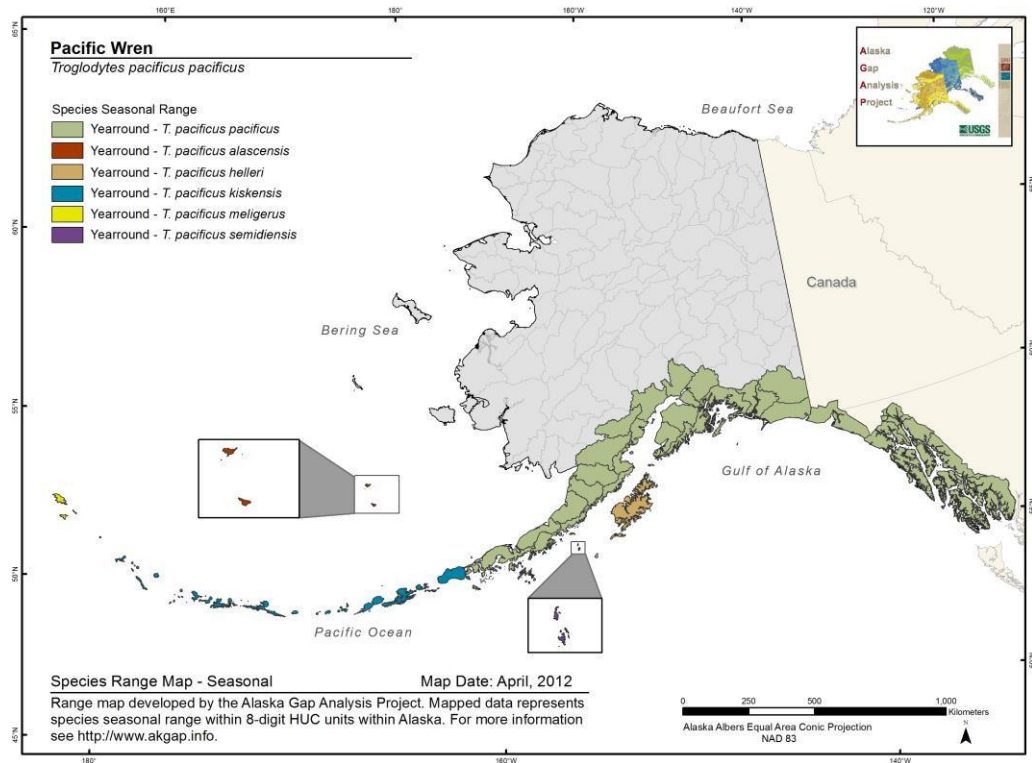
Pacific Wren *Troglodytes pacificus pacificus*

Range Map and Distribution Model Summary

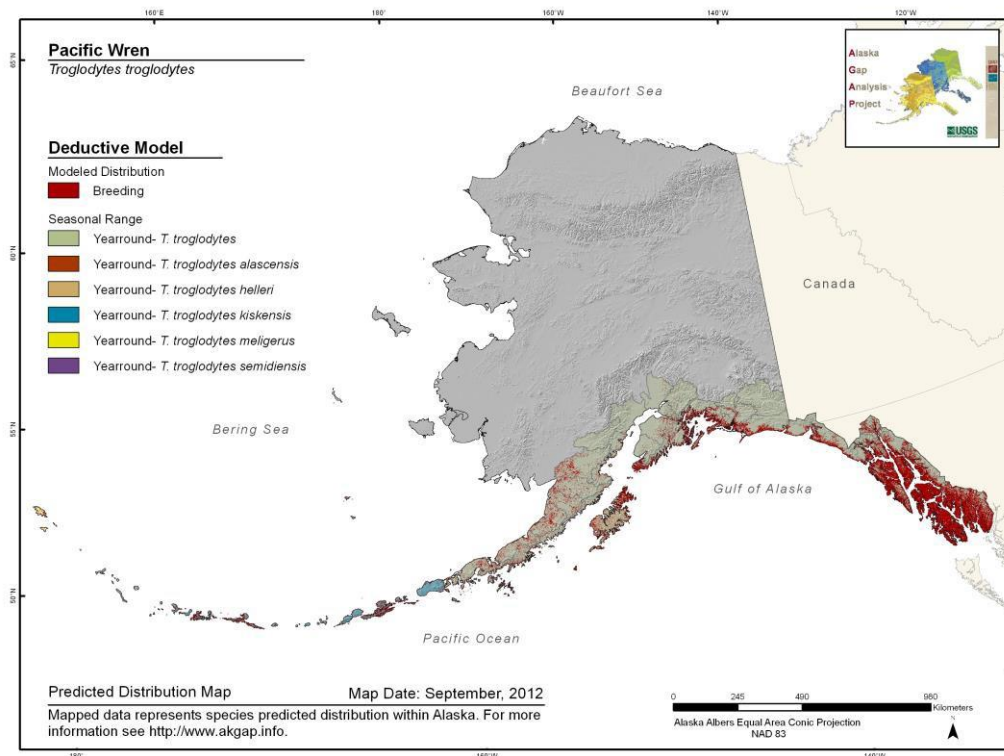
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.837**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds commonly in coniferous forests with complex understory (Alexander et al. 2003). Frequently associated with and nests and forages near water, particularly streams, but also bogs, swamps, and lakes (Hejl et al. 2002) and dead wood in the form of fallen logs and coarse woody debris, standing dead logs, stumps and slash piles (Hagar 1960, Ellison 1985, Manuwal 1986, Waterhouse 1998) and very large trees (Godfrey 1986, Gilbert and Allwine 1991). Nests on coastal block fields and sea cliffs and in dense vegetation within grass meadows and tall forb meadows (Gibson and Byrd 2007). May also nest in the roots of upturned trees, in old stumps, brush piles or abandoned buildings (Kessler and Kogut 1985, Armstrong 1995). In the Aleutian and Pribilof Islands, found on beaches (Armstrong 2008). Elsewhere may utilize a wide range of habitat types ranging from recently-cleared to old-growth forest (Kessler and Kogut 1985). In the winter utilizes a wider variety of woodland habitats (Dickinson 1999).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Dickinson, M. B., ed. 1999. Field guide to the birds of North America. 3rd ed. Natl. Geogr. Soc., Washington, D.C.

Ellison, W. G. 1985. Winter Wren. Pp. in The atlas of breeding birds of Vermont (S. B. Laughlin and D. P. Kibbe, eds.). University Press of New England, Hanover, NH.

Gibson, D. D. and G. V. Byrd. 2007. Birds of the Aleutian Islands, Alaska. Nuttall Ornithological Club, Cambridge, MA and AOU, Washington D.C.

Gilbert, F. F. and R. Allwine. 1991. Spring bird communities in the Oregon Cascade Range. USDA, USFS Report 285, Portland, OR.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Hagar, D. C. 1960. The interrelationships of logging, birds, and timber regeneration in the Douglas-fir region of northwestern California. Ecology 41:116-125.

Hejl, S. J., J. A. Holmes, and D. E. Kroodsma. 2002. Winter Wren (TRYGLODYTES TRYGLODYTES). In The Birds of North America, No. 623 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kessler, W. B. and T. E. Kogut. 1985. Habitat orientations of forest birds in southeastern Alaska. Northwest Science 59:58-65.

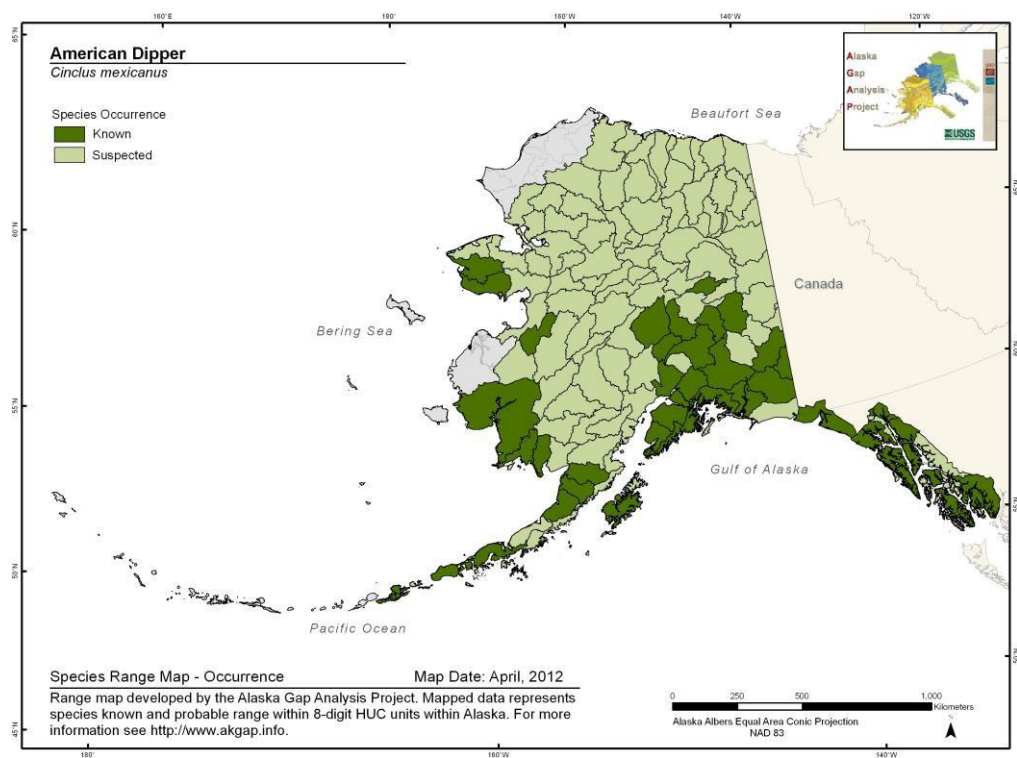
Manuwal, D. A. 1986. Characteristics of bird assemblages along linear riparian zones in western Montana. Murrelet 67: 10-18.

Waterhouse, F. L. 1998. Habitat of Winter Wrens in riparian and upland areas of coastal forests. M. S. thesis. Simon Fraser University, Vancouver, B. C.

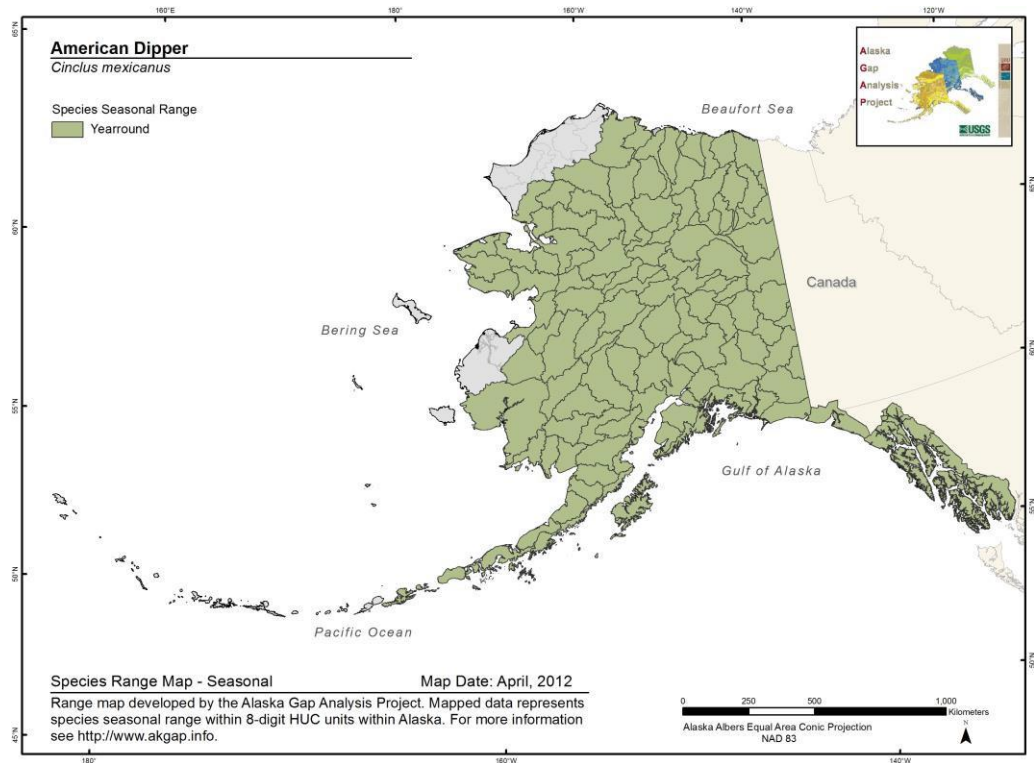
American Dipper *Cinclus mexicanus*

Range Map and Distribution Model Summary

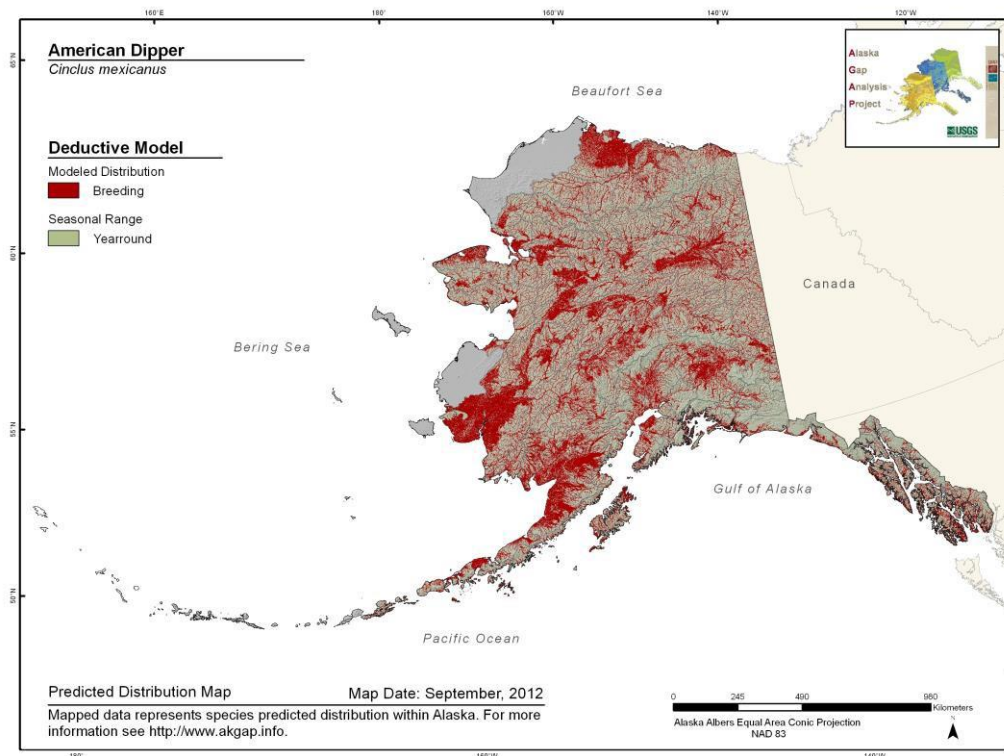
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.555**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits fast-moving, clear, unpolluted streams with cascades, riffles, and waterfalls and occasionally ponds, lakeshores, saltwater beaches, especially in winter when streams are frozen. Nests on rock walls or banks bordering streams (Kingery 1996, Armstrong 2008). Breeding streams rarely exceed 15m in width and 2m in depth (Kingery 1996). Dippers were also found foraging on deltas (Willson and Hocker 2008). Prefers streams with rocky, sandy, or gravelly bottom with little to no aquatic vegetation and instream or streamside boulders for perching.

Auxiliary habitat: Require cliffs, large rocks, fallen trees, and driftwood for escape, roosting, or nesting (Kingery 1996). Streams with salmonoids appear to be important winter and breeding habitat in BC (Campbell et al. 1997, Obermeyer 2006). Found in mountains to treeline.

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Kingery, H. E. 1996. American Dipper (*Cinclus mexicanus*). In *The Birds of North America*, Vol.333, No. 229 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

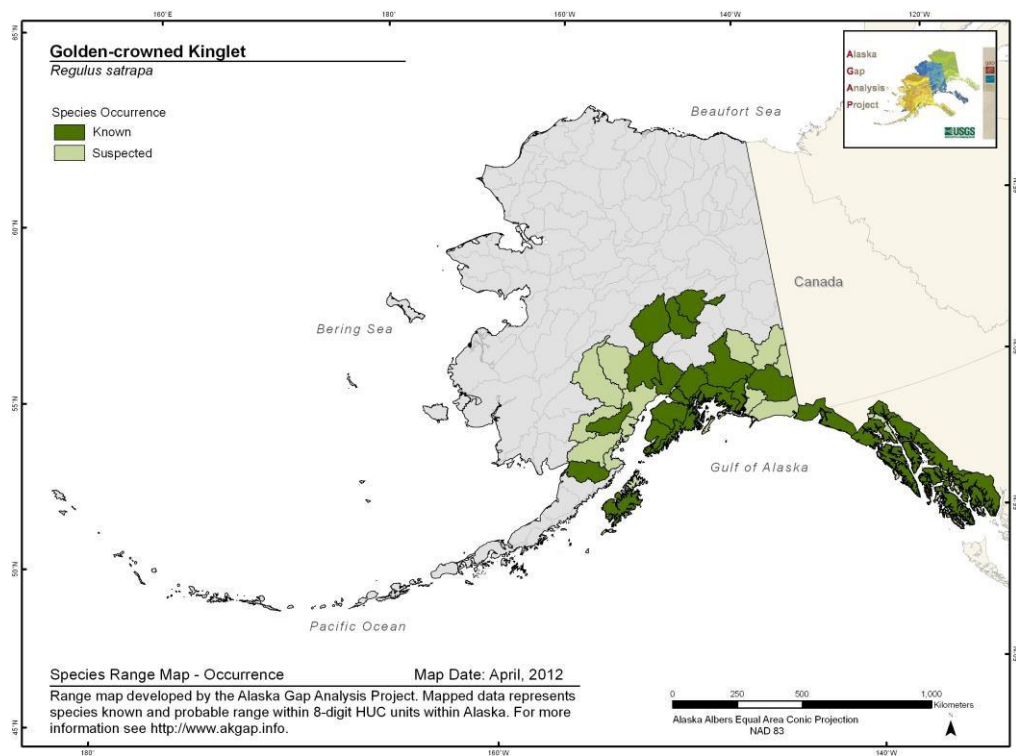
Wilson, M. F. and K. M. Hocker. 2008. American Dippers wintering near Juneau, Alaska. *Northwestern Naturalist* 89: 24-32.

Golden-crowned Kinglet

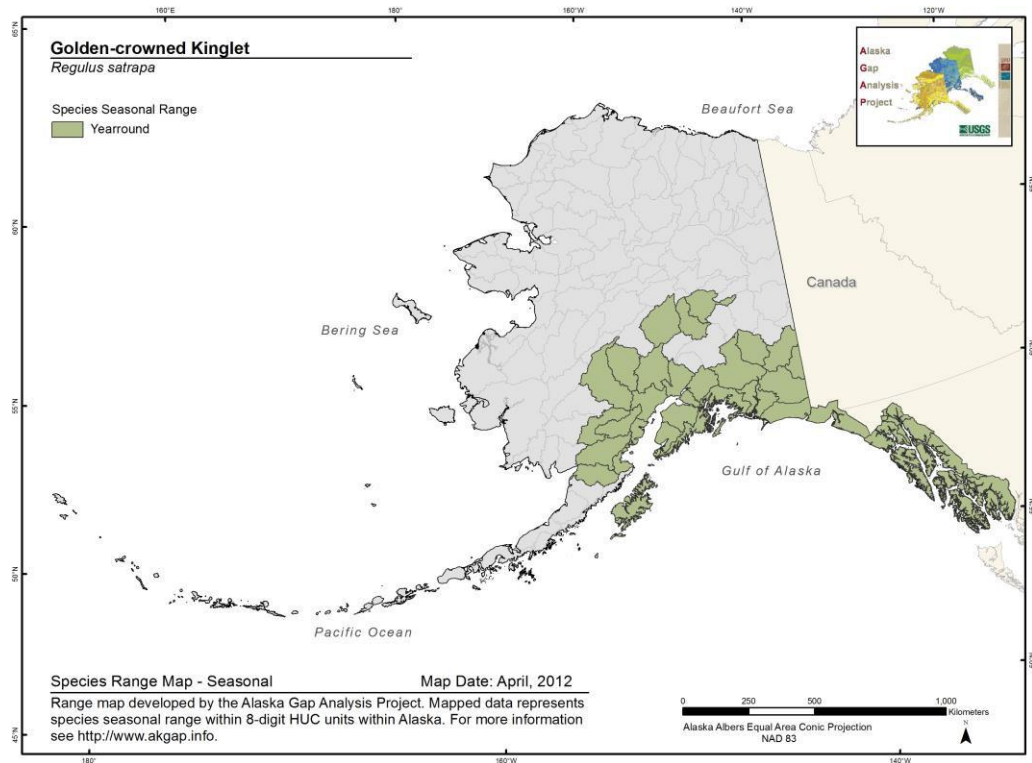
Regulus satrapa

Range Map and Distribution Model Summary

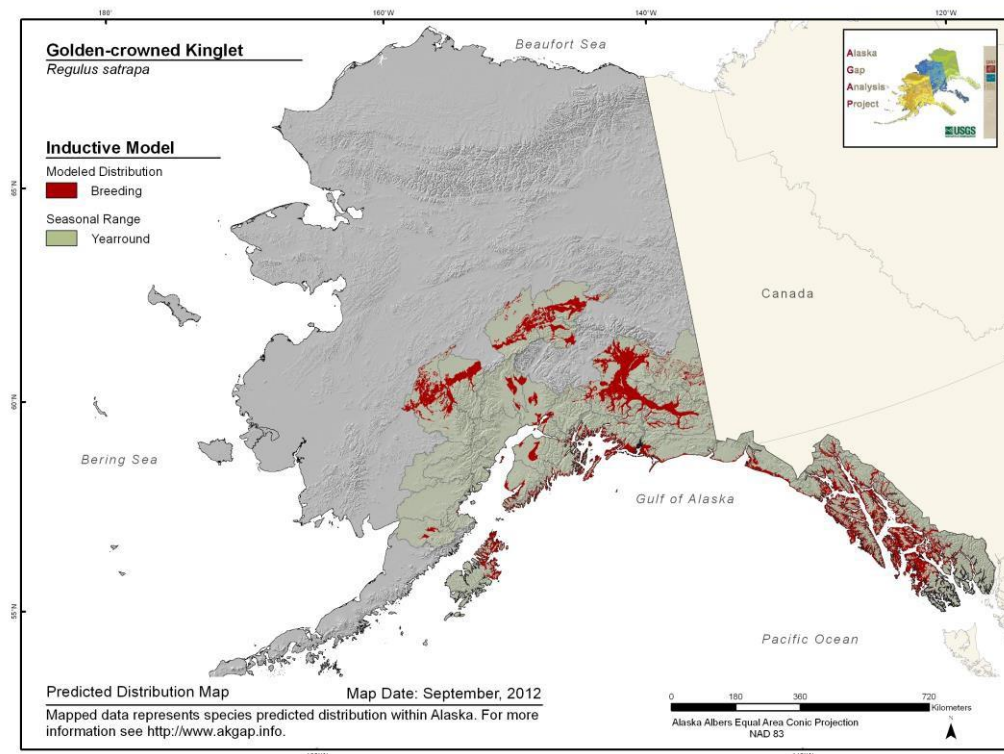
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.859**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in boreal and subalpine spruce or fir forests. Also occurs in mixed forests, deciduous forests, and single species stands. Nests in open or closed canopies, edges of clearings, near water, logged areas, burned areas, and either dense or sparse understory (Beedy 1981, Peck and James 1987, Franzreb and Ohmart 1978, Titterton et al. 1979, Wetmore et al. 1985). In the Yukon, breeding birds are found almost exclusively in old-growth white spruce forests (Alexander et al. 2003). Wintering habitat in Alaska includes coniferous forests, willow, black cottonwood, alder thickets, pinon-juniper, woodlands, riparian forests, and residential areas (Jewett et al. 1953, LaGory et al. 1984, Andrews and Righter 1992).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Andrews, R. and R. Righter. 1992. Colorado birds: a reference to their distribution and habitat. Denver Mus. Nat. Hist., Denver, CO.

Beedy, E. C. 1981. Bird communities and forest structure in the Sierra Nevada of California. Condor 83:97-105.

Franzreb, K. E., and R. D. Ohmart. 1978. The effects of timber harvesting on breeding birds in a mixed-coniferous forest. Condor 80:431-441.

Jewett, S. G., W. P. Taylor, W.T. Shaw, and J. W. Aldrich. 1953. Birds of Washington State. University of Washington Press, Seattle, Washington.

LaGory, K. E., M. K. LaGory, D. M. Meyers, and S. G. Herman. 1984. Niche relationships in wintering mixed-species flocks in western Washington. *Wilson Bulletin* 96:108-116.

Peck, G.K., and R.D. James. 1987. *Breeding birds of Ontario: nidiology and distribution, volume 2. Passerines*. Royal Ontario Museum, Toronto, Ontario.

Titterington, R. W., H. S. Crawford, and B. N. Burgason. 1979. Songbird responses to commercial clear-cutting in Maine spruce-fir forests. *Journal of Wildlife Management* 42:602-609.

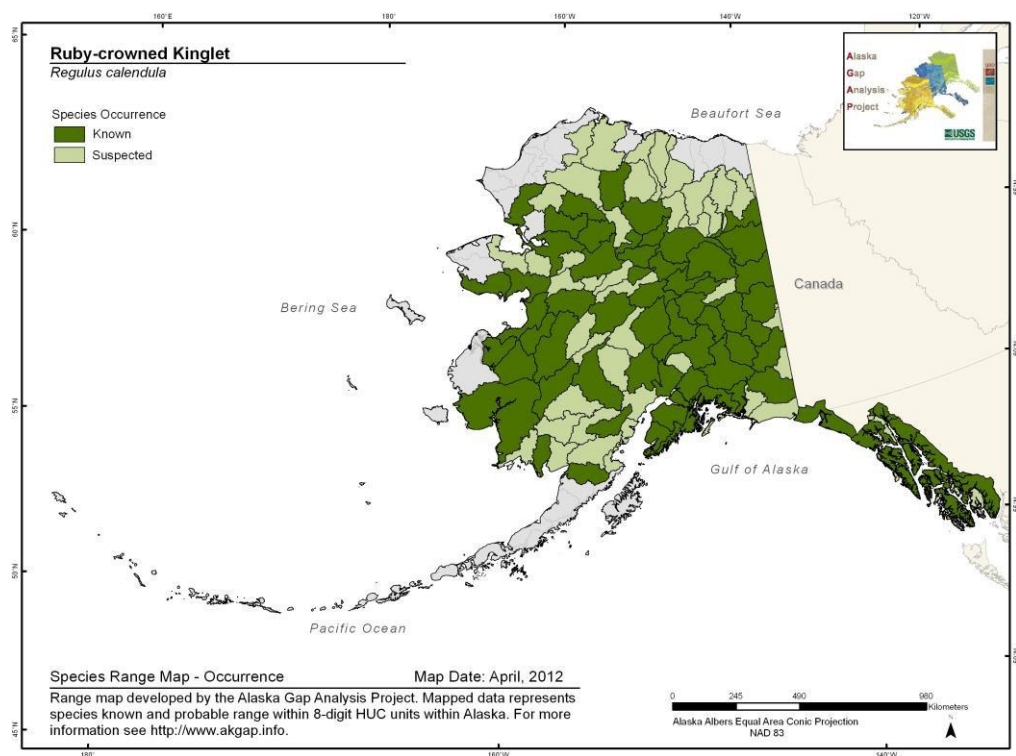
Wetmore, S. P, R. A. Keller, and G. E. John Smith. 1985. Effects of logging on bird populations in British Columbia as determined by a modified point-count method. *Can. Field Nat.* 99: 224-233.

Ruby-crowned Kinglet

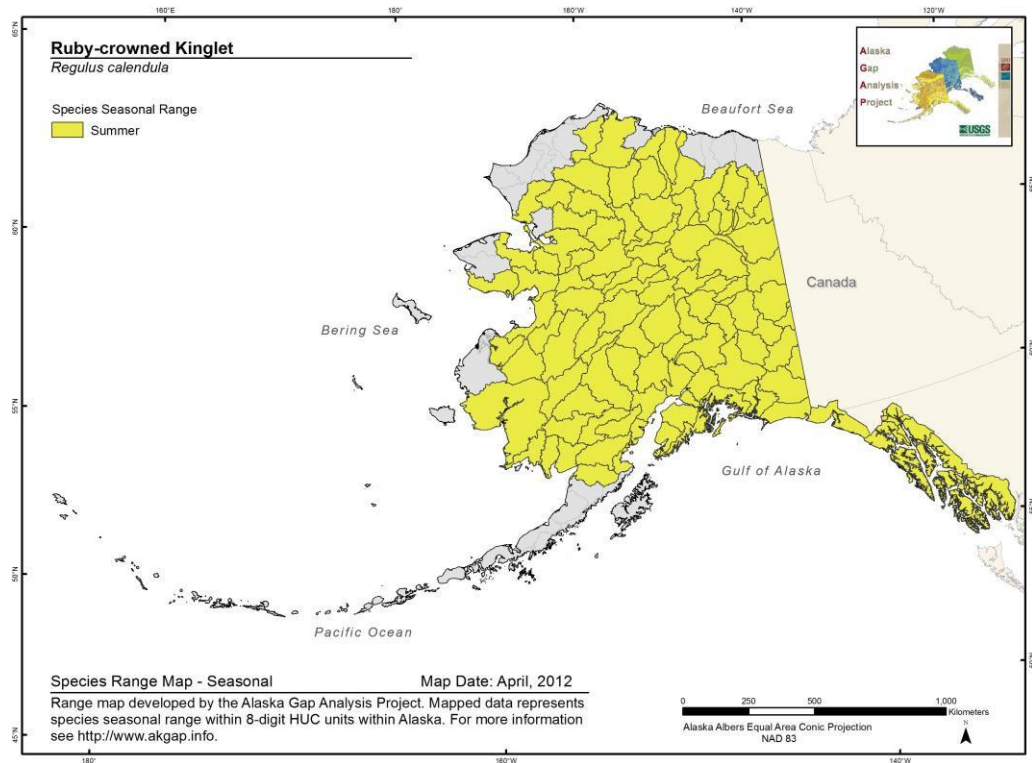
Regulus calendula

Range Map and Distribution Model Summary

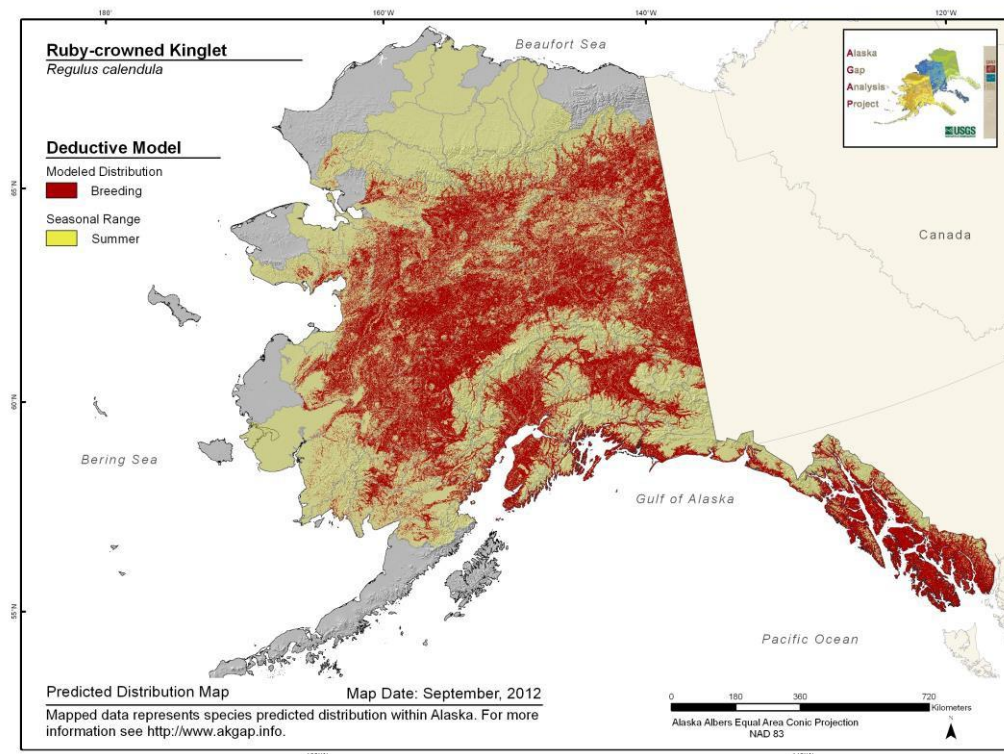
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

In the Yukon, found most frequently in mature, spruce dominated forests during the breeding season (Alexander et al. 2003). In Alaska, occurs wherever spruce forests exists, also found in mixed coniferous-deciduous woodlands and shrub thickets (Armstrong 2008) and favors intermediate levels of canopy coverage (Kessel 1998). In B.C., breeds from sea level along the coast to 2,070 m in the interior (Campbell et al. 2001).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

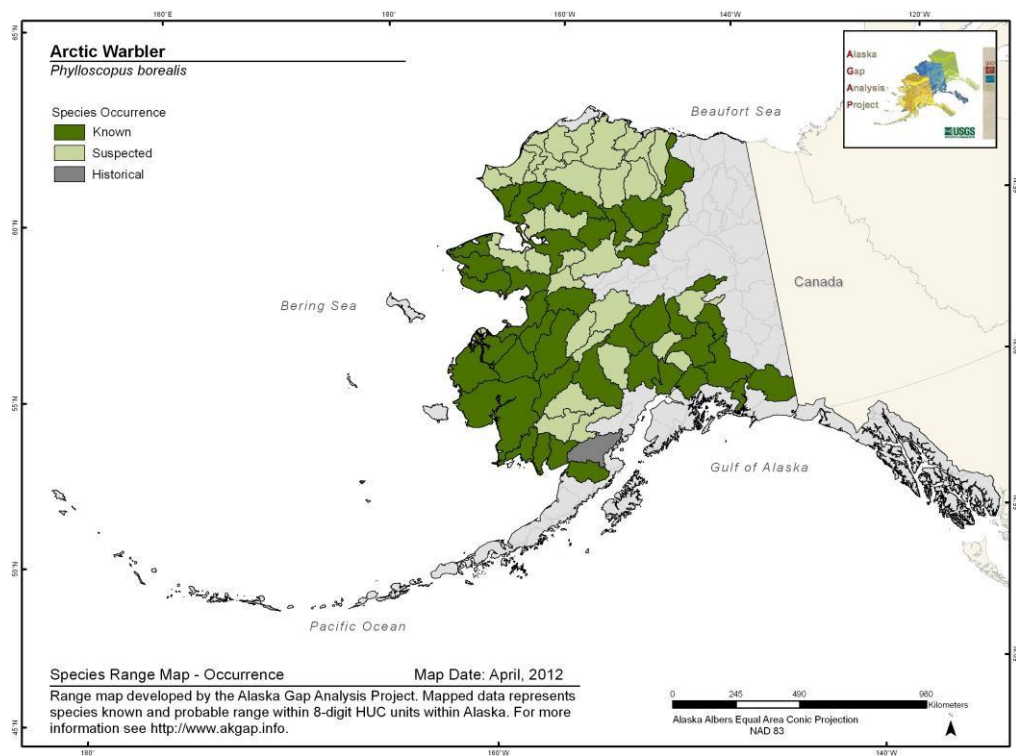
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Kessel, B. 1998. Habitat characteristics of some passerine birds in western North American taiga. University of Alaska Press, Fairbanks, AK.

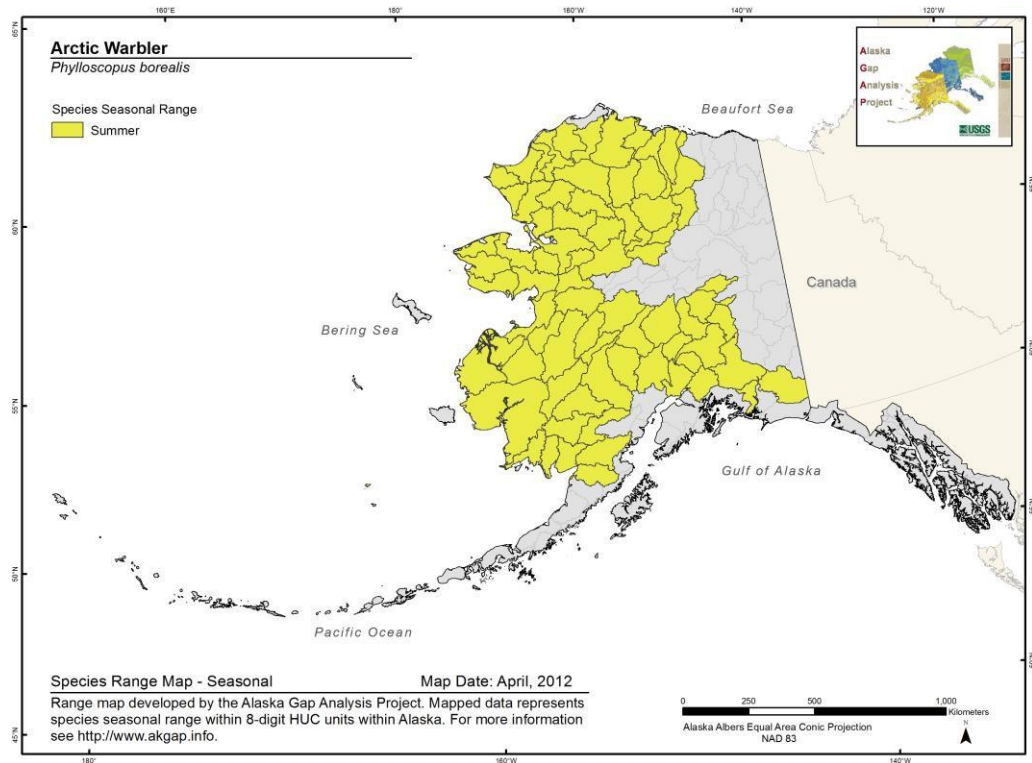
Arctic Warbler *Phylloscopus borealis*

Range Map and Distribution Model Summary

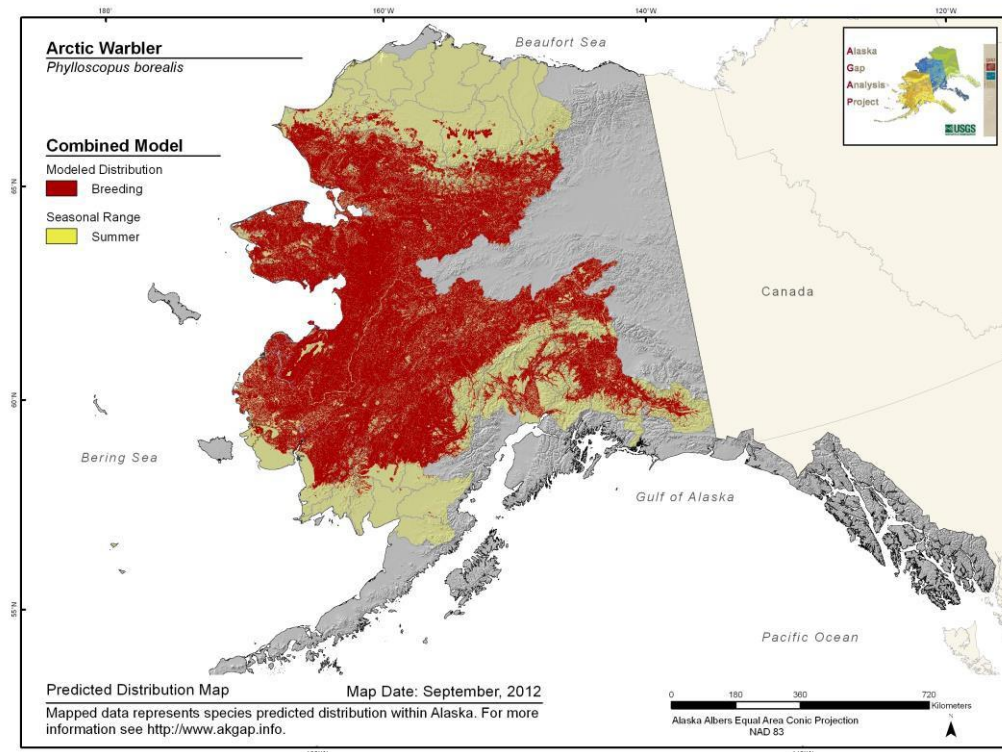
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.504**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, occurs in dwarf willow often along streams, spruce woods, medium shrub habitats with willow and shrub birch or scattered trees; avoids forests (Gabrielson and Lincoln 1959, Dixon 1938, Price and Beck 1989, Kessel 1998). Open coniferous or mixed forest, medium to tall shrublands (AOU 1983). Nests in sparse patchy woods in deciduous, coniferous, and mixed growth, commonly along water courses among willows and in birch forests; nest placed on ground under bushes or in tall grasses (Terres 1980). Near Nome, Alaska, nests commonly in association with willows along river and stream valleys (Price and Beck 1989). In a recent study on Arctic Warblers, researchers found that plots with a more open shrub layer consisting of shorter willow and more openings dominated by graminoids and forbs had a greater density of nests. The attributed the nest site selection and possibly nest success to the availability of grass, sedge (*Carex* spp.), and moose hair (Ring et al. 2005).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Dixon, J. S. 1938. Birds and mammals of Mount McKinley National Park, Alaska. National Park Service Faunal Series, No. 3. U.S. Government Printing Office, Washington, DC. 235 p.

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

Kessel, B. 1998. Habitat characteristics of some passerine birds in western North American taiga. University of Alaska Press, Fairbanks, AK.

Price, T., and D. Beck. 1989. Observations on the breeding biology of the arctic warbler in Alaska. Condor 91:219-221.

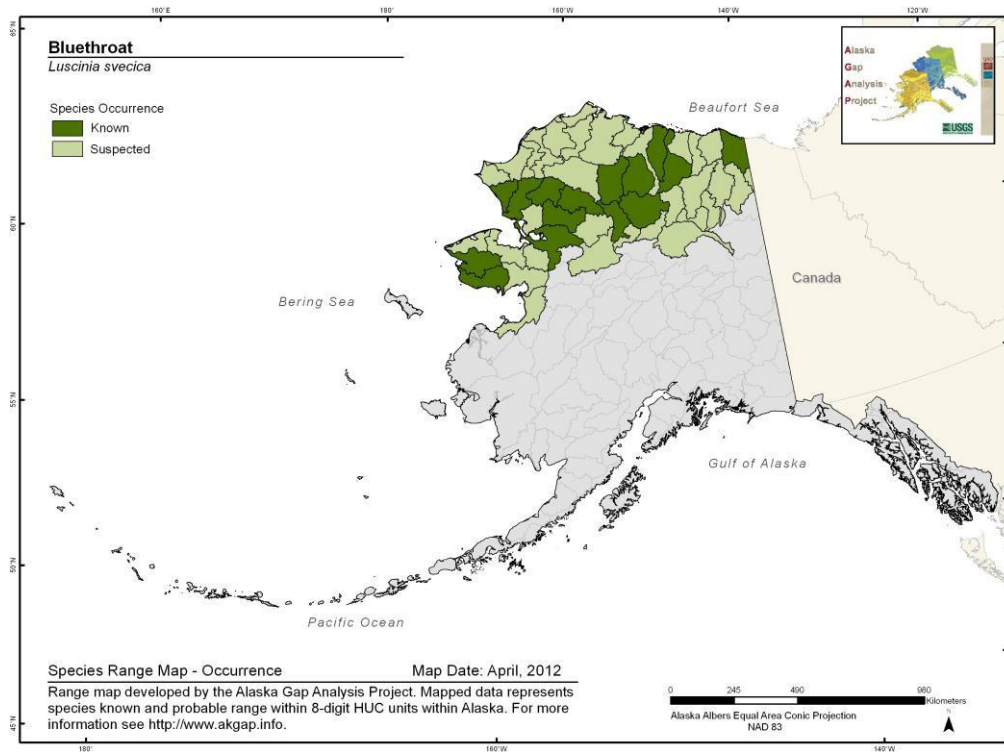
Ring, R., S. Sharbaugh, and N. Dewitt. 2005. Breeding ecology and habitat associations of the Arctic Warbler in Interior Alaska. Final Report 2005, Alaska Bird Observatory, Fairbanks, AK.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

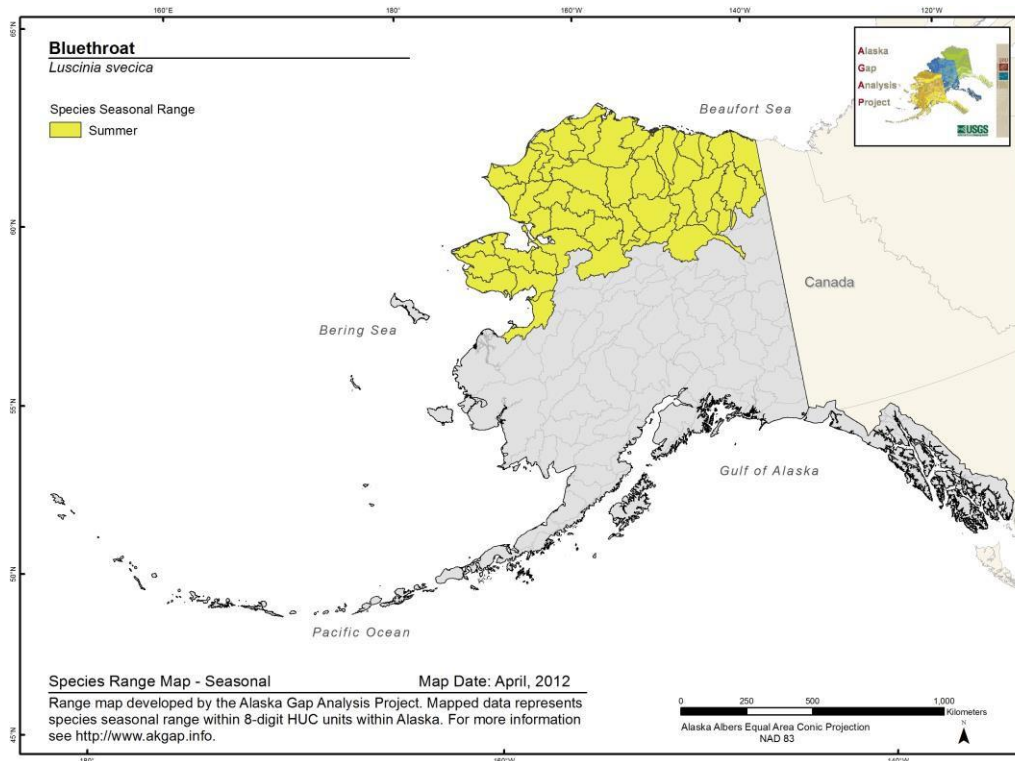
Bluethroat *Luscinia svecica*

Range Map and Distribution Model Summary

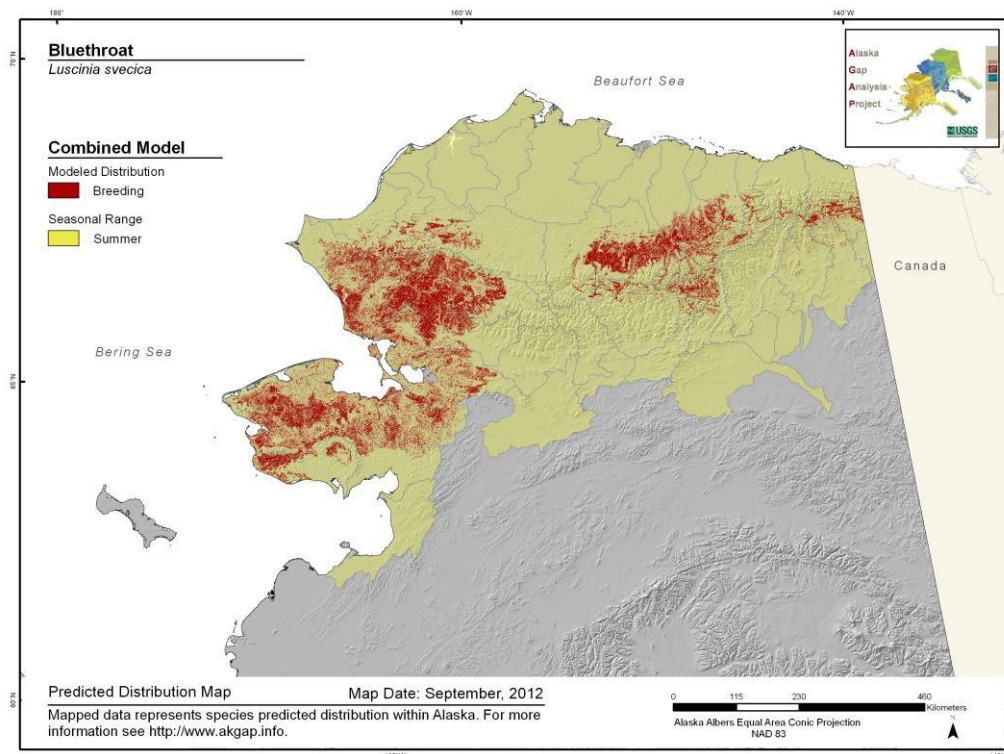
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.662**

**Model Quality
Summary:**
Low

Habitat Description

Occurs in low shrub thickets of willow, alder, birch, and ericaceous shrubs and in tundra (Kessel 1989, Manuwal 1975). Tundra habitat characterized by cottongrass tussock tundra with scattered willows and thickets near rivers, streams, or lakes (Manuwal 1975). Nests in thickets (near water in Arctic willows and scrub birches) on ground in small hollow or in clump of grass near lake edge (Terres 1980). Also in tundra with little cover (Harrison 1978). Nests on ground or low in willow bush (Johnson and Herter 1989).

References

Harrison, C. 1978. A Field Guide to the Nests, Eggs and Nestlings of North American Birds. Collins, Cleveland, Ohio.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

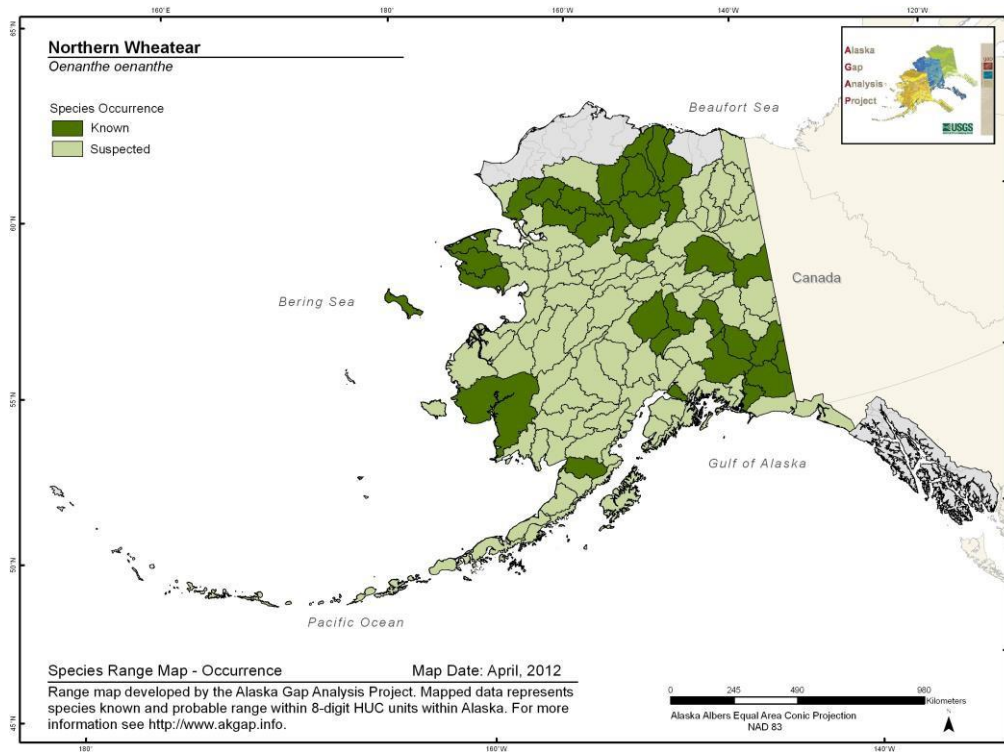
Manuwal, D.A. 1975. The status of the bluethroat (*LUSCINIA SVECICA*) in North America. Murrelet 56(2):5-7.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

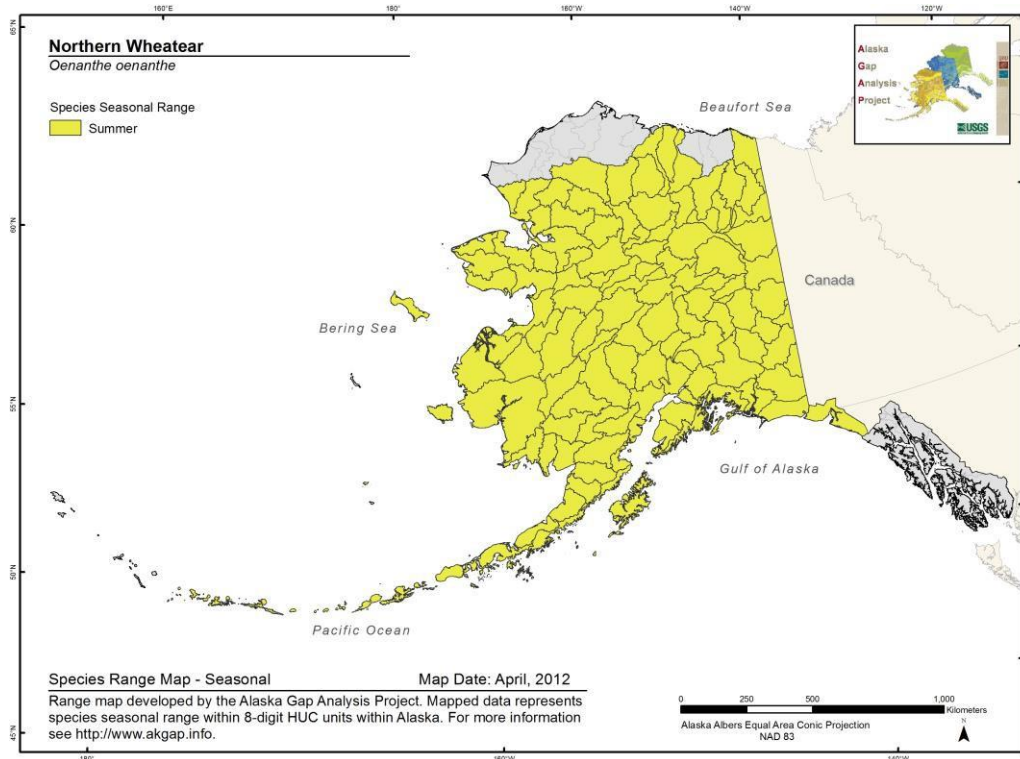
Northern Wheatear *Oenanthe oenanthe*

Range Map and Distribution Model Summary

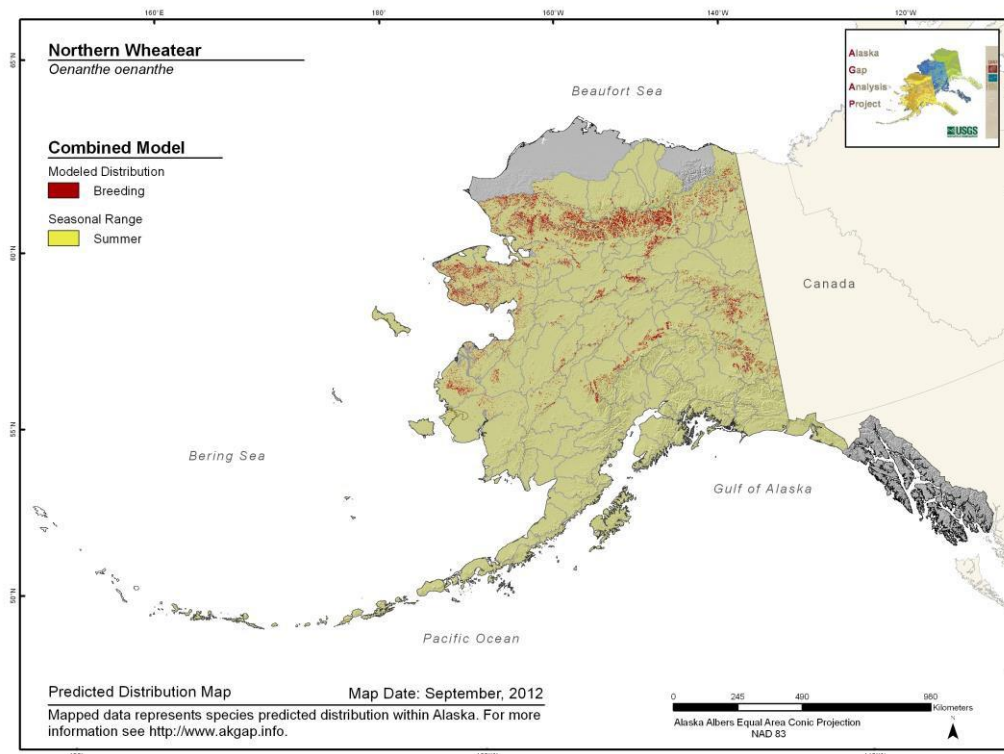
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.576**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, this species is frequently distributed on mountains and dry, stony, barren hilltops where caribou congregate (Bent 1949). Also found in areas where rock fields are juxtaposed with tundra (Kessel and Gibson 1978). Prefers dry and elevated tundra with rubble piles and precipices (Portenko 1989). Recorded on mountainsides about 330 m above timberline in Denali National Park (Dixon 1938), and about 750 m above timberline in the Brooks Range (Conder 1989). Always below permanent snowline (Gabrielson and Lincoln 1959). Absent from coastal plains (B. MacCaffery per. Comm. In Kren and Zoerb 1997).

References

Bent, A. C. 1949. Life histories of North American thrushes, kinglets, and their allies. U. S. Nat. Mus. Bull. 196. 452 pp., 51 pls.

Conder, P. 1989. The Wheatear. Christopher Helm, London.

Dixon, J. S. 1938. Birds and mammals of Mount McKinley National Park, Alaska. National Park Service Faunal Series, No. 3. U.S. Government Printing Office, Washington, DC. 235 p.

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

Kessel, B., and D.D. Gibson. 1978. Status and distribution of Alaska birds. Studies Avian Biology. In: Studies in Avian Biology No. 1. R. J. Raitt, Ed. Cooper Ornithological Society. 1:1-100.

Kren, J. and A. C. Zoerb. 1997. Northern Wheatear (*Oenanthe oenanthe*). In The Birds of North America, No. 316 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

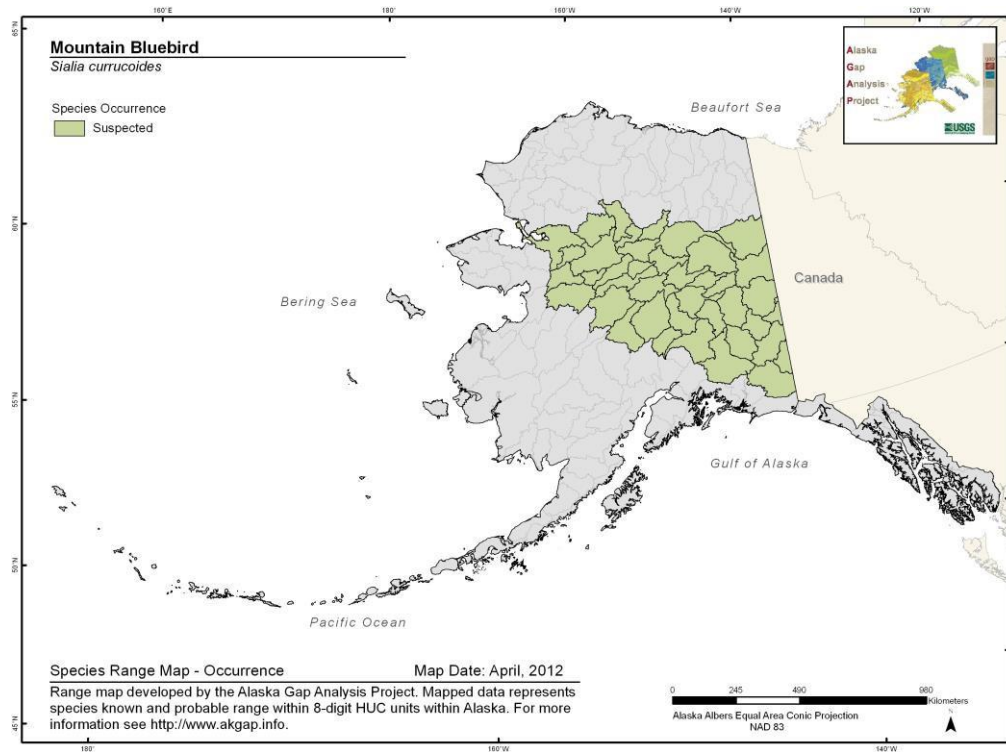
Portenko, L. A. 1989. Birds of the Chukchi Peninsula and Wrangell Island. Vol. 2. Amerind Publ. Co., New Delhi (Russian ed., 1973).

Mountain Bluebird

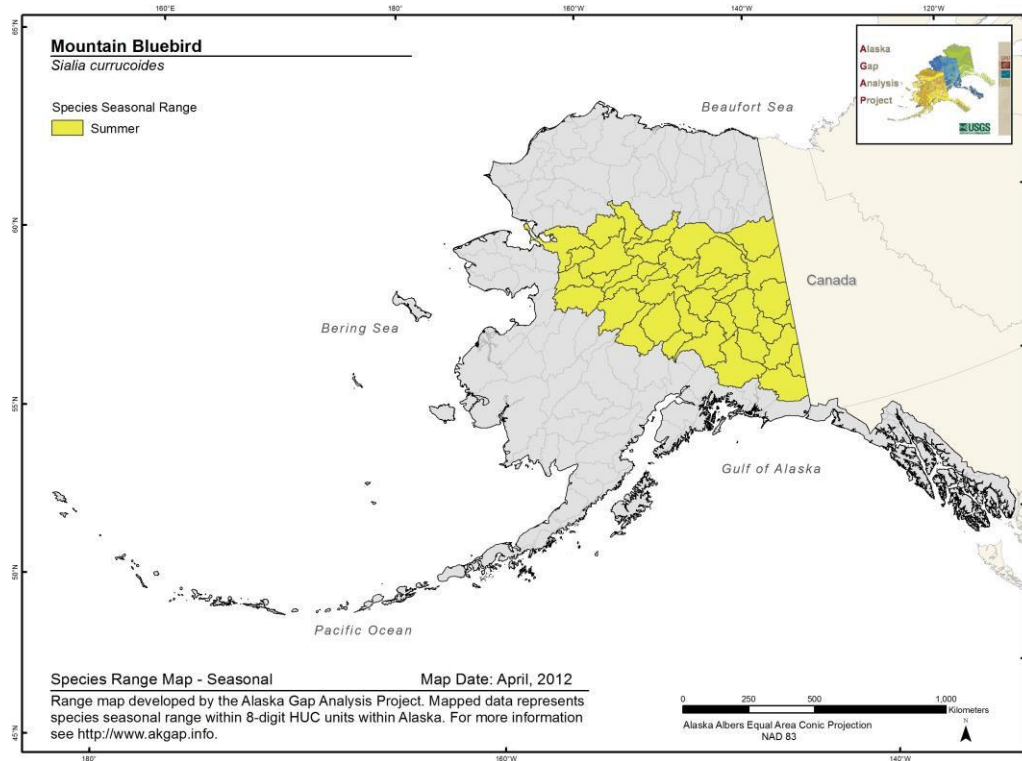
Sialia currucoides

Range Map and Distribution Model Summary

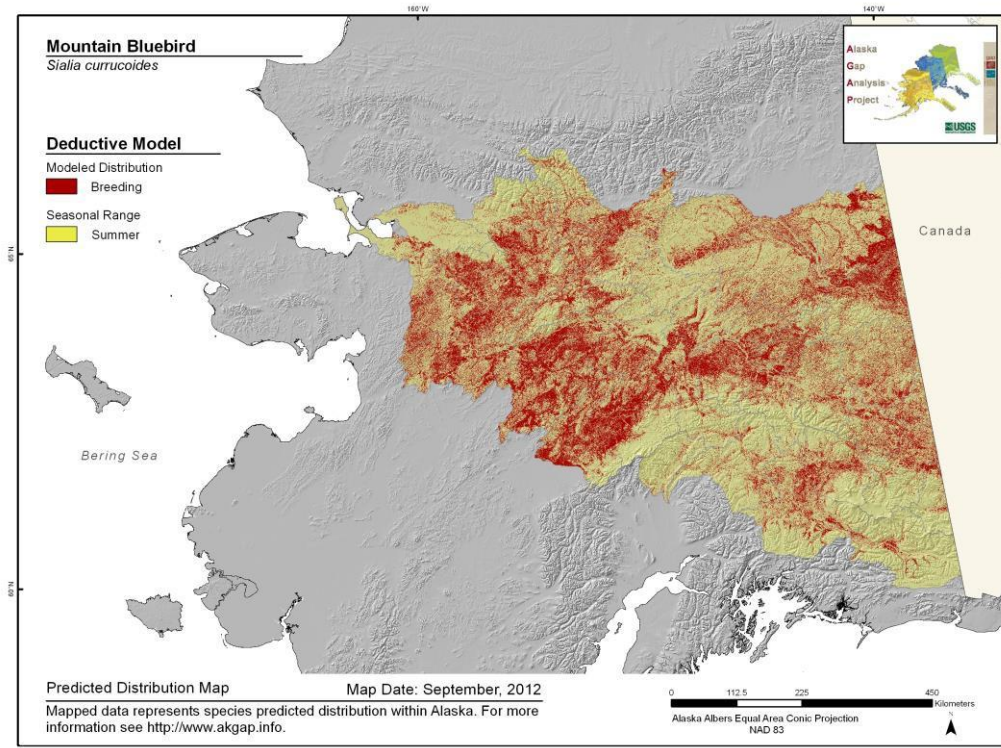
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.565**

**Model Quality
Summary:**
Low

Habitat Description

Subalpine meadows, grasslands, shrub-steppe, savanna, and pinon-juniper woodland (Nature Serve 2007b). Prairie-forest ecotones with clustered of trees, short grasses, and few shrubs. Also burned areas, clear cuts, edges of alpine tundra, and sagebrush flats (Power and Lombardo 1996). In B.C., nests from 260 to 2,700 m in elevation (Campbell et al. 1997) and in the Yukon, this species favors open lowland habitats, such as agricultural fields, settlement areas, old burns, and meadows with some trees or adjacent to forests (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

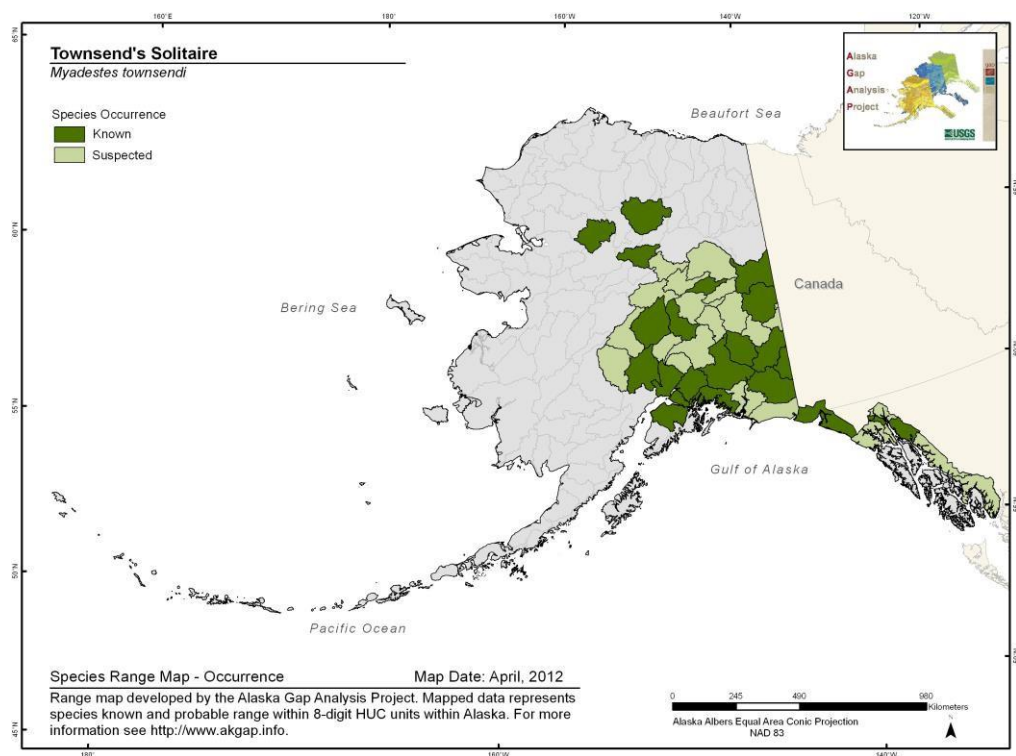
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Power, H. W. and M. P. Lombardo. 1996. Mountain Bluebird (*Sialia currucoides*). In The Birds of North America, No. 222 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

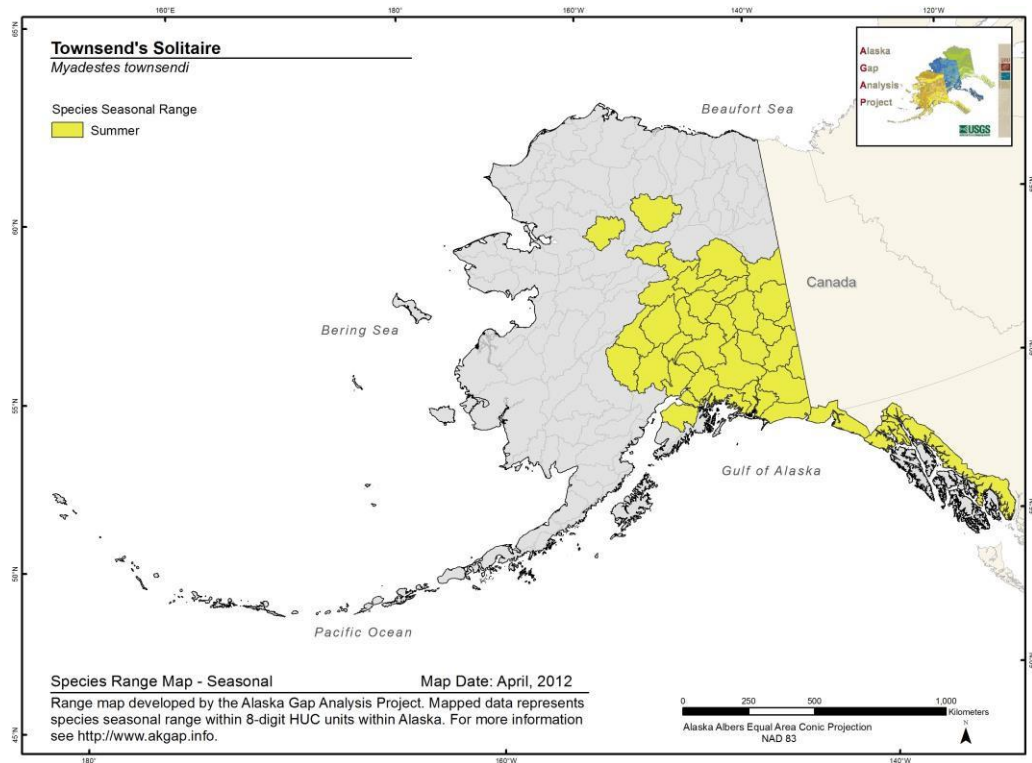
Townsend's Solitaire *Myadestes townsendi*

Range Map and Distribution Model Summary

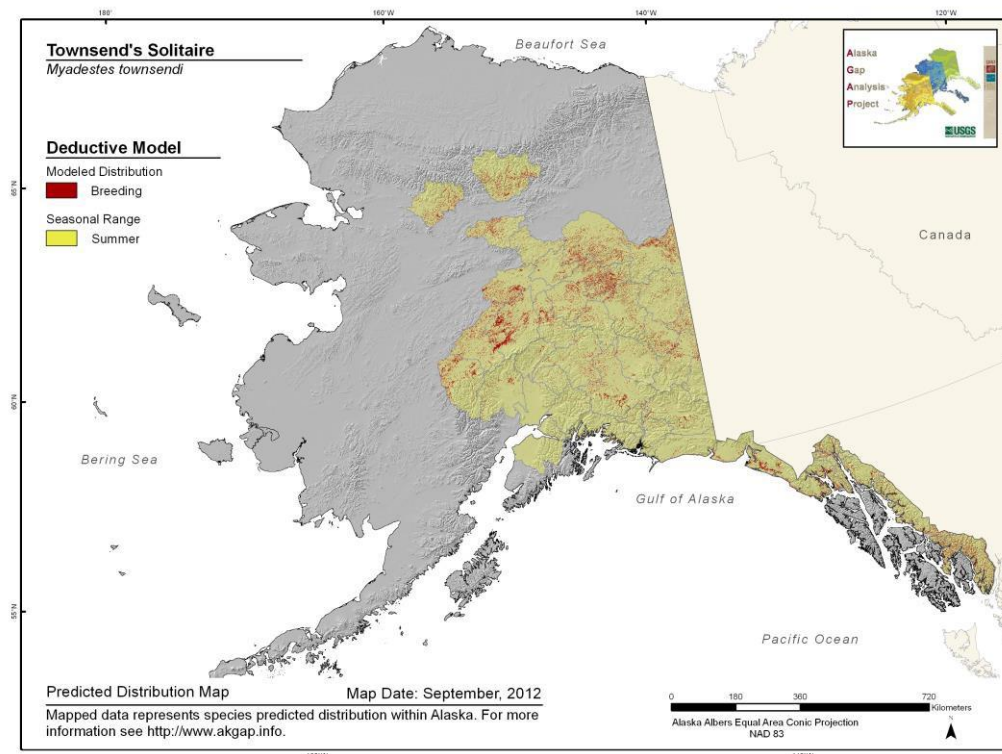
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.502**

**Model Quality
Summary:**
Low

Habitat Description

inhabits relatively open stands of dense coniferous forests with spruce thinned by light burns or selective logging with sparse shrubs and little ground cover in mountainous areas up to and even in alpine areas (Bowles and Decker 1927, Campbell pers. comm. in Bowen 1997, Bowen 1997). Nests under rocks, logs, or other objects that provide an overhang. May also nest on exposed dirt banks or road cuts (Bowen 1997). In the Yukon, often associated with south-facing slopes (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Bowen, R. V. 1997. Townsend's Solitaire (*Myadestes townsendi*). In The Birds of North America, No. 269 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

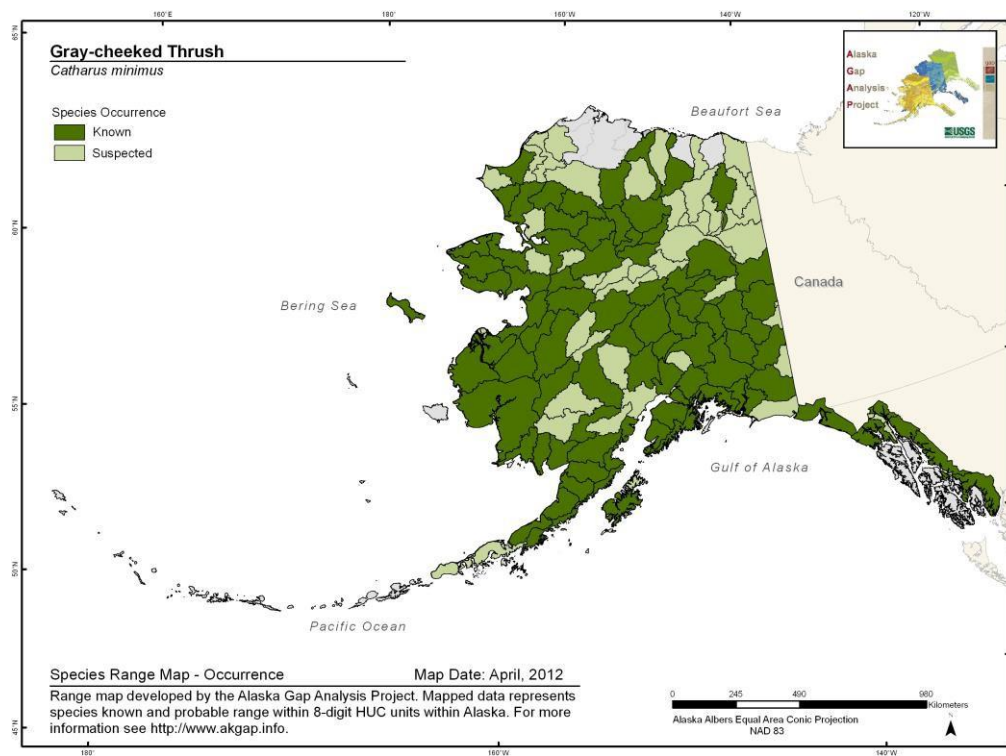
Bowles, J. H. and F. R. Decker. 1927. Nesting habits of the Townsend's Solitaire. Murrelet 8:12-13.

Gray-cheeked Thrush

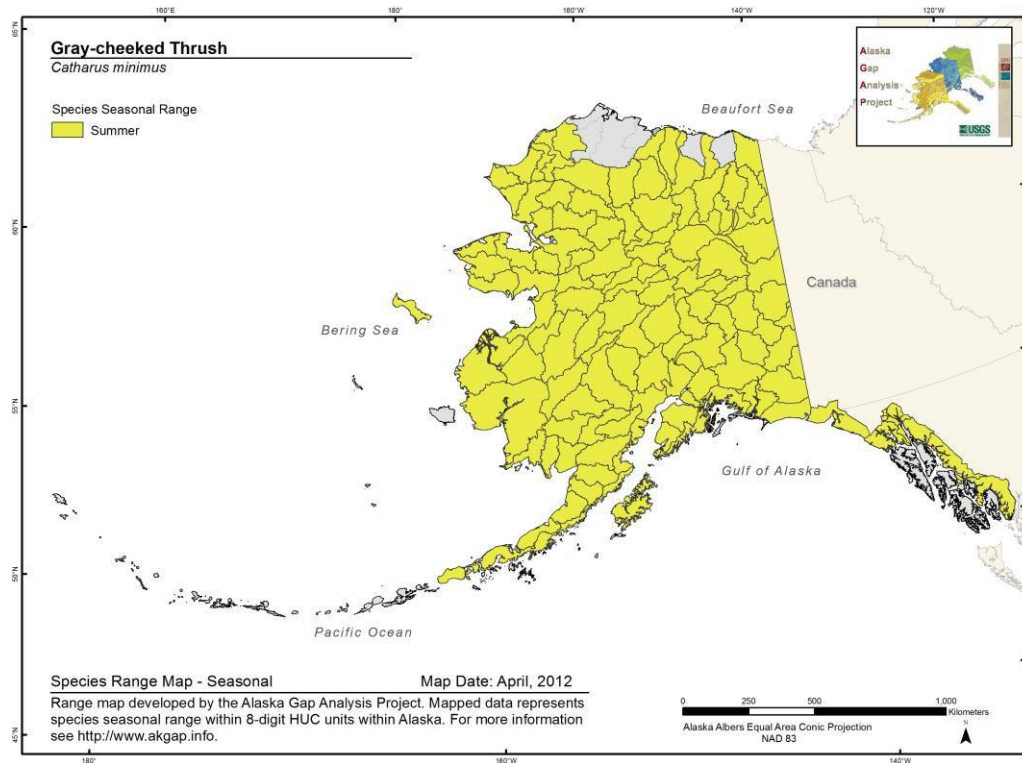
Catharus minimus

Range Map and Distribution Model Summary

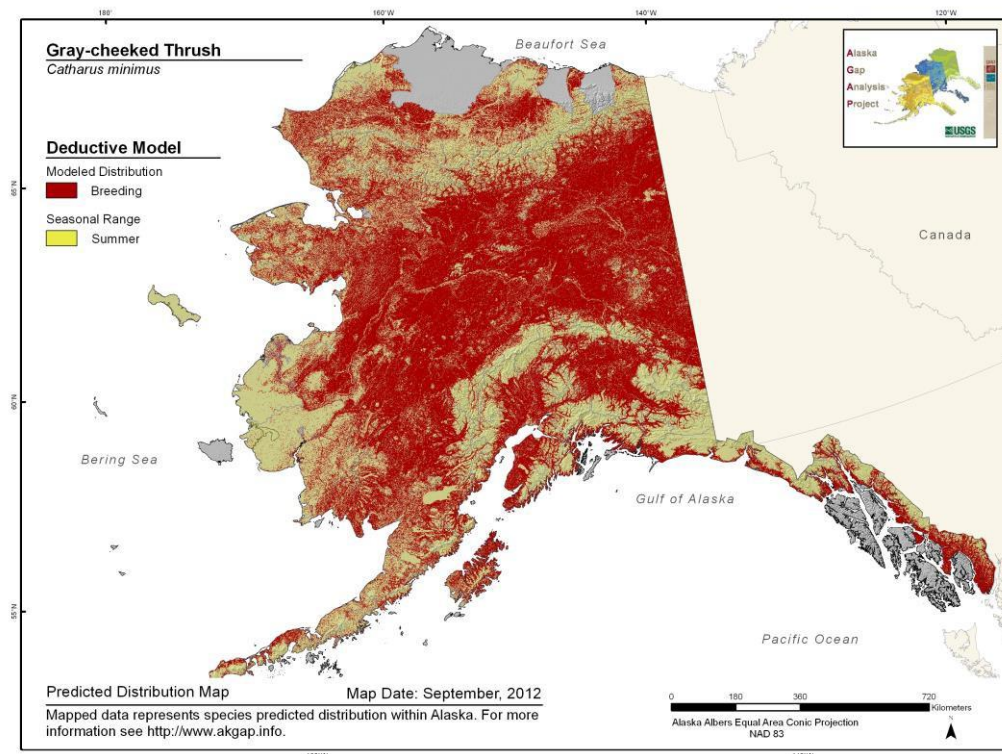
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.525**

**Model Quality
Summary:**
Low

Habitat Description

Primarily coniferous forest (mainly spruce) and upland and riparian deciduous woodlands; also tall shrubby areas in taiga, willow and alder thickets near water, above tree line, upland and subalpine areas (Gabrielson and Lincoln 1959, McCaffery 1996). Breeding occurs primarily on shrubby habitats. In southern part of range nests in damp woodlands and valley bottoms where there are stands of shrubs, or spruce and fir forests at higher elevations. In treeless tundra regions, willow and alder thickets near water are characteristic breeding locations. Outside of tundra areas birds occur in shrubby locations such as mountain bogs and subalpine zones (Pogson et al. 1997).

References

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

McCaffery, B.J. 1996. Distribution and relative abundance of gray-cheeked thrush (*CATHARUS MINIMUS*) and blackpoll warbler (*DENDROICA STRIATA*) on Yukon Delta National Wildlife Refuge, Alaska. Unpub. Report USFWS. Bethel, Alaska.

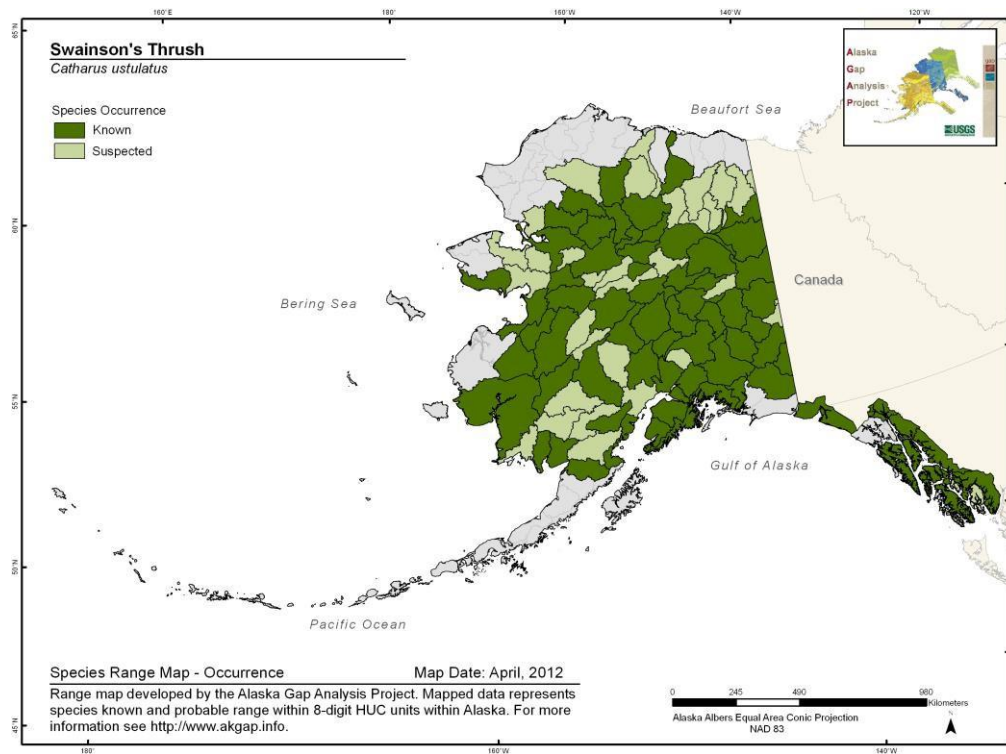
Pogson, T. H., S. E. Quinlan, and B. Lehnhausen. 1997. A manual of selected neotropical migrant birds of Alaska national forests. USDA, USFS, Juneau, AK.

Swainson's Thrush

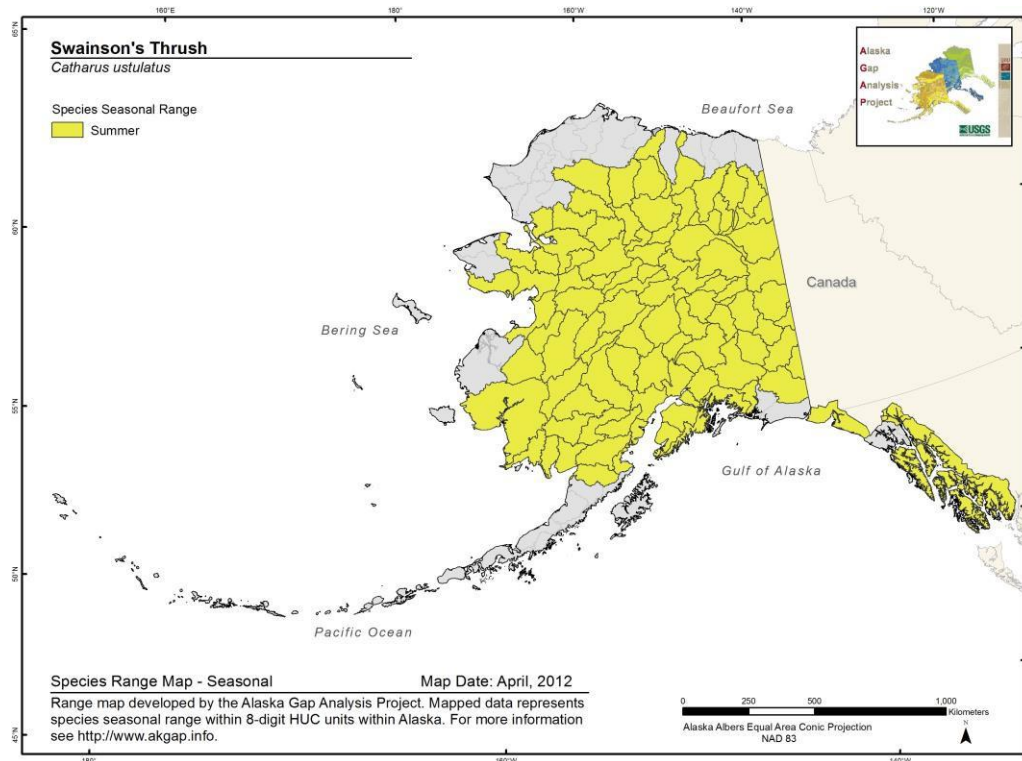
Catharus ustulatus

Range Map and Distribution Model Summary

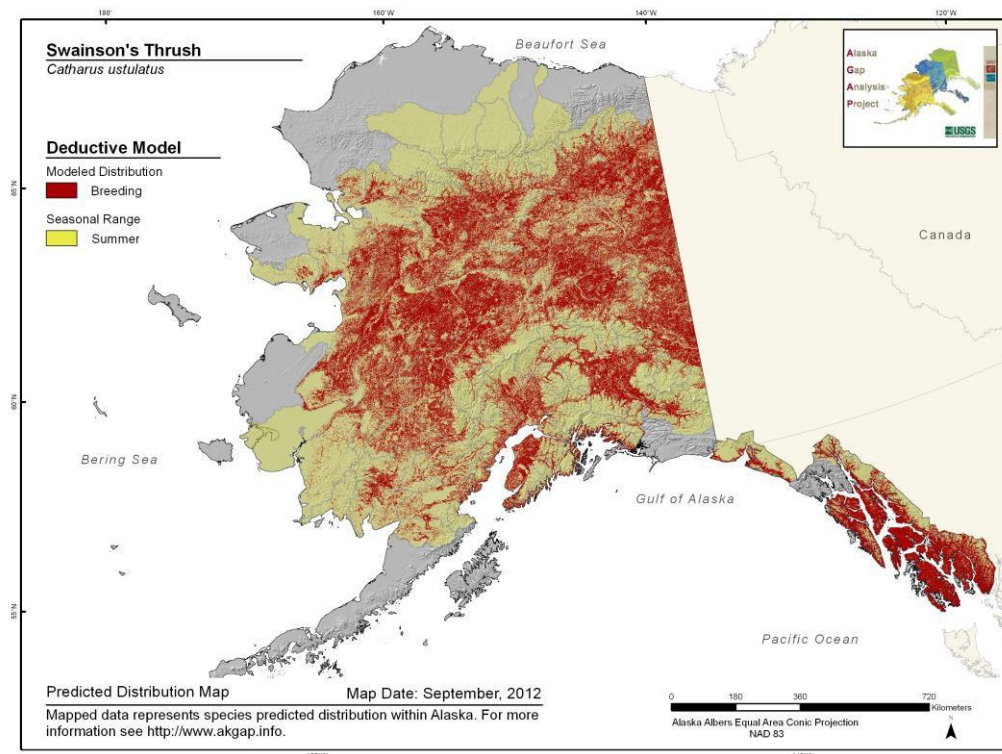
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.554**

**Model Quality
Summary:**
Low

Habitat Description

Strongly associated with coniferous forests (spruce-fir; Garrett and Dunn 1981). Found in coastal Douglas-hemlock forests in the Pacific Northwest (Jewett et al. 1953). Preference for mature forests and earlier successional habitats has been documented, but associations in Pacific Northwest have been inconclusive ranging from mesic old growth in Washington to mature unlogged stands along streams in Oregon, to 84% of nests associated with undisturbed forests in BC (Manuwal 1991, McGarigal and McComb 1992, Campbell et al. 1997). Equally abundant in young, mature, and old-growth (Carey et al. 1991). In Alaska taiga, found in forests where canopy cover, tree height, and canopy thickness were greater, and the shrub understory layer was relatively open (Kessel 1998). In southeast Alaska, BBS found this species commonly in shrub and needleleaf habitats, in southcentral Alaska commonly in forest habitat, and in central Alaska in a variety of forest habitats including needleleaf, broadleaf, and mixed forests (Cotter and Andres 2000).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Carey, A. B., M. M. Hardt, S. P. Horton, and B. L. Biswell. 1991. Spring bird communities in the Oregon Coast Range. Pages 123-142 in L.F. Ruggiero, K.B. Aubry, A.B. Carey, and M.H. Huff, technical coordinators. Wildlife and Vegetation of unmanaged Douglas-fir Forests. USDA, USFS, Pacific Northwest Research Station, General Technical Report PNW-GTR-285, Portland, OR.

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

Garrett, K. and J. Dunn. 1981. Birds of southern California status and distribution. Los Angeles Audubon Society, Los Angeles, CA.

Jewett, S. G., W. P. Taylor, W.T. Shaw, and J. W. Aldrich. 1953. Birds of Washington State. University of Washington Press, Seattle, Washington.

Kessel, B. 1998. Habitat characteristics of some passerine birds in western North American taiga. University of Alaska Press, Fairbanks, AK.

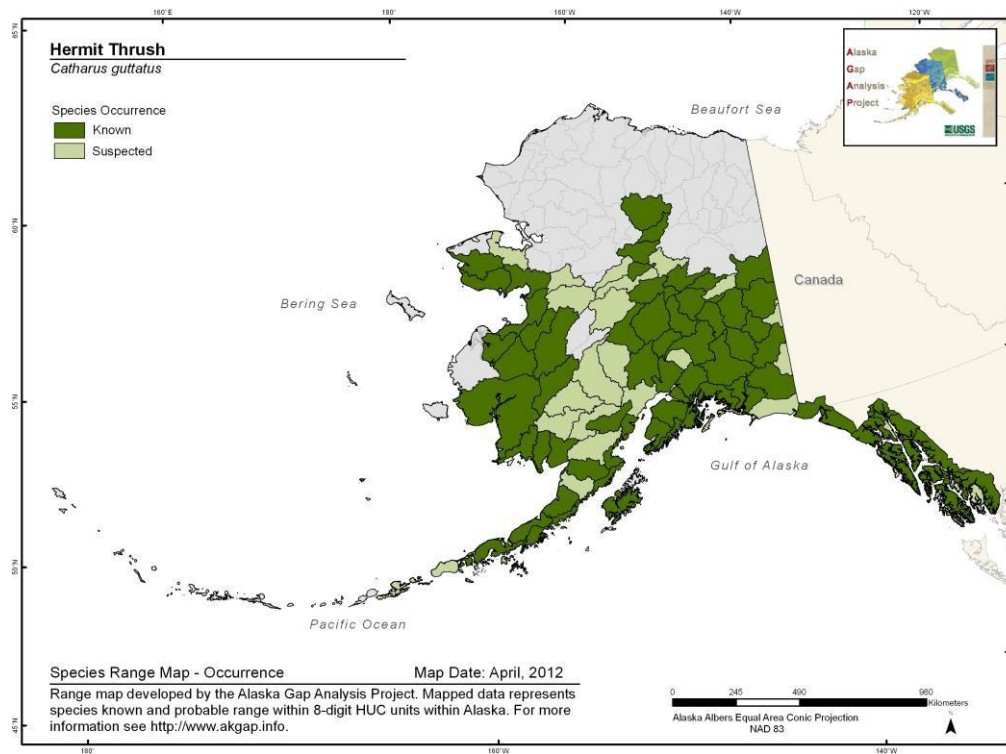
Manuwal, D. A. 1991. Spring bird communities in the southern Washington Cascade Range. Pages 161-174 IN L. F. Ruggiero, K. B. Aubry, A. B. Carey, and M. H. Huff, technical coordinators. Wildlife and Vegetation of unmanaged Douglas-fir Forests. USDA, USFS, Pacific Northwest Research Station, General Technical Report PNW-GTR-285, Portland, OR.

McGarigal, K., and W. C. McComb. 1992. Streamside versus upslope breeding bird communities in the central Oregon Coast Range. *Journal of Wildlife Management* 56:10-23.

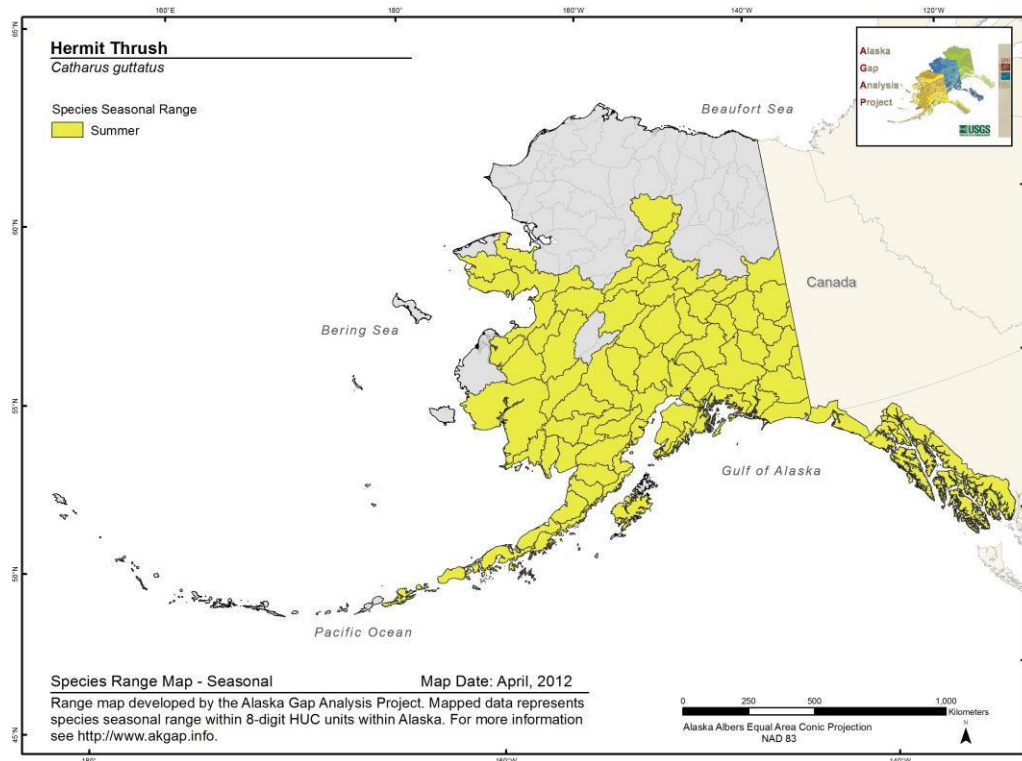
Hermit Thrush *Catharus guttatus*

Range Map and Distribution Model Summary

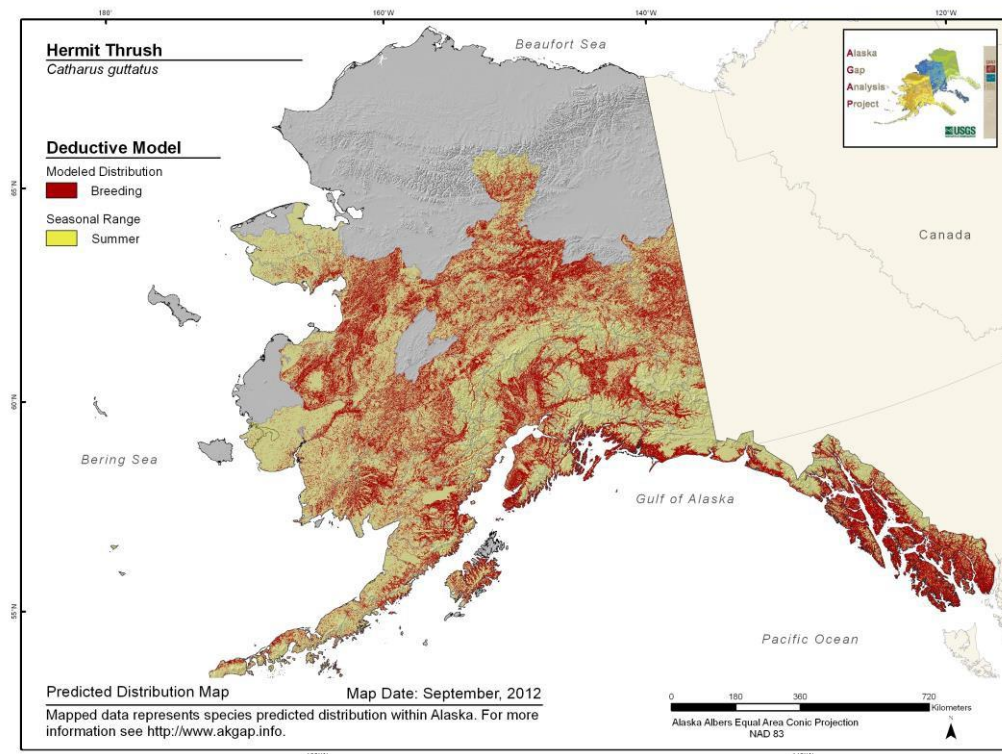
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.676**

**Model Quality
Summary:**
Low

Habitat Description

Uses a wide variety of habitats, including forests and shrublands; favors internal forest edges such as pond or meadow margins, mountain bogs bordered by conifers, and small clearings created in forest by disturbance such as logging, fire, or wind (Jones and Donovan 1996). Although often associated with forest edges (Jones and Donovan 1996, AOU 1998), a study of nest success in Wisconsin hardwood forests showed probability of nest failure increased with decreasing distance to clearcut edge (Flaspohler et al. 2001). Negatively impacted by forest fragmentation in southern Wyoming (Keller and Anderson 1992) and throughout its range (Hames 1999). In Alaska, generally occupies forest habitats; inhabits tall shrub thickets (of usually *Alnus crispa*) beyond tree line. In Southeast Alaska, found in forest stands of all ages, even over 150 years old (Kessler 1979); abundant in old-growth and early successional spruce-hemlock stands on Prince of Wales Island (Noble 1977, Pogson et al. 1997). On the Kenai Peninsula in southcentral Alaska, nests in forest stands of all ages under 100 years old (Quinlan 1978, Quinlan 1979). In interior Alaska, occurs in deciduous, white spruce coniferous and mixed forests; territories associated with forest edges. Does not typically occur in black spruce-dominated forests, scattered woodland or dwarf forests (Spindler and Kessel 1980). In western-southwestern Alaska, utilizes tall shrub thickets near the coast and barren islands off the coast (Pogson et al. 1997).

References

AOU. 1998. Check-list of North American birds. Seventh edition. American Ornithologists' Union, Washington, D.C. 829 pp.

Flaspohler, D. J., S. A. Temple, and R. N. Rosenfield. 2001. Species-specific edge effects on nest success and breeding bird density in a forested landscape. *Ecological Applications* 11(1):32-46.

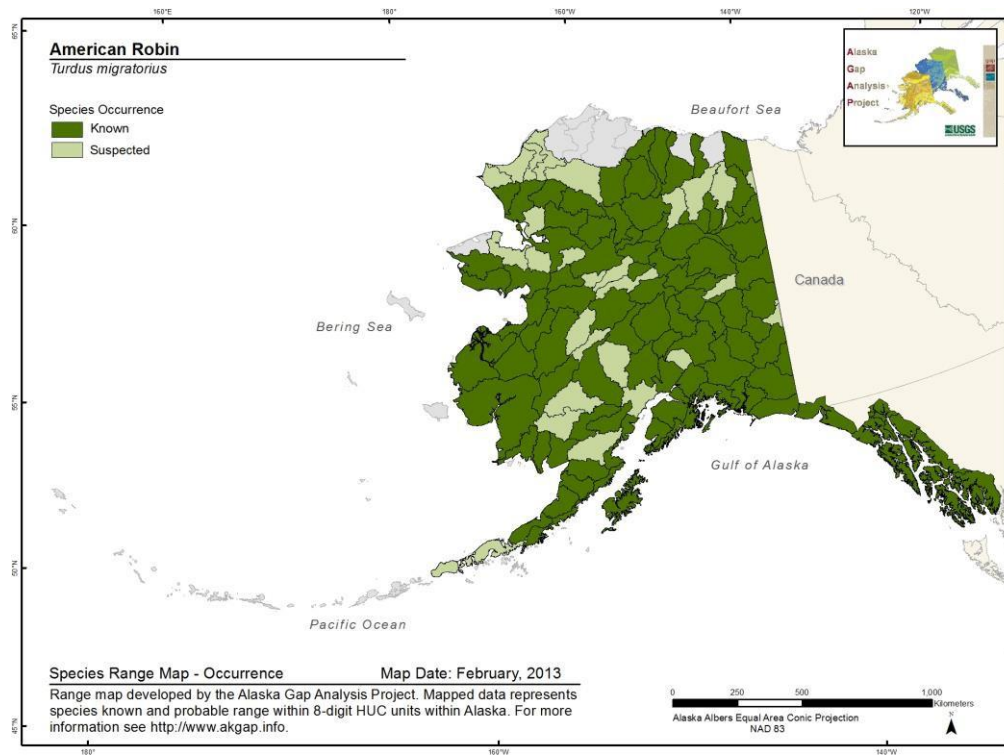
Hames, S. 1999. Early looks at thrush relationships. *Birdscope* 13(3):11-13.

- Jones, P. W., and T. M. Donovan. 1996. Hermit Thrush (*Catharus guttatus*). In *The Birds of North America*, No. 261 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Keller, M. E., and S. H. Anderson. 1992. Avian use of habitat configurations created by forest cutting in southeastern Wyoming. *Condor* 94:55-65.
- Kessler, W.B. 1979. Bird population responses to clearcutting in the Tongass National Forest of Southeast Alaska. USDA, USFS, Tongass National Forest, Ketchikan, AK. Alaska Region report No. 71.
- Noble, R.E. 1977. Breeding-bird populations in hemlock-spruce old growth and clearcuts, Prince of Wales Island, Alaska. USDA, USFS, Ketchikan, AK. 56 p.
- Pogson, T. H., S. E. Quinlan, and B. Lehnhausen. 1997. A manual of selected neotropical migrant birds of Alaska national forests. USDA, USFS, Juneau, AK.
- Quinlan, S.E. 1978. Bird communities and white spruce succession on the Kenai Peninsula, Alaska. Unpubl. report to the Chugach National Forest, Seward, Alaska. 34 pp.
- Quinlan, S.E. 1979. Effects of controlled burning and succession of white spruce forests on breeding bird communities, Kenai Peninsula, Alaska. Unpublished report, Chugach National Forest, Seward, AK.
- Spindler, M. A. and B. A. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. *Syesis* 13:61-104.

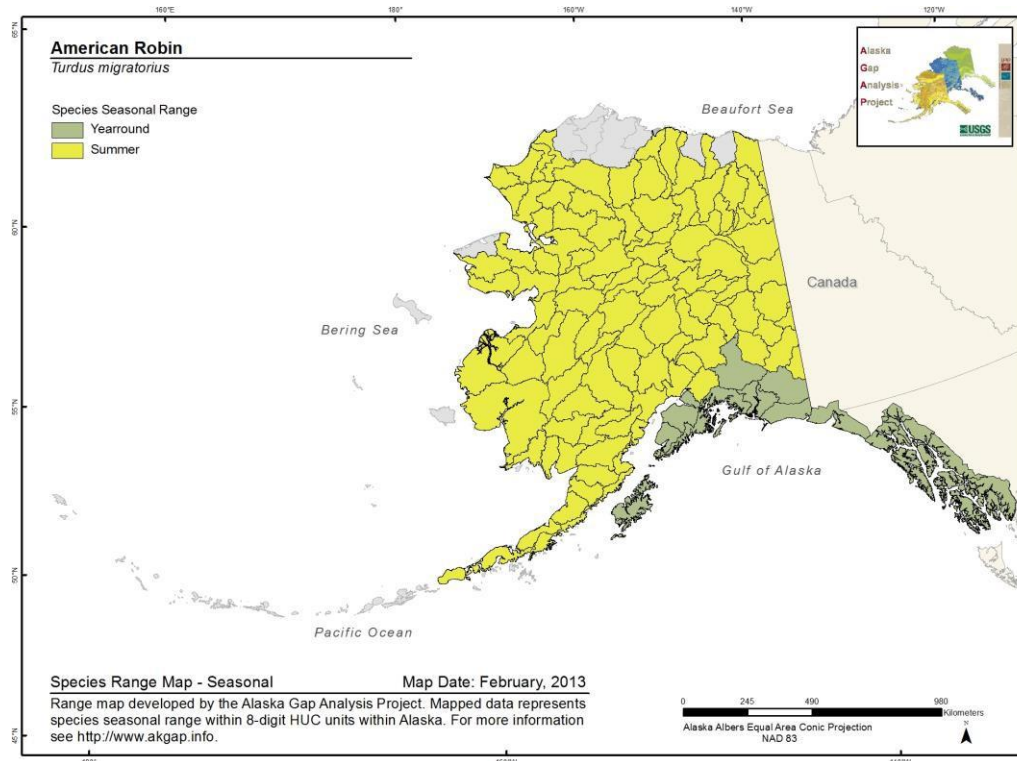
American Robin *Turdus migratorius*

Range Map and Distribution Model Summary

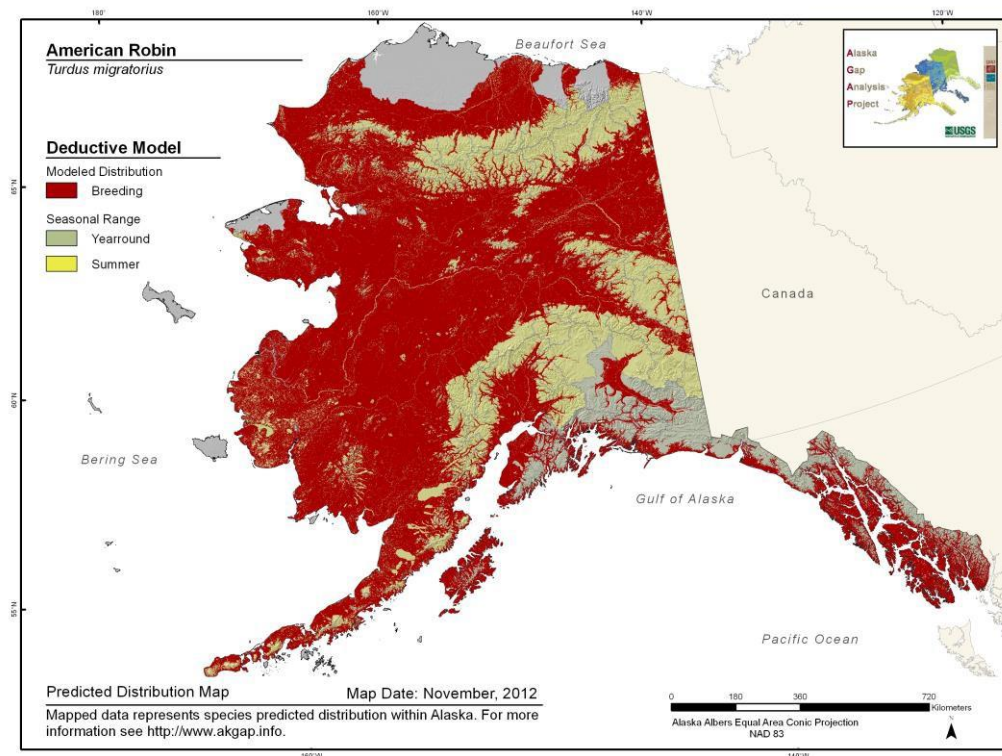
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.51**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits forest edges, muskegs, tundra, saltwater beaches, and tidal flats (Armstrong 2008). Also, occurs in woodlands, forests, and gardens, including developed areas, riparian areas, logged areas (Sallabanks and James 1999), scrub, parks, thickets, cultivated lands, savanna, suburbs (NatureServe 2007b).

In B. C., common breeder in lower elevations in floodplains, valleys, plateaus, and lower slopes. Small numbers breed in higher elevation forests and in subalpine shrub zone near timberline where more numerous in subalpine parkland basins and cirques than on steep forested mountain slopes. Less abundant away from human influenced habitat in lowland spruce forests of the taiga and mountainous boreal forests. Breeds in a very wide variety of habitats with the most nest records in developed areas. Breeds from sea level to 2200m (Campbell et al. 1997).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

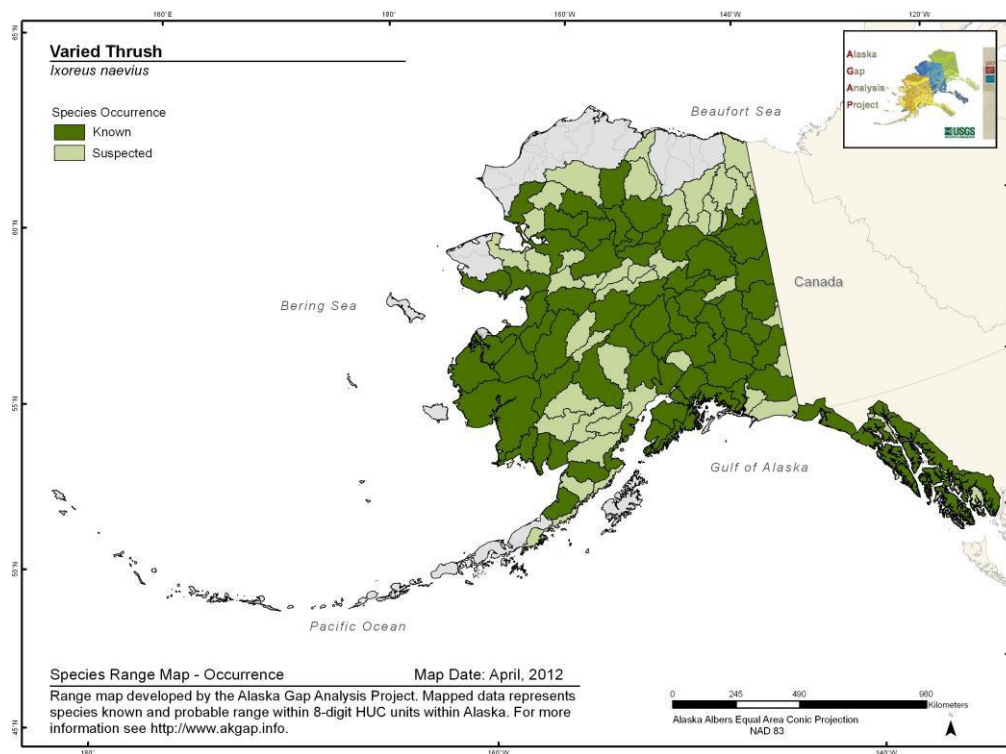
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Sallabanks, R. and F. C. James. 1999. American Robin (*Turdus migratorius*). In The Birds of North America, No. 462 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

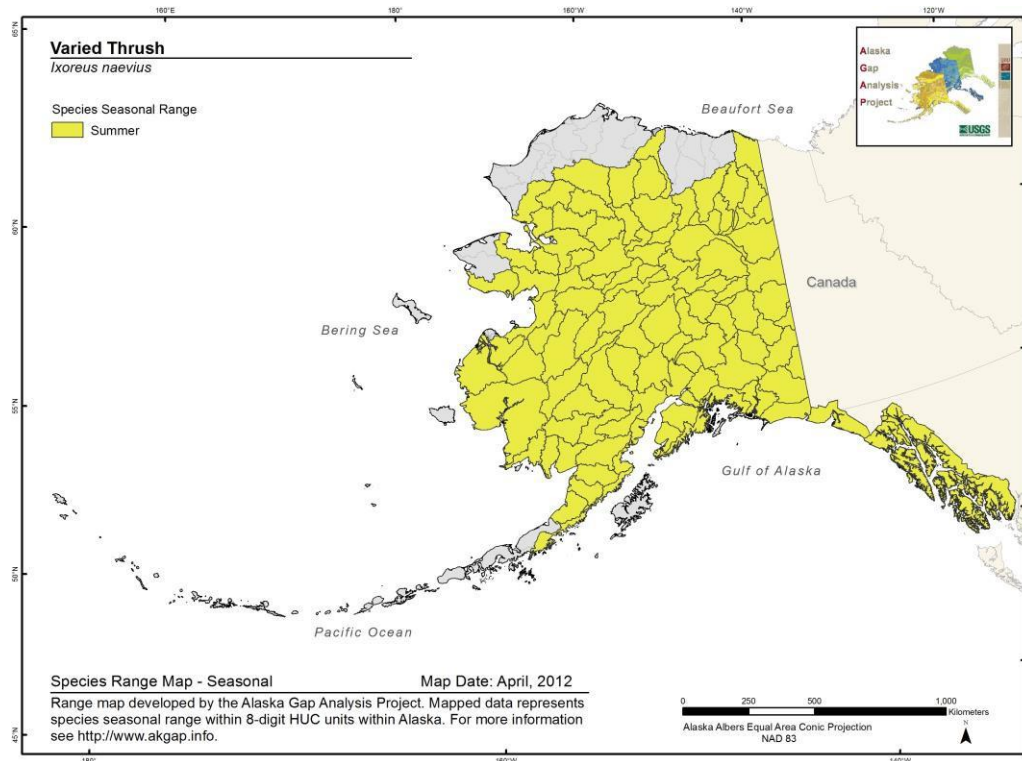
Varied Thrush *Ixoreus naevius*

Range Map and Distribution Model Summary

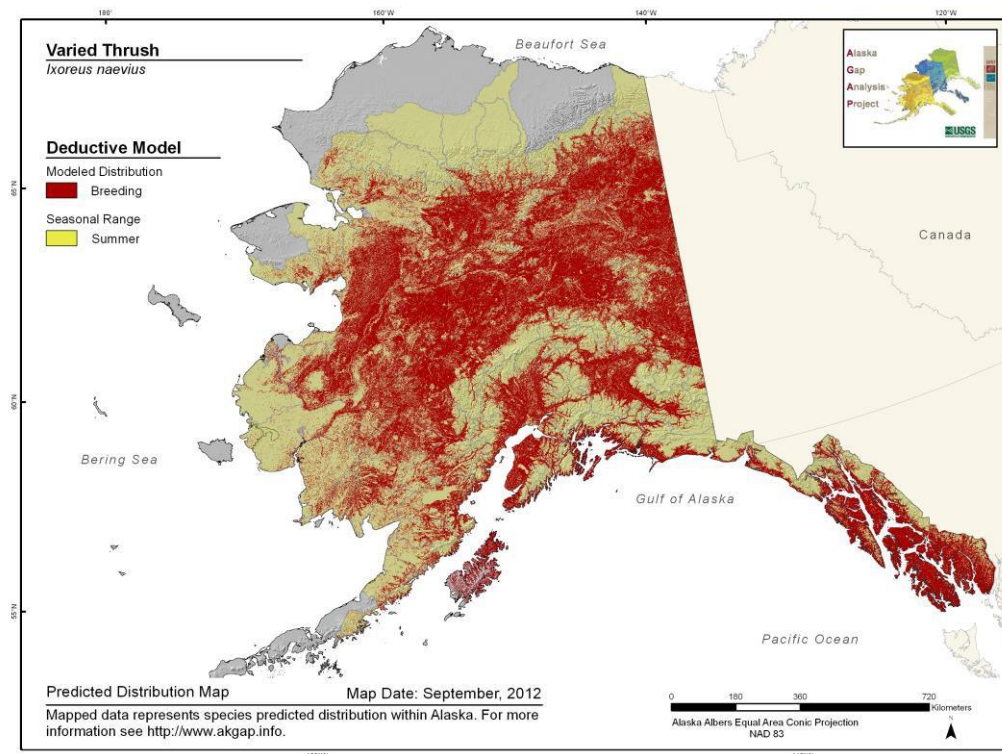
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.607**

**Model Quality
Summary:**
Low

Habitat Description

Forests from sea level to alpine (Armstrong 2008). In Alaska, occurs in wet coastal forests of southeast and taiga forests of north central and eastern Alaska. Found in spruce forests, deciduous (balsam poplar and dense alder stands), and mixed forests (Kessel 1989, Kessel 1998, George 2000). Thick, wet (although occurs in some drier areas of the taiga), shady, mossy forests and deciduous shrub and thickets. Also found beyond the forest taiga, in dense alder thickets, and isolated cottonwood patches (Kessel 1998). May forage in open tundra (Kaufman 1996, Armstrong 1995).

References

Armstrong, R. H. 1995. Guide to the birds of Alaska, 4th ed. Alaska Northwest Books, Anchorage, AK. 322 pp.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

George, T. L. 2000. Varied Thrush (*Ixoreus naevius*). In The Birds of North America, No. 541 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin, New York. 675 pp.

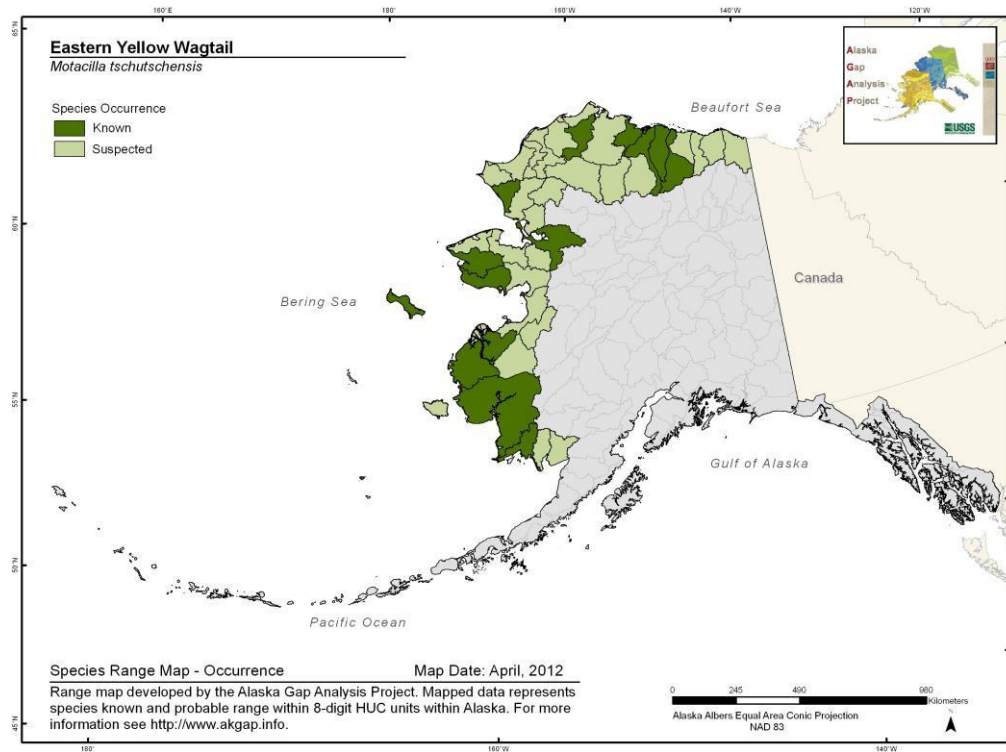
Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

Kessel, B. 1998. Habitat characteristics of some passerine birds in western North American taiga. University of Alaska Press, Fairbanks, AK.

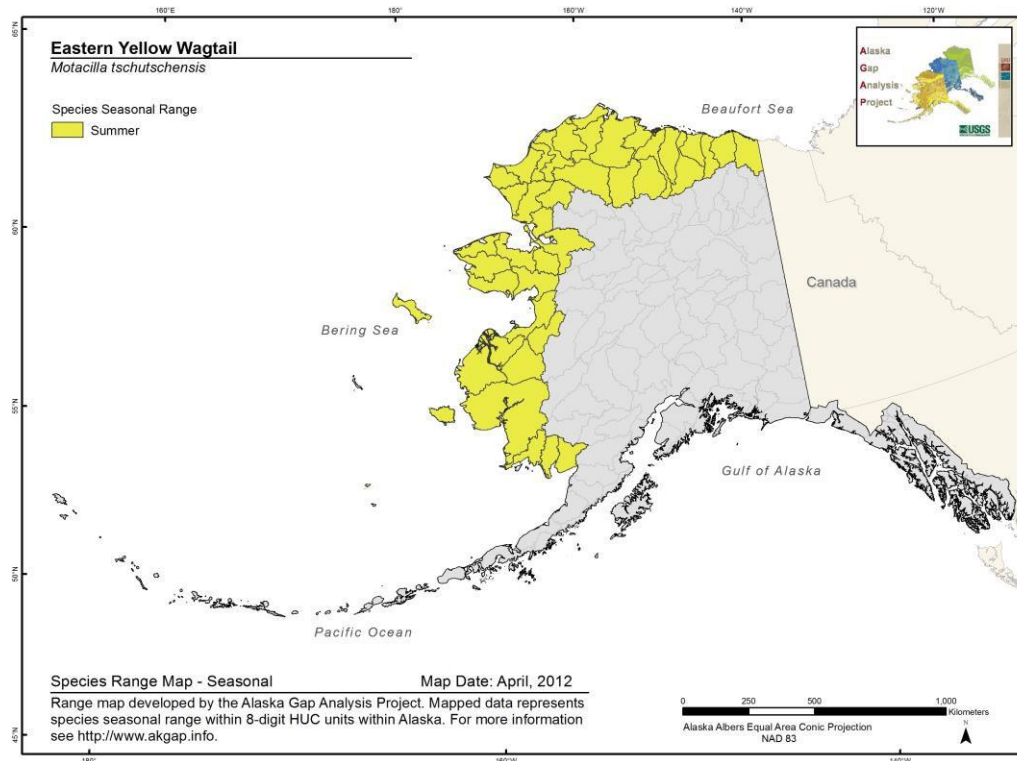
Eastern Yellow Wagtail *Motacilla tschutschensis*

Range Map and Distribution Model Summary

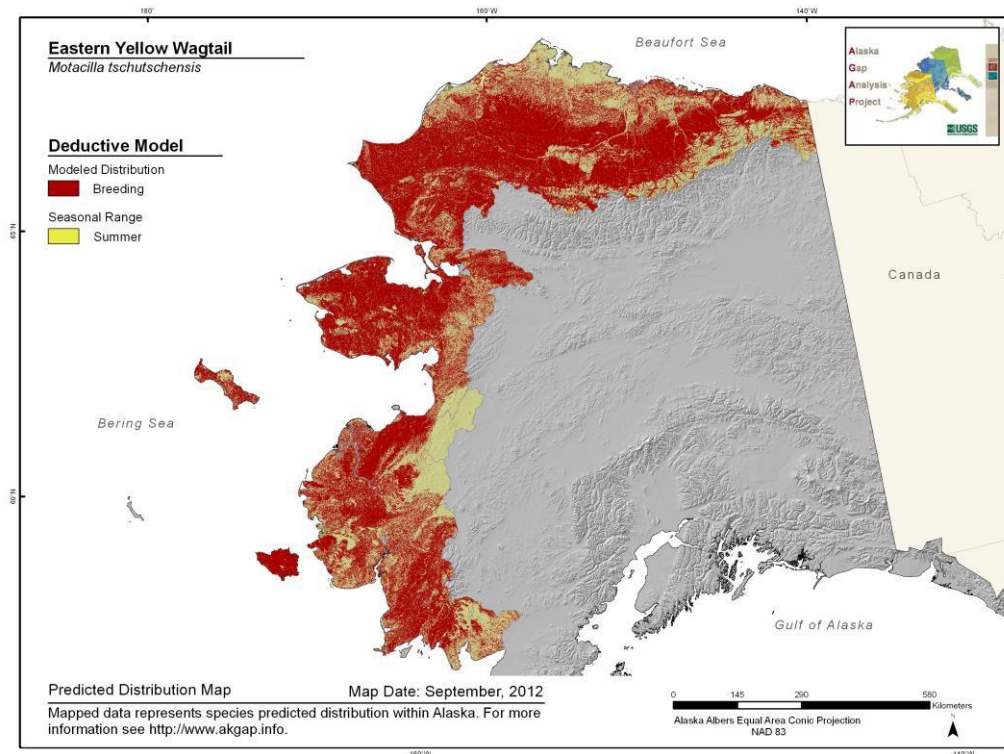
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.662**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits open shrubby areas, especially near edges with sedge, grass, or dwarf shrub. Prefers moist areas with tussocks and vegetated hummocks, cut banks along creeks, tops of river bluffs, roadsides, ditches, and mining operations (Badyaev et al. 1998).

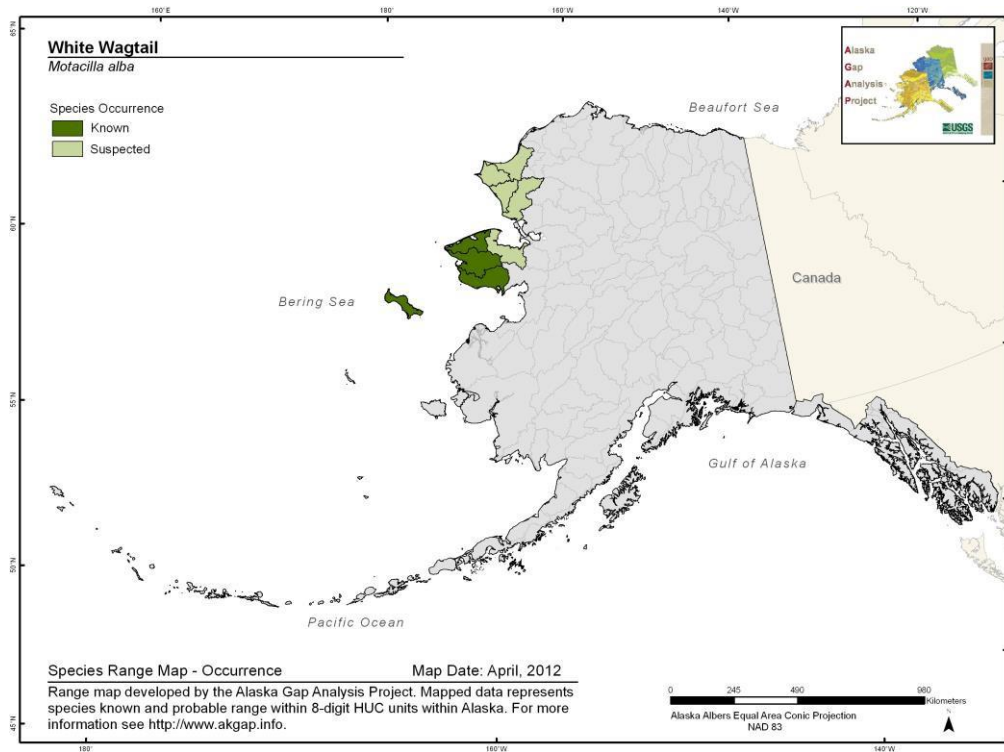
References

Badyaev, A. V., B. Kessel, and D. D. Gibson. 1998. Yellow Wagtail (*Motacilla flava*). In *The Birds of North America*, Vol. 7, No. 382 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

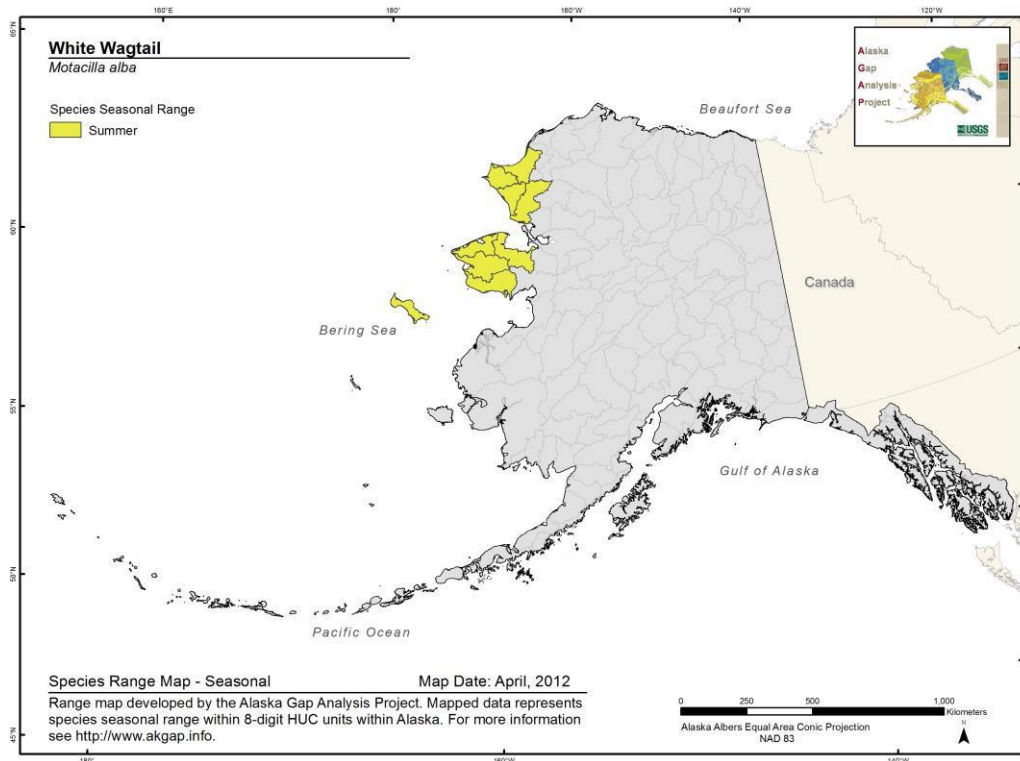
White Wagtail *Motacilla alba*

Range Map and Distribution Model Summary

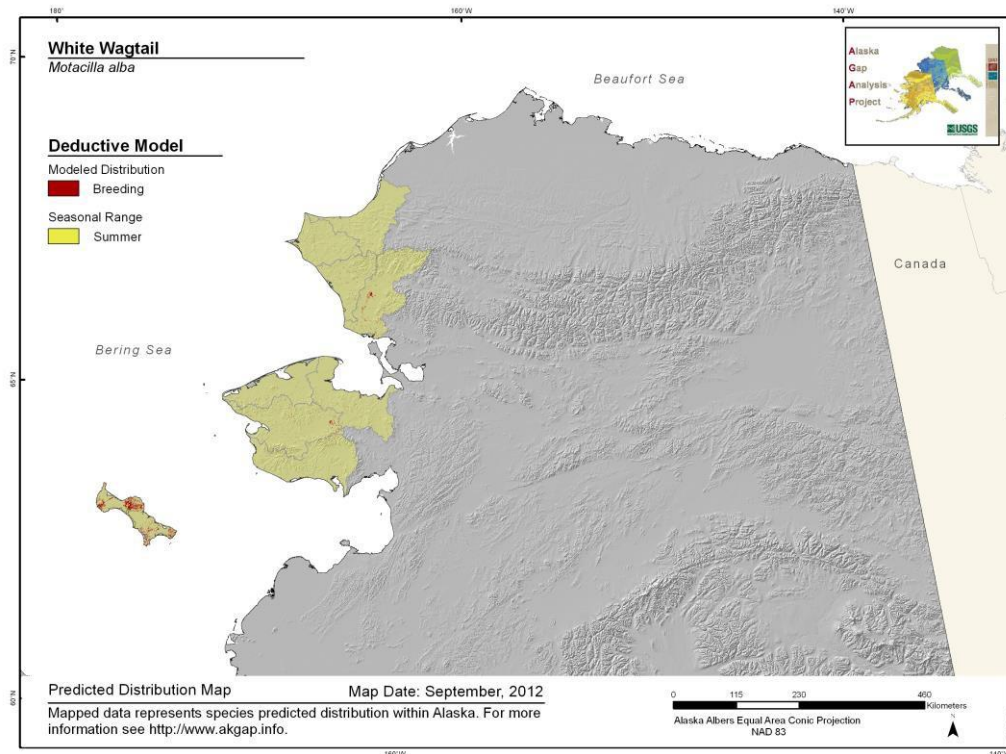
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.507**

**Model Quality
Summary:**
Low

Habitat Description

Within Alaska, breeds along sea cliffs, river banks, and coastal villages (Kessel 1989). Along sea coasts, uses grassy terraces with overhanging vegetation and associated with seabird colonies (Kistchinski 1980).

References

Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

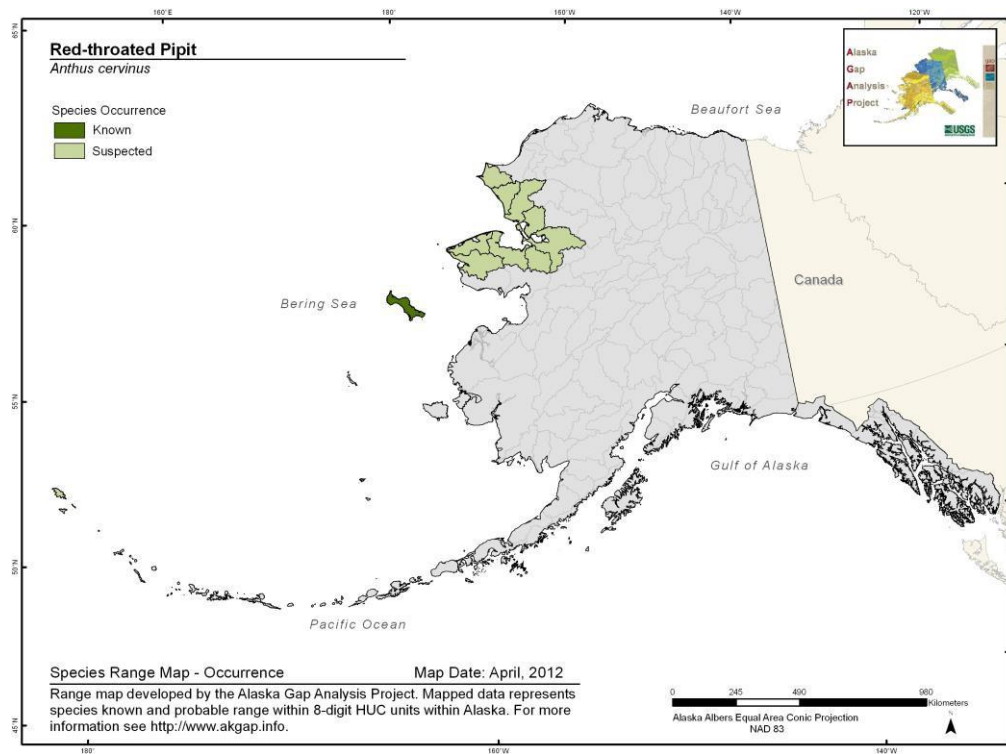
Kistchinski, A. A. 1980. Birds of the Koryak Highlands. Nauka, Moscow.

Red-throated Pipit

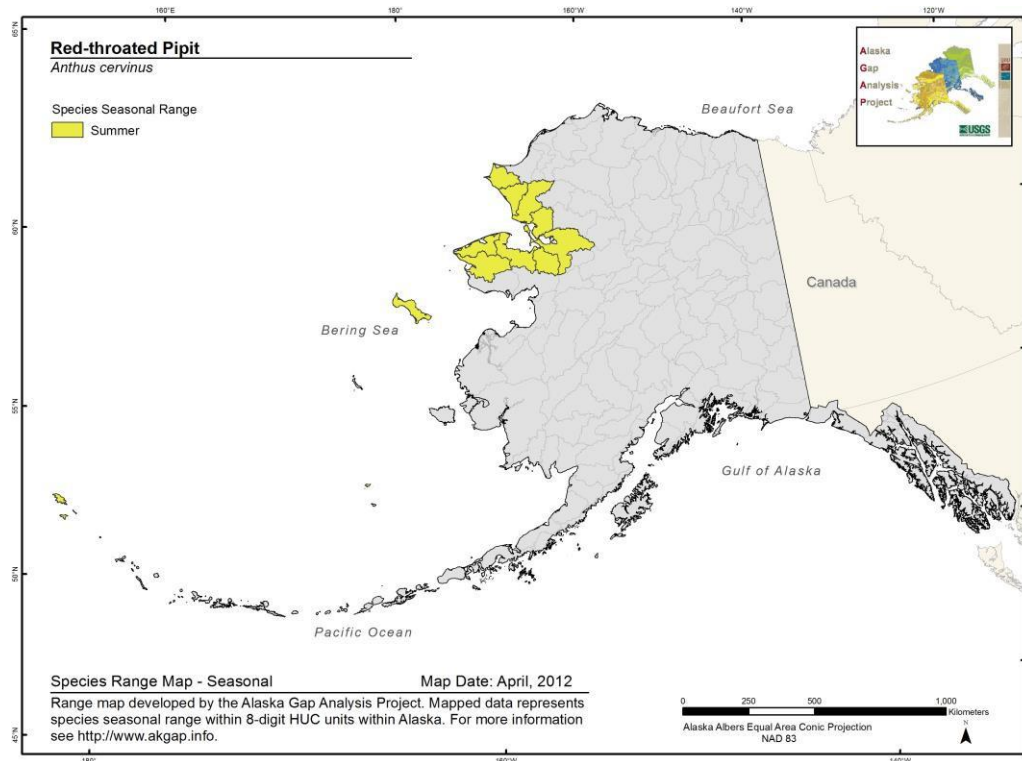
Anthus cervinus

Range Map and Distribution Model Summary

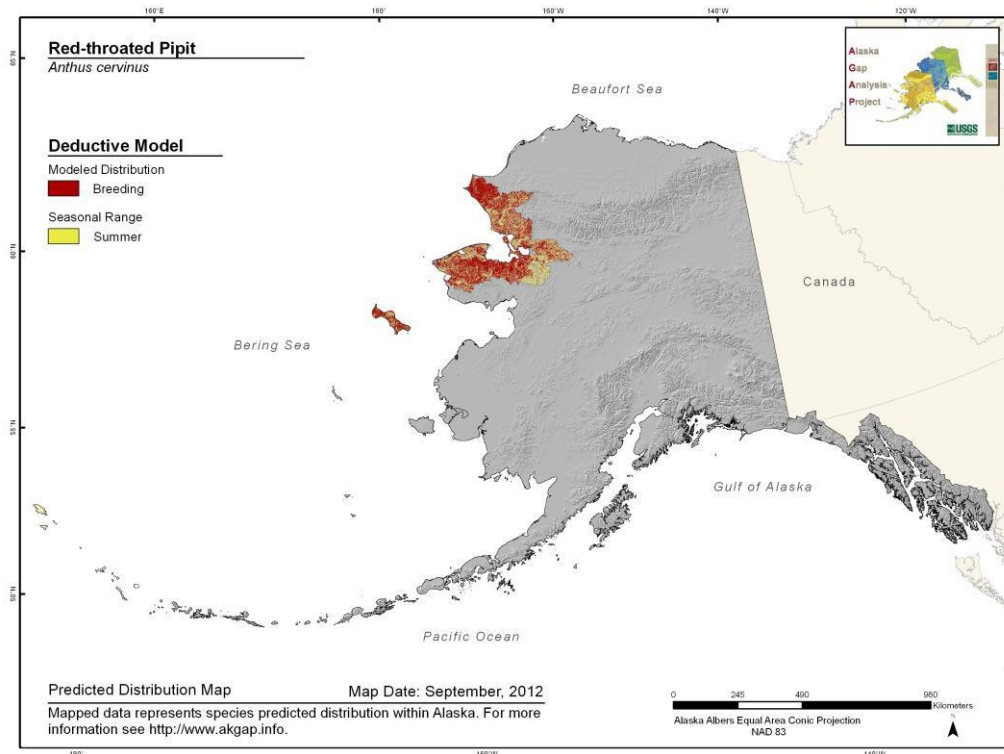
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeds in rocky areas with mat tundra in coastal mountains (AOU 1983). Nests in moist tundra, often in recess in side of hummock, sometimes sheltered by dwarf birch or willow (Terres 1980).

References

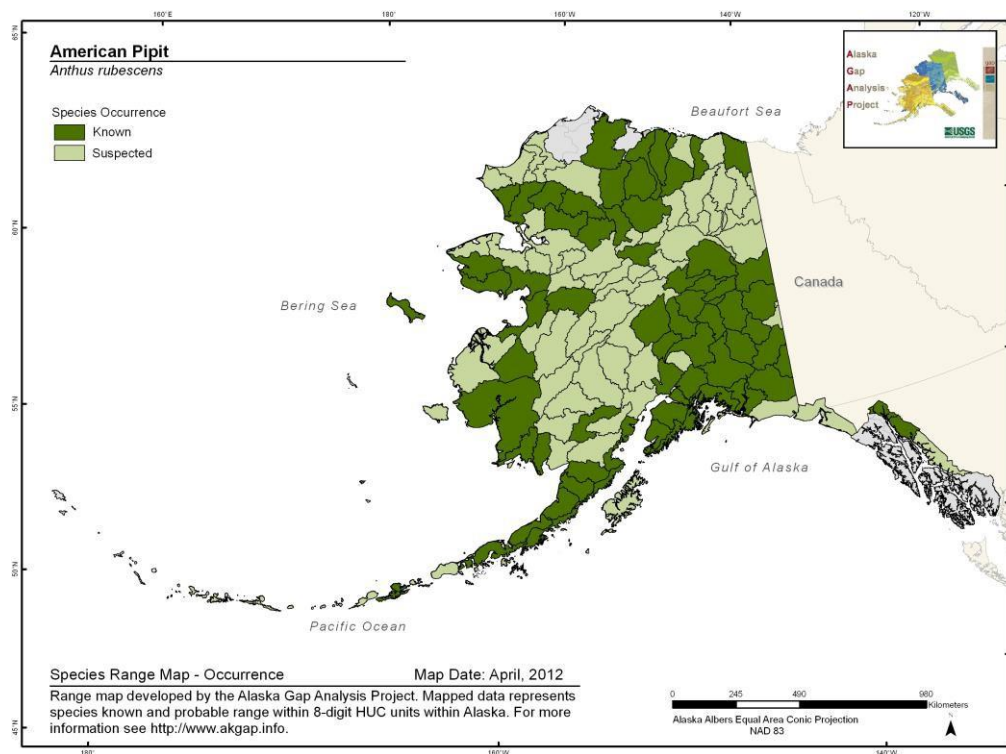
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

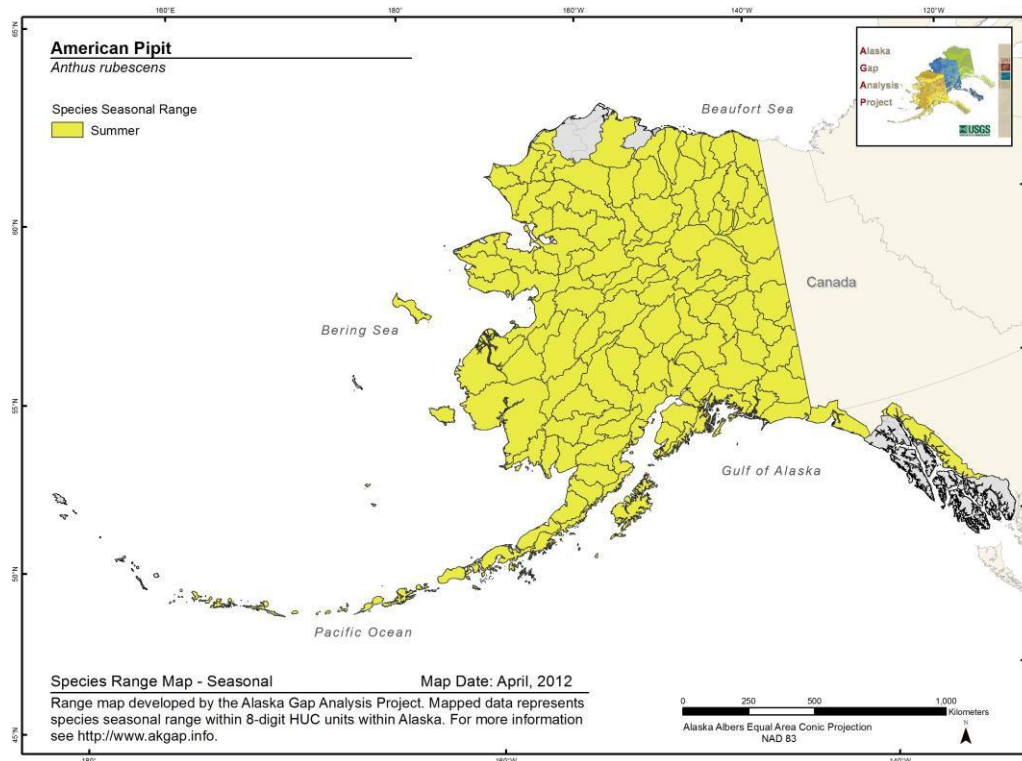
American Pipit *Anthus rubescens*

Range Map and Distribution Model Summary

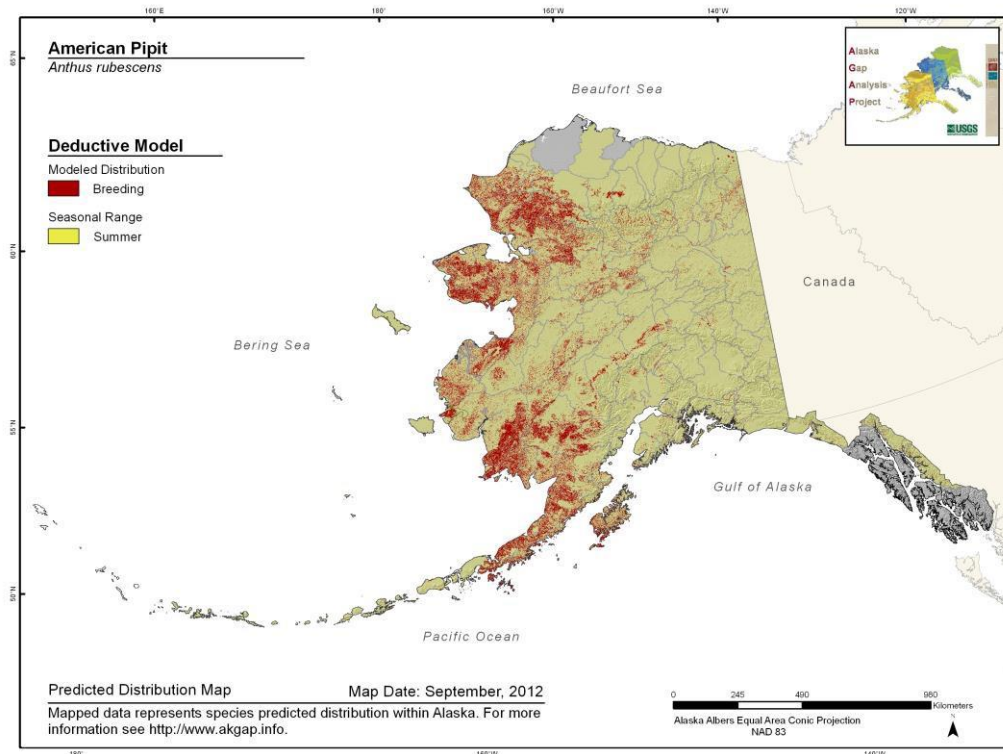
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.521**

**Model Quality
Summary:**
Low

Habitat Description

Nests in tundra, rocky talus slopes, and alpine meadows on drier ridges and foothills and above timberline (NatureServe 2007b, Armstrong 2008). In B.C., nests in alpine habitats throughout mountainous areas of the interior and to a lesser extent in coastal alpine habitats. Nests have been found from 600 to 2400m, but breeding always occurs in alpine habitats. Habitat during the breeding season consists of sparsely vegetated alpine tundra, heath meadows, more richly vegetated alpine meadows, boulder fields, scree slopes with scattered vegetation between rocks, cliff ledges, and gravelly stream beds. Nesting habitat is mainly in well-vegetated sites, from above timberline to rock and scree dominated areas. Nests are usually located on sloping hillsides (Campbell et al. 1997).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

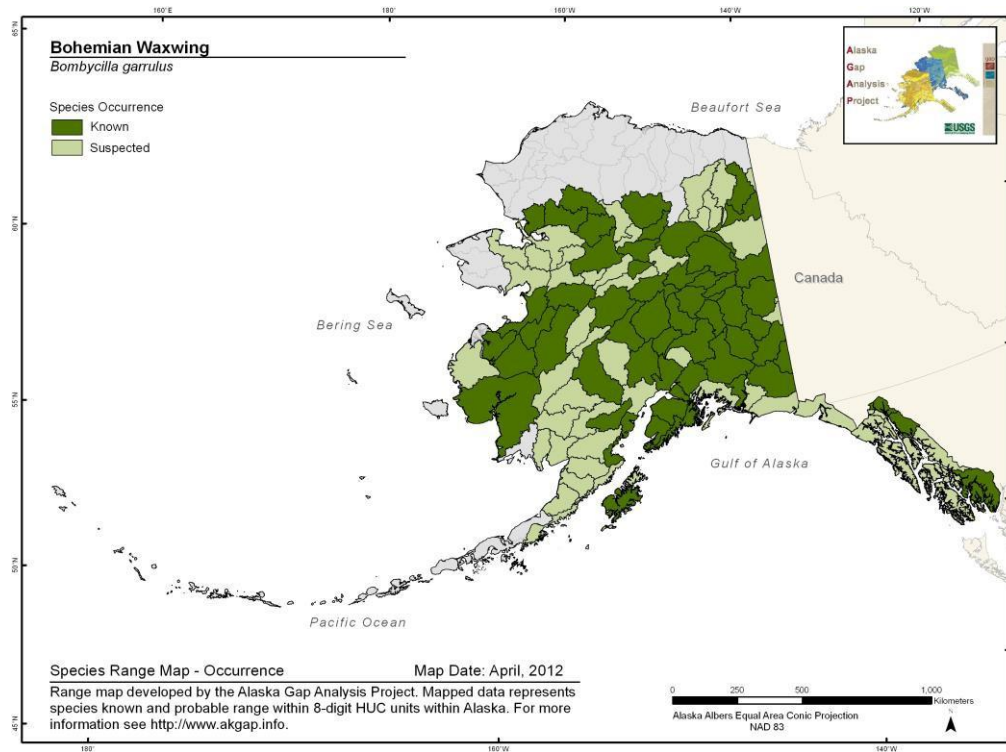
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

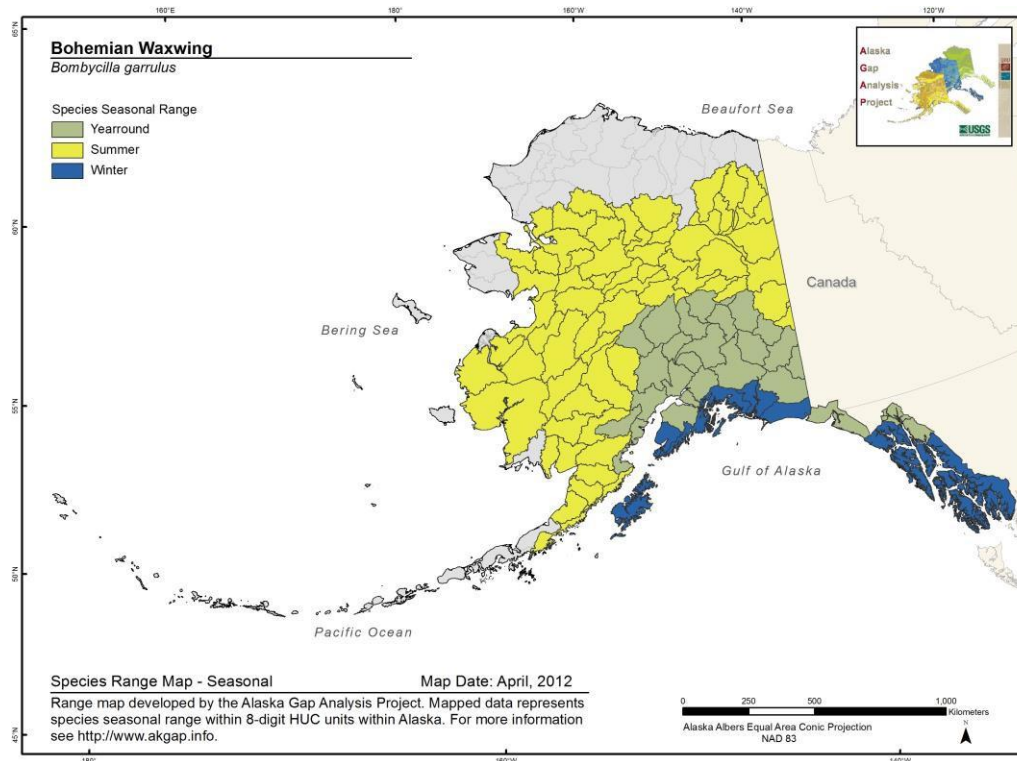
Bohemian Waxwing *Bombycilla garrulus*

Range Map and Distribution Model Summary

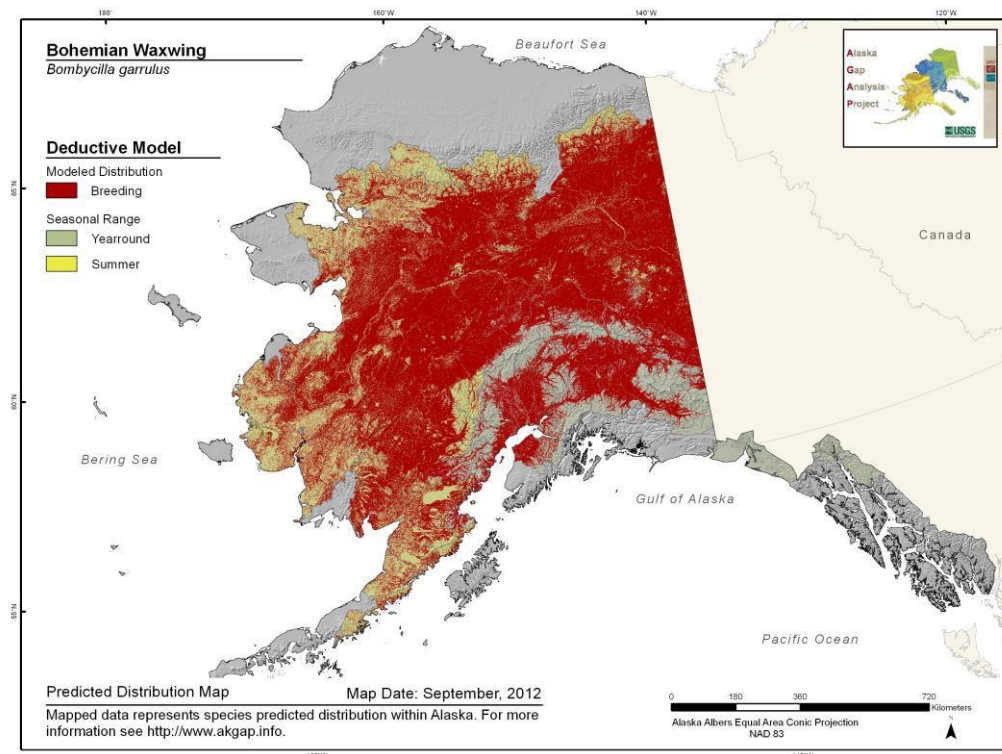
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.601**

**Model Quality
Summary:**
Low

Habitat Description

Occurs throughout the taiga of central Alaska and becomes less common where taiga extends into forested areas (Kessel and Gibson 1978). Breeding habitat includes open coniferous or mixed forests, often recently burned or second growth edges and near water (Godfrey 1986, Cramp 1988, Scemenchuk 1992, Smith 1996, Campbell et al. 1997). Breeds in conifer dominated forest habitats with an abundance of berries and with damp open areas or bodies of water nearby. Beaver ponds, swamps, muskegs, and old burns considered good habitat. Favored habitat includes open mature coniferous forest edges, mainly spruce with aspens, alders, and willows interspersed. In the north, this habitat common in Boreal white and black spruce and lower spruce-willow-birch (Campbell et al. 1997).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

Cramp, S. ed. 1988. The Birds of the Western Palearctic. Vol. 5. Oxford University Press, Oxford U.K.

Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Kessel, B., and D.D. Gibson. 1978. Status and distribution of Alaska birds. Studies Avian Biology. In: Studies in Avian Biology No. 1. R. J. Raitt, Ed. Cooper Ornithological Society. 1:1-100.

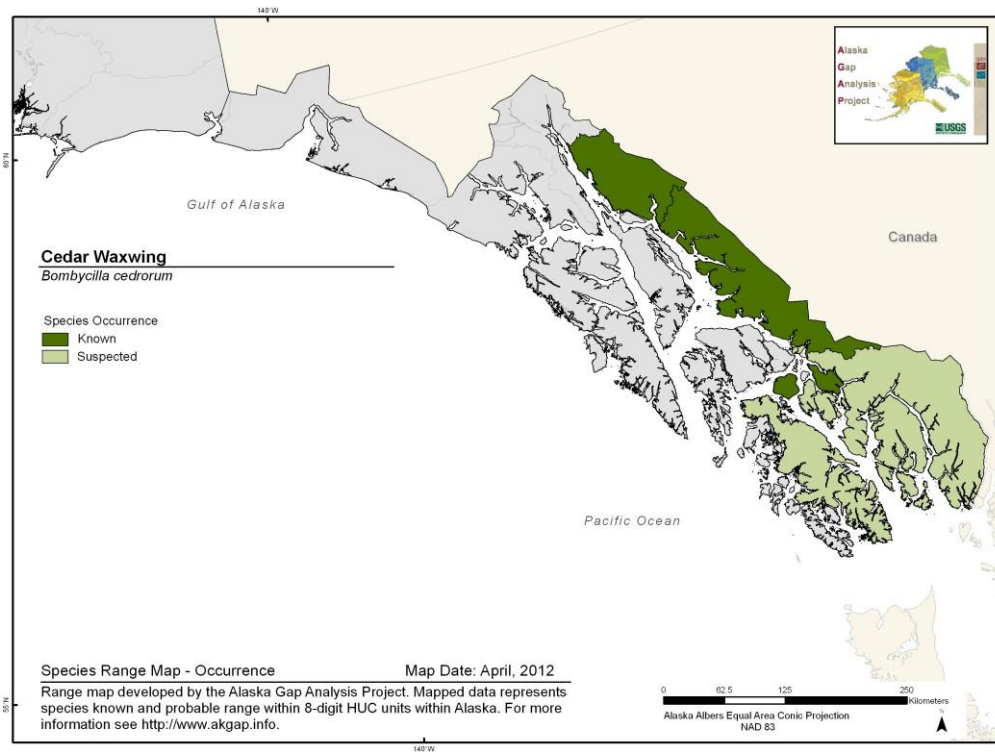
Semenchuk, G. P., ed. 1992. The atlas of breeding birds of Alberta. Fed. Of Alberta Nat., Edmonton.

Smith, A. R. 1996. Atlas of Saskatchewan birds. Sask. Nat. Hist. Soc. Spec. Publ. no. 22, Regina.

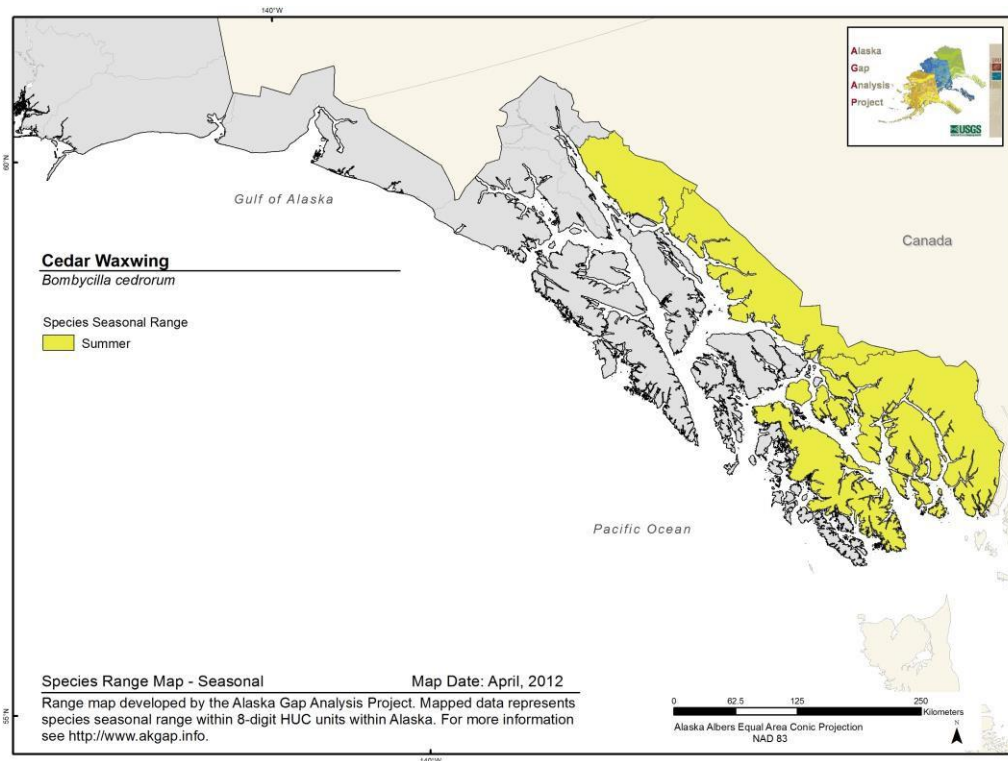
Cedar Waxwing *Bombycilla cedrorum*

Range Map and Distribution Model Summary

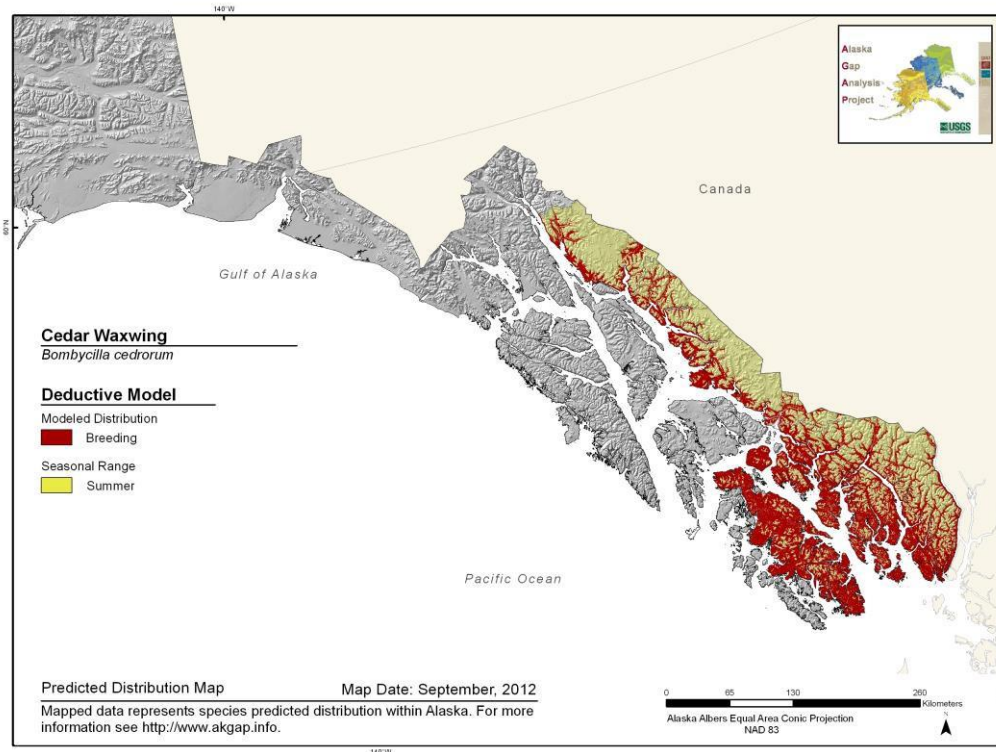
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.697**

**Model Quality
Summary:**
Low

Habitat Description

Prefers edges of mixed woodlands with shrubs and open spaces and often near water. According to Armstrong (2008), in Alaska, inhabits openings and edges of coniferous forests. The majority of nests in B. C. have been reported from suburban gardens and rural areas with low trees, abundant shrubs, near water, and a good supply of insects, berries, and soft fruit. Also use orchards, riparian thickets, forests along rivers, edges of lakes and beaver ponds, tamarack muskegs, edges of second-growth spruce, and regenerating burned areas with willow, huckleberry and blackberry (Campbell et al. 1997). In B. C., breeds from sea level to 1,530 m.

References

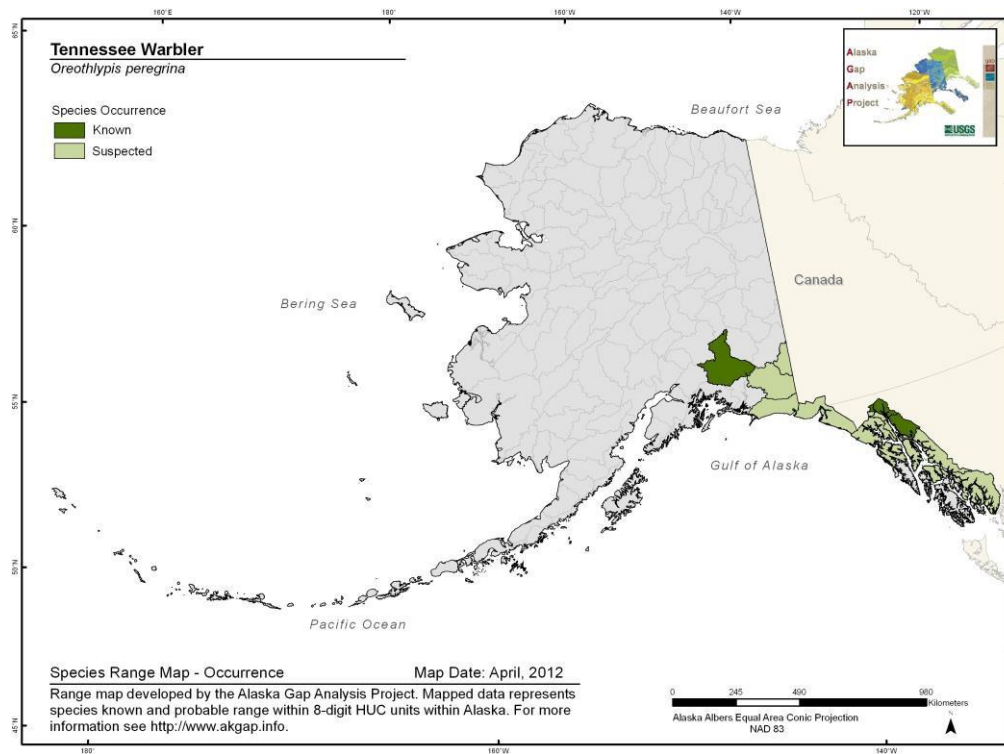
Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, M. C. E. McNall, and G. E. J. Smith. 1997. The Birds of British Columbia. Volume 3. Passerines: flycatchers through vireos. University of British Columbia Press, Vancouver. 693 pages.

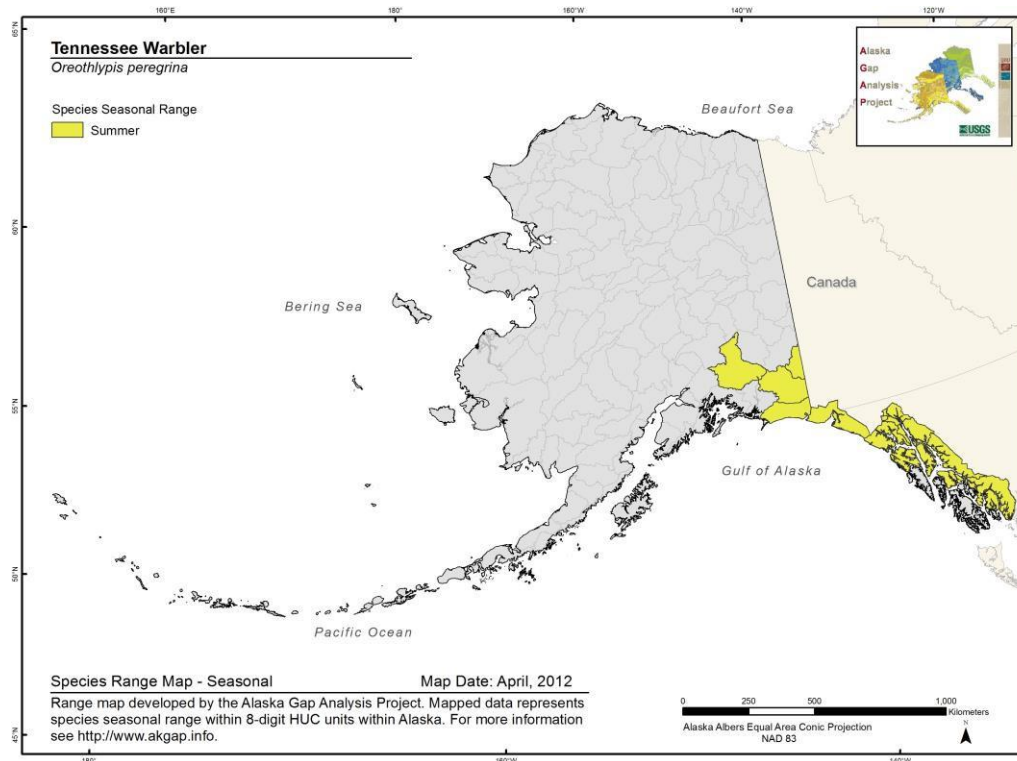
Tennessee Warbler *Oreothlypis peregrina*

Range Map and Distribution Model Summary

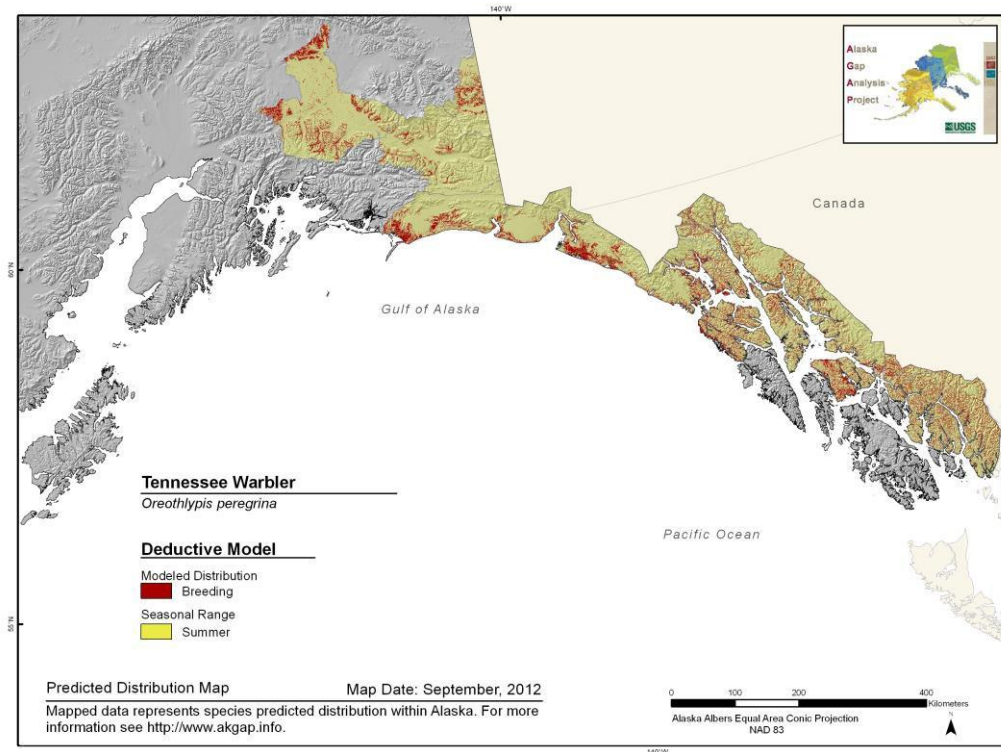
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.568**

**Model Quality
Summary:**
Low

Habitat Description

Occurs in the boreal zone within deciduous, mixed, and coniferous forests. Associated with open areas containing grasses, dense shrubs, and clumps of young deciduous trees (Rimmer and McFarland 1998). Associations vary slightly with range, but strongly associated with shrubs in all habitats (Cadman et al. 1987).

References

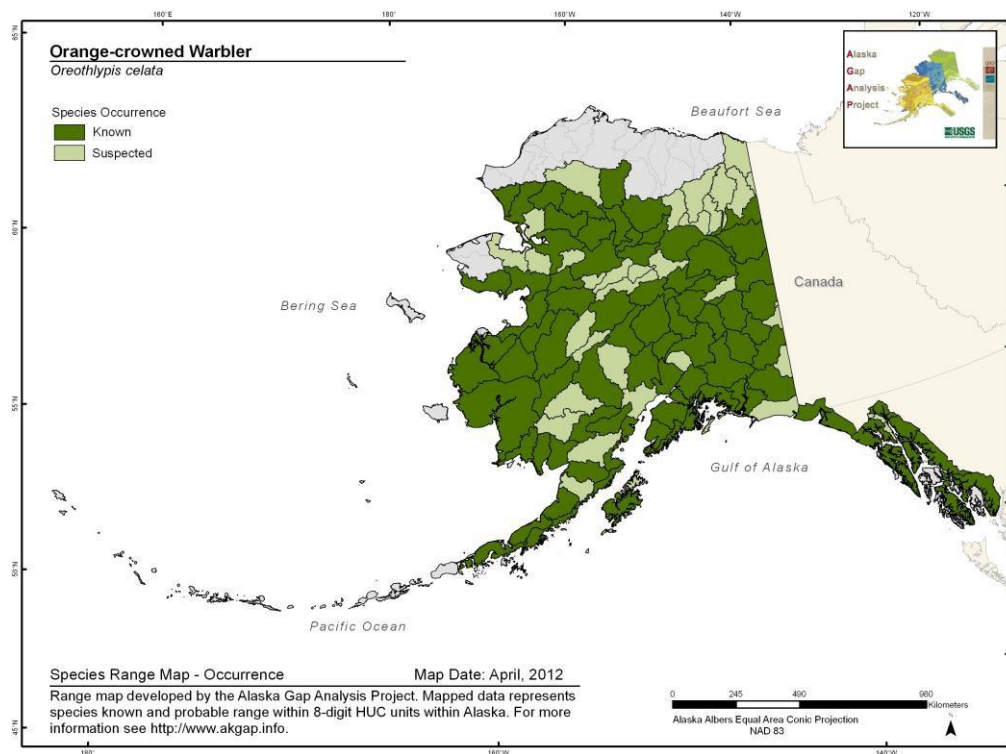
Cadman, M. D., P. F. Eagles and F. M. Helleiner (Compilers). 1987. Atlas of the Breeding Birds of Ontario. University of Waterloo Press, Waterloo.

Rimmer, C. C. and K. P. McFarland. 1998. Tennessee Warbler (*Vermivora peregrina*). In The Birds of North America, Vol. 11, No. 350 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

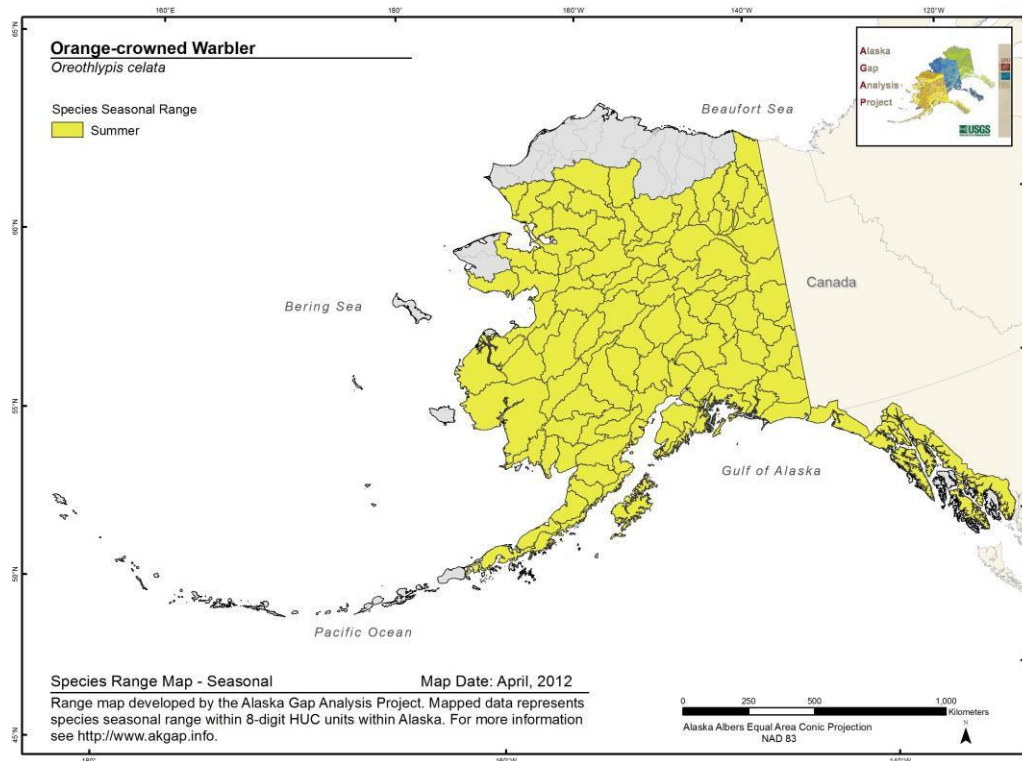
Orange-crowned Warbler *Oreothlypis celata*

Range Map and Distribution Model Summary

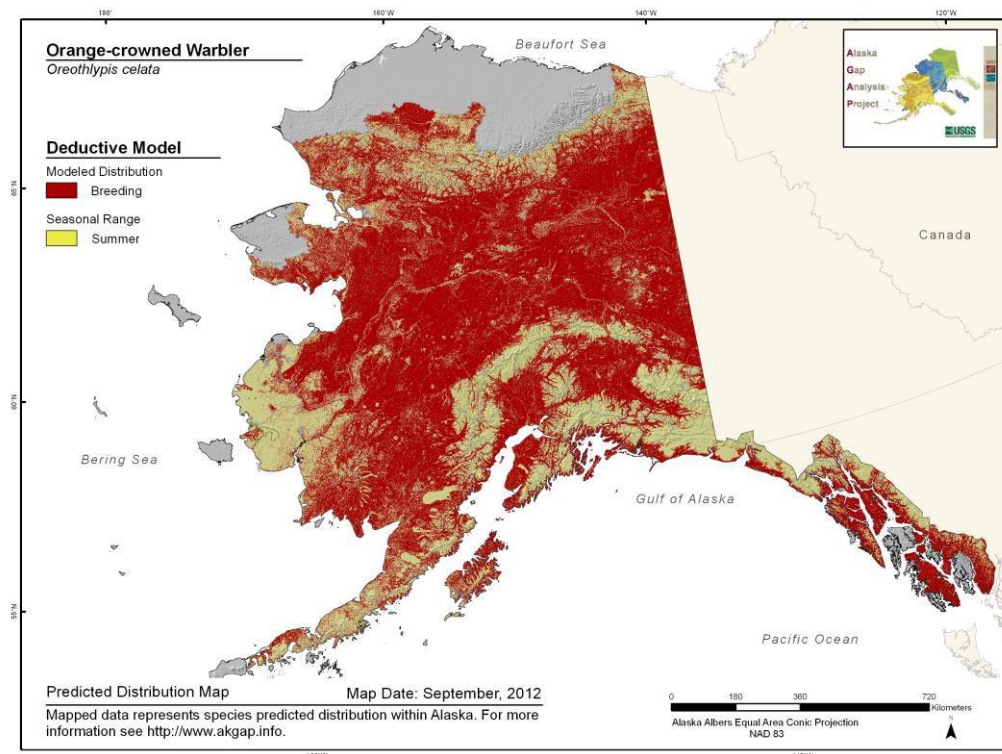
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.511**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, breeds in brushy and open deciduous woodlands, shrub thickets, and mixed forests, and coniferous forest edges where low growth is present (Bent 1953, Godfrey 1986, Armstrong 2008). In B.C., breeds from sea level to 420 m elevation on the coast and 300 to 1,200 m in the interior and is associated with dense thickets, bushes, or shrubs (Campbell et al. 2001). In the Yukon, reported in lowlands and up to and beyond treeline (Frisch 1987).

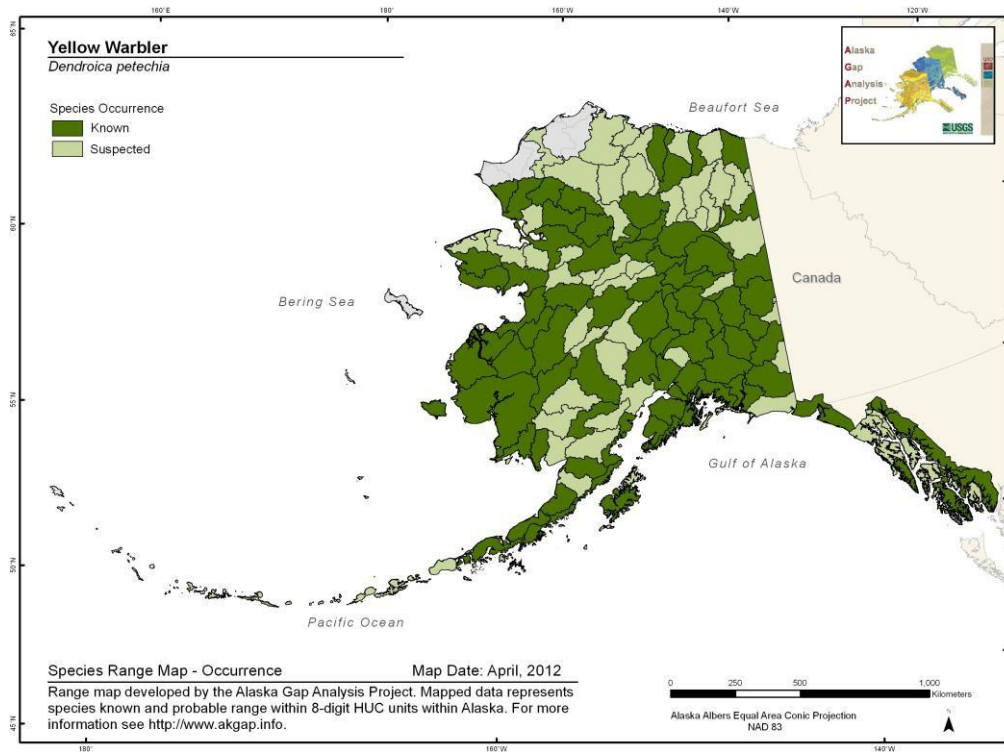
References

- Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.
- Bent, A. C. 1953. Life histories of North American wood warblers. U.S. Natl. Mus. Bull. 203. Washington, DC.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.
- Frisch, R. 1987. Birds by the Dempster highway. Revised edition. Morriss Printing, Victoria, B.C. 98 pp.
- Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

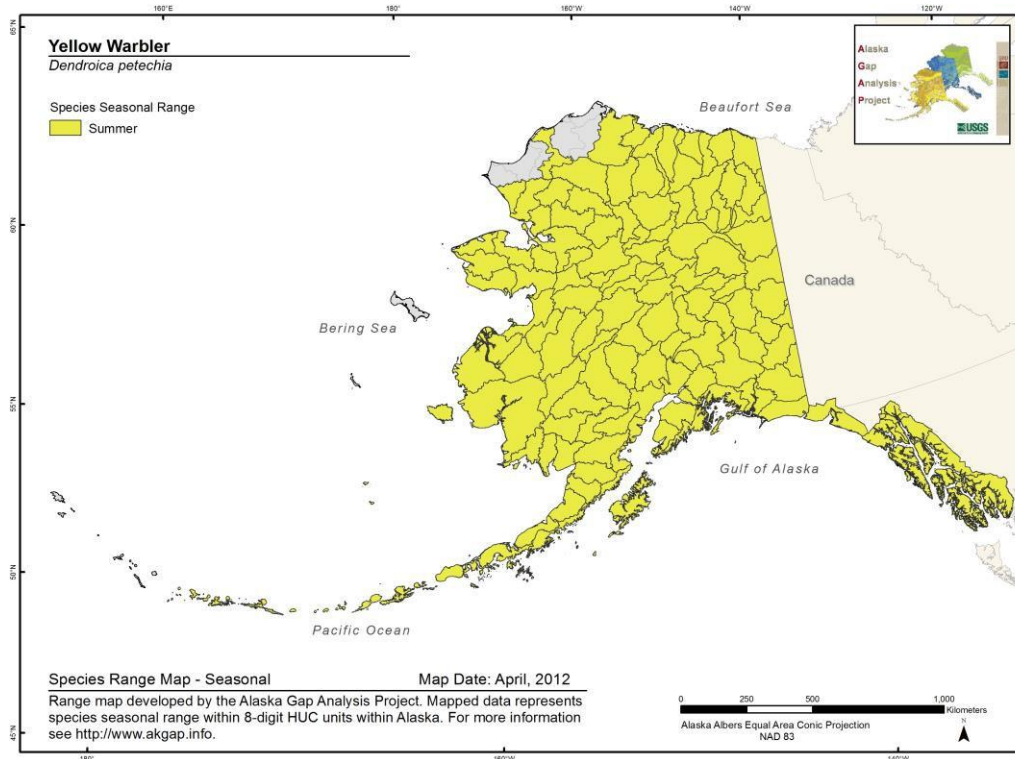
Yellow Warbler *Dendroica petechia*

Range Map and Distribution Model Summary

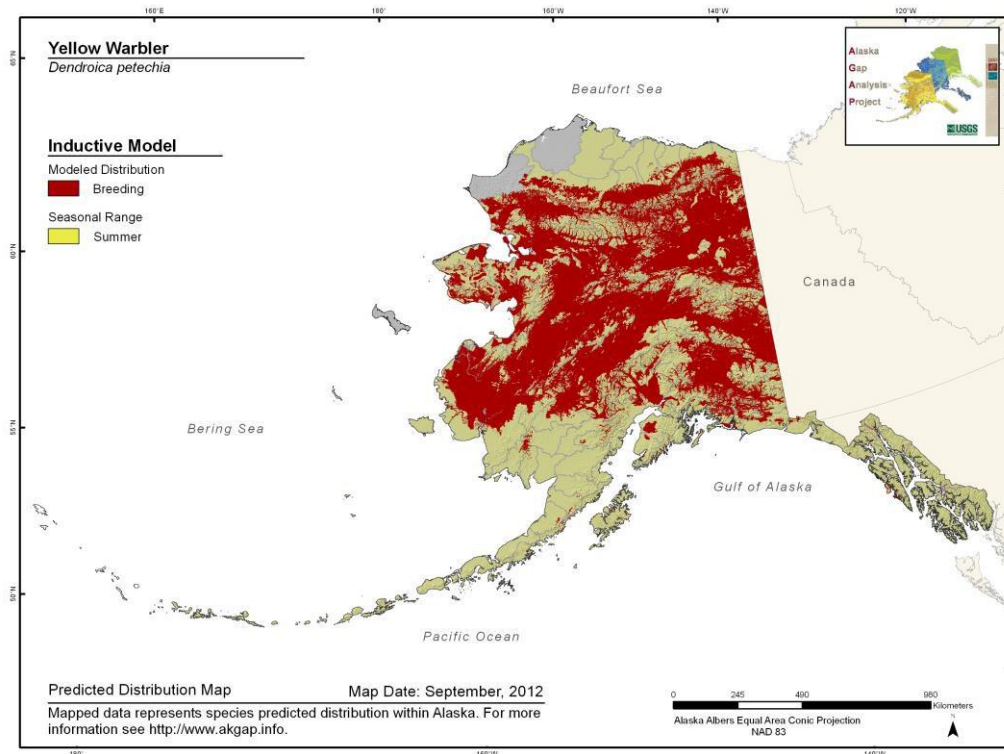
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.695**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in wet deciduous thickets, especially those dominated by willows and in disturbed and early successional habitats (Dunn and Garrett 1997). Shrubby riparian areas along rivers, streams, lakes, marshes, muskegs, and wetlands are of particular importance (Campbell et al. 2001, Alexander et al. 2003). In B.C., breeds from sea level to 900 m on the coast and from 330 to 1,450 m elevation in the interior (Campbell et al. 2001).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

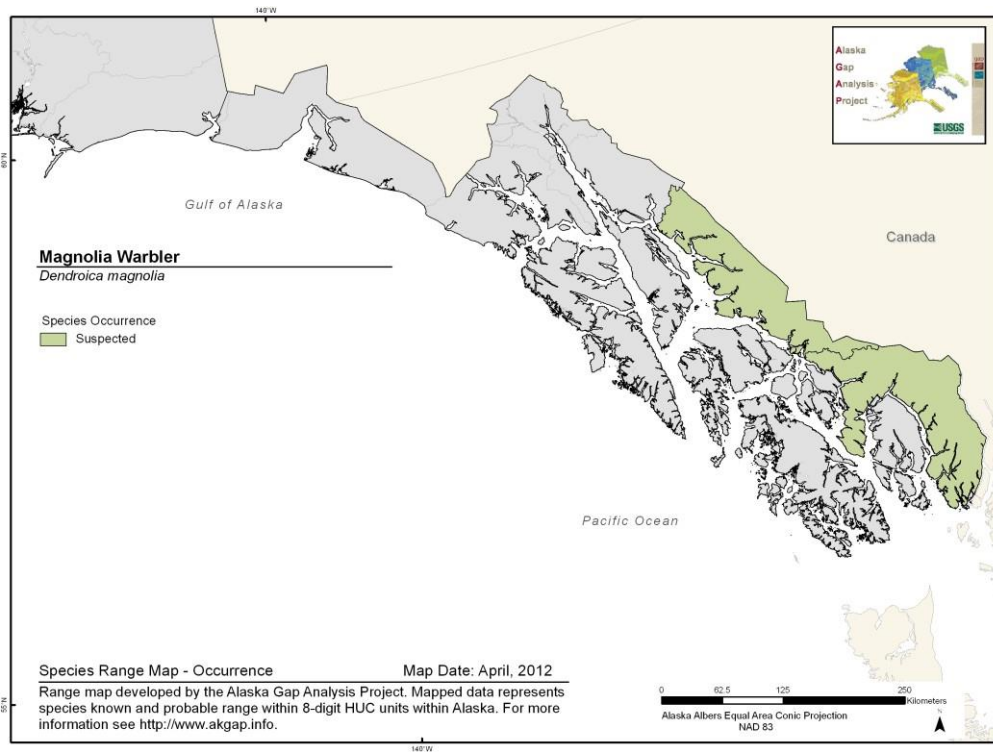
Dunn, J. L., and K. L. Garrett. 1997. A field guide to warblers of North America. Houghton Mifflin Company, Boston.

Magnolia Warbler

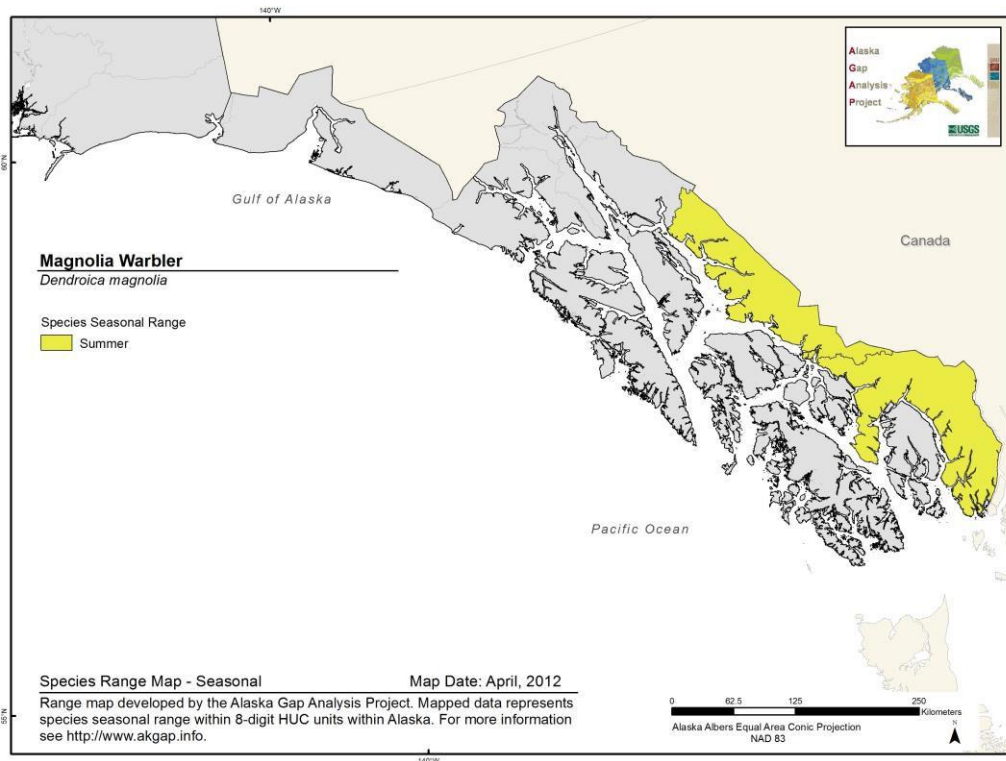
Dendroica magnolia

Range Map and Distribution Model Summary

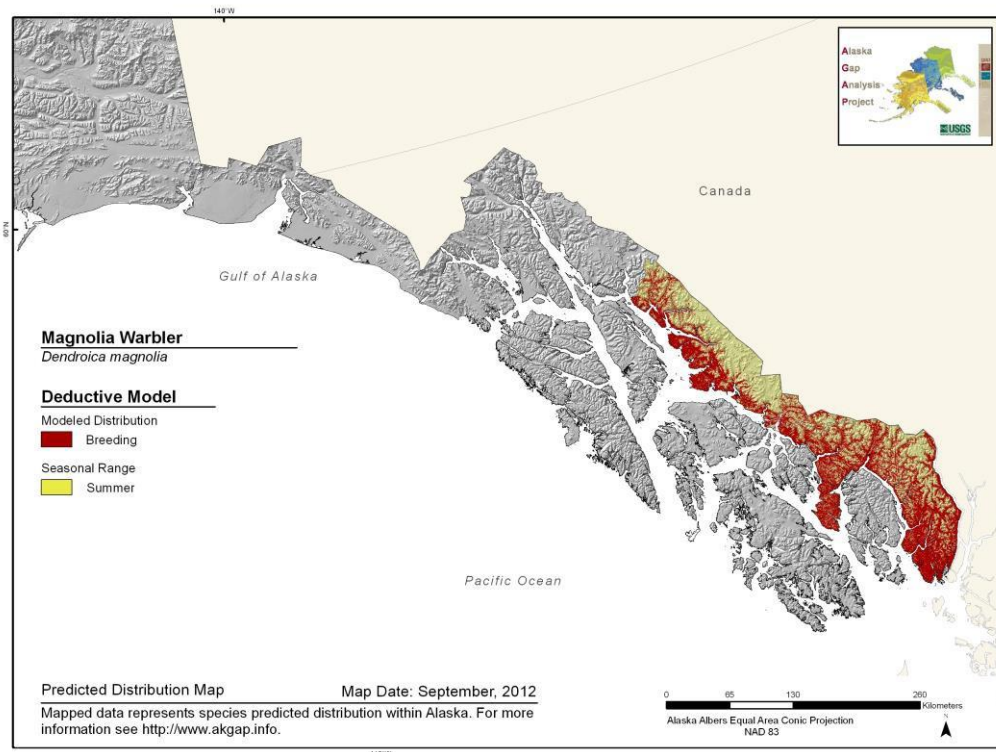
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Breeding habitat is small, close-growing, young conifers in either pure stands or mixed with hardwoods. Also found in mature forests with dense understories (Hall 1994). Often associated with openings and edges where a coniferous shrub layer has developed (Phinney 1998). In the Yukon, often found in riparian and upland forests with balsam poplar, but also in areas with white spruce (Alexander et al. 2003). At higher latitudes in B.C., nests over a narrow elevational range between 570 and 810 m, but farther south in the Rocky Mountains, nests up to 1,300 m (Campbell et al. 2001).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Hall, G. A. 1994. Magnolia Warbler (*Dendroica magnolia*). In The Birds of North America, No. 136 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

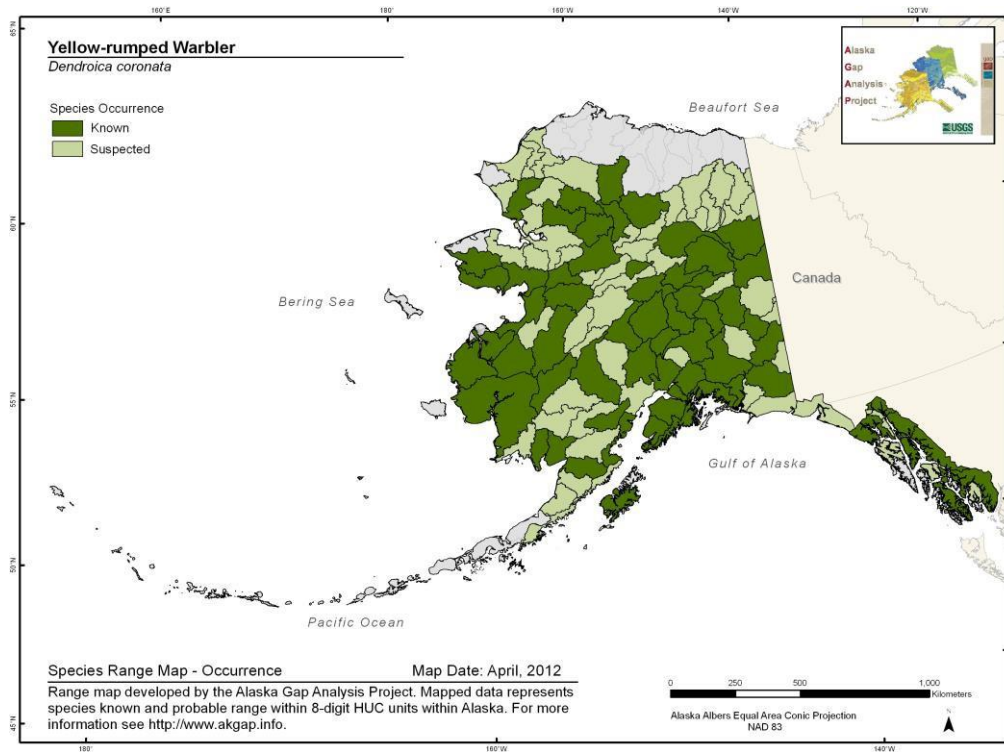
Phinney, M. 1998. Spring and summer birds of Dawson Creek, 1991-1995. WBT Wild Bird Trust of British Columbia Wildlife Report No. 4, West Vancouver. 60 pp.

Yellow-rumped Warbler

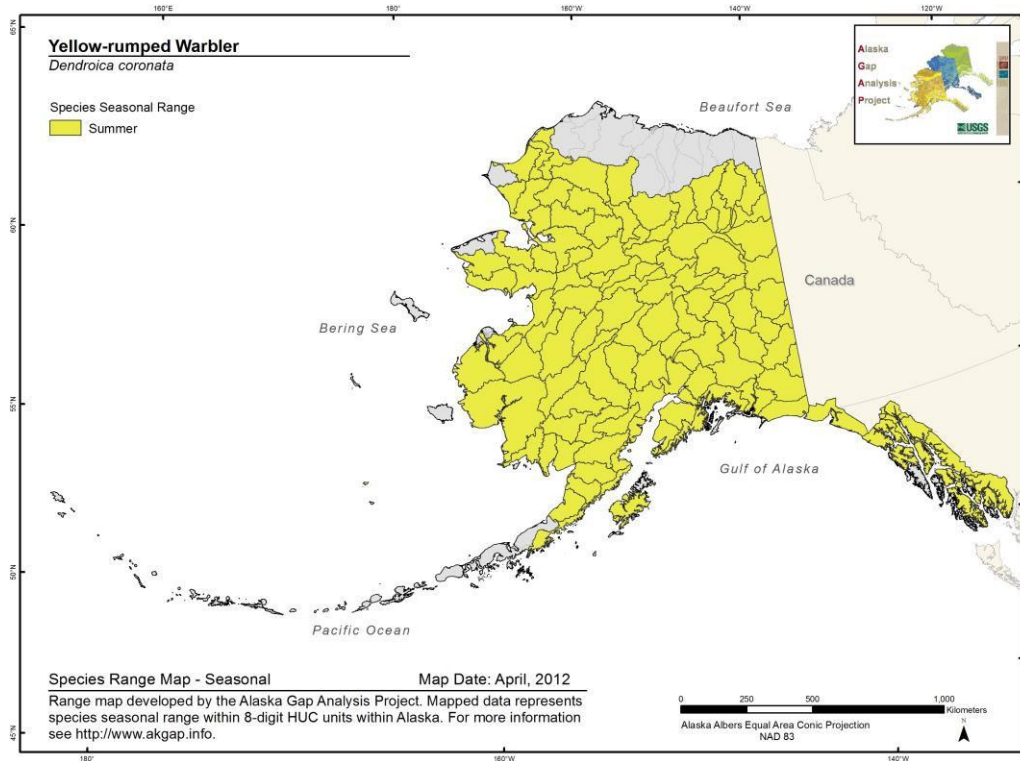
Dendroica coronata

Range Map and Distribution Model Summary

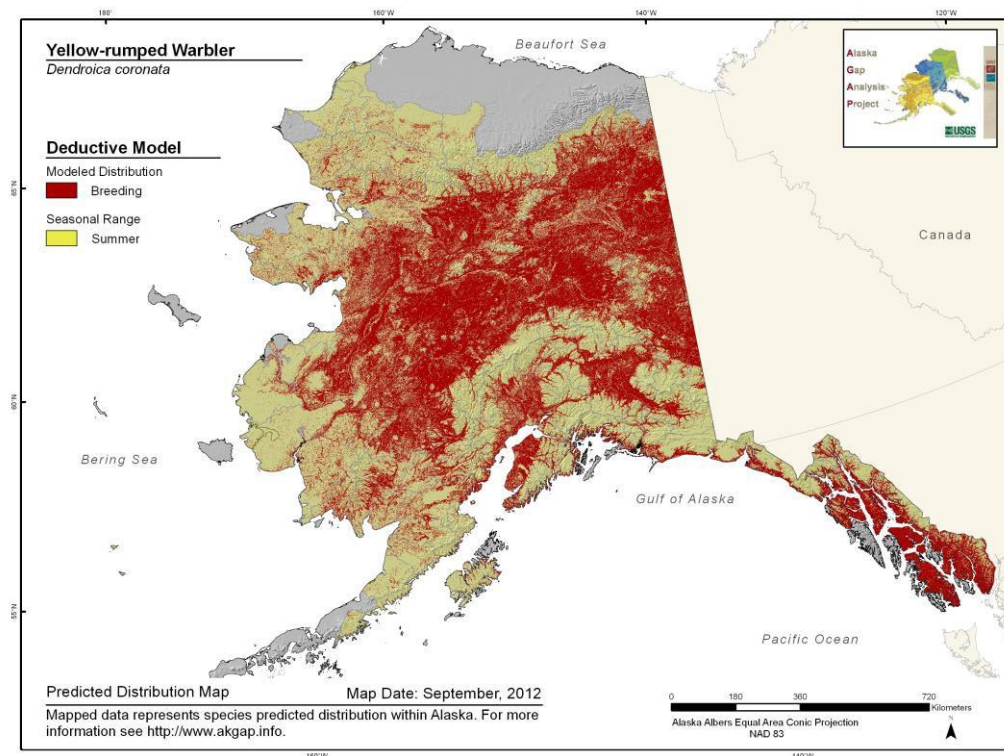
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.647**

**Model Quality
Summary:**
Low

Habitat Description

Mature coniferous and mixed coniferous-deciduous forests (Martin 1960, Franzreb 1978, Noon et al. 1980, Sabo 1980, Douglas et al. 1992). In northern part of range, found in areas where conifers intergrade with aspen and willow forests (Drury 1953, Theberge 1976). Much less common in early successional stages of coniferous forests (Parker et al. 1994) and in hardwoods (Holmes et al. 1986). Found from lowland valleys to treeline in the Yukon (Alexander et al. 2003).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Douglas, D.C., J.T. Ratti, R. A. Black, and J.R. Alldredge. 1992. Avian habitat associations in riparian zones of Idaho's Centennial Mountains. *Wilson Bulletin* 104:485-500.

Drury, W. H. Jr. 1953. Birds of the Saint Elias quadrangle in the southwestern Yukon Territory. *Can. Field Nat.* 67:103-128.

Franzreb, K. E. 1978. Tree species used by birds in logged and unlogged mixed-coniferous forests. *Wilson Bull.* 90: 221-238.

Holmes, R. T., T. W. Sherry, and F. W. Sturges. 1986. Bird community dynamics in a temperate deciduous forest: long-term trends at Hubbard Brook. *Ecological Monographs* 56:201-220.

Martin, N. D. 1960. An analysis of bird populations in relation to forest succession in Algonquin Provincial Park, Ontario. *Ecology* 41: 126-140.

Noon, B. R., D. K. Dawson, D. B. Inkly, C. S. Robbins, and S. H. Anderson. 1980. Consistency in habitat preference of forest bird species. Transactions North American Wildlife Natural Resources Conference 45:226-244.

Parker, G. R., D. G. Kimball, and B. Dalzell. 1994. Bird communities breeding in selected spruce and pine plantations in New Brunswick. Can. Field-Nat. 108: 1-9.

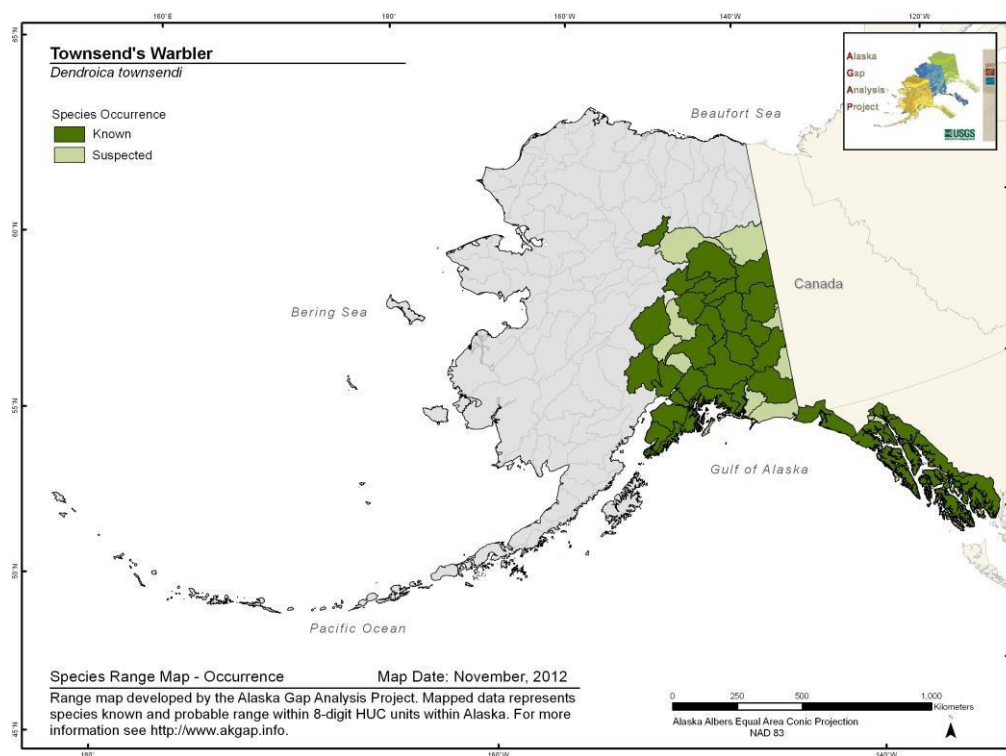
Sabo, S. R. 1980. Niche and habitat relations in subalpine bird communities of the White Mountains of New Hampshire, U.S.A. Ecological Monographs 50:241-60.

Theberge, J. B. 1976. Bird populations in the Kluane Mountains, southwest Yukon, Canada with special reference to vegetation and fire. Can. J. Zool. 54: 1386-1356.

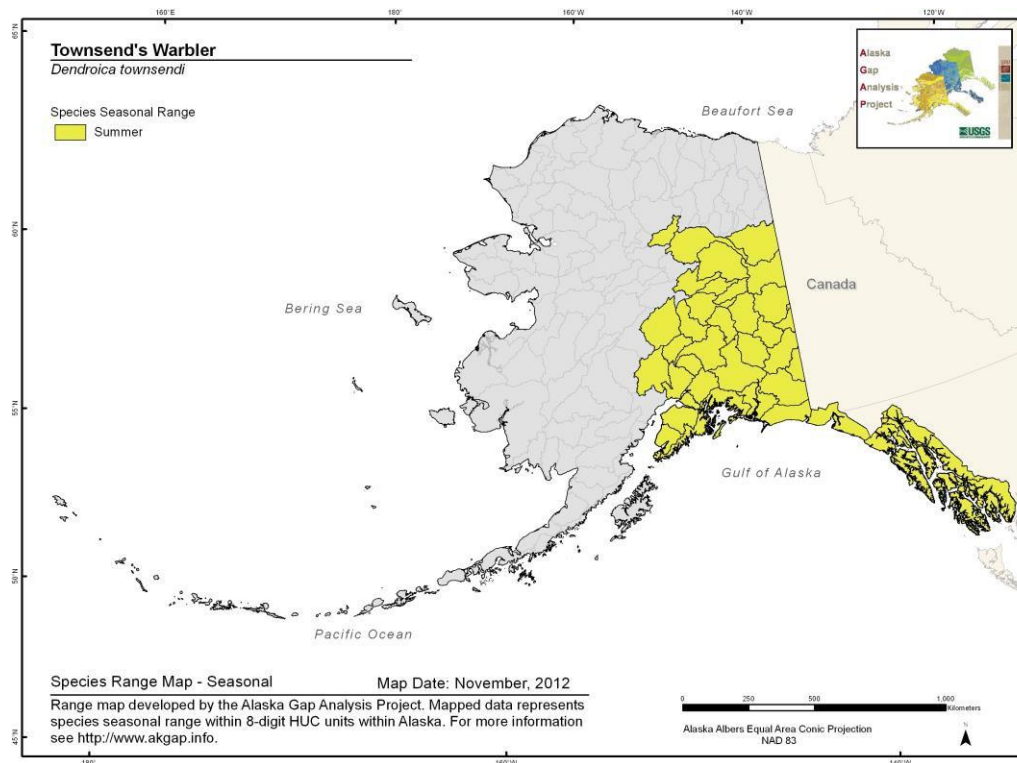
Townsend's Warbler *Dendroica townsendi*

Range Map and Distribution Model Summary

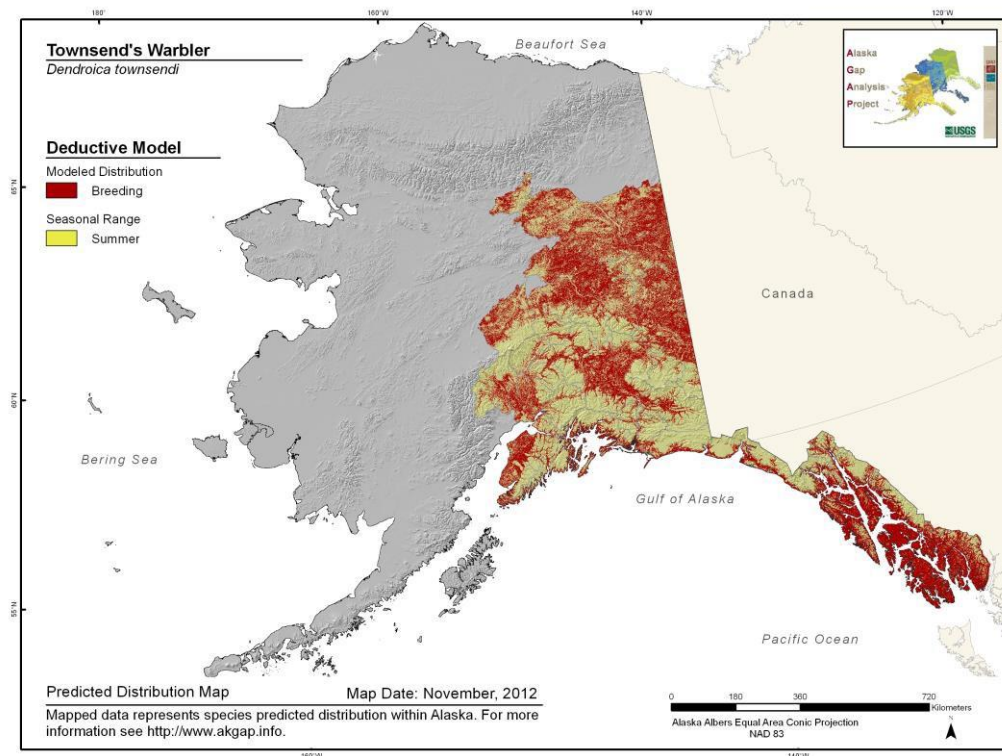
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.698**

**Model Quality
Summary:**
Low

Habitat Description

Prefers contiguous mature and old-growth forests with large (>150 year old) conifers (Mannan and Meslow 1984, Kessler and Kogut 1985, Wetmore et al. 1985, Hejl et al. 1995). Nests almost exclusively in conifers (Mannan et al. 1983, Matsuoka et al. 1997a). Selection of breeding territories more closely associated with selection of nest sites. Near Anchorage, territories are also selected in areas with low densities of alder and steep-sided slopes, the former potentially lowering the risk of nestling infestation by bird blow flies (Matsuoka et al. 1997b). In the Tanana Valley, restricted to mature white spruce forests where breeding density is positively associated with density of white spruce (Spindler and Kessel 1980). In Southeast Alaska, occurs in coniferous forests and muskegs (Andres, personal communication in Andres 1999b).

References

Andres, B.A. 1999b. Landbird conservation plan for Alaska biogeographic regions. Version 1.0. Boreal Partners in Flight Working Group. October 1999. USFWS, Anchorage, Alaska.

Hejl, S. J., R. L. Hutto, C. R. Preston, and D. M. Finch. 1995. Effects of silvicultural treatments in the Rocky Mountains. Pages 220-244 in T.E. Martin and D.M. Finch, editors. Ecology and management of neotropical migratory birds. Oxford University Press, New York.

Kessler, W. B. and T. E. Kogut. 1985. Habitat orientations of forest birds in southeastern Alaska. Northwest Science 59:58-65.

Mannan, R. W. and E. C. Meslow. 1984. Bird populations and vegetation characteristics in managed and old-growth forests, northeastern Oregon. Journal of Wildlife Management 48:1219-1238.

Mannan, R. W., B.S. Hale, and M. L. Morrison. 1983. Observations of nesting Townsends Warblers in northeastern Oregon. Murrelet 64:23-25.

Matsuoka, S., C. Handel, and D. Roby. 1997a. Nesting ecology of Townsends warblers in relation to habitat characteristics in a mature boreal forest. *Condor* 99:271-281.

Matsuoka, S.M., C.M. Handel, D.D. Roby, and D.L. Thomas. 1997b. The relative importance of nest sites and foraging sites in selection of breeding territories by Townsends Warblers. *Auk* 114:657-667.

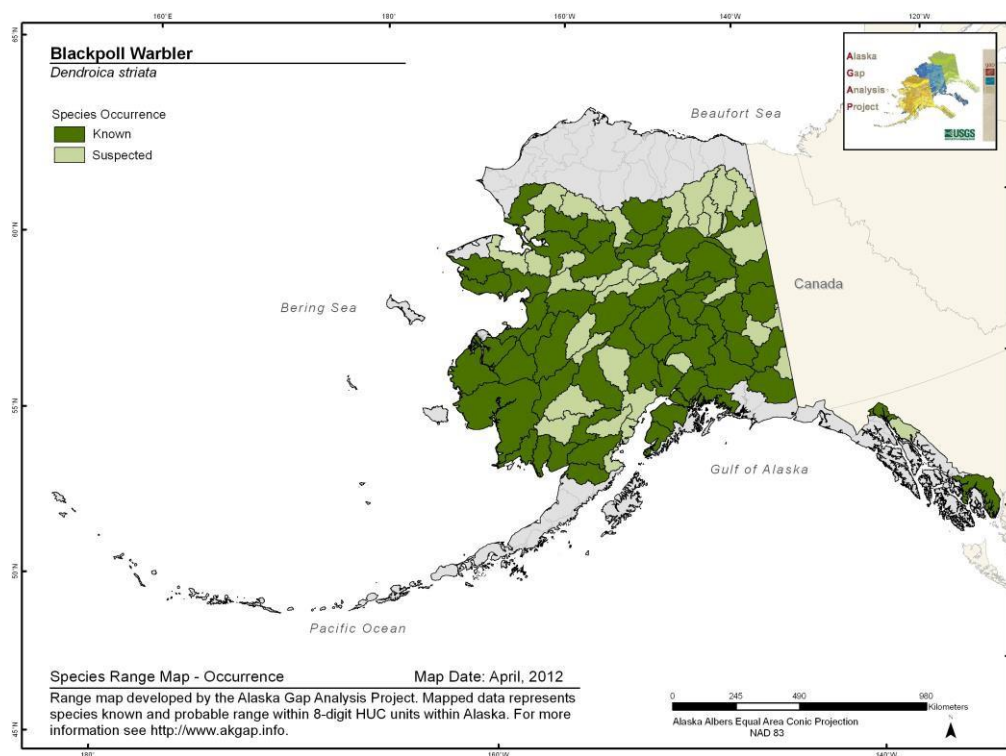
Spindler, M. A. and B. A. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. *Syesis* 13:61-104.

Wetmore, S. P, R. A. Keller, and G. E. John Smith. 1985. Effects of logging on bird populations in British Columbia as determined by a modified point-count method. *Can. Field Nat.* 99: 224-233.

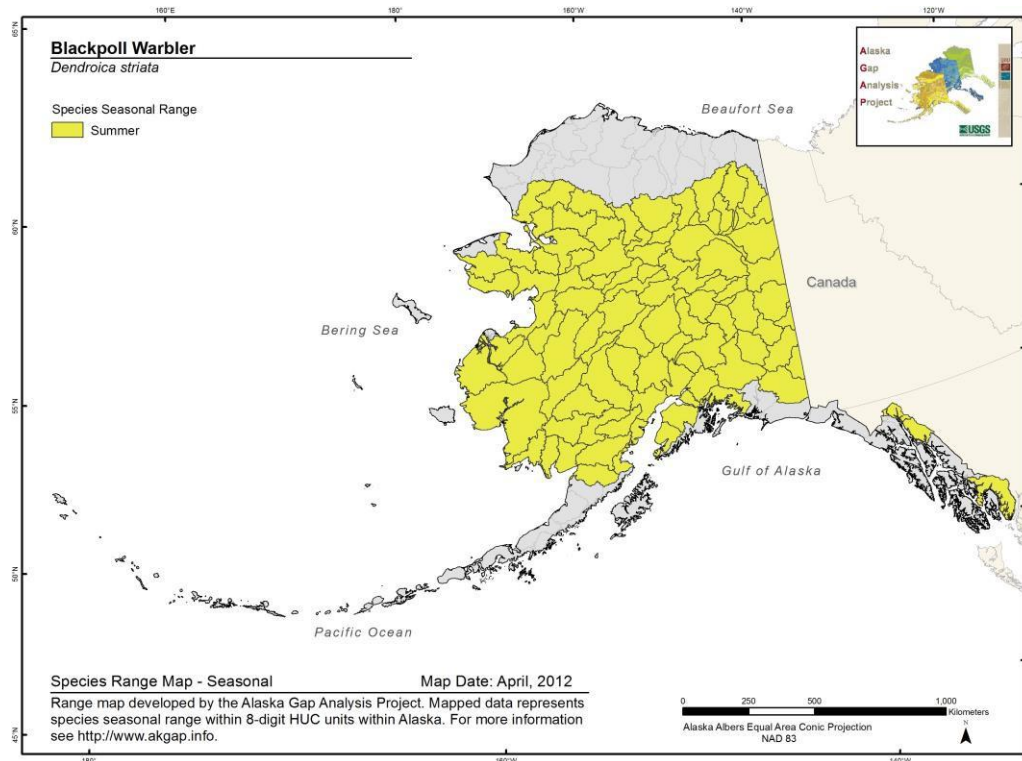
Blackpoll Warbler *Dendroica striata*

Range Map and Distribution Model Summary

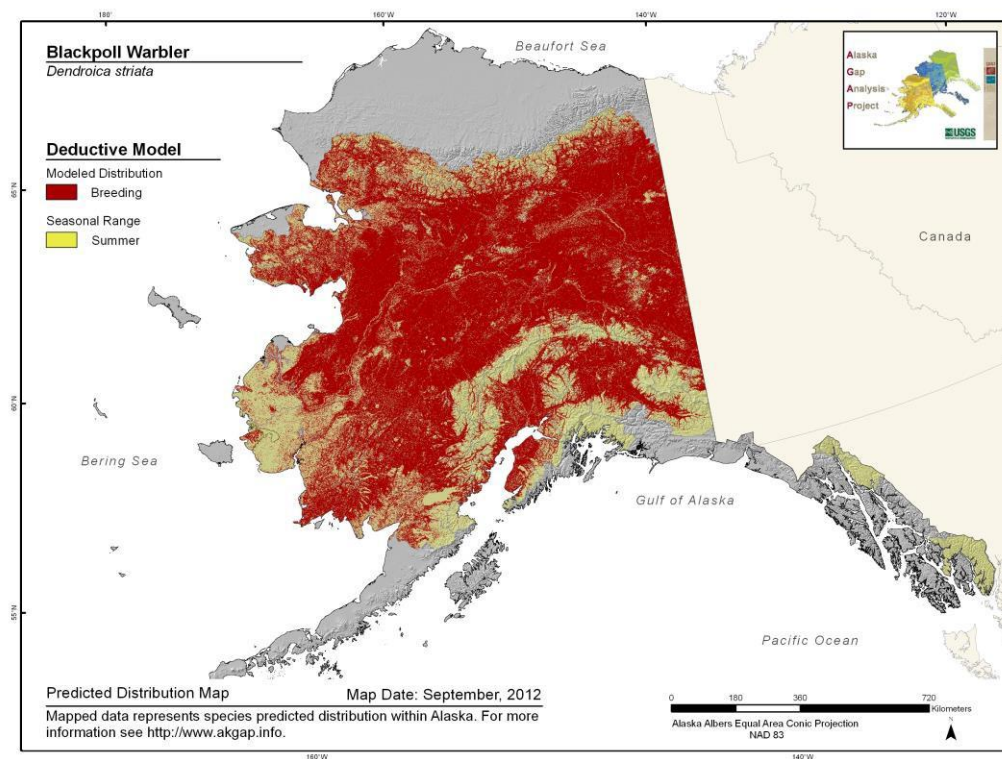
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.506**

**Model Quality
Summary:**
Low

Habitat Description

Within Alaska, predominantly along rivers, streams, or bogs in mixed or coniferous forests and tall shrub thickets (especially *Salix alaxensis* and *Alnus incana*) with black or white spruce (particularly in central Alaska) or mixed spruce-paper birch overstory (*Betula papyrifera*; Gabrielson and Lincoln 1959, Kessel 1989, McCaffery 1996, Kessel 1998, Cotter and Andres 2000). Also inhabits riparian areas and ecotones between treeline taiga and alpine or coastal tundra (Kessel 1998, Kessel and Gibson 1978). Breeding density highest in riparian habitats in western Alaska (McCaffery 1996, Harwood 2002). In B. C., breeds from 350 to 1100 m (Campbell et al. 2001). During a survey, BLPW was observed in black spruce bog, shrub swamp, boreal white spruce-balsam poplar riparian, and montane shrub-grassland in order of numbers observed. Within these habitats occupied wet edge habitat dominated by spruce or willow fingers of wet meadows (Enns and Siddle 1996).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

Enns, K. and C. Siddle. 1996. The distribution, abundance, and habitat requirements of selected passerine birds of the boreal and taiga plains of British Columbia. British Columbia Ministry of Environment, Lands, and Parks, Wildlife Branch, Wildlife Working Report No. WR-76, Victoria. 44 pp.

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

Harwood, C. M. 2002. 2002 Lower Yukon River Watershed Breeding Bird Survey (BBS). Unpublished report, USFWS Yukon Delta National Wildlife Refuge.

Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

Kessel, B. 1998. Habitat characteristics of some passerine birds in western North American taiga. University of Alaska Press, Fairbanks, AK.

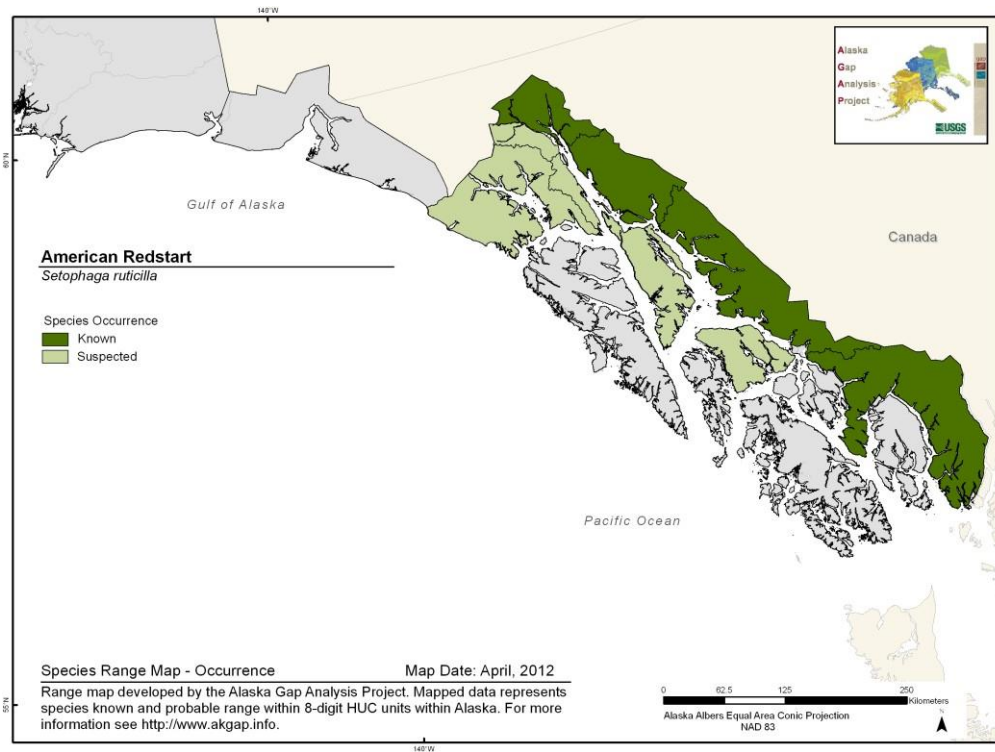
Kessel, B., and D.D. Gibson. 1978. Status and distribution of Alaska birds. Studies Avian Biology. In: Studies in Avian Biology No. 1. R. J. Raitt, Ed. Cooper Ornithological Society. 1:1-100.

McCaffery, B.J. 1996. Distribution and relative abundance of gray-cheeked thrush (*CATHARUS MINIMUS*) and blackpoll warbler (*DENDROICA STRIATA*) on Yukon Delta National Wildlife Refuge, Alaska. Unpub. Report USFWS. Bethel, Alaska.

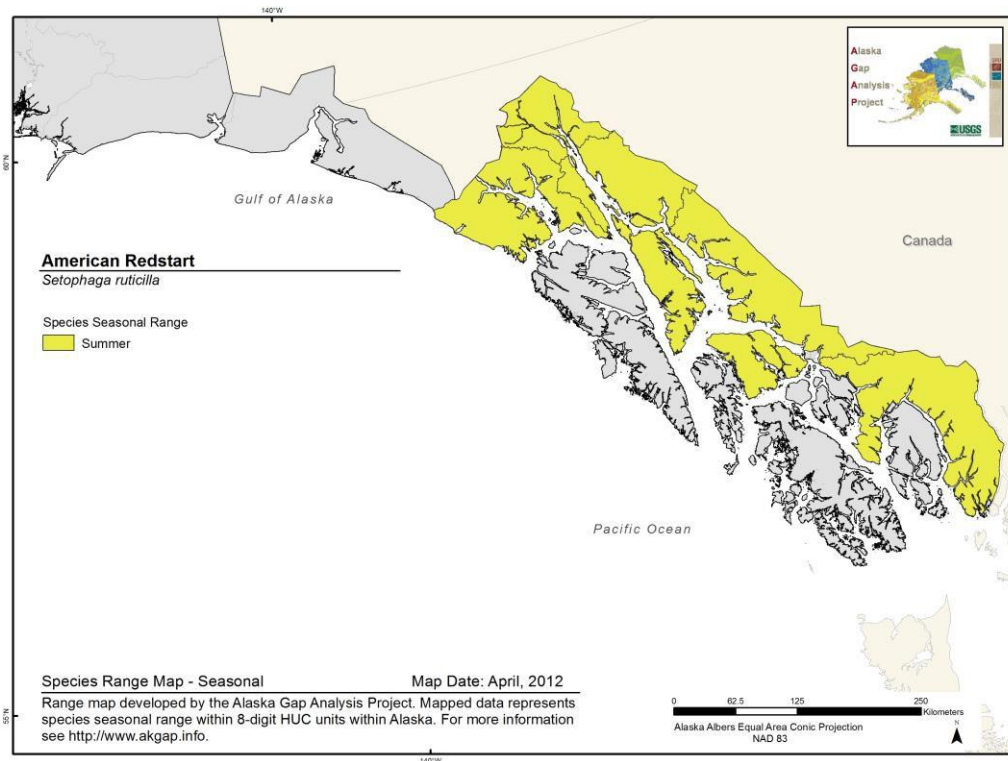
American Redstart *Setophaga ruticilla*

Range Map and Distribution Model Summary

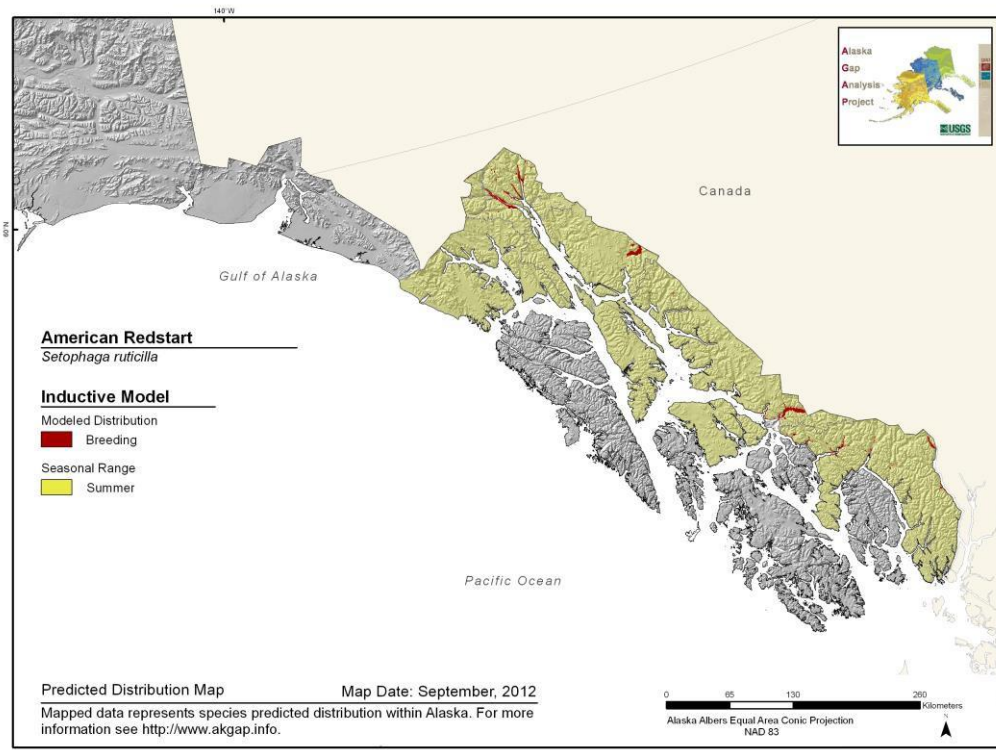
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.818**

**Model Quality
Summary:**
Moderate

Habitat Description

Most occurrences in deciduous forests in Southeast Alaska (Armstrong 2008). In northern and western part of range, inhabits moist, deciduous, second growth and mature woodlands with abundant shrubs and often near water (Baker 1944, Bent 1953, Hamel et al. 1982, De Graaf 1985, Peck and James 1987, Sallabanks 1993, Hunt 1996). Also occurs in alder and willow thickets, second-growth woodlands, thickets in treefall gaps in old-growth, orchards, and mixed forests (Sherry and Holmes 1997). Prefers willow and alder thickets, riparian woodlands, and coniferous woodlands in the west (Sallabanks 1993).

References

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Baker, B. W. 1944. Nesting of the American Redstart. Wilson Bulletin 56:83-90.

Bent, A. C. 1953. Life histories of North American wood warblers. U.S. Natl. Mus. Bull. 203. Washington, DC.

DeGraaf, R. M. 1985. Breeding bird assemblages in New England northern hardwoods. Pages 5-22 in R. J. Regan and D. E. Capen (editors). Conference Proceedings: The impact of timber management practices on nongame birds in Vermont. Montpelier, Vermont.

Hamel, P. B., H. E. LeGrand Jr., M. R. Lennartz, and S. A. Gauthreaux, Jr. 1982. Bird-habitat relationships on southeastern forest lands. USFS General Technical Report SE-22.

Hunt, P. D. 1996. Habitat selection by American Redstarts along a successional gradient in northern hardwoods forest: evaluation of habitat quality. Auk 113:875-888.

Peck, G.K., and R.D. James. 1987. Breeding birds of Ontario: nidiology and distribution, volume 2. Passerines. Royal Ontario Museum, Toronto, Ontario.

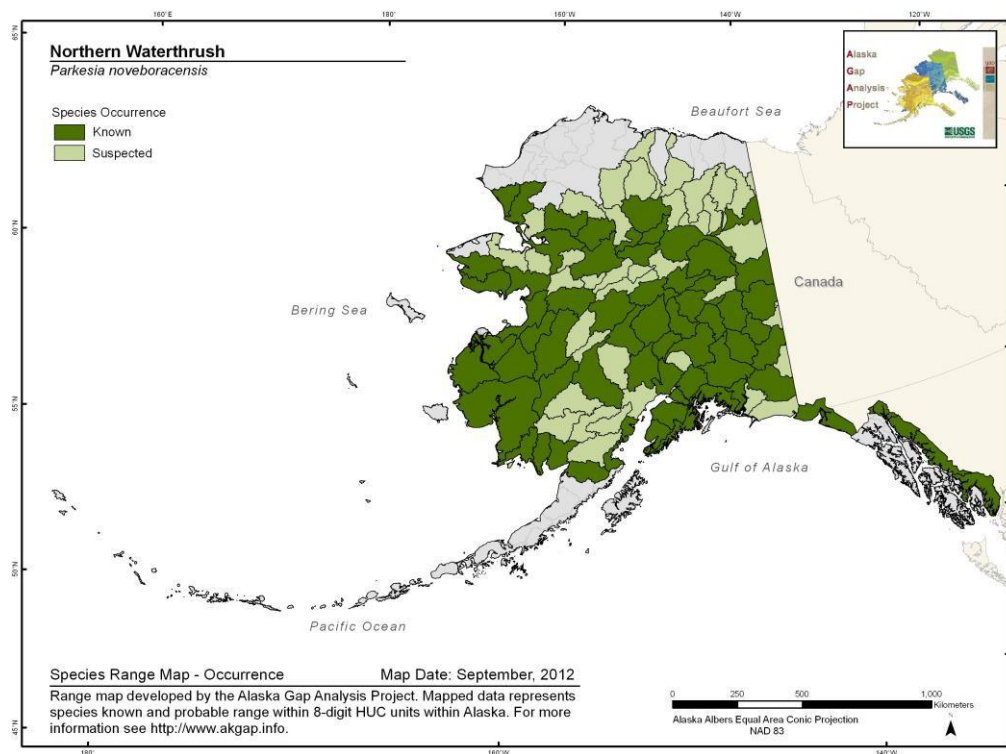
Sallabanks, R. 1993. *Setophaga ruticilla* (American Redstart). Element Stewardship Abstract Report. The Nature Conservancy, Conservation Science Division, in association with the Network of Natural Heritage Programs and Conservation Data Centers, Arlington, VA.

Sherry, T.W., and R.T. Holmes. 1997. American Redstart (*Setophaga ruticilla*). In *The Birds of North America*, No. 277 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

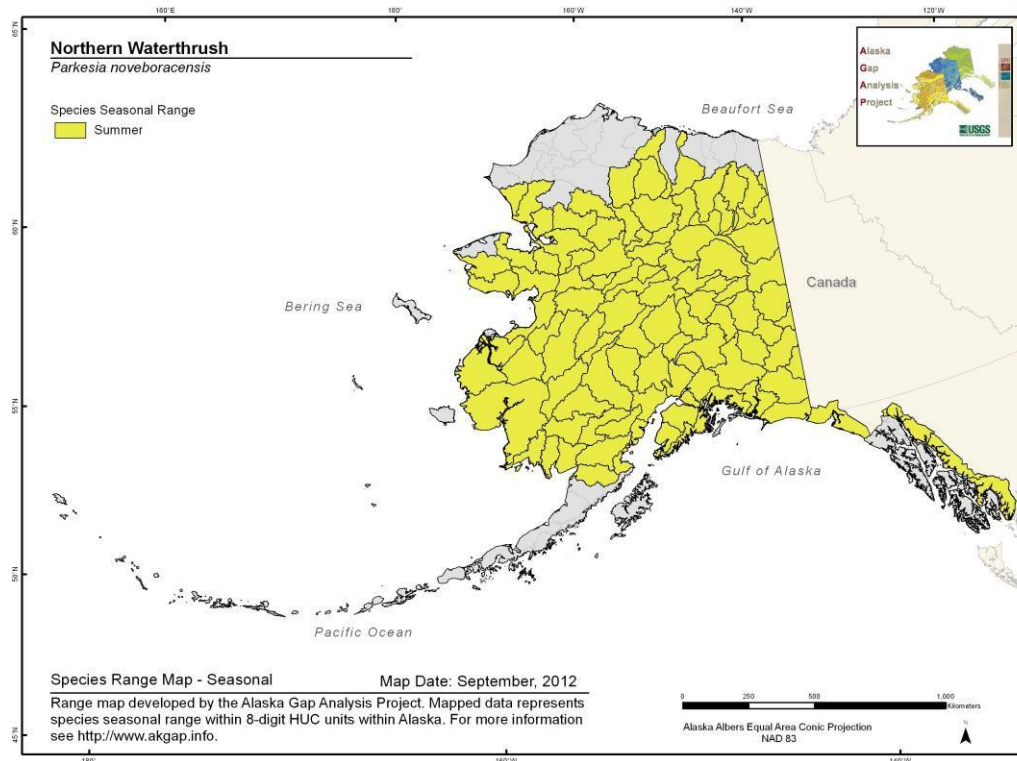
Northern Waterthrush *Parkesia noveboracensis*

Range Map and Distribution Model Summary

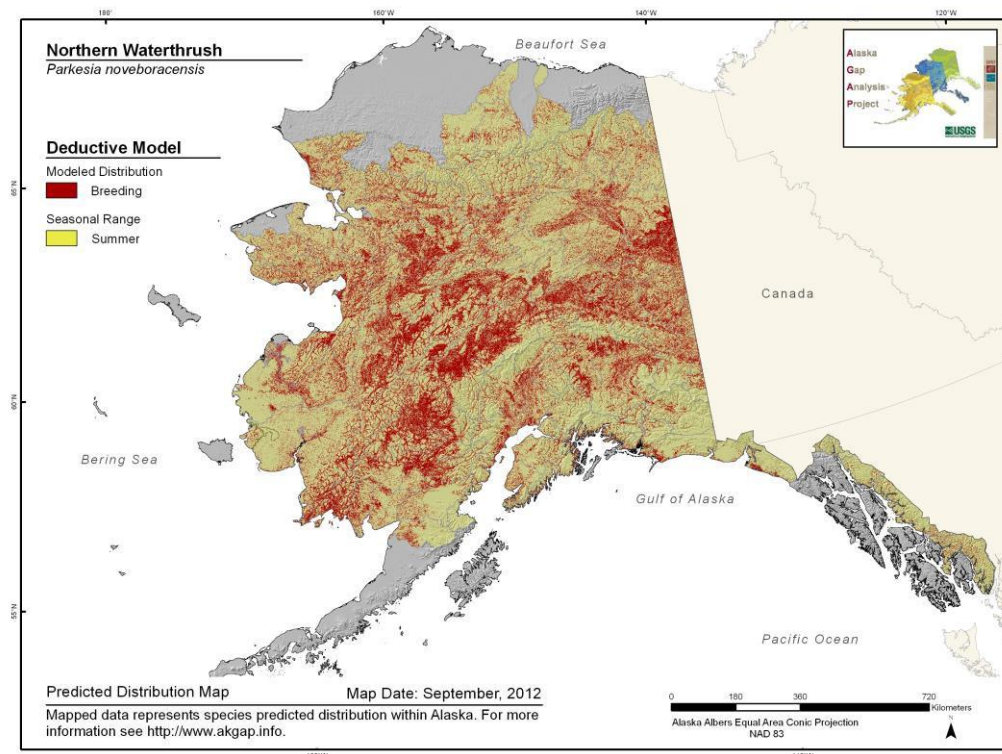
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.515**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in cool, dark wooded swamps, thickets of bogs, near northern lakes and willow and alder riparian areas (Godfrey 1986, Peck and James 1987), often associated with water and shrubs (Alexander et al. 2003). In Alaska, mainly nests in spruce bogs, along alder and willow riparian areas, and along lakes, swamps, and wet woodlands (Godfrey 1986). In B.C., nests between 405 and 1,350 m elevation (Campbell et al. 2001).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

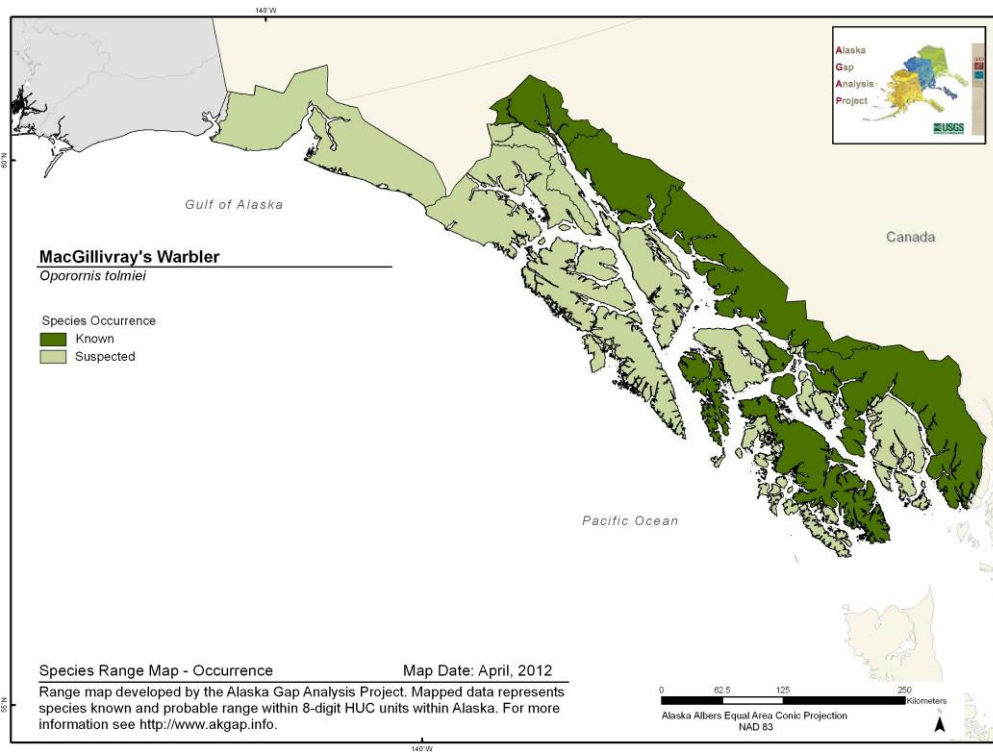
Godfrey, W. E. 1986. The Birds of Canada. Revised edition. National Museum of Natural Sciences, Ottawa, Canada. 595 pp.

Peck, G.K., and R.D. James. 1987. Breeding birds of Ontario: nidiology and distribution, volume 2. Passerines. Royal Ontario Museum, Toronto, Ontario.

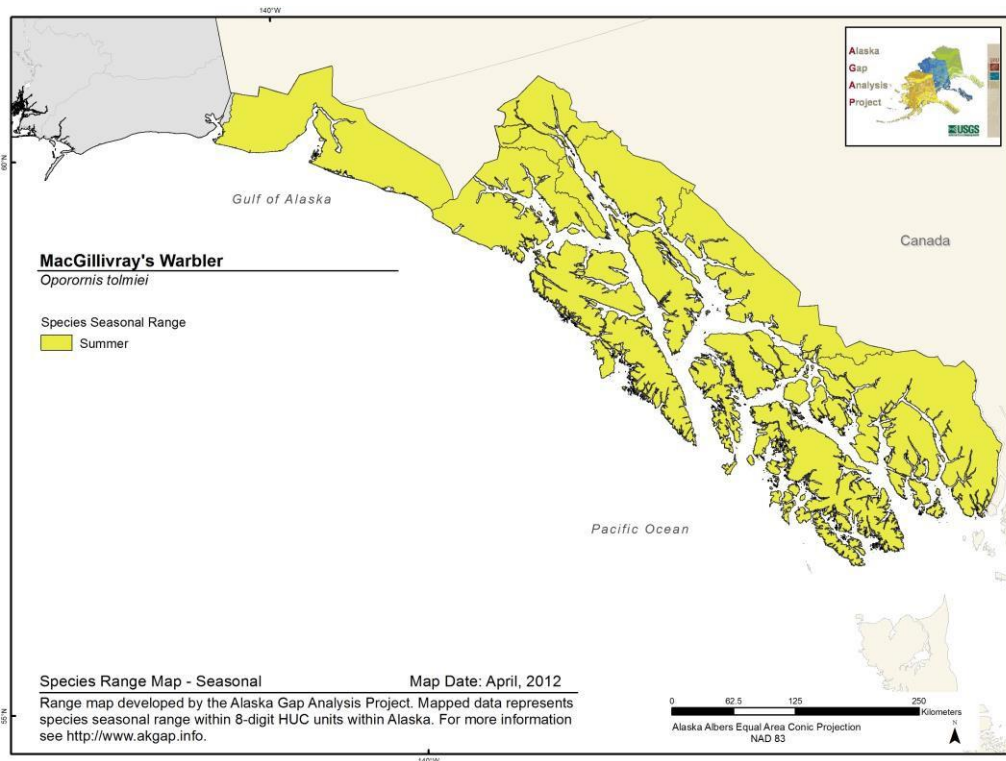
Macgillivray's Warbler *Oporornis tolmiei*

Range Map and Distribution Model Summary

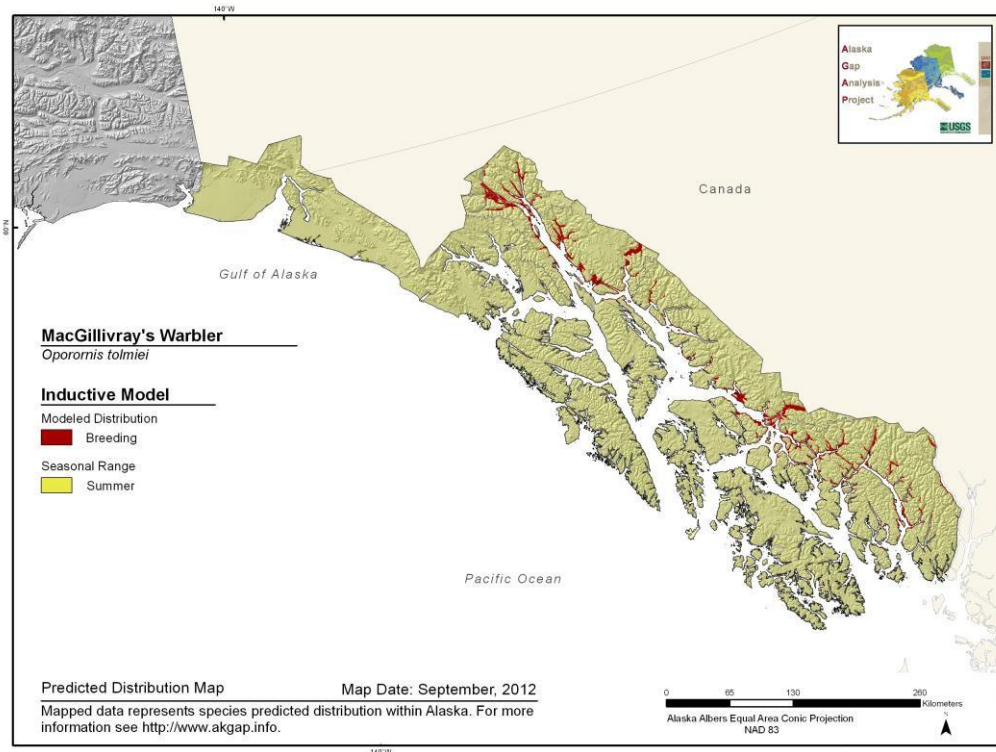
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.75**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabits coniferous forest clearcuts with spruce and Douglas-fir or mixed deciduous forests with birch, aspen and poplar during the breeding season. Habitat characteristics include dense undergrowth of shrubs and moderate cover (Morrison and Meslow 1983). In Alaska, found in shrubs along hemlock/spruce edges, deciduous woodlands with shrubs, clearcuts, and riparian shrubs (Pogson et al. 1999). In B.C. breeds from sea level to at least 1,500 m (Munro 1947) on the coast and from 380 to at least 2,000 m in the interior (Campbell et al. 2001).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Morrison, M.L., and C. Meslow. 1983. Bird community structure in early-growth clearcuts in western Oregon. *American Midland Naturalist* 110:129-137.

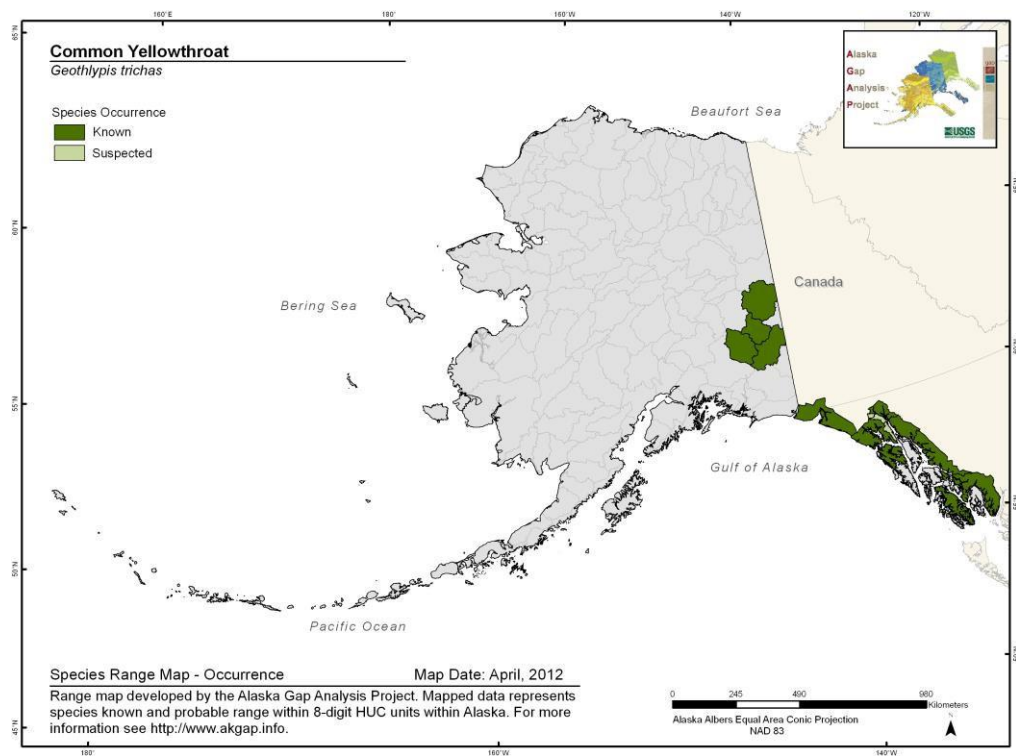
Munro, J. A. 1947. Observations of birds and mammals in central British Columbia. British Columbia Provincial Museum Occasional Paper No. 6, Victoria. 165 pp.

Pogson, T.H., S.E. Quinlan, and B. Lehnhausen. 1999. A manual of selected neotropical migrants of Alaska national forests. E. Campbell and N. Andison (eds.). USDA, USFS, Juneau, Alaska.

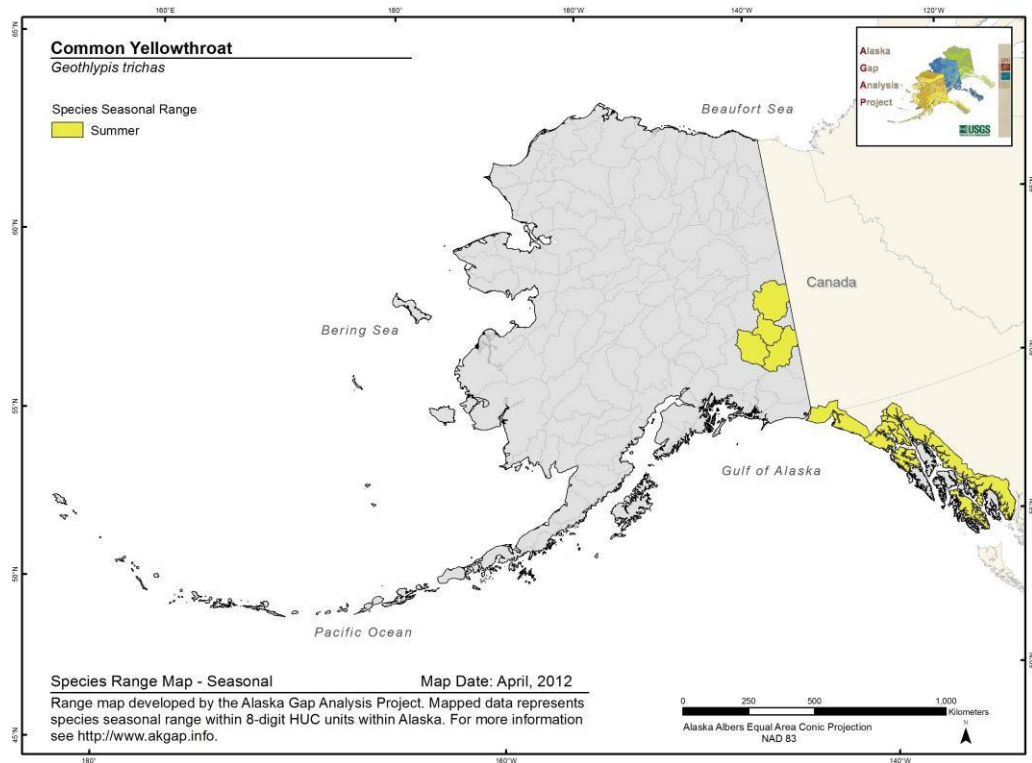
Common Yellowthroat *Geothlypis trichas*

Range Map and Distribution Model Summary

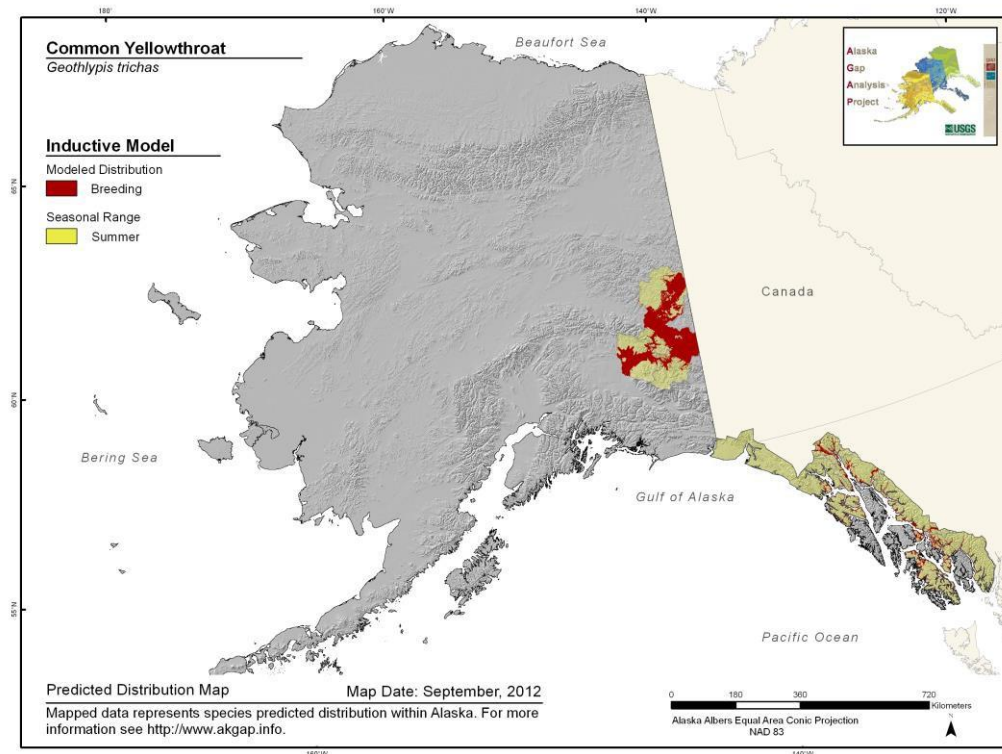
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.889**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in riparian areas, such as densely vegetated wetlands, shallow lakes and ponds, sedge-grass-bulrush meadows, estuarine salt marshes, marshy borders of rivers, beaver ponds, sewage lagoons, roadsides, ditches, riparian scrub, permanent ponds in fields, wooded swamps, regenerating trembling aspen clearcuts (Phinney 1998), abandoned quarries, and similar habits dominated by emergent vegetation, including tall sedges, reedbeds, stands of cattails, sweetgale, and willow (Campbell et al. 2001). Has also been reported in drier habitats along the edges of agricultural lands, airport runways, tall grasses bordered by shrubs, and even in the undergrowth of a mixed forest of conifer and trembling aspen (Pojar 1993).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

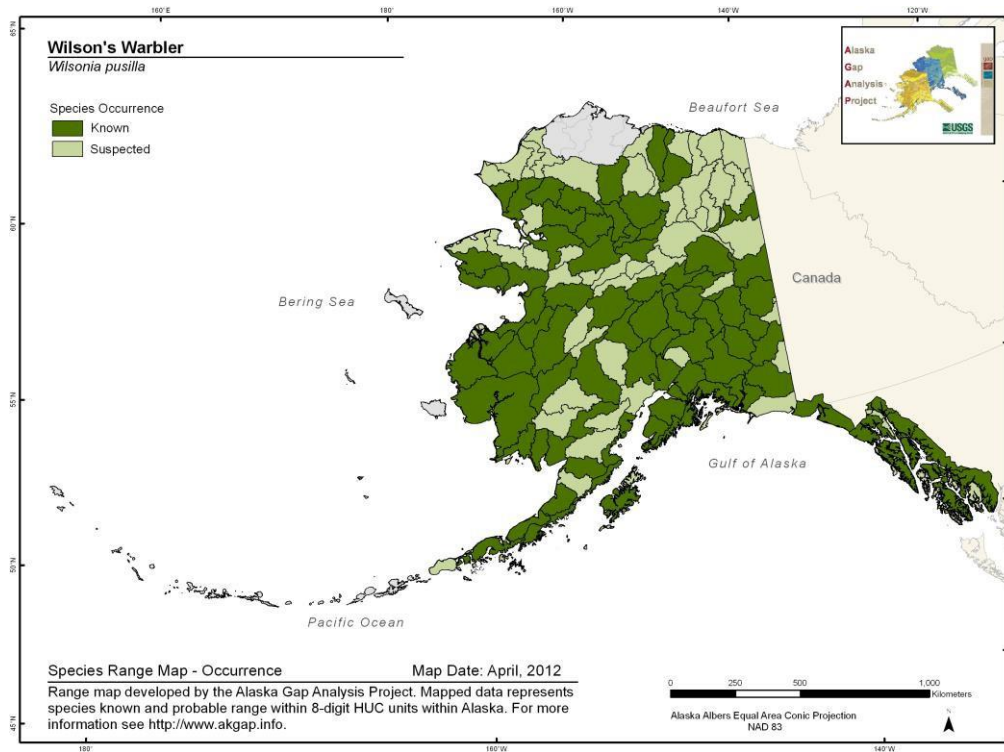
Phinney, M. 1998. Spring and summer birds of Dawson Creek, 1991-1995. WBT Wild Bird Trust of British Columbia Wildlife Report No. 4, West Vancouver. 60 pp.

Pojar, R. A. 1993. The diversity of bird communities in interior aspen forests in the western end of the dry cool subzone of the sub-boreal spruce (SSBS dk) in the Prince Rupert forest region - baseline studies. British Columbia Forest Service Unpublished Report, Victoria. 74 pp.

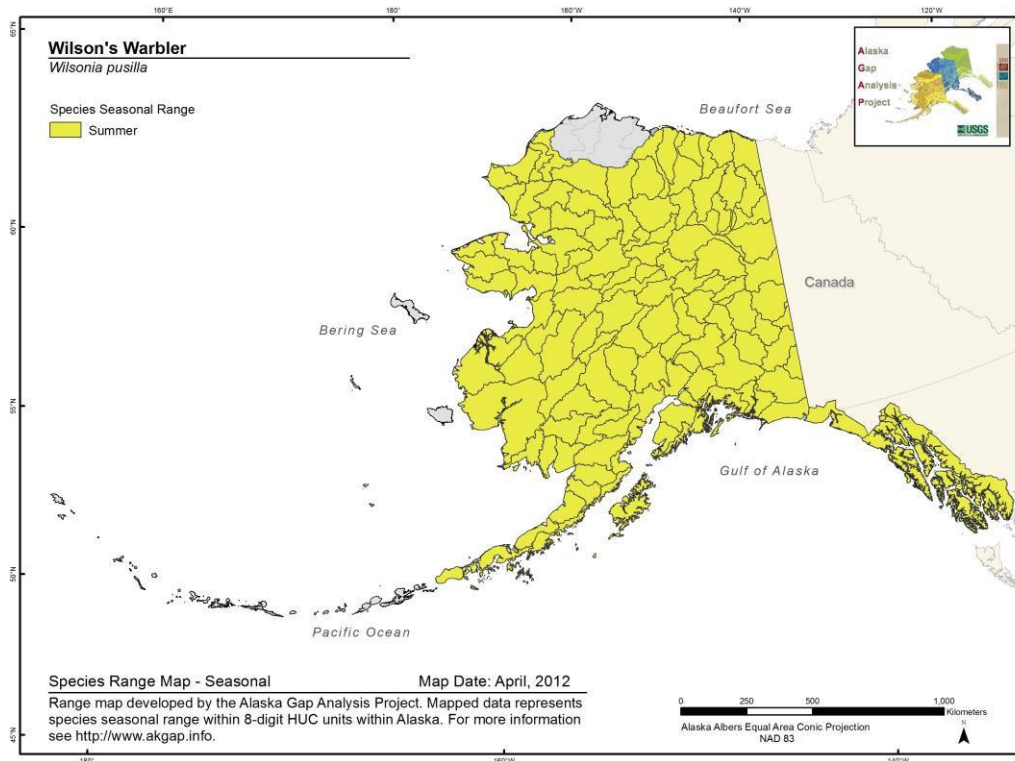
Wilson's Warbler *Wilsonia pusilla*

Range Map and Distribution Model Summary

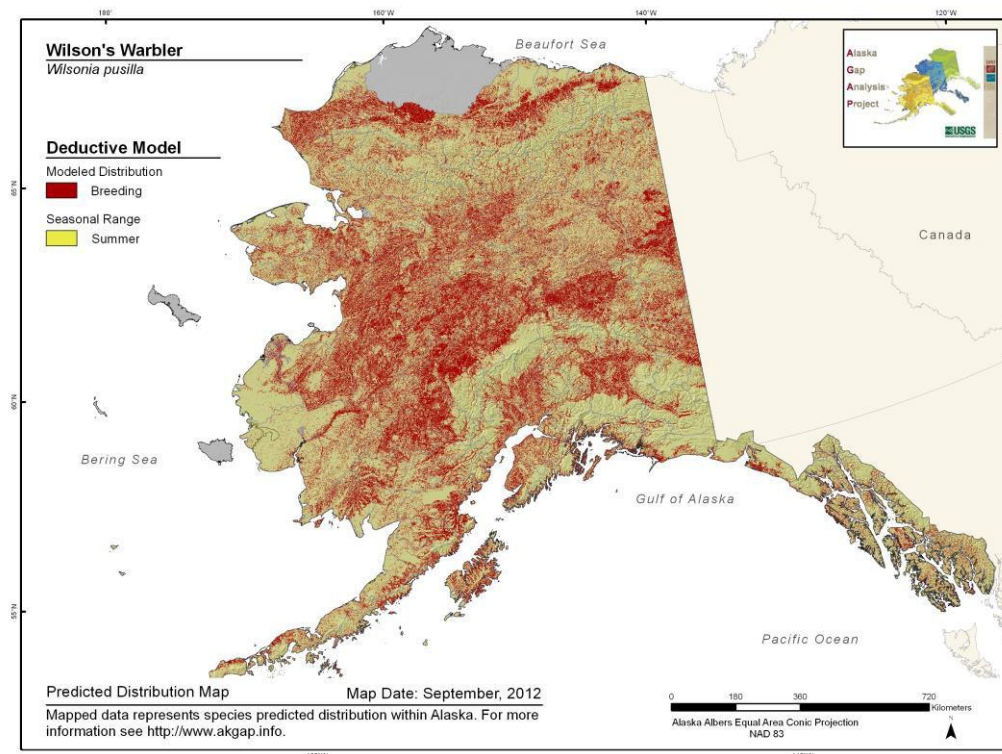
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.519**

**Model Quality
Summary:**
Low

Habitat Description

Open areas in moist mixed deciduous-coniferous woodlands, bogs with scattered trees, and shrub thickets (NatureServe 2007b). Also found in avalanche chutes on steep slopes (Campbell et al. 2001). In Yukon, commonly found in medium to tall shrubs (willow, alder, and dwarf birch; Alexander et al. 2003). Often associated with wetlands, creeks, rivers, lake edges, subalpine areas, and burns (Alexander et al. 2003). Also, overgrown clear-cuts in montane and boreal zone. May occur in alpine zone (Finch 1989). In Alaska, density is associated with percent shrub cover (Cotter and Andres 2000). In B.C., breeds from sea level on the coast to timberline in the mountains (Campbell et al. 2001).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

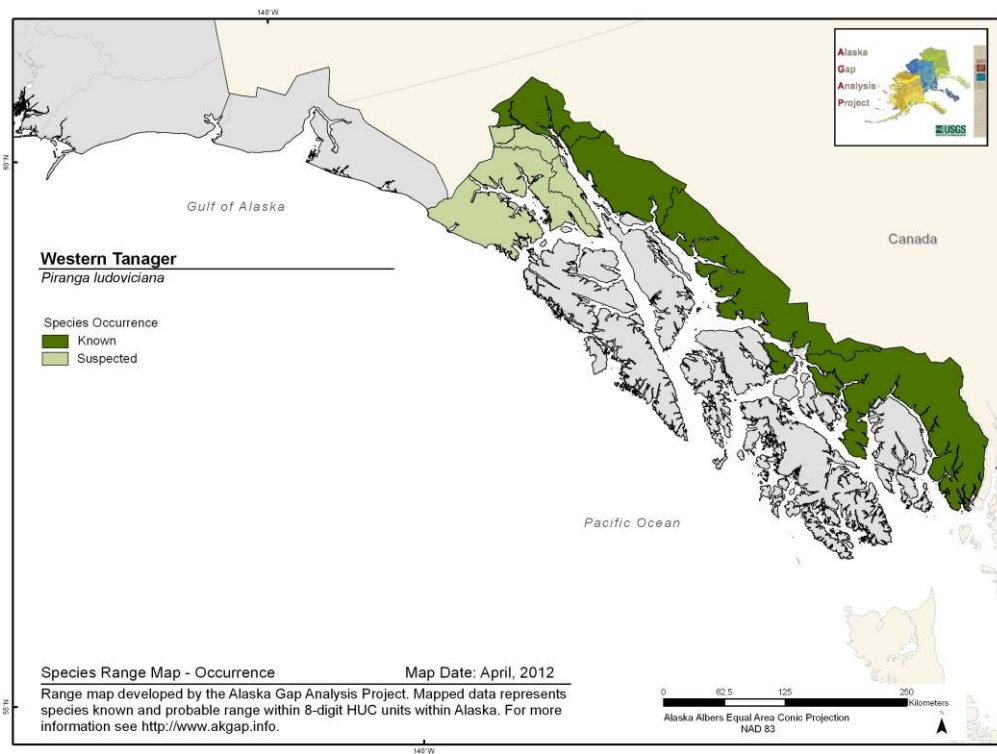
Finch, D. 1989. Habitat use and habitat overlap of riparian birds in three elevational zones. Ecology 70:866-880.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

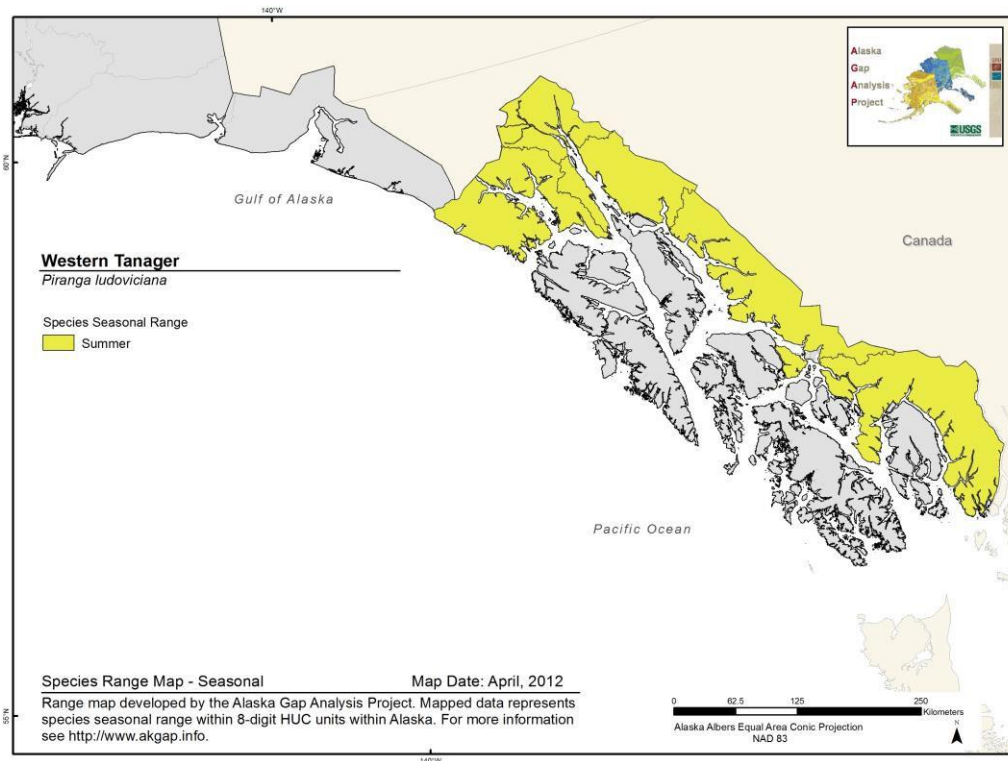
Western Tanager *Piranga ludoviciana*

Range Map and Distribution Model Summary

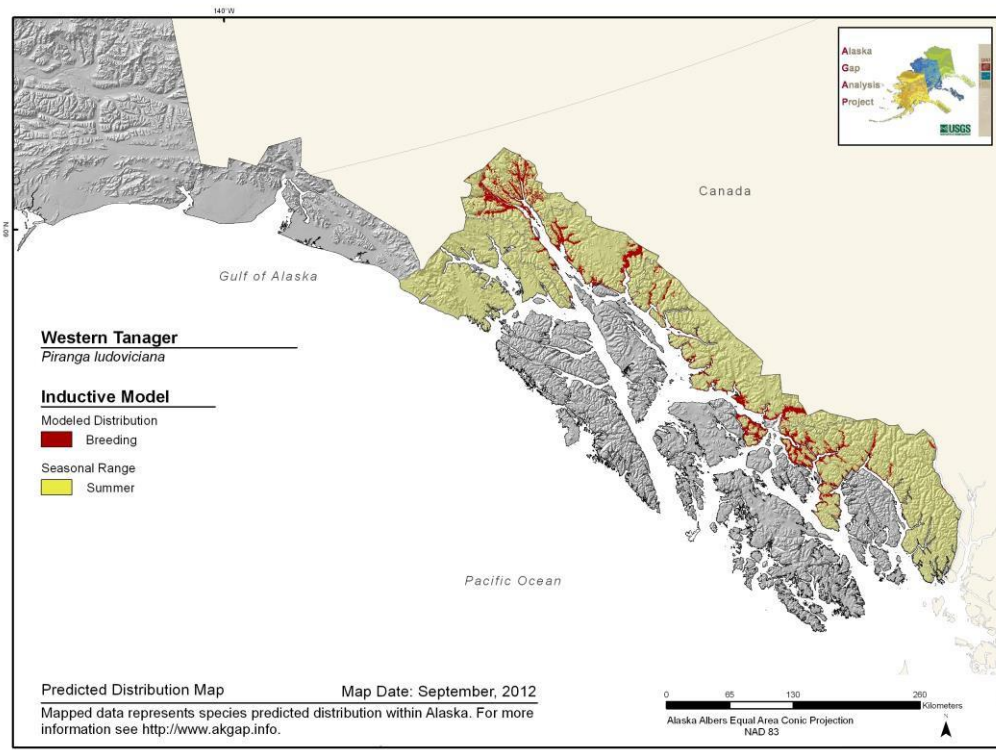
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.917**

**Model Quality
Summary:**
High

Habitat Description

Open coniferous and mixed coniferous woodlands; Douglas fir, ponderosa pine, lodgepole pine, spruce fir, mixed coniferous, riparian woodlands (Jewett et al. 1953, Kessel and Gibson 1976, Francis and Lumbis 1980, Walters 1983, Andrews and Righter 1992, Small 1994). Often found at the edge of western Hemlock/ Sitka spruce forests in southeast Alaska (Armstrong 2008) and numerous in edge and ecotone habitats elsewhere, such as openings for beaver ponds, meadows, and tree copses (Campbell et al. 2001).

References

Andrews, R. and R. Righter. 1992. Colorado birds: a reference to their distribution and habitat. Denver Mus. Nat. Hist., Denver, CO.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Francis, J. and K. Lumbis. 1980. Habitat relationships and management of terrestrial birds in northeastern Alberta. Prep for the Alberta Oil Sands Environmental Research Program by Canadian Wildlife Service, Edmonton. AOSERP report no. 78.

Jewett, S. G., W. P. Taylor, W.T. Shaw, and J. W. Aldrich. 1953. Birds of Washington State. University of Washington Press, Seattle, Washington.

Kessel, B. and D. D. Gibson. 1976. Status and distribution of Alaska birds. Stud. Avian Biol. no. 1.

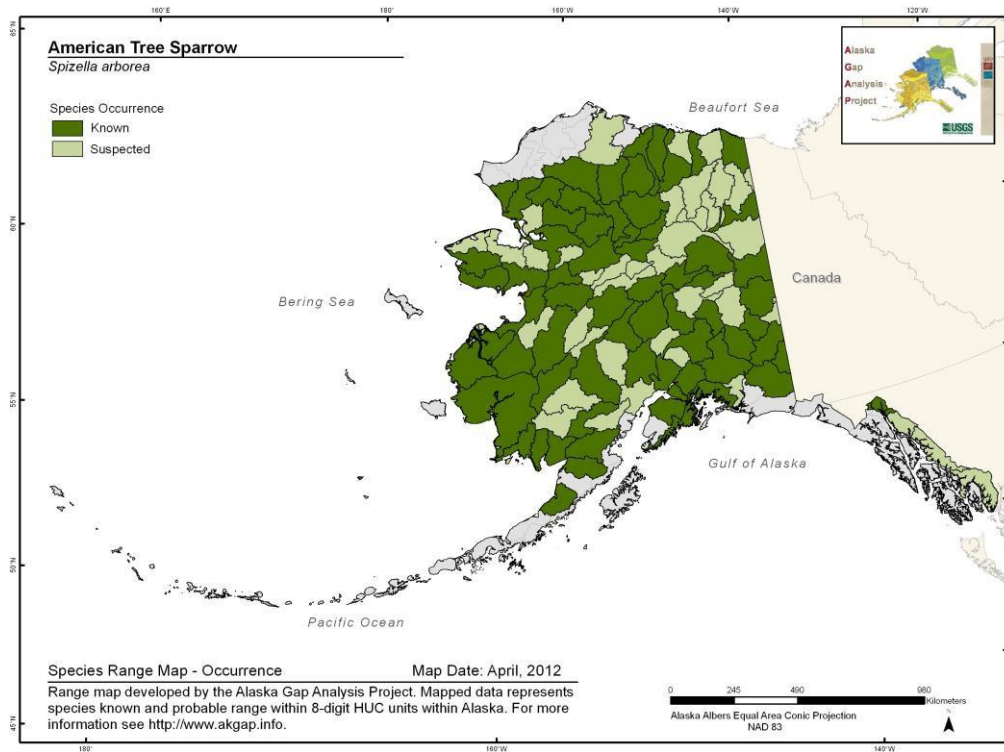
Small, A. 1994. California birds: their status and distribution. Ibis Publ. Co., Vista, CA.

Walters, R. E., ed. 1983. Utah bird distribution: latilong study 1983. Utah Div. Wildl. Res., Salt Lake City.

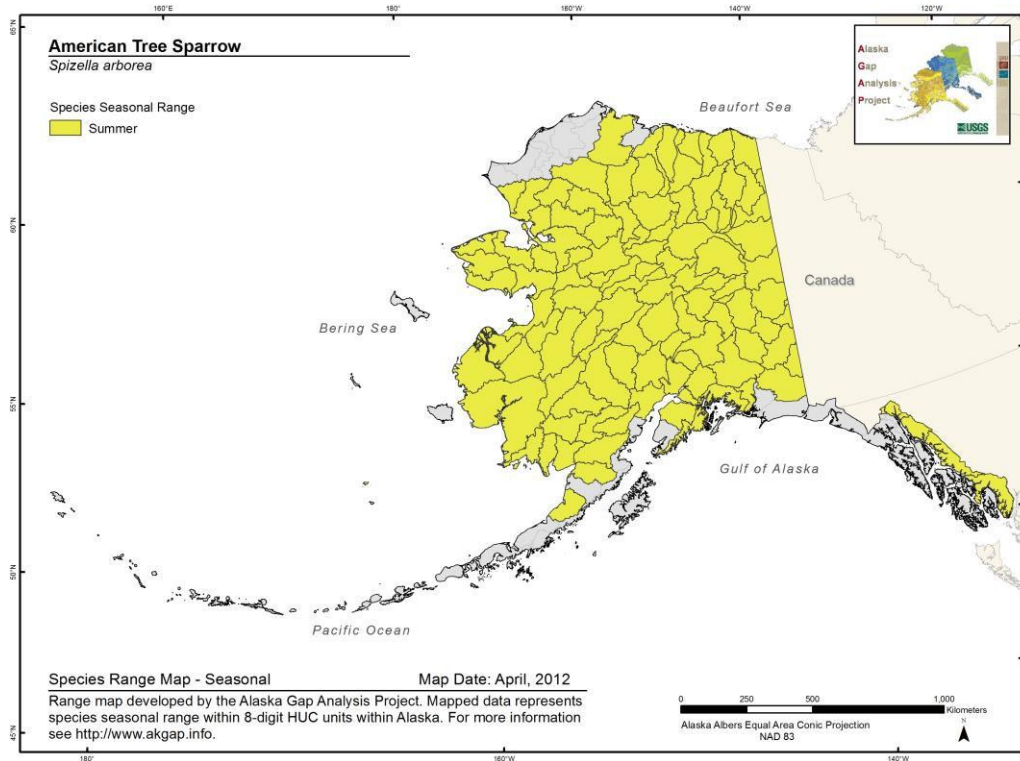
American Tree Sparrow *Spizella arborea*

Range Map and Distribution Model Summary

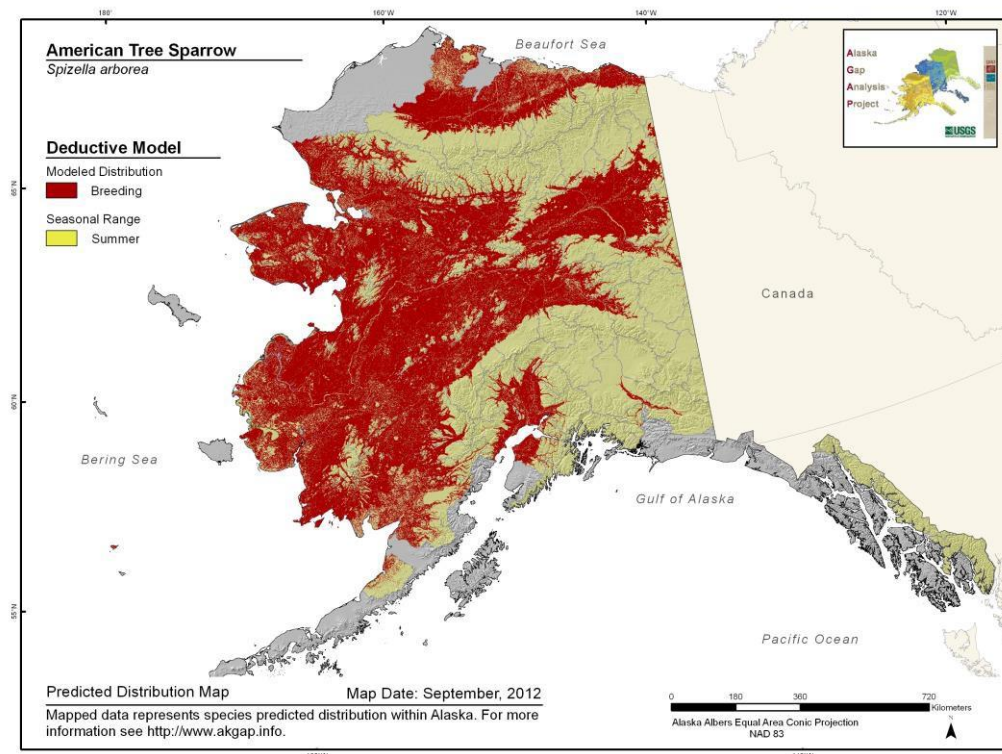
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.582**

**Model Quality
Summary:**
Low

Habitat Description

Typically breeds near treeline. Open shrubby areas of willow, birch, alder, stunted spruce and open tundra with scattered shrubs common breeding habitat. Small trees used as singing posts. Often near water, such as lakes or bogs (Naugler 1993). In B. C., nests in elevations between 800 and 1,400 m. Nesting habitat is near the altitudinal limit of trees, where subalpine meadows and wet or marshy wetlands are interspersed with willow thickets from a few centimeters to 2 m or more. Spruce, subalpine fir, and scrub birch are often present (Campbell et al. 2001).

References

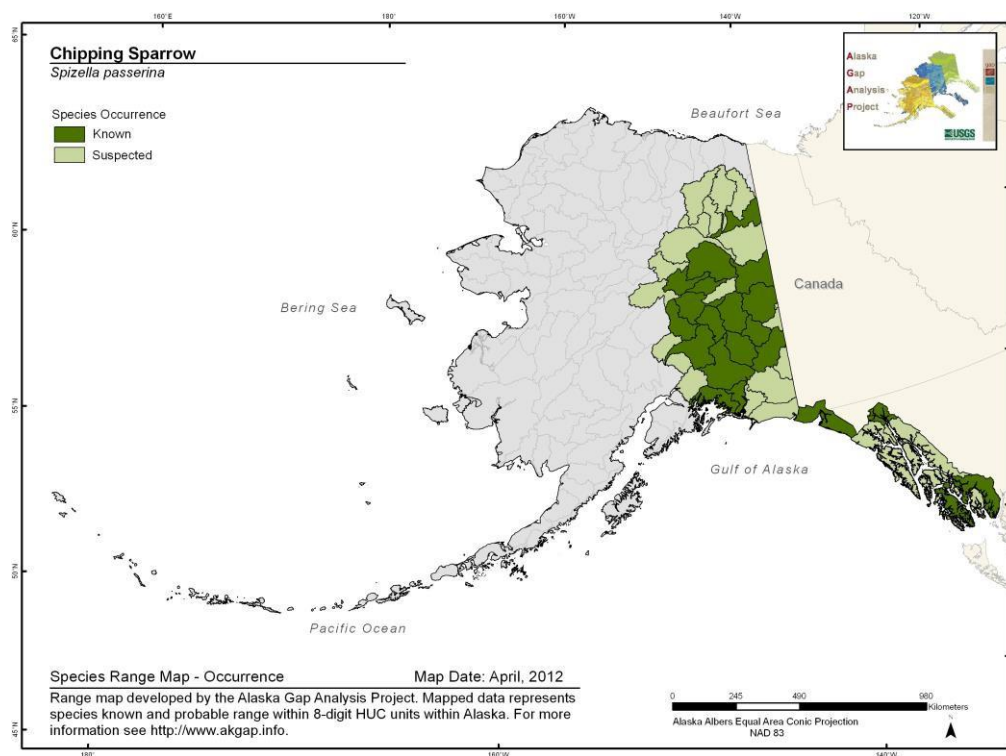
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Naugler, C. T. 1993. American Tree Sparrow (*Spizella arborea*). In The Birds of North America, Vol. 7, No. 37 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

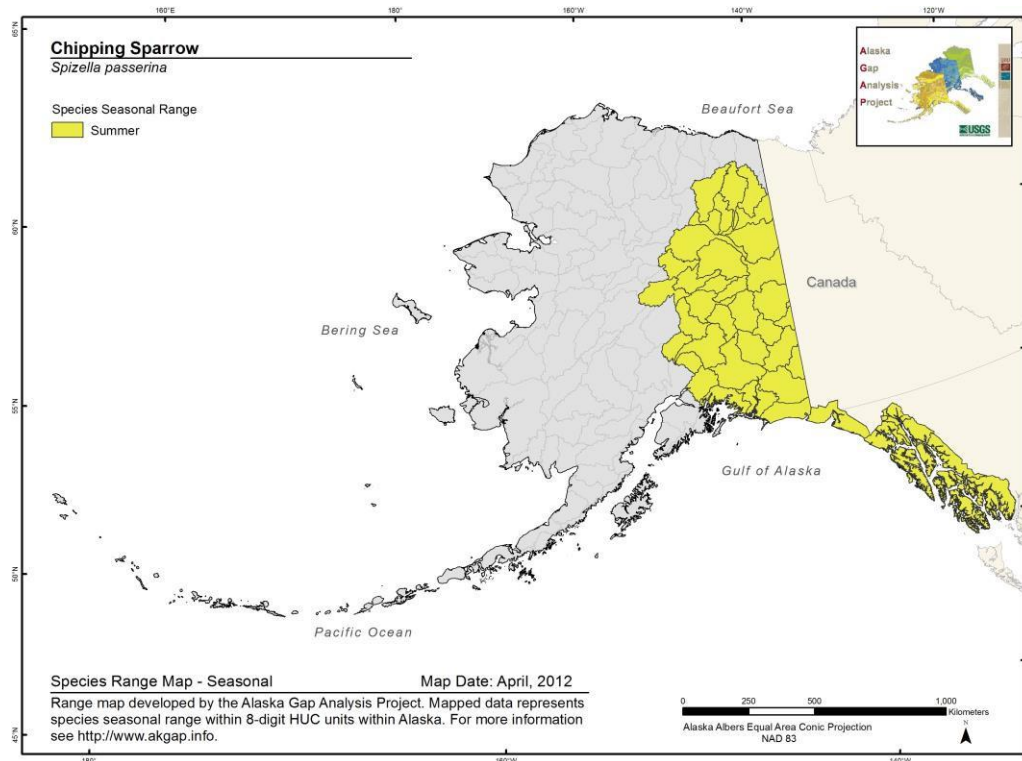
Chipping Sparrow *Spizella passerina*

Range Map and Distribution Model Summary

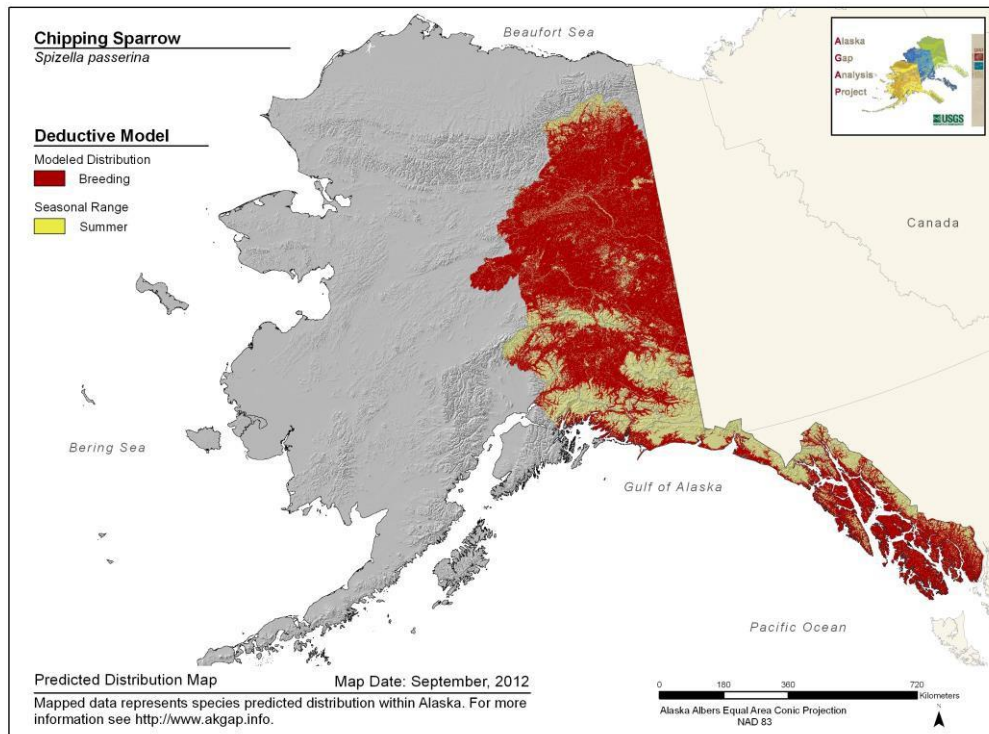
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.62**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in a variety of shrubby coniferous habitats, typically in open spaces and often with coniferous and deciduous woodlands, wetlands, cutblocks, or agricultural edges (Campbell et al. 2001). Found mostly along mainland rivers in Alaska (Armstrong 2008). In B. C. nests mainly in areas modified by human use. Open forests of Douglas-fir, western hemlock-western red cedar forest and scrubland are wildlands used in B. C. In taiga, nesting associated with wetlands surrounded by willow, alder, and birch patches. In B.C., breeds from sea level to 230 m on coast and valley bottoms to 1,950 m in interior (Campbell 2001).

References

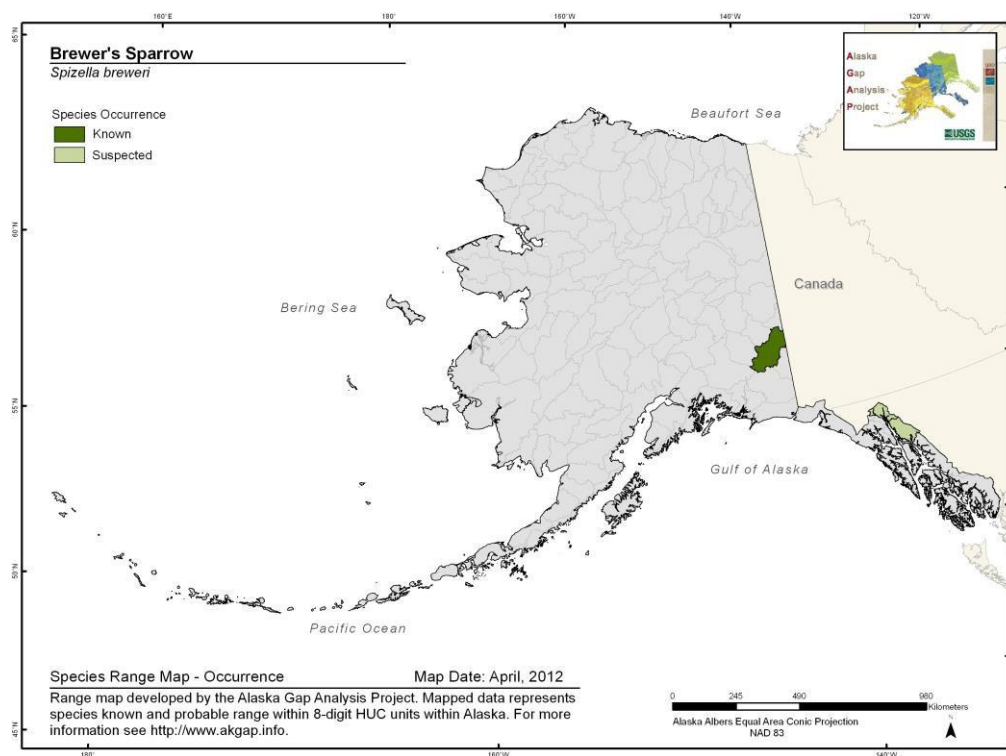
Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

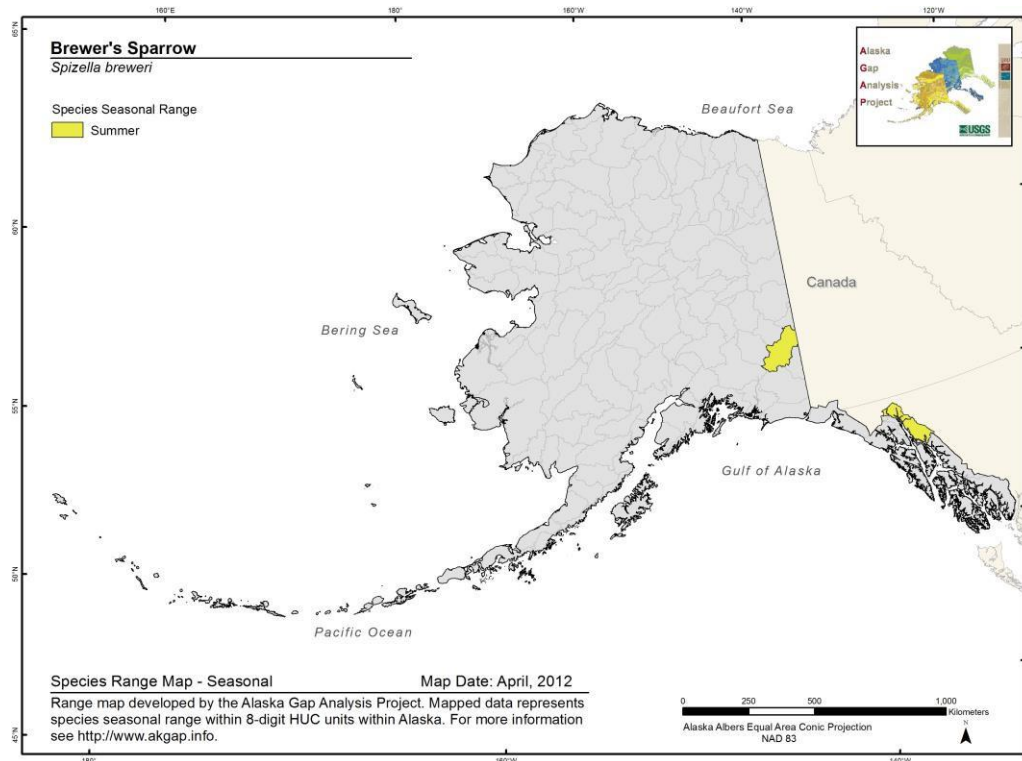
Brewer's Sparrow *Spizella breweri*

Range Map and Distribution Model Summary

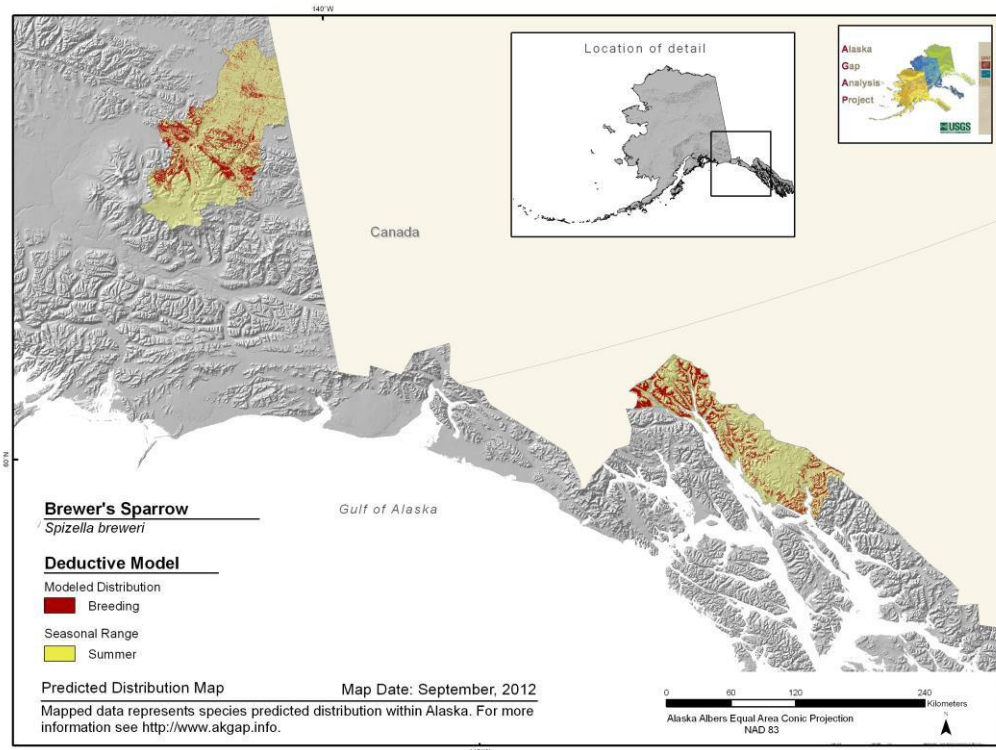
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.714**

**Model Quality
Summary:**
Moderate

Habitat Description

In B. C., nesting reported from 340 to 2,040 m in arid, subalpine, or alpine shrublands (Campbell et al. 2001). In the far north B. C., frequents open, grass-covered areas near and above timberline with clumps of mountain-heather, subalpine fir, and waist-high scrub birch and taller willow shrubs (Swarth 1926). Also, occurs in shrubby montane valleys dominated by low-growing willow, dwarf birch, and shrubs (Doyle et al. 1997).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

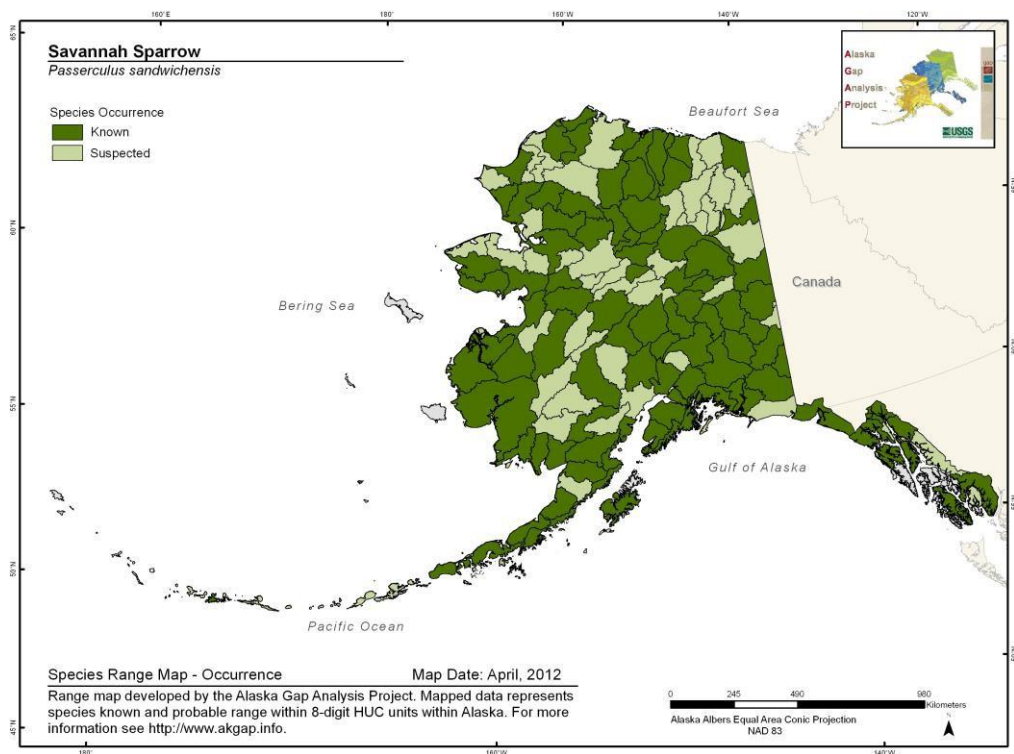
Doyle, T. J. 1997. The Timberline Sparrow, *Spizella (breweri) taverneri*, in Alaska, with notes on breeding habitat and vocalizations. *Western Birds* 28:1-12.

Swarth, H.S. 1926. Report on a collection of birds and mammals from the Atlin region, northern British Columbia. *Univ. Calif. Publ. Zool.* 30(4):51-162.

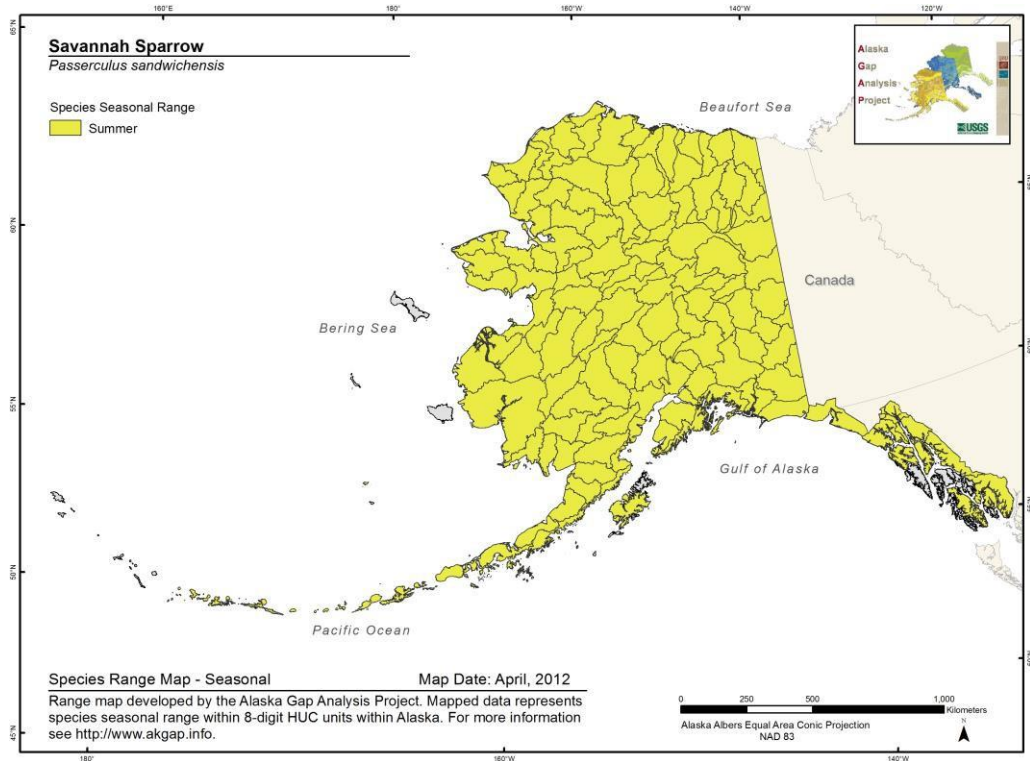
Savannah Sparrow *Passerculus sandwichensis*

Range Map and Distribution Model Summary

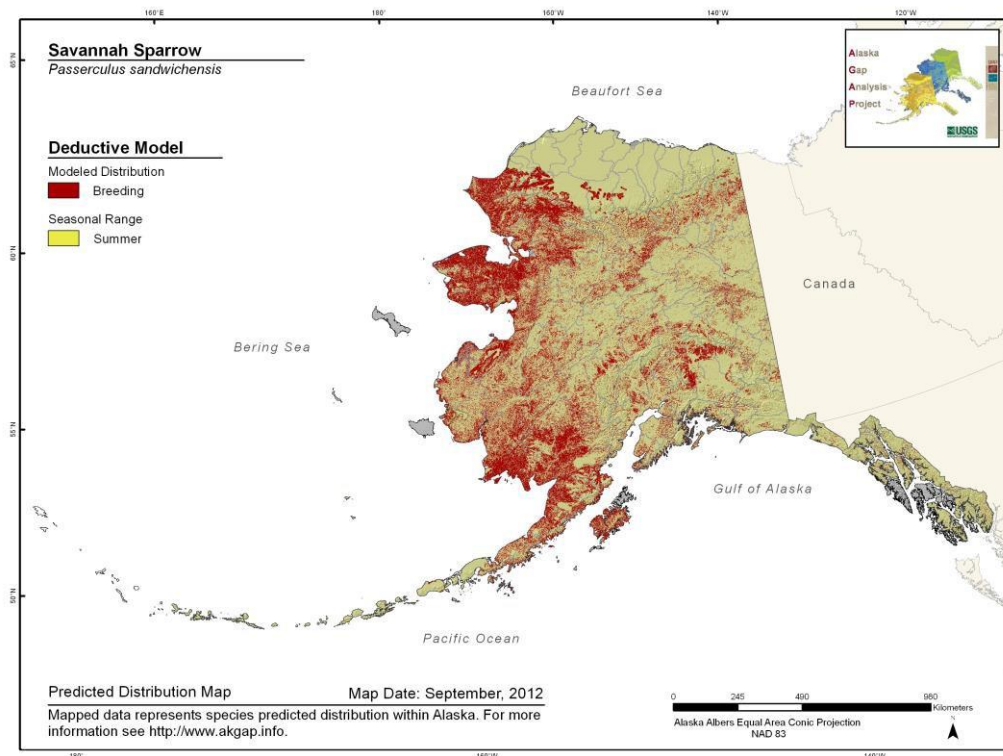
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.521**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits open areas, avoiding areas with extensive tree cover. Prefers habitat with short to intermediate vegetation height, intermediate vegetation density, and a well developed litter layer (NatureServe 2007b). In northern regions of its range, found in dwarf willows or birch and feeds readily in conifers (Wheelwright and Rising 1993). Also breeds in grasslands, weedy fields, edges of ponds, small lakes, and swamps, alpine meadows, and subalpine tundra (Campbell et al. 2001). On the North Slopes of the Yukon, commonly found in moist to wet sedge tundra, in association with wet drainages or patterned ground (Alexander et al. 2003). Widespread in Alaska from seashore to mountain ridges (Armstrong 2008). In B.C., breeds from near sea level to 2,010 m elevation (Campbell et al. 2001).

References

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. Birds of the Yukon Territory (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Armstrong, R. H. 2008. Guide to the birds of Alaska. 5th edition. Alaska Northwest Books, Anchorage, AK. 360 pp.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

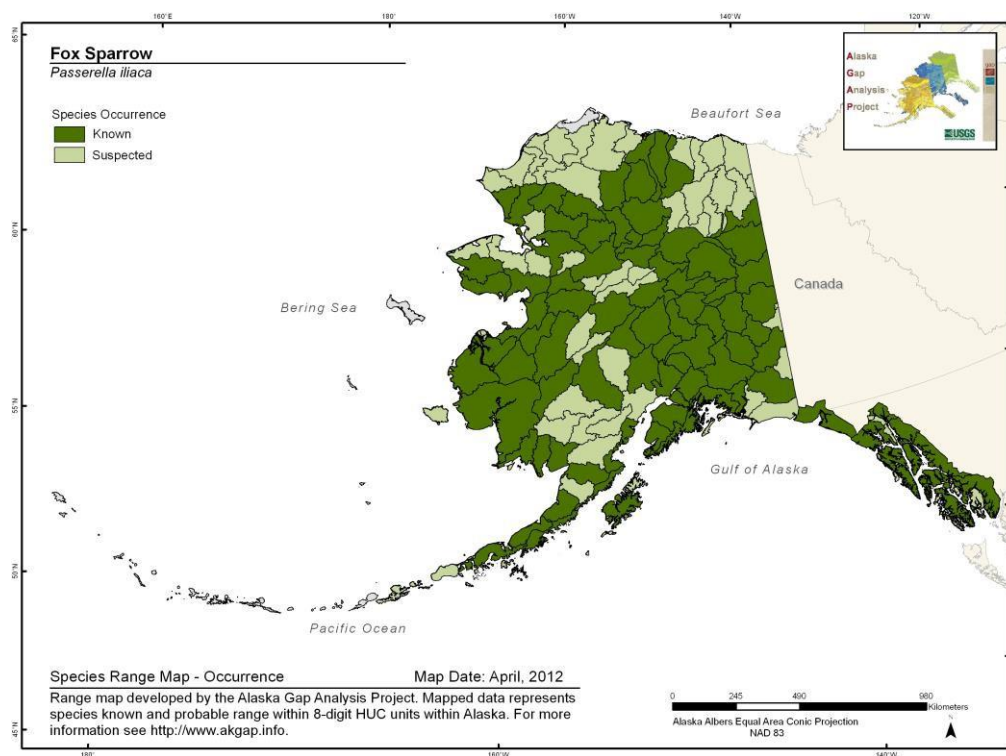
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Wheelwright, N. T., and J. D. Rising. 1993. Savannah Sparrow (*PASSERCULUS SANDWICHENSIS*). In *The Birds of North America*, No. 45 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

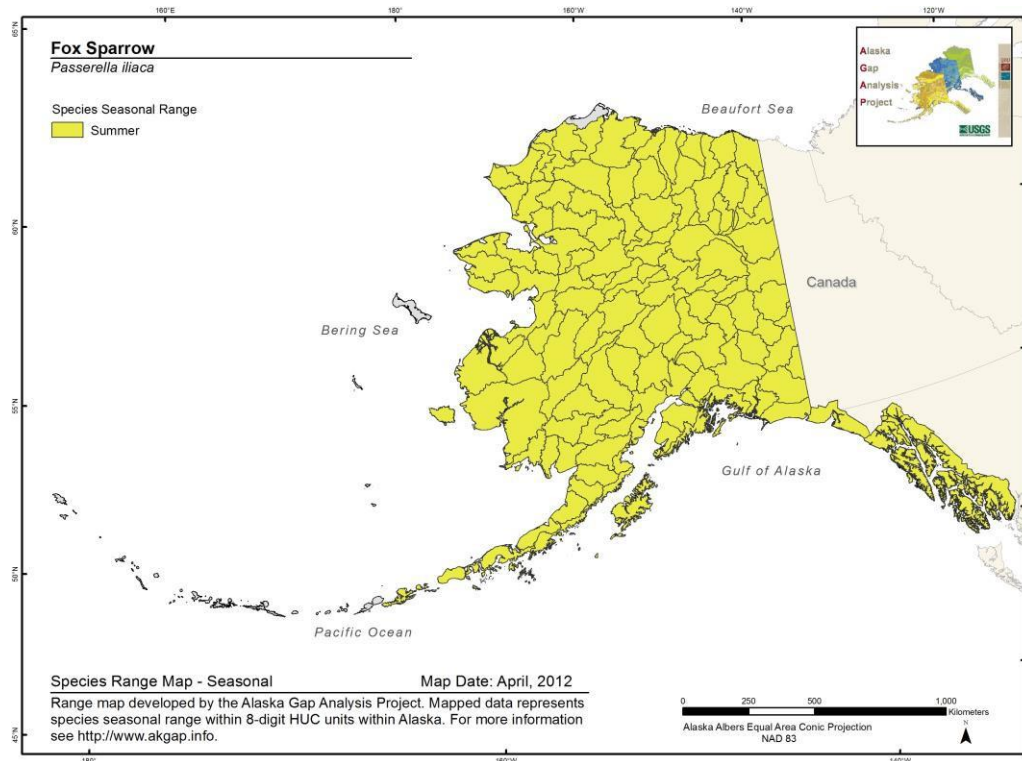
Fox Sparrow *Passerella iliaca*

Range Map and Distribution Model Summary

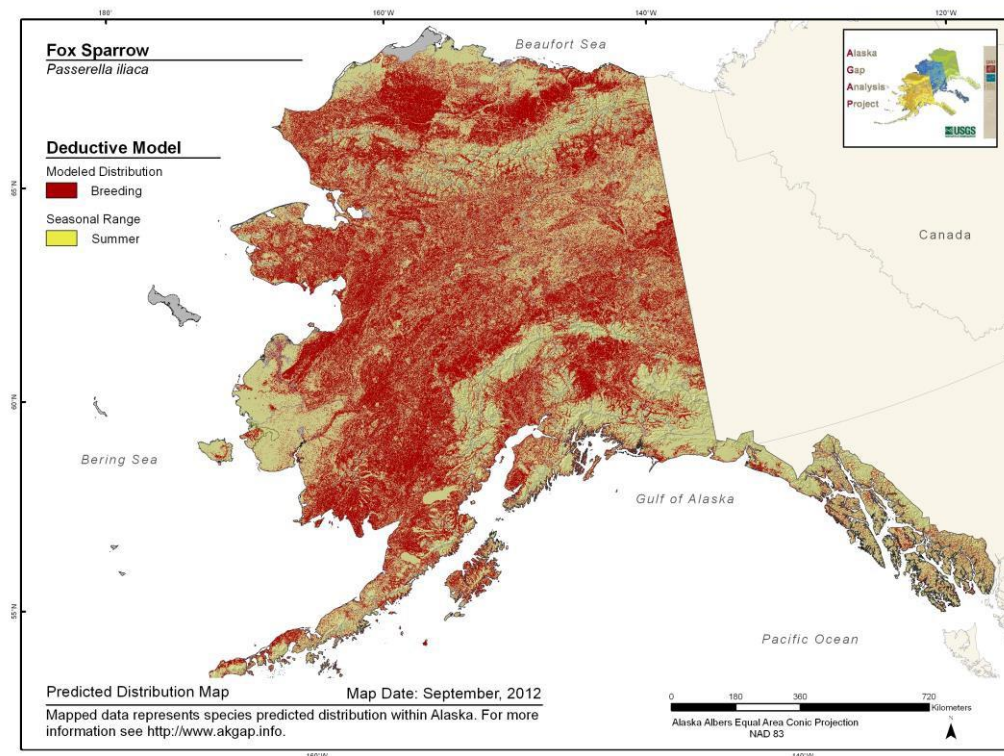
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.567**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, Iliaca inhabits alder and willow thickets in spruce forest, often in white spruce (Austin 1968). Unalascensis occurs from beaches to timberline, preferring willow and blackberry thickets, and lush and brushy riparian vegetation (Linsdale 1928, Williamson and Peyton 1962, Austin 1968).

References

Austin, Jr., O. L. 1968. Fox Sparrow (various subspecies). Pp. 1392-1395, 1414-1434 in Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and their allies (O. L. Austin, Jr. ed.) U. S. Nat. Mus. Bull. 237. Pt. 3.

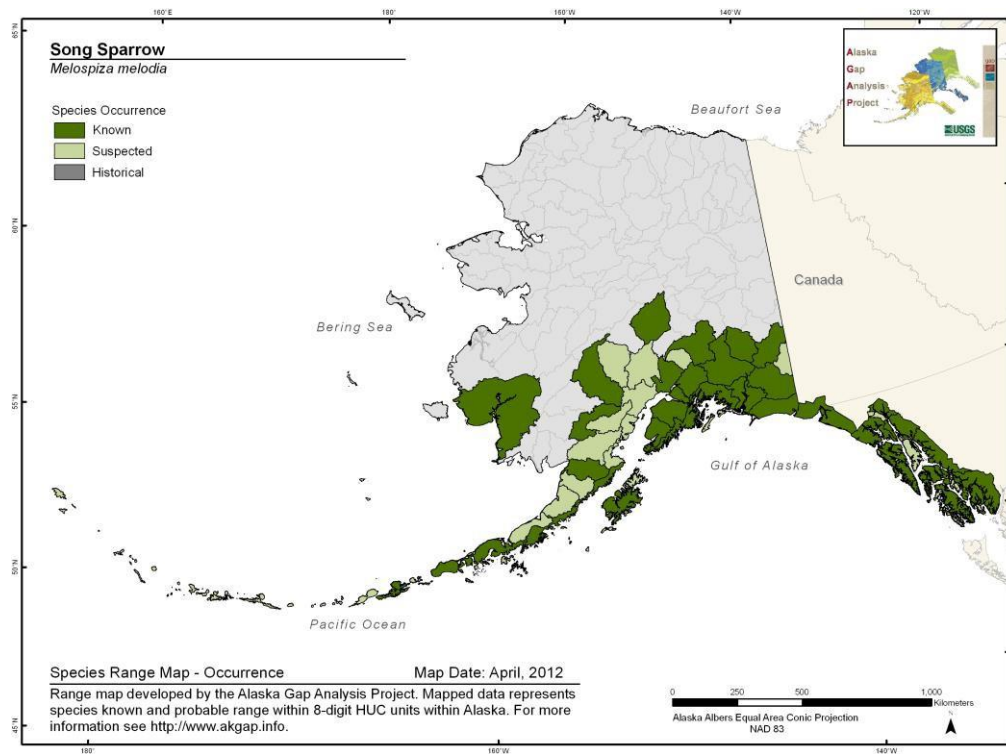
Linsdale, J. M. 1928. Variation in the Fox Sparrow (*Passerella iliaca*) with reference to natural history and osteology. University of California Publ. Zool. 30:251-392.

Williamson, F. S. L. and L. J. Peyton. 1962. Faunal Relationships of birds in the Iliamna Lake Area, Alaska. Biological Papers of the University of Alaska Number 5, Anchorage.

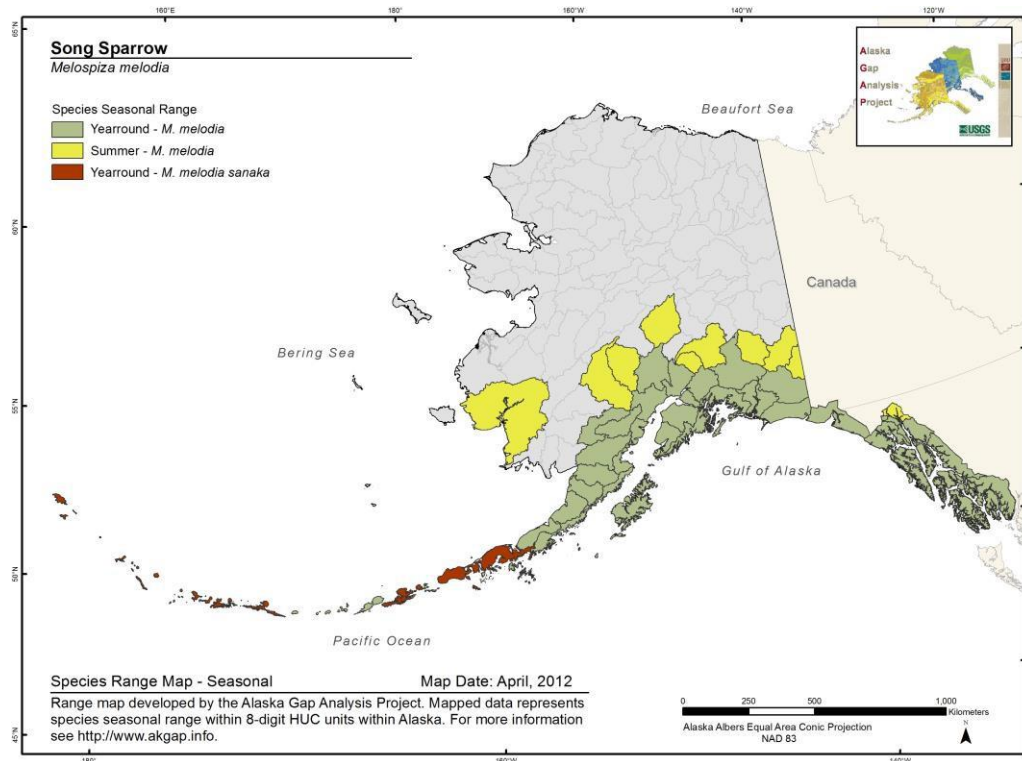
Song Sparrow *Melospiza melodia*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

**Model
Evaluation
Statistic
(AUC): No
AUC**

Model Quality

Summary:

Not validated

Habitat Description

Aleutian and Alaska-Pacific birds (*M. m. maxima*) inhabit grass hummocks and boulders piles on beaches (Aldrich 1984, C. Adkins pers. comm. in Arcese et al. 2002). All other subspecies found in shrubs on moist ground along streams, sloughs, marshes, or coastline (Marshall 1948a, 1948b, Johnston 1956a, Aldrich 1984, Howell and Webb 1995). Also found in suburban areas, agricultural habitats (Knapton 1976, Beissinger and Osborn 1982), clearcuts in deciduous and coniferous forests (Aldrich 1984), tall grasses, sedges, rushes, hedges, and brush piles, where cover is provided but some light can penetrate through the vegetation (Campbell et al. 2001).

References

Aldrich, J. W. 1984. Ecogeographical variation in size and proportion of Song Sparrows (*Melospiza melodia*). Ornithol. Monog. 35: 1-134.

Arcese, P., M. K. Sogge, A. B. Marr, and M. A. Patten. 2002. Song Sparrow (*Melospiza melodia*). In The Birds of North America, No.704 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Beissinger, S. R. and D. R. Osborne. 1982. Effects of urbanization on avian community organization. Condor 84:75-83.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press, Oxford, UK.

Johnston, R. F. 1956a. Population structure in salt marsh Song Sparrows. Pt. I: environment and annual cycle. *Condor* 58: 24-44.

Knapton, R. W. 1976. Dominance in winter hierarchies of Song Sparrows. *Condor* 78: 567-569.

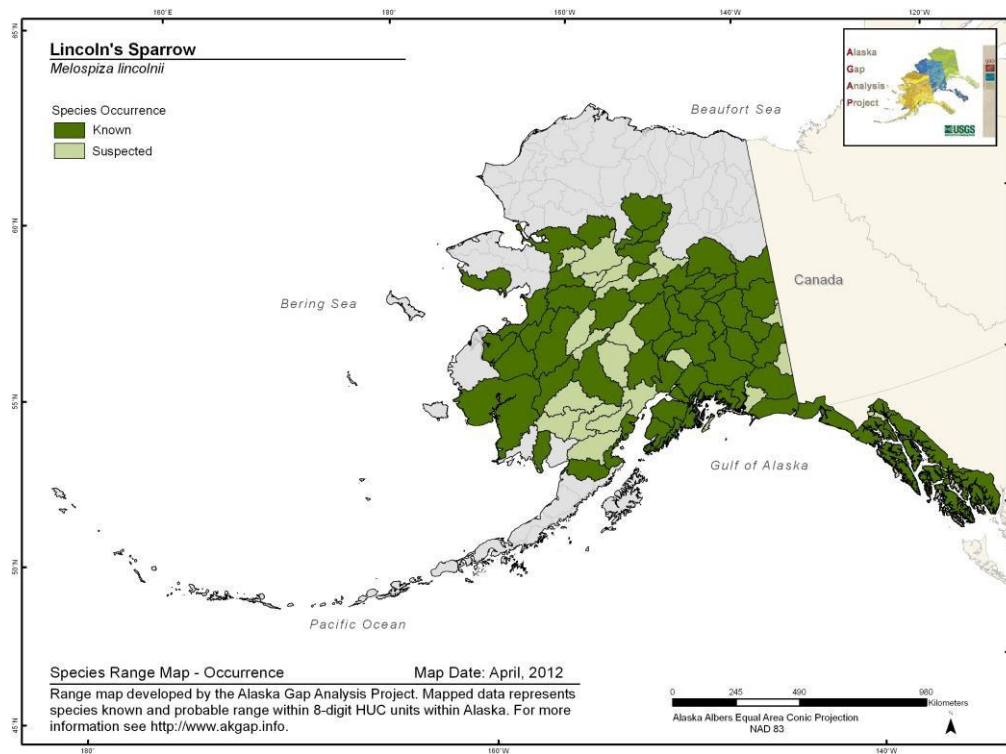
Marshall, J. T., Jr. 1948a. Ecologic races of Song Sparrows in the San Francisco Bay region: II. geographic variation. *Condor* 50: 233-256.

Marshall, J. T., Jr. 1948b. Ecologic races of Song Sparrows in the San Francisco Bay region: I. habitat and abundance. *Condor* 50: 193-215.

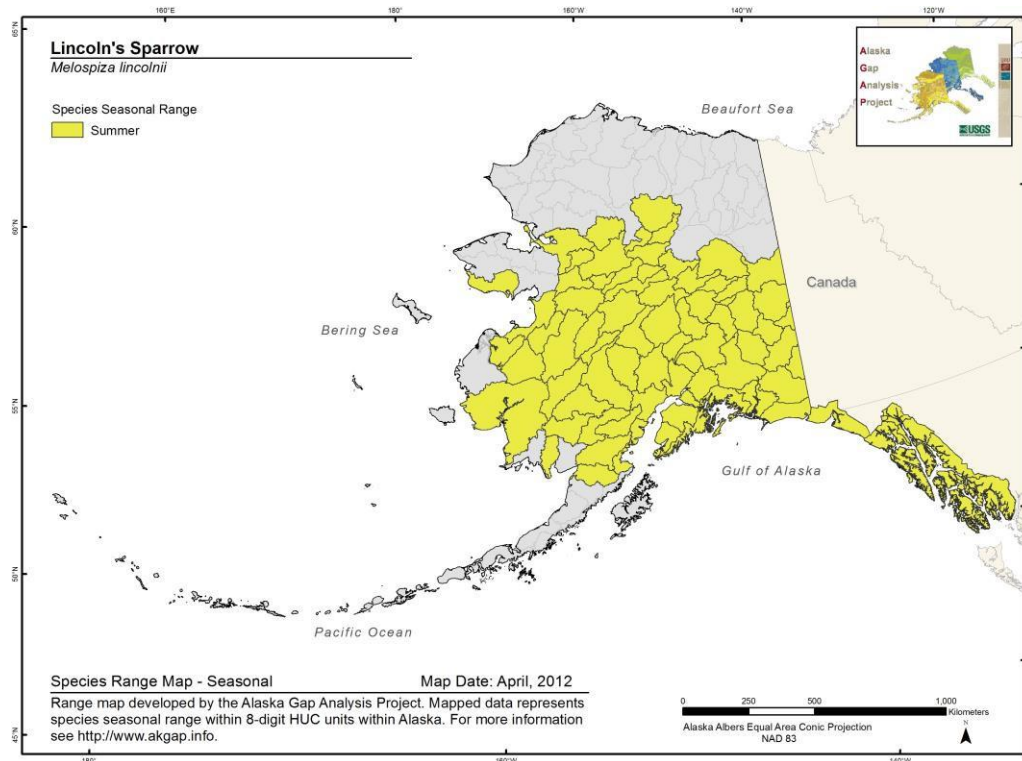
Lincoln's Sparrow *Melospiza lincolnii*

Range Map and Distribution Model Summary

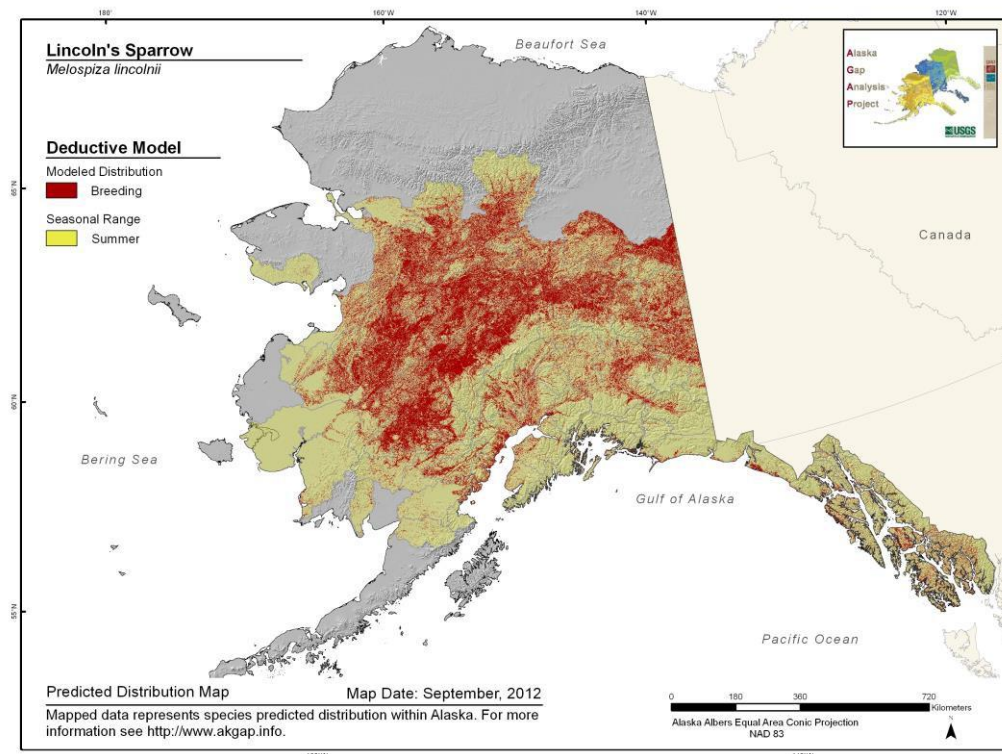
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.551**

**Model Quality
Summary:**
Low

Habitat Description

Breeds in subalpine and montane zones in boggy, willow-, sedge-, and moss- dominated habitats (Ammon 1995). At lower elevations, also prefers mesic willow shrubs, but can be found in mixed deciduous wood groves, such as aspen and cottonwoods, mixed shrub-willows, black spruce-tamarack bogs, as well as a variety of other riparian habitat types (Salt 1957, Erskine 1977, Ewert 1982, Douglas et al. 1992, Dobkin 1994, M. L. Cody pers. comm. in Ammon 1995). Also inhabits regenerating burns, logged areas, floodplain forests, and avalanche slopes (Campbell et al. 2001). In B.C., nesting has been reported from sea level to 1,300 and singing males have been reported at 1,700 m (Campbell et al. 2001).

References

Ammon, E. M. 1995. Lincoln's Sparrow (*Melospiza lincolnii*). In *The Birds of North America*, Vol.5, No. 191 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. *The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows.* University of British Columbia Press, Vancouver. 739 pages.

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

Dobkin, D.S. 1994. Conservation and management of neotropical migrant landbirds in the northern Rockies and Great Plains. High Desert Ecological Research Institute, Bend, OR. University of Idaho Press, Moscow, ID.

Douglas, D.C., J.T. Ratti, R. A. Black, and J.R. Alldredge. 1992. Avian habitat associations in riparian zones of Idaho's Centennial Mountains. *Wilson Bulletin* 104:485-500.

Erskine, A. J. 1977. Birds in boreal Canada. Report 41. Canadian Wildlife Service, Ottawa, Ontario.

Ewert, D. 1982. Birds in isolated bogs in central Michigan. *Am. Midl. Nat.* 108: 41-50.

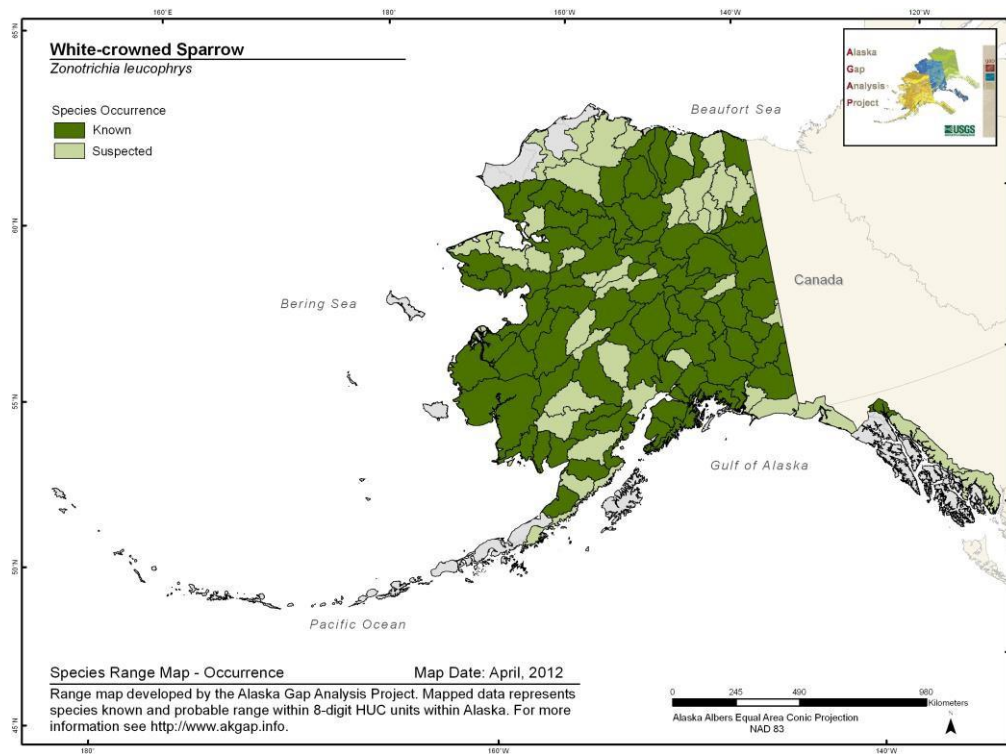
Salt, G. W. 1957. An analysis of avifaunas in the Teton Mountains and Jackson Hole, Wyoming. *Condor* 59: 373-393.

White-crowned Sparrow

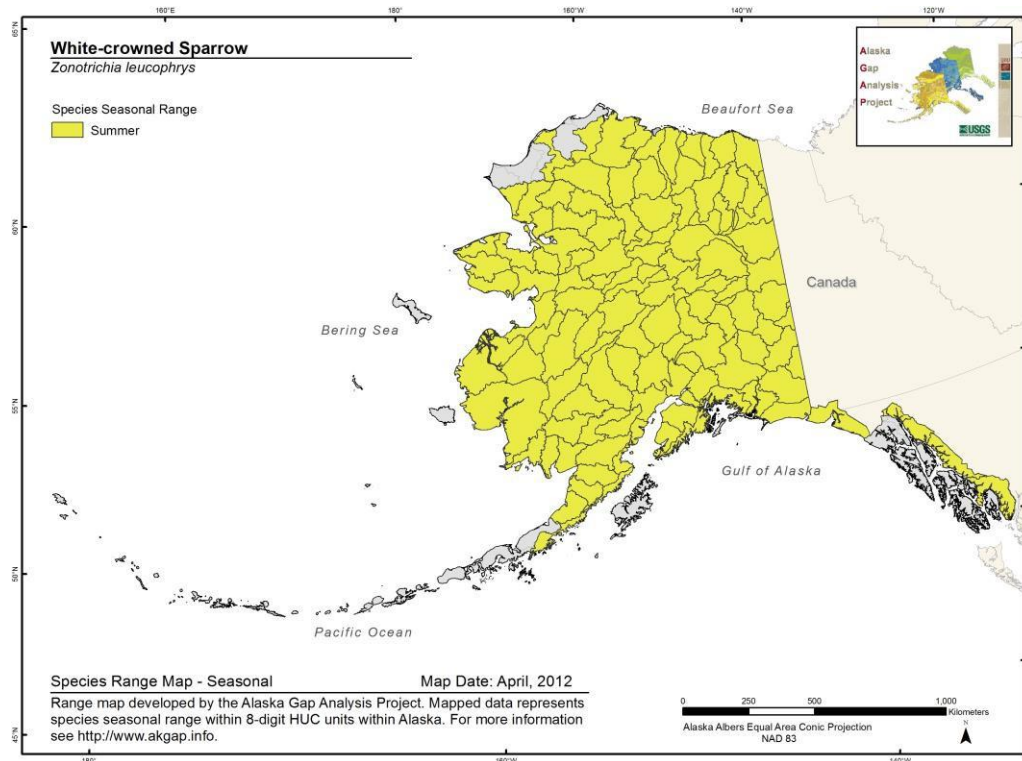
Zonotrichia leucophrys

Range Map and Distribution Model Summary

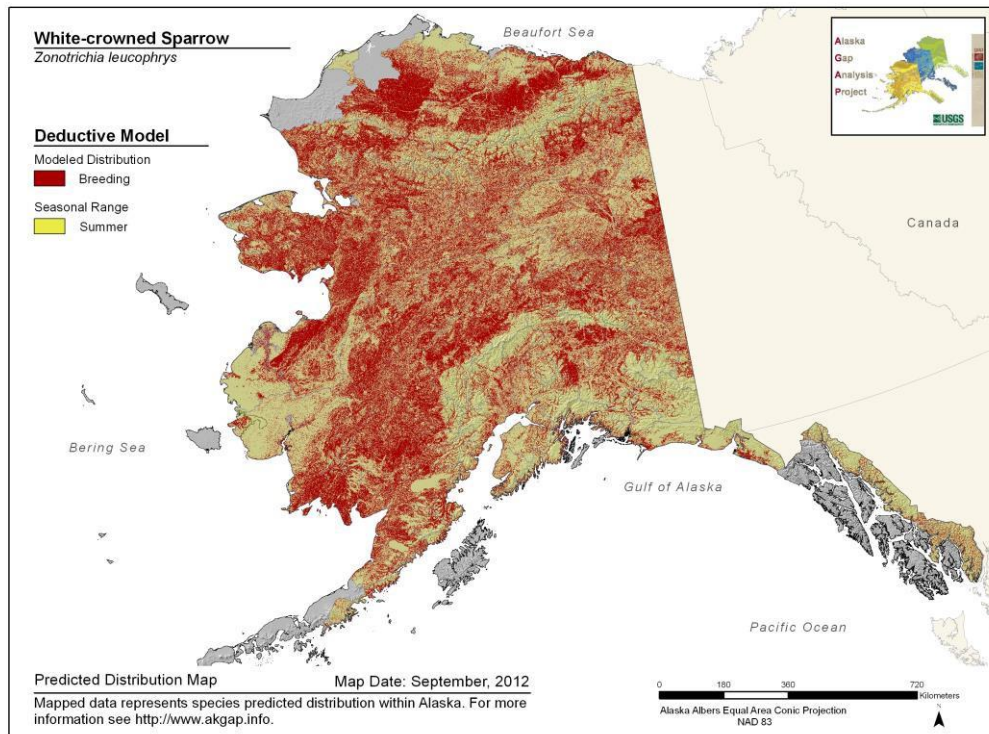
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.515**

**Model Quality
Summary:**
Low

Habitat Description

Require grass, bareground for foraging, dense shrubs or small conifers for roosting and nest cover, water, and tall coniferous trees on periphery of territory (DeWolfe and DeWolfe 1962). In Alaska, sparrow density often increases with increasing shrub cover (Cotter and Andres 2000). Subspecies *gambelii* occupies a wide range of habitats including farmland, alpine meadows, grass, and dense shrublands (DeWolfe 1967).

References

Cotter, P. A. and B. A. Andres. 2000. Breeding bird habitat associations on the Alaska Breeding Bird Survey: USGS, Biological Resources Division Information and Technology Report USGS/BRD/ITR-2000-0010, 53 p.

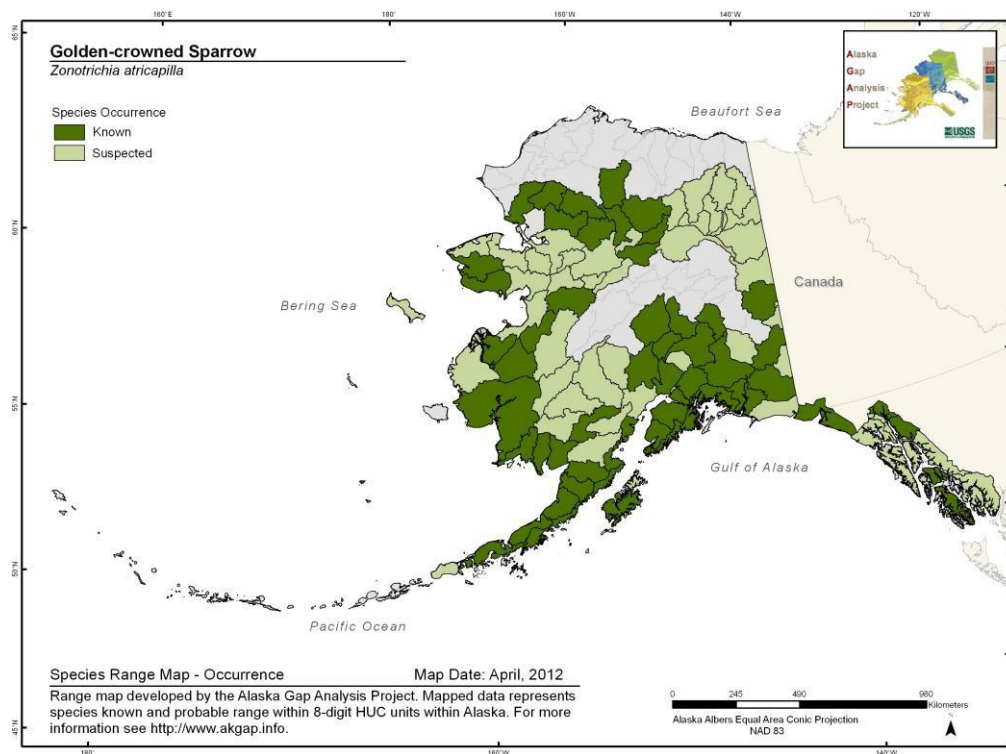
DeWolfe, B. B. 1967. Biology of White-crowned Sparrows in late summer at College, Alaska. *Condor* 69:110-132.

DeWolfe, B. B. and R. H. DeWolfe. 1962. Mountain White-crowned Sparrows in California. *Condor* 64:378-389.

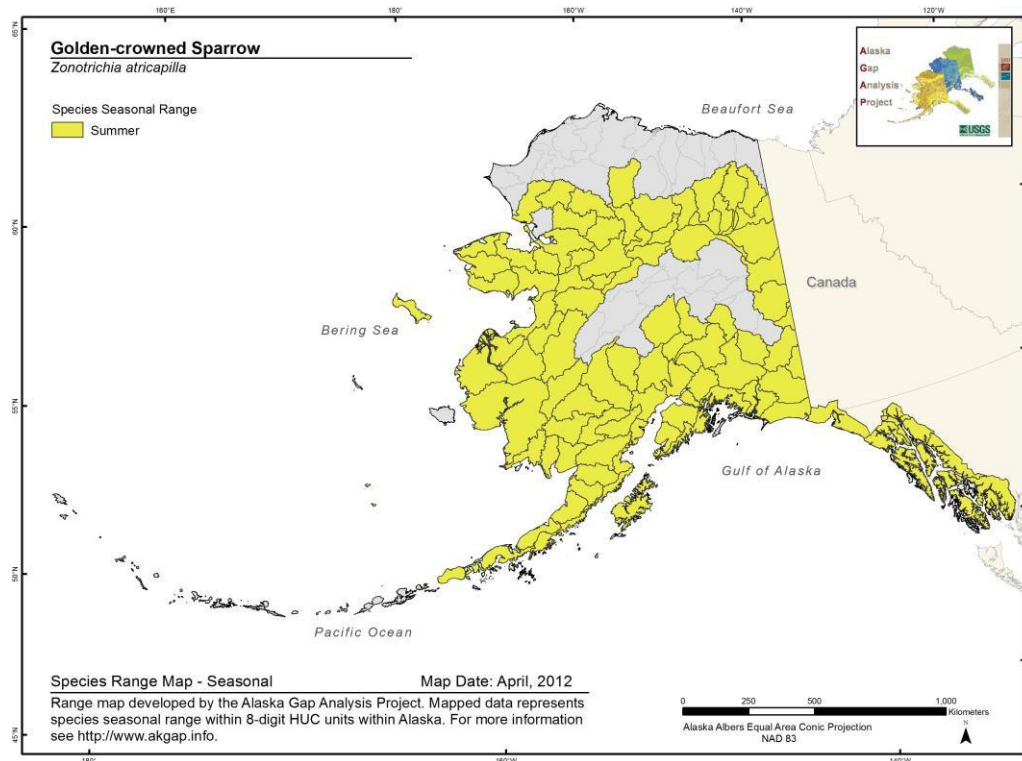
Golden-crowned Sparrow *Zonotrichia atricapilla*

Range Map and Distribution Model Summary

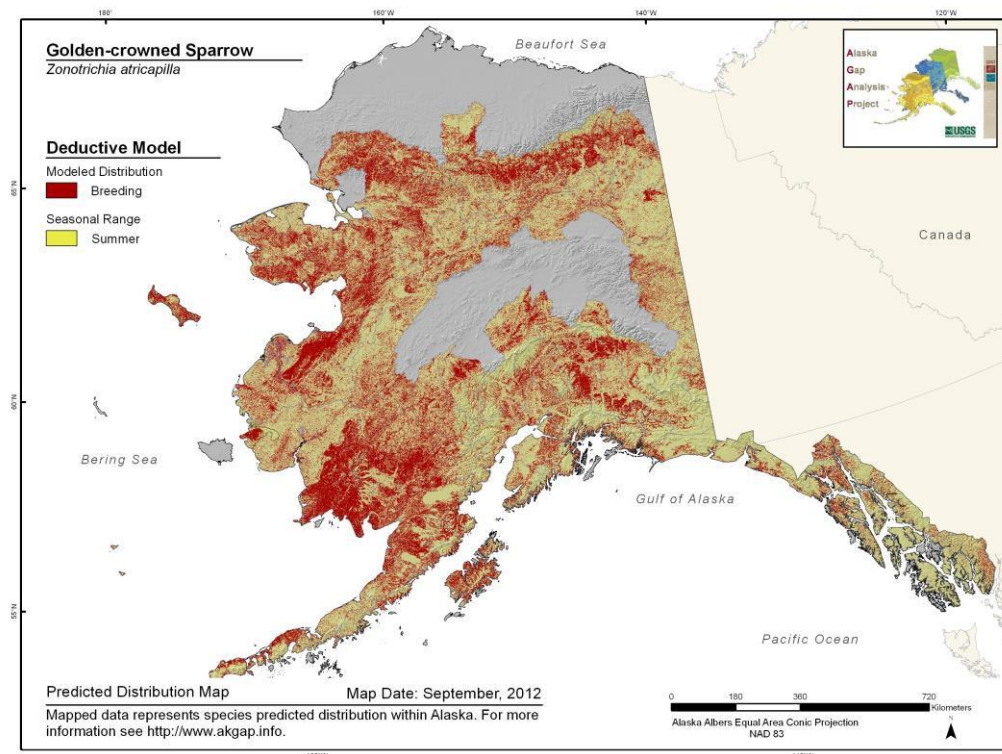
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.566**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, inhabits narrow band of conifers and deciduous shrubs near treeline in the mountains (Manuwal 1978, Kessel 1989, Petersen et al. 1991). Also occurs above treeline in similarly structured habitat (Swarth 1934, Murie 1959, Bailey 1974) and in shrubby arctic and alpine habitat in western Alaska (Kessel 1989, Petersen et al. 1991). Willow, short conifers, and water are common habitat characteristics (Norment et al. 1998). At northern limit, found in riparian willow and tundra willow thickets near water (Manuwal 1978).

References

Bailey, E. P. 1974. Passerine diversity, relative abundance, and migration at Cold Bay, Alaska. *Bird-Banding* 45: 145-151.

Kessel, B. 1989. *Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history*. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

Manuwal, D. A. 1978. Avian diversity and habitat selection in the Noatak Valley, Brooks Range, Alaska. *Murrelet* 59:42-58.

Murie, O. J. 1959. *Fauna of the Aleutian Islands and Alaska Peninsula*. USDI, USFWS Rep. no. 61. Washington, D. C. N. Amer. Fauna 61: 1-364.

Norment, C. J., P. Hendricks, and R. Santonocito. 1998. Golden-crowned Sparrow (*Zonotrichia atricapilla*). In *The Birds of North America*, Vol. 7, No. 352 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

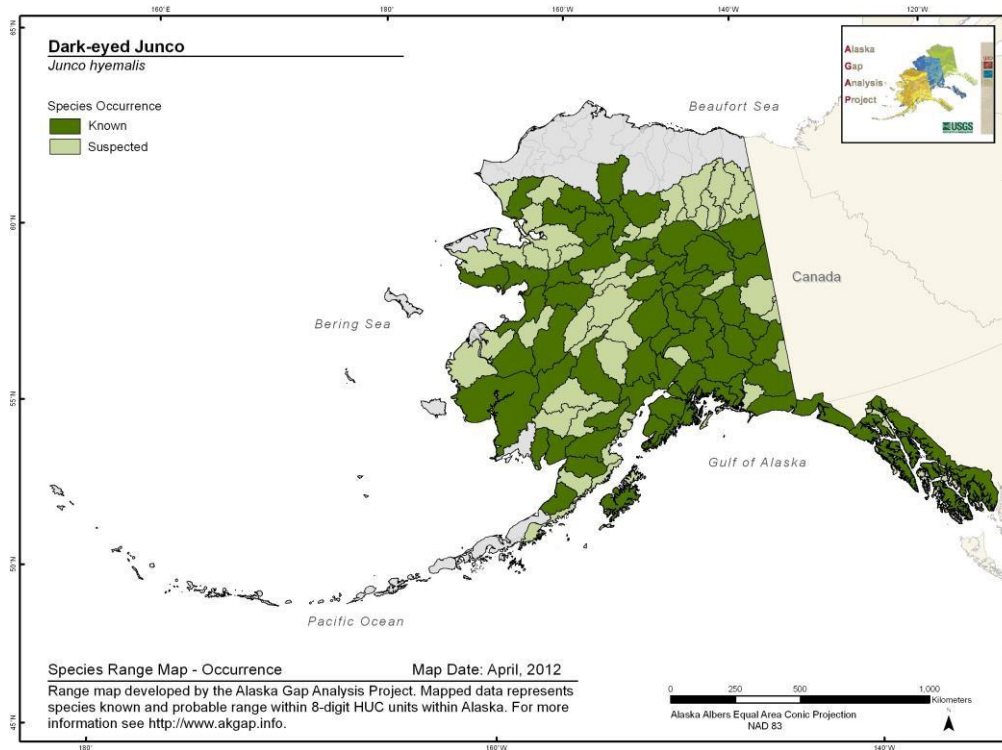
Petersen, M. R., D. N. Weir, and M. H. Dick. 1991. *Birds of the Kilbuck and Ahklun Mountain Region, Alaska*. North American Fauna 76. 158 pp.

Swarth, H. S. 1934. *Birds of Nunivak Island, Alaska*. Pac. Coast Avifauna 22.

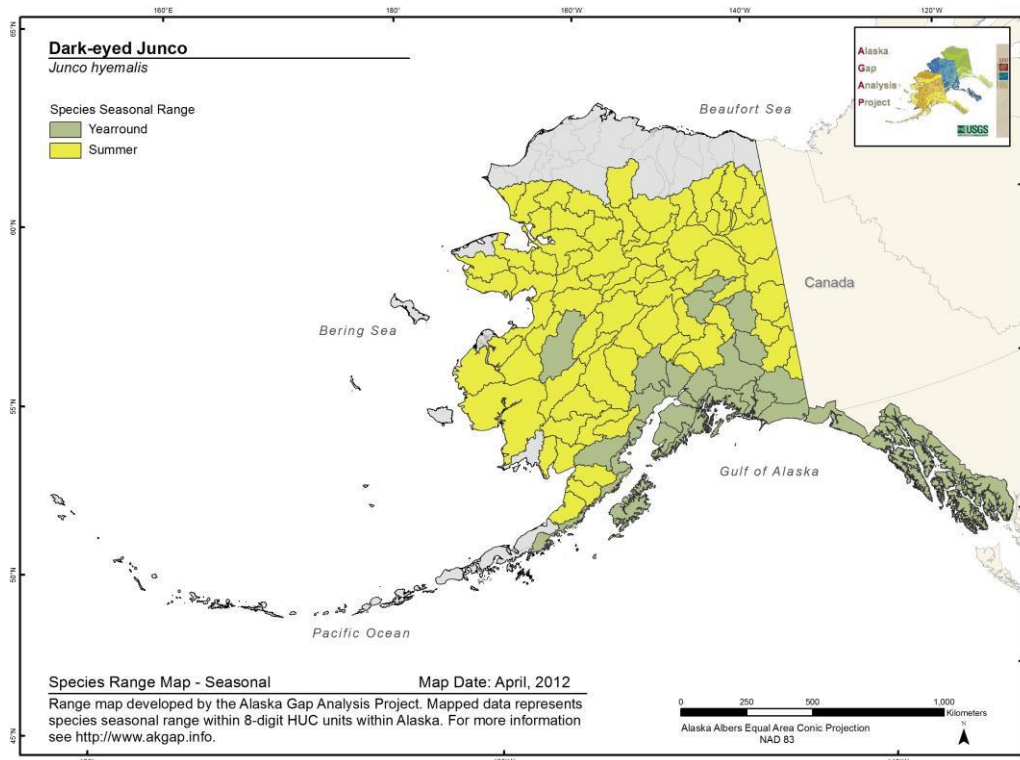
Dark-eyed Junco *Junco hyemalis*

Range Map and Distribution Model Summary

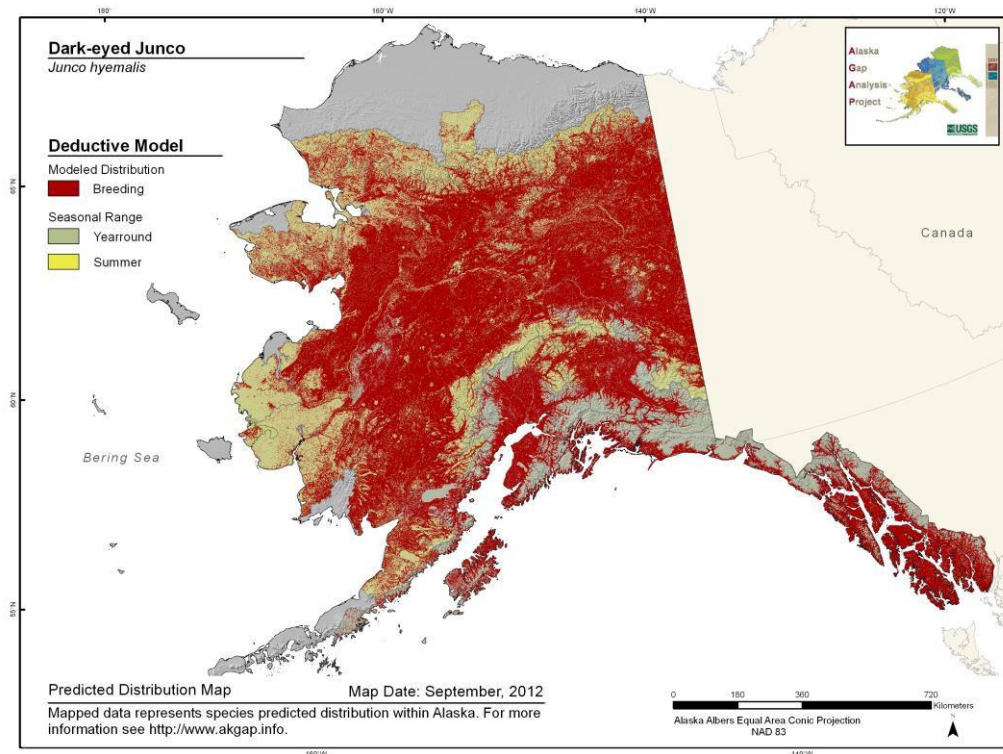
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.694**

Model Quality Summary:
Low

Habitat Description

Coniferous and deciduous forest, forest edge, clearings, bogs, open woodland, brushy areas adjacent to forest, and burned-over lands (AOU 1983). In Alaska, breeding habitat consists of old growth to earlier seral stages. Absent from closed dense canopy cover with low light, scant ground cover. Most abundant in shrub/forb and sapling/shrub, lakeshore old growth, and muskeg (Kessler and Kogut 1985). Occur on densely forested Alaskan islands, beaches, and epiphytic growth along streams (Miller 1941).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

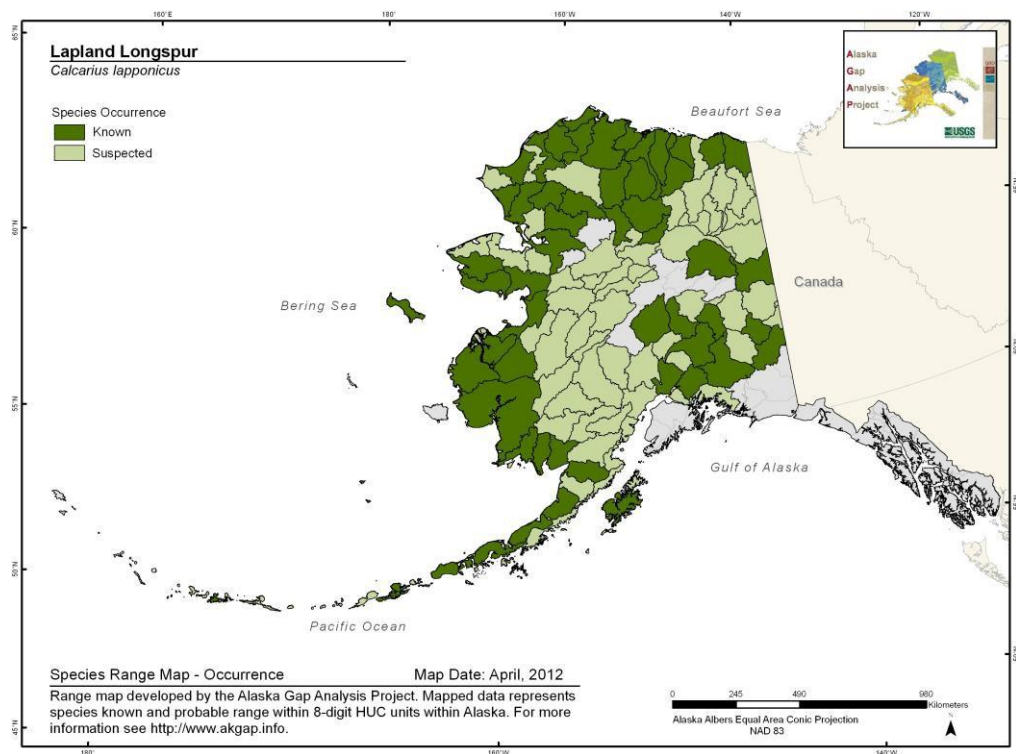
Kessler, W. B. and T. E. Kogut. 1985. Habitat orientations of forest birds in southeastern Alaska. Northwest Science 59:58-65.

Miller, A. H. 1941. Speciation in the avian genus Junco. University of Junco. University of California Publ. Zool. 44:173-434.

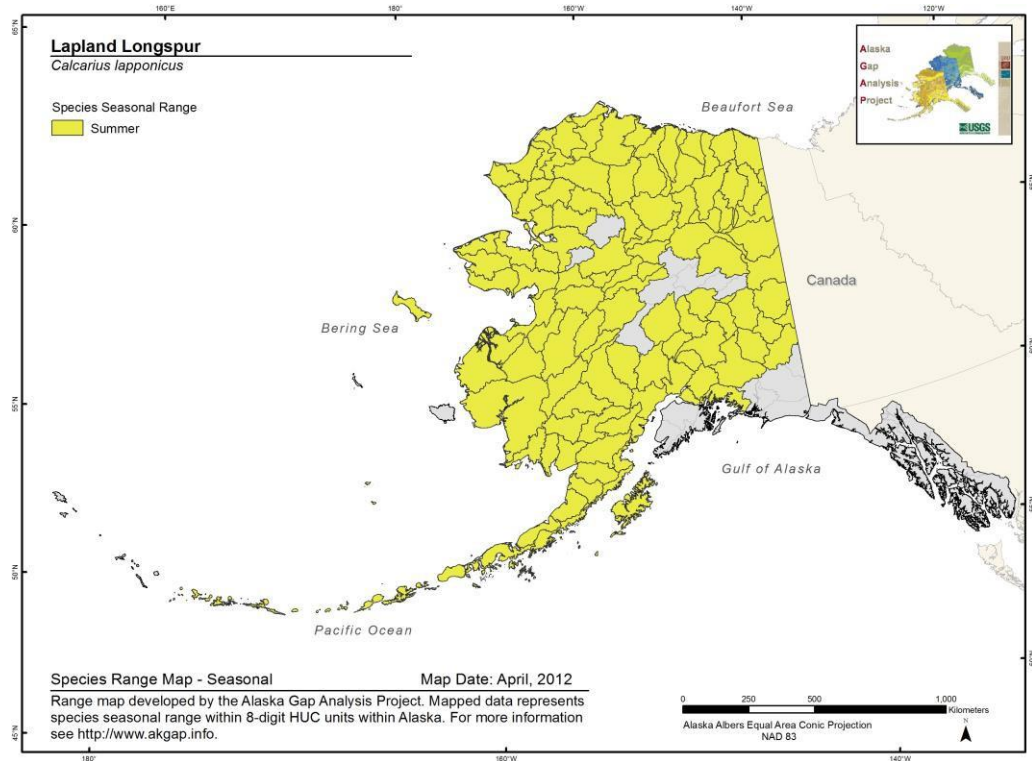
Lapland Longspur *Calcarius lapponicus*

Range Map and Distribution Model Summary

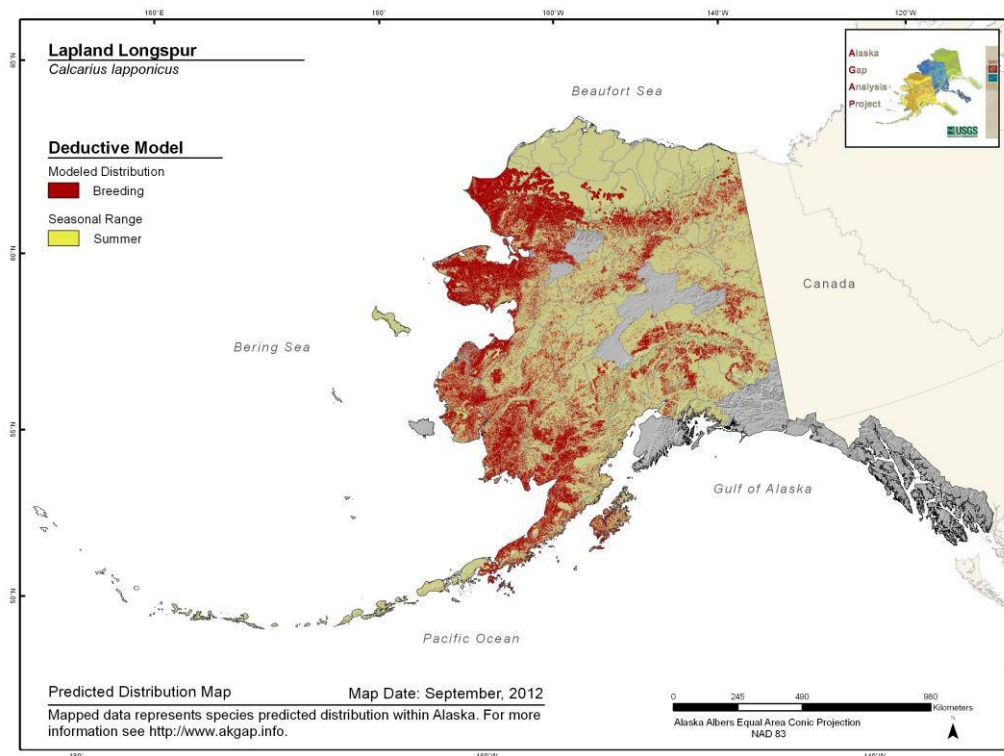
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.584**

**Model Quality
Summary:**
Low

Habitat Description

Typically in wet, hummocky, tundra meadows, often on relatively flat ground, but also on drier, well-vegetated slopes. Avoids rocky bare terrain occupied by Snow Buntings (Hussell and Montgomerie 2002). On Amchitka Island and at Cape Thompson, highest densities in low-lying flat meadows with dense stands of sedge mixed with other plants (Williamson and Emison 1971). Also occurs in uplands dominated by crowberry and *Cladonia pacifica* and with sedges, grasses, mosses, and woody or shrubby plants on Amchitka Island. Upland habitats at Cape Thompson includes sedge meadows with diamond-leaf willow, dwarf birch, Labrador tea, and bilberry (Williamson and Emison 1971). In Hooper Bay, breeds in relatively dry freshwater uplands 3-35 m above sea level, avoiding low-lying salt-water tidal marshes where Savannah Sparrows breed (Hussell and Montgomerie 2002). In central Yukon, nests were found up to 1,700 m in elevation (Frisch 1987).

References

Frisch, R. 1987. Birds by the Dempster highway. Revised edition. Morriss Printing, Victoria, B.C. 98 pp.

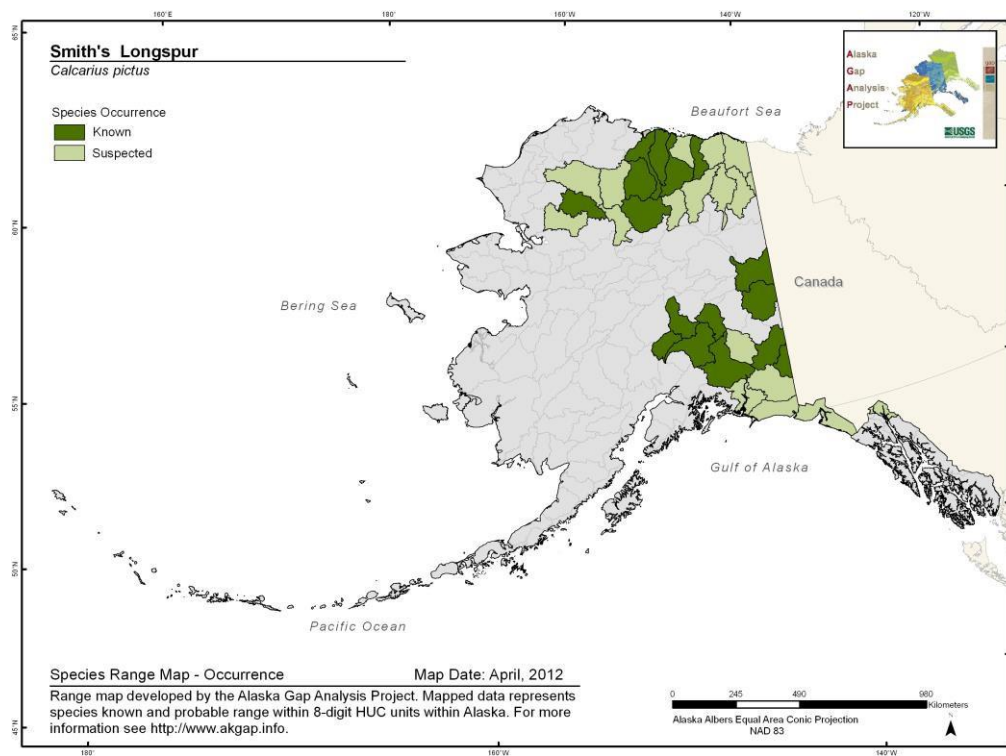
Hussell, D. J. T. and R. Montgomerie. 2002. Lapland longspur (*Calcarius lapponicus*). In *The Birds of North America*. Vol. 17, No. 656 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Williamson, F. S. L. and W. B. Emison. 1971. Variation in the timing of breeding and molt of the Lapland Longspur (*Calcarius lapponicus*) in Alaska, with relation to differences in latitude. *Bioscience* 21: 701-707.

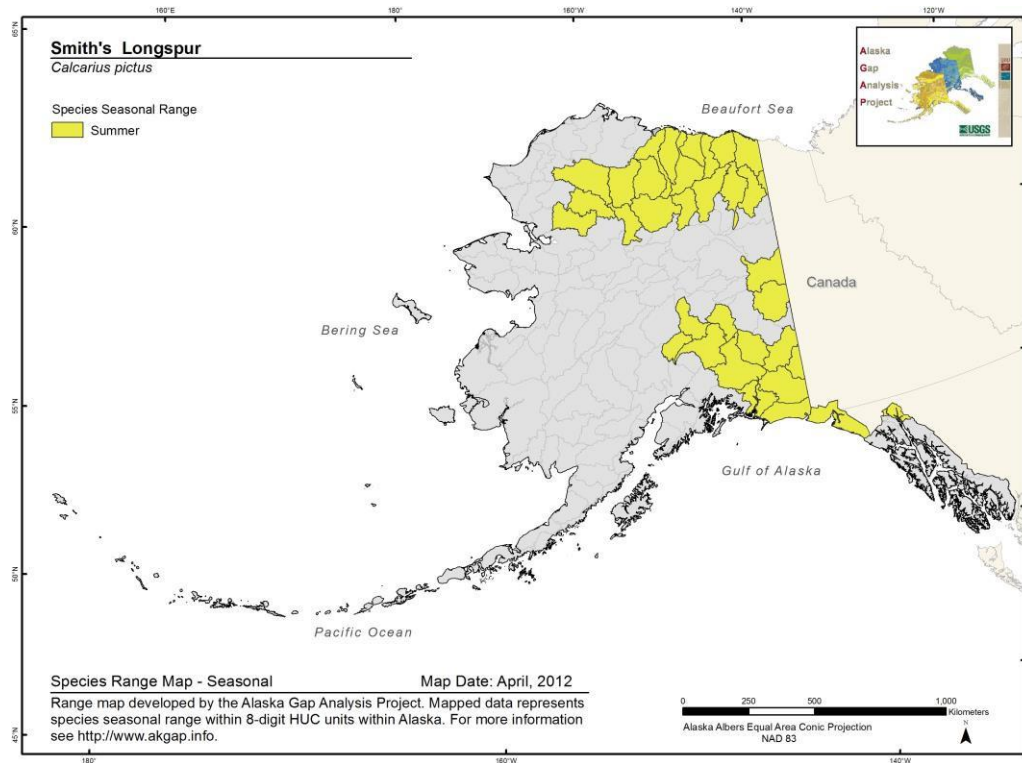
Smith's Longspur *Calcarius pictus*

Range Map and Distribution Model Summary

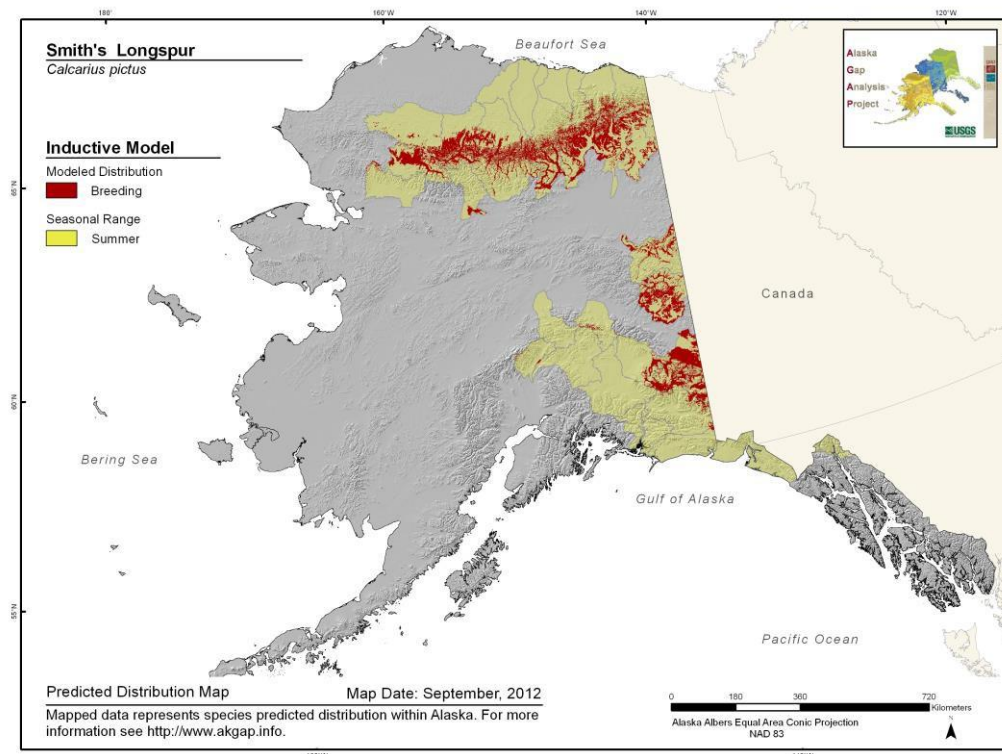
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.861**

**Model Quality
Summary:**
Moderate

Habitat Description

Preferred habitat in northern Alaska is moist tussock meadows in wide alpine valleys, often surrounding lakes. In central Alaska, prefers dry ridge top tundra (Kessel and Gibson 1978). Elsewhere, found at treeline. In the Wrangell Mountains, found on alpine plateaus around 5000 ft in low shrub and tussock tundra (Sage 1976). May be found in low areas of tundra interspersed with spruce (Briskie 1993). According to Kendall (USFWS, personal communication) Smith's Longspurs breed in tussock tundra on the north side of the Brooks Range (Irving 1960, Kendall 2007), in the taiga/tundra edge on the south side of the Brooks Range (Kessel and Shaller 1960, Arctic NWR unpubl. data) and in Manitoba (Briskie 1993), above treeline in the Tanana/Yukon uplands (Blackwelder 1919 and Kemsies 1961 in Sage 1976) and on dry tundra ridges in central Alaska (Kessel and Gibson 1978). While these are somewhat diverse habitats, they are also geographically restricted and isolated areas.

References

- Briskie, J. V. 1993. Smith's Longspur. In *The Birds of North America*, No. 34 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Irving, L. 1960. Birds of Anaktuvuk Pass, Kobuk, and Old Crow. A study in arctic adaptation. United States National Museum Bulletin 217. Smithsonian Institution, Washington, D.C. 409 pp.
- Kendall, S. J. 2007. Smith's Longspur Ecology: Pilot Studies in the Arctic National Wildlife Refuge, Alaska, June 2006. Unpubl. Rept. USFWS, Arctic National Wildlife Refuge, Fairbanks, AK
- Kessel, B., and D.D. Gibson. 1978. Status and distribution of Alaska birds. *Studies Avian Biology*. In: *Studies in Avian Biology* No. 1. R. J. Raitt, Ed. Cooper Ornithological Society. 1:1-100.

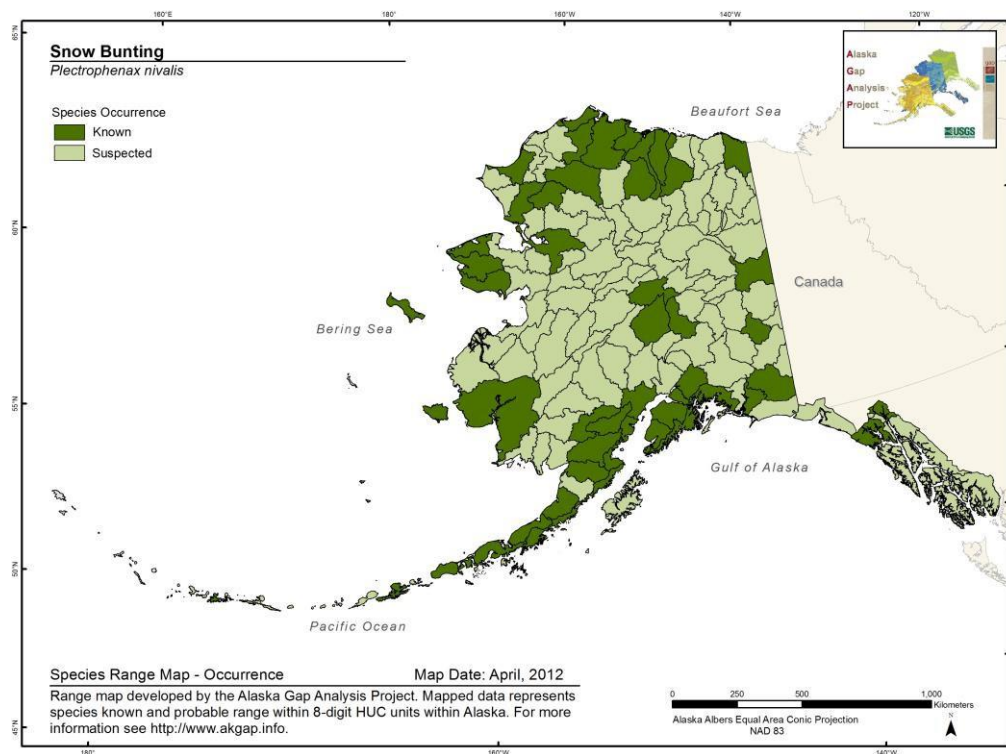
Kessel, B., and G. B. Schaller. 1960. Birds of the upper Sheenjek valley, northeastern Alaska. Biol. Pap. Univ. Alaska 4. Univ. of Alaska, Fairbanks, AK. 59 pp.

Sage, B. L. 1976. The breeding distribution of Smith's longspur in Alaska. Condor 78:116-117.

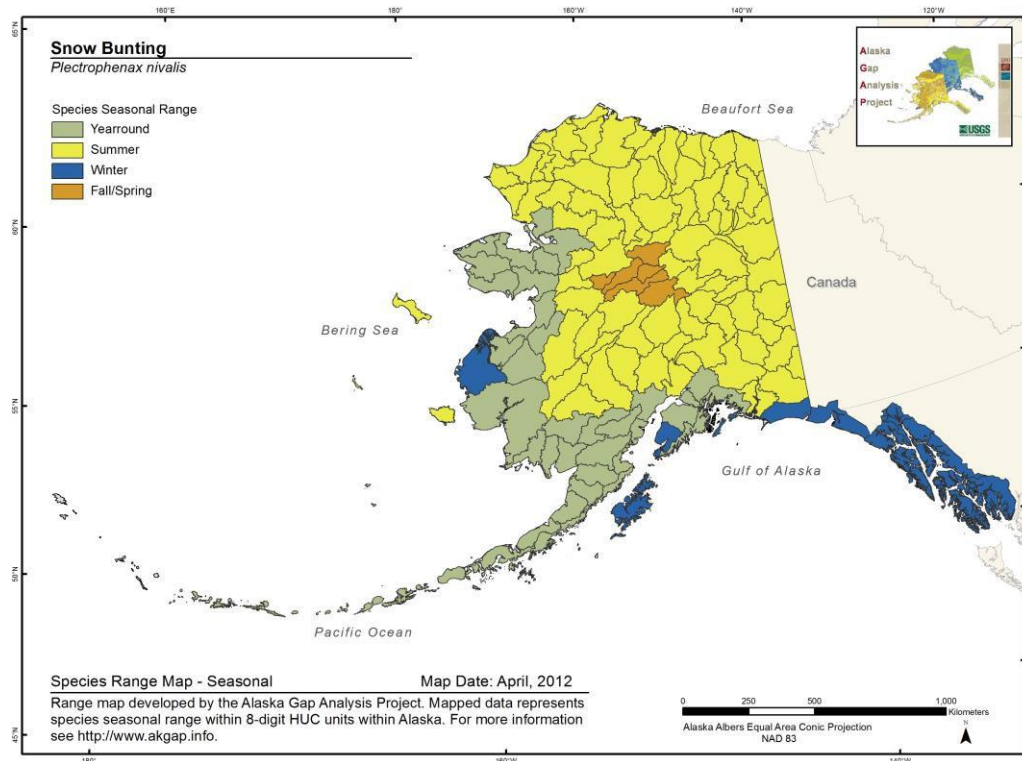
Snow Bunting *Plectrophenax nivalis*

Range Map and Distribution Model Summary

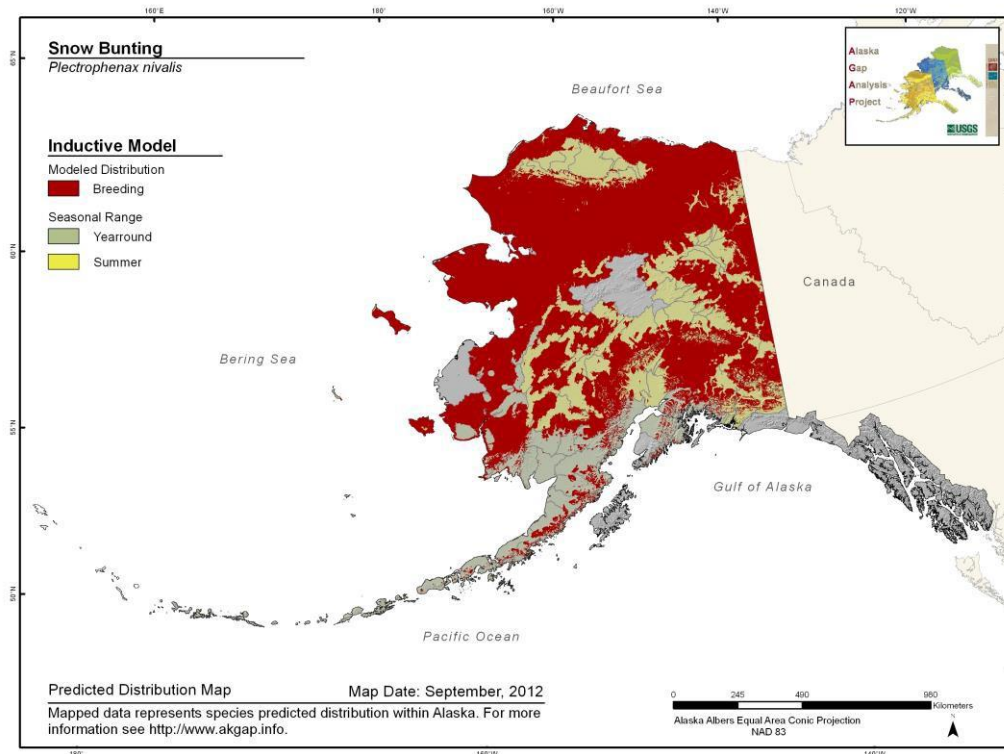
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.612**

**Model Quality
Summary:**
Low

Habitat Description

Arctic rocky shores, cliffs, stony escarpments and dry tundra; in migration and winter in grassy or weedy fields, stubble, and along roadsides and shores of lakes and oceans (AOU 1983). May venture far out on ice-covered Arctic Ocean (Johnson and Herter 1989). Nests on ground in bare rocky areas; nest usually well hidden in crevice. May also nest in bird house, cabin, pipeline support, or other structure, or under beach debris.

References

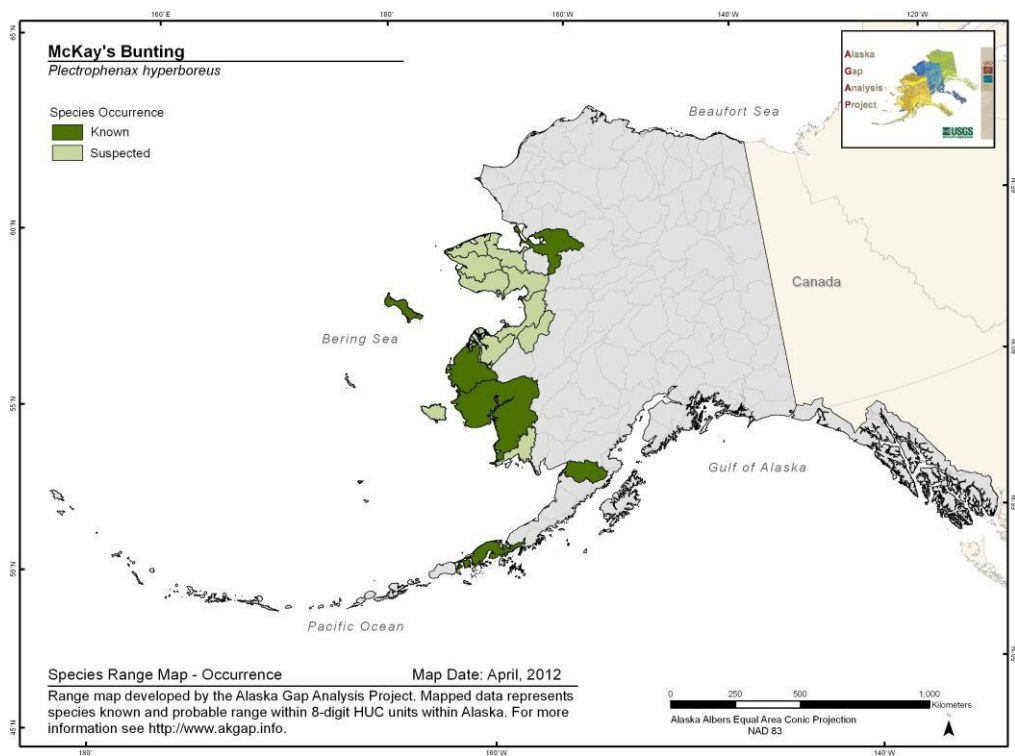
AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Johnson, S. R. and D. R. Herter. 1989. The Birds of the Beaufort Sea. BP Exploration (Alaska) Inc., Anchorage, AK. 372 pp.

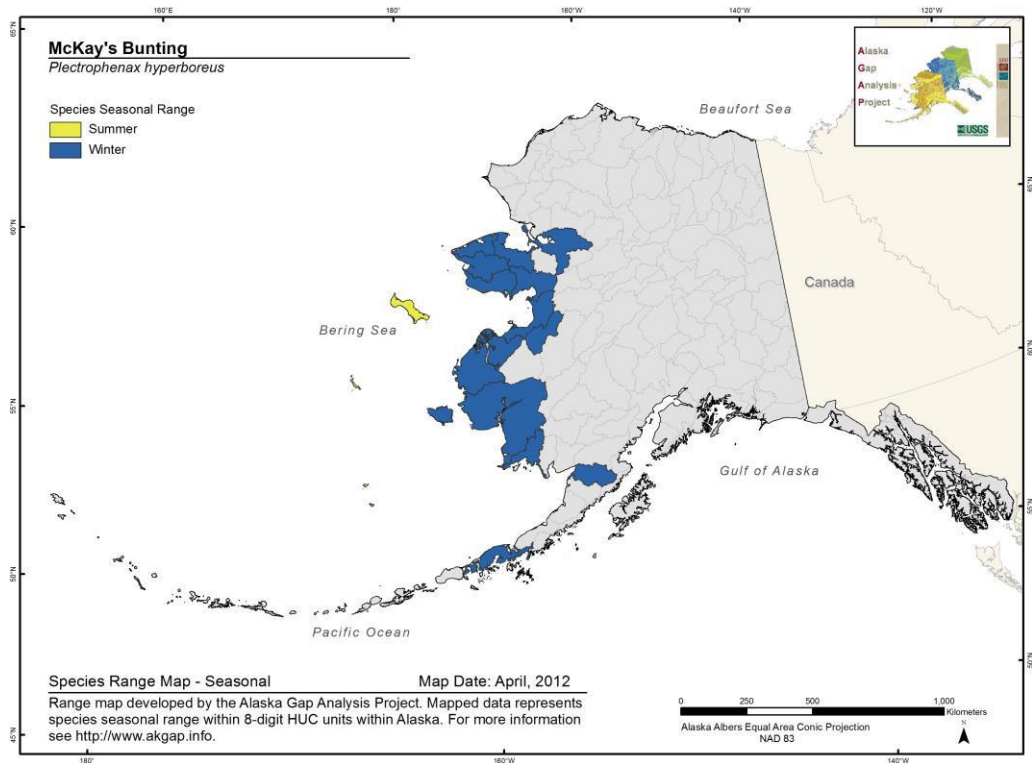
Mckay's Bunting *Plectrophenax hyperboreus*

Range Map and Distribution Model Summary

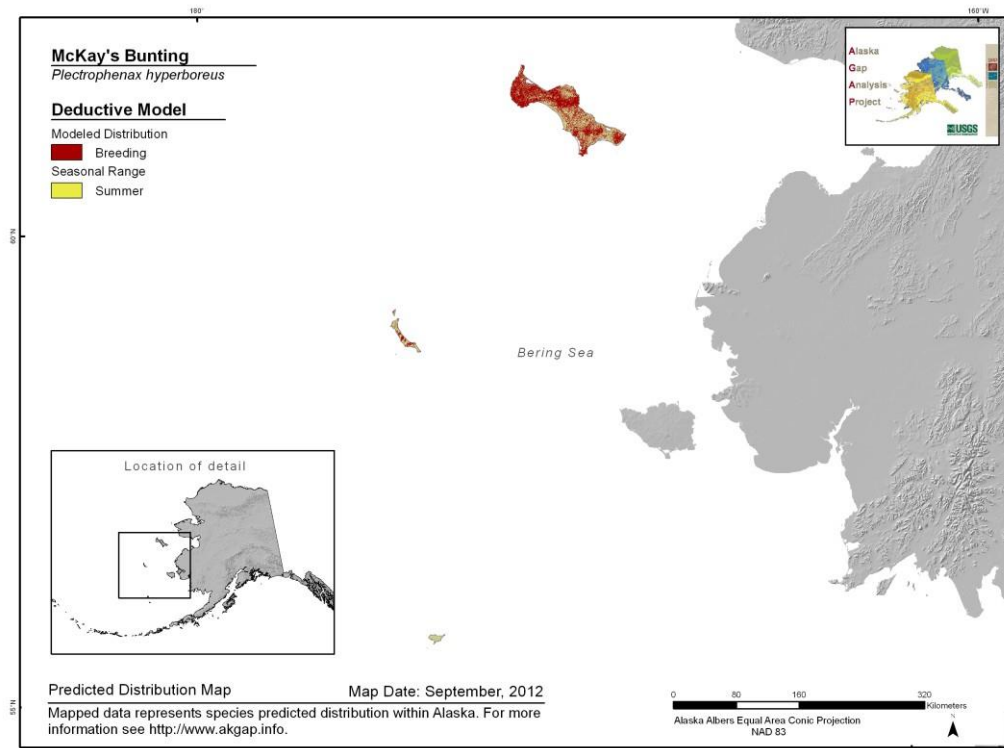
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.504**

Model Quality Summary:
Low

Habitat Description

Breeding populations restricted to Hall and St. Matthew islands in the Bering Sea. Breeds on vegetated and rocky tundra, apparently most common on coastal lowlands of breeding islands (Lyon and Montgomerie 1995). Nests in crevices in rocks on open rocky ground, on beaches (in old hollow drift logs), and on shores of tundra pools; few nests ever observed (Terres 1980, AOU 1983). Non-breeding habitat is open tundra and rocky or sandy areas, coastal marshes, and on fields or anywhere that exposed vegetation is present (AOU 1983; Lyon and Montgomerie 1995).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

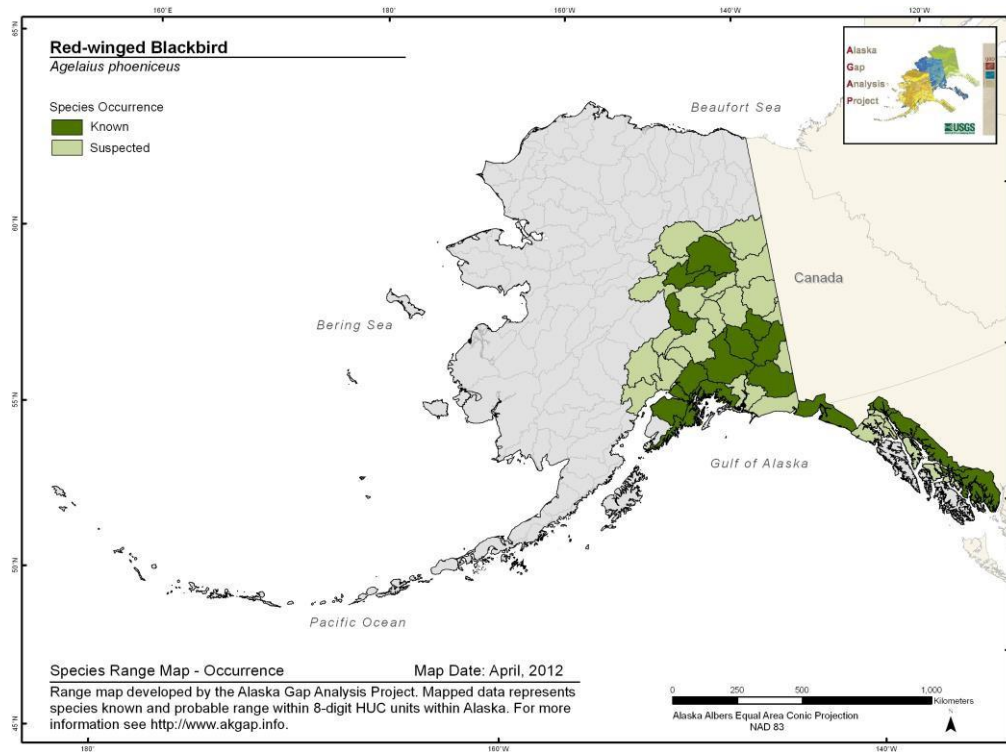
Lyon, B. and Montgomerie, R. 1995. Snow bunting and McKay's bunting. In: A. Poole and F. Gill, eds. The Birds of N. America, No. 198-199. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C. 28 pp.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

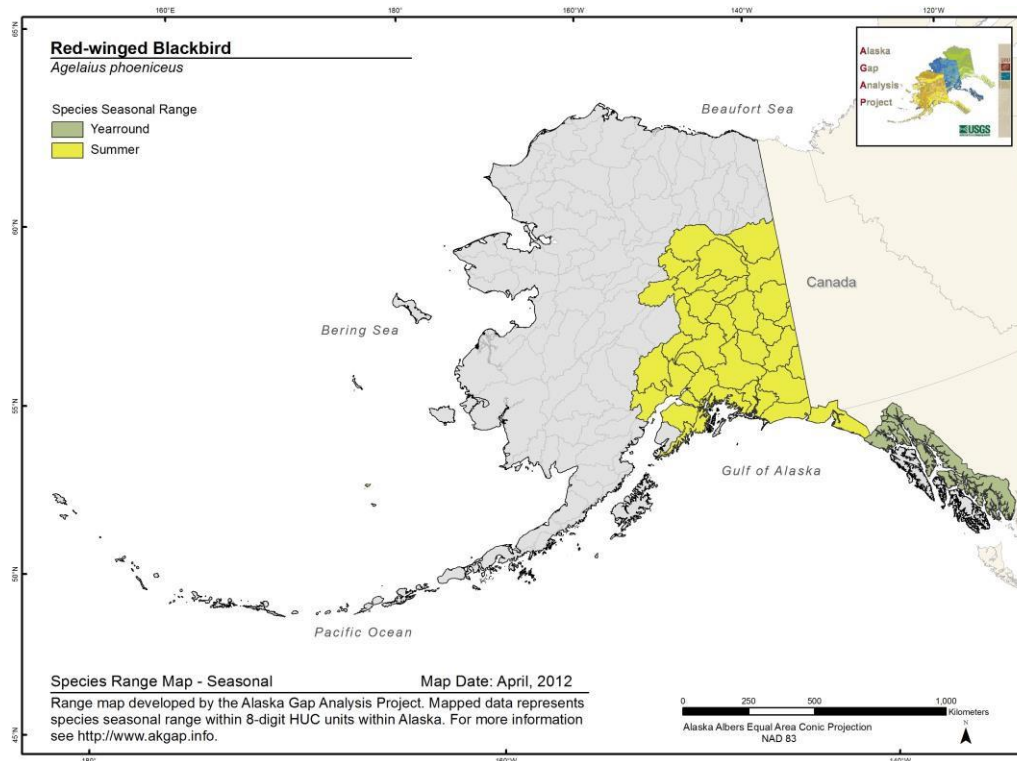
Red-winged Blackbird *Agelaius phoeniceus*

Range Map and Distribution Model Summary

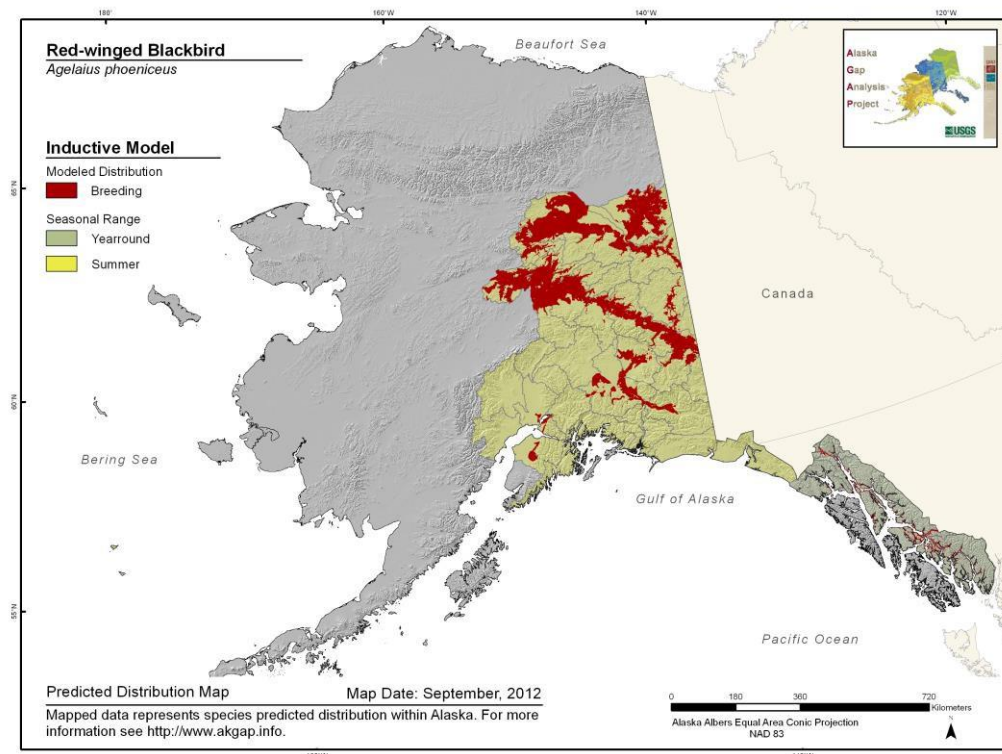
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.875**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in a variety of wetlands, including freshwater and saltwater marshes, and lesser so upland habitats, including sedge meadows and crop fields. Also occurs in riparian areas and in open patches of forests (Nero 1984, Orians and Beletsky 1989, Searcy and Yasukawa 1995). In the northern part of its range, this species uses smaller ponds, and even muskeg habitats in spruce dominated forests (Campbell et al. 2001). Roosts during breeding season in dense cover primarily in wetlands (Meanley 1965, Weatherhead and Bider 1979). Usually nests near water (small ponds, lakes, beaver ponds), in cattails, rushes, sedges; occasionally in shrubs or trees (NatureServe 2007b). In Southeast Alaska, found in freshwater marshes and in sedges by beaver ponds (Johnson 2003).

References

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Johnson, J. A. 2003. Breeding bird communities of major mainland rivers of southeastern Alaska. Thesis, Utah State University, Logan, Utah, USA.

Meanley, B. 1965. The roosting behavior of the red-winged blackbird in the southern United States. Wilson Bulletin 77:217-228.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Nero, R. W. 1984. Redwings. Smithsonian Institution Press, Blue Ridge Summit, PA. 160 p.

Orians, G. H. and L. D. Beletsky. 1989. Red-winged Blackbird Pp. 183-197 in Lifetime reproduction in birds (I. Newton, ed.). Academic Press, New York.

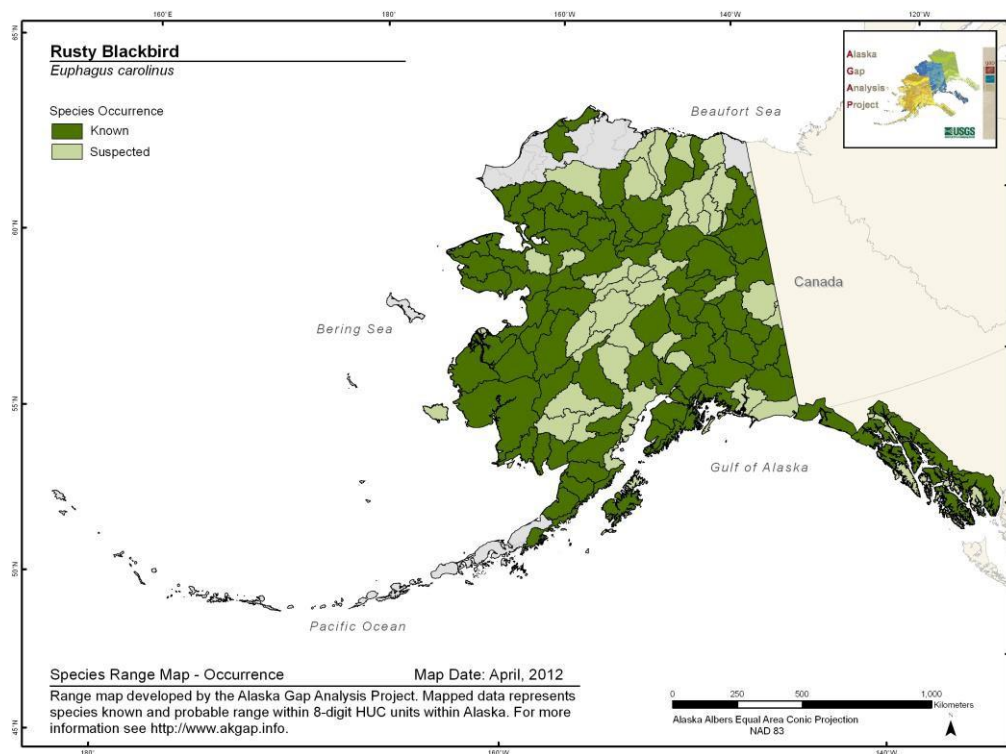
Searcy, W. A. and K. Yakusawa. 1995. Polygyny and sexual selection in Red-winged Blackbirds. Princeton Univ. Press, Princeton, NJ.

Weatherhead, P. J. and J. R. Bider. 1979. Management options for blackbird problems in agriculture. *Phytoprotection* 60:145-155.

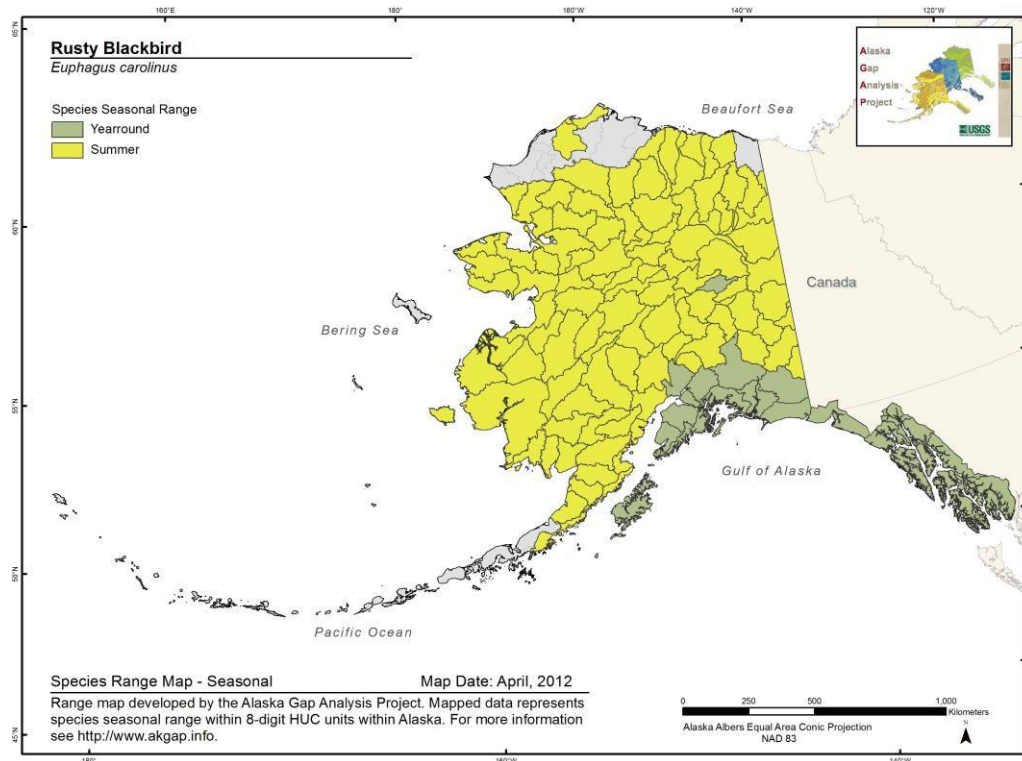
Rusty Blackbird *Euphagus carolinus*

Range Map and Distribution Model Summary

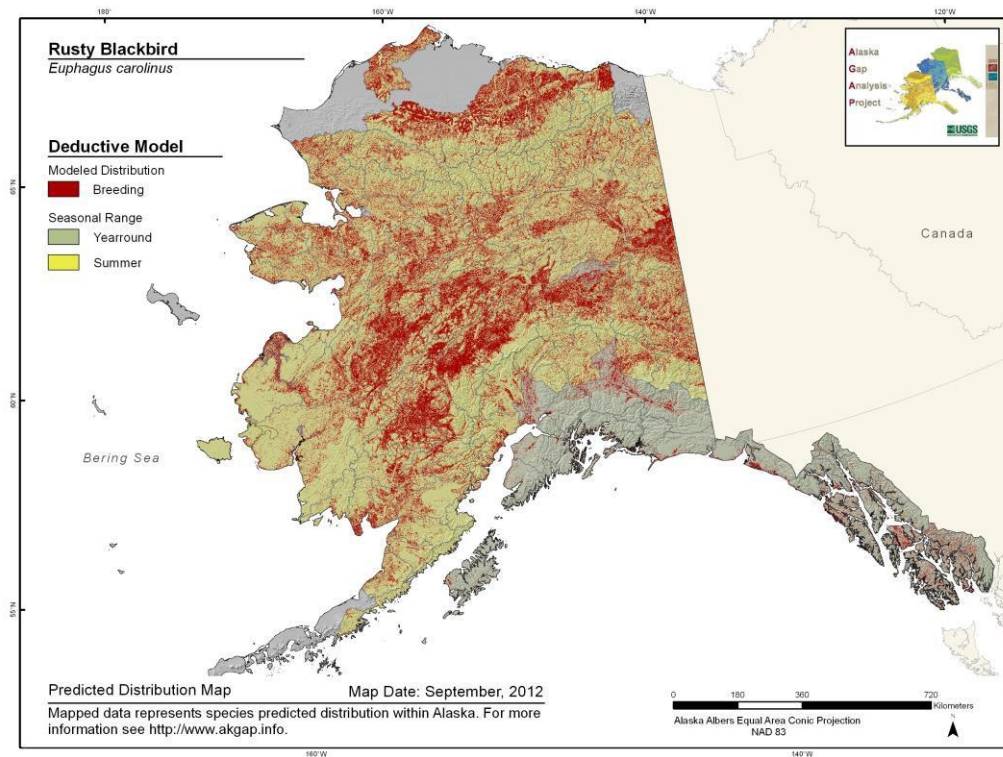
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Favors open habitat near water, with a preference for nesting in tall shrubs (Spindler and Kessel 1980). Also prefers moist woodland (primarily coniferous), bushy bogs, and wooded edges of water courses (Spindler and Kessel 1980). May be found along streams and rivers and at associated sloughs and wetlands, around the margins of taiga ponds, beaver ponds, lakes and adjacent marshes, and in brackish estuarine meadows (UAM unpubl. data in Hannah 2004). May be disturbance-dependent, selecting habitats that have reverted to early- to mid-successional stages due to fire, windthrow, and beaver activity (Spindler 1976, Ellison 1990). Nests in conifers such as black spruce (*Picea mariana*) and other stunted muskeg trees (Bent 1958, AOU 1983). Considered an ecological specialist compared to other blackbird species, which are largely generalists; more averse to unfamiliar conditions (neophobic) than other blackbirds (Lewis 1931, Cade 1951, Hannah 2004).

References

AOU. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington D. C.

Bent, A.C. 1958. Life histories of North American blackbirds, orioles, tanagers, and their allies. U.S. National Museum Bulletin 211. Washington, DC.

Cade, T. 1951. Food of the Peregrine Falcon, *Falco peregrinus*, in Interior Alaska. *Auk* 68:373-374.

Ellison, W.G. 1990. The status and habitat of the Rusty Blackbird in Caledonia and Essex counties. Cooperative project with the Nongame and Natural Heritage Program, Vermont Fish and Wildlife Department, Woodstock, VT.

Hannah, K. C. 2004. Status review and conservation plan for the Rusty Blackbird (*Euphagus carolinus*) in Alaska, Draft Report. Alaska Bird Observatory, Fairbanks, Alaska.

Lewis, J. B. 1931. Behaviour of Rusty Blackbird. *Auk* 48:125-126.

Spindler, M.A. 1976. Ecological survey of the birds, mammals and vegetation of Fairbanks Wildlife Management Area. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 258 p.

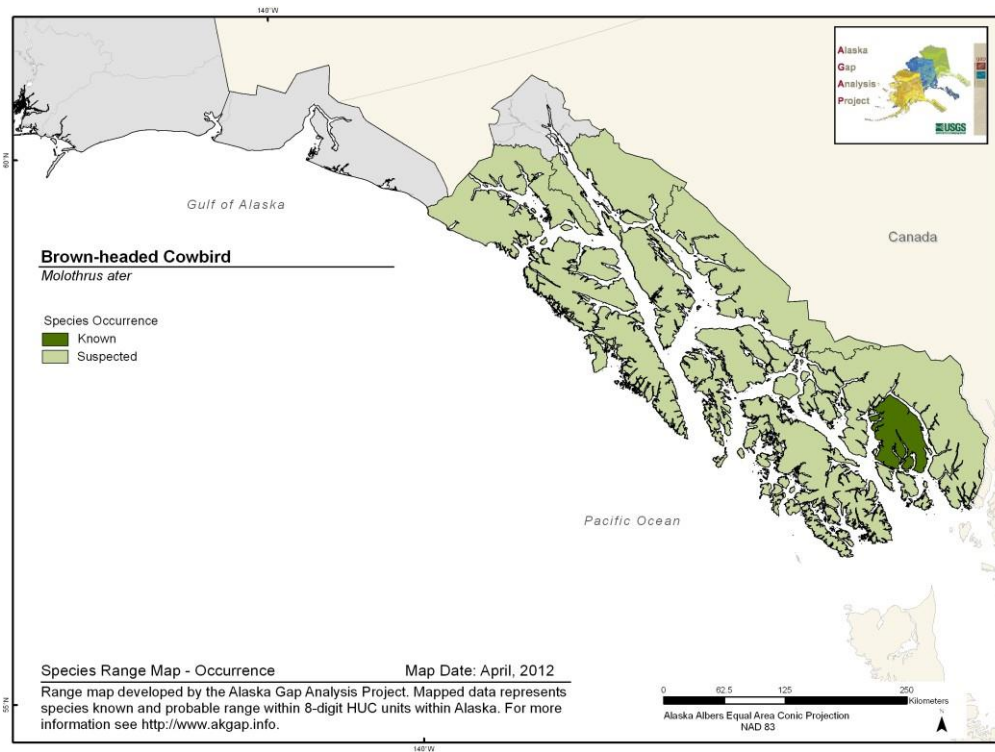
Spindler, M. A. and B. A. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. *Syesis* 13:61-104.

Brown-headed Cowbird

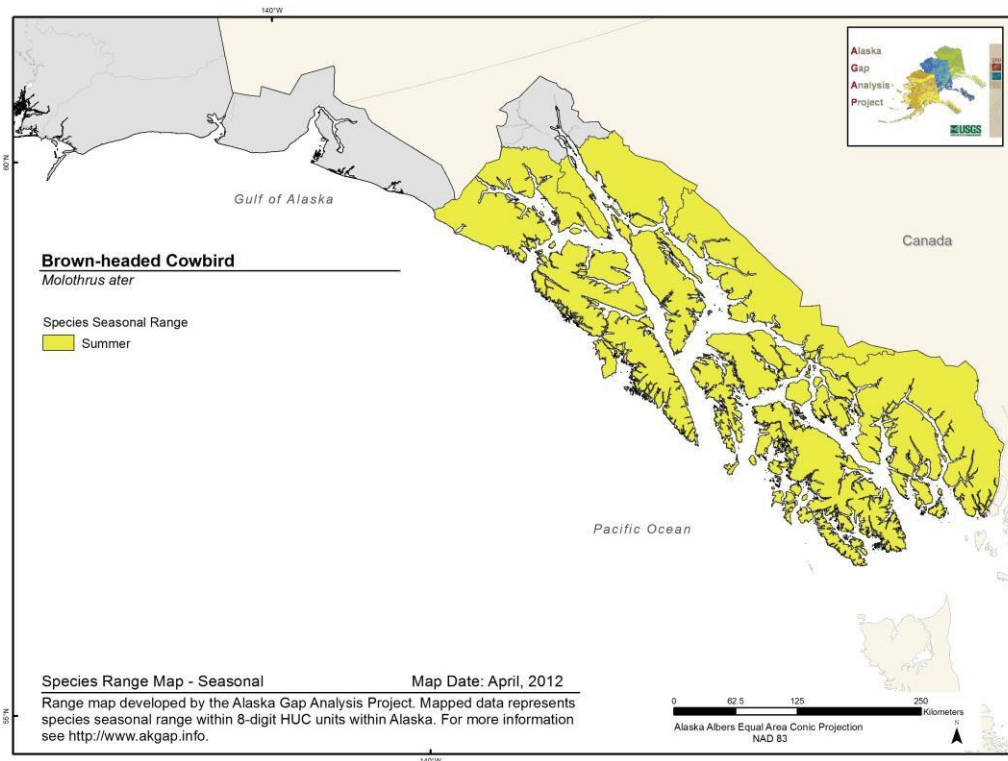
Molothrus ater

Range Map and Distribution Model Summary

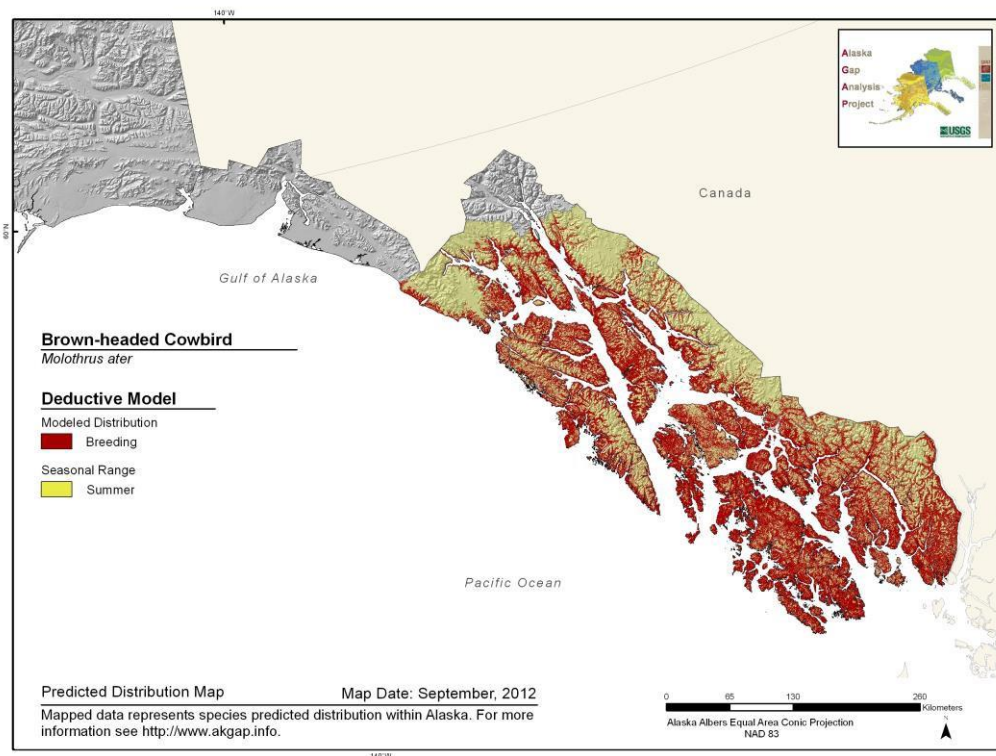
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.526**

**Model Quality
Summary:**
Low

Habitat Description

Open habitats with low or scattered trees. May occur in woodland edges (primarily deciduous), shrub thickets, prairies, pastures, orchards, and residential areas (Lowther 1993).

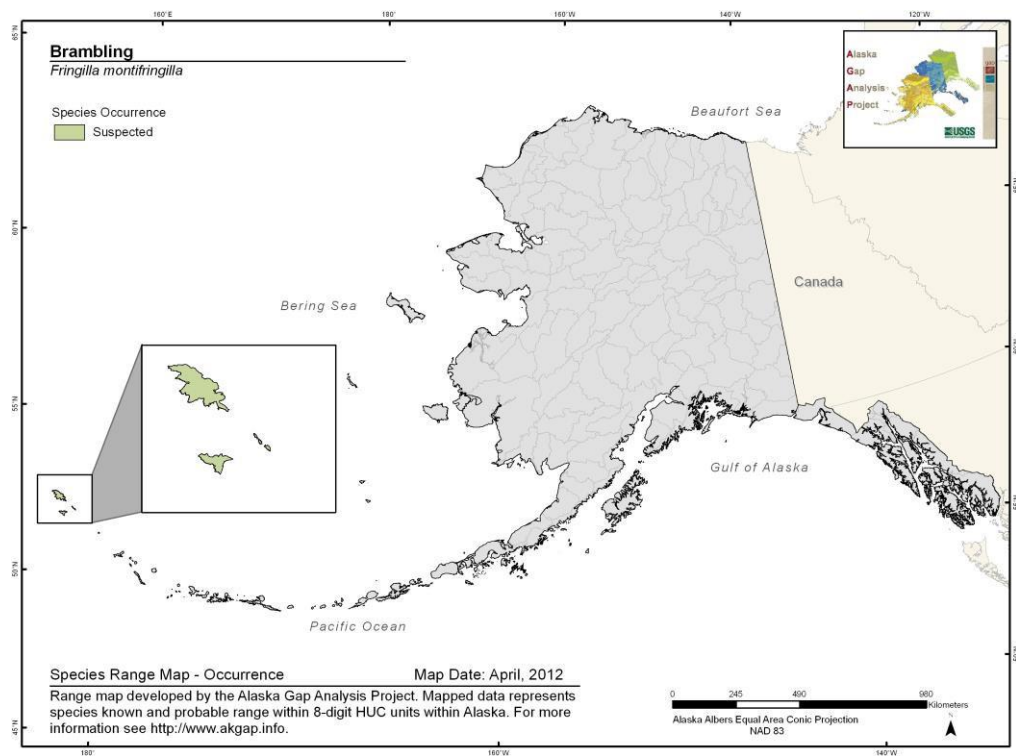
References

Lowther, P.E. 1993. Brown-headed Cowbird (*Molothrus ater*). In *The Birds of North America*, No. 47 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

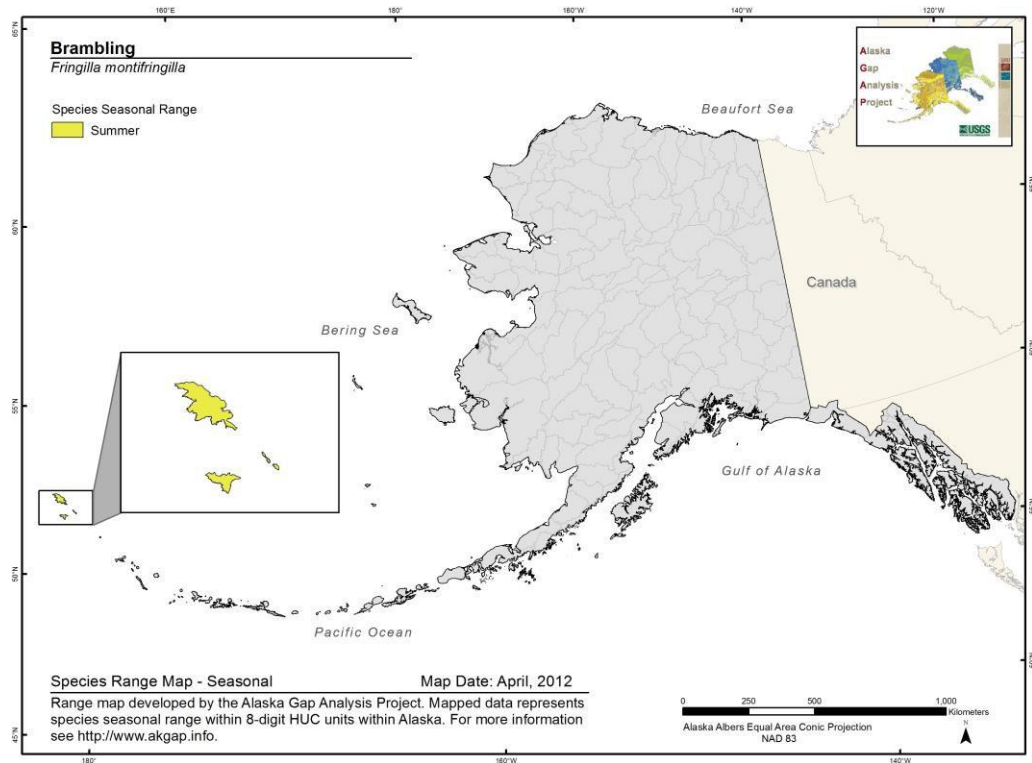
Brambling *Fringilla montifringilla*

Range Map and Distribution Model Summary

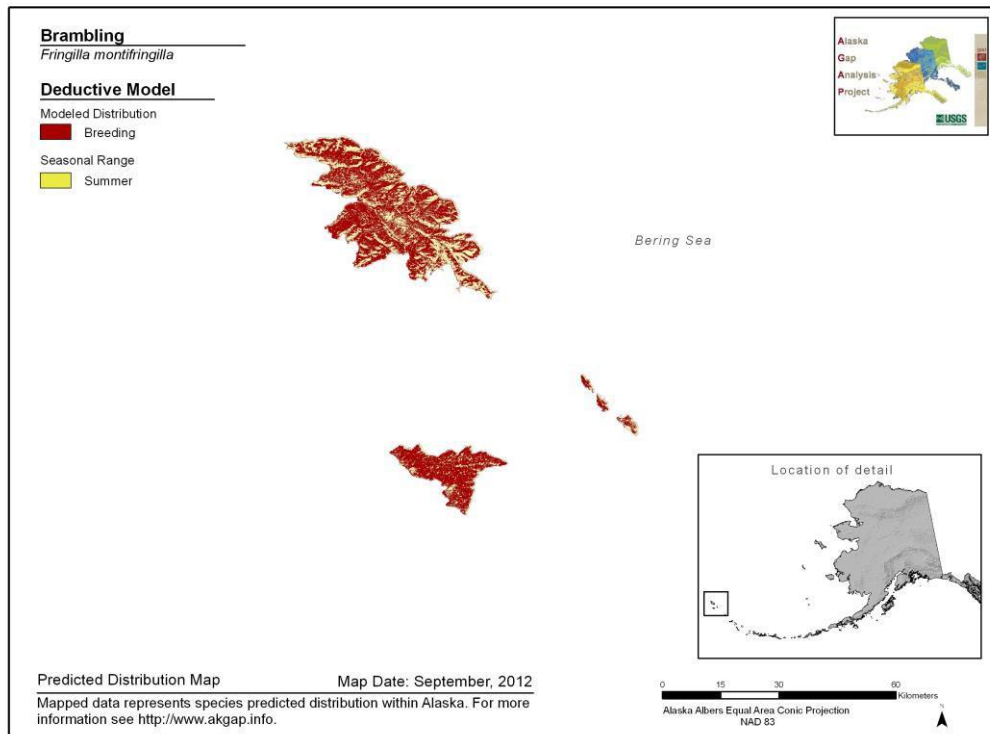
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

Model Evaluation Statistic (AUC): No AUC

Model Quality Summary:
Not validated

Habitat Description

Only breeding record of Brambling in Alaska on Attu Island. Habitat was dwarf shrub meadow (Sykes and Sonneborn 1998). Elsewhere habitat includes subalpine birch (Hogstad 2000) and Beech forests (Jenni 1986). Beech forests important feeding sites in Scandinavia (Jenni 1986, Lindstrom 1990, Jenni 1991).

References

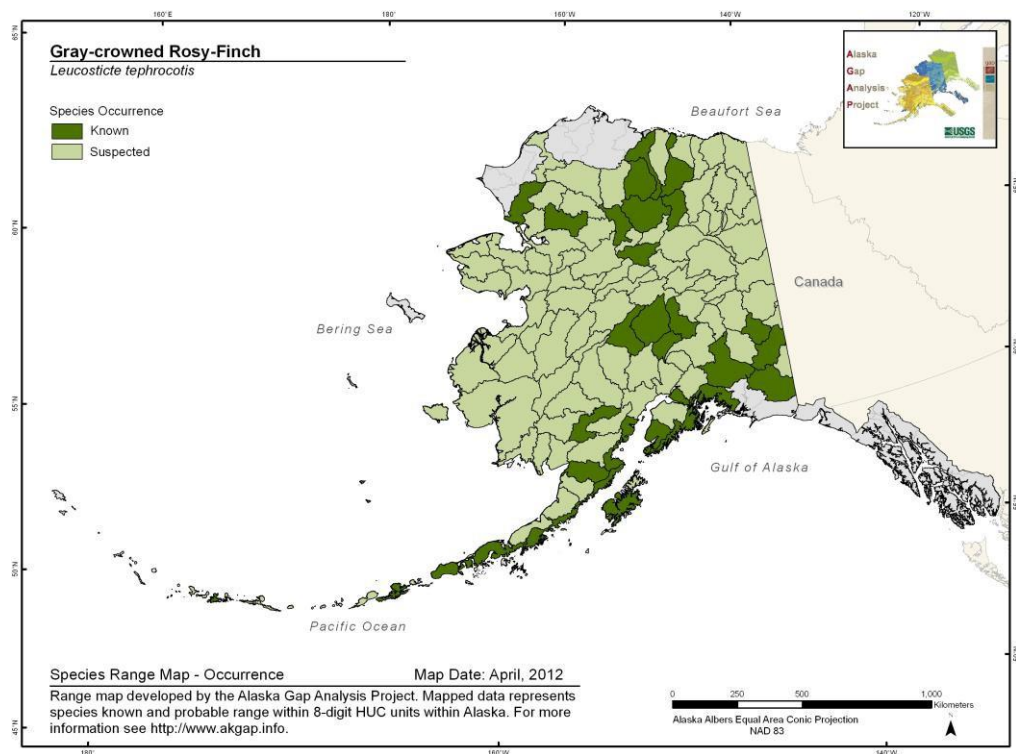
- Hogstad, O. 2000. Fluctuation of a breeding population of Brambling (*Fringilla montifringilla*) during 33 years in a subalpine birch forest. *Ornis Fennica* 77:97-103.
- Jenni, L. 1986. The importance of large roosts of Bramblings *Fringilla montifringilla* in beech-mast areas. *Der Ornithologische Beobachter* 83:269-274.
- Jenni, L. 1991. Microclimate of roost sites selected by wintering Bramblings *Fringilla montifringilla*. *Ornis Scandinavica* 22:327-334
- Lindstrom, A. 1990. The role of predation risk in stopover habitat selection in migrating Bramblings, *Fringilla montifringilla*. *Behavioral Ecology* 1: 102-107.
- Sykes, P.W., Jr., and D.W. Sonneborn. 1998. First breeding records of Whooper Swan and Brambling in North America at Attu Island, Alaska. *The Condor* 100(1):162-164.

Gray-crowned Rosy-Finch

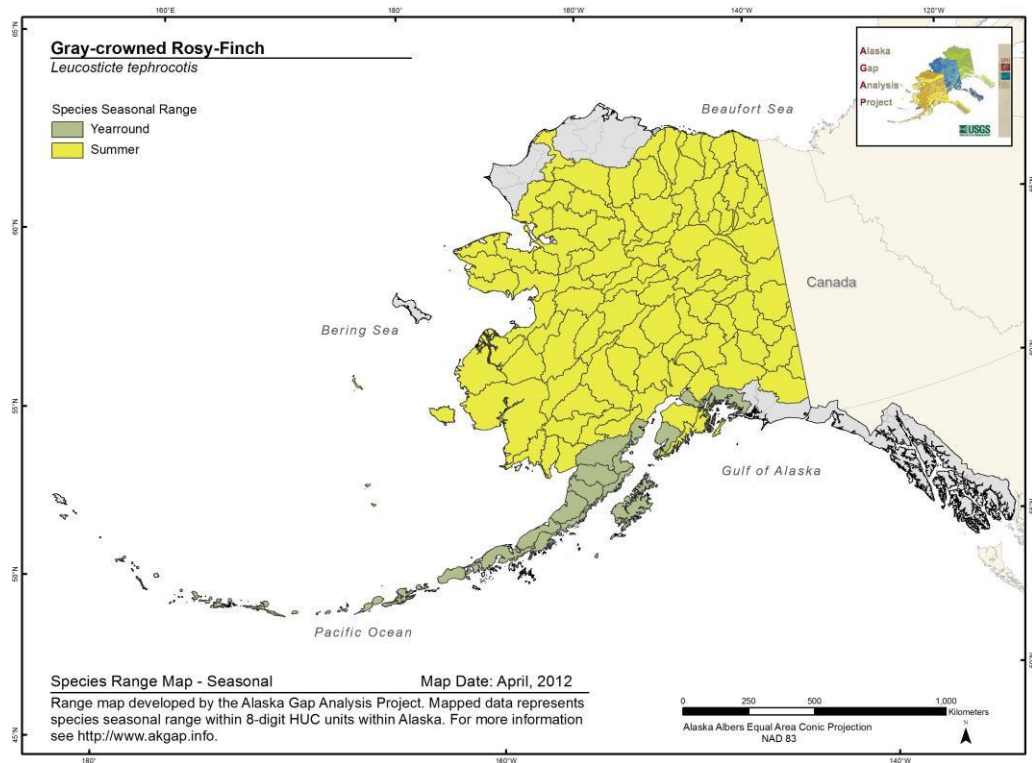
Leucosticte tephrocotis

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:
Rejected all models

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Barren, rocky or grassy areas and cliffs among glaciers and snow fields or beyond timberline among talus, rockpiles, and cliffs (Gabrielson and Jewett 1940, Gabrielson and Lincoln 1959, Bent 1968, Kessel 1989). Nests usually in rock crevices or holes in cliffs. Nests in buildings and other structures on Amchitka Island, Alaska (Johnson 1983). On islands in western Alaska, found on beaches and in villages (Gabrielson and Lincoln 1959). In B.C., this species nests at higher elevations than any other songbird, with nests reported at 1,500 to 2,010 m on the coast and from 1,500 to 2,550 m in the interior (Campbell et al. 2001).

References

Bent, A.C., et al. 1968. Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies. U.S. Natl. Mus. Bull. 237. Washington, DC.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Gabrielson, I. N., and S. G. Jewett. 1940. Birds of Oregon. Corvallis, Oregon: Oregon State College.

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Stackpole Company, Harrisburg, PA and Wildl. Manage. Inst., Washington, D.C. 922 pp.

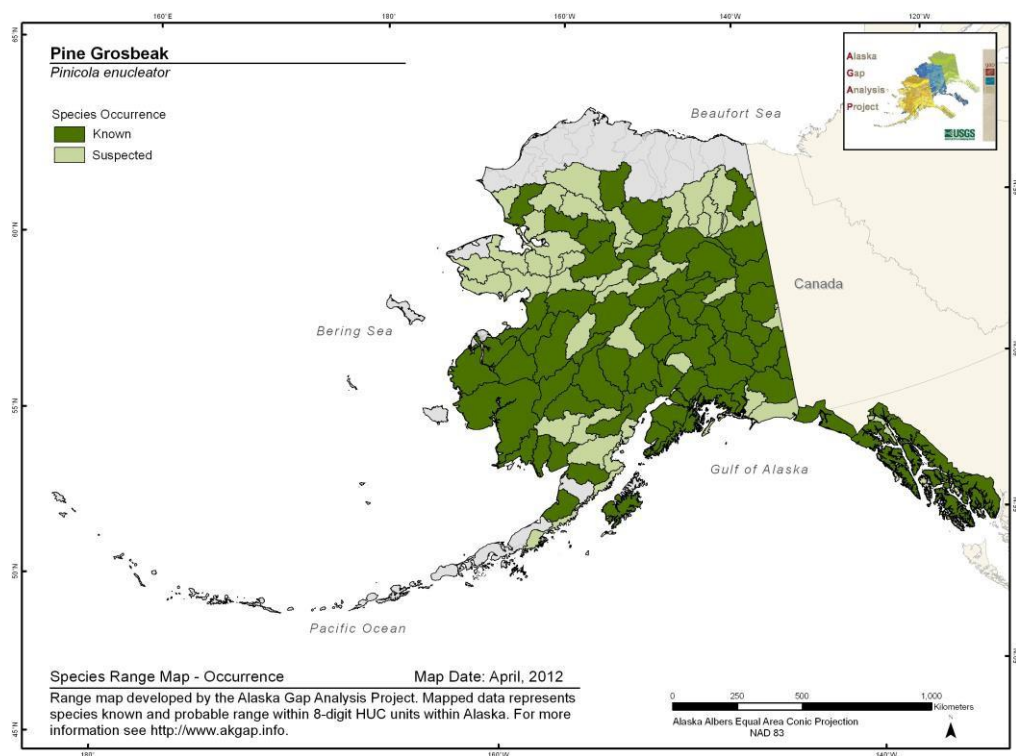
Johnson, R. E. 1983. Nesting biology of the rosy finch on the Aleutian Islands, Alaska. Condor 85:447-452.

Kessel, B. 1989. Birds of the Seward Peninsula, Alaska: their biogeography, seasonality, and natural history. Univ. of Alaska Press, Fairbanks, AK. 330 pp.

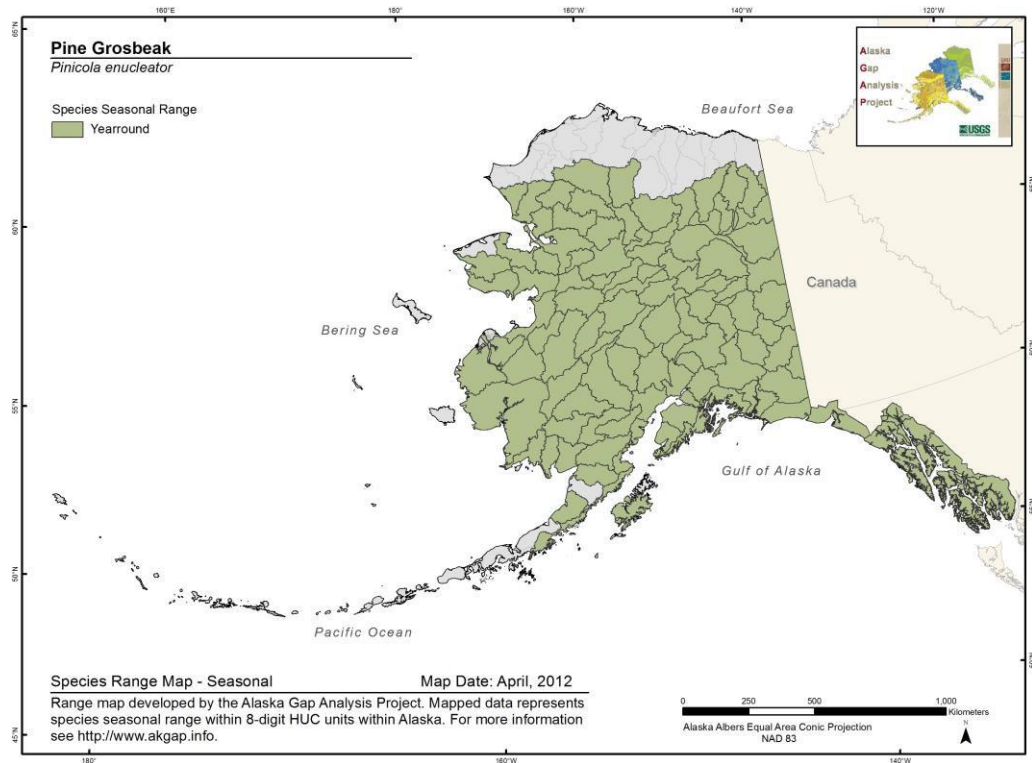
Pine Grosbeak *Pinicola enucleator*

Range Map and Distribution Model Summary

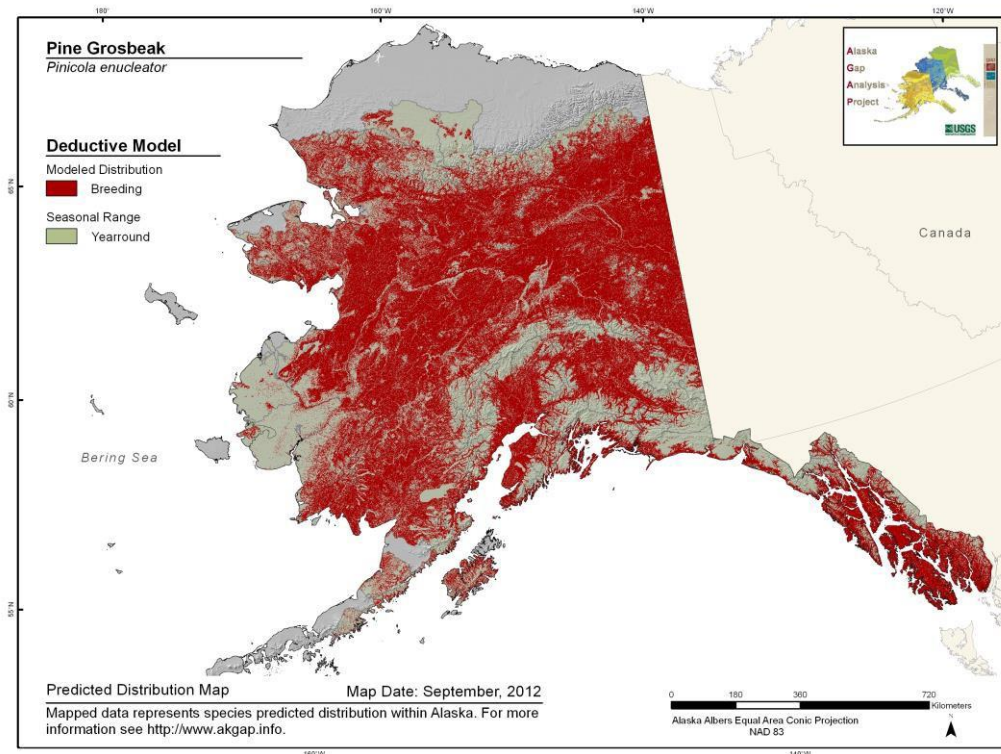
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.508**

Model Quality Summary:
Low

Habitat Description

Open coniferous forest and forest edge near treeline in taiga, coastal forests of Sitka spruce, montane black and white spruce forests. Associated with water (Adkisson 1999). Nests in trees or shrubs in open coniferous woods (Terres 1980). On Alaska Peninsula found in alder thickets beyond treeline (Gibson, pers. comm. in Adkisson 1999). May also occur in human made open forests, such as those disturbed by partial logging (Adkisson 1999). In winter, typically descends to lower elevations and inhabits coniferous, mixed, and deciduous forests, woodlands, second growth, shrubbery, forest edges and openings, and bird feeders in human settlements (NatureServe 2007b, Campbell et al. 2001, Alexander et al. 2003).

References

Adkisson, C. S. 1999. Pine Grosbeak (*Pinicola enucleator*). In *The Birds of North America*, Vol. 7, No. 456 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Alexander, S. A., F. I. Doyle, C. D. Ecker, H. Grünberg, N. L. Hughes, M. Jensen, I. Johnson, D. H. Mossop, W. A. Nixon, and P. H. Sinclair. 2003. *Birds of the Yukon Territory* (P. H. Sinclair, W. A. Nixon, C. D. Eckert, and N. L. Hughes, eds.). UBC Press, Vancouver, B.C.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

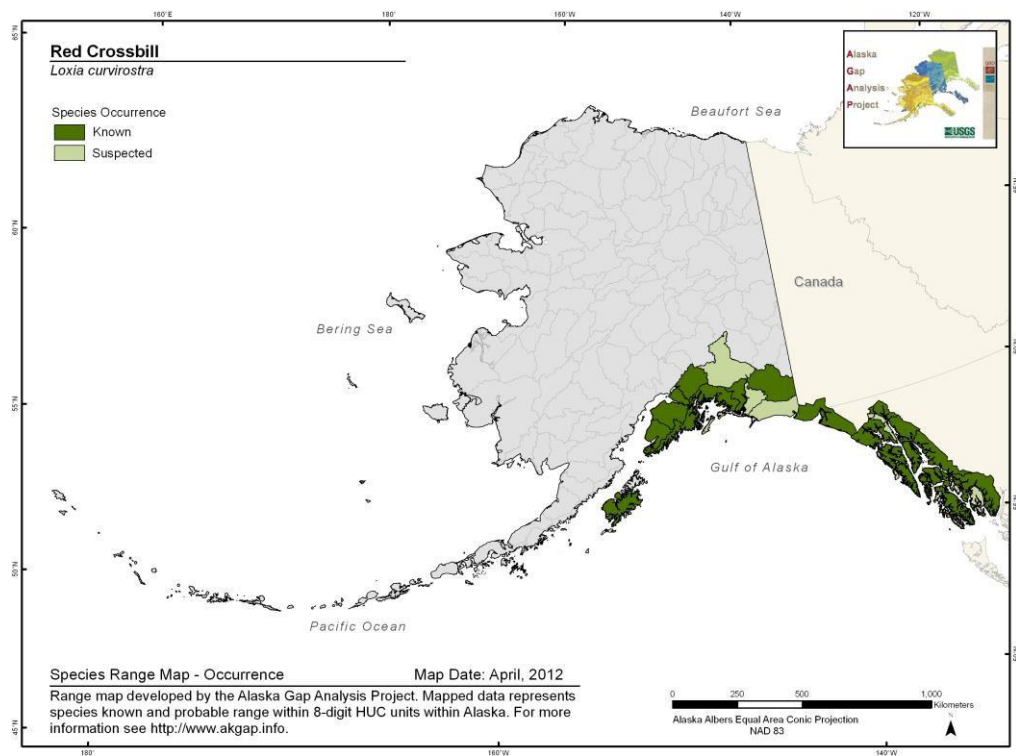
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York, NY.

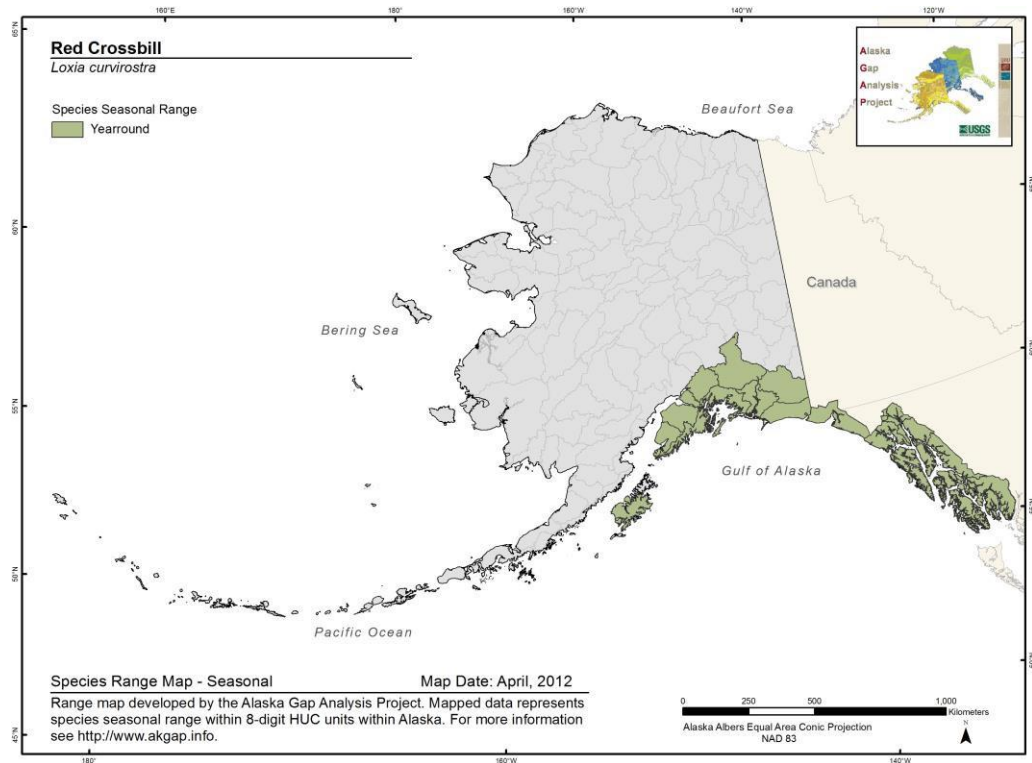
Red Crossbill *Loxia curvirostra*

Range Map and Distribution Model Summary

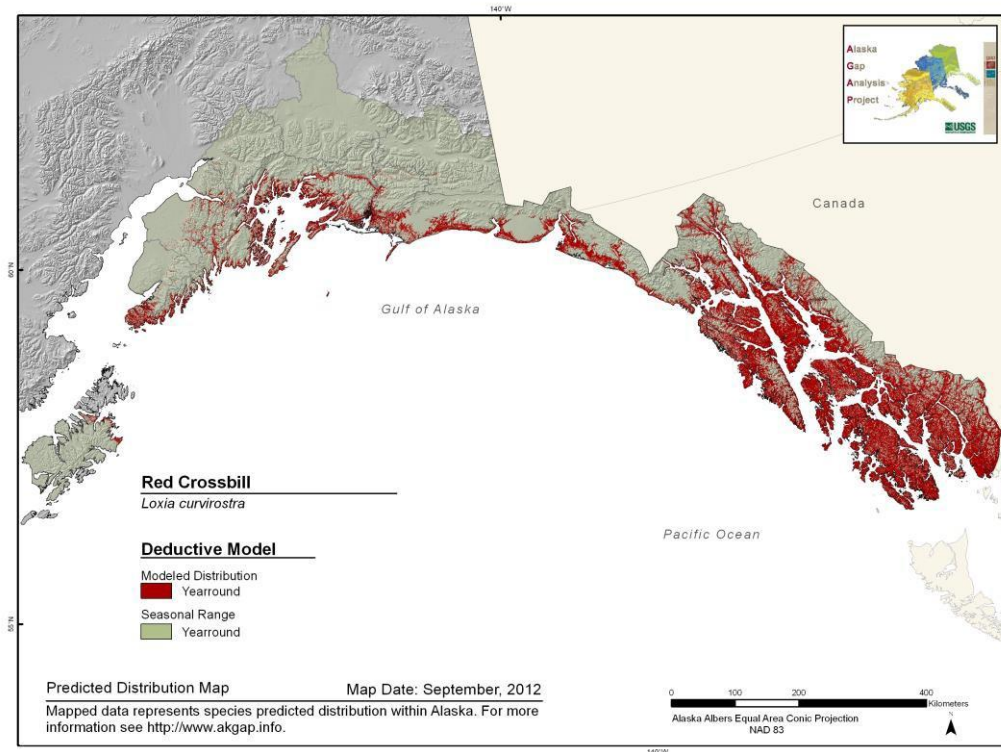
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.836**

**Model Quality
Summary:**
Moderate

Habitat Description

Mature coniferous forests where spruce, Douglas-fir, hemlock, and/or pine produce large cone crops (Adkisson 1996). Also, mixed-coniferous forests. In Alaska, mainly associated with spruce species (Adkisson 1996). In B.C., this species may occur throughout the year at all elevations up to timberline, but is more often found at middle and lower elevations (Campbell et al. 2001).

References

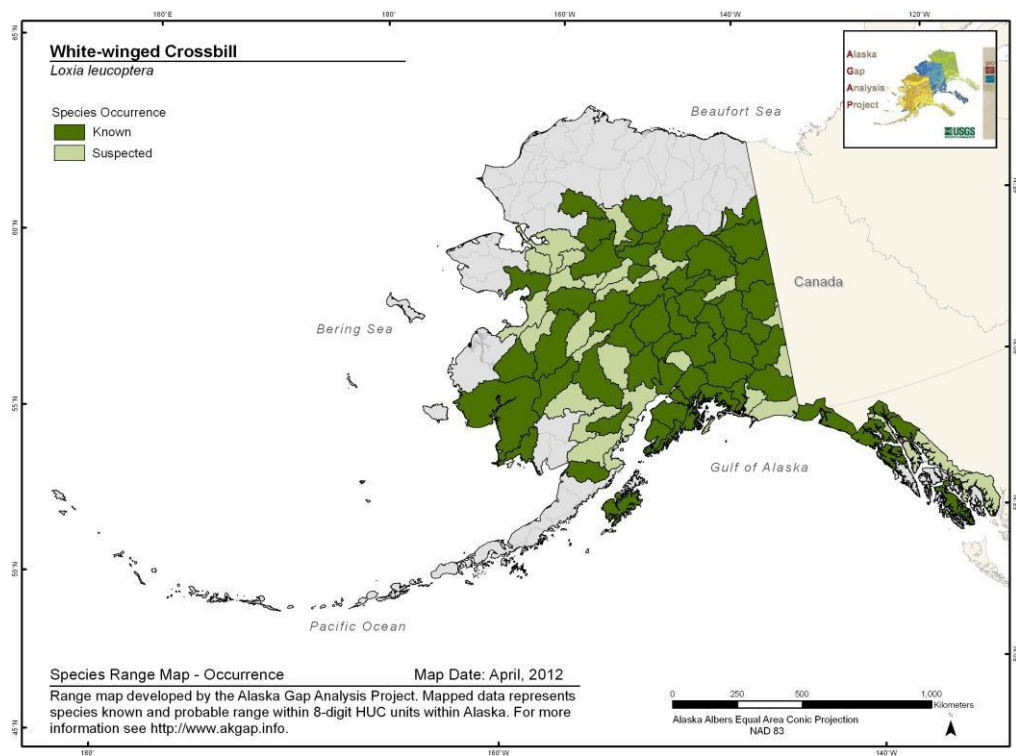
Adkisson, C. S. 1996. Red Crossbill (*Loxia curvirostra*). In *The Birds of North America*, Vol. 7, No. 256 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. *The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows*. University of British Columbia Press, Vancouver. 739 pages.

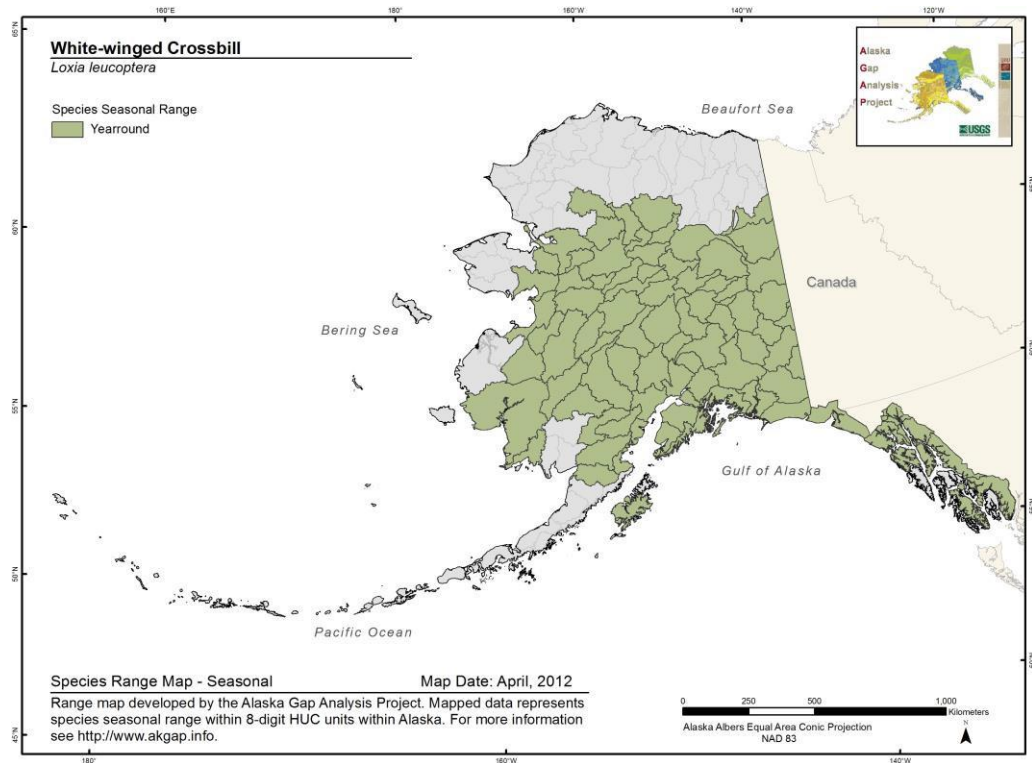
Loxia leucoptera

Range Map and Distribution Model Summary

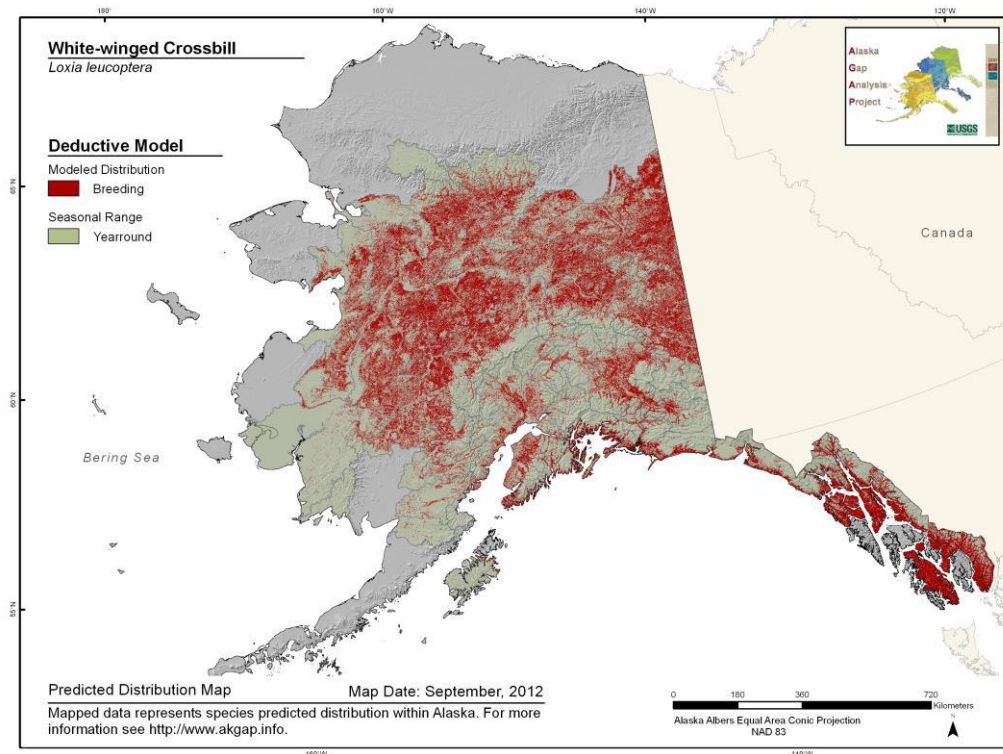
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.542**

**Model Quality
Summary:**
Low

Habitat Description

Conifer forests, primarily white spruce, black spruce, tamarack forests, douglas-fir, and hemlock forests (Benkman 1992, Campbell et al. 2001). Also, coastal Sitka spruce in southeast Alaska (Benkman 1992). Rarely occurs in non-treed habitats (Campbell et al. 2001). In northern regions of B.C., breeds from valley bottoms to timberline (Campbell et al. 2001).

References

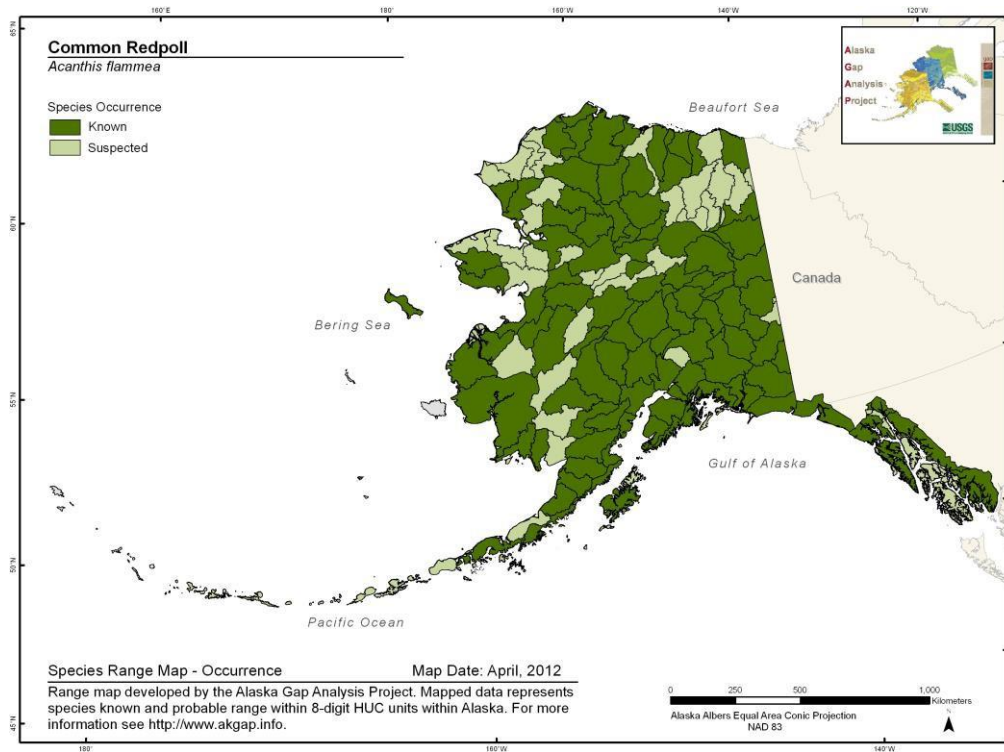
Benkman, C. W. 1992. White-winged Crossbill (LOXIA LEUCOPTERA). In The Birds of North America, No. 27 (A. Poole, P. Stettenheim, and F. Gill, Eds). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

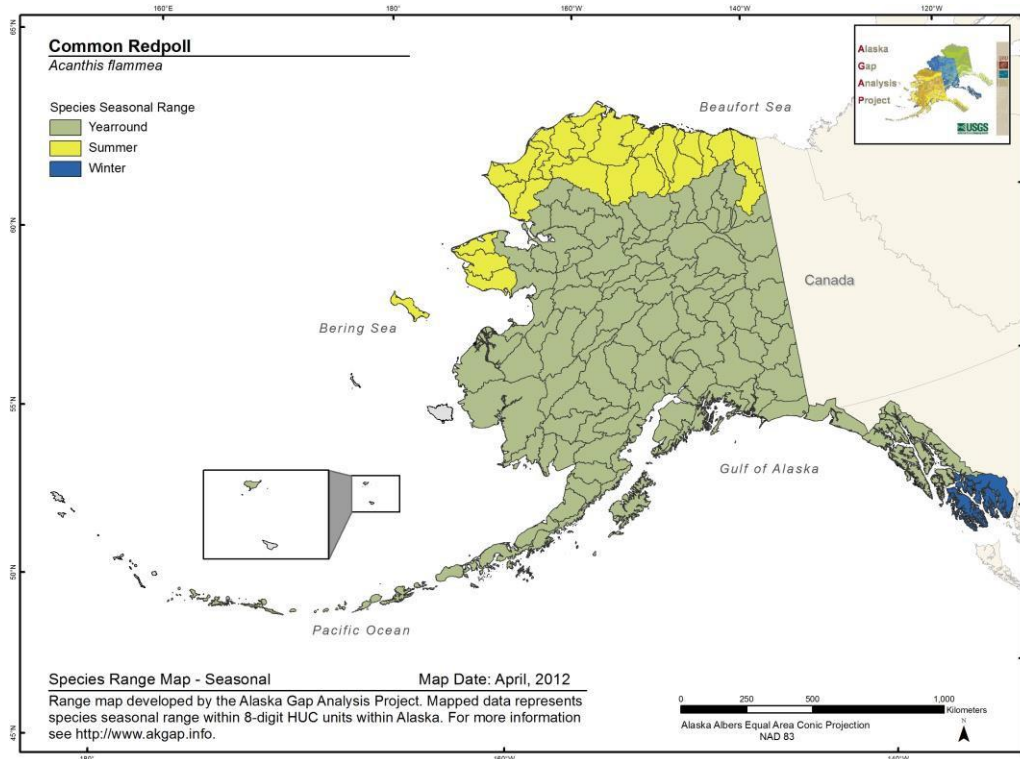
Common Redpoll *Acanthis flammea*

Range Map and Distribution Model Summary

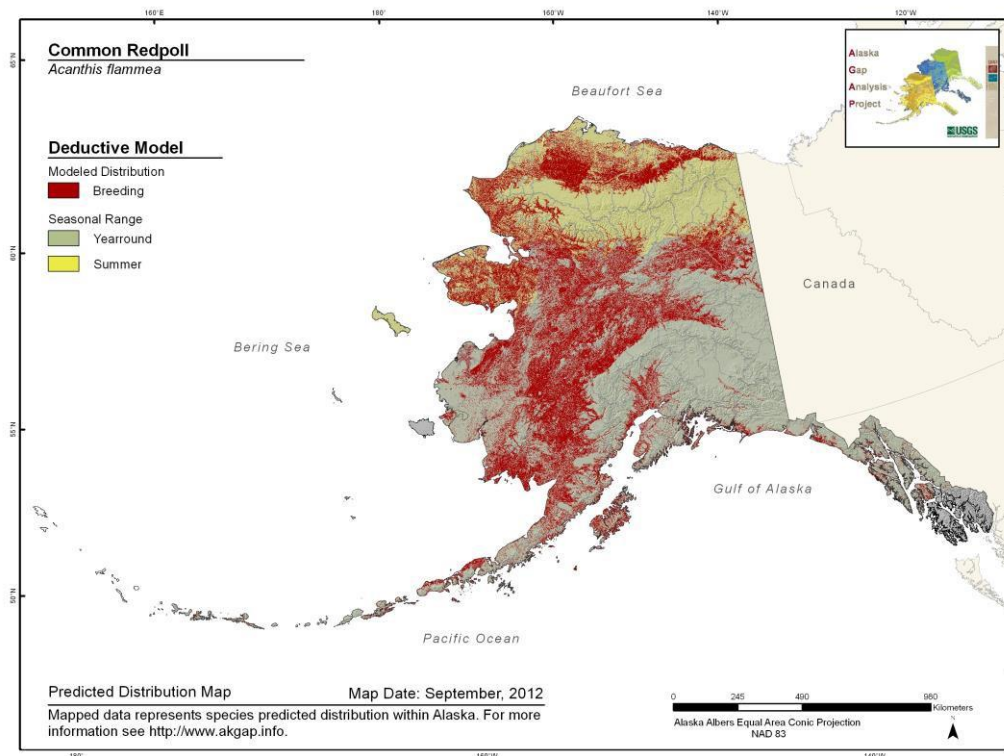
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.522**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat includes open subarctic, coniferous, mixed, and deciduous forest and scrub (spruce, alder, birch, willow, low tundra scrub). Only occurs in tundra where shrubby vegetation occurs in sheltered places. Avoids dense forests. Found from sea level to 1,350 m (Knox and Lowther 2000). In B. C., breeding habitat consists of subalpine willow thickets, mixed spruce and deciduous thickets at edge of openings and edge habitat along streams, rivers, wetlands (Campbell et al. 2001).

References

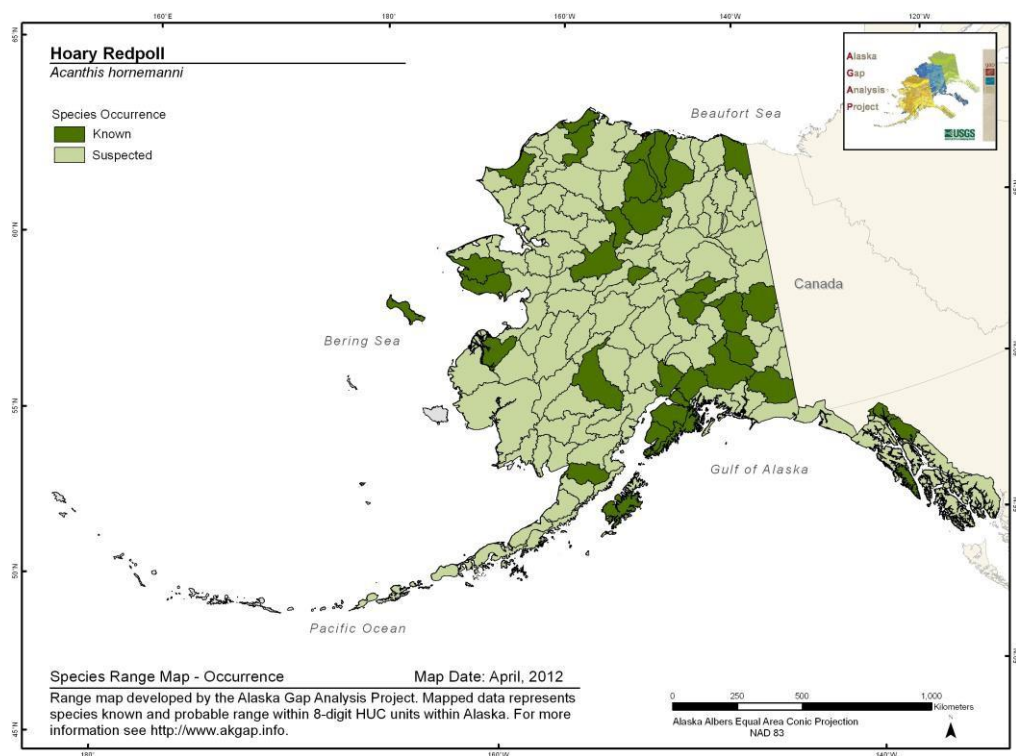
Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines: wood-warblers through Old World sparrows. University of British Columbia Press, Vancouver. 739 pages.

Knox, A. G. and P. E. Lowther. 2000. Common Redpoll (*Carduelis flammea*). In The Birds of North America, Vol. 7, No. 543 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

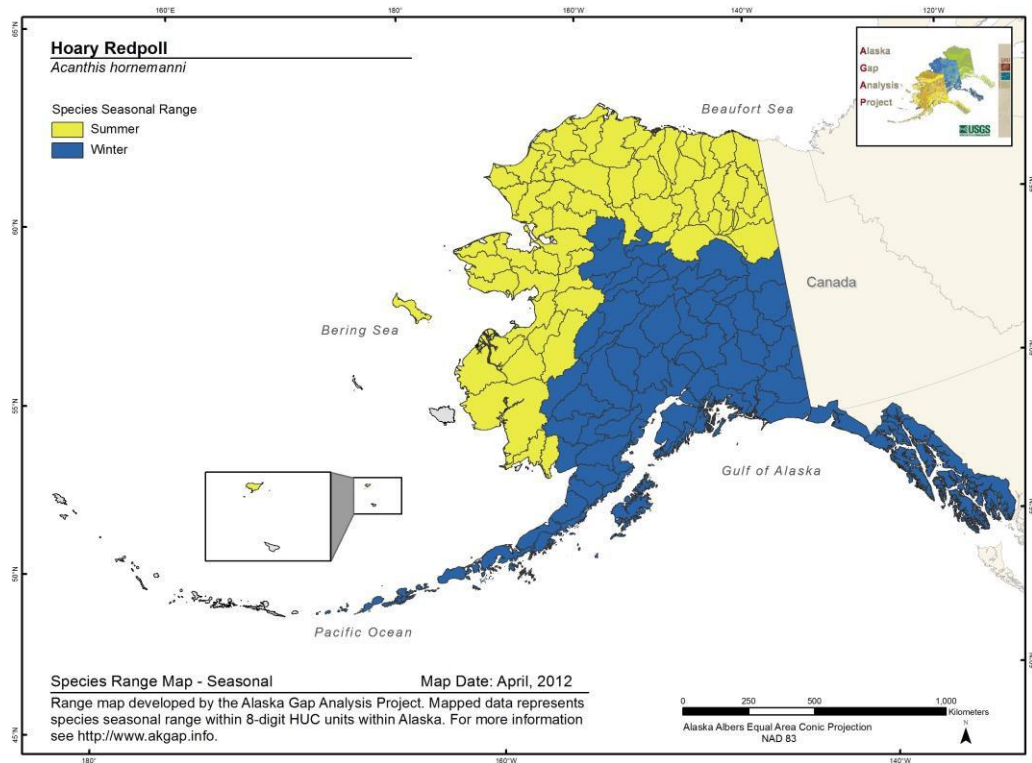
Hoary Redpoll *Acanthis hornemanni*

Range Map and Distribution Model Summary

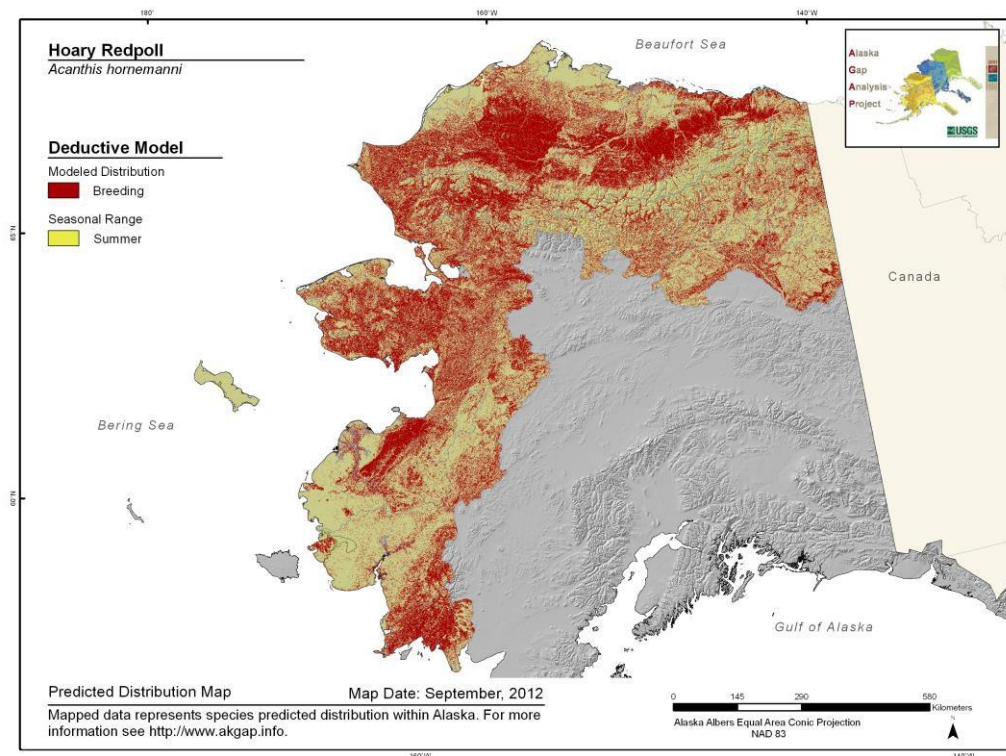
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.502**

**Model Quality
Summary:**
Low

Habitat Description

Breeding habitat open forest and scrub from sea level extending into tundra. In southwest Alaska, riparian shrub and low-shrub habitats with scattered and stunted conifers, shrub, dwarf birch, willow, and alder at high elevations. Nests in open tundra, in areas sparsely vegetated with low scattered willows and alders, often near water; in bushes 0.3-2 m above ground, or on ground near rocks or bushes, or in driftwood pile along coast (NatureServe 2007b). Feeds on tundra late in summer (Baldwin 1955).

References

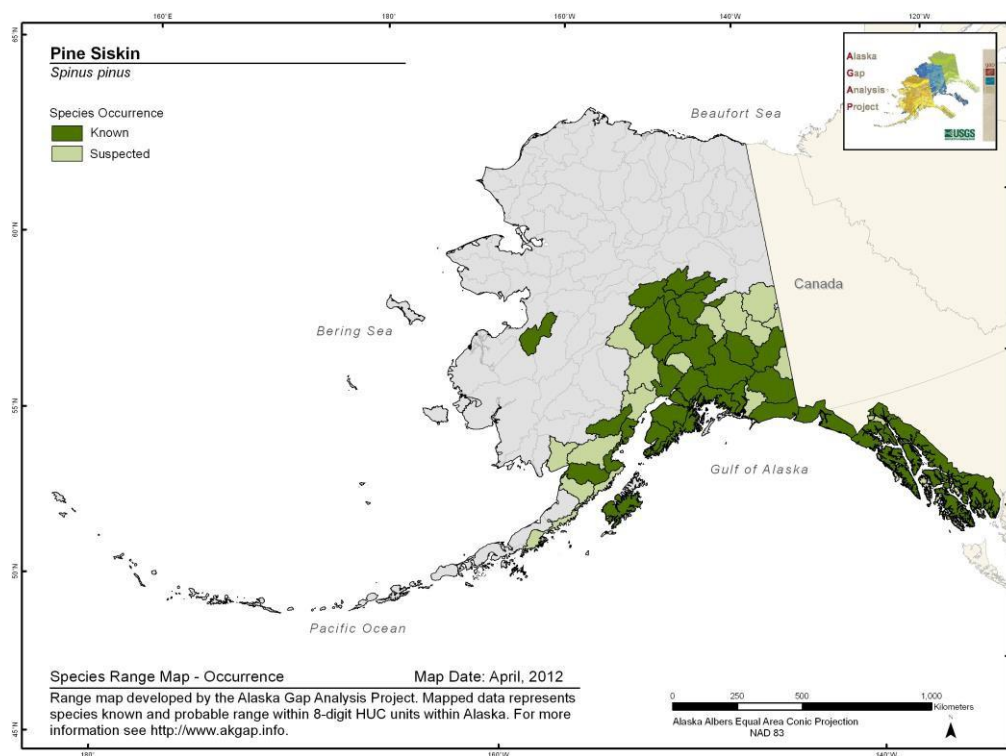
Baldwin, P. H. 1955. The breeding ecology and physiological rhythms of some arctic birds at Umiat, Alaska. Final report. Office of Naval Res., and Arctic Inst. N. Am., Washington, D. C.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

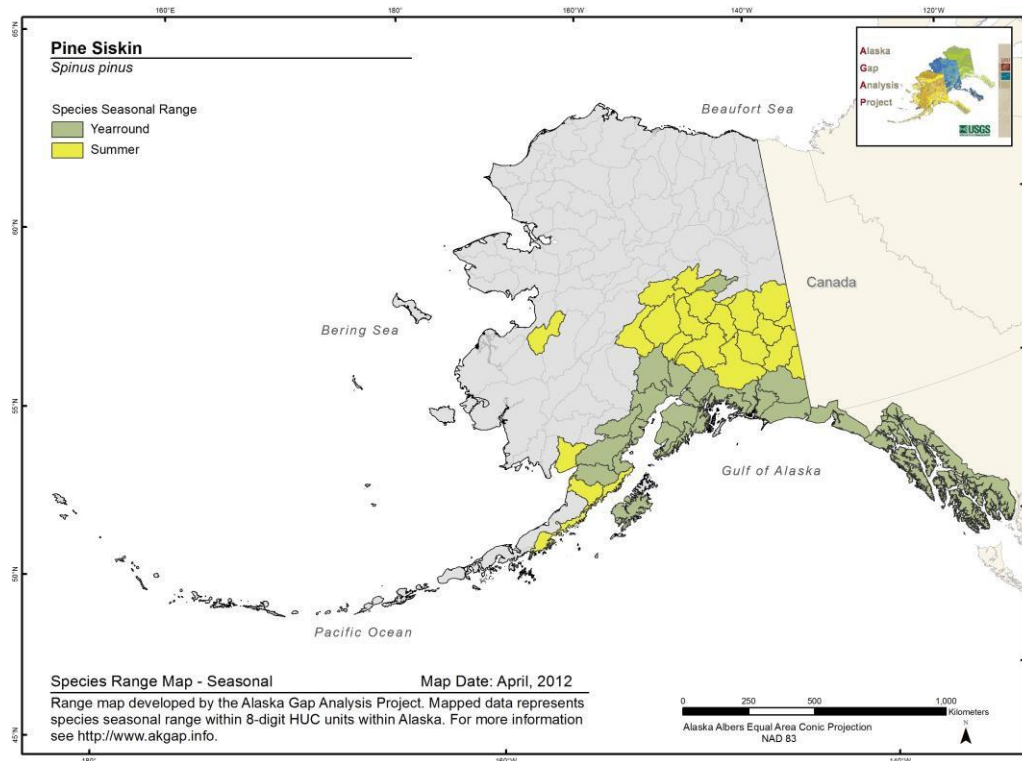
Pine Siskin *Spinus pinus*

Range Map and Distribution Model Summary

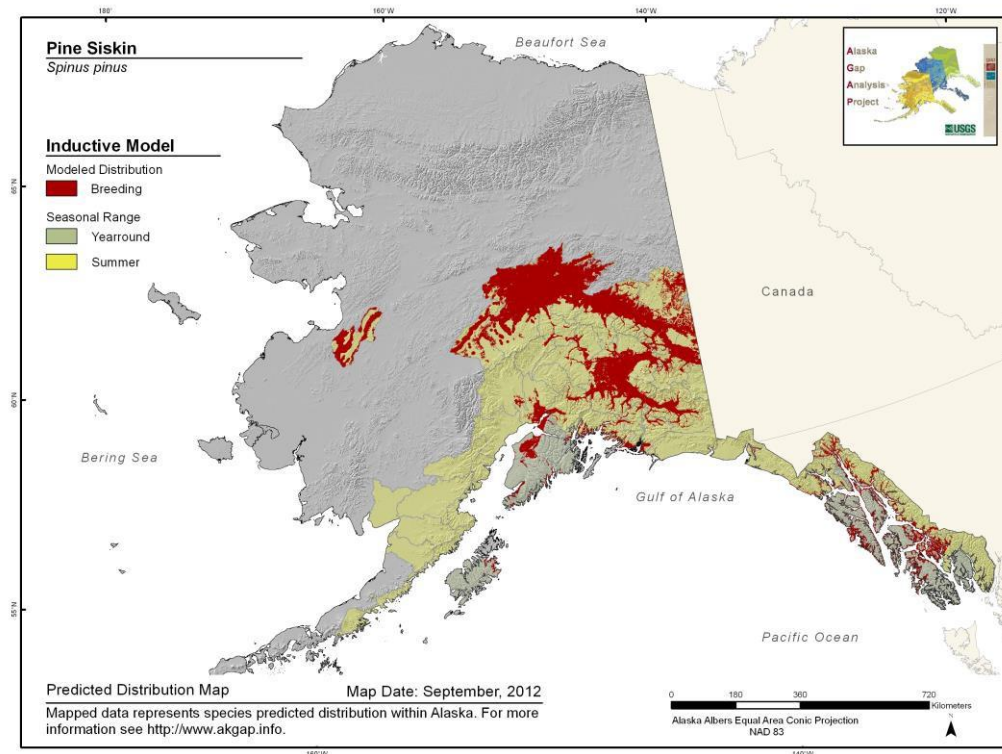
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.843**

**Model Quality
Summary:**
Moderate

Habitat Description

Breeds in primarily open coniferous, but also mixed-coniferous forests. May also breed in parks and cemeteries, and forages in trees, shrubs, and grassy areas (Dawson 1997).

References

Dawson, W. R. 1997. Pine Siskin (*Carduelis pinus*). In *The Birds of North America*. Vol. 7, No. 280 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Mammals



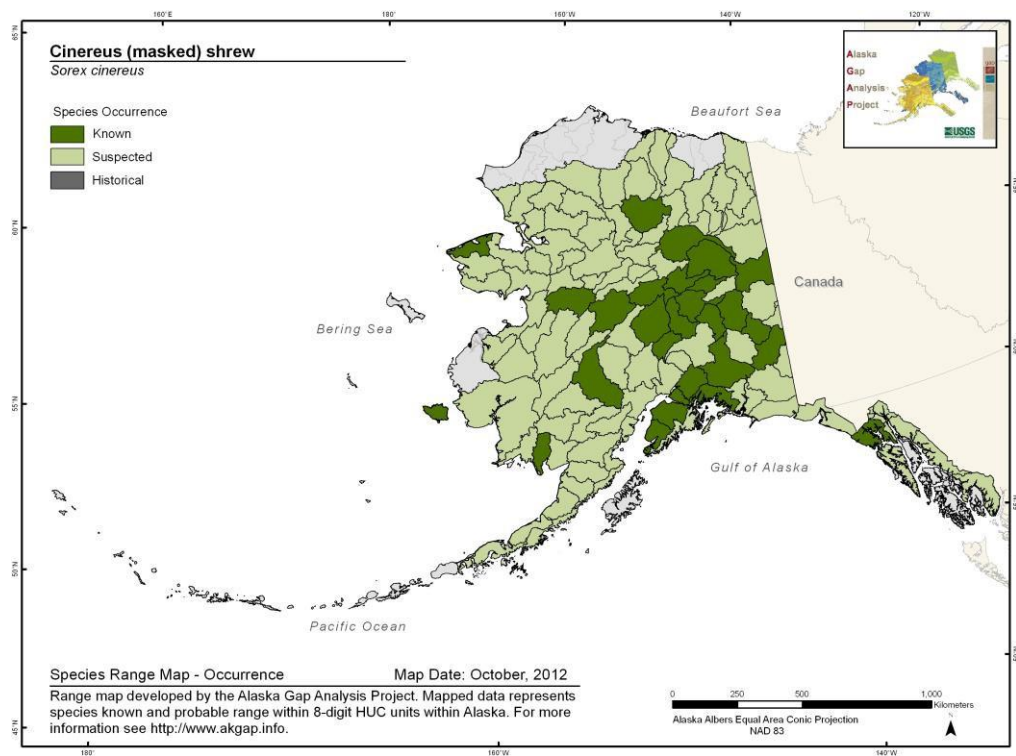
Arctic fox, Credit: Alaska Natural Heritage Program

Cinereus (Masked) Shrew

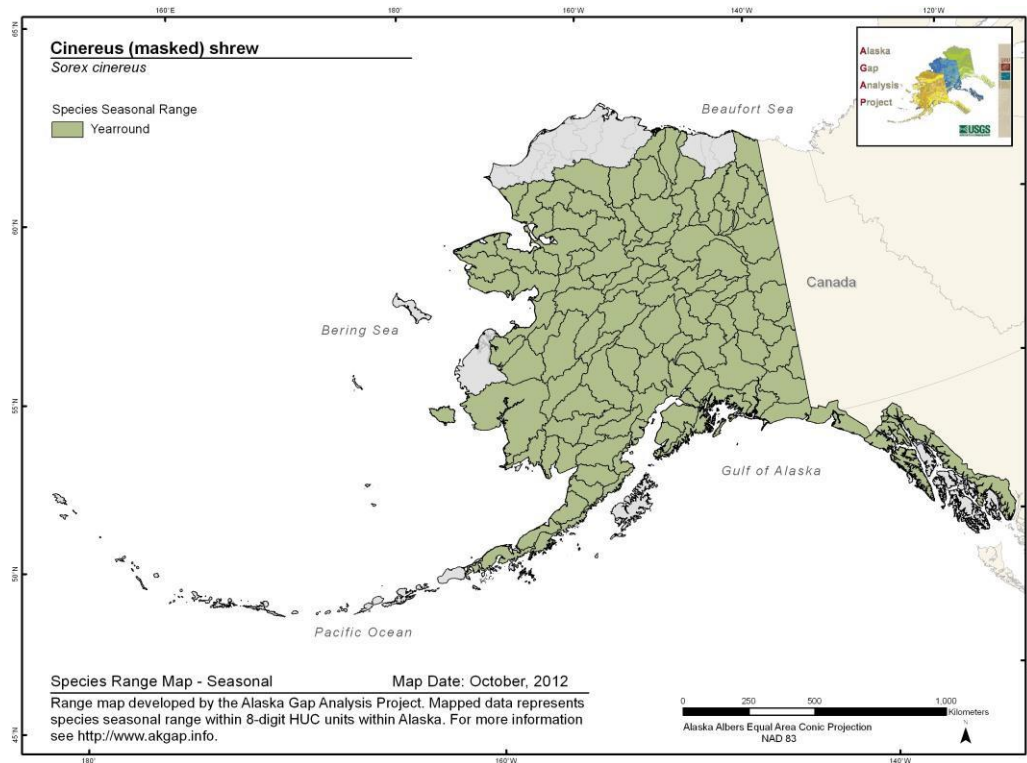
Sorex cinereus

Range Map and Distribution Model Summary

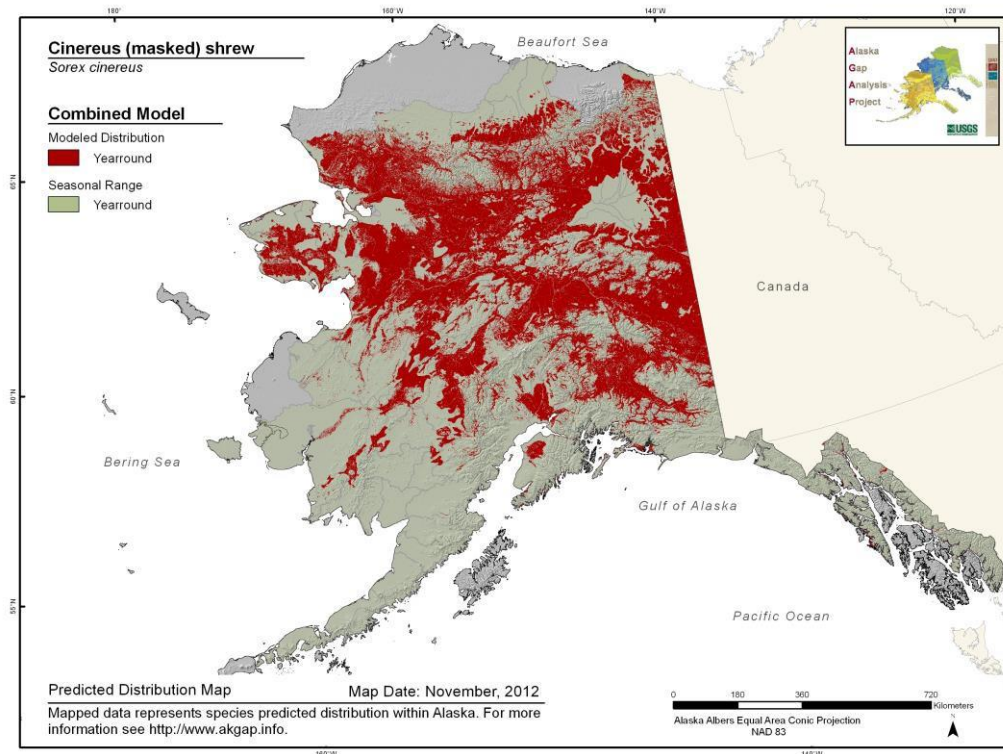
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.592**

**Model Quality
Summary:**
Low

Habitat Description

Abundant in a wide variety of habitats excluding areas with a little or no vegetation. Favors riparian areas with dense ground cover (Banfield 1974, MacDonald 1980) or damp forests with thick leaf litter (NatureServe 2007b).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

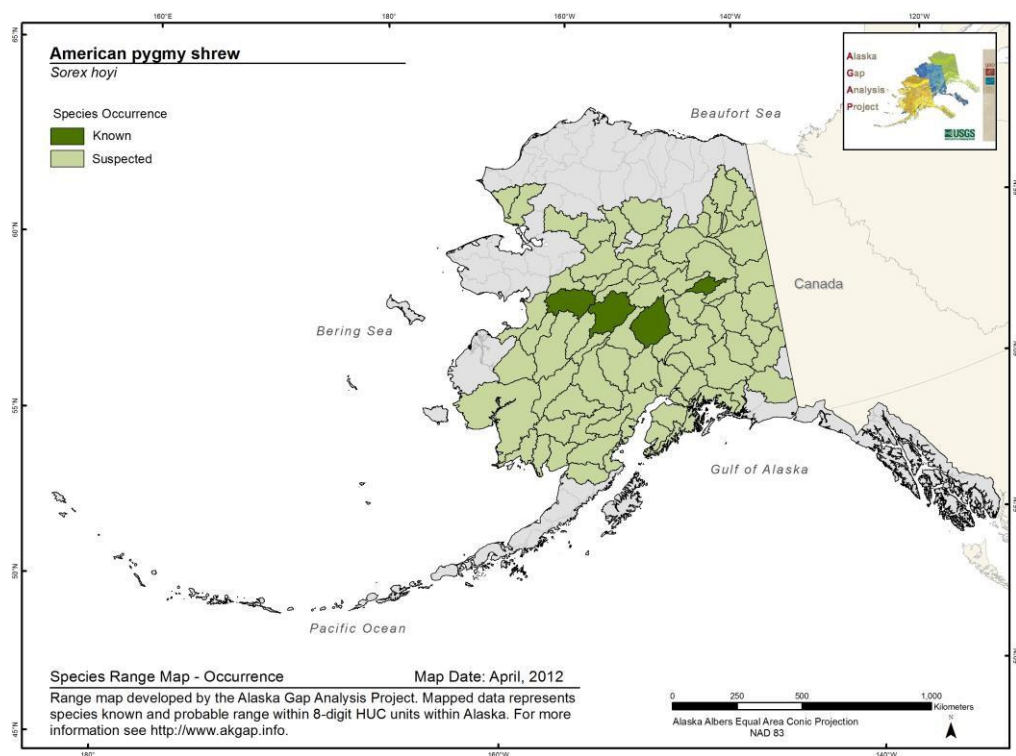
MacDonald, S. O. 1980. Habitats of small mammals and birds: Evaluating the effects of agricultural development in the Delta Junction area, Alaska. Unpublished report for the State of Alaska, Department of Natural Resources, Division of Lands and Water Management, Fairbanks.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

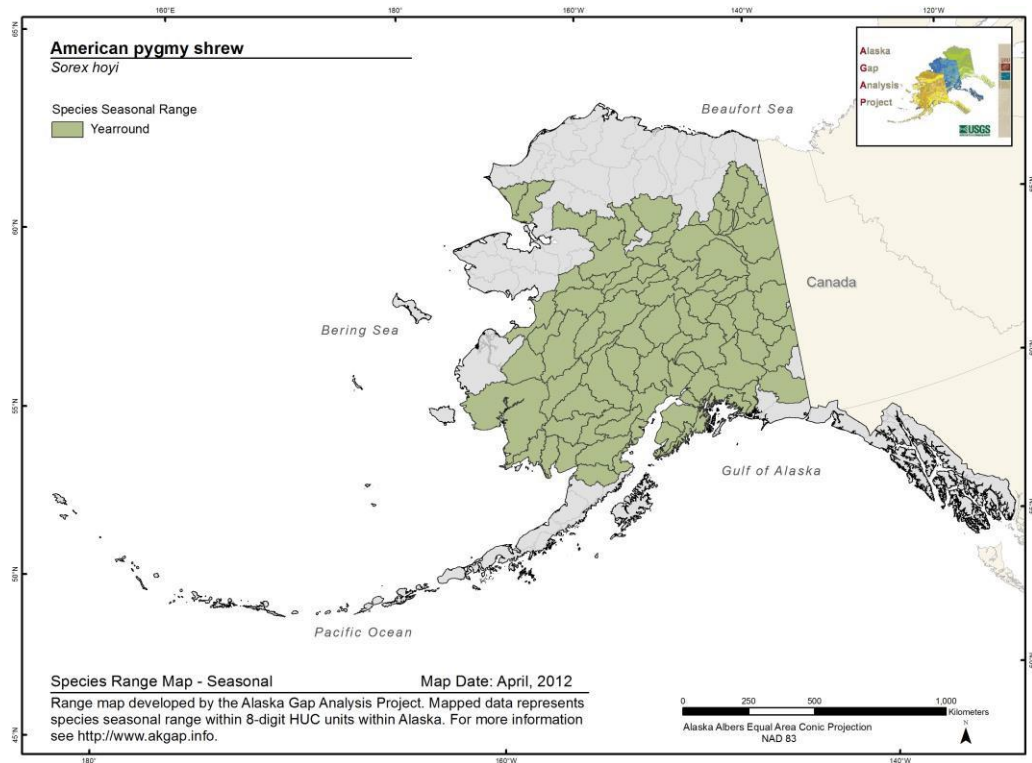
American Pygmy Shrew *Sorex hoyi*

Range Map and Distribution Model Summary

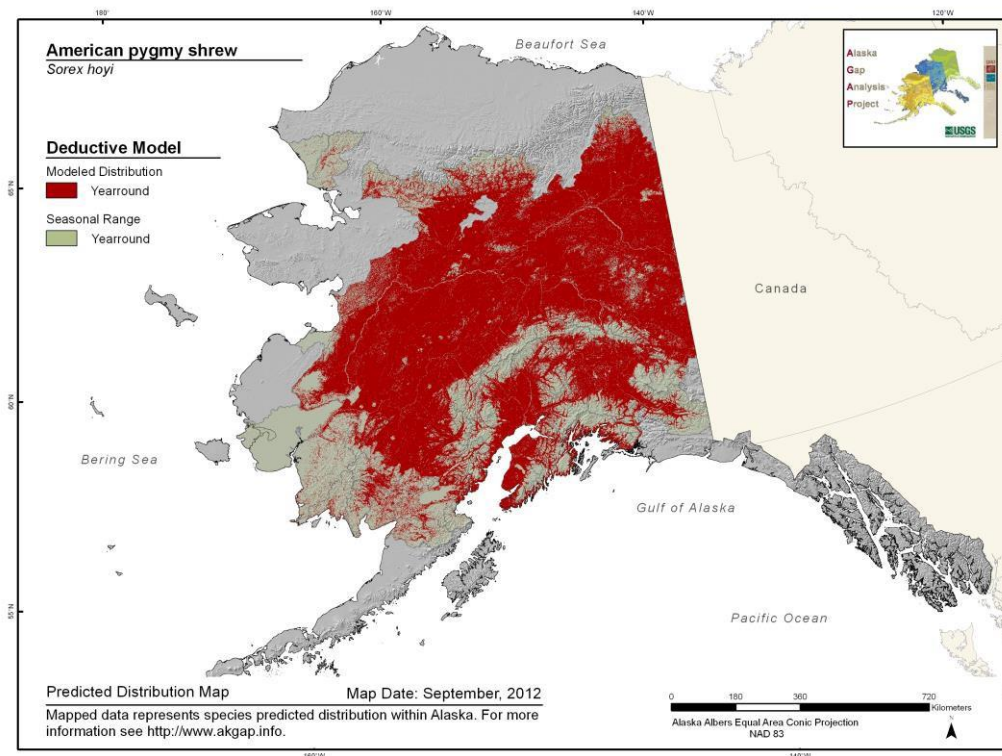
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.711**

**Model Quality
Summary:**
Moderate

Habitat Description

Occupies a wide variety of habitats, including forests, disturbed sites, shrub thickets, meadows, marshes, bogs, and especially riparian situations with dense ground cover near open water (Long 1974, MacDonald 1980). Appears to prefer grassy openings of boreal forest with a mixture of wet and dry soil (Baker 1983, Feldhamer et al. 1993, Nagorsen 1996, NatureServe 2006).

References

Baker, R. H. 1983. Michigan mammals. Michigan State University Press. 642 pp.

Feldhamer, G. A., R.S. Klann, A.S. Gerard and A.C. Driskell. 1993. Habitat partitioning, body size, and timing of parturition in pygmy shrews and associated soricids. J. Mamm. 74:403-411.

Long, C.A. 1974. *Microsorex hoyi* and *Microsorex thompsoni*. Amer. Soc. Mamm. Mammalian Species No. 33 pp. 3-4.

MacDonald, S. O. 1980. Habitats of small mammals and birds: Evaluating the effects of agricultural development in the Delta Junction area, Alaska. Unpublished report for the State of Alaska, Department of Natural Resources, Division of Lands and Water Management, Fairbanks.

Nagorsen, D.W. 1996. Opossums, shrews and moles of British Columbia. Royal British Columbia Museum Handbook. UCB Press, Vancouver BC. 149 pp.

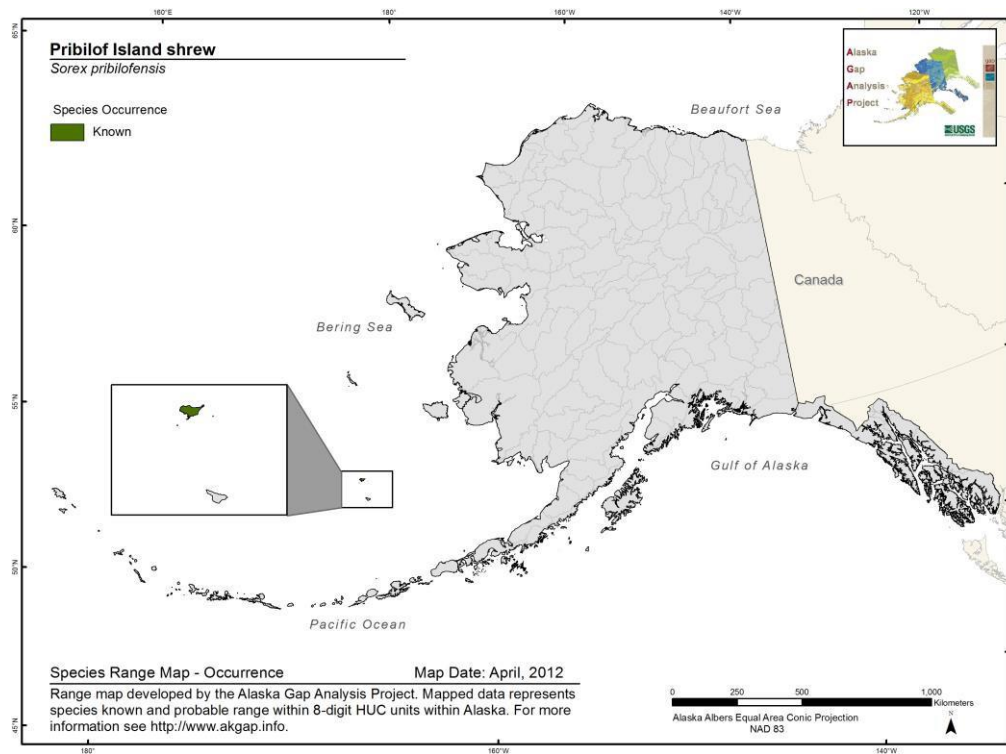
NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life. Version 5.0. NatureServe, Arlington, VA. Available <http://www.natureserve.org/explorer>.

Pribilof Island Shrew

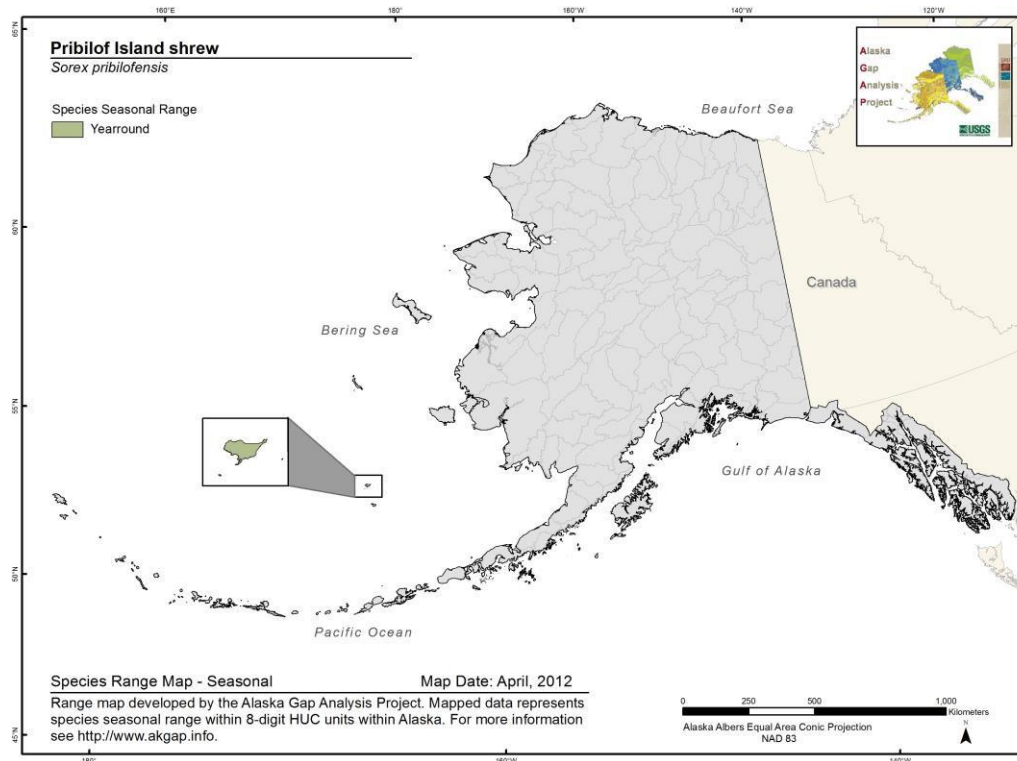
Sorex pribilofensis

Range Map and Distribution Model Summary

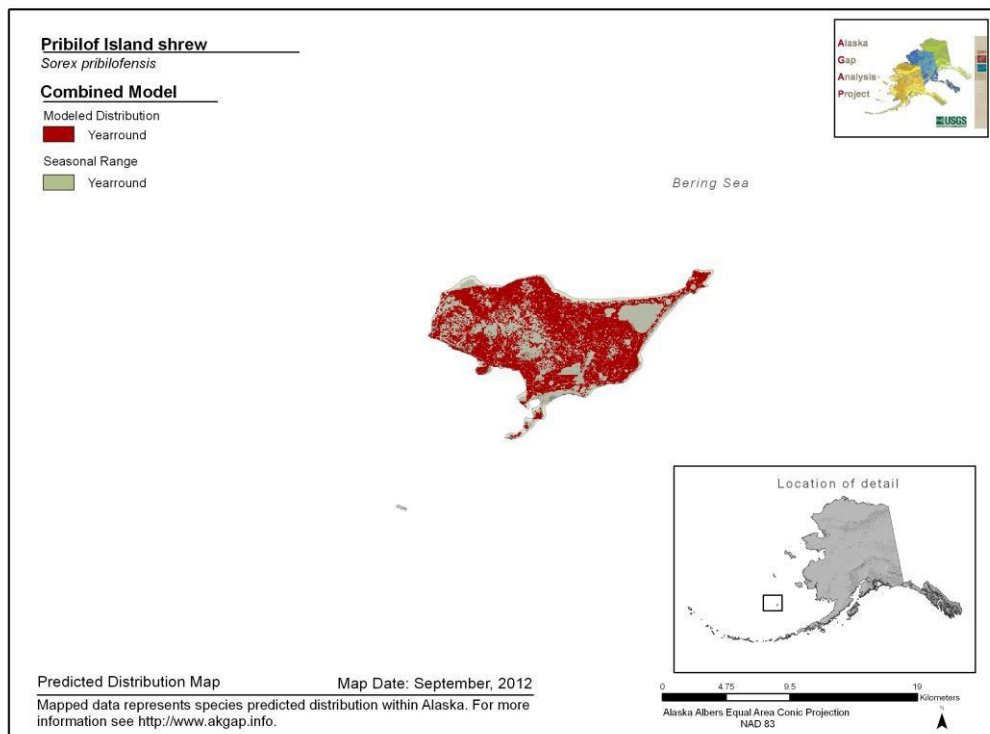
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.88**

**Model Quality
Summary:**
Moderate

Habitat Description

Preferred habitats include dune and grass-umbel communities and secondarily, forb and mixed (grass-umbel and forb) habitats. Carex and upland habitats do not appear to be used by the shrews (Byrd and Norvell 1988). Most abundant in habitats with greater tall stems per unit area (Byrd and Norvell 1988, Byrd and Mendenhall 1986). Found at high densities within communities dominated by tall plants, particularly beach rye (*Elymus arenarius*), bluegrass (*Poa eminens*), wild celery (*Angelica lucida*), and sage (*Artemesia arctica*; Byrd and Norvell 1993).

References

Byrd, G.V. and V.M. Mendenhall. 1986. Habitat use by the Pribilof shrew in summer. USDI, USFWS, AK Maritime NWR, Homer, AK. 13 p. + maps.

Byrd, G.V. and N. Norvell. 1988. Distribution and habitat use of the Pribilof shrew in summer. USDI, USFWS, Alaska Maritime National Wildlife Refuge, Homer, AK. 27 pp.

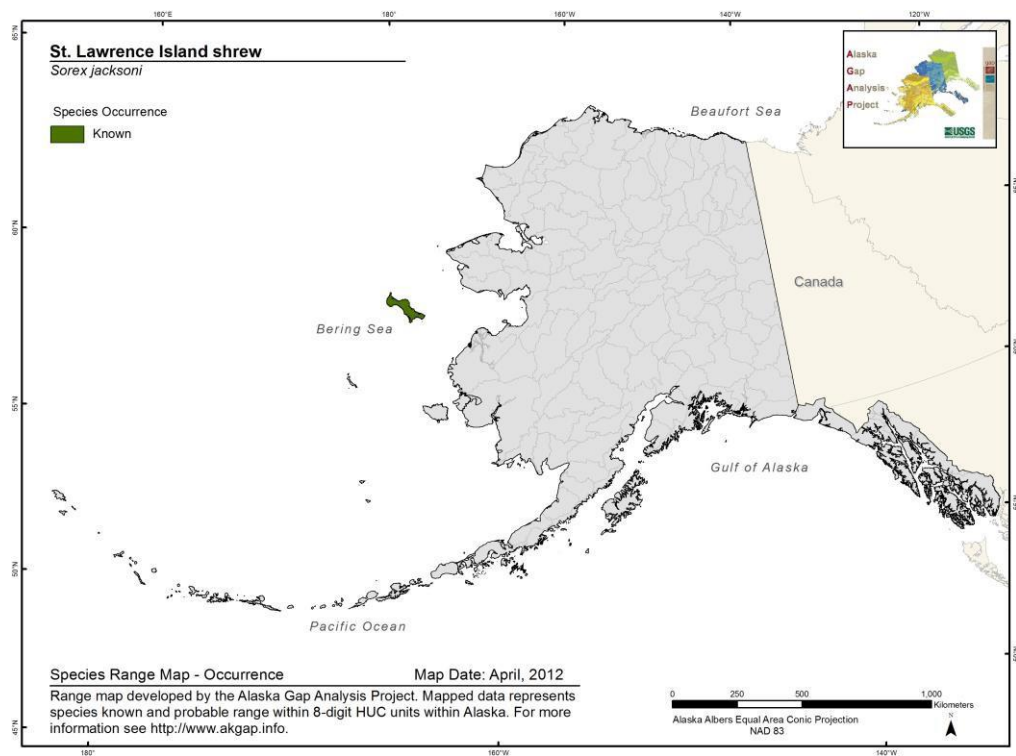
Byrd, G.V., and N. Norvell. 1993. Status of the Pribilof shrew based on summer distribution and habitat use. *Northwestern Naturalist* 74:49-54.

St. Lawrence Island Shrew

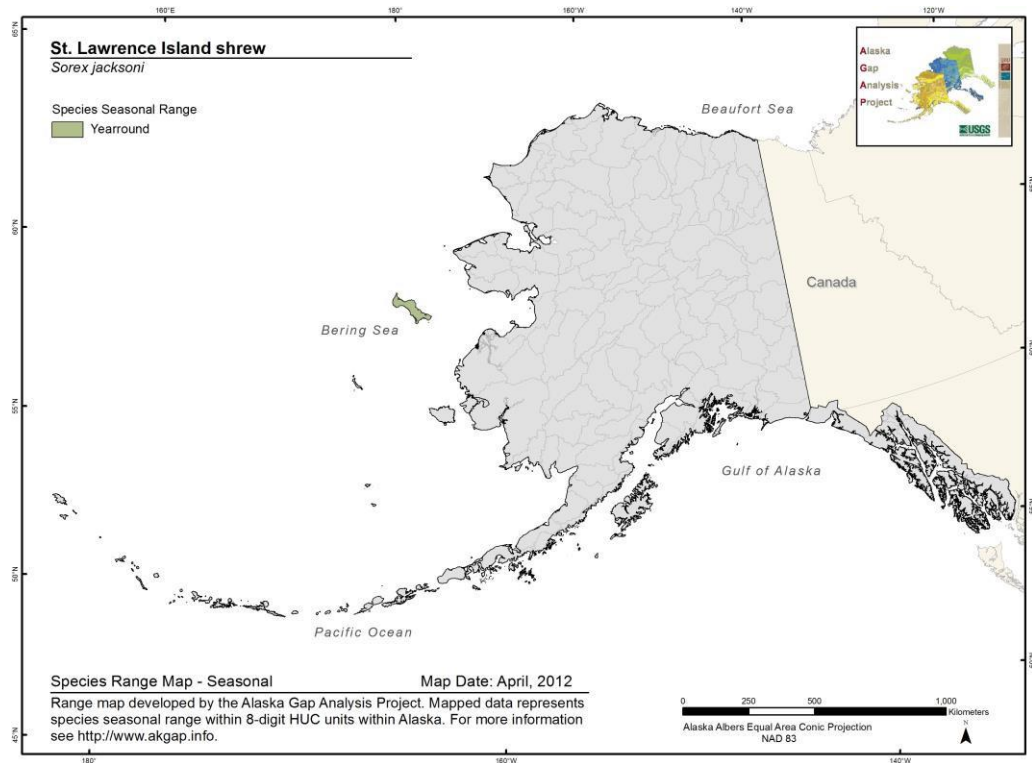
Sorex jacksoni

Range Map and Distribution Model Summary

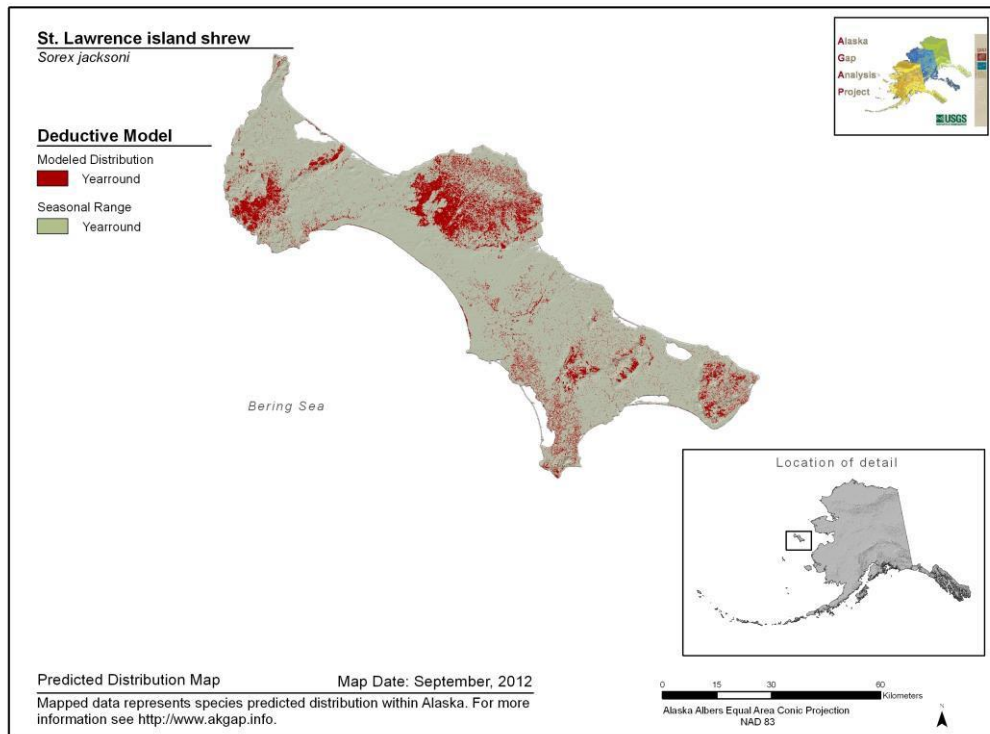
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.512**

**Model Quality
Summary:**
Low

Habitat Description

When abundant, inhabits old village sites and three major habitat types on the island: bog/wet tundra, alpine/fell-field tundra, and mesic tundra. When scarce, found in fell-field habitats and boulder scree, especially within auklet nesting colonies. In winter, often invades human dwellings (Fay and Sease 1985).

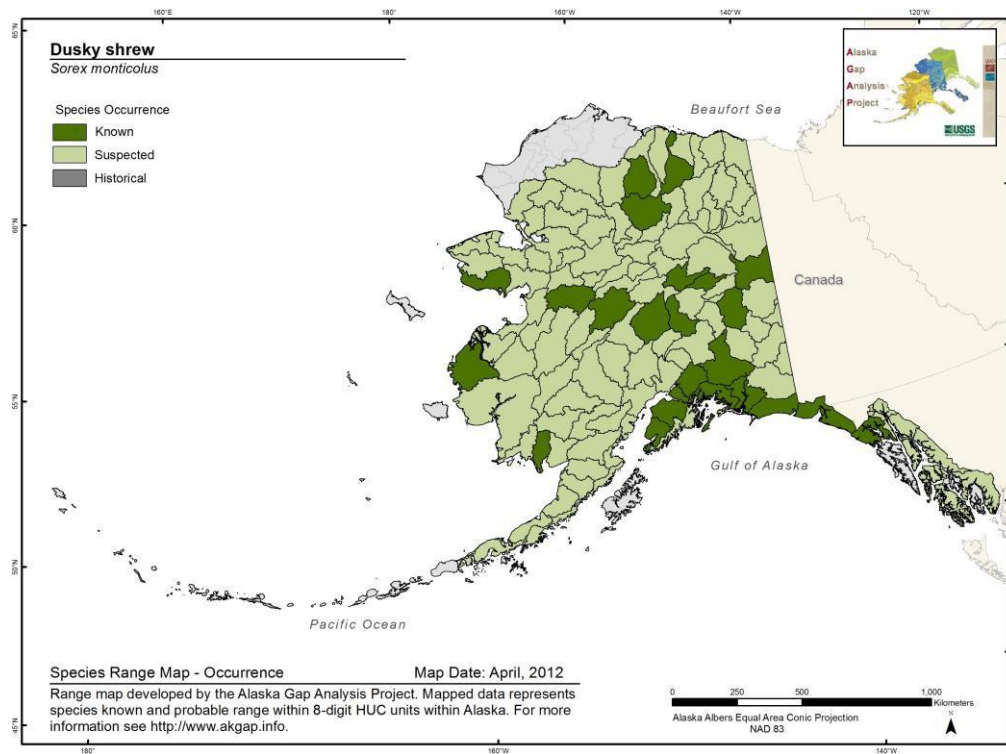
References

Fay, F.H., and J.L. Sease. 1985. Preliminary status survey of selected small mammals. Final report to USFWS. Univ. of Alaska, Institute of Marine Science, Fairbanks, AK. 53 p.

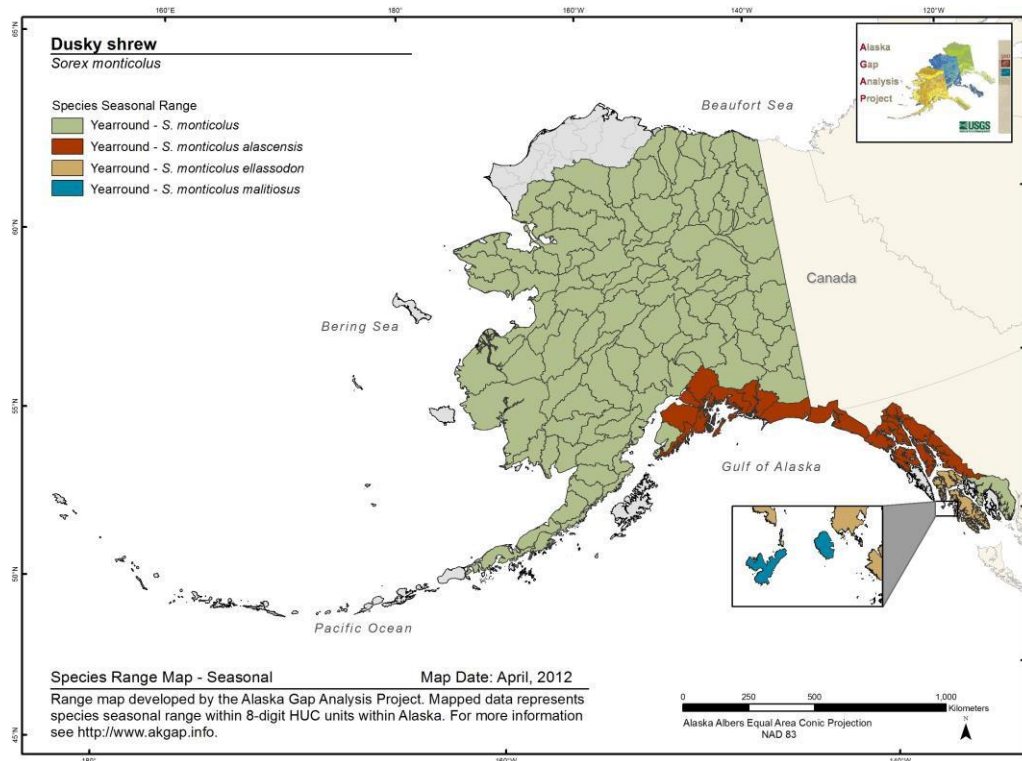
Dusky Shrew *Sorex monticolus*

Range Map and Distribution Model Summary

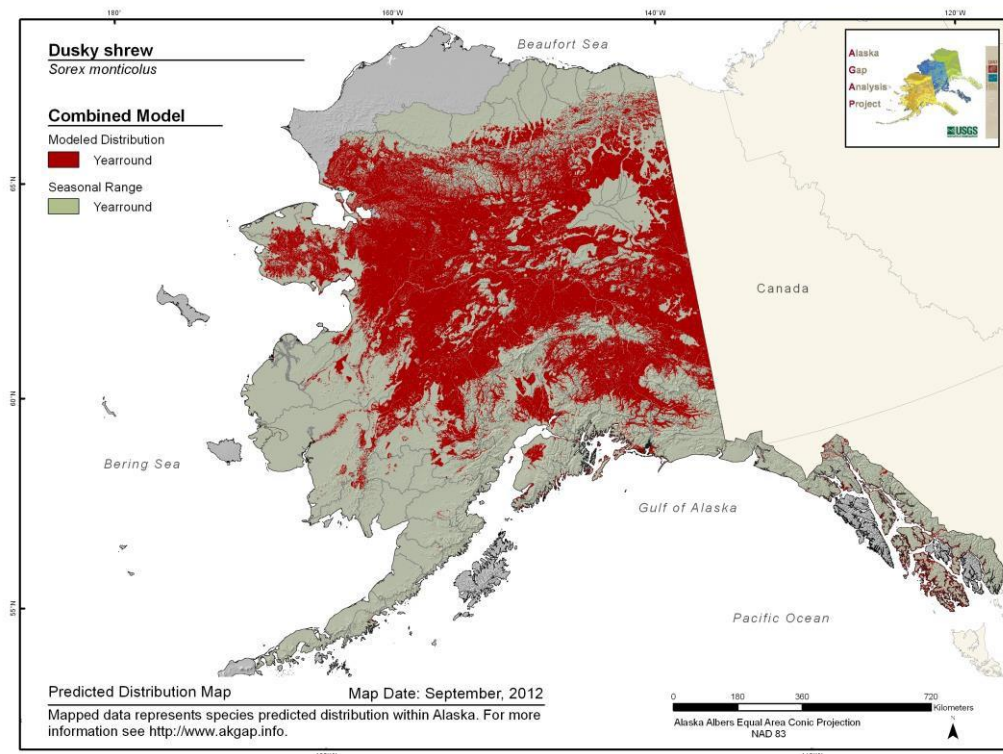
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.51**

**Model Quality
Summary:**
Low

Habitat Description

Found in many different habitats, from coastal and boreal forests to riparian shrub thickets in the mountains and in the subarctic tundra-taiga transition at higher latitudes (van Zyll de Jong 1983, Nagorsen 1996). Requires dense understory ground cover in moist or wet situations (Belk et al. 1990, Doyle 1990, Hawes 1977, MacDonald 1980). Other habitats include damp meadows surrounded by coniferous forest, in grass among spruce-fir, mid-elevation fir-larch, along streams and rivers in high prairie, mossy banks of small streams, and sphagnum bogs. Rarely found more than a few meters from water in summer (Ingles 1965, NatureServe

References

- Belk, M. C., C. L. Pritchett, and H. D. Smith. 1990. Patterns of microhabitat use by *Sorex monticolus* in summer. *The Great Basin Naturalist* 50: 387-389.
- Doyle, A. T. 1990. Use of riparian and upland habitats by small mammals. *Journal of Mammalogy* 71: 14-23.
- Hawes, M. L. 1977. Home range, territoriality, and ecological separation in sympatric shrews, *Sorex vagrans* and *Sorex obscurus*. *Journal of Mammalogy* 57: 404-406.
- Ingles, L.G. 1965. *Mammals of the Pacific states*. Stanford Univ. Press, Stanford, CA. 506 p.
- MacDonald, S. O. 1980. *Habitats of small mammals and birds: Evaluating the effects of agricultural development in the Delta Junction area, Alaska*. Unpublished report for the State of Alaska, Department of Natural Resources, Division of Lands and Water Management, Fairbanks.
- Nagorsen, D.W. 1996. *Opossums, shrews and moles of British Columbia*. Royal British Columbia Museum Handbook. UCB Press, Vancouver BC. 149 pp.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life. Version 5.0. NatureServe, Arlington, VA. Available <http://www.natureserve.org/explorer>.

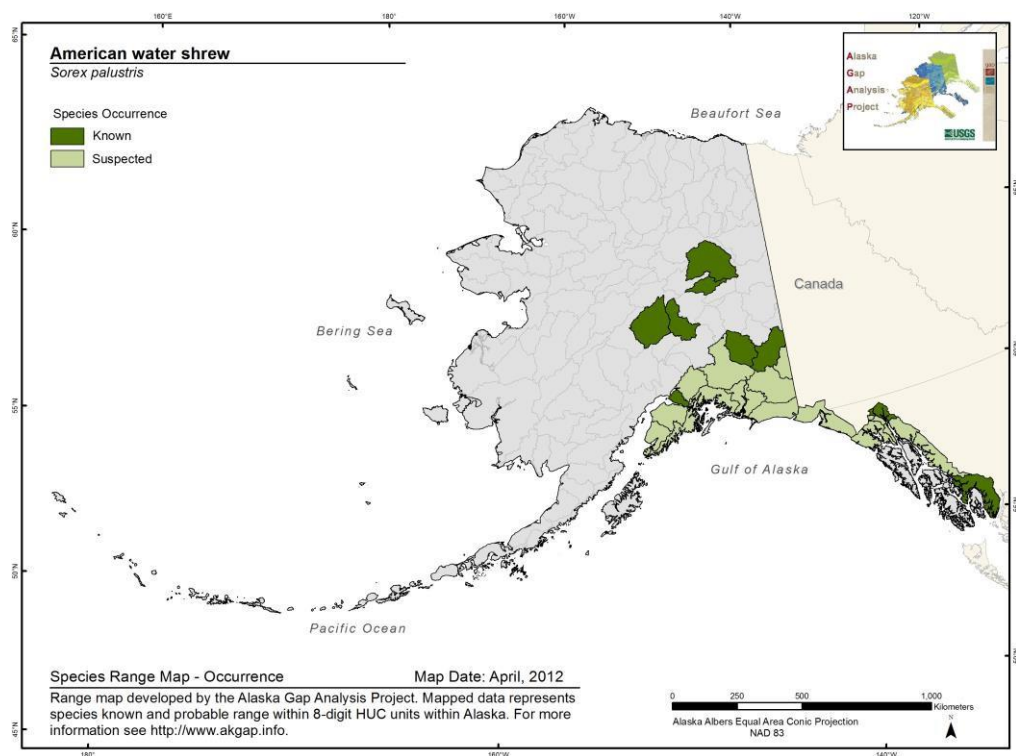
van Zyll de Jong, C. G. 1983. Handbook of Canadian mammals. Part 1. Marsupials and insectivores. National Museum of Natural History.

American Water Shrew

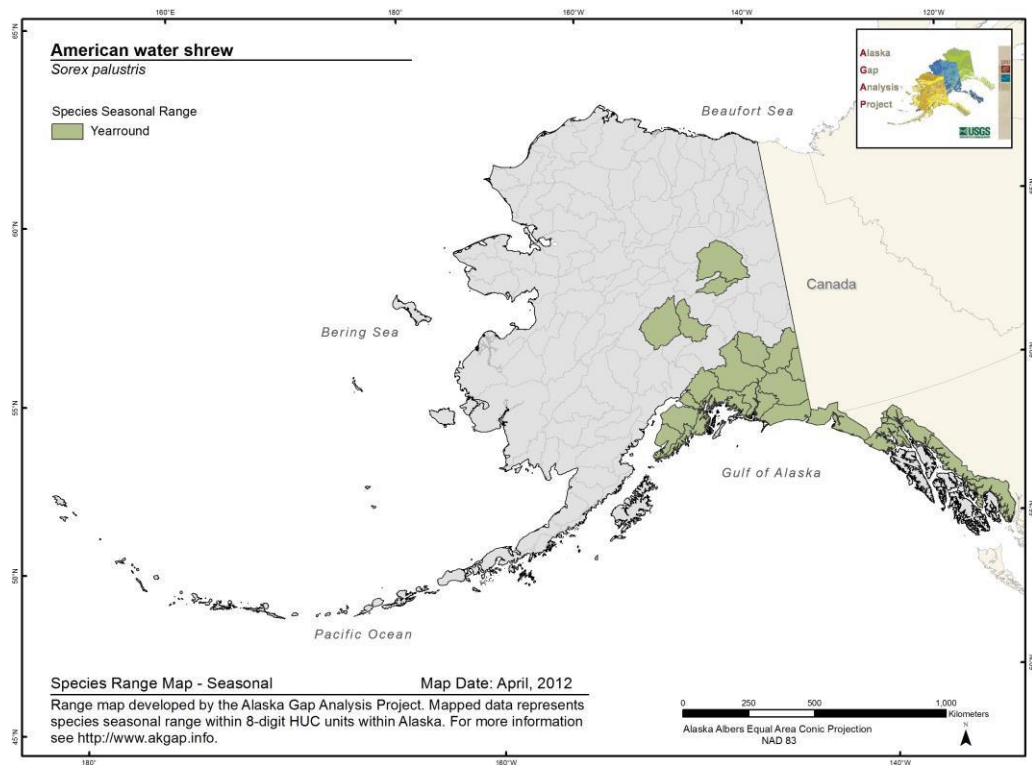
Sorex palustris

Range Map and Distribution Model Summary

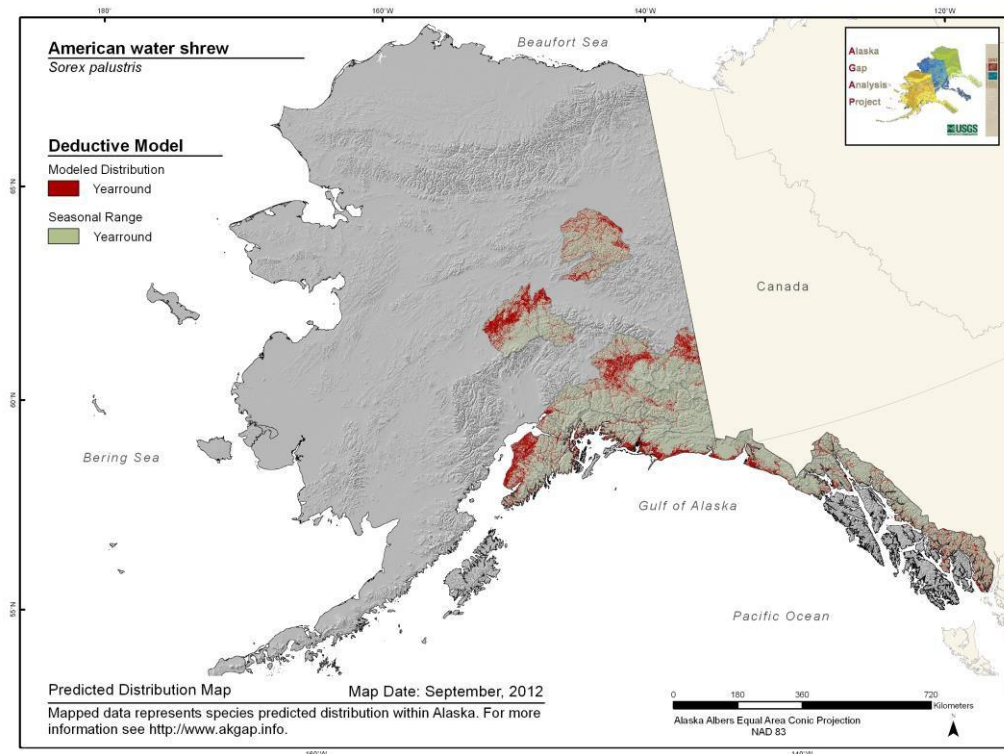
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.674**

**Model Quality
Summary:**
Low

Habitat Description

Highly aquatic and usually restricted to dense ground cover and thick overhanging riparian growth along streams, lakes, beaver ponds, and marshes from sea level to alpine areas (Banfield 1974, Beneski and Stinson 1987, Nagorsen 1996).

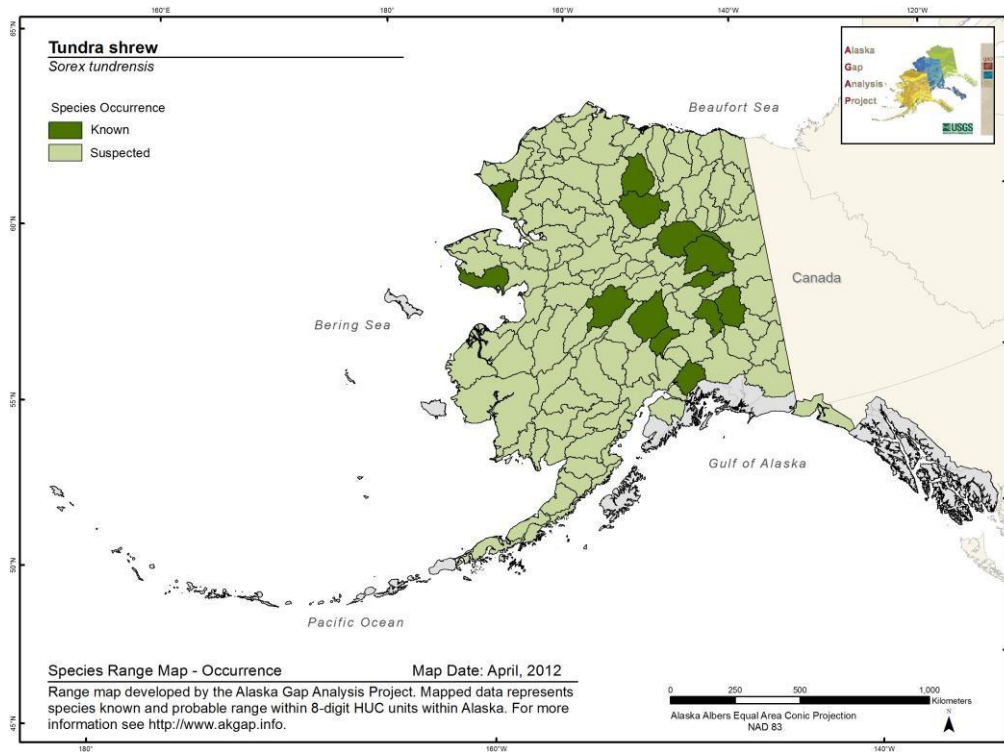
References

- Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.
- Beneski, J. T., Jr., and D. W. Stinson. 1987. *Sorex palustris*. Am. Soc. Mamm., Mammalian Species 296:1- 6.
- Nagorsen, D.W. 1996. Opossums, shrews and moles of British Columbia. Royal British Columbia Museum Handbook. UCB Press, Vancouver BC. 149 pp.

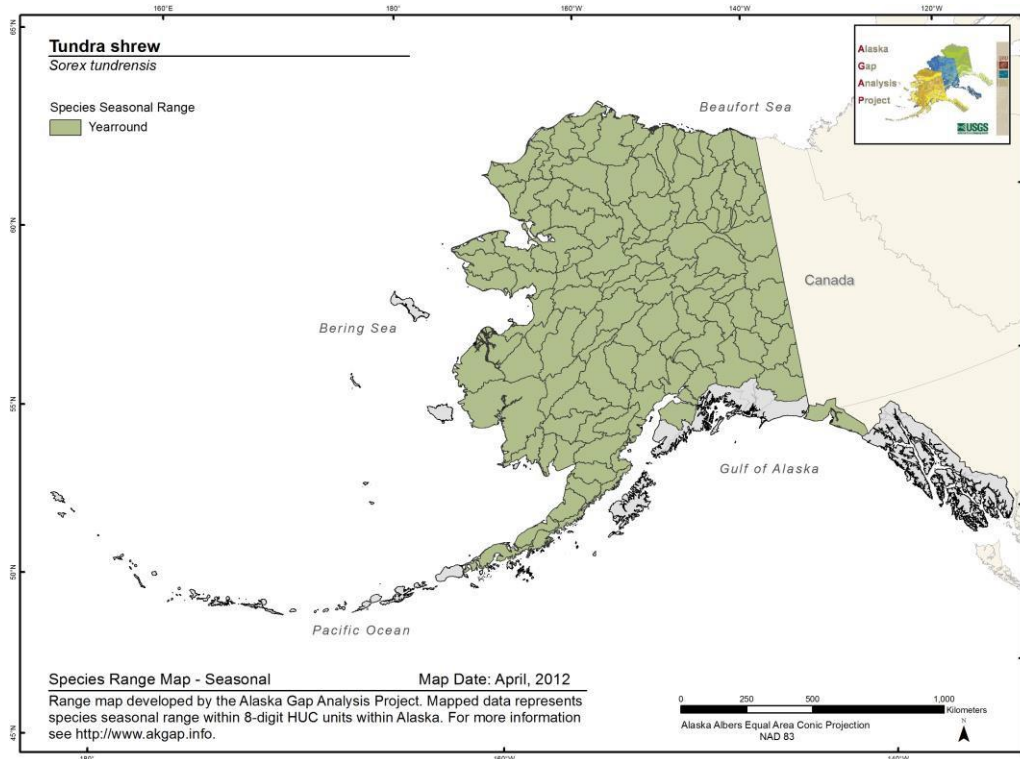
Tundra Shrew *Sorex tundrensis*

Range Map and Distribution Model Summary

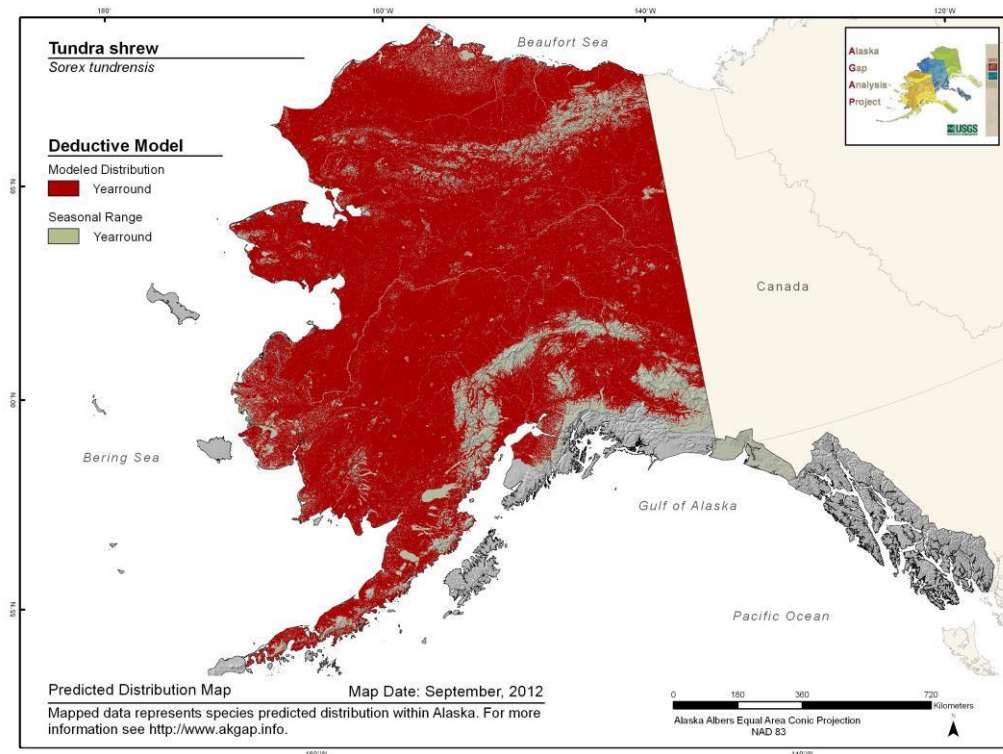
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.511**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits a variety of arctic and alpine tundra as well as forests, shrub, bog, and marsh habitats within the taiga and lower elevations and latitudes (Banfield 1974, MacDonald 1980, Nagorsen 1996).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

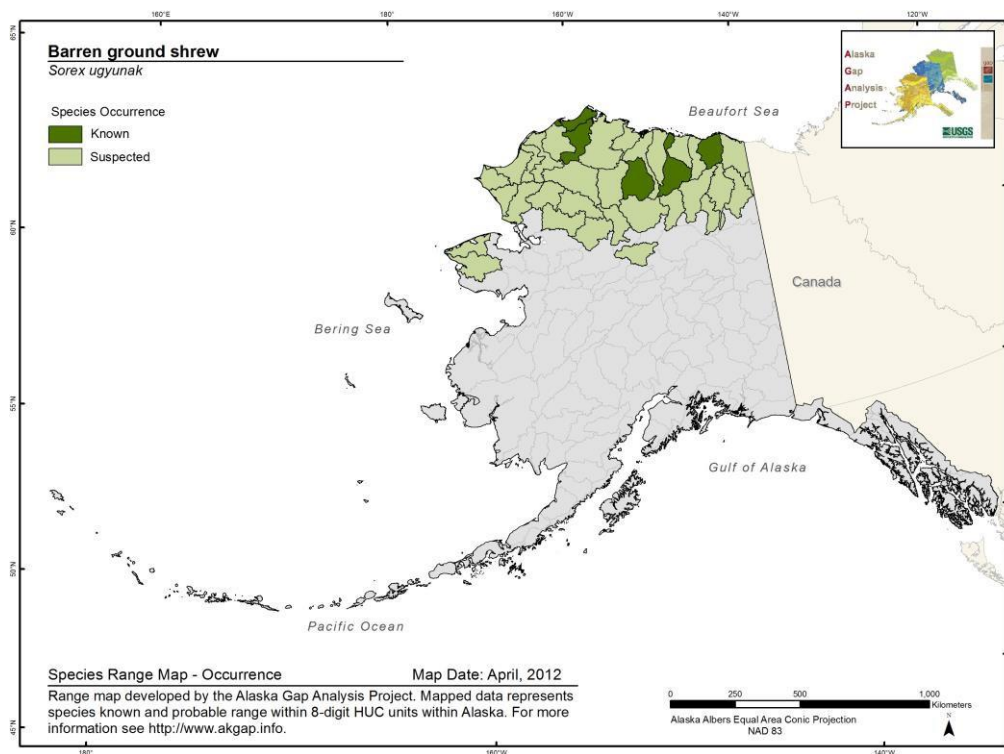
MacDonald, S. O. 1980. Habitats of small mammals and birds: Evaluating the effects of agricultural development in the Delta Junction area, Alaska. Unpublished report for the State of Alaska, Department of Natural Resources, Division of Lands and Water Management, Fairbanks.

Nagorsen, D.W. 1996. Opossums, shrews and moles of British Columbia. Royal British Columbia Museum Handbook. UCB Press, Vancouver BC. 149 pp.

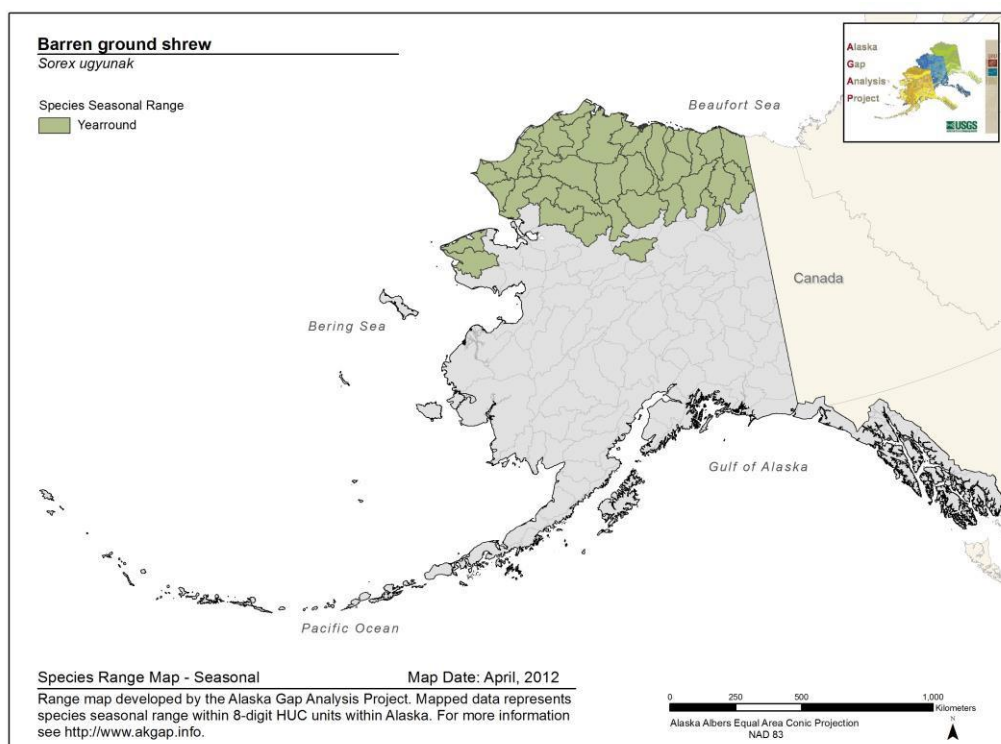
Barren Ground Shrew *Sorex ugyunak*

Range Map and Distribution Model Summary

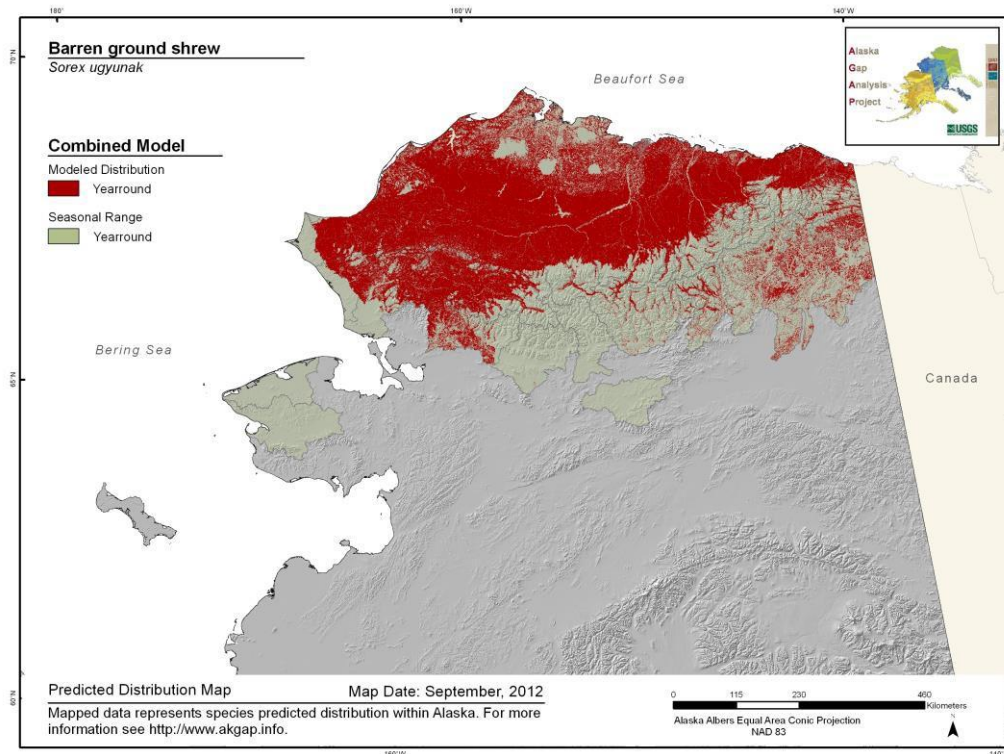
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.602**

**Model Quality
Summary:**
Low

Habitat Description

Occurs in the high arctic and prefers low sedge-grass tundra and thickets of dwarf willow and birch (van Zyll de Jong 1999). Inhabit a variety of tundra communities, but optimum habitat is damp to wet with grasses and sedges (Bee and Hall 1956).

References

Bee, J.W. and E.R. Hall. 1956. Mammals of northern Alaska on the Arctic Slope. Univ. Kansas Mus. Nat. Hist. Misc. Publ. No. 8. 309 p.

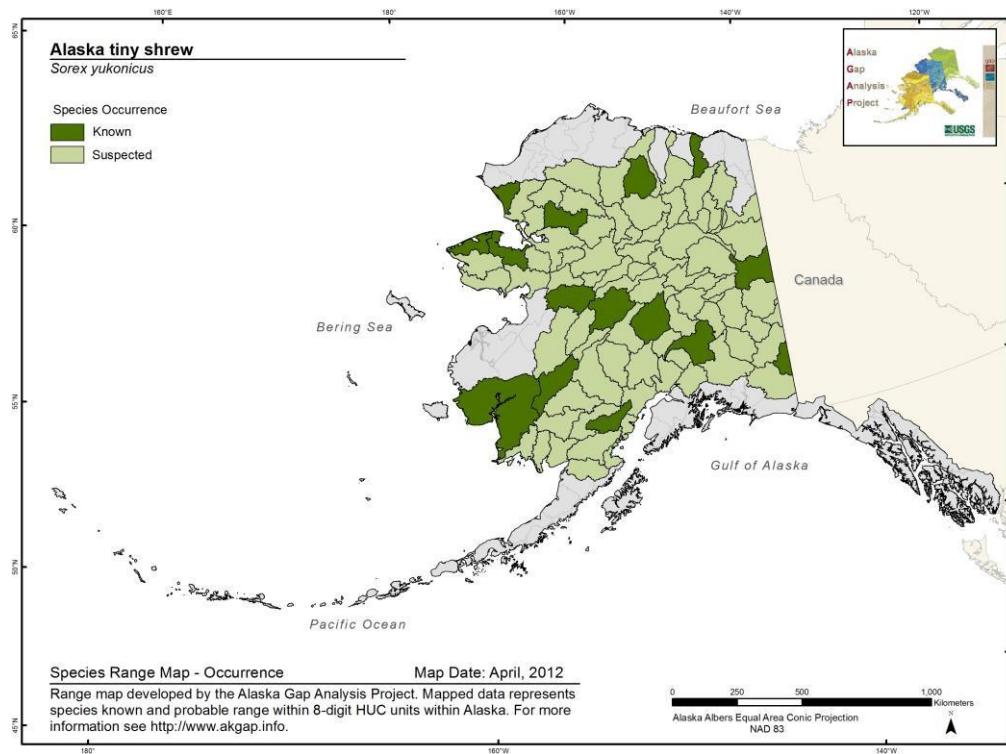
van Zyll de Jong. 1999. Barren ground shrew, *Sorex tundrensis*. Pp. 44-45, in The Smithsonian book of North American mammals (D. E. Wilson and S. Ruff, eds.). Smithsonian Institution Press, Washington, D. C., in association with the American Society of Mammalogists.

Alaska Tiny Shrew

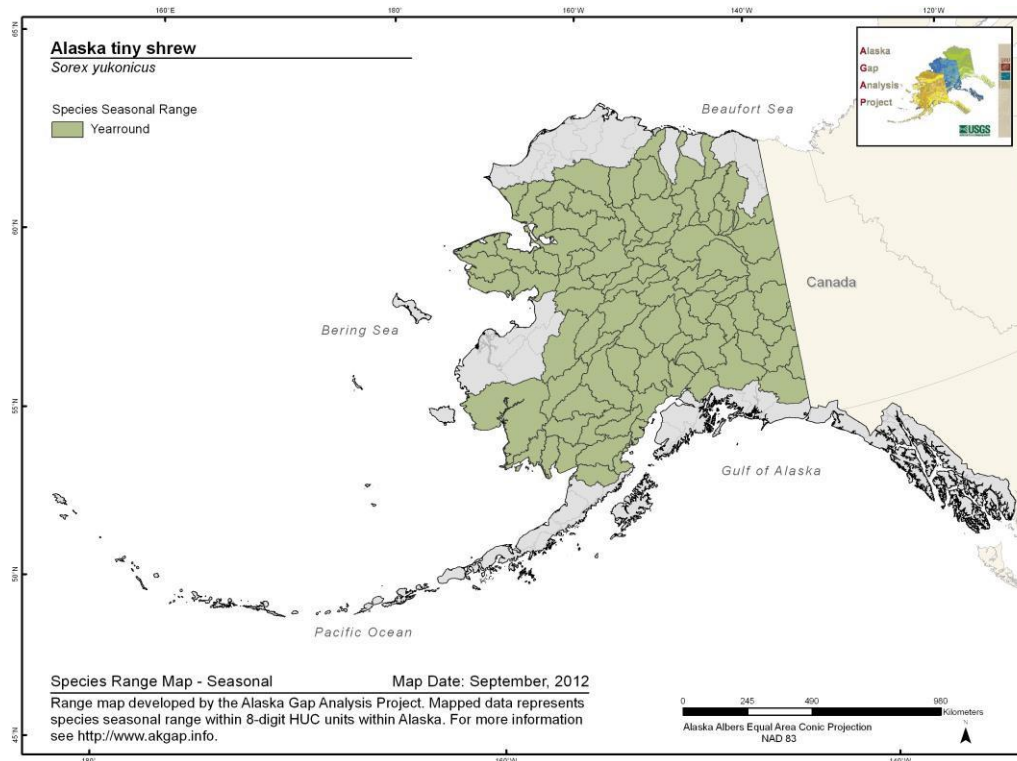
Sorex yukonicus

Range Map and Distribution Model Summary

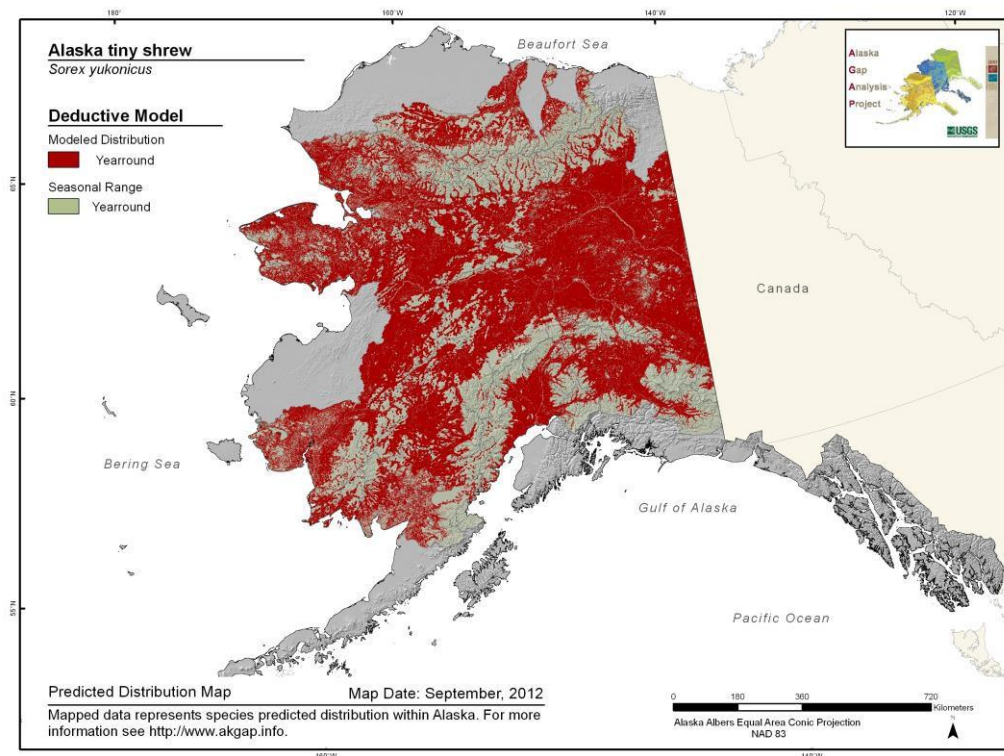
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.671**

**Model Quality
Summary:**
Low

Habitat Description

Although poorly documented, found in a wide range of forested and nonforested habitats with riparian scrub the most common habitat (MacDonald and Cook 2009). All specimens collected by Dokuchaev (1997) were from riparian habitats.

Auxiliary habitat preferences: A few specimens collected in open low mixed shrub sedge tussock tundra habitat, and one animal was found in closed tall willow shrub habitat (Peirce and Peirce 2000). Other specimen collections occurred over a wide range of habitat types including wetlands/bog and coniferous and mixed forests.

References

Dokuchaev, N. E. 1997. A new species of shrew (Soricidae, Insectivora) from Alaska. *Journal of Mammalogy* 78:811-817.

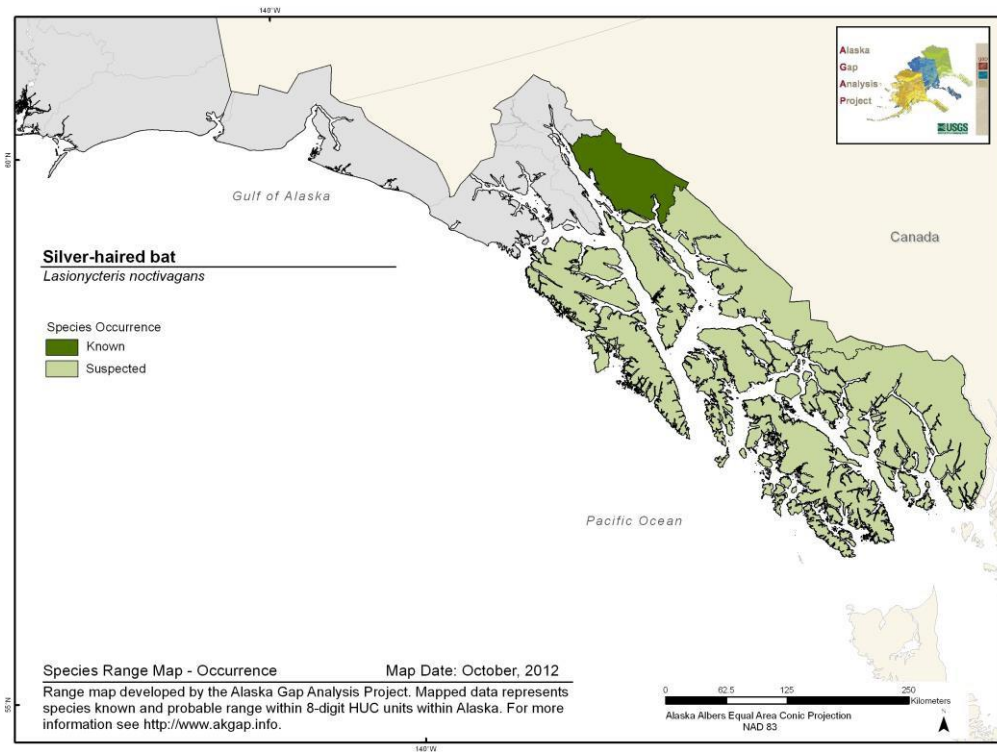
MacDonald, S. O. and J. A. Cook. 2009. *Recent Mammals of Alaska*. University of Alaska Press, Fairbanks, AK.

Peirce, K. N., and J. M. Peirce. 2000. Range extensions for the Alaska tiny shrew and pygmy shrew in southwestern Alaska. *Northwestern Naturalist* 81:67-68.

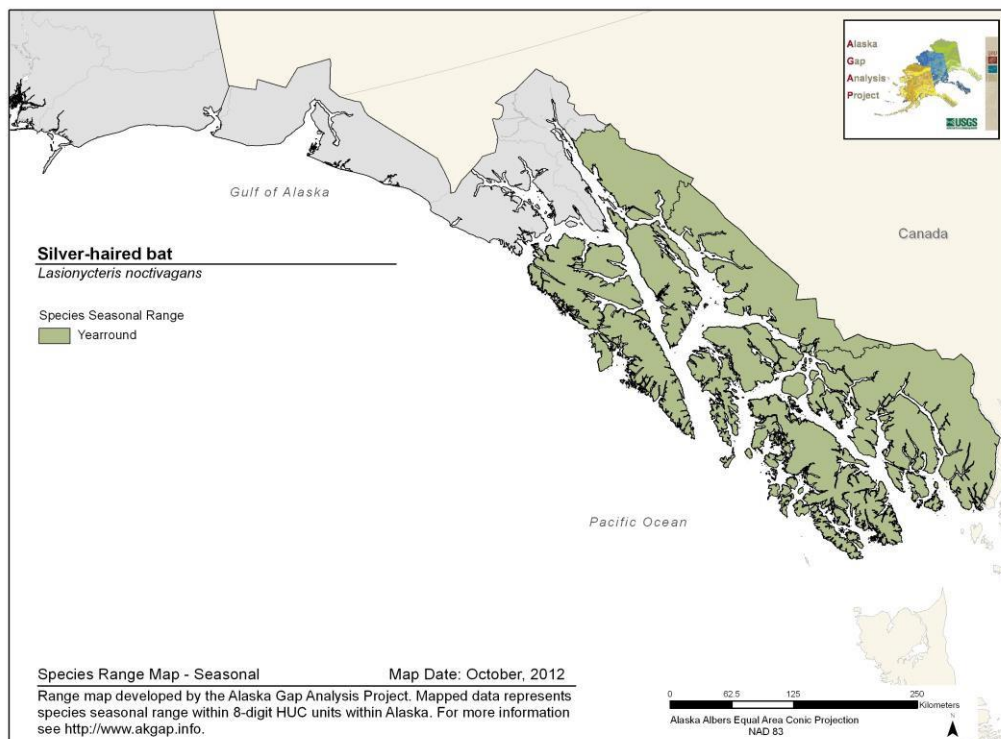
Silver-haired Bat *Lasionycteris noctivagans*

Range Map and Distribution Model Summary

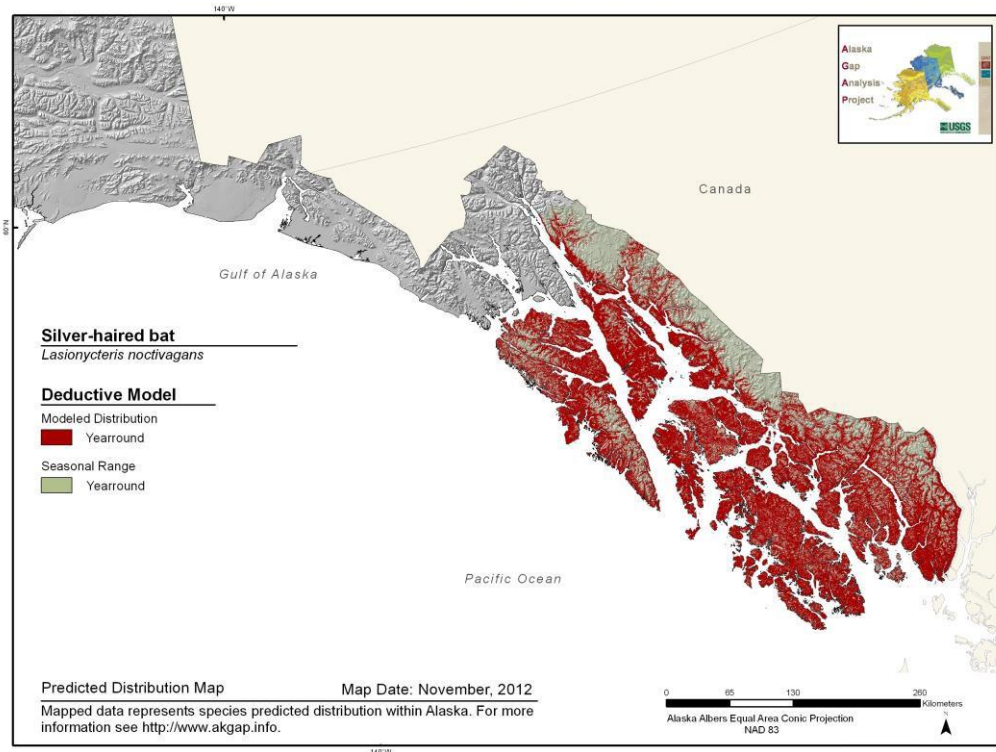
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.562**

**Model Quality
Summary:**
Low

Habitat Description

Associated with mature forests adjacent to lakes, ponds, and streams, but often occurs distant from water. Roost in loose bark, crevices, woodpecker holes, bird nests in trees, and buildings. Trees, rarely caves, are used as hibernacula (NatureServe 2006, MacDonald and Cook 2009).

References

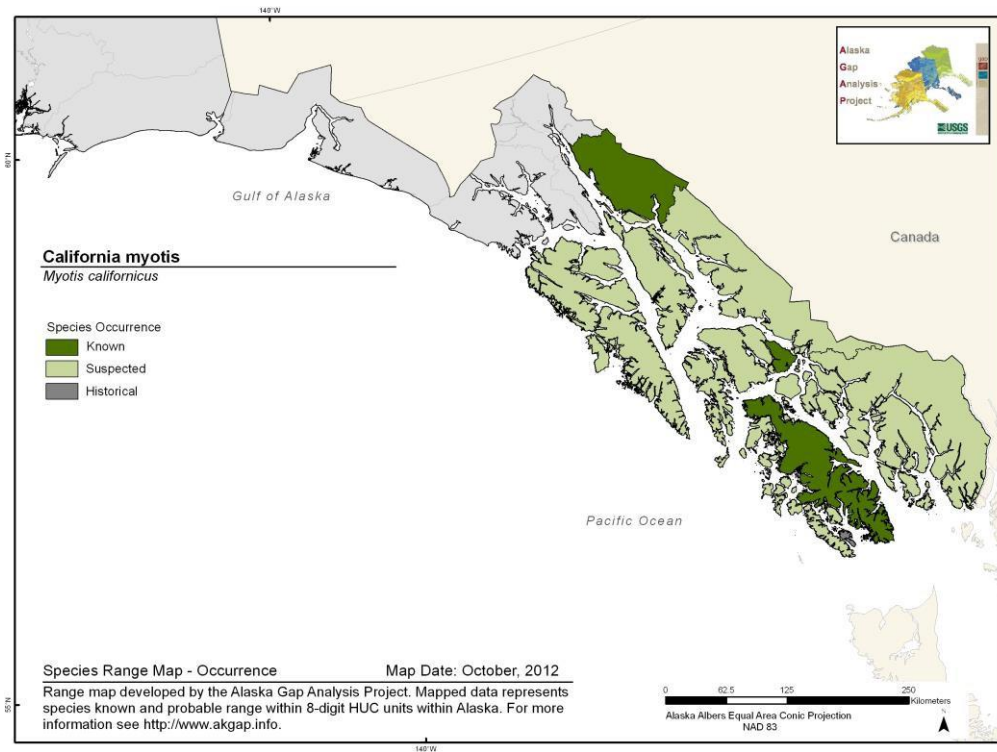
MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life. Version 5.0. NatureServe, Arlington, VA. Available <http://www.natureserve.org/explorer>.

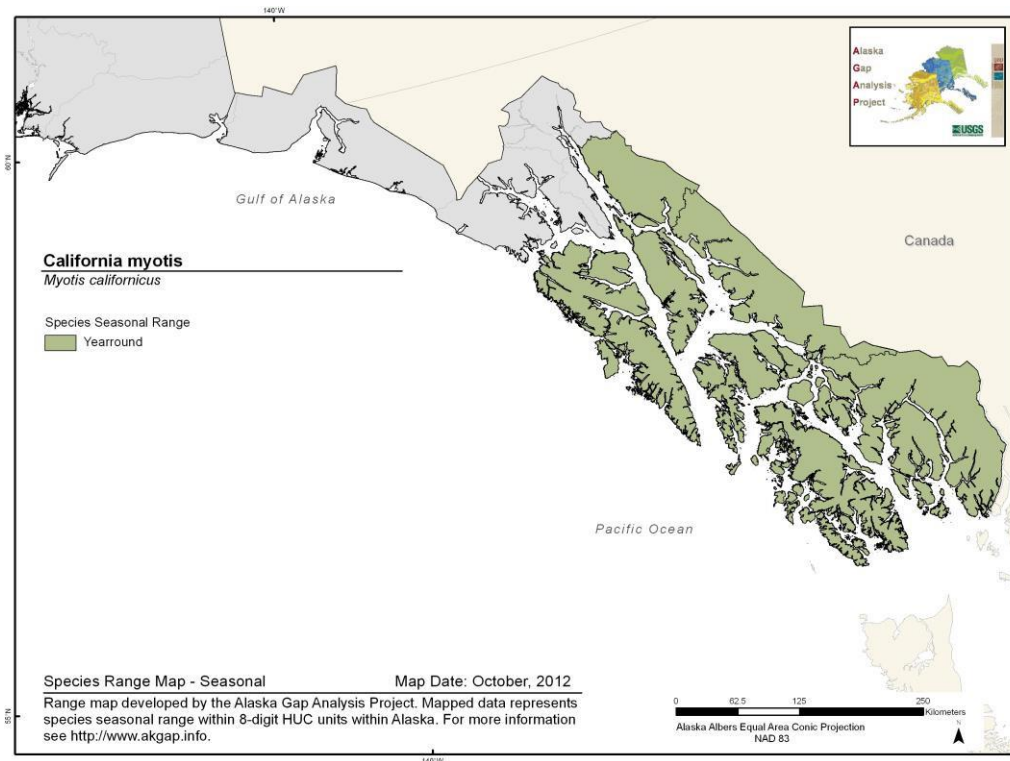
California Myotis *Myotis californicus*

Range Map and Distribution Model Summary

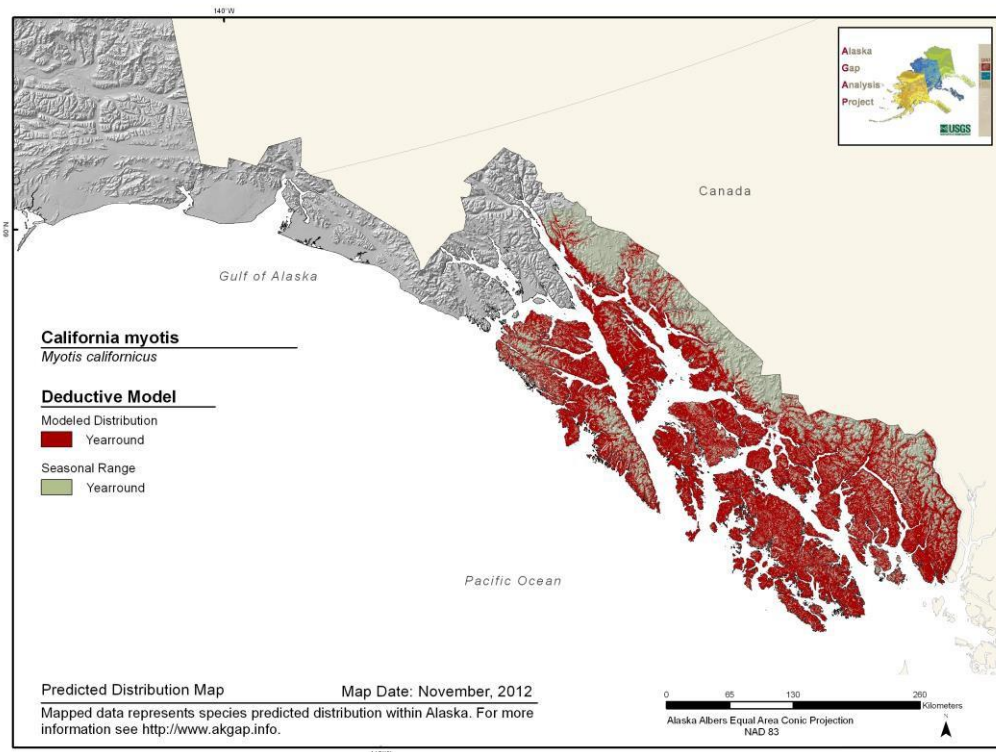
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.694**

**Model Quality
Summary:**
Low

Habitat Description

Found in a variety of habitats at various elevations. In Southeast Alaska, found primarily in relatively dense forested habitats (Boland 2007). Temperate rainforest of Southeast Alaska contains abundant live trees, snags, and fallen logs in a variety of sizes. The extensive karst formations in Southeast Alaska also provide numerous caves where hibernating bats have been observed and collected in winter. Roosting habits unknown in Alaska. Elsewhere, day roosts include rock crevices, tree cavities, tree bark, and buildings. Night roosts include caves and mine shafts (Barbour and Davis 1969, Nagorsen and Brigham 1993, Parker et al. 1997).

References

Barbour, R. W., and W. H. Davis. 1969. Bats of America. The University of Kentucky Press, Lexington, Kentucky.

Boland, J. L. 2007. Distribution of bats in southeast Alaska and selection of day-roosts in trees by Keen's myotis on Prince of Wales Island, southeast Alaska. Unpublished thesis. Oregon State University, Corvallis.

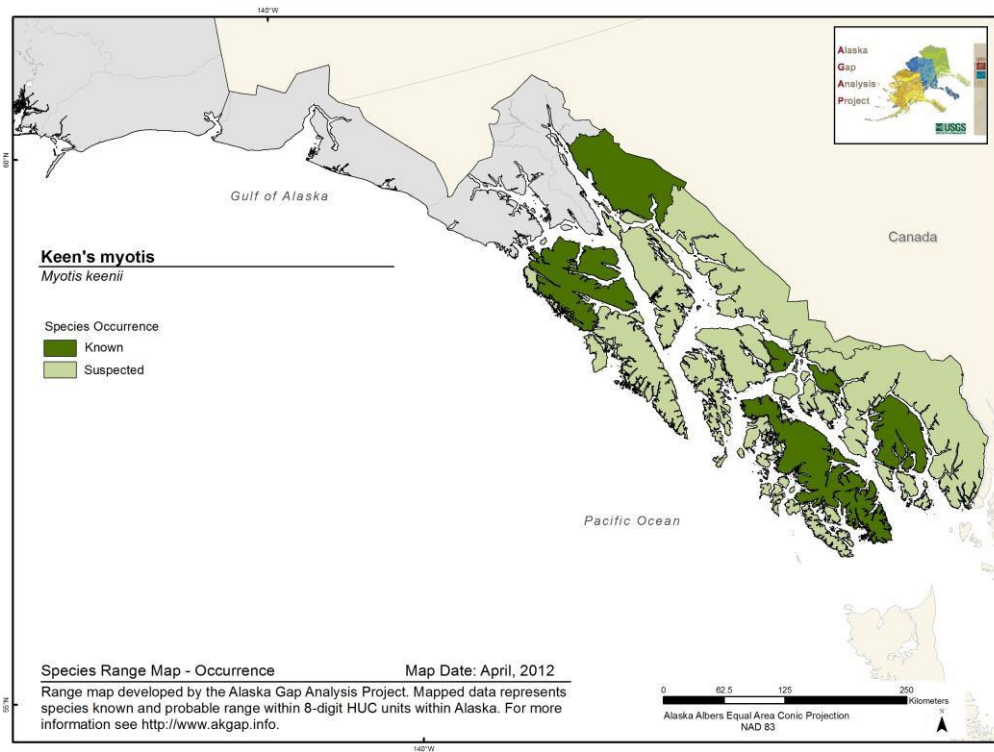
Nagorsen, D.W. and R.M. Brigham. 1993. Bats of British Columbia. Royal British Columbia Museum Handbook. Volume 1, The mammals of British Columbia. UBC Press. Vancouver, British Columbia, Canada. 164 p.

Parker, D.I., B.E. Lawhead, and J.A. Cook. 1997. Distributional limits of bats in Alaska. Arctic 50(3):256-265.

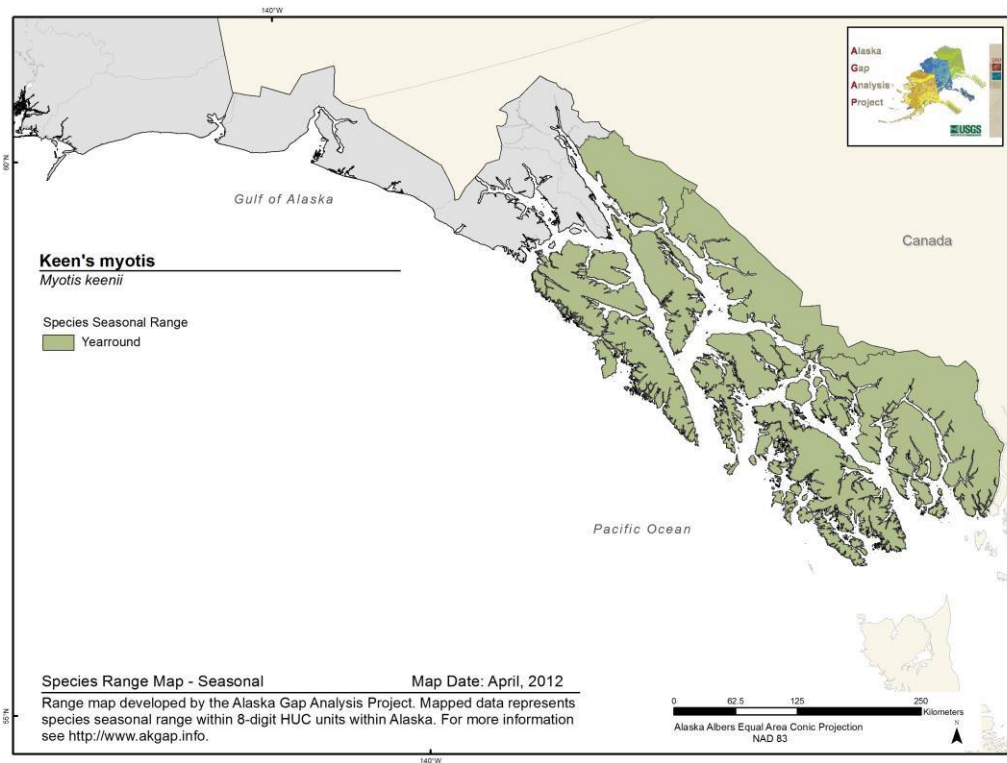
Keen's Myotis *Myotis keenii*

Range Map and Distribution Model Summary

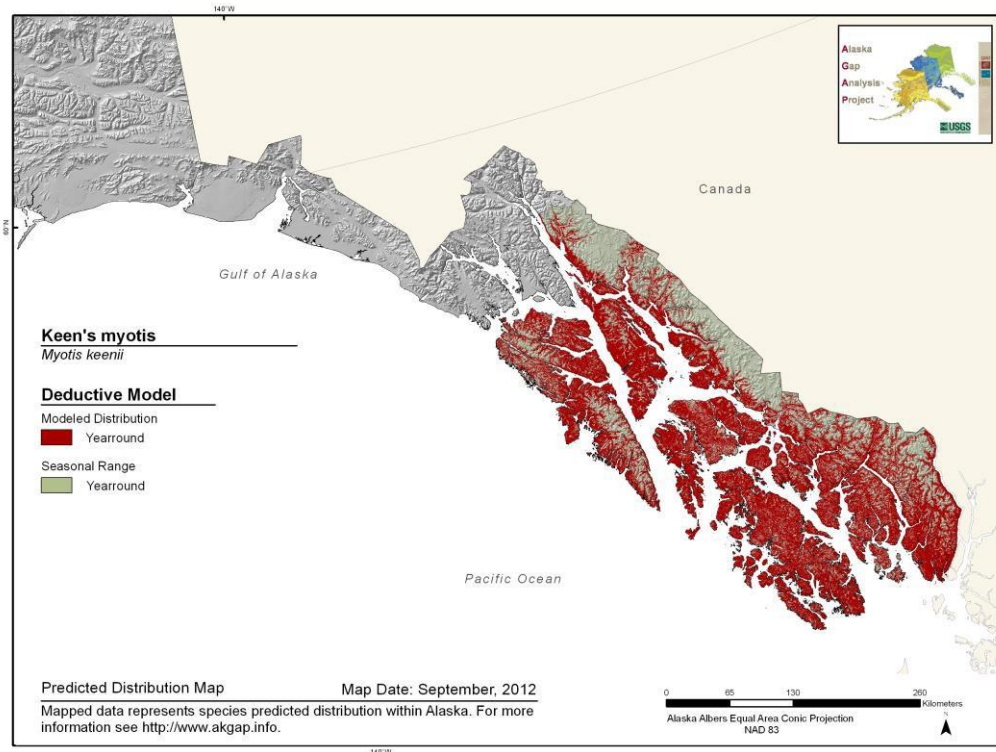
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.9**

**Model Quality
Summary:**
High

Habitat Description

Closely association with coastal forest habitats (Nagorsen and Brigham 1993). In Southeast Alaska, primarily associated with coniferous forests with females preferring old-growth forests and cedar trees in riparian areas for day roosts (Boland 2007).

References

Boland, J. L. 2007. Distribution of bats in southeast Alaska and selection of day-roosts in trees by Keen's myotis on Prince of Wales Island, southeast Alaska. Unpublished thesis. Oregon State University, Corvallis.

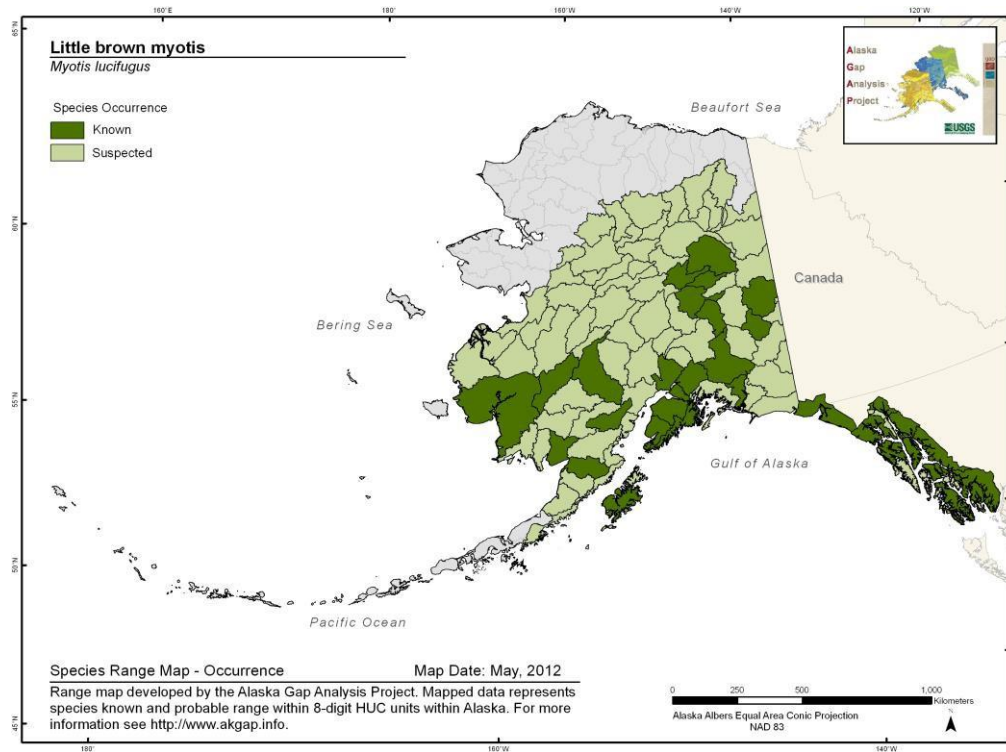
Nagorsen, D.W. and R.M. Brigham. 1993. Bats of British Columbia. Royal British Columbia Museum Handbook. Volume 1, The mammals of British Columbia. UBC Press. Vancouver, British Columbia, Canada. 164 p.

Little Brown Myotis

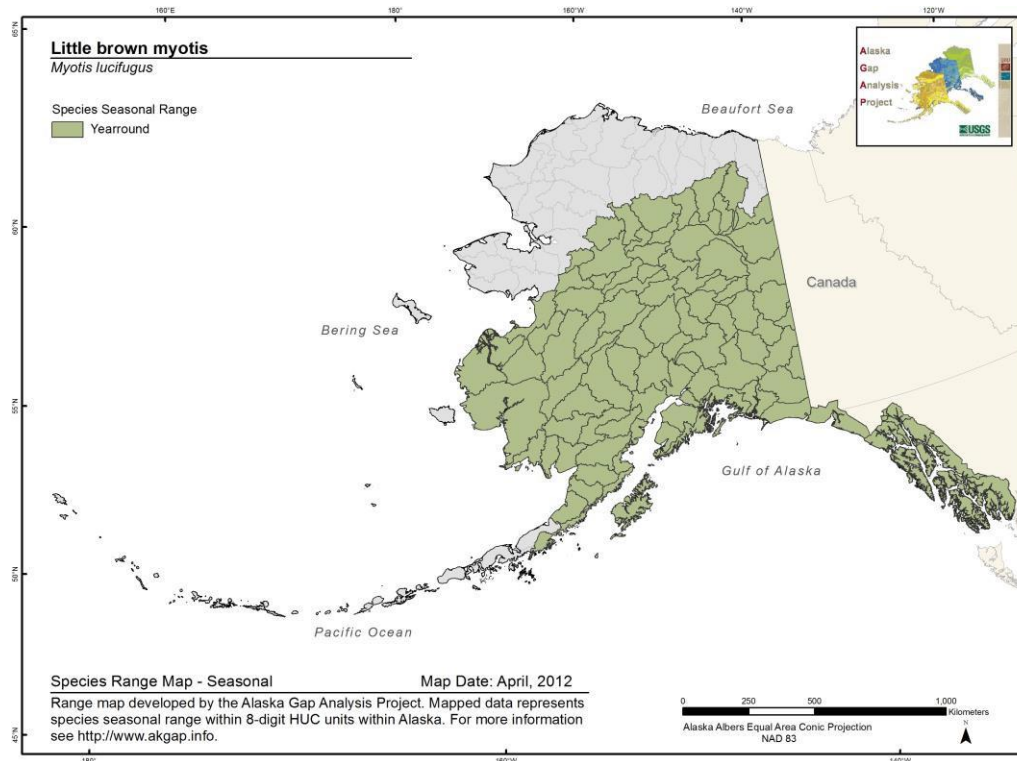
Myotis lucifugus

Range Map and Distribution Model Summary

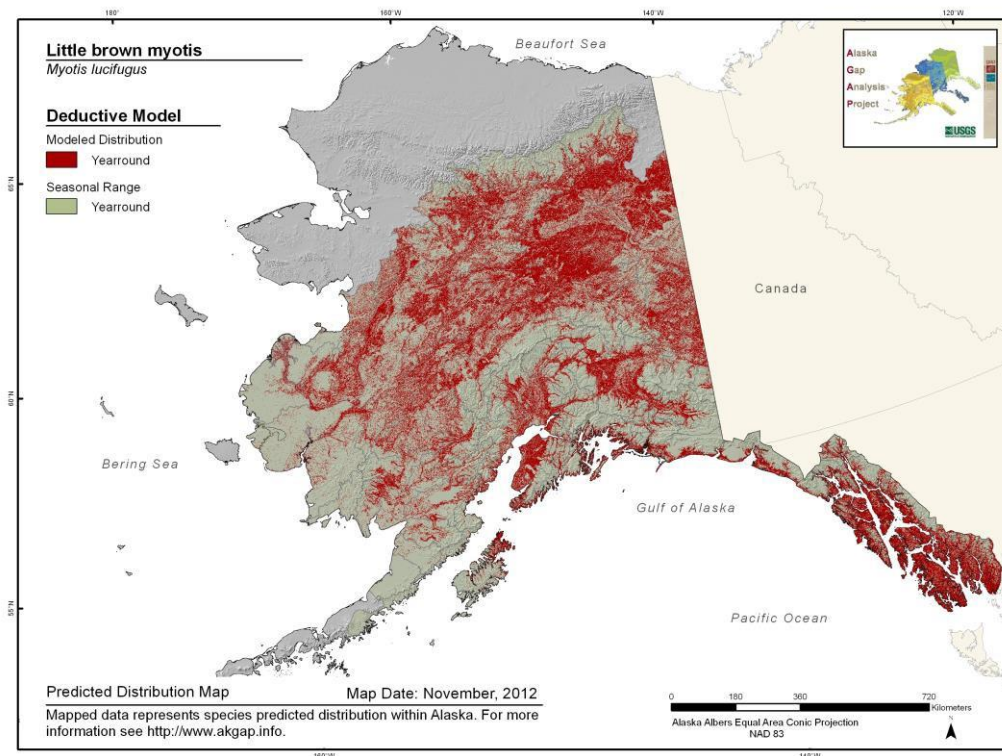
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.754**

**Model Quality
Summary:**
Moderate

Habitat Description

Only documented in forested regions of Alaska (Parker 1996, Parker et al. 1997). In Southeast Alaska, favors old-growth forests and riparian habitats (Parker et al. 1996). Roosts in building, trees, under rocks and wood, and caves. Karst system in Southeast Alaska may also be important (MacDonald and Cook 1996).

References

MacDonald, S.O. and J.A. Cook. 1996. The land mammal fauna of Southeast Alaska. The Canadian Field-Naturalist 110(4):571-598.

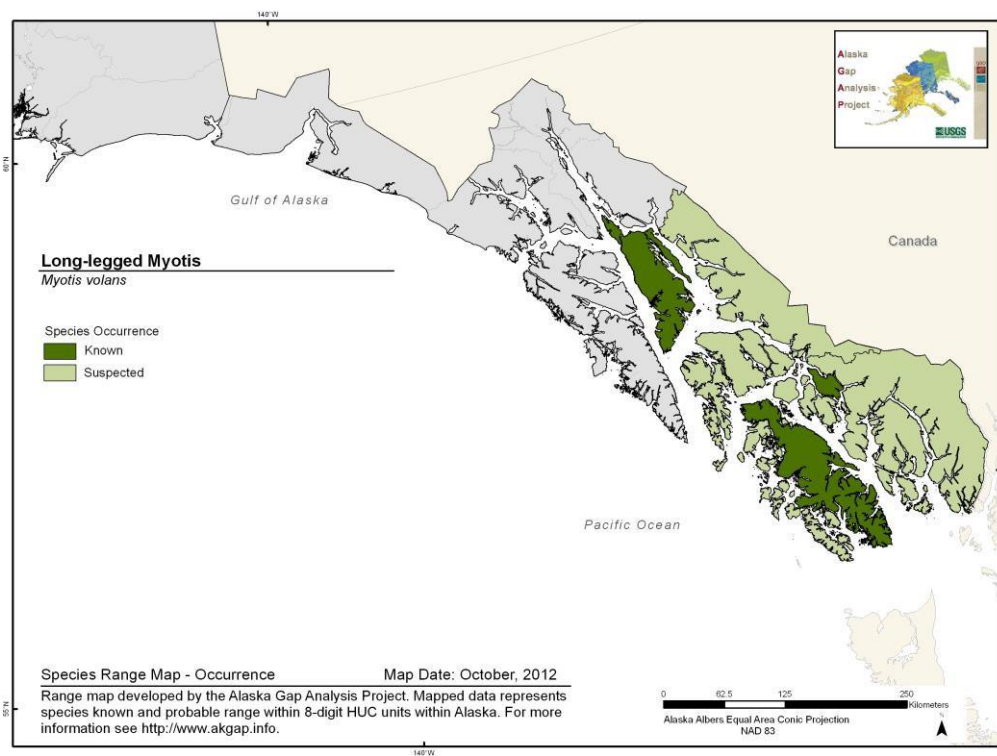
Parker, D.I. 1996. Forest ecology and distribution of bats in Alaska. M. S. thesis. Univ. of Alaska, Fairbanks. 73 pp.

Parker, D.I., B.E. Lawhead, and J.A. Cook. 1997. Distributional limits of bats in Alaska. Arctic 50(3):256-265.

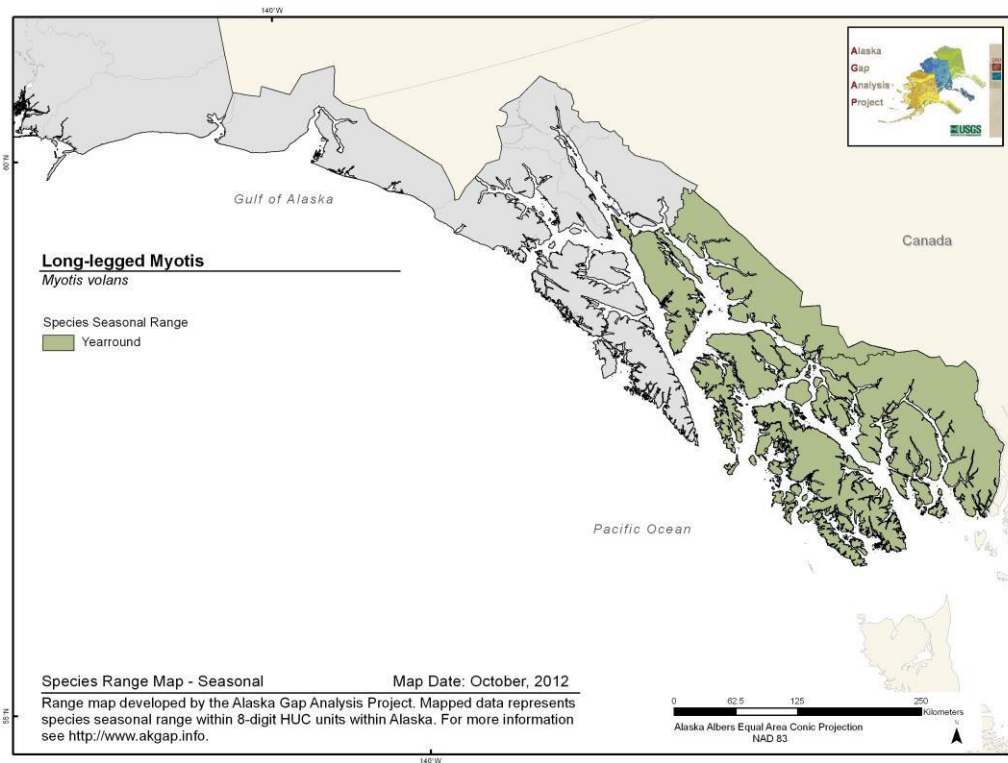
Long-legged Myotis *Myotis volans*

Range Map and Distribution Model Summary

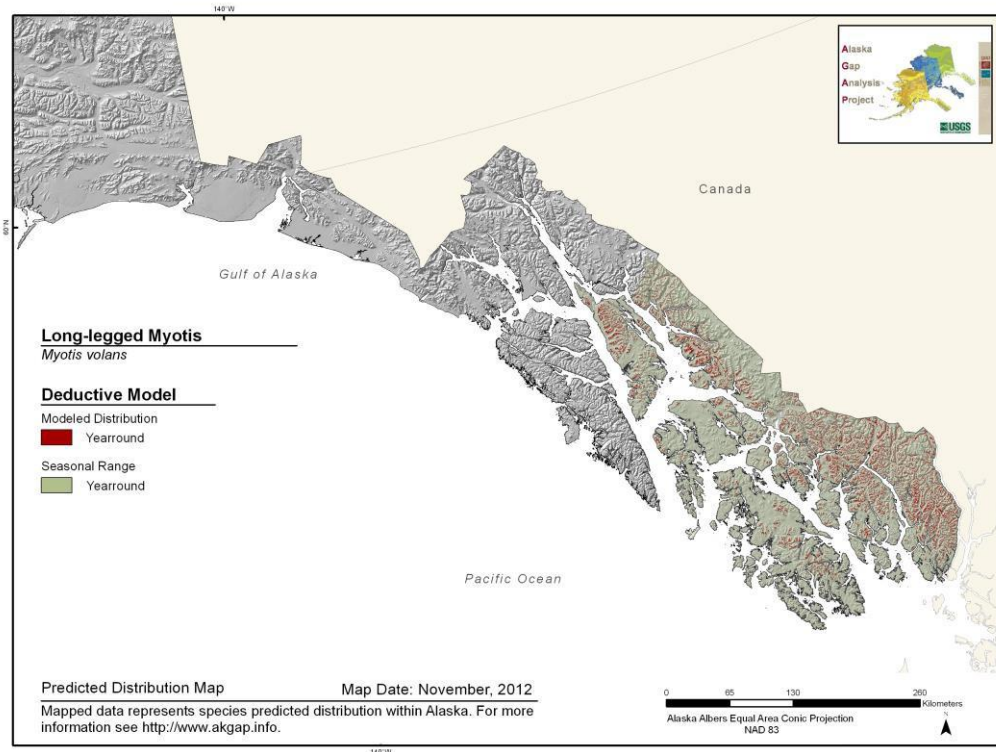
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, occurs primarily in montane coniferous forests at 2000-3000 m (Nagorsen and Brigham 2003, NatureServe 2006, Boland 2007). Likely prefers old-growth and riparian habitats. Summer day roosts and maternity colonies found in rock crevices in cliffs, cracks in ground and trees, under tree bark, and in buildings (MacDonald and Cook 2007).

References

Boland, J. L. 2007. Distribution of bats in southeast Alaska and selection of day-roosts in trees by Keen's myotis on Prince of Wales Island, southeast Alaska. Unpublished thesis. Oregon State University, Corvallis.

MacDonald, S.O. and J.A. Cook. 2007. Mammals and amphibians of Southeast Alaska. The Museum of Southwestern Biology, Special publication 8:1-191. University of New Mexico, Albuquerque, NM.

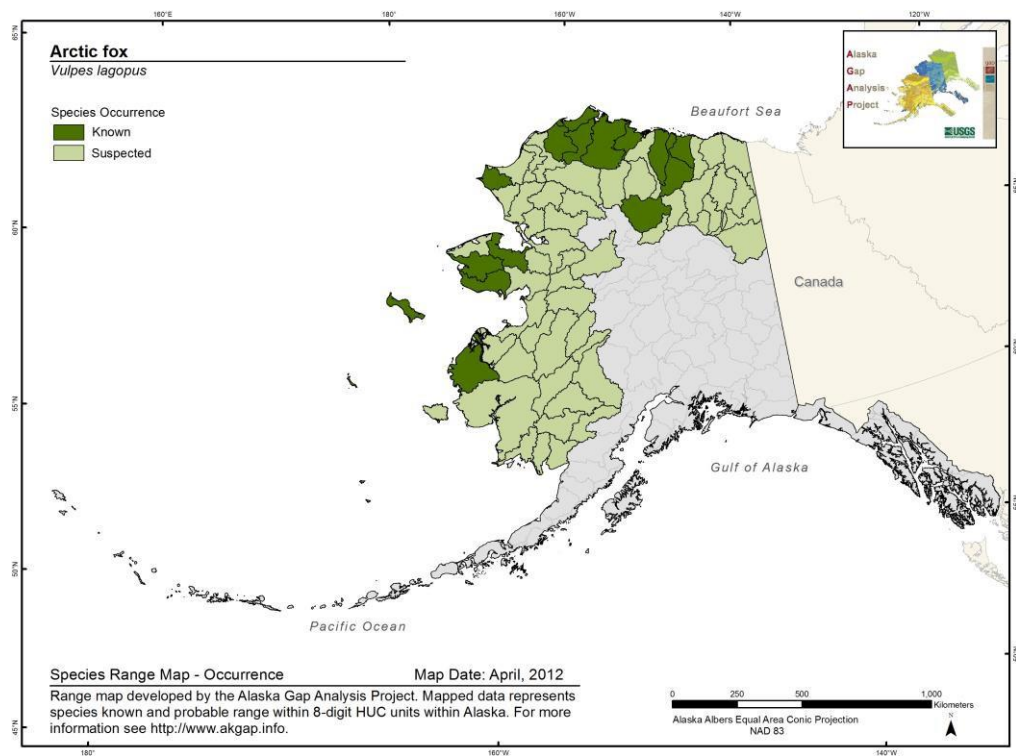
Nagorsen, D.W. and R.M. Brigham. 1993. Bats of British Columbia. Royal British Columbia Museum Handbook. Volume 1, The mammals of British Columbia. UBC Press. Vancouver, British Columbia, Canada. 164 p.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life. Version 5.0. NatureServe, Arlington, VA. Available <http://www.natureserve.org/explorer>.

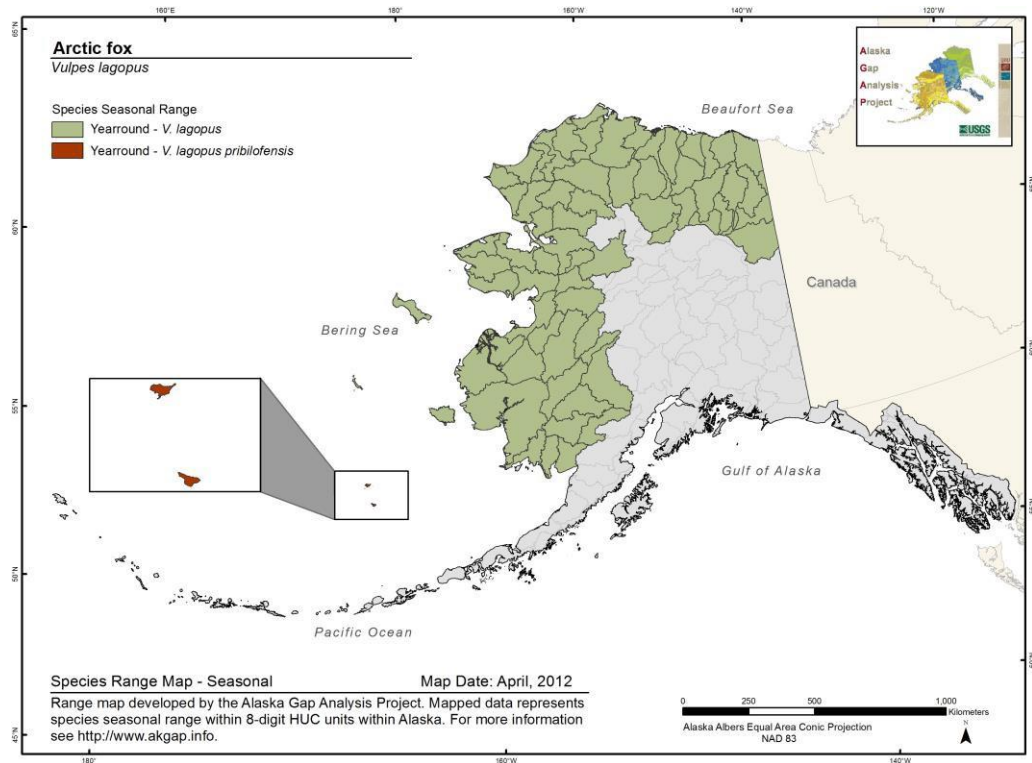
Arctic Fox *Vulpes lagopus*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**

Not validated

Habitat Description

Inhabit arctic tundra, along rocky beaches, and far out on frozen pack ice (ADF&G 1978, Banfield 1974). Prefer to den in light sandy soil along river banks and small hillocks, occasionally in talus (Anderson 1999).

Commonly uses garbage dumps in northern Alaska.

When inactive, occupies underground den in bank or hillside; may tunnel into snowbank in winter.

References

ADF&G. 1978. Alaska's wildlife and habitat, volume II. Anchorage, AK.

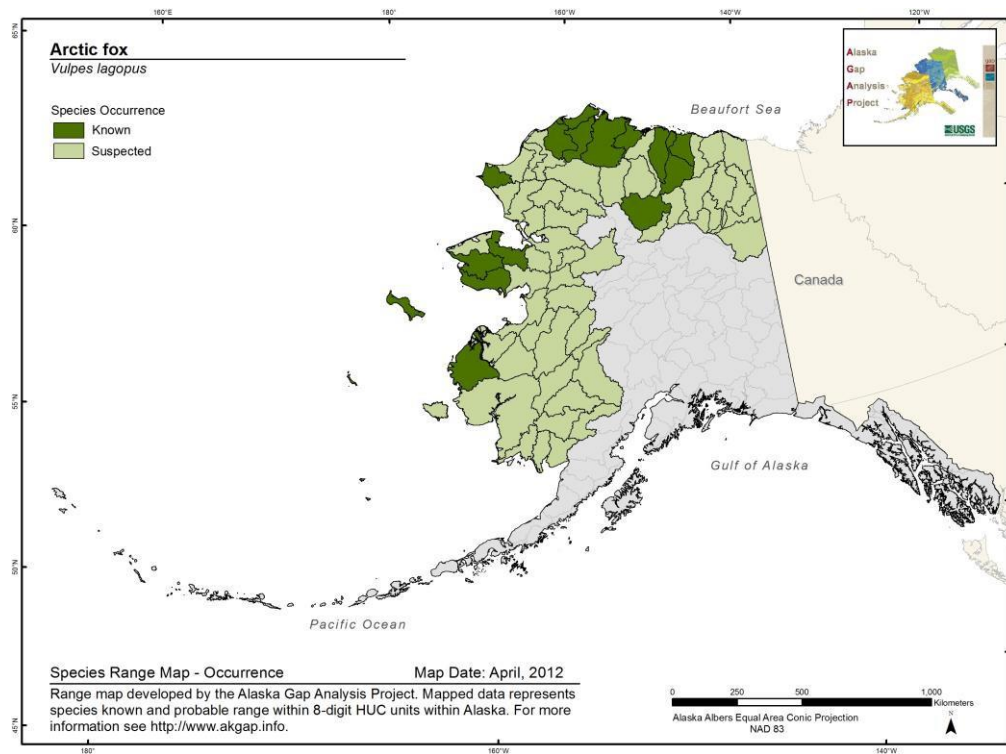
Anderson, C. G. 1999. Arctic Fox, *Alopex lagopus*. Pp. 146-148, in The Smithsonian book of North American mammals (D. E. Wilson and S. Ruff, eds.). Smithsonian Institution Press, Washington, D. C., in association with the American Society of Mammalogists.

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

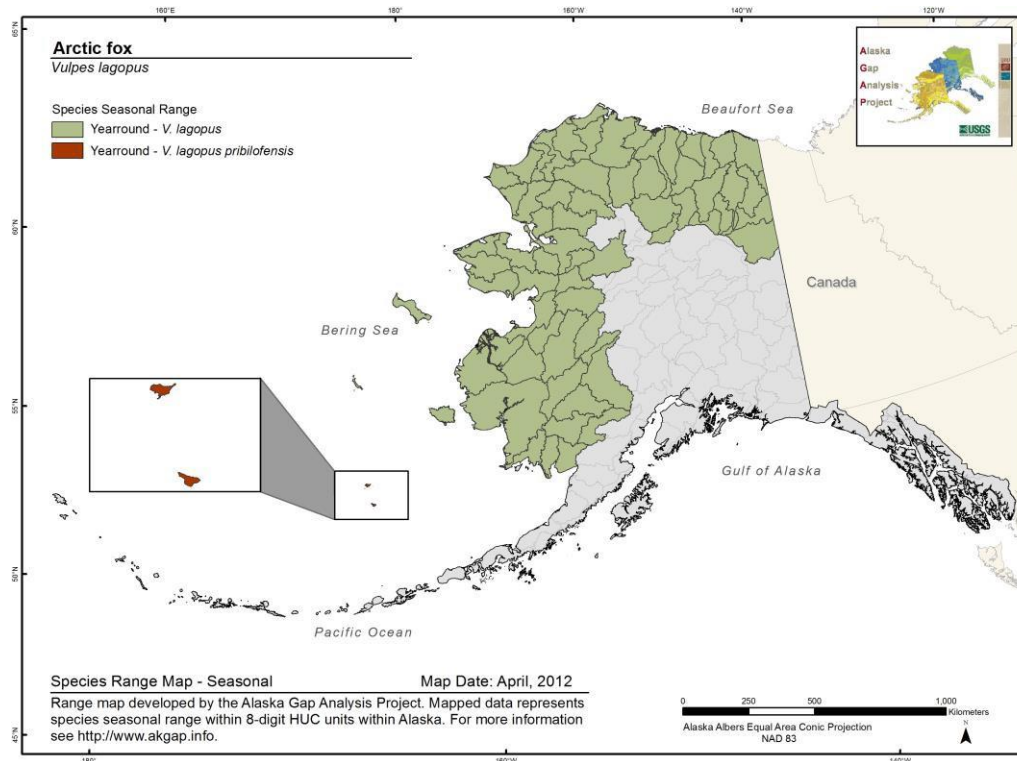
Pribilof Island Arctic Fox *Vulpes lagopus pribilofensis*

Range Map and Distribution Model Summary

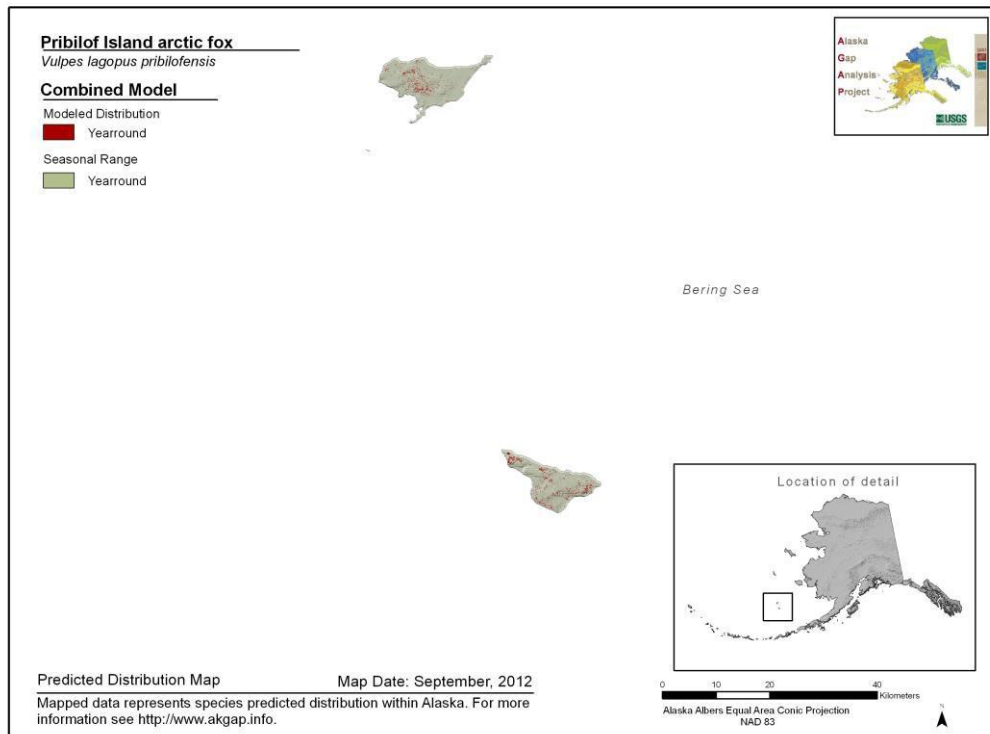
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.514**

**Model Quality
Summary:**
Low

Habitat Description

Inhabit arctic tundra, along rocky beaches, and far out on frozen pack ice (ADF&G 1978, Banfield 1974). Prefer to den in light sandy soil along river banks and small hillocks, occasionally in talus (Anderson 1999). Treeless coastal areas (ADF&G n. d.).

References

ADF&G. 1978. Alaska's wildlife and habitat, volume II. Anchorage, AK.

ADF&G. Wildlife notebook series.

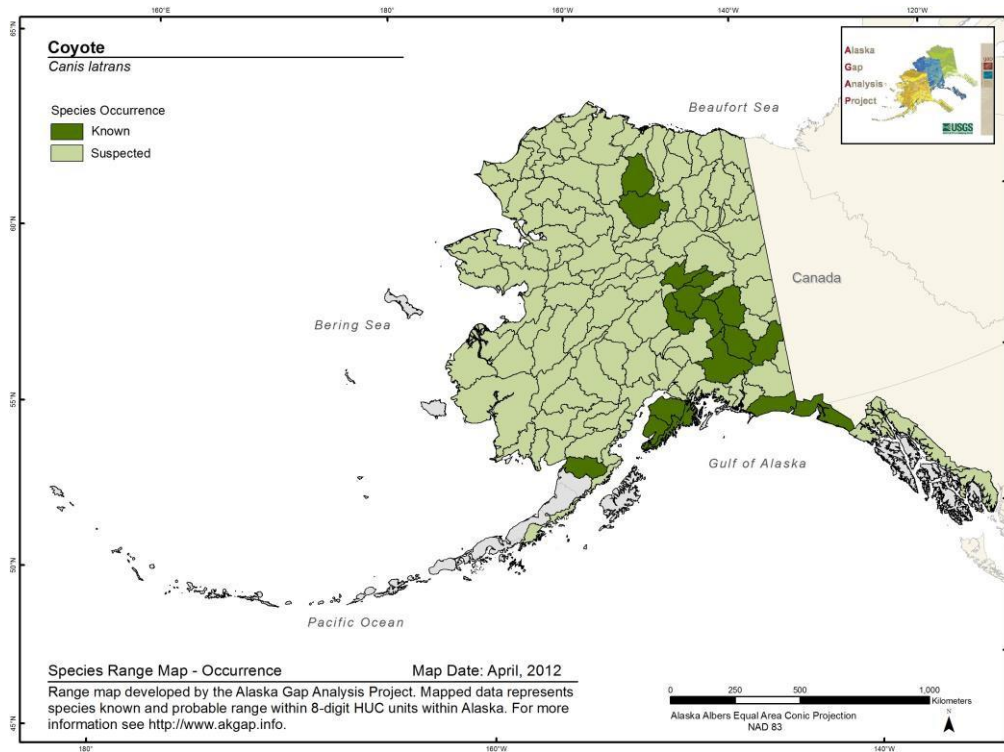
Anderson, C. G. 1999. Arctic Fox, *Alopex lagopus*. Pp. 146-148, in The Smithsonian book of North American mammals (D. E. Wilson and S. Ruff, eds.). Smithsonian Institution Press, Washington, D. C., in association with the American Society of Mammalogists.

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

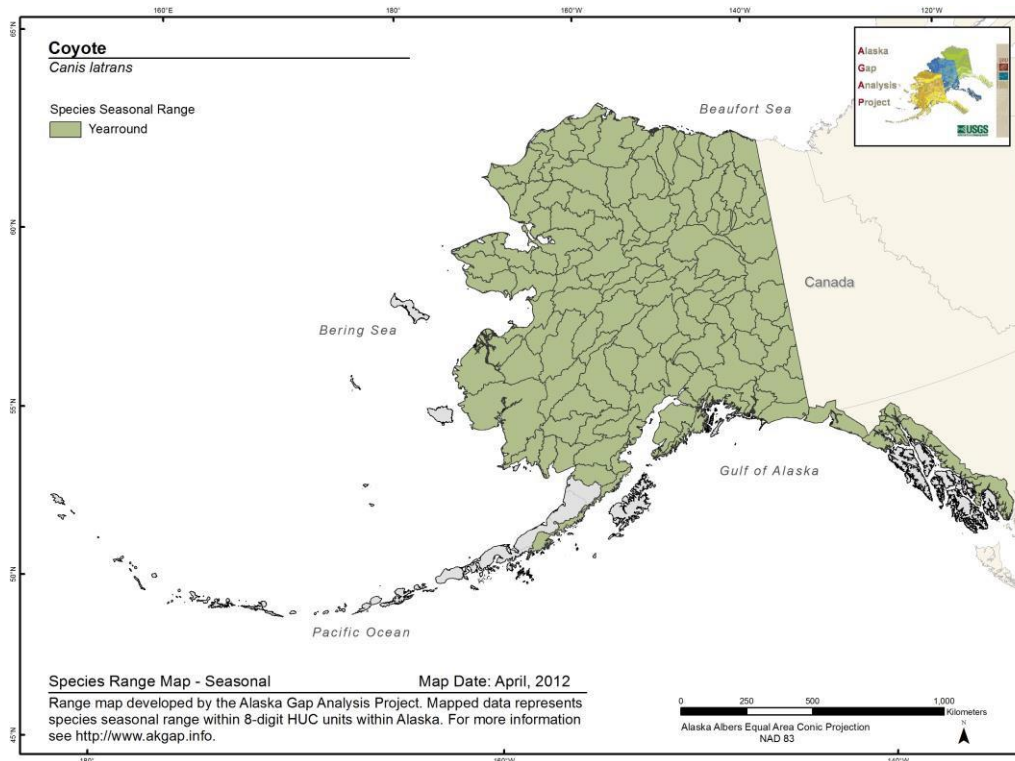
Coyote *Canis latrans*

Range Map and Distribution Model Summary

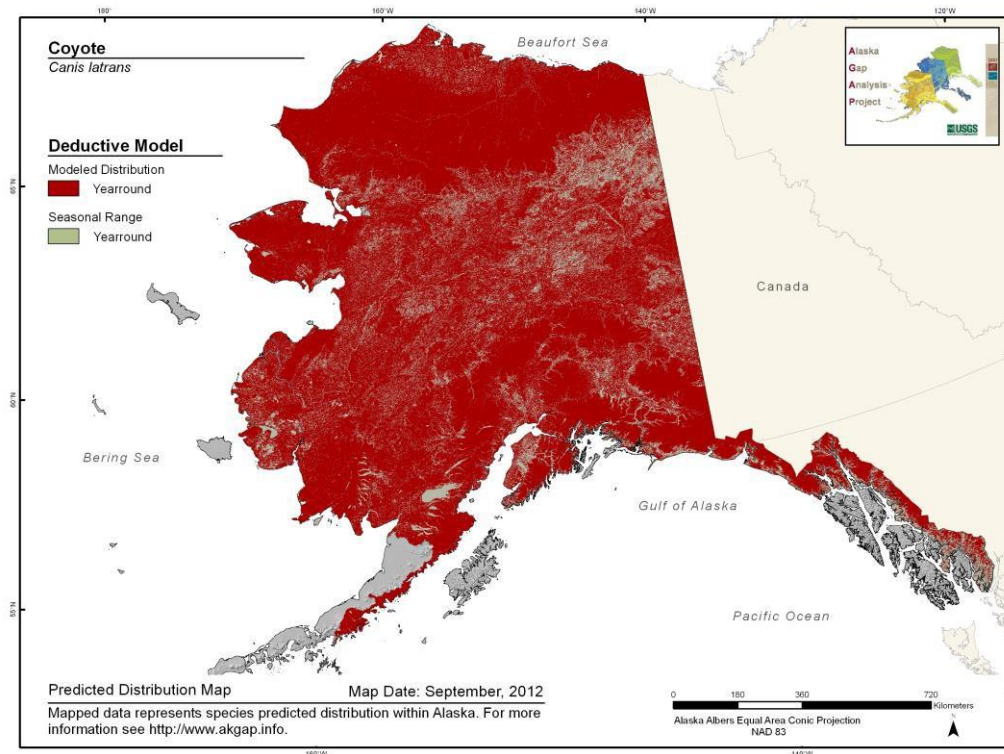
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.558**

**Model Quality
Summary:**
Low

Habitat Description

Can thrive in a variety of habitats from heavily forested areas to open prairies (NatureServe 2007b). In Alaska, prefer broken and open country (ADF&G 1978).

References

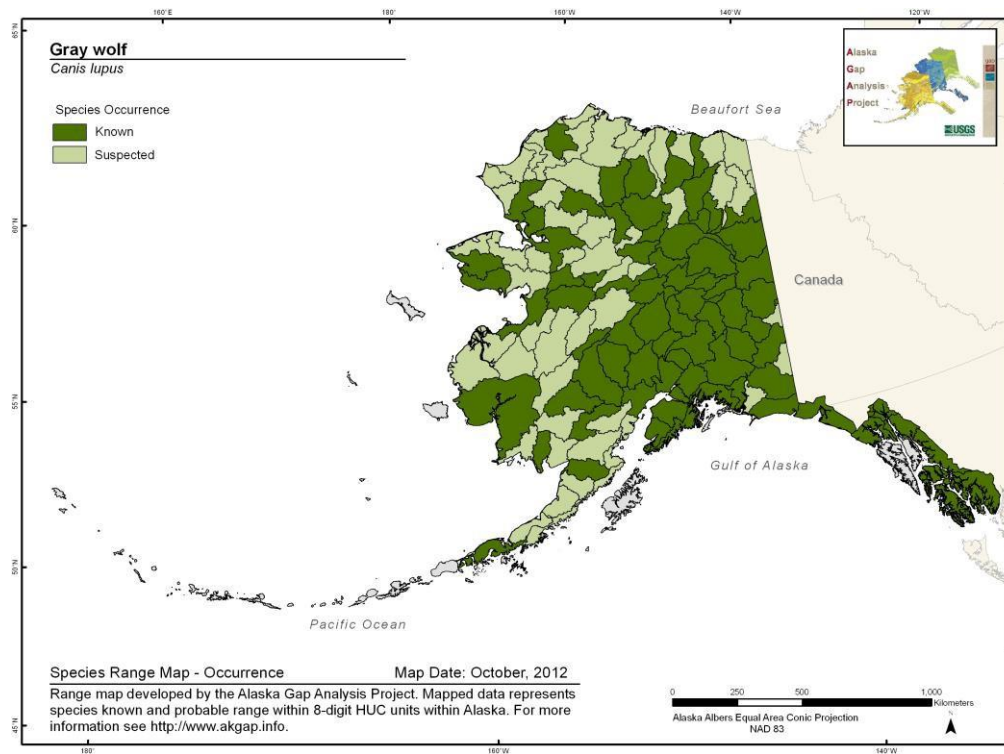
ADF&G. 1978. Alaska's wildlife and habitat, volume II. Anchorage, AK.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

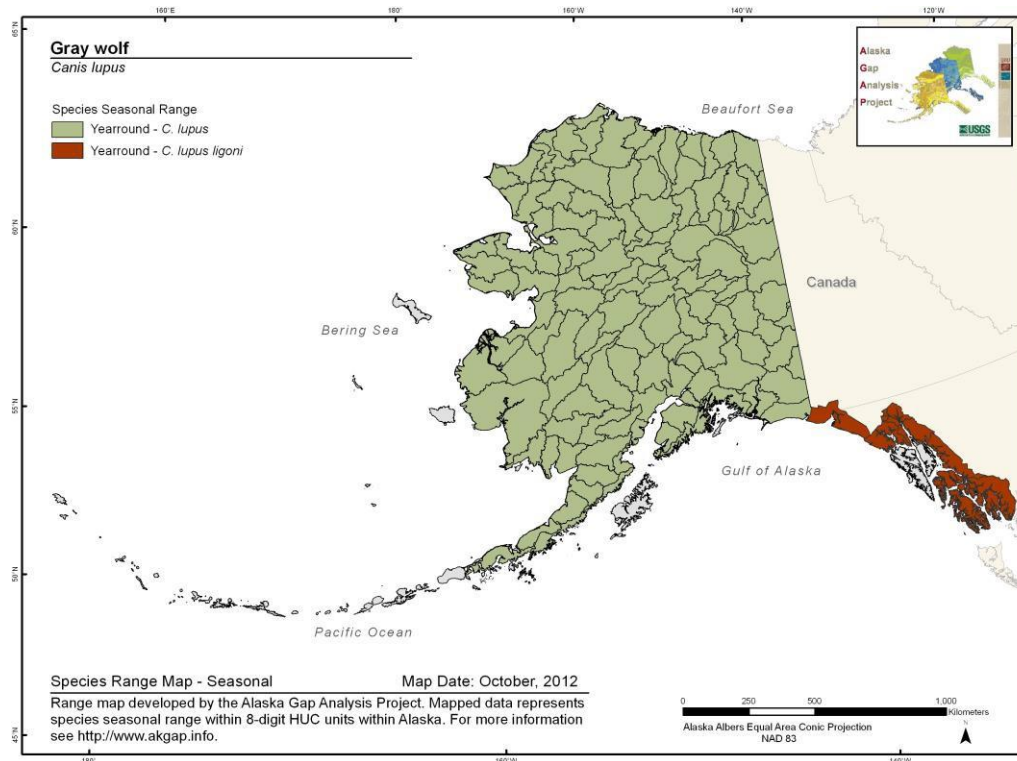
Wolf *Canis lupus*

Range Map and Distribution Model Summary

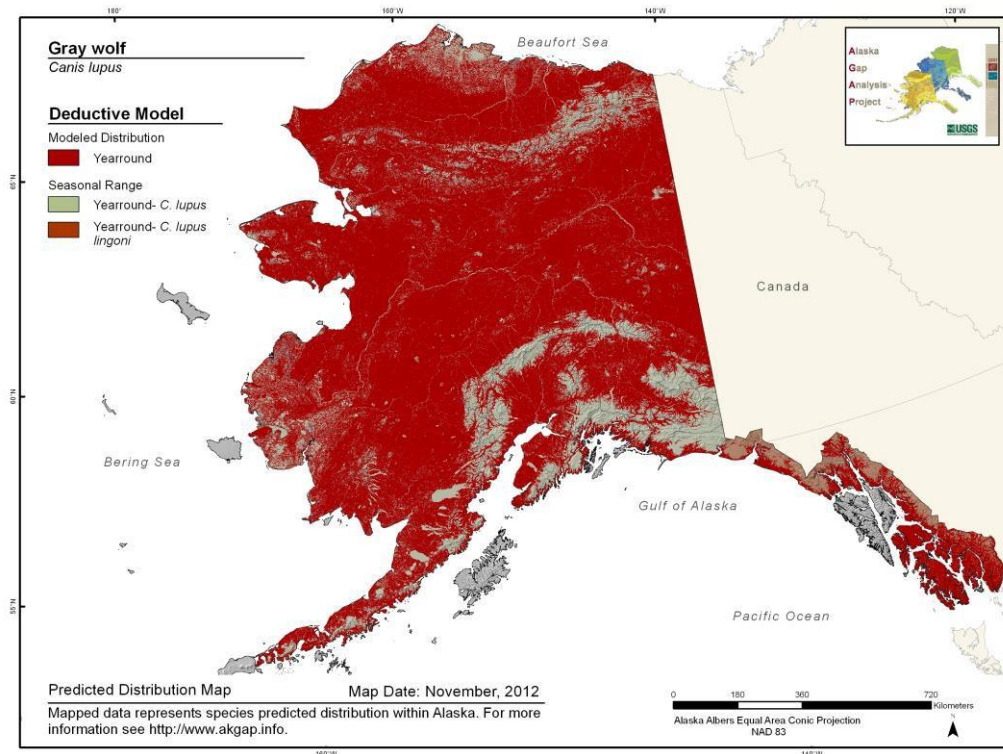
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.538**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, occur where suitable prey populations exist, from dense coastal rain forests to open arctic tundra (MacDonald and Cook 2009). Forests, open meadows, rocky ridges, and lakes or rivers all comprise a pack's territory (Herman and Willard 1978).

References

Herman, M. and E. E. Willard. 1978. Rocky Mountain wolf and its habitat. Missoula, MT:USDA USFS, National Forest System Cooperative Forestry, Forestry Research, Region 1. 17 p.

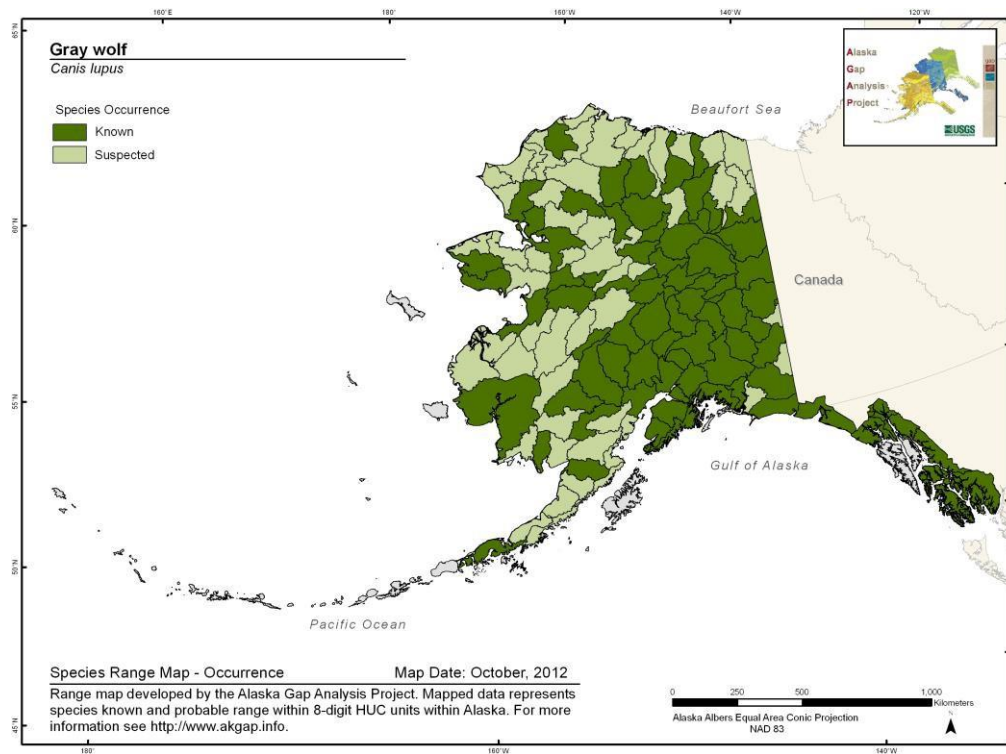
MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

Alexander Archipelago Wolf

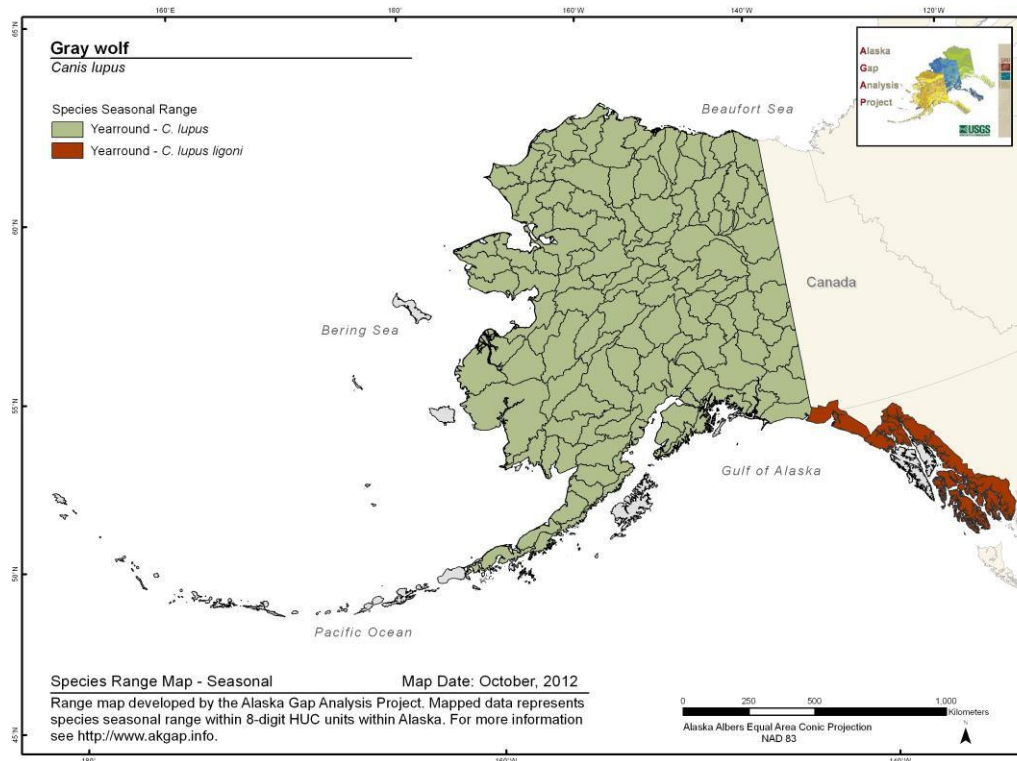
Canis lupus ligoni

Range Map and Distribution Model Summary

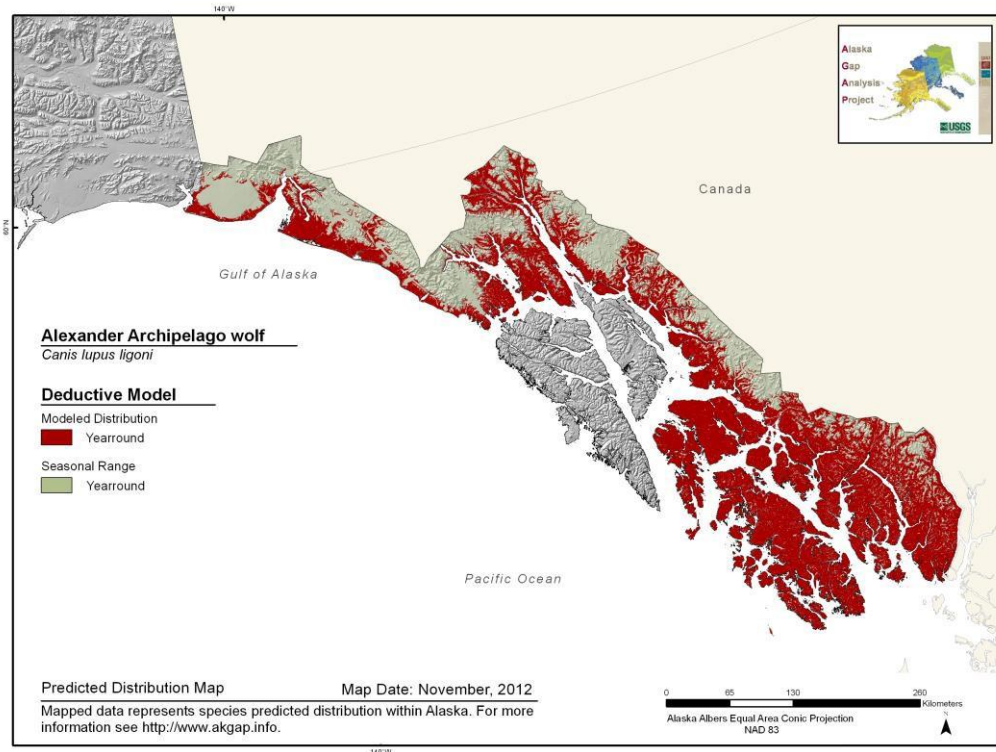
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.591**

**Model Quality
Summary:**
Low

Habitat Description

Little is known about the habitat preferences of Alexander Archipelago wolves (see Kirchhoff 1992). They are found primarily in rugged coastal spruce-hemlock forests in areas frequented by their prey such as deer, beaver, mountain goat, small mammals, waterfowl, spawning salmon, and marine mammals (Kirchhoff 1992, Viereck and Little 1972, Smith et al. 1986, Wood 1990).

References

Kirchoff, M.D. 1992. The Alexander Archipelago Wolf. Pp 166-186 In: Suring, L.H., D.C. Crocker-Bedford, R.W. Flynn, C.L. Hale, G.C. Iverson, M.D. Kirchoff, T.E. Schenck II, L.C. Shea, K. Titus. A strategy for maintaining well-distributed, viable populations of wildlife associated with old-growth forests in southeast Alaska. Rep. of an interagency committee. Review draft, Juneau, AK. April 1992. 307 pp.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

Smith, C.A., E.L. Young, C.R. Land, and K.P. Bovee. 1986. Wolf-deer habitat relationships in southeast Alaska. Progress rep. Federal Aid in Wildlife Restoration, Proj. W-22-3, and W-22-4, Job 14.14. Alaska Dept. of Fish and Game, Juneau, AK. 24 p.

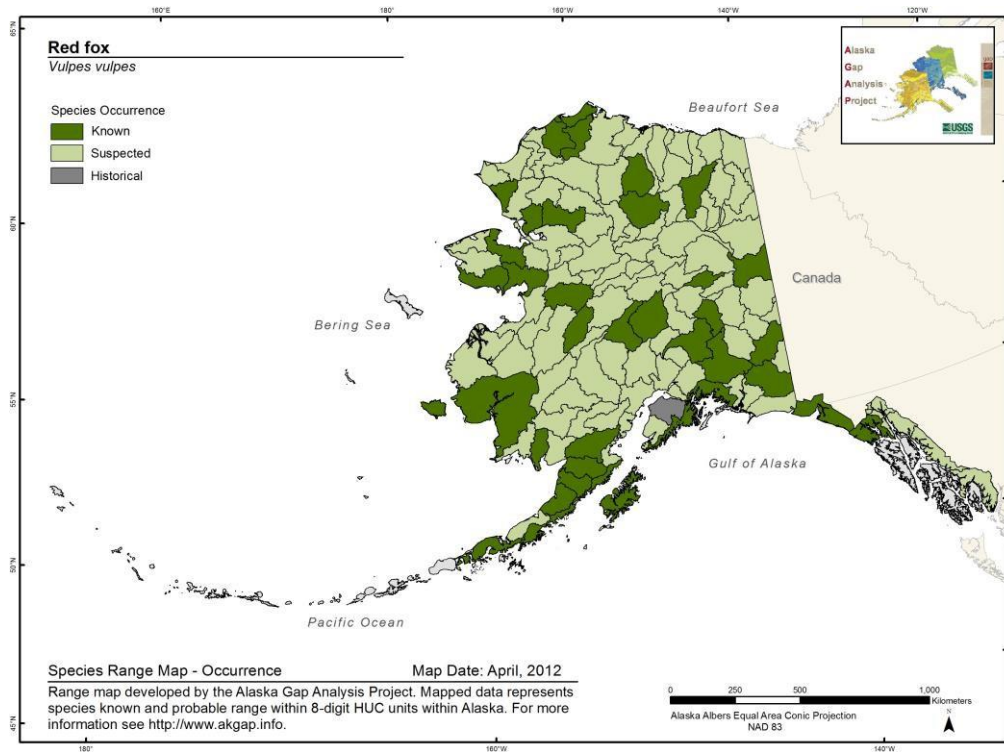
Viereck, L.A. and E.L. Little, Jr. 1972. Alaska trees and shrubs. Agriculture Handbook No. 410. USDA, USFS, Washington, DC. 265 p.

Wood, R.R. 1990. Game management in unit 1A: In: Morgan, S.O., ed. Wolf. Juneau, AK. ADF&G; federal aid in wildlife restoration; annual report of survey-inventory activities; project W-23-2; study 12.0.

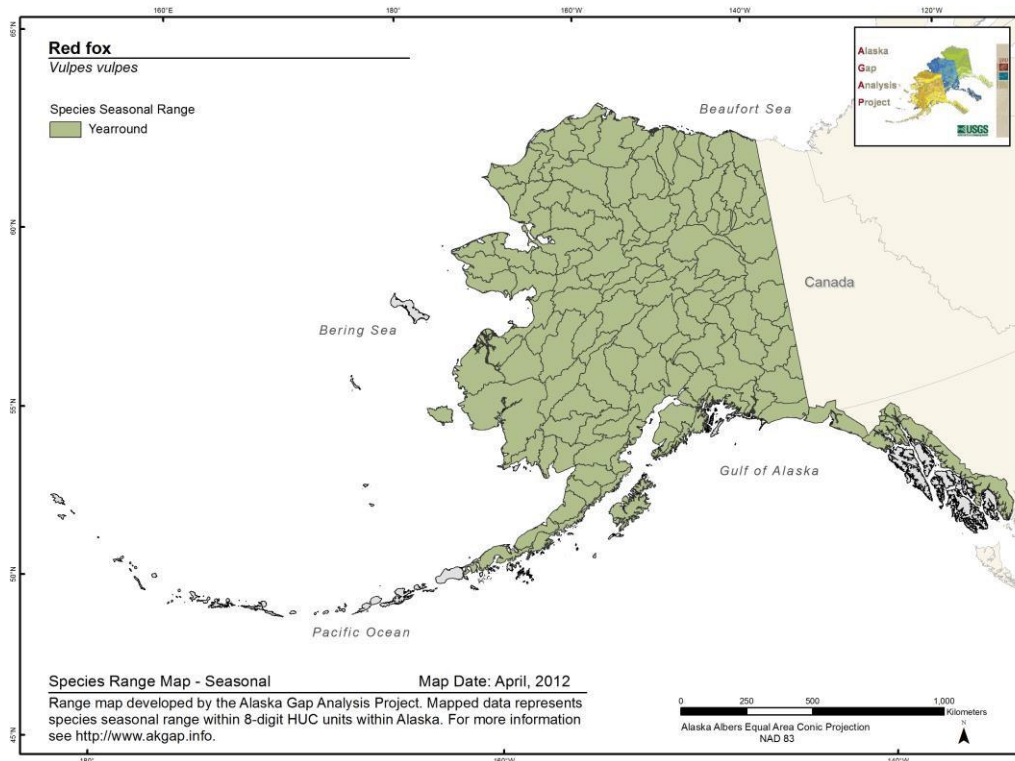
Red Fox *Vulpes vulpes*

Range Map and Distribution Model Summary

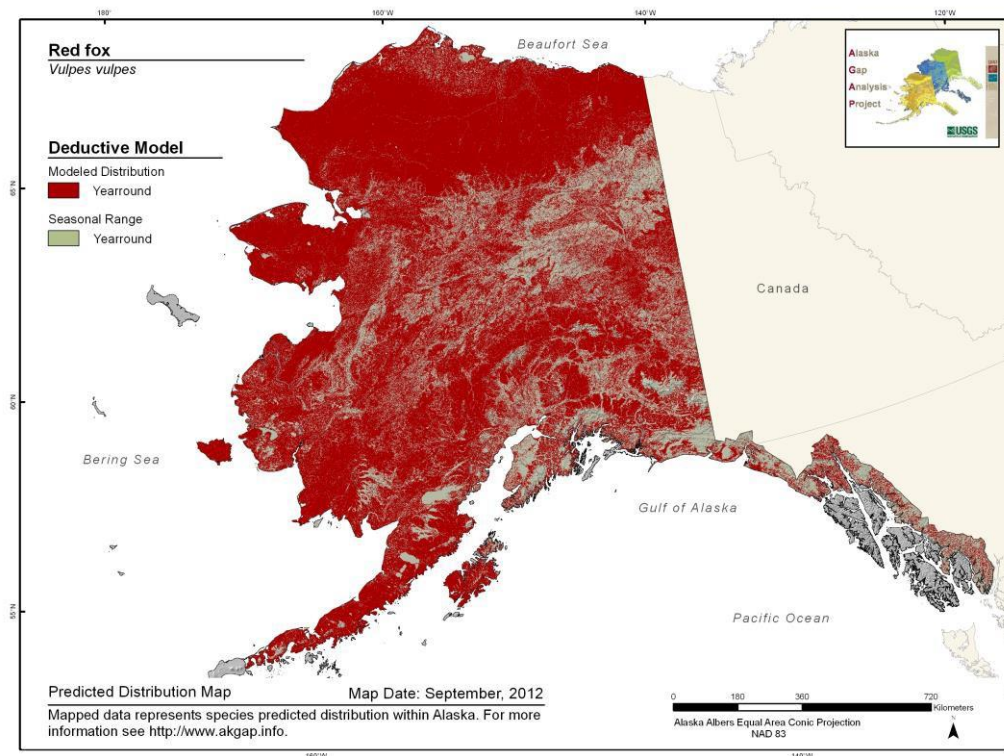
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.564**

**Model Quality
Summary:**
Low

Habitat Description

Occupies a variety of habitats from tundra to boreal forests, steppe, and temperate deserts (Lariviere and Pasitschniak-Arts 1996). Primarily inhabits open and semi-open habitats. Usually avoids dense forest, although open woodlands frequently are used. Sometimes occurs in suburban areas or even cities. May range onto sea ice (Labrador). Maternity dens are in burrows dug by fox or abandoned by other mammals, often in open fields or wooded areas, sometimes under rural buildings, in hollow logs, under stumps, etc. (NatureServe 2007b). In British Columbia red foxes are most common in mixed forests that are interspersed with meadows (Ables 1971).

References

Ables, E. D. 1971. Ecology of the red fox in North America. In: M. W. Fox, ed. The wild canids. New York: Van Nostand Reinhold Co: 216-235.

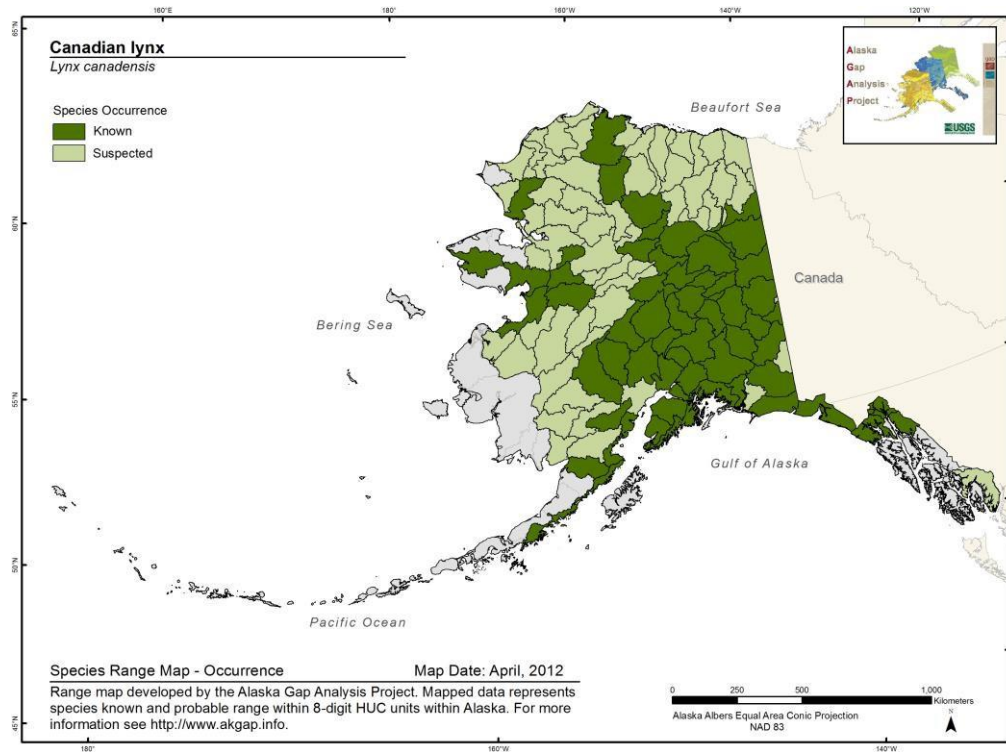
Lariviere, S., and M. Pasitschniak-Arts. 1996. VULPES VULPES. Mammalian Species (537):1-11.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

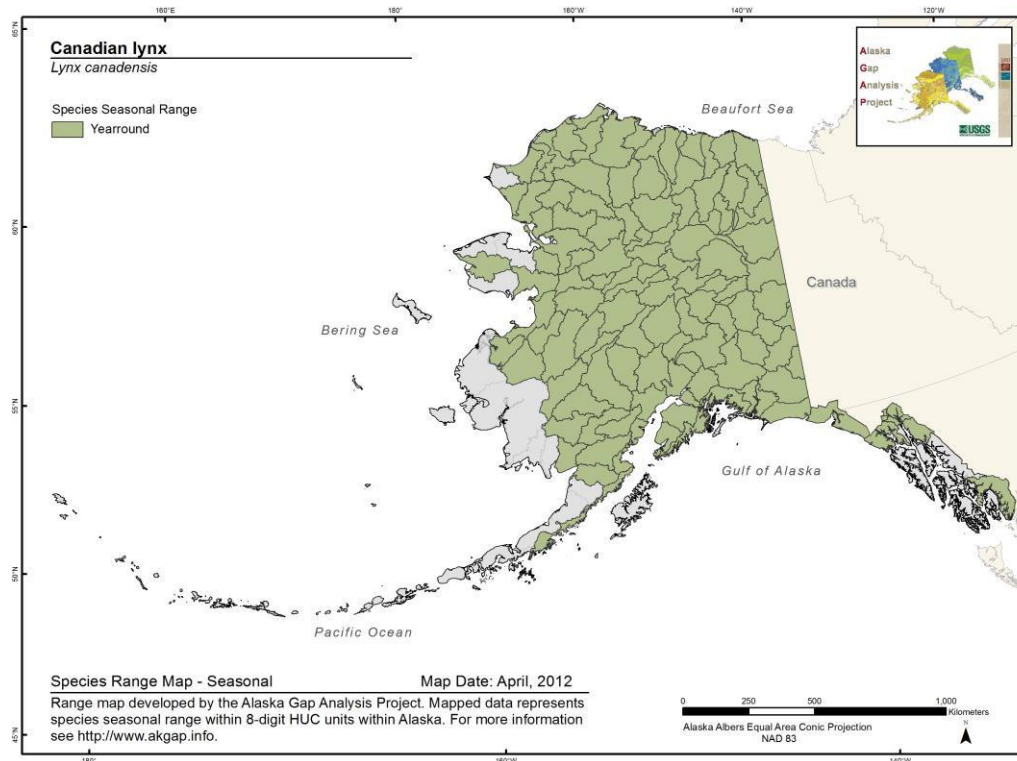
Canadian Lynx *Lynx canadensis*

Range Map and Distribution Model Summary

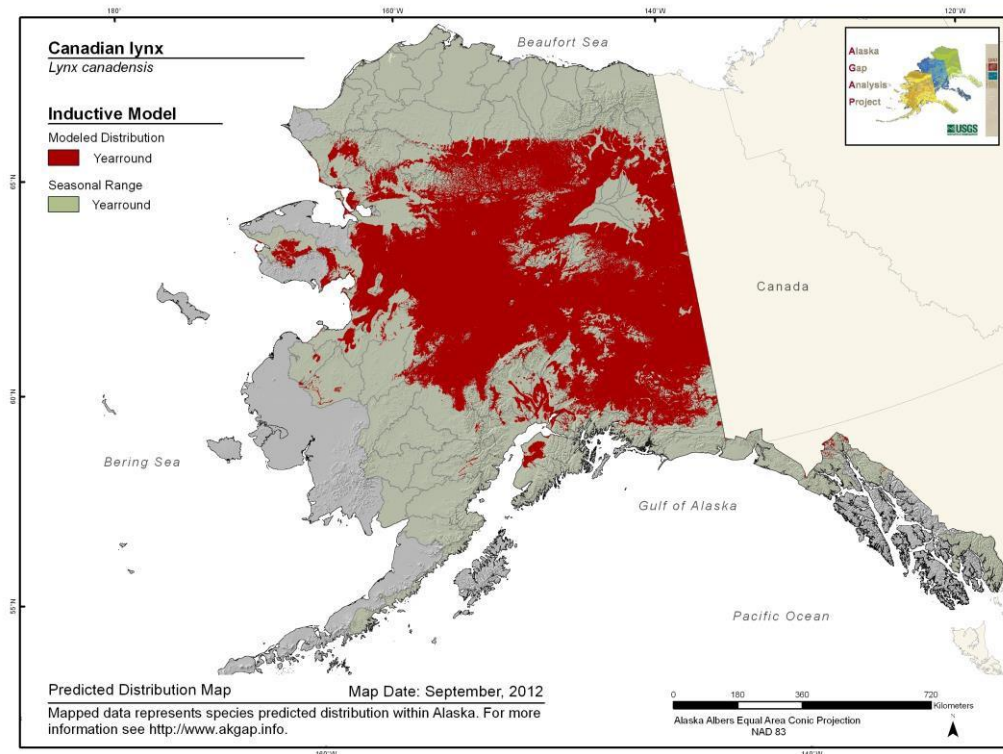
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.738**

**Model Quality
Summary:**
Moderate

Habitat Description

Occurs in boreal and montane forests dominated by coniferous or mixed forests with thick undergrowth. May also forage in open forest, rocky areas, and tundra during periods of prey scarcity (auxiliary habitat). Den sites in mature or old growth stands with high density of logs. Requires a mosaic of habitat types, including old growth for denning and younger stands for foraging (Koehler 1990, Koehler and Brittell 1990). In a study conducted in Alaska, Canadian lynxes preferred hilly terrain 984 feet to 3,527 feet (300-1,075 m) in elevation (Berrie 1973).

References

Berrie, P. M. 1973. Ecology and status of the lynx in interior Alaska. In: R. L. Eaton, ed. The world's cats: Vol. 1-Ecology and conservation. Winston, OR: World Wildlife Safari: 4-41.

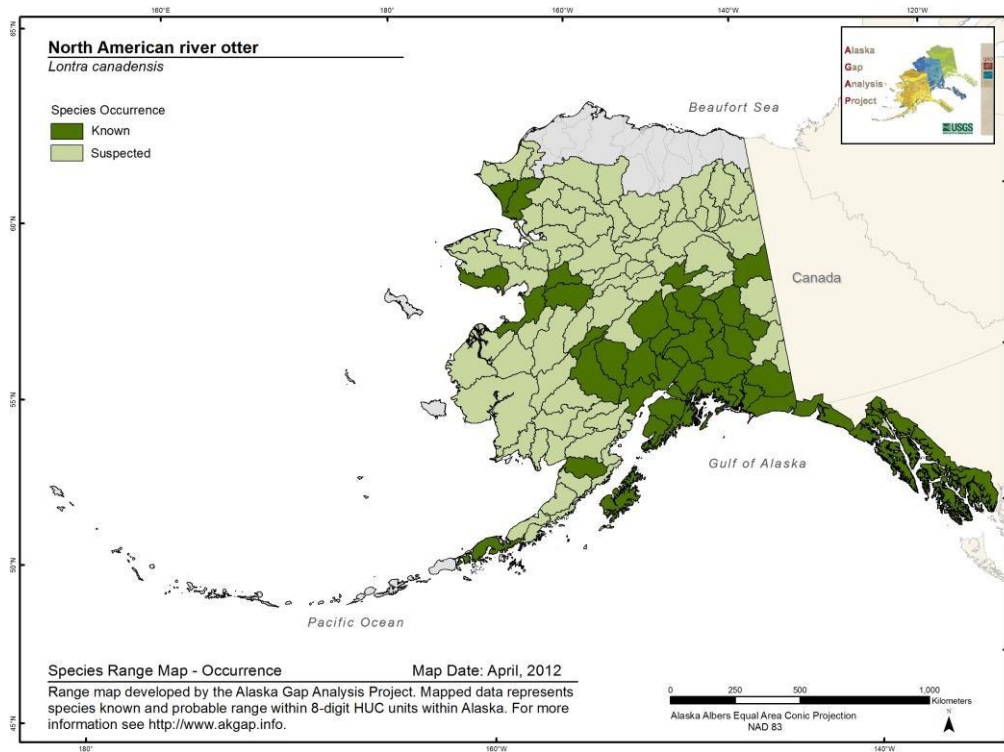
Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology 68:845-851.

Koehler, G. M. and J. D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. Journal of Forestry 88: 10.

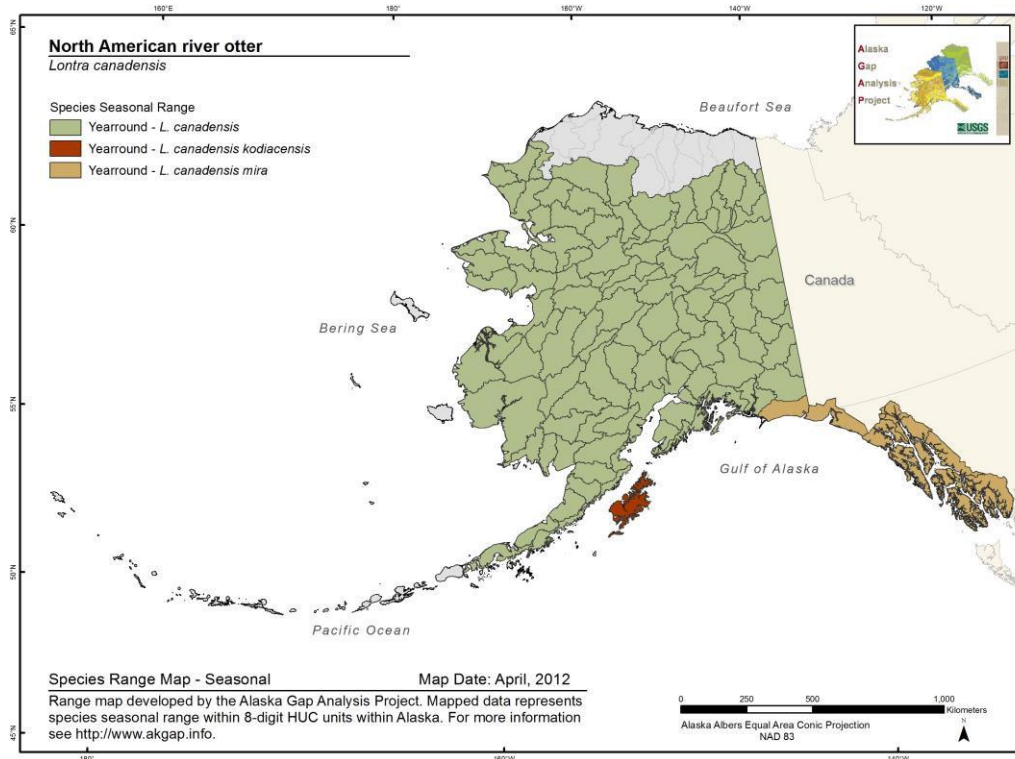
River Otter *Lontra canadensis*

Range Map and Distribution Model Summary

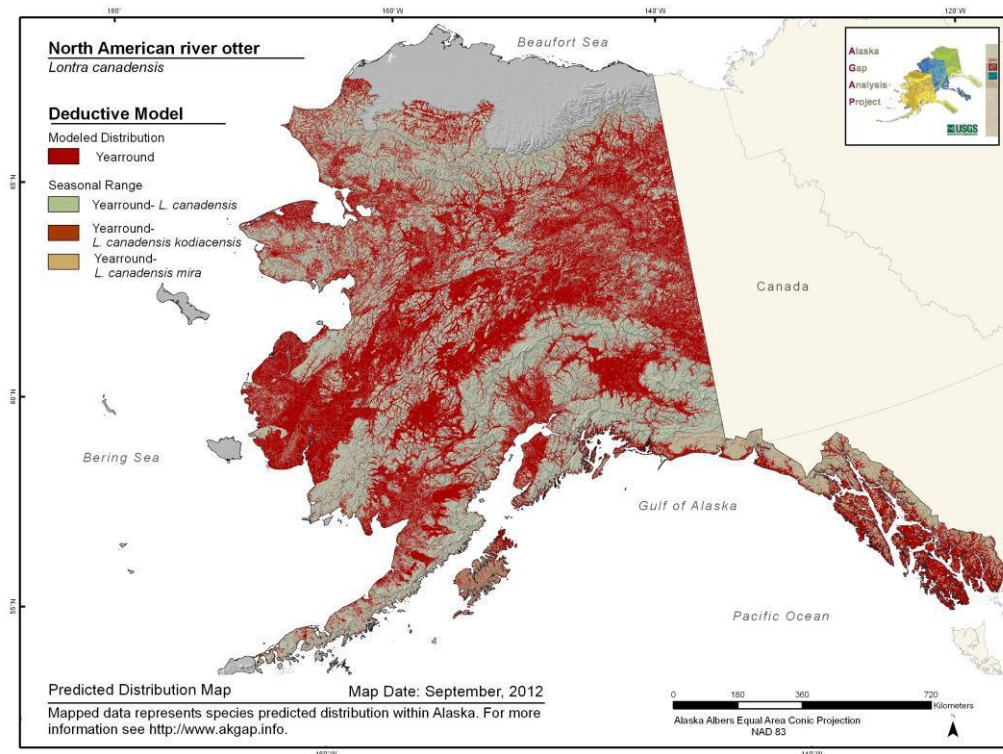
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.607**

Model Quality Summary:
Low

Habitat Description

Inhabits a wide variety of coastal marine and freshwater habitats, including streams, lakes, ponds, swamps, marshes, estuaries, beaver flowages, and exposed outer coast. In Southeast Alaska, river otters avoided clearcuts of 5 to 20 years old, and preferred beaches with convex shorelines, short intertidal lengths and bedrock substrate (Larsen 1983). The predominant vegetation types used in Southeast were uneven aged old-growth dominated by hemlock/spruce and hemlock (Woolington 1984). Activity is typically confined to within 100 ft of the shore, however females move inland to establish natal denning sites within 0.5 miles of the shore near small streams (Larsen 1983, Woolington 1984). In old growth habitats natal dens occurred on well-drained sites near streams, which were used as corridors for travel between the den site and foraging areas on the coastline (Reid et al. 1994).

References

Larsen, D.N. 1983. Habitats, movements, and foods of river otters in coastal southeastern Alaska. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 149 p.

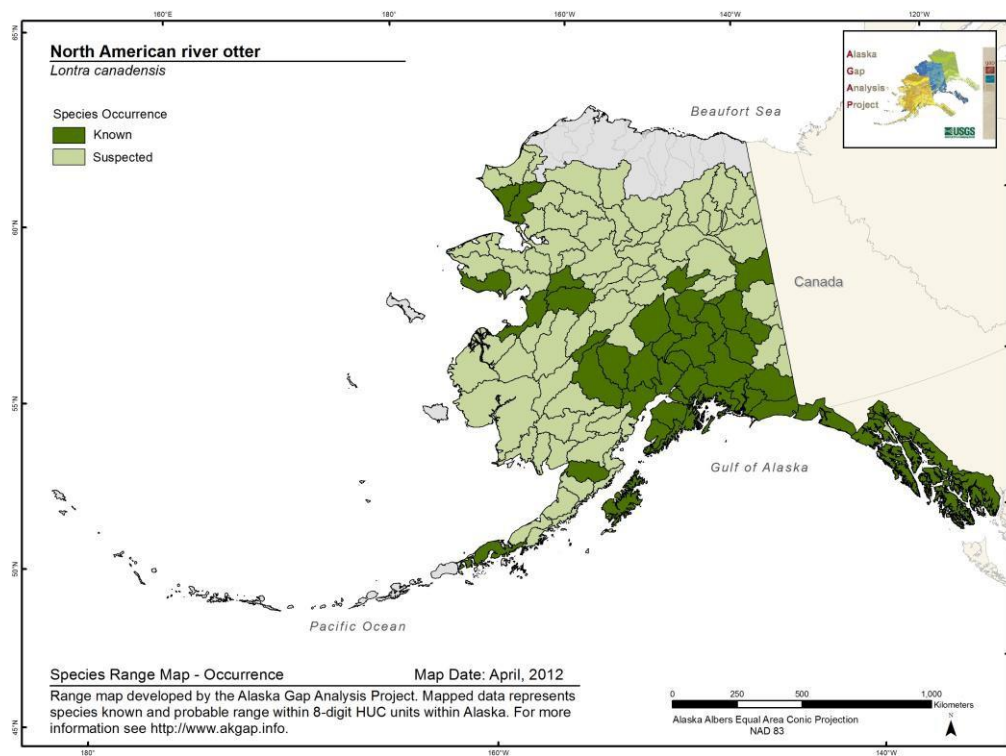
Reid, D.G., T.E. Code, A.C.H. Reid and S.M. Herrero. 1994. Spacing, movements, and habitat selection of the river otter in boreal Alberta. *Can. J. Zool.* 72(7):1314-1324.

Woolington, J.D. 1984. Habitat use and movements of river otters at Kelp Bay, Baranof Island, Alaska. M.S. thesis, University of Alaska, Fairbanks. 147 pp.

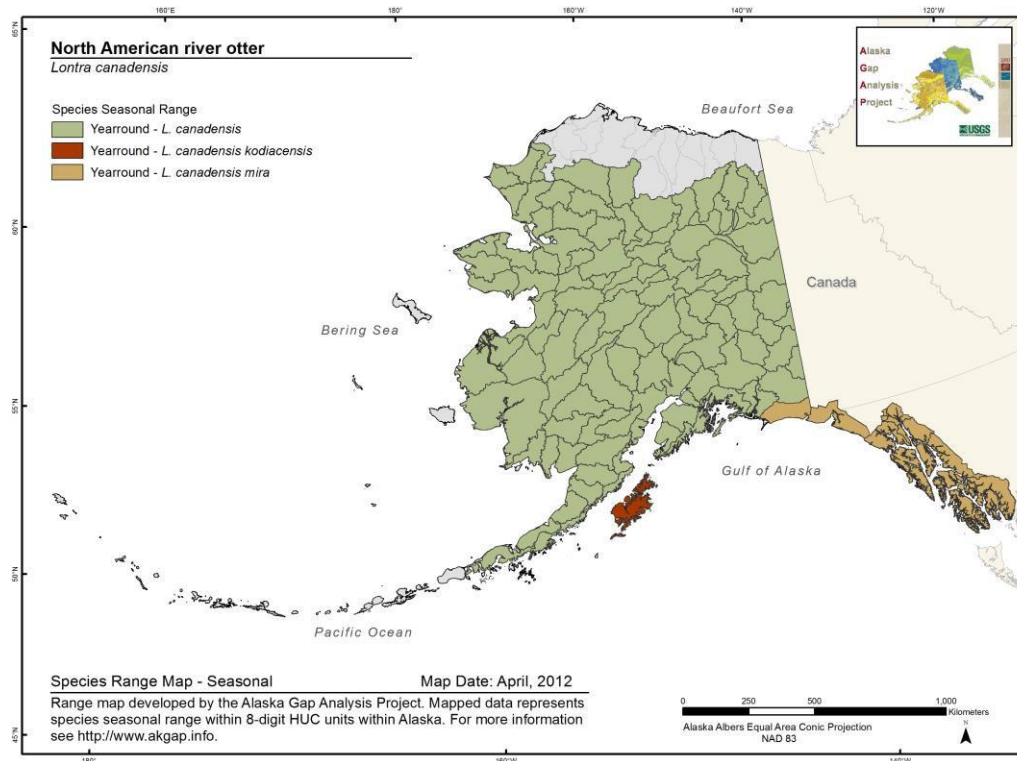
Kodiak River Otter *Lontra canadensis kodiacensis*

Range Map and Distribution Model Summary

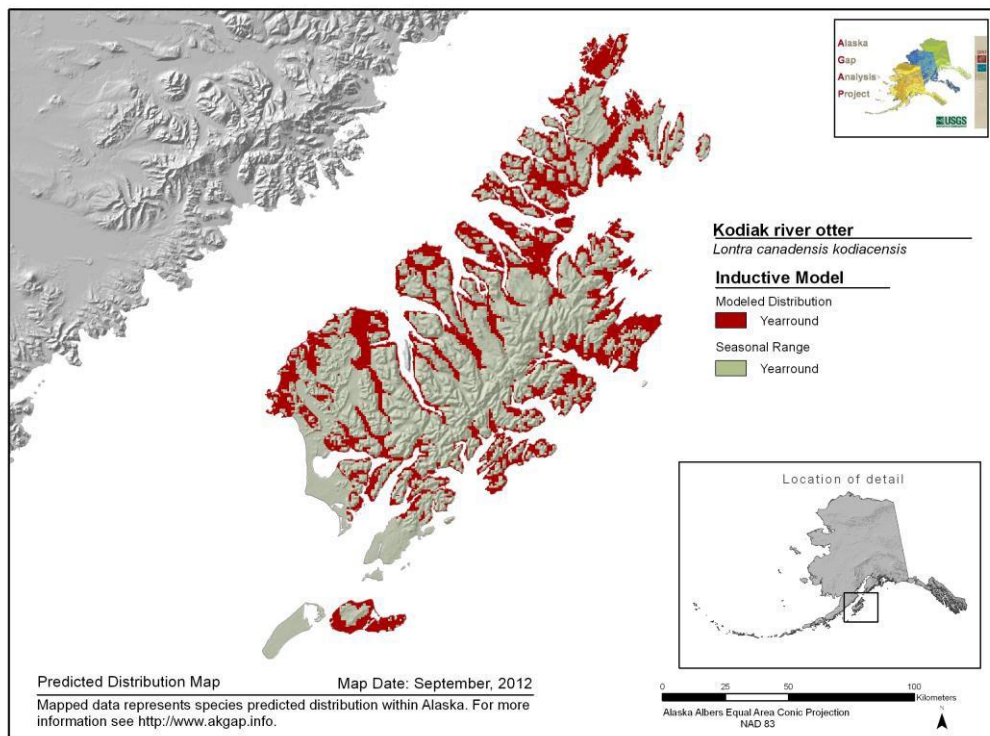
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Coastal river otter utilize beach fringe or freshwater lake and stream riparian habitats (Home 1982, Larsen 1983, Woolington 1984). Coastal river otters such as *L. c. kodiacensis*, utilize a narrow zone of timbered habitat adjacent to the coast, moving inland only occasionally (Kruuk and Hewson 1978, Larsen 1983, Woolington 1984). In Southeast Alaska, river otters avoided clearcuts of 5 to 20 years old, and preferred beaches with convex shorelines, short intertidal lengths and bedrock substrate (Larsen 1983). The predominant vegetation types used in Southeast were uneven aged old-growth dominated by hemlock/spruce and hemlock (Woolington 1984). Activity is typically confined to within 100 ft of the shore, however females move inland to establish natal denning sites within 0.5 miles of the shore near small streams (Larsen 1983, Woolington 1984). In old growth habitats natal dens occurred on well-drained sites near streams, which were used as corridors for travel between the den site and foraging areas on the coastline (Reid et al. 1994).

References

- Home, W.S. 1982. Ecology of river otters (*LUTRA CANADENSIS*) in marine coastal environments. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 323 p.
- Kruuk, H. and R. Hewson. 1978. Spacing and foraging of otters (*Lutra lutra*) in a marine habitat. *J. Zool., London*. 185:20-212.
- Larsen, D.N. 1983. Habitats, movements, and foods of river otters in coastal southeastern Alaska. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 149 p.
- Reid, D.G., T.E. Code, A.C.H. Reid and S.M. Herrero. 1994. Spacing, movements, and habitat selection of the river otter in boreal Alberta. *Can. J. Zool.* 72(7):1314-1324.

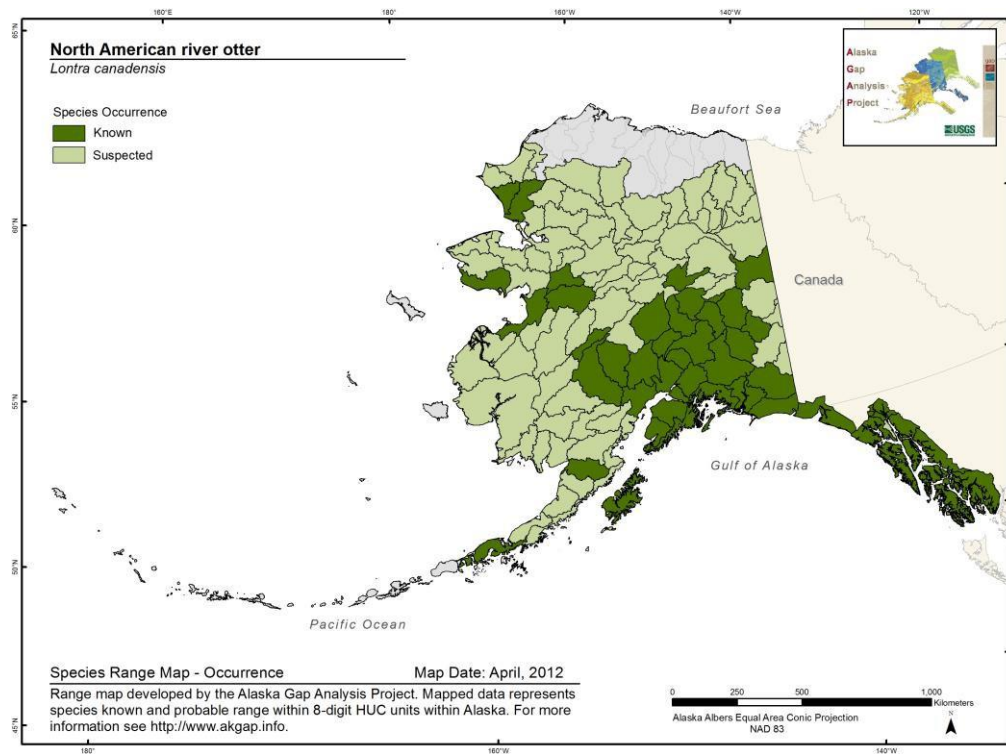
Woolington, J.D. 1984. Habitat use and movements of river otters at Kelp Bay, Baranof Island, Alaska. M.S. thesis, University of Alaska, Fairbanks. 147 pp.

Prince of Wales River Otter

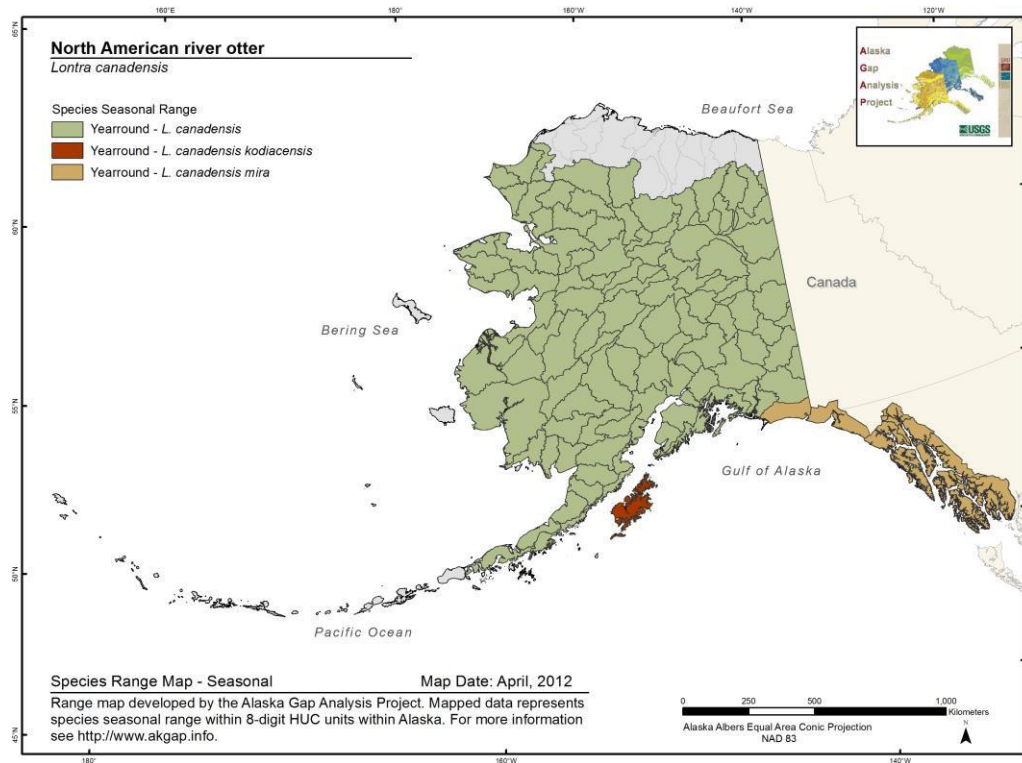
Lontra canadensis mira

Range Map and Distribution Model Summary

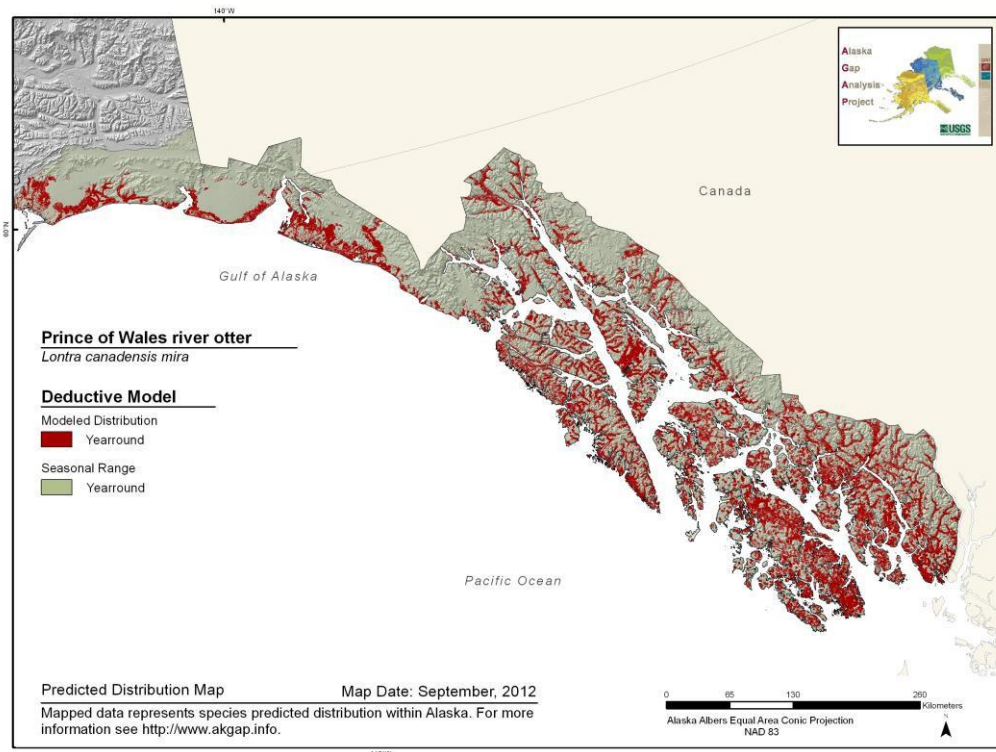
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Coastal river otter utilize beach fringe or freshwater lake and stream riparian habitats (Home 1982, Larsen 1983, Woolington 1984). In Southeast Alaska, river otters avoided clearcuts of 5 to 20 years old, and preferred beaches with convex shorelines, short intertidal lengths and bedrock substrate (Larsen 1983). The predominant vegetation types used in Southeast were uneven aged old-growth dominated by hemlock/spruce and hemlock (Woolington 1984). Activity is typically confined to within 100 ft of the shore, however females move inland to establish natal denning sites within 0.5 miles of the shore near small streams (Larsen 1983, Woolington 1984). In old growth habitats natal dens occurred on well-drained sites near streams, which were used as corridors for travel between the den site and foraging areas on the coastline (Reid et al. 1994).

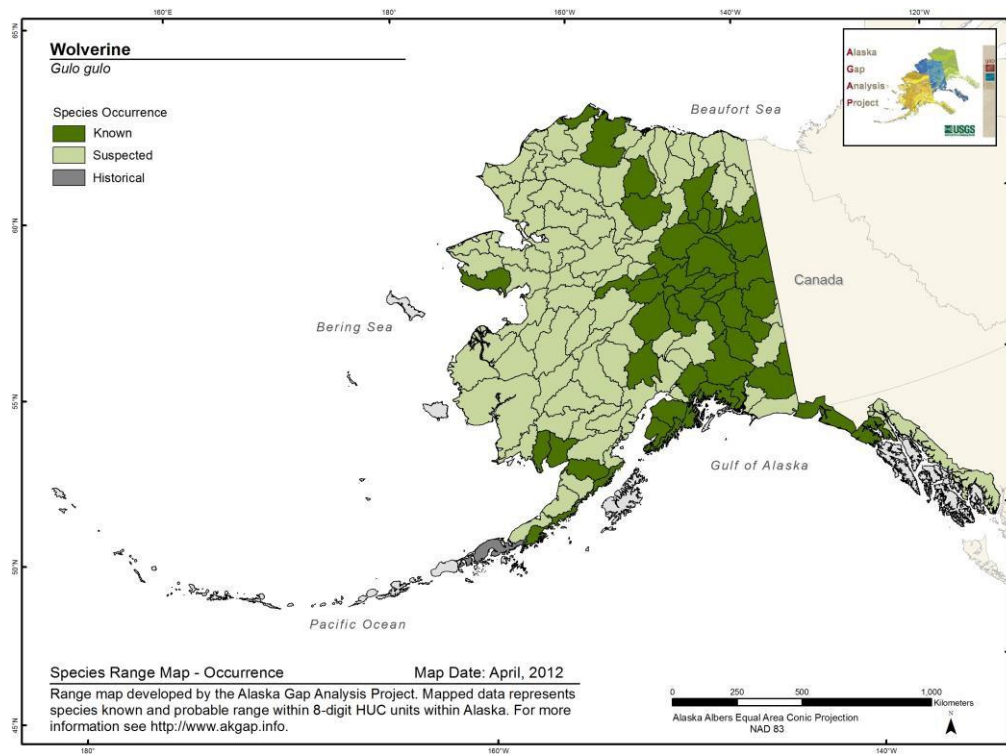
References

- Home, W.S. 1982. Ecology of river otters (LUTRA CANADENSIS) in marine coastal environments. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 323 p.
- Larsen, D.N. 1983. Habitats, movements, and foods of river otters in coastal southeastern Alaska. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 149 p.
- Reid, D.G., T.E. Code, A.C.H. Reid and S.M. Herrero. 1994. Spacing, movements, and habitat selection of the river otter in boreal Alberta. Can. J. Zool. 72(7):1314-1324.
- Woolington, J.D. 1984. Habitat use and movements of river otters at Kelp Bay, Baranof Island, Alaska. M.S. thesis, University of Alaska, Fairbanks. 147 pp.

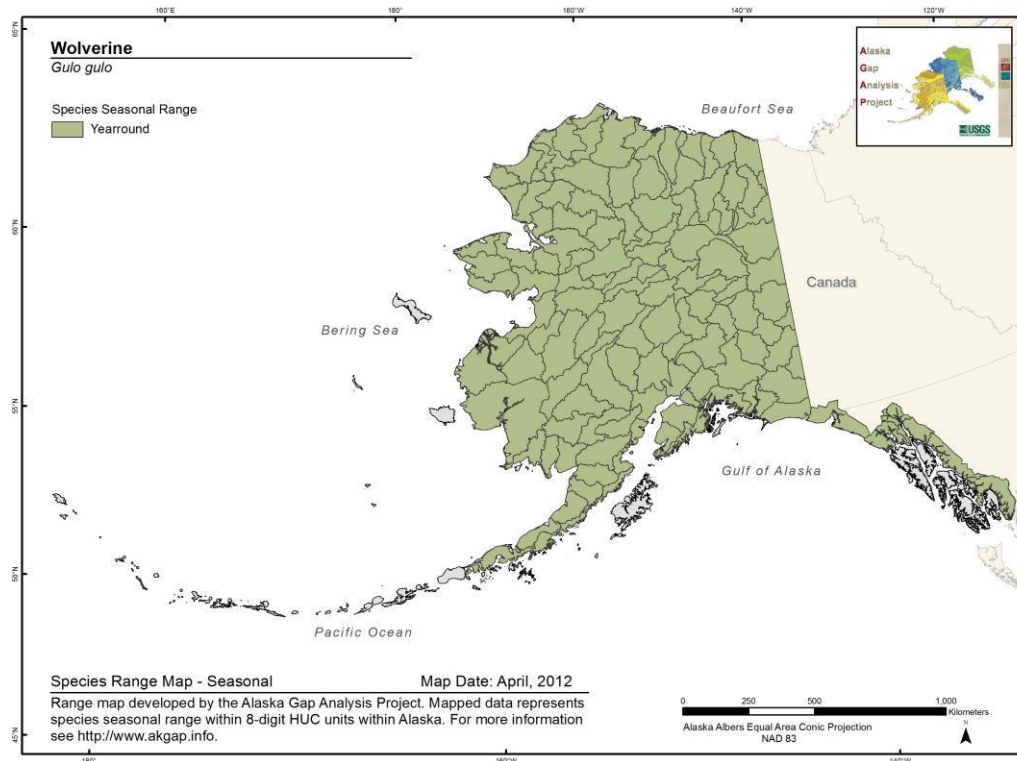
Wolverine *Gulo gulo*

Range Map and Distribution Model Summary

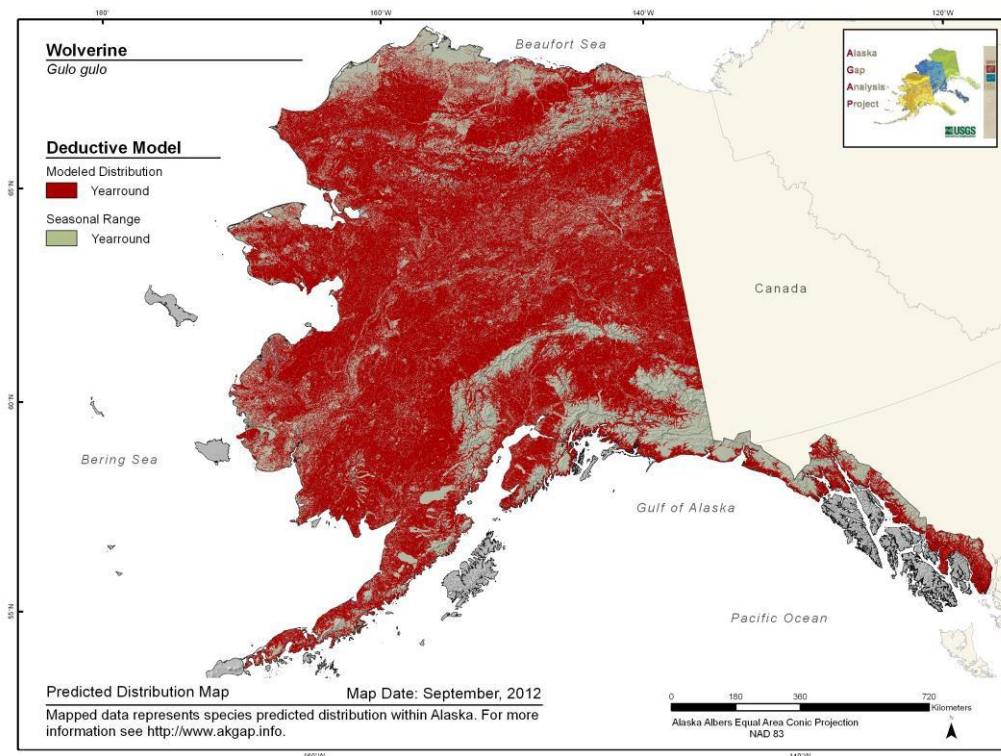
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.512**

**Model Quality
Summary:**
Low

Habitat Description

Occur in a variety of habitats including alpine and arctic tundra, boreal and mountain forests (primarily coniferous) from sea level to tops of mountains (Banci and Harestad 1990, Gardner 1985, Gardner et al. 1986, Magoun 1985, Whitman et al. 1986, NatureServe 2007b). In winter, usually in areas with snow. May also use riparian areas in winter. Dens are usually long, complex snow tunnels (Magoun and Copeland 1998). In southern Alaska, wolverines are found above and below treeline in forests dominated by white spruce (*Picea glauca*) and black spruce (*P. mariana*). Above treeline, plant associates included diamondleaf willow (*Salix pulchra*), rough fescue (*Festuca altaica*), white arctic mountain heather (*Cassiope tetragona*), black crowberry (*Empetrum nigrum*), mountain cranberry (*Vaccinium vitis-idaea*), alpine azalea (*Loiseleuria procumbens*), pincushion plant (*Diapensia lapponica*), eightpetal mountain-avens (*Dryas octopetala*), bog birch (*Betula glandulosa*), and lichens (Skoog 1968). In another study from southern Alaska, white spruce-black spruce habitats were primarily used December to April. Use of tundra habitats peaked in May and September to November. Use of riparian brush habitats peaked from June to August, with limited use during the rest of the year. Upland brush habitats were utilized year round with peaks during July and December. Rock outcrops were used throughout the year with a peak in August (Whitman and Ballard 1984). In south-central Alaska, forested, birch-willow-alder (*Betula* spp.-*Salix* spp.-*Alnus* spp.), and rock-ice habitat types are used in the winter and tundra, birch-willow-alder, and rock-ice habitat types are utilized in the summer (Whitman et al. 1986).

References

- Banci, V. and A. S. Harestad. 1990. Home range and habitat use of wolverines *Gulo gulo* in Yukon, Canada. *Holarctic Ecology* 13:195-200.
- Gardner, C. L. 1985. The ecology of wolverines in southcentral Alaska. Unpublished thesis, University of Alaska Fairbanks.

Gardner, C. L., W. B. Ballard, and R. H. Jessup. 1986. Long distance movement by an adult wolverine. *Journal of Mammalogy* 67:603.

Magoun, A. J. 1985. Population characteristics, ecology and management of wolverine in Northwestern Alaska. Unpublished thesis. University of Alaska Fairbanks.

Magoun, A.J. and J.P. Copeland. 1998. Characteristics of wolverine reproductive sites. *J. Wildl. Manage.* 62:1313-1320.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Skoog, R. O. 1968. Ecology of the caribou (*Rangifer tarandus granti*) in Alaska. Berkeley, CA: University of California, Berkeley. 699 p. Dissertation.

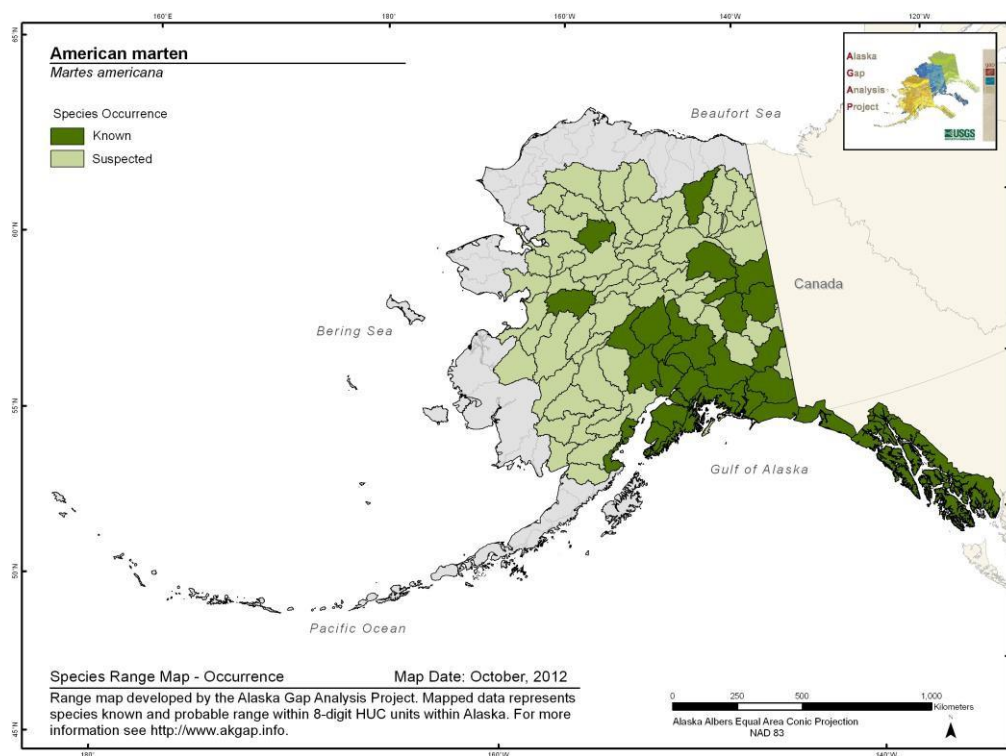
Whitman, J. S. and W. B. Ballard. 1984. Big game studies. Volume 7. Wolverine. Susitna Hydroelectric Project--Final Report. [Anchorage, AK]: ADF&G. 25 p.

Whitman, J. S., W. B. Ballard, and C. L. Gardner. 1986. Home range and habitat use by wolverines in southcentral Alaska. *The Journal of Wildlife Management* 50: 460-463.

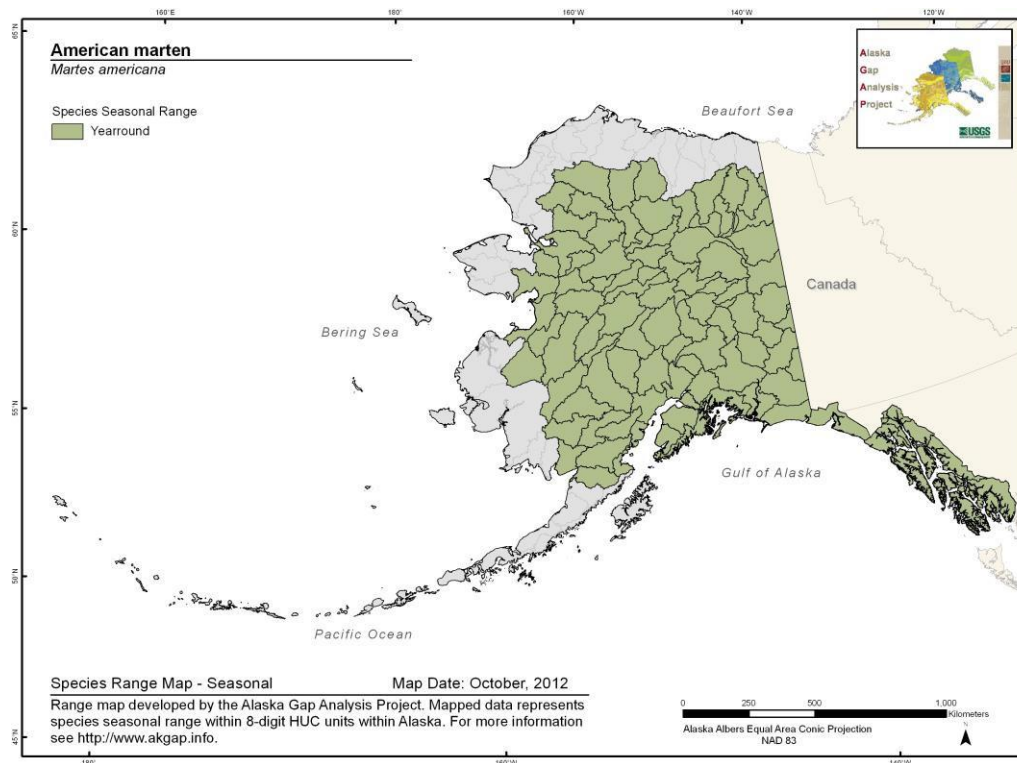
American Marten *Martes americana*

Range Map and Distribution Model Summary

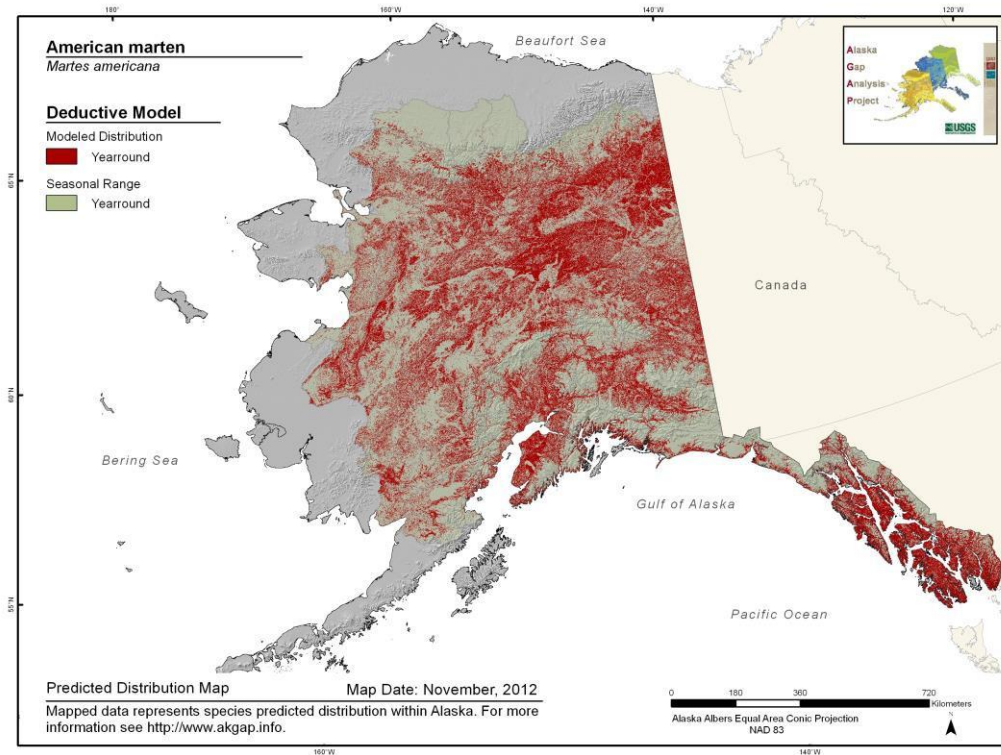
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.592**

**Model Quality
Summary:**
Low

Habitat Description

Adapted to a variety of forested habitats (Strickland et al. 1982). Prefer mature old-growth or dense spruce communities with well-established understory and ground cover to support prey (Buskirk 1983, Buskirk and MacDonald 1984, Clark et al. 1987, Flynn and Blundell 1992, Lensink et al. 1955, Schoen et al. 2007). Cover requirements for American martens include dense conifer or mixed forests with 40 to 60 percent canopy closure. They will avoid areas that are so dense that herbaceous cover is suppressed (Koehler et al. 1975). Dense understory, including slash or rotten logs and stumps, is necessary for denning and hiding (Spencer 1987). Mesic sites that support dense, succulent understory vegetation for American marten prey species are considered the best habitat (Koehler et al. 1975). American martens inhabit high elevation basins in spruce (*Picea* spp.)-subalpine fir (*Abies lasiocarpa*) or mountain hemlock (*Tsuga mertensiana*) forests in the West. Mature lodgepole pine (*Pinus contorta*) stands that include spruce or subalpine fir will also support American marten. Although American martens are usually found at high elevations, they will use forests at lower elevations with high precipitation, such as cedar (*Thuja* spp.)-grand fir (*Abies grandis*, Koehler et al. 1975). May also use rocky alpine areas. Open areas adjacent to these forests will be used for hunting only if they provide adequate hiding cover and food. Uneven-aged stands are most beneficial because their vegetation is more diverse which leads to a greater food base (Koehler et al. 1975, Koehler and Hornocker 1977, Allen 1984).

References

Allen, A. W. 1984. Habitat suitability index models: marten. FWS/OBS-82/10.11 (Revised). Washington, DC: USDI, USFWS. 13 p.

Buskirk, S. 1983. The ecology of marten in southcentral Alaska. Unpublished dissertation, University of Alaska Fairbanks.

Buskirk, S. W. and S. O. MacDonald. 1984. Seasonal food habits of marten in south-central Alaska. *Canadian Journal of Zoology* 62: 944-950.

Clark, T. W., E. Anderson, C. Douglas, and M. Strickland. 1987. *Martes americana*. *Mammalian Species* 289: 1-8.

Flynn, R. W. and G. Blundell. 1992. Ecology of martens in southeast Alaska. ADF&G, Federal Aid in Wildlife Restoration Research Progress Report. Project W-23-5, Study 7.16, December.

Koehler, G. M. and M. G. Hornocker. 1977. Fire effects on marten habitat in the Selway-Bitterroot Wilderness. *Journal of Wildlife Management*. 41(2): 500-505.

Koehler, G. M., W. R. Moore, and A. R. Taylor. 1975. Preserving the pine martin: management guidelines for western forests. Western Wildlands Summer 1975. Missoula, MT: University of Montana, Montana Forest and Conservation Experiment Station. 6 p.

Lensink, C. J., R. O. Skoog, and J. L. Buckley. 1955. Food habits of marten in interior Alaska and their significance. *Journal of Wildlife Management* 19: 364-368.

Schoen, J. W., R. Flynn, and B. Clark. 2007. Marten (*Martes americana*). In *The coastal forests and mountains ecoregion of southeastern Alaska and the Tongass National Forest: A conservation assessment and resource synthesis* (J. W. Schoen and E. Dovichin, eds.). Audubon Alaska and The Nature Conservancy, Anchorage, Alaska.

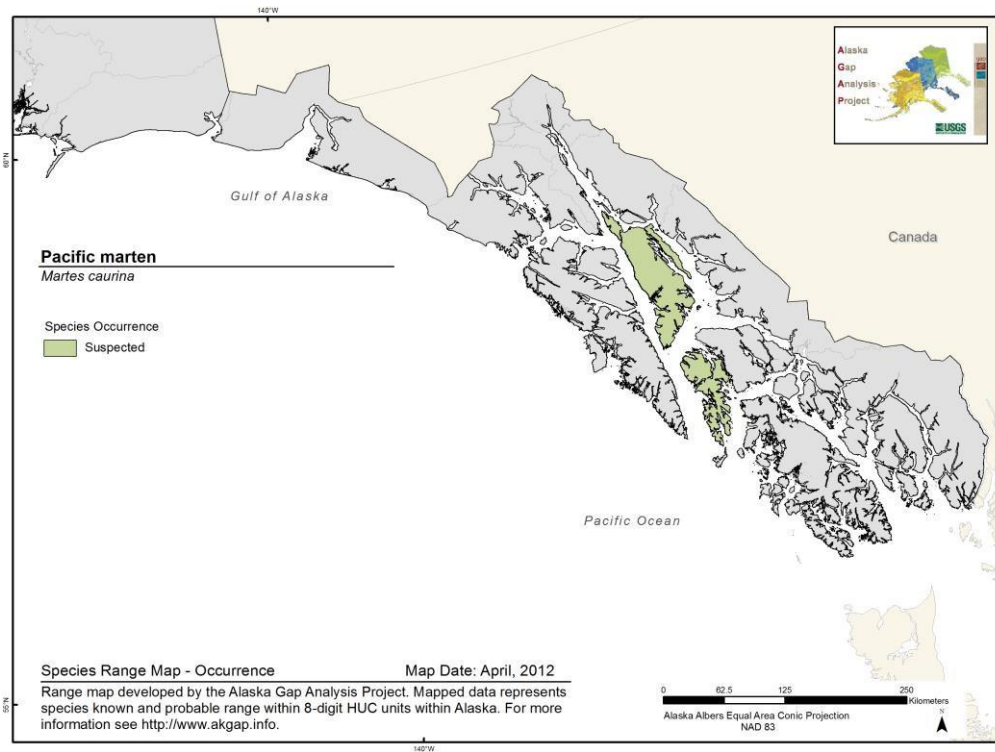
Spencer, W. D. 1987. Seasonal rest-site preferences of pine martens in the northern Sierra Nevada. *Journal of Wildlife Management*. 51(3): 616-621.

Strickland, M. A., C. W. Douglas, M. Novak, and N. P. Hunziger. 1982. Marten (*Martes americana*). Pp. 599-612, in *Wild mammals of North America* (J. A. Chapman and G. A. Feldhamer, eds.). The Johns Hopkins University Press, Baltimore.

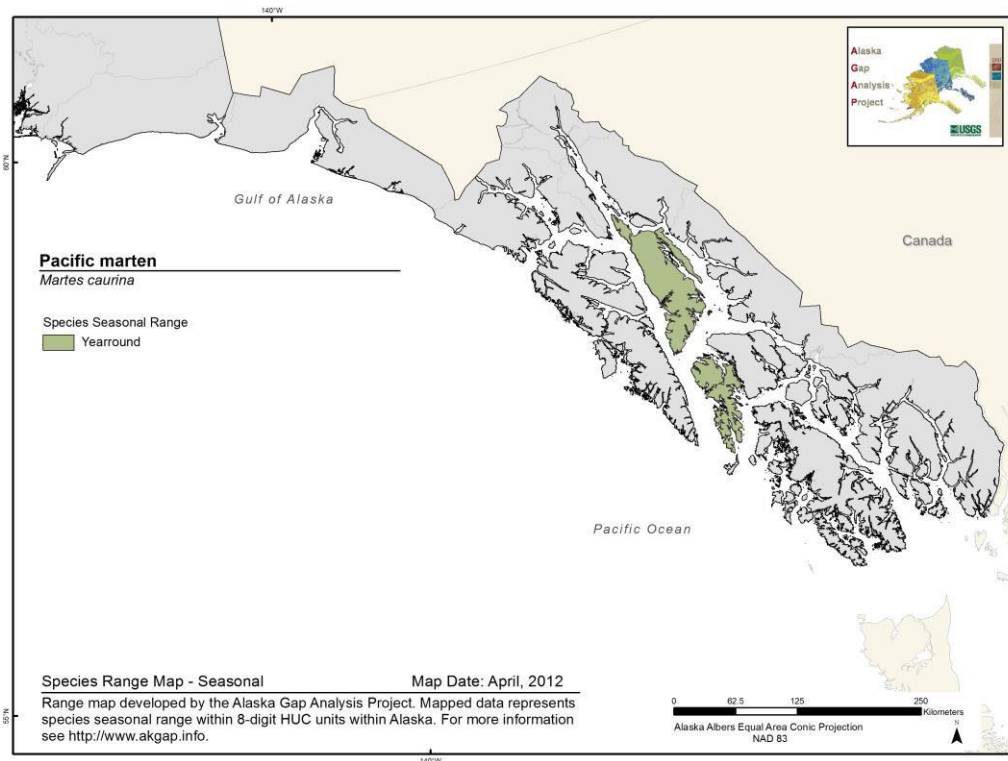
Pacific Marten *Martes caurina*

Range Map and Distribution Model Summary

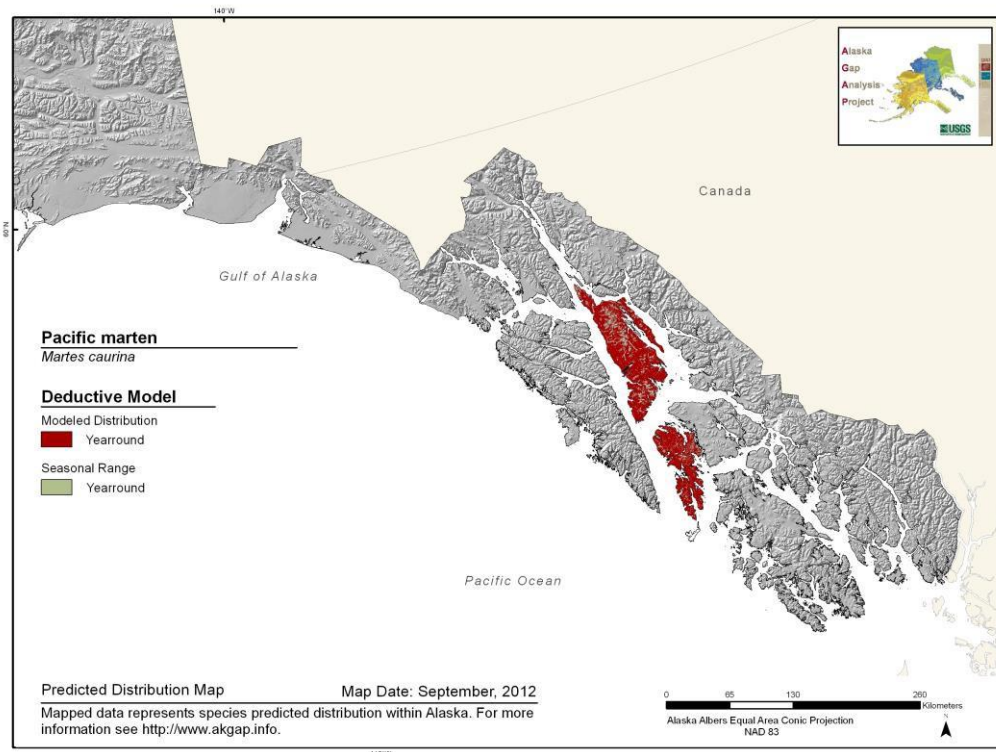
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Adapted to a variety of forested habitats (Strickland et al. 1982). Prefer mature old-growth or dense spruce communities with well-established understory and ground cover to support prey (Buskirk 1983, Buskirk and MacDonald 1984, Clark et al. 1987, Flynn and Blundell 1992, Lensink et al. 1955, Schoen et al. 2007). May also use rocky alpine areas.

References

Buskirk, S. 1983. The ecology of marten in southcentral Alaska. Unpublished dissertation, University of Alaska Fairbanks.

Buskirk, S. W. and S. O. MacDonald. 1984. Seasonal food habits of marten in south-central Alaska. Canadian Journal of Zoology 62: 944-950.

Clark, T. W., E. Anderson, C. Douglas, and M. Strickland. 1987. *Martes americana*. Mammalian Species 289: 1-8.

Flynn, R. W. and G. Blundell. 1992. Ecology of martens in southeast Alaska. ADF&G, Federal Aid in Wildlife Restoration Research Progress Report. Project W-23-5, Study 7.16, December.

Lensink, C. J., R. O. Skoog, and J. L. Buckley. 1955. Food habits of marten in interior Alaska and their significance. Journal of Wildlife Management 19: 364-368.

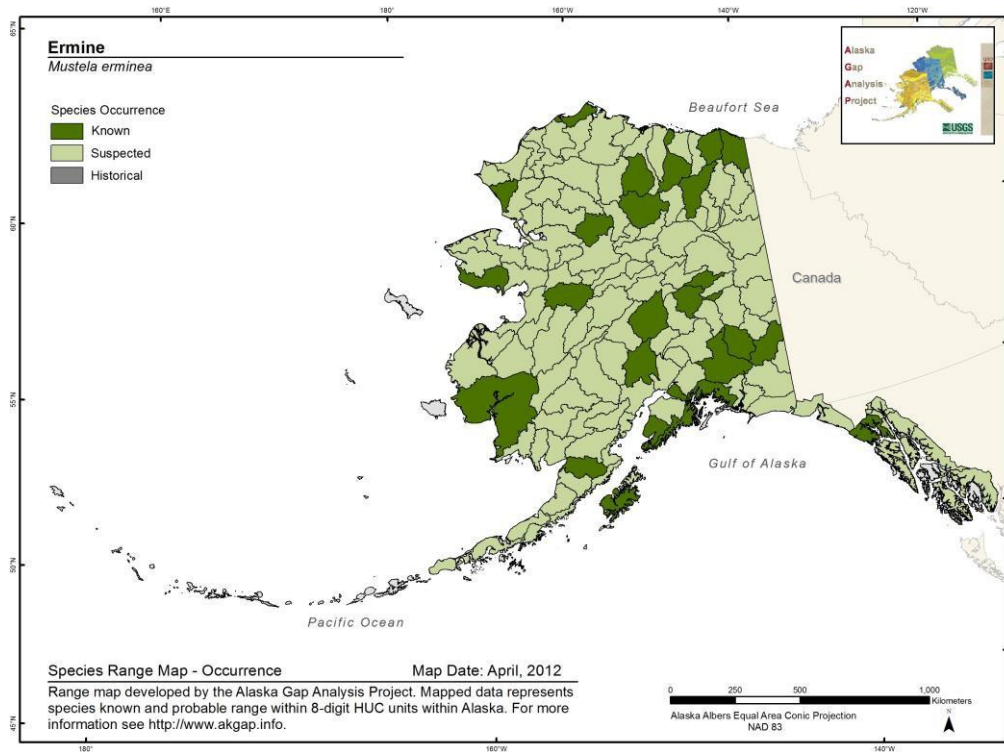
Schoen, J. W., R. Flynn, and B. Clark. 2007. Marten (*Martes americana*). In The coastal forests and mountains ecoregion of southeastern Alaska and the Tongass National Forest: A conservation assessment and resource synthesis (J. W. Schoen and E. Dovichin, eds.). Audubon Alaska and The Nature Conservancy, Anchorage, Alaska.

Strickland, M. A., C. W. Douglas, M. Novak, and N. P. Hunziger. 1982. Marten (*Martes americana*). Pp. 599-612, in *Wild mammals of North America* (J. A. Chapman and G. A. Feildhamer, eds.). The Johns Hopkins University Press, Baltimore.

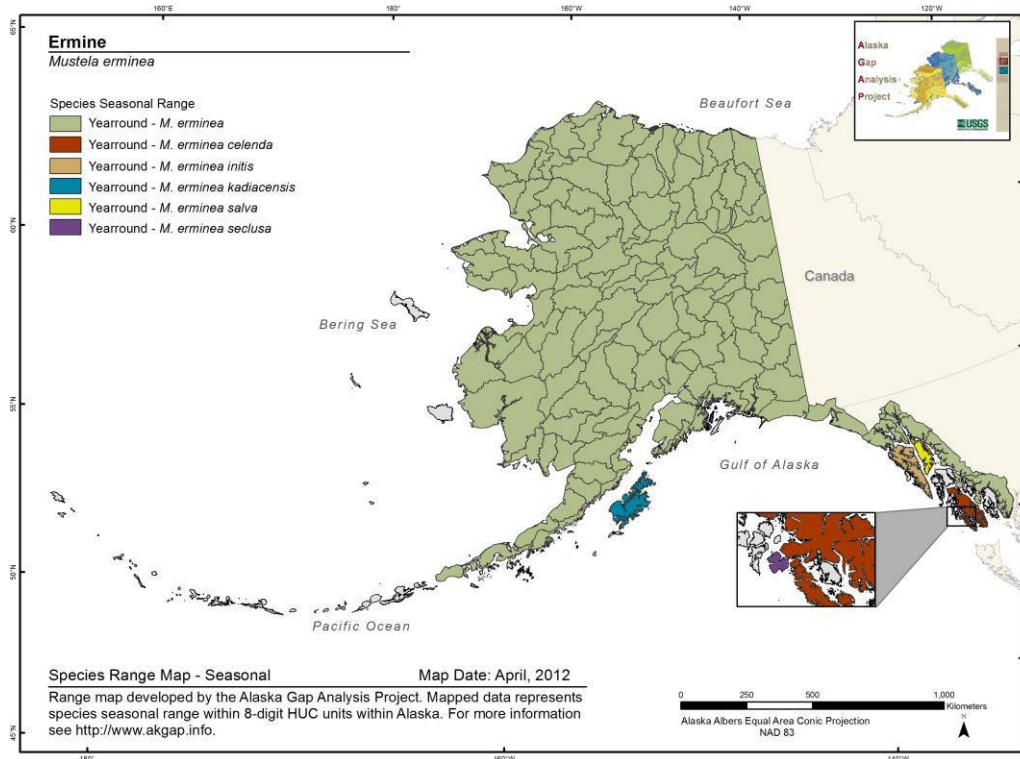
Ermine *Mustela erminea*

Range Map and Distribution Model Summary

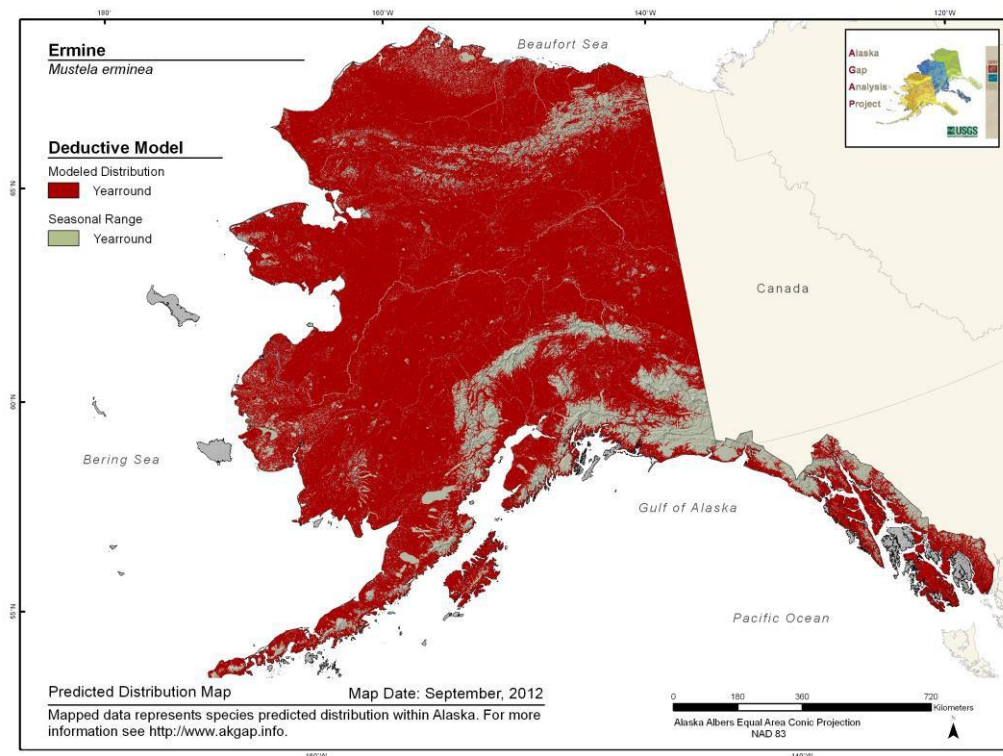
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.59**

**Model Quality
Summary:**
Low

Habitat Description

Adapted to a wide variety of habitats ranging from forest to tundra and from sea to above treeline. Favor early-successional or forest ecotonal boundaries near wet meadows, marshes, ditches, riparian woodlands, shrubby stream banks, lakeshores, and beaver ponds near rock talus, shrub thickets, stumps, and logs for cover (Simms 1979a, Simms 1979b, King 1983, MacDonald and Cook 2009). Also prefers wooded areas with thick understory near watercourses (Simms 1979a, Simms 1979b, King 1983). Coastal ermine may exhibit a preference for low elevation riparian and marine shoreline and estuarine habitats (Reid et al. 2000). Well-adapted to snowy environments and range into alpine areas (Fagerstone 1987) and also successfully inhabit tundra habitats throughout northern Canada and Alaska.

References

Fagerstone, K.A. 1987. Black-footed ferret, long-tailed weasel, short-tailed weasel, and least weasel. Pp. 548-573 in: Novak, M., J.A. Baker, M.E. Obbard, and B. Malloch (Eds.). Wild furbearer management and conservation in North America. Ontario Ministry of Natural Resources, Ottawa, ONT. 1150 pp.

King, C.M. 1983. *Mustela erminea*. Am. Soc. Mamm., Mammalian Species No. 195. 8 pp.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

Reid, D.G., L. Waterhouse, P.E.F. Buck, A.E. Derocher, R. Bettner, C.D. French, and C. Husband. 1999. Status and management of ermine on the Queen Charlotte Islands, British Columbia. Forest Research Extension Note EN-001, Vancouver Forest Region, BCMOF, Nanaimo, B.C.

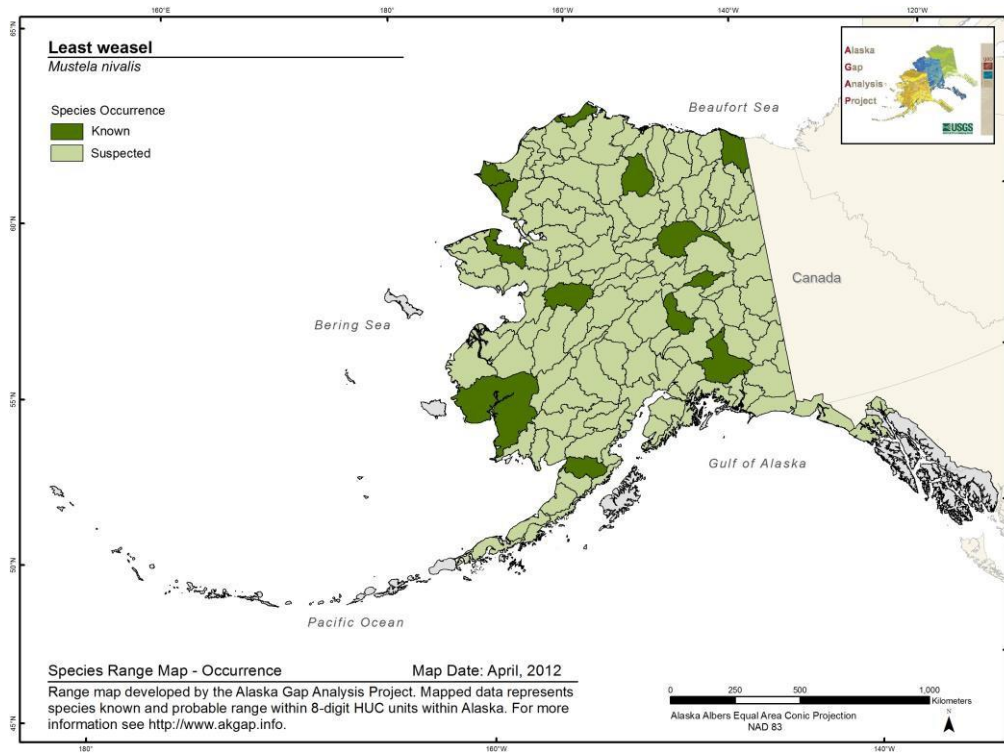
Simms, D.A. 1979a. Studies of an ermine population in southern Ontario. Can. J. Zool. 57:824-832.

Simms, D.A. 1979b. North American weasels: resource utilization and distribution. *Canadian Journal of Zoology* 57:504-520.

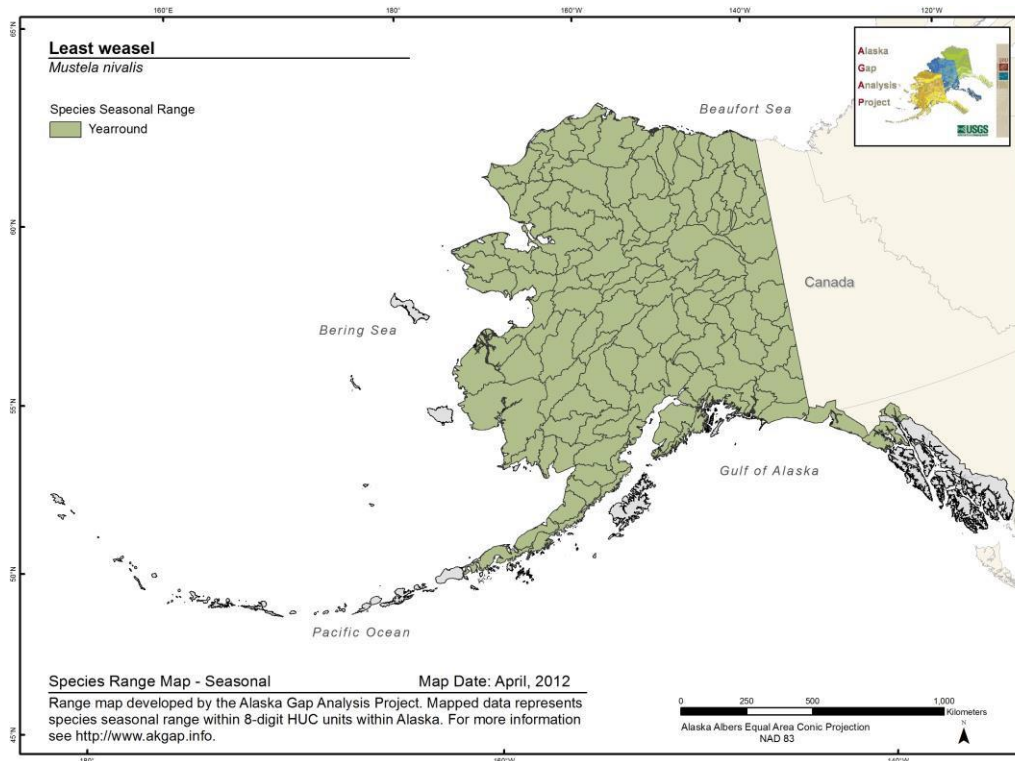
Least Weasel *Mustela nivalis*

Range Map and Distribution Model Summary

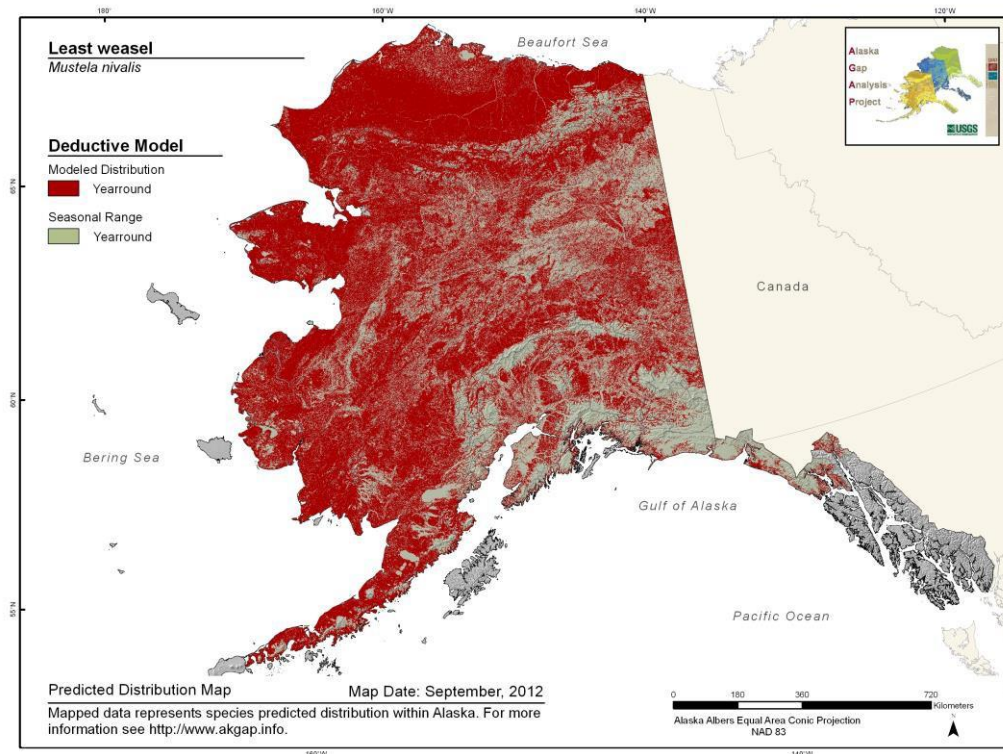
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.545**

**Model Quality
Summary:**
Low

Habitat Description

Occur in a wide variety of forest and tundra habitats, but favors meadows, marshes, and riparian areas (MacDonald and Cook 2009). May occupy open forests, cultivated areas, alpine and grassy meadows, scrub, steppe and semi-deserts, coastal dunes. Snow cover is not an obstacle. Avoids dense forests and sandy deserts (NatureServe 2007b).

References

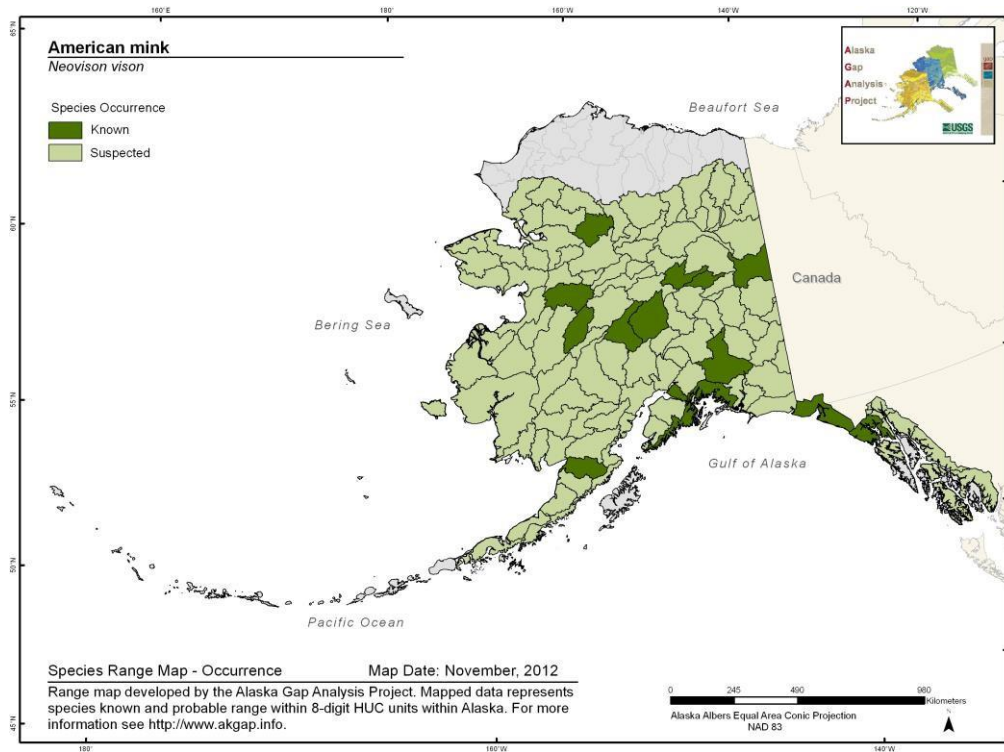
MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

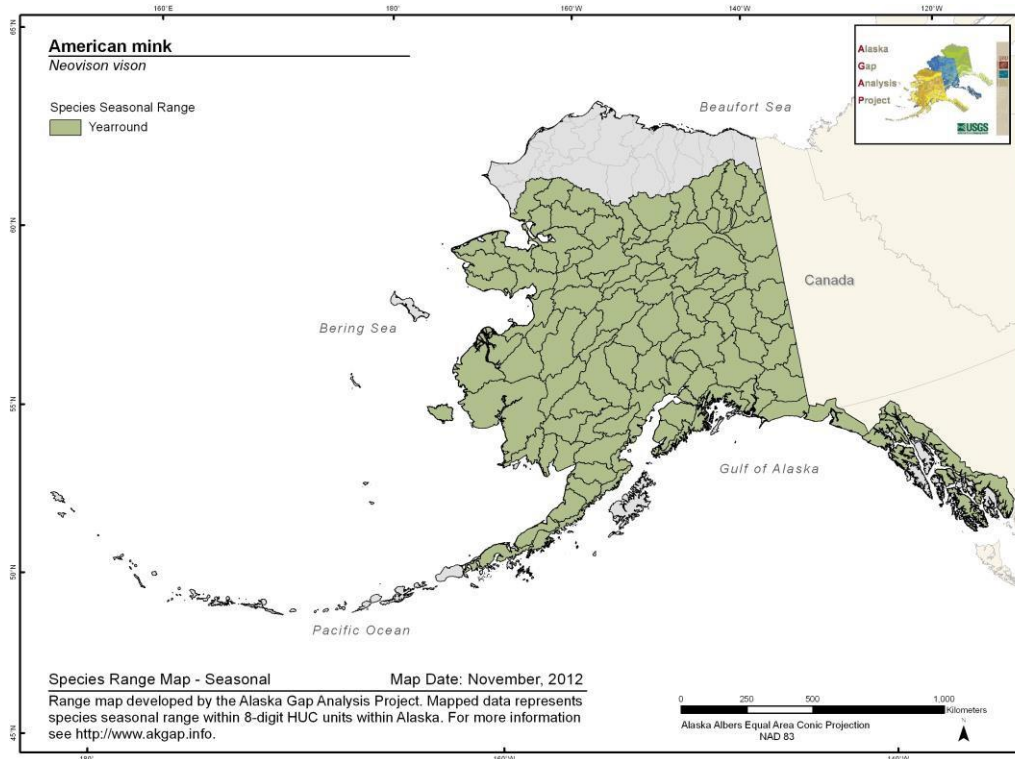
American Mink *Neovison vison*

Range Map and Distribution Model Summary

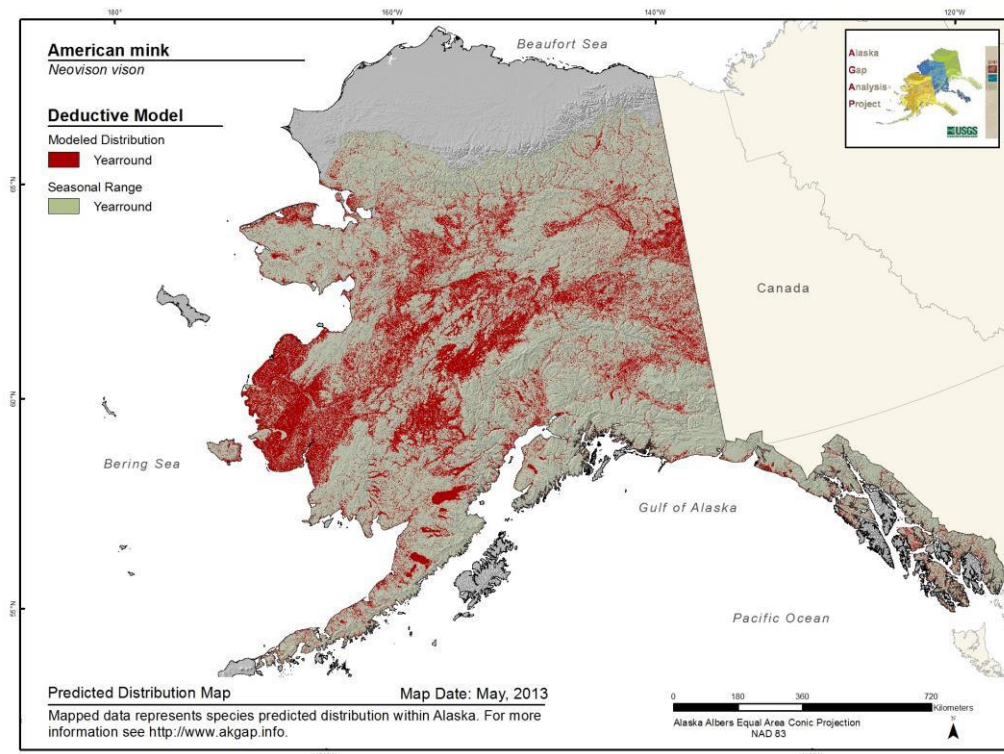
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.573**

**Model Quality
Summary:**
Low

Habitat Description

Found in close association with coastal marine and freshwater ecosystems, preferring saltwater beaches and riparian habitats of lakeshores, marshes, and stream banks (Banfield 1974, Lariviere 1999). Habitats associated with small streams are preferred to habitats near large, broad rivers (Allen 1986). In Quebec the majority of American mink activity takes place less than 4.8 km from water (Burgess 1978), in Michigan within 30.4 m of the water's edge (Marshall 1936), in Minnesota all den sites were within 69.9 m of open water (Schladweiler and Storm 1969), and in Idaho den sites were 5-100 m from water, and American mink were never observed more than 200 m from water (Melquist et al. 1981). American mink favor forested wetlands with abundant cover such as shrub thickets, fallen trees, and rocks (DeGraaf and Rudis 1986). Wetlands with irregular, diverse shorelines are better American mink habitat than those with straight, open, or exposed shorelines. In upland habitats, ecotones are most used (Allen 1986). In southeastern Alaska mink spend the summers along streams and in upland muskegs; they spend the winter in a narrow ocean beach zone (Meehan 1974). In Alaska the highest American mink densities occurred in low swampy terrain and in extensively interconnected waterways with abundant fish (Burns 1964).

References

- Allen, A. W. 1986. Habitat suitability index models: mink. Biol. Rep. 82 (10.127). Washington, DC: USDI, USFWS. 23 p.
- Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.
- Burgess, S. A. 1978. Aspects of mink ecology in the southern Laurentians of Quebec. Montreal, PQ: McGill University. 87 p. Thesis.
- Burns, J. J. 1964. The ecology, economics and management of mink in the Yukon-Kuskokwim Delta, Alaska. Fairbanks, AK: University of Alaska. 114 p. Thesis.

DeGraaf, R. M. and D. D. Rudis. 1986. New England wildlife: habitat, natural history, and distribution. Gen. Tech. Rep. NE-108. Broomall, PA: USDA,USFS, Northeastern Forest Experiment Station. 491 p.

Lariviere, S. 1999. *Mustela vison*. Mammalian Species (608):1-9.

Marshall, W. H. 1936. A study of the winter activities of the mink. Journal of Mammalogy. 17(4): 382-392.

Meehan, W. R. 1974. The forest ecosystem of southeast Alaska: 4. Wildlife habitats. Gen. Tech. Rep. PNW-16. Portland, OR: USDA, USFS, Pacific Northwest Forest and Range Experiment Station. 32 p.

Melquist, W. E., J. S. Whitman, and M. G. Hornocker. 1981. Resource partitioning and coexistence of sympatric mink and river otter populations. In: J. A. Chapman and D. Pursley, eds. Worldwide furbearer conference: Proceedings; 1980 August 3-11; Frostburg, MD. Volume I. [Place of publication unknown]: [Publisher unknown]: 187-220.

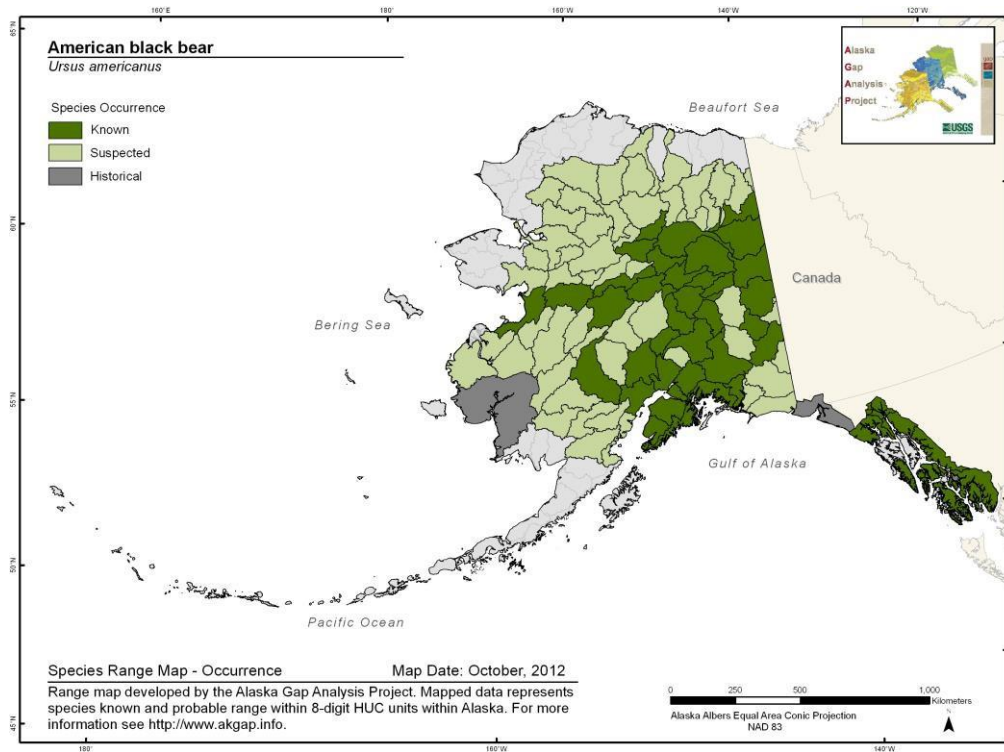
Schladweiler, J. S. and G. L. Storm. 1969. Den-use by mink. Journal of Wildlife Management. 33(4): 1025-1026.

American Black Bear

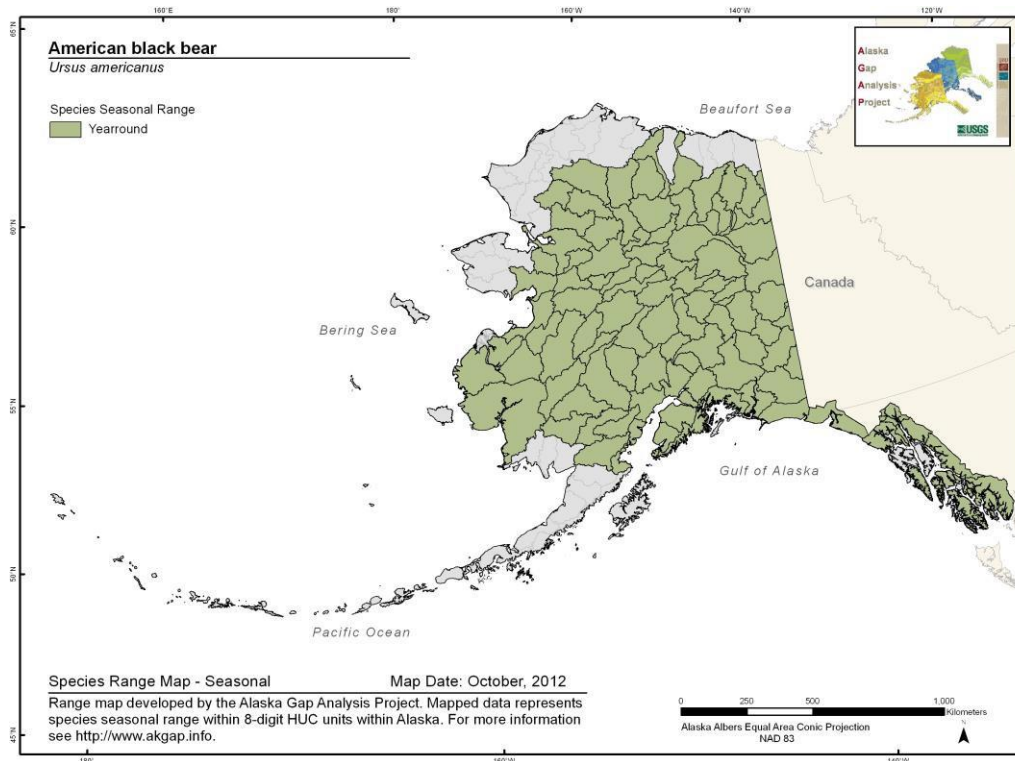
Ursus americanus

Range Map and Distribution Model Summary

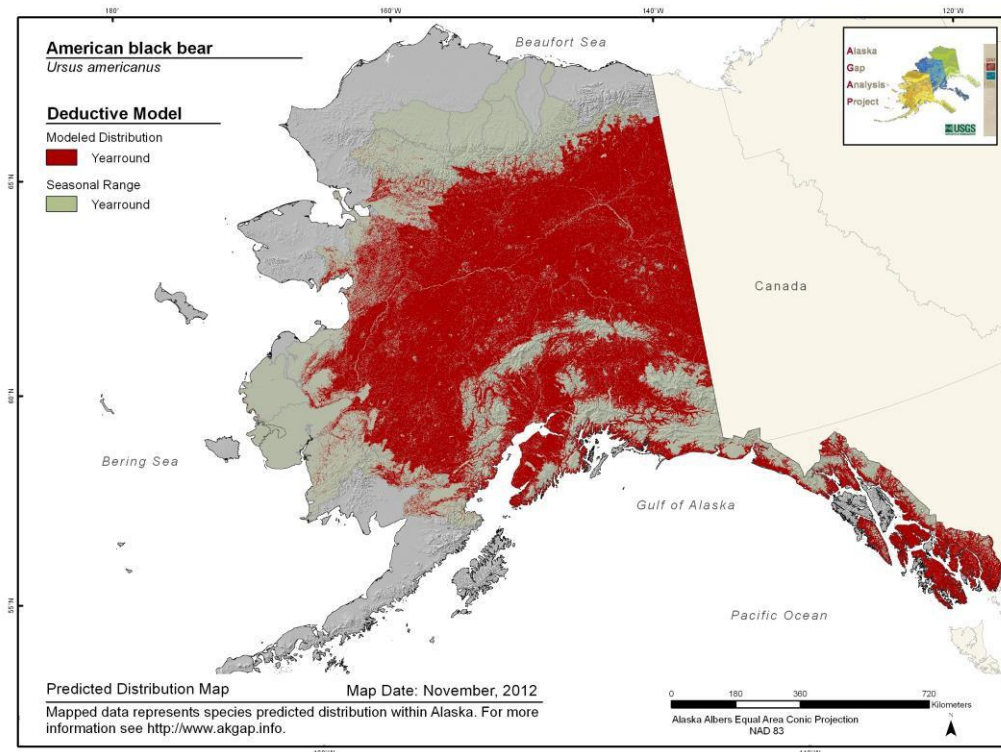
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

Model Evaluation Statistic (AUC): 0.614

Model Quality Summary:
Low

Habitat Description

The American black bear requires a mosaic of vegetation associations rather than one plant community, so habitat diversity is important. Generally inhabits forested habitats from sea level to alpine areas. Prefer semi-open areas with fruit-bearing shrubs and herbs, lush grasses, and succulent forbs. Extensive open areas are avoided (ADF&G 1973, Lariviere 2001). In general, meadows are preferred for foraging on grasses and forbs during spring. Riparian habitat, avalanche chutes, and early-successional habitat created by logging or fire are preferred for foraging during summer, and mature forest containing hard mast is preferred during fall. For denning and cover, mature or old-growth forest containing coarse woody debris, snags, and adequate cover are typically preferred (ULEV 2007). In the Yukon-Tanana uplands of interior Alaska, preferred spring forage areas with riverbottoms containing brush ≥ 2.5 feet (0.8 m) tall and paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), and black cottonwood (*P. balsamifera* ssp. *Trichocarpa*). Riverbottoms contained new green leaves and abundant horsetail (*Equisetum* spp.), which composed 86% of their spring diet. During summer, American black bears preferred foraging for bog blueberries (*Vaccinium uliginosum*) in "old" burns (age not given) dominated by willow (*Salix* spp.), alder (*Alnus* spp.), and dwarf birch (*B. nana*; Hatler 1972). On the Kenai Peninsula, American black bears denned in 2 major vegetation types: "regrowth" boreal upland forest (67% of dens, "regrowth" not defined) and "mature" boreal upland forest (31% of dens, "mature" not defined). At high elevations of the Kenai Peninsula and the Susitna River Basin, caves and excavated dens under large boulders and rockpiles were used most often because few trees attained large diameters. In virgin coastal rain forest at low elevations of the Kenai Peninsula, large-diameter western hemlock, white spruce (*Picea glauca*), and black spruce were preferred for denning. At low elevations in the Susitna River Basin, American black bears preferred denning in alder draws with spruce or paper birch. In Prince William Sound, excavated dens at low elevations were more prone to flooding at low altitudes and were not used as often as tree dens or rock caves (Schwartz et al. 1987). In southeastern Alaska, American black bears preferred den sites located in windstorm-protected forest (58%) over windstorm-prone forest (6%). In windstorm-protected forest, large, hollow trees (>35 inches (88 cm)) were least prone to wind damage. Density of large trees was twice that of the windstorm-prone forest and the forest was in later successional stages (DeGayner et al. 2005).

References

ADF&G. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 144 pp. + maps.

DeGayner, E. J., M. G. Kramer, J. G. Doerr, and M. J. Robertsen. 2005. Windstorm disturbance effects on forest structure and black bear dens in southeast Alaska. *Ecological Applications*. 15(4): 1306-1316.

Hatler, D. F. 1972. Food habits of black bears in interior Alaska. *The Canadian Field-Naturalist*. 86(1): 17-31.

Lariviere, S. 2001. *Ursus americanus*. *Mammalian Species* 647: 1-11.

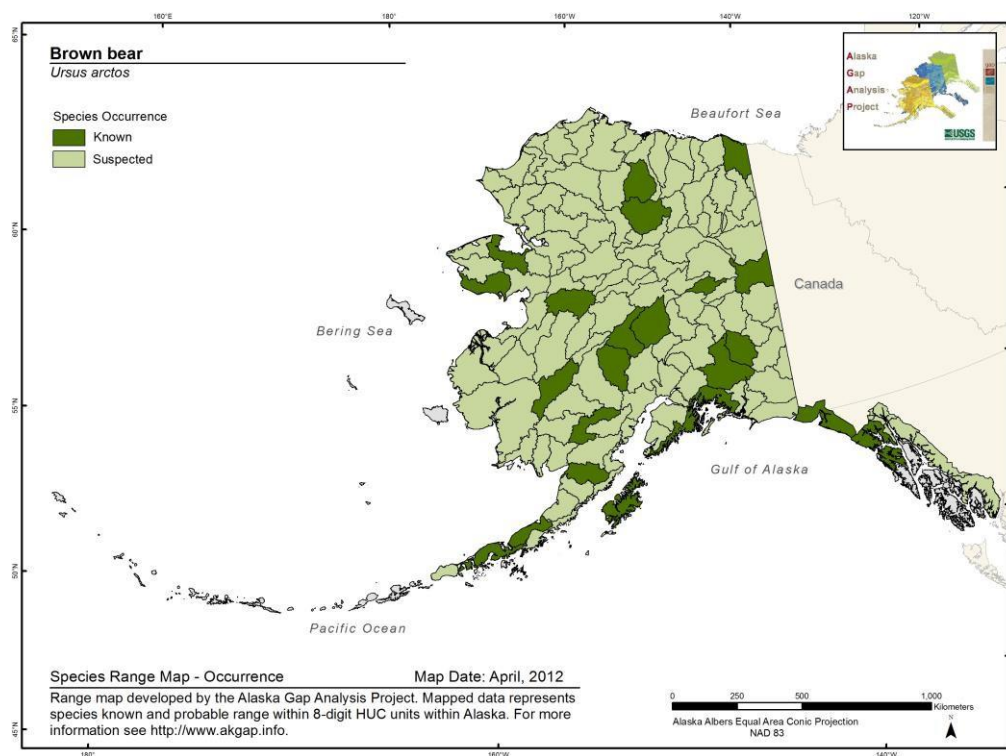
Schwartz, C. C., S. D. Miller, and A. W. Franzmann. 1987. Denning ecology of three black bear populations in Alaska. In: P. Zager, ed. *Bears-their biology and management: Proceedings, 7th international conference on bear research and management; 1986 February-March; Williamsburg, VA; Plitvice Lakes, Yugoslavia*. [Place of publication unknown]: International Association of Bear Research and Management: 281-291.

Ulev, E. 2007. *Ursus americanus*. In: *Fire Effects Information System*, [Online]. USDA, USFS, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2011, July 22].

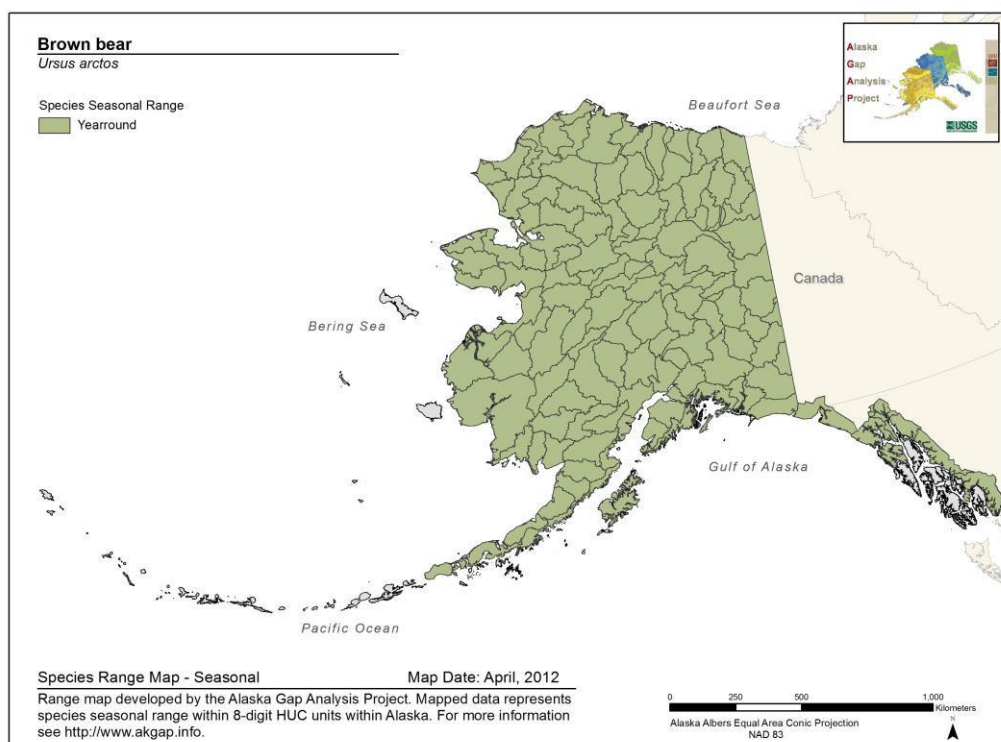
Brown Bear *Ursus arctos*

Range Map and Distribution Model Summary

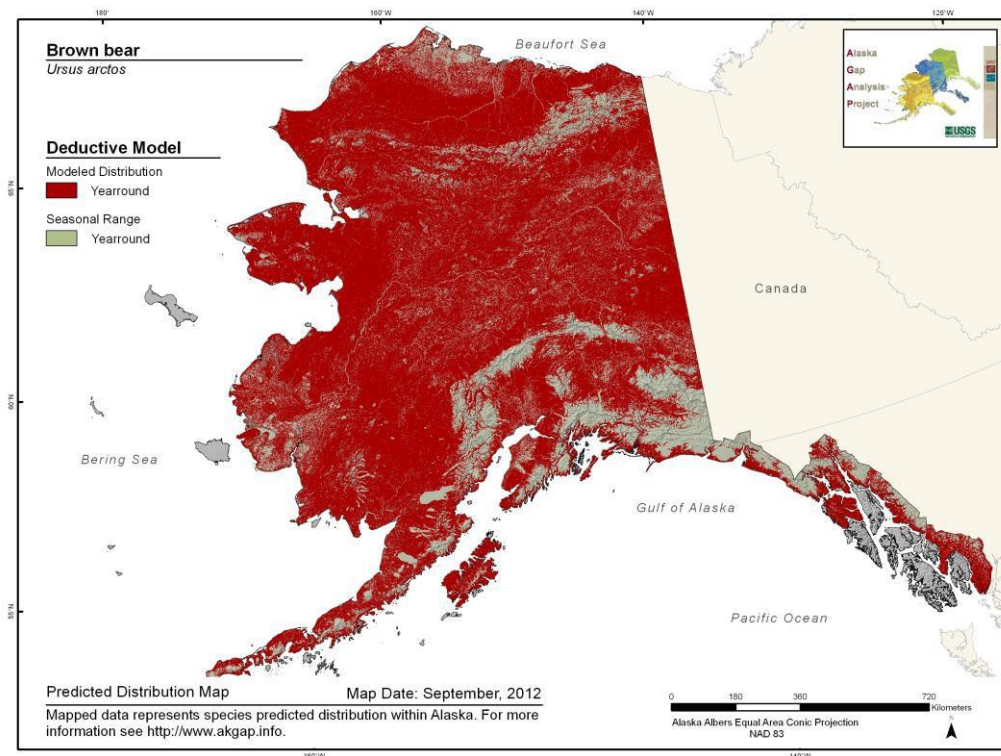
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.651**

**Model Quality
Summary:**
Low

Habitat Description

In Alaska, most common in open arctic, alpine tundra, grassland, and subalpine forests. Prefer open, shrub communities, alpine and low elevation meadows, riparian areas, seeps, alpine slabrock areas, and avalanche chutes (Willard and Herman 1977, Servheen 1983, Zager et al. 1983). In forests, typically occur near mountain meadows muskegs, sedge flats, and other grasslands (ADF&G 1973, Schoen and Gende 2007, NatureServe 2007b). Den sites are often on hillsides (MacDonald and Cook 2009). They typically choose low elevation riparian sites, wet meadows, and alluvial plains during spring (Willard and Herman 1977, Reichert 1989). During summer and fall grizzly bear more frequently use high elevation meadows, ridges, and open, grassy timbered sites (Servheen 1983, Reichert 1989).

References

ADF&G. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 144 pp. + maps.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Reichert, C. 1989. Silviculture in grizzly bear habitat. In: Silviculture for all resources: Proceedings of the national silviculture workshop; 1987 May 11-14; Sacramento, CA. Washington, DC: USDA, USFS: 48-60.

Schoen, J. W. and S. Gende. 2007. Brown bear (*Ursus arctos*). In the coastal forests and mountains ecoregion of southeastern Alaska and the Tongass National Forest: A conservation assessment and resource synthesis (J. W. Schoen and E. Dovichin, eds.). Audubon Alaska and The Nature Conservancy, Anchorage, Alaska.

Servheen, C. 1983. Grizzly bear food habits, movements, and habitat selection in the Mission Mountains, Montana. *Journal of Wildlife Management* 47(4): 1026-1035.

Willard, E. E. and M. Herman. 1977. Grizzly bear and its habitat. Final Report, Cooperative Agreement between USDA, USFS, Region 1 and University of Montana, Montana Forest and Conservation Experiment Station. 28 p.

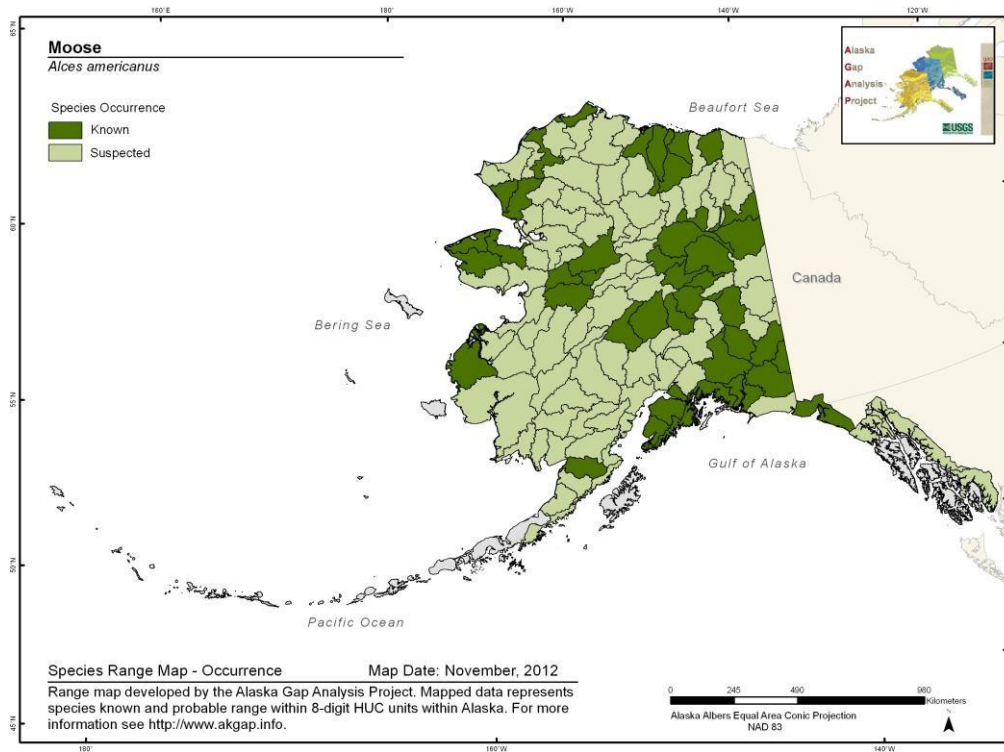
Zager, P., C. Jonkel, and J. Habeck. 1983. Logging and wildfire influence on grizzly bear habitat in northwestern Montana. In: E. C. Meslow, ed. 5th International conference on bear research and management; [Date of conference unknown]; Madison, WI. [Place of publication unknown]. International Association for Bear Research and Management: 124-132.

Moose

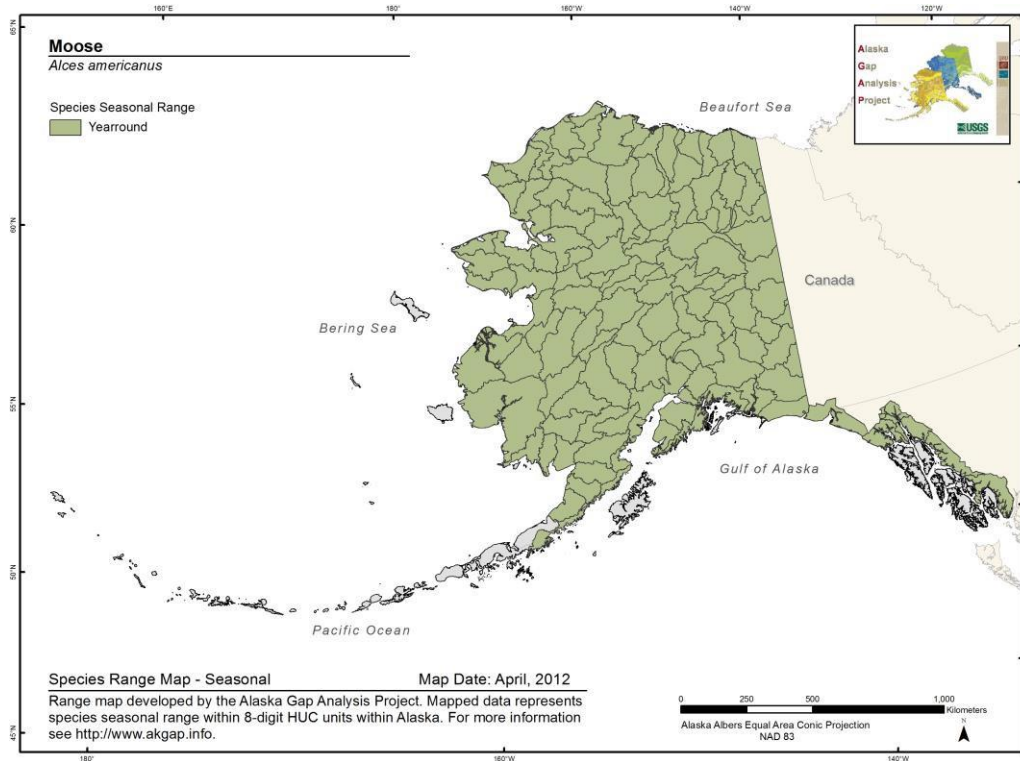
Alces americanus

Range Map and Distribution Model Summary

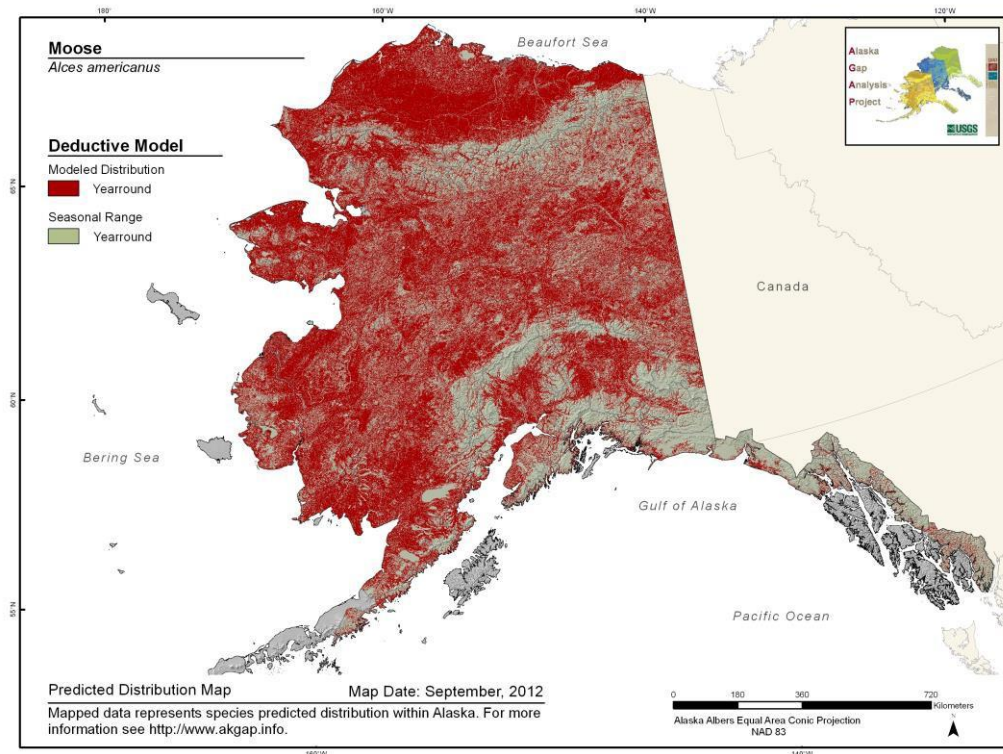
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.522**

**Model Quality
Summary:**
Low

Habitat Description

Associated with a wide variety of forest, shrub (particularly willow), and wetland habitats at various elevations. Forages on shrubs and early successional trees (poplar, birch) in forested areas. In Alaska, traditionally move between mountains and adjoining lowlands seasonally (ADF&G 1973, Franzmann 1981, Peterson 1955). Abundant in recently burned areas and naturally disturbed areas that have dense stands of willow, aspen, cottonwood, and birch. Often abundant along riparian corridors in patches of willow.

References

ADF&G. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 144 pp. + maps.

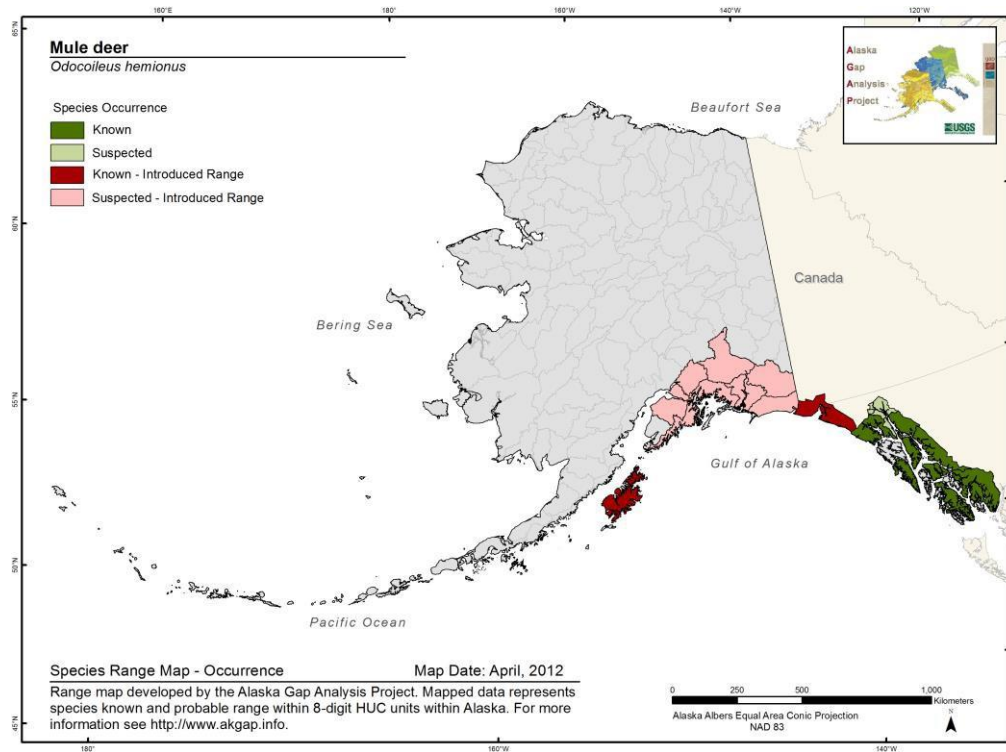
Franzmann, A. W. 1981. *Alces alces*. Mammalian Species 154:1-7.

Peterson, R.L. 1955. North American moose. Univ. Toronto Press, Toronto. 280 pp.

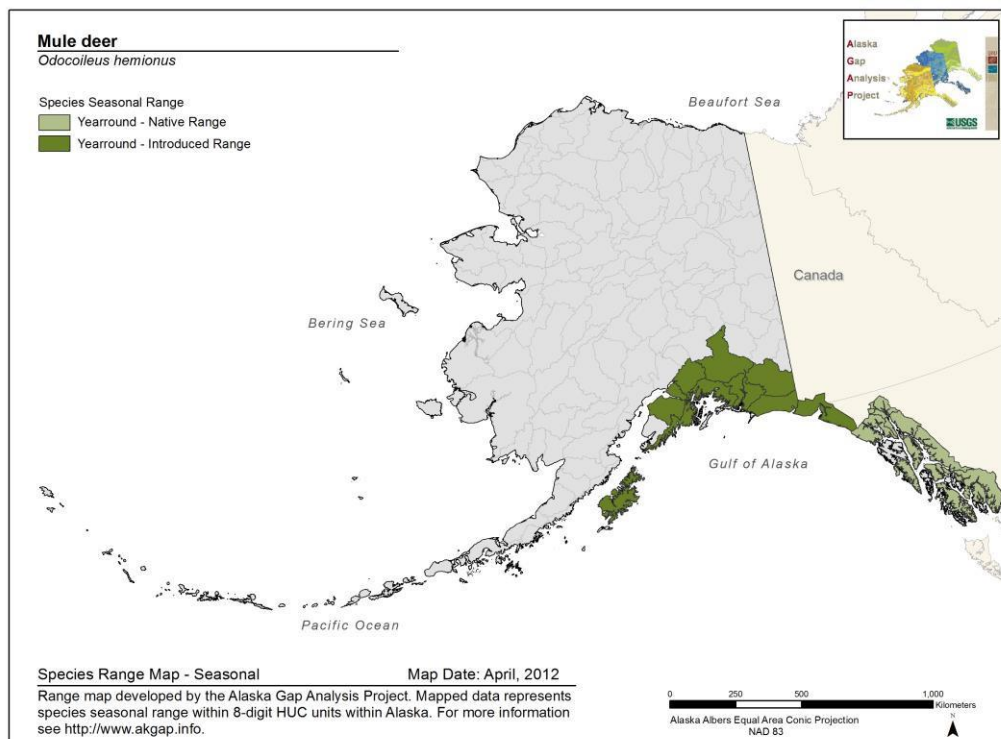
Mule Deer *Odocoileus hemionus*

Range Map and Distribution Model Summary

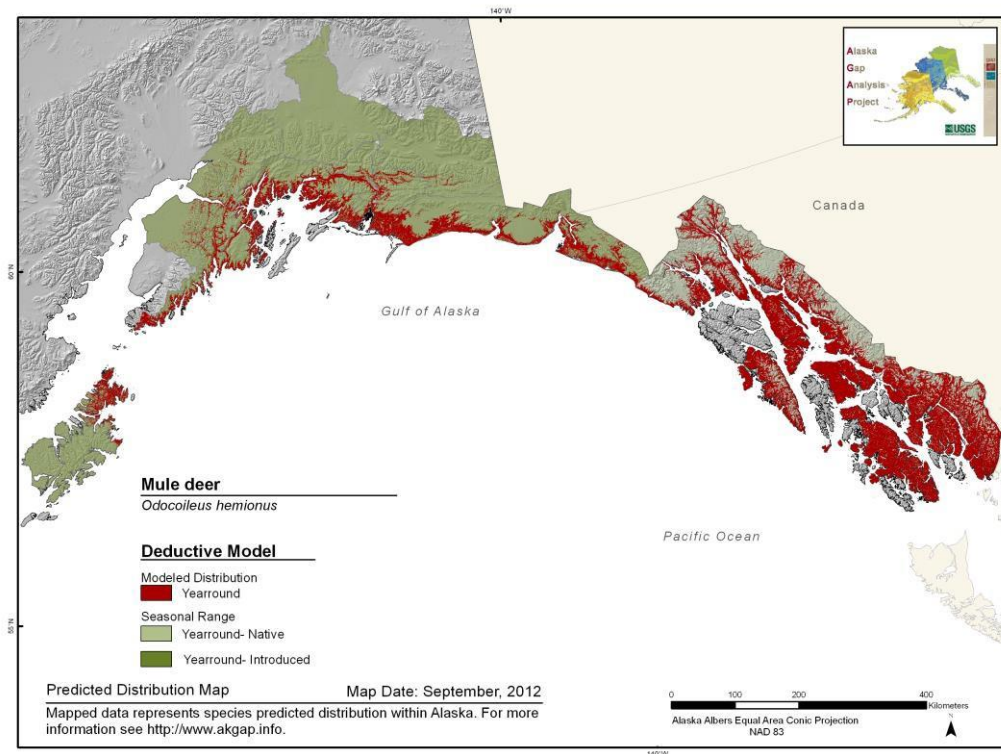
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.747**

**Model Quality
Summary:**
Moderate

Habitat Description

In Alaska, inhabit wet rain forests of the coast. In summer, can be found in high alpine meadows and subalpine shrub thickets. In fall and winter, move down to lower elevations old-growth and beaches to forage. Critical winter habitat characteristics in the north include adequate stands of uneven-aged old-growth forests more than two hundred years old (Schoen and Kirchoff 2007, Suring et al. 1992, Wallmo 1981).

References

Schoen, J. W., and M. Kirchoff. 2007. Sitka black-tailed deer (*Odocoileus hemionus sitkensis*). In The coastal forests and mountains ecoregion of southeastern Alaska and the Tongass National Forest: A conservation assessment and resource synthesis (J. W. Schoen and E. Dovichin, eds.). Audubon Alaska and The Nature Conservancy, Anchorage, Alaska.

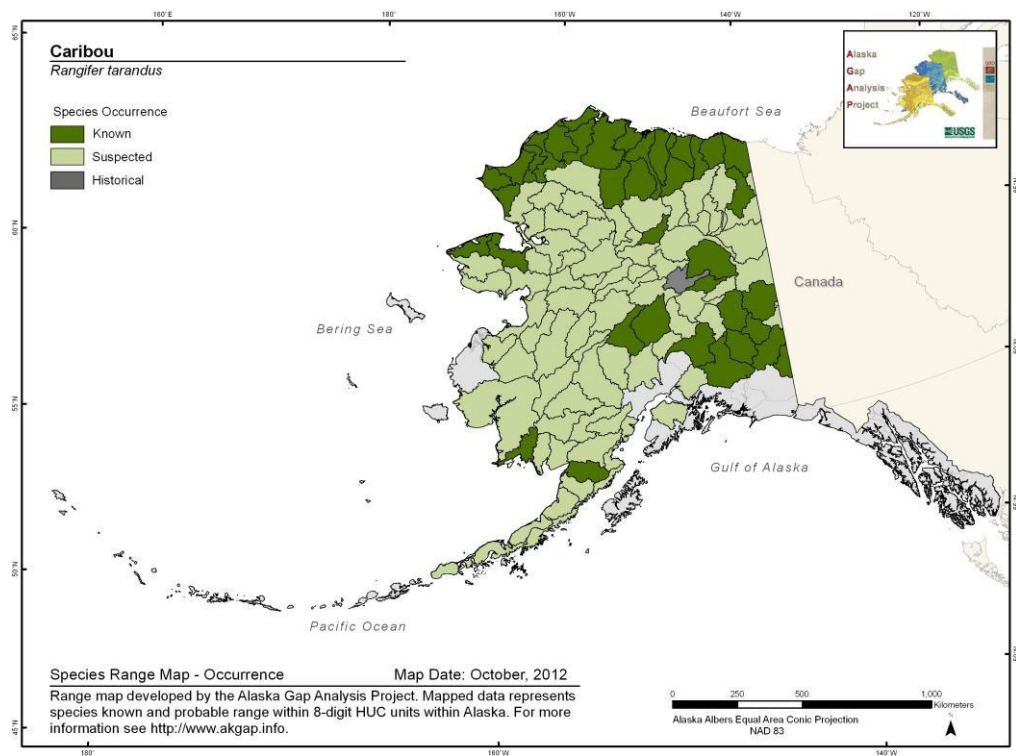
Suring, L. H., D. C. Crocker-Bedford, R. W. Flynn, C. L. Hale, G. C. Iverson, M. D. Kirchoff, T. E. Schenck II, L. C. Sea, and K. Titus. 1992. A strategy for maintaining well-distributed, viable populations of wildlife associated with old growth forest in Southeast Alaska. Report of an Interagency Committee, Juneau.

Wallmo, O.C. 1981. The mule and black-tailed deer of North America. 605 pp.

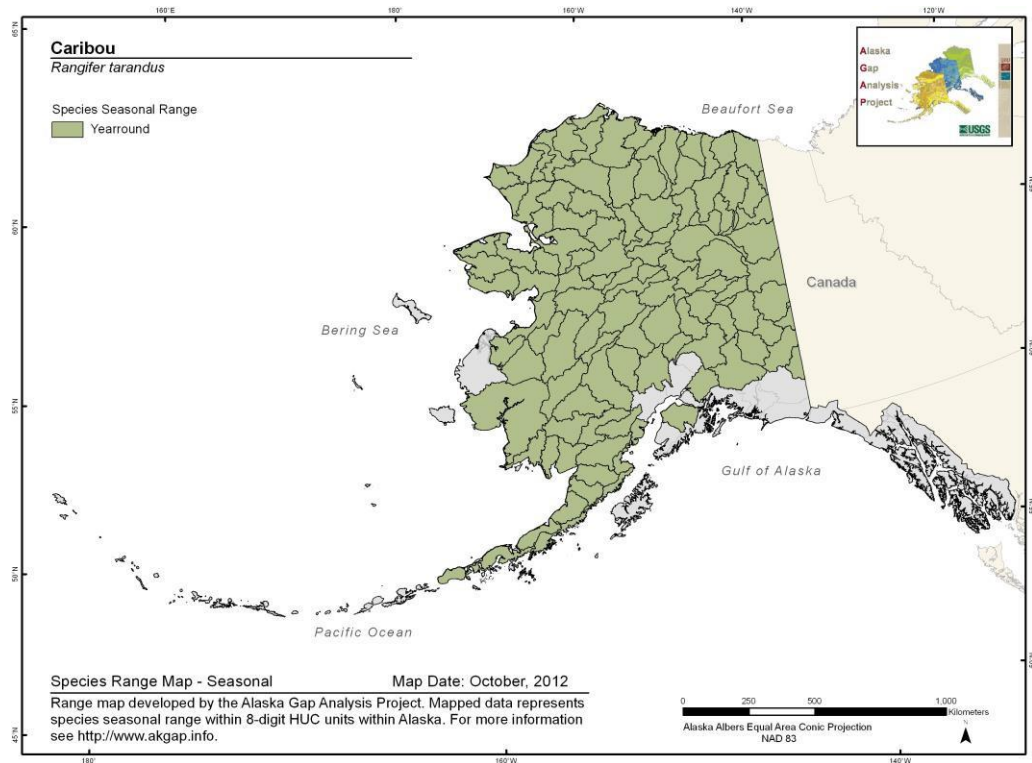
Caribou *Rangifer tarandus*

Range Map and Distribution Model Summary

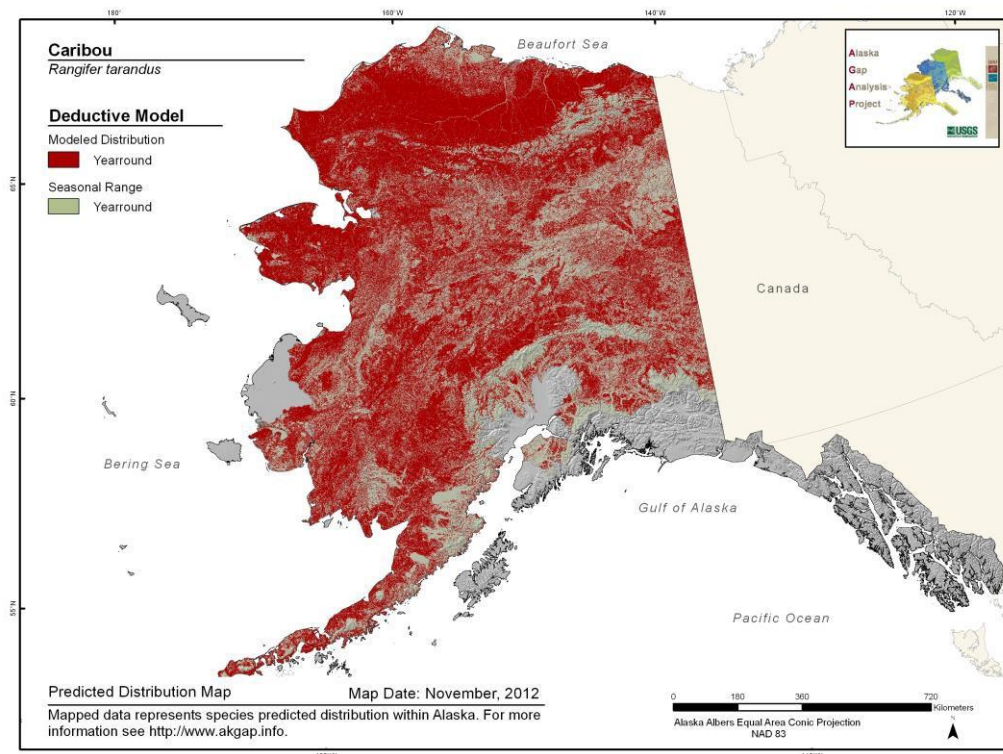
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.572**

**Model Quality
Summary:**
Low

Habitat Description

Calving areas are the center of a caribou herd's distribution (ADF&G 1973). Calving grounds are above timberline or along the coast in rolling hills or foothills dominated by heaths, sedges, and forbs. Summer ranges include alpine and arctic tundra (tussock and sedge meadow). Seek lower elevations during winter to forage on lichens, sedges, and browse plants, including boreal forests (Valkenburg 1999). Other habitats include subarctic taiga, mature coniferous forest, semi-open and open bogs, rocky ridges with jack pine, and riparian zone. Black spruce and white spruce (*Picea glauca*) in pure or codominant stands with lichen-moss understories are heavily utilized in Alaska (Skoog 1968, Joly et al. 2003). Sedge meadows dominated by water sedge (*Carex aquatilis*), rock sedge (*C. saxatilis*), and tall cottonsedge (*Eriophorum angustifolium*) provide year-round forage. Barren ground caribou also utilize willow stands dominated by feltleaf willow (*Salix alaxensis*), Barclay's willow (*S. barclayi*), grayleaf willow (*S. glauca*), teal leaf willow (*S. pulchra*), and Richardson's willow (*S. richardsonii*). Grasslands dominated by rough fescue (*Festuca altaica*) with birch (*Betula* spp.) and willow (*Salix* spp.) associates are frequently utilized (Skoog 1968). Porcupine herd of northeastern Alaska and northwestern Yukon: females give birth on patches of bare ground within snowfields (Eastland et al. 1989); cows select areas north of the foothills (snow conditions permitting), thereby reducing exposure of calves to predators.

References

ADF&G. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 144 pp. + maps.

Eastland, W. G., R. T. Bowyer, and S. G. Fancy. 1989. Effects of snow cover on selection of calving sites by caribou. *J. Mamm.* 70:824-828.

Joly, K., B. W. Dale, W. B. Collins, and L. G. Adams. 2003. Winter habitat use by female caribou in relation to wildland fires in interior Alaska. *Canadian Journal of Zoology.* 81(7): 1192-1201.

Skoog, R. O. 1968. Ecology of the caribou (*Rangifer tarandus granti*) in Alaska. Berkeley, CA: University of California, Berkeley. 699 p. Dissertation.

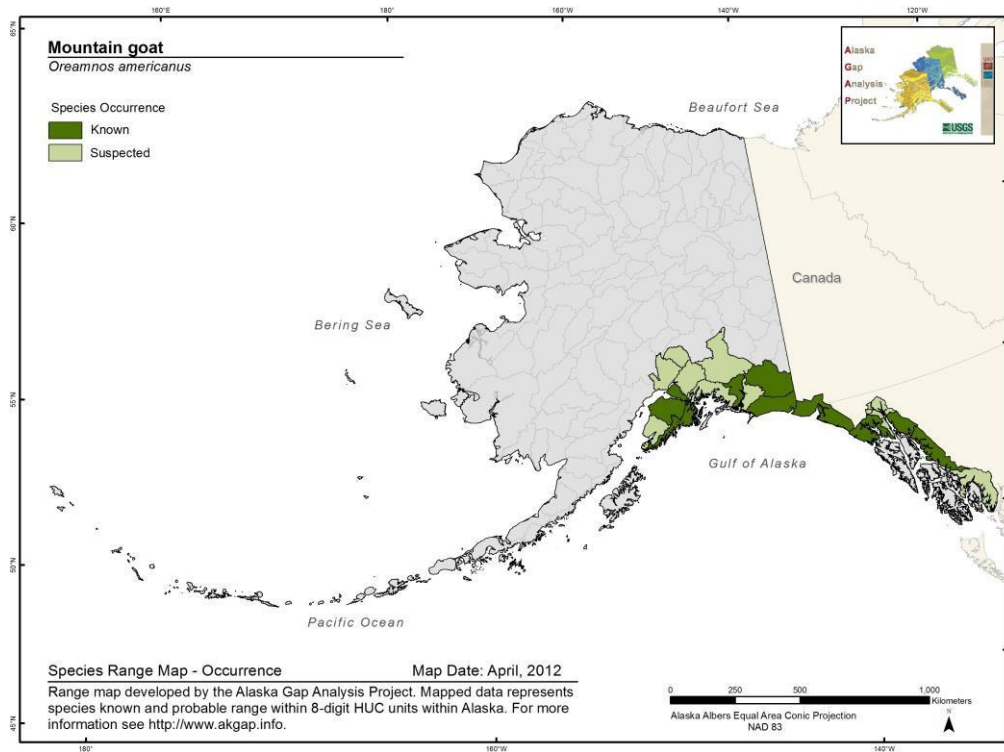
Valkenburg, P. 1999. Caribou. ADF&G Wildlife Notebook Series.

[Http://www.adfg.state.ak.us/pubs/notebook/biggame/caribou.php](http://www.adfg.state.ak.us/pubs/notebook/biggame/caribou.php) (accessed 26 March 2007).

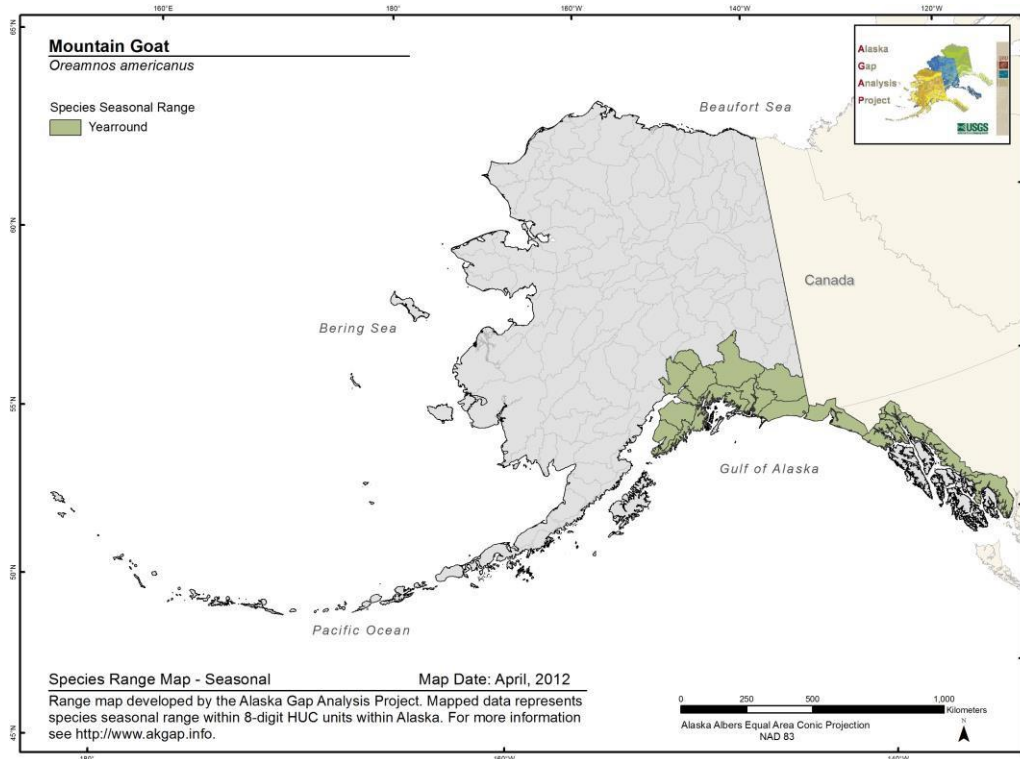
Mountain Goat *Oreamnos americanus*

Range Map and Distribution Model Summary

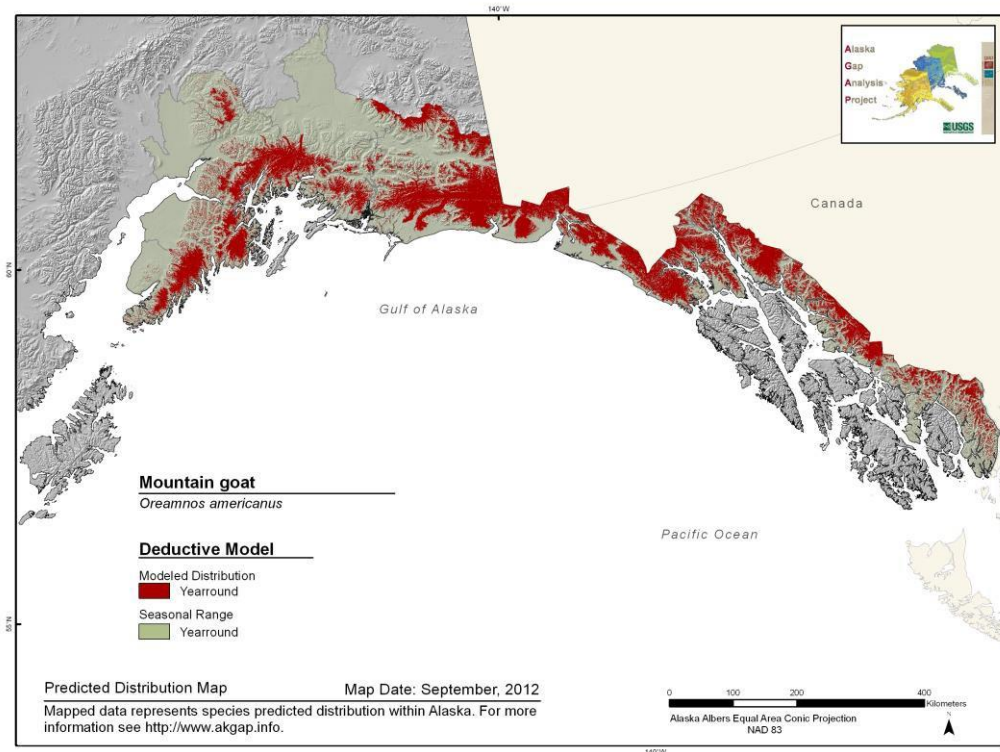
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.647**

Model Quality Summary:
Low

Habitat Description

In Alaska, thrive in wet coastal habitats. Restricted to mountains, often in steep, rugged terrain. In summer, occupy steep grassy talus slopes, grassy ledges of cliffs, and alpine meadows moving to snow patches on warm days (Hjeljord 1973, Schoen and Kirchoff 1981, Fox et al. 1989). During winter, occur from sea to timberline (ADF&G 1973, Shackleton 1999), in general, mountain goats make use of higher elevations during summer and lower ones in winter (Chapman and Feldhamer 1982). May seek shelter in spruce or hemlock in winter (NatureServe 2007b). Mountain goat winter ranges are characterized by a lack of persistent or melt-crusted snow along cliffs, and steep terrain interspersed with vegetation. Suitable winter ranges may be at lower elevations where snow is less abundant and persistent, or on relatively unforested, steep, mostly south-facing slopes where snow sheds rapidly. Mountain goats use those portions of winter ranges on slopes exceeding 40 degrees (Boyd et al. 1986). At low elevations, particularly near the Pacific Coast, a conifer canopy may benefit wintering mountain goats by intercepting and distributing snow and by providing forage. In contrast, goats wintering on interior ranges, where snowfall is great, tend to avoid dense stands of conifers that accumulate snow (Boyd et al. 1986).

References

ADF&G. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 144 pp. + maps.

Boyd, R. J., A. Y. Cooperrider, P. C. Lent, and J. A. Bailey. 1986. Ungulates. In: A. Y. Cooperrider, R. J. Boyd, and H. R. Stuart, eds. Inventory and monitoring of wildlife habitat. Denver, CO: USDI, BLM, Service Center: 519-564.

Chapman, J. A. and G. A. Feldhamer, eds. 1982. Wild mammals of North America. Baltimore, MD: The Johns Hopkins University Press. 1147 p.

Fox, J. L., C. A. Smith, and J. W. Schoen. 1989. Relation between mountain goats and their habitat in southeast Alaska. General Technical Report PNW-GTR-246. USDA, USFS, Washington, D. C.

Hjeljord, O. 1973. Mountain goat forage and habitat preference in Alaska. *Journal of Wildlife Management* 37:353-362.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

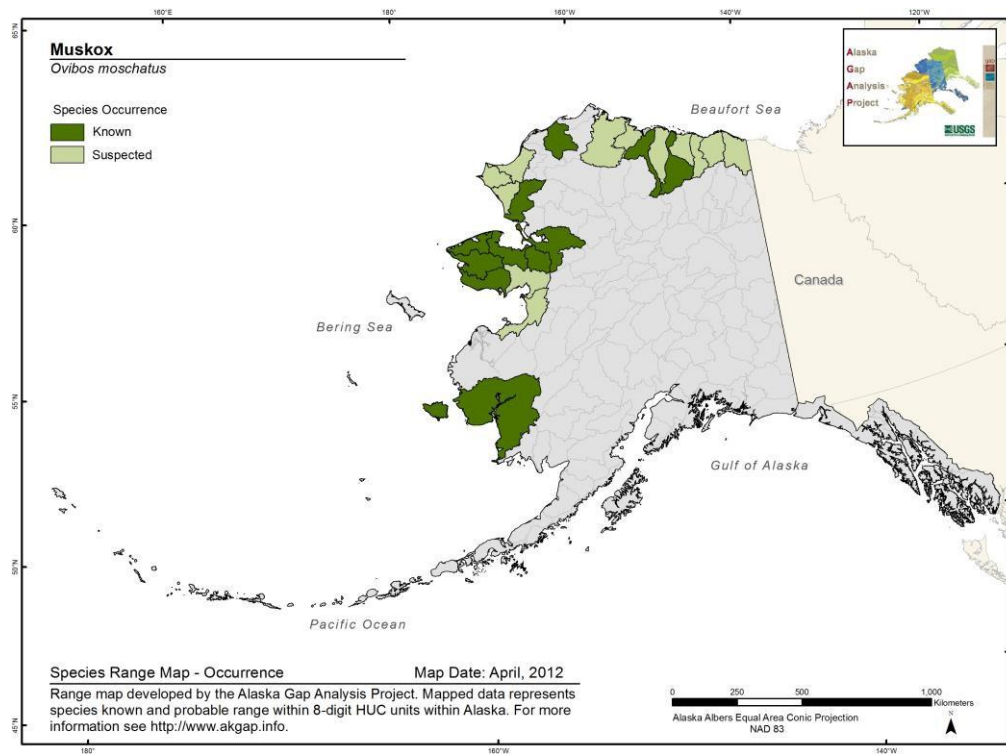
Schoen, J. W. and M.D. Kirchoff. 1981. Habitat use by mountain goats in southeast Alaska. Final Report Project W-17-R, ADF&G, Juneau, Alaska.

Shackleton, D. 1999. Hoofed mammals of British Columbia. Royal British Columbia Museum Handbook Volume 3. University of British Columbia Press, Vancouver.

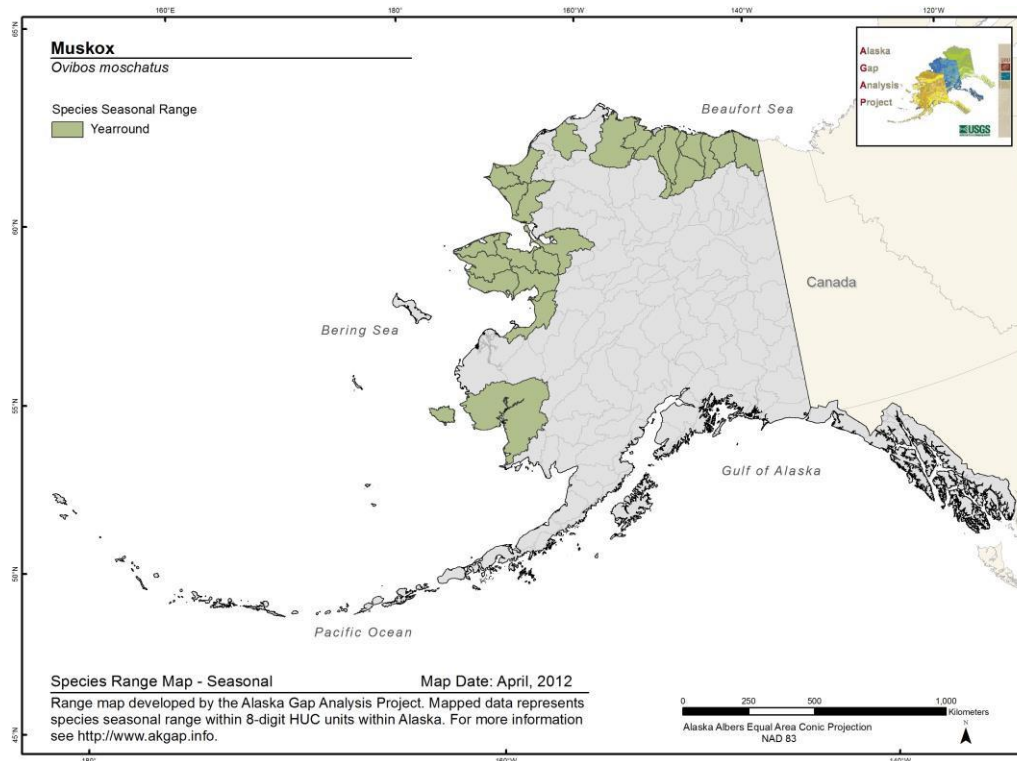
Muskox *Ovibos moschatus*

Range Map and Distribution Model Summary

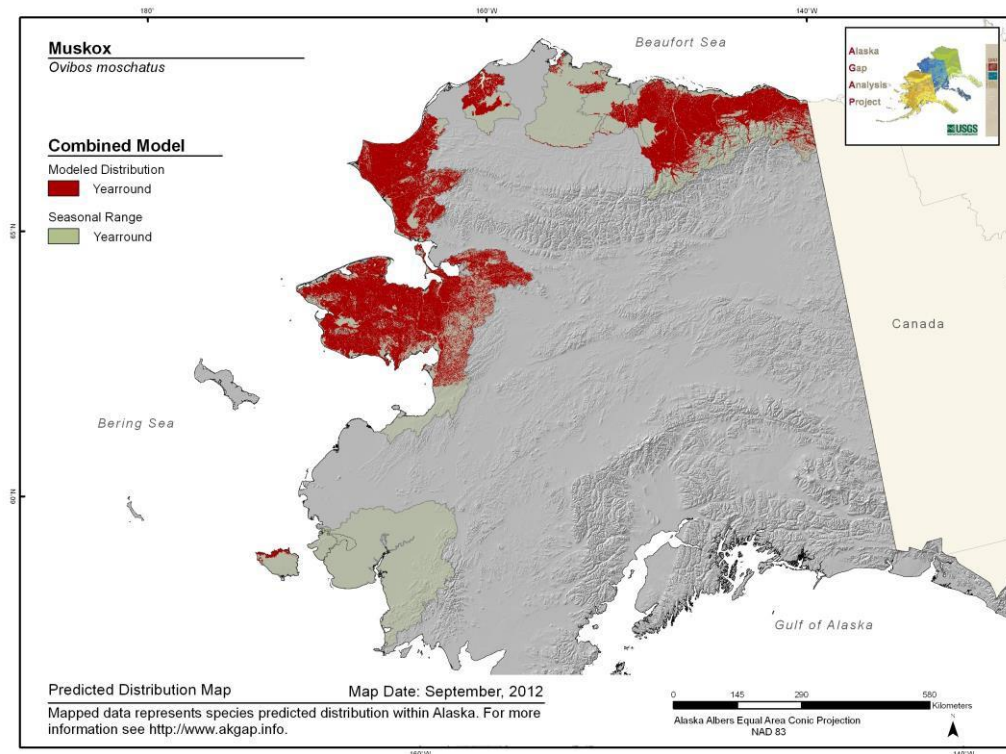
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.735**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabits arctic tundra. In summer, prefers moist habitats and riparian vegetation where sedges, and sometimes shrubs play a major role in their summer diet (Lent 1988). In winter, may shift to hilltops, slopes, and plateaus (Nowak 1991).

References

Lent, P. C. 1988. OVIBOS MOSCHATUS. Mammalian Species 302:1-9.

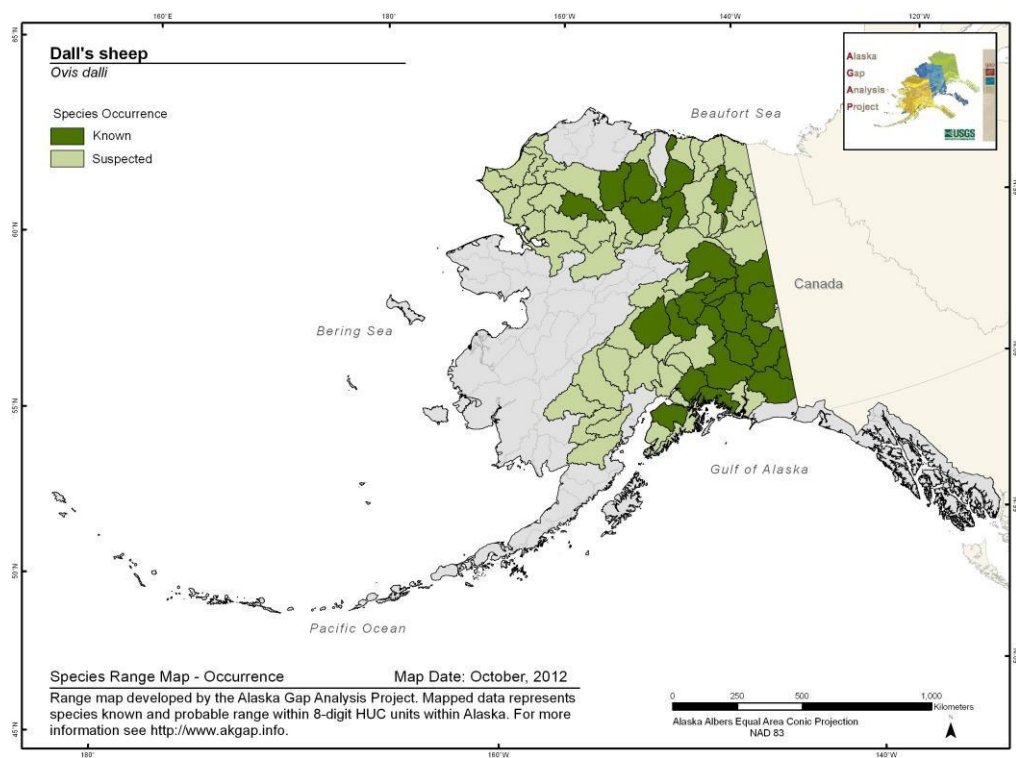
Nowak, R.M. 1991. Walker's mammals of the world. Fifth edition. Vols. I and II. Johns Hopkins Univ. Press, Baltimore. 1629 pp.

Dall's Sheep

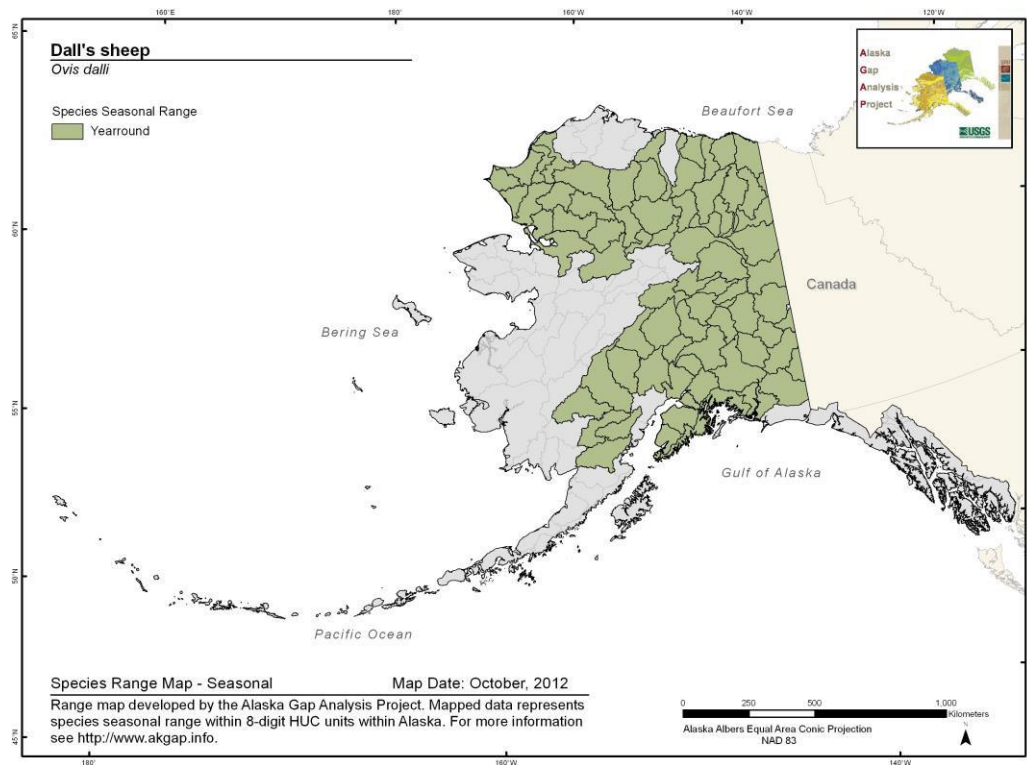
Ovis dalli

Range Map and Distribution Model Summary

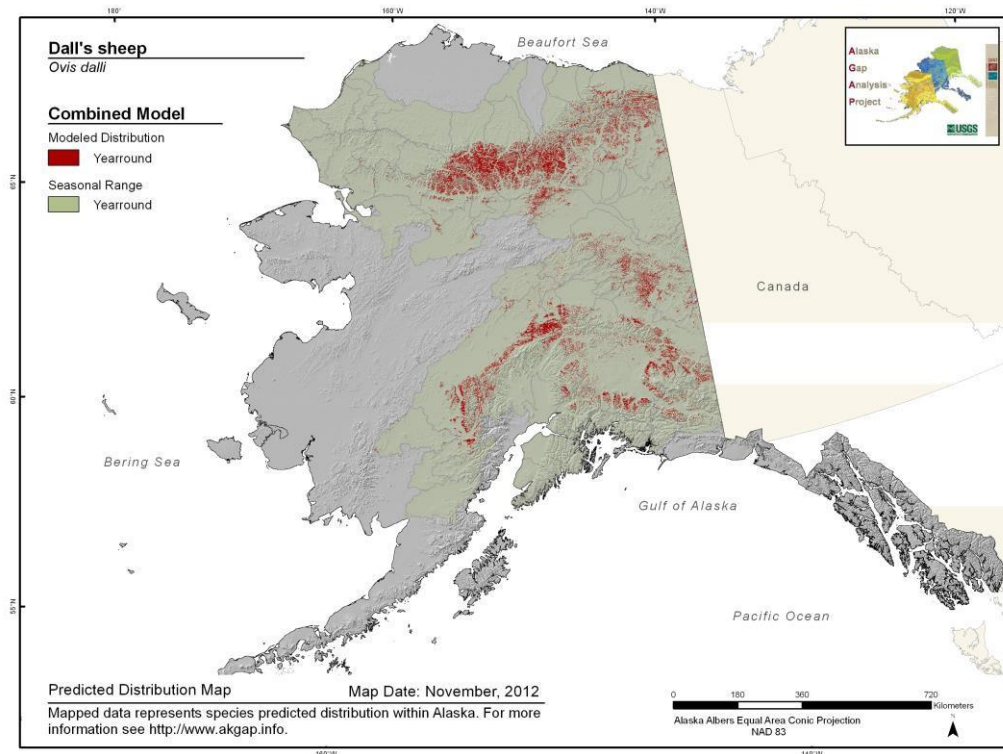
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.584**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits semi-open, precipitous terrain with rocky slopes, ridges, and cliffs or rugged canyons; dry mountainous terrain, subalpine grass-low shrub communities. In winter, attracted to areas with little or no snow cover. Females rely on precipitous mountain areas for escape cover during lambing period (Lawson and Johnson 1982). Mineral licks essential during spring (MacDonald and Cook 2009).

References

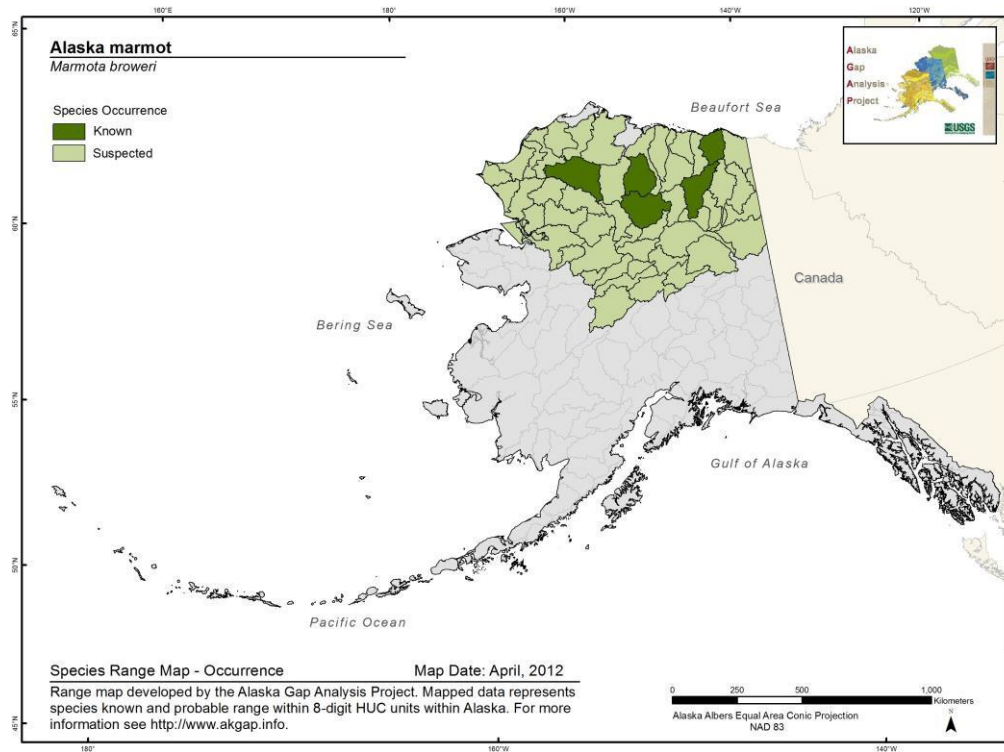
Lawson, B., and R. Johnson. 1982. Mountain sheep. Pages 1036-1055 in Chapman, J. A., and G. A. Feldhamer, eds. Wild mammals of North America. Biology, management, and economics. Johns Hopkins Univ. Press, Baltimore.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

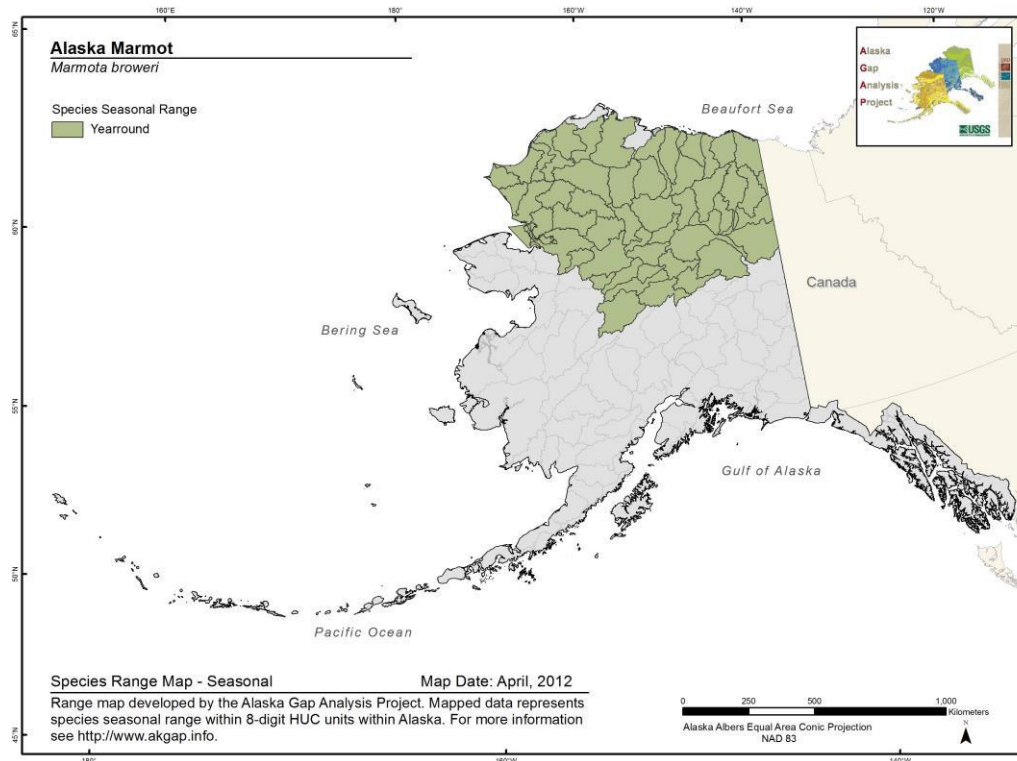
Alaska Marmot *Marmota broweri*

Range Map and Distribution Model Summary

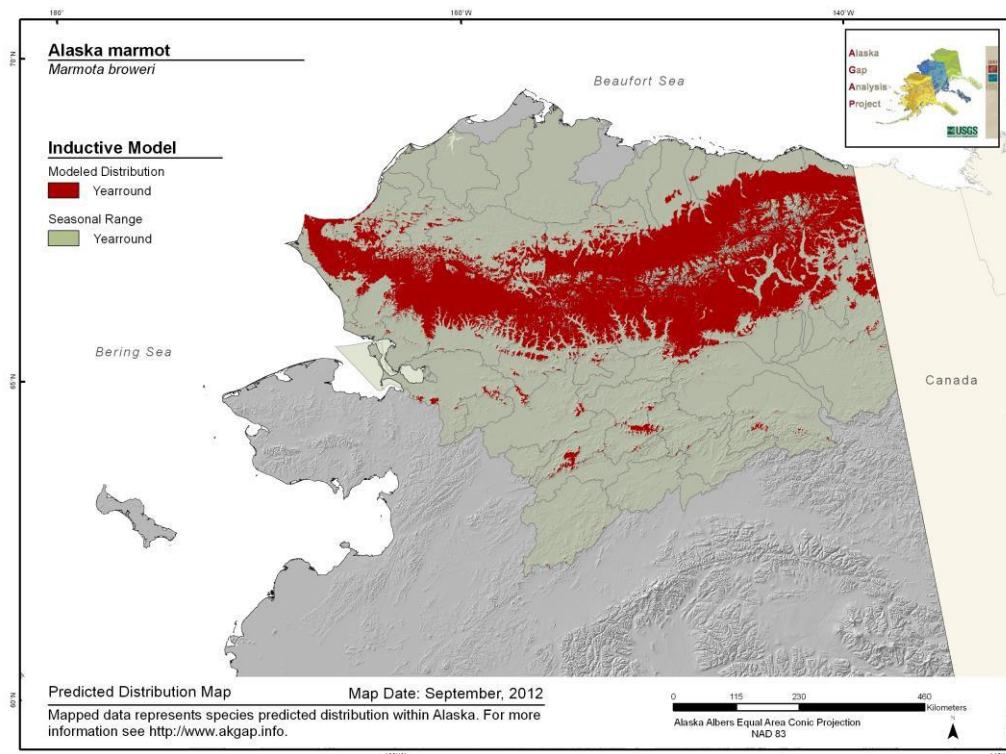
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.778**

**Model Quality
Summary:**
Moderate

Habitat Description

Dens located in extensive boulder fields, rock slides, outcrops, terminal moraines, and talus slopes in alpine tundra with large rocks and adequate herbaceous forage (Bee and Hall 1956, Manville and Young 1965, Cook and MacDonald 2003). Rocks must be large enough and accumulated to a depth sufficient to give subsurface protection. Shallow accumulations of boulders or slides of any depth that have been completely sealed in with vegetation are uncommonly used, nevertheless, stabilized rock fields and lateral moraines in mountain slopes in the later seral stages of succession are inhabited. Dens are often located near an observation post, such as a tall rock or cliff edge, within 10 m of the entrance (Bee and Hall 1956). Dens are created by burrowing into permafrost soil under rocks (Hoffmann 1999).

References

Bee, J.W. and E.R. Hall. 1956. Mammals of northern Alaska on the Arctic Slope. Univ. Kansas Mus. Nat. Hist. Misc. Publ. No. 8. 309 p.

Cook, J. A. and S. O. MacDonald. 2003. Mammal inventories of Alaska's national parks and preserves: Gates of the Arctic National Park and Preserve. Annual Report 2002.

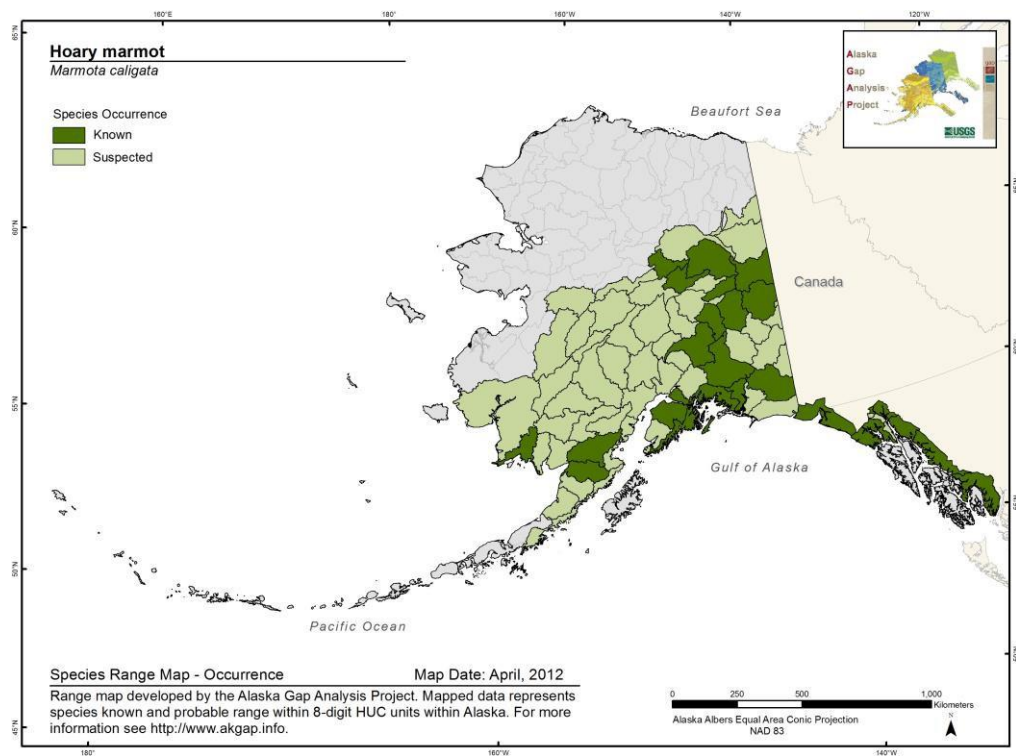
Hoffmann, R. S. 1999. Alaska marmot, *Marmota broweri*. Pp. 393-395 in: Wilson, D.E., and S. Ruff (eds.). The Smithsonian book of North American mammals. Smithsonian Institution Press, Washington, D.C., in association with the American Society of Mammalogists. 750 pp.

Manville, R. H. and S. P. Young. 1965. Distribution of Alaskan mammals. Bird and Mammal Laboratories, Division of Wildlife Research. Circular 211. Published by the Bureau of Sport Fisheries and Wildlife, Washington. 70 pp.

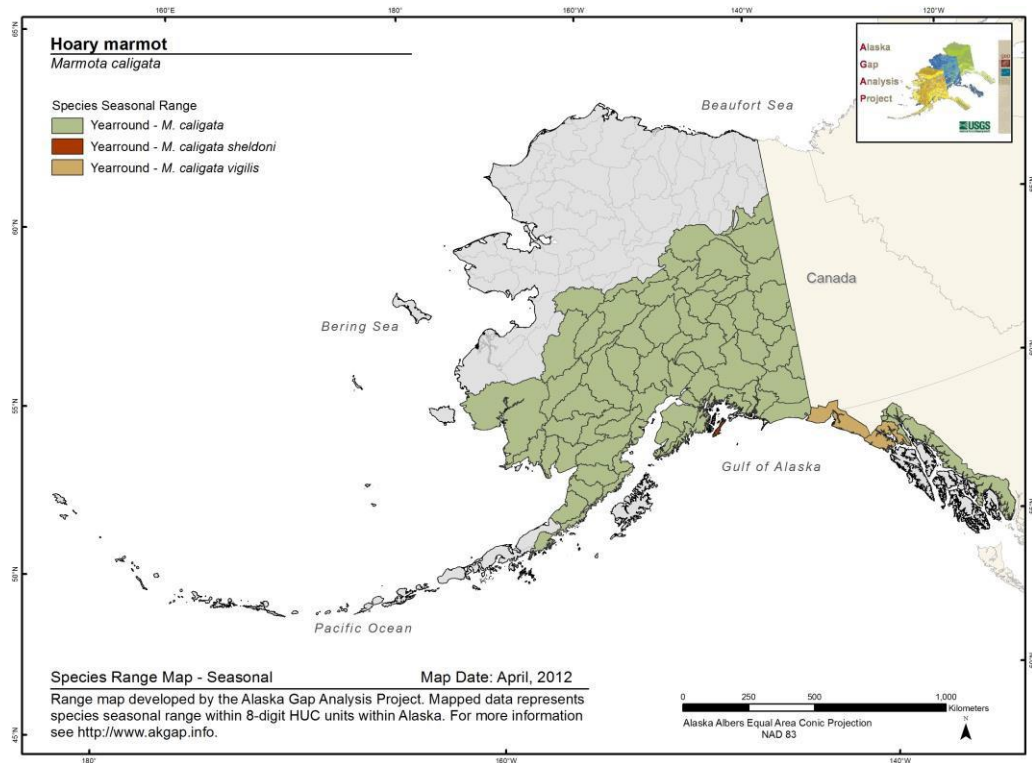
Hoary Marmot *Marmota caligata*

Range Map and Distribution Model Summary

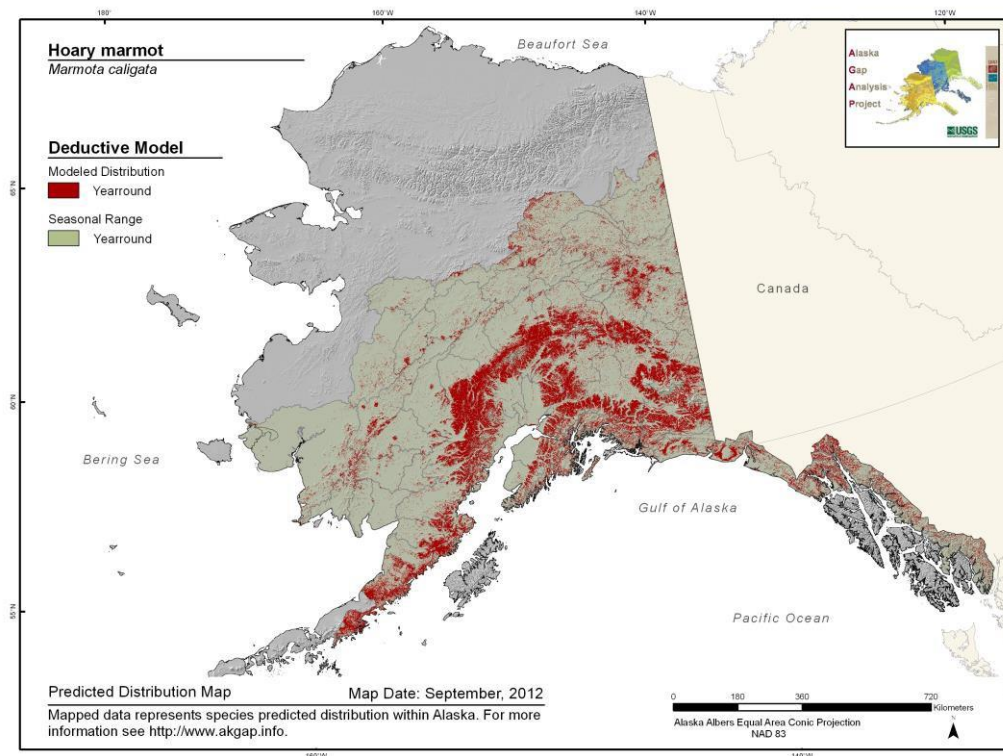
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.608**

**Model Quality
Summary:**
Low

Habitat Description

Hoary marmots prefer rocky tundra habitats on precipitous sides of canyons and valleys in the mountains. Occur at sea level where alpine conditions extend to coast (MacDonald and Cook 2009).

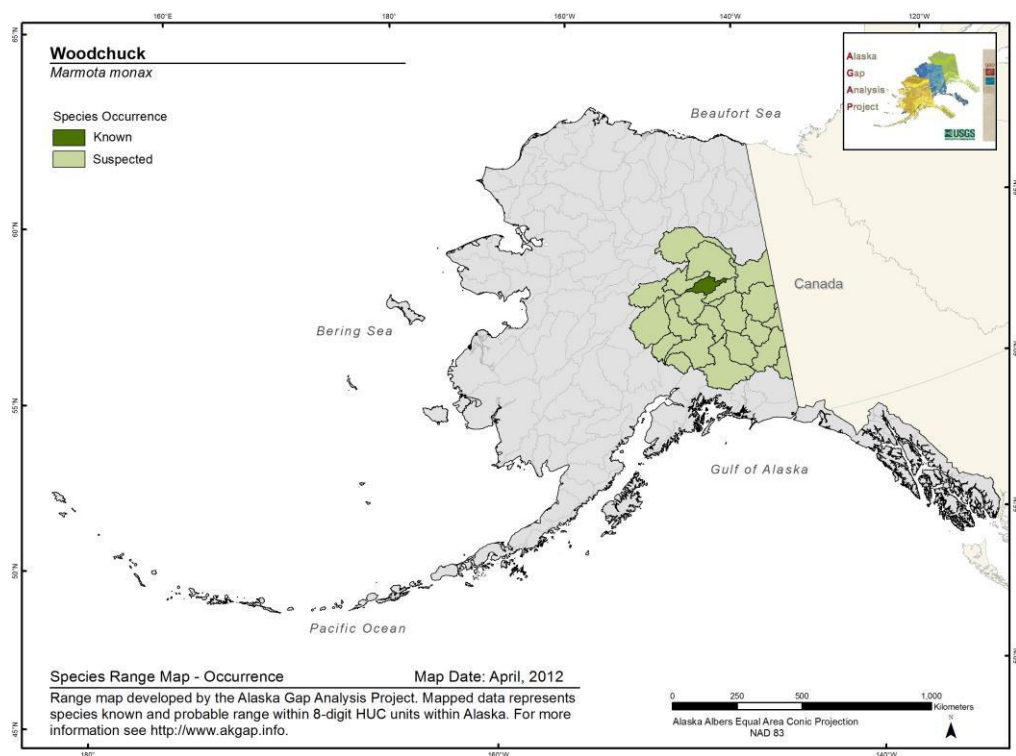
References

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

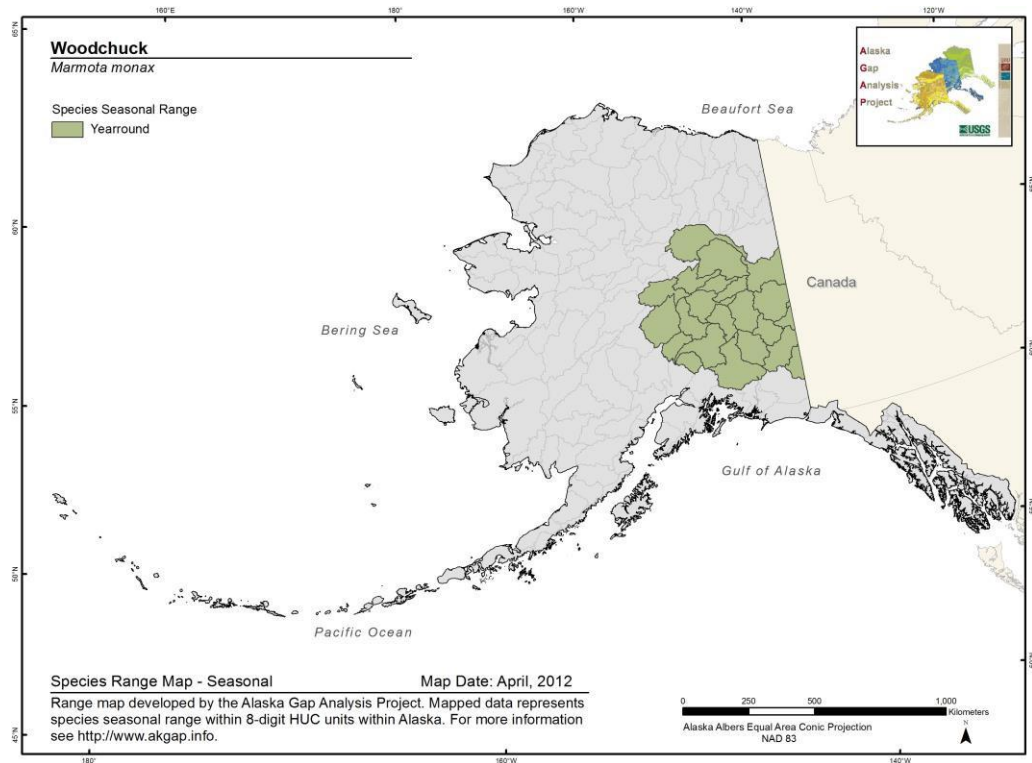
Woodchuck *Marmota monax*

Range Map and Distribution Model Summary

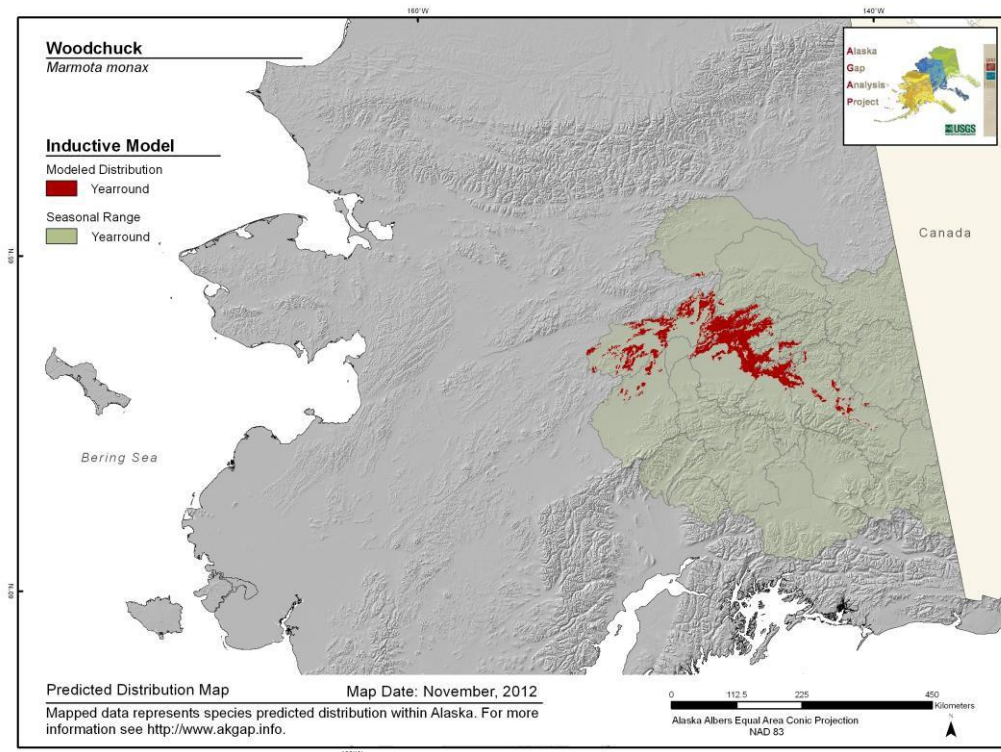
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.917**

**Model Quality
Summary:**
High

Habitat Description

In Alaska, thought to prefer open, well-drained grassy areas and open deciduous forest with an undergrowth of grasses, forbs, and shrubs (ADF&G 1978). Frequently, sighted along roadsides and near old buildings (MacDonald and Cook 2009).

References

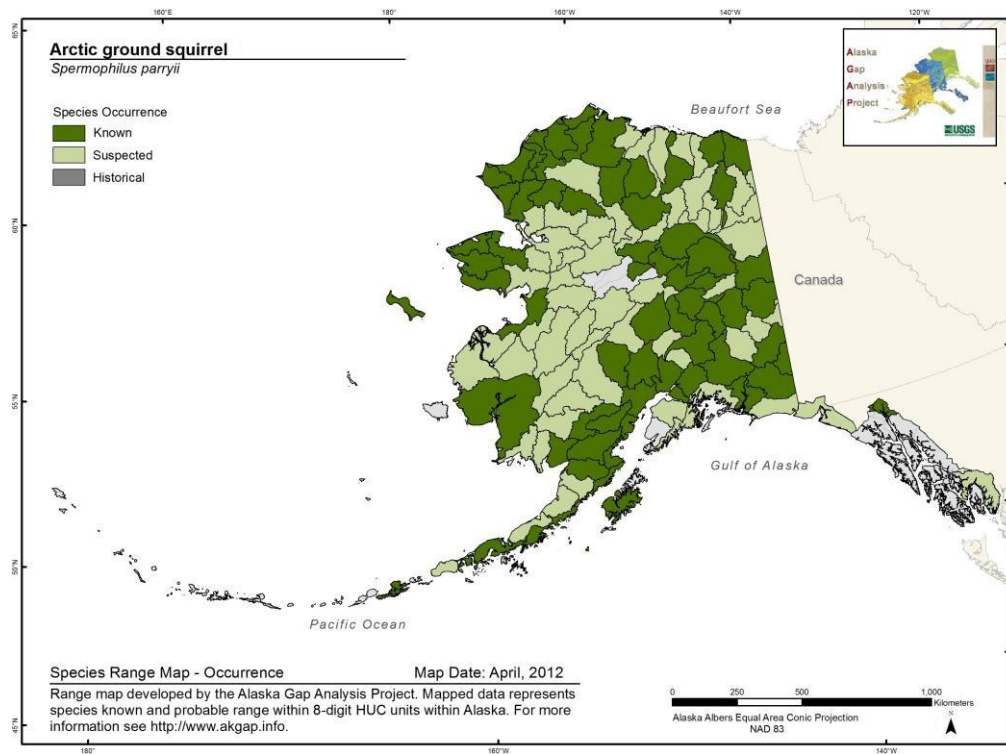
ADF&G. 1978. Alaska's wildlife and habitat, volume II. Anchorage, AK.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

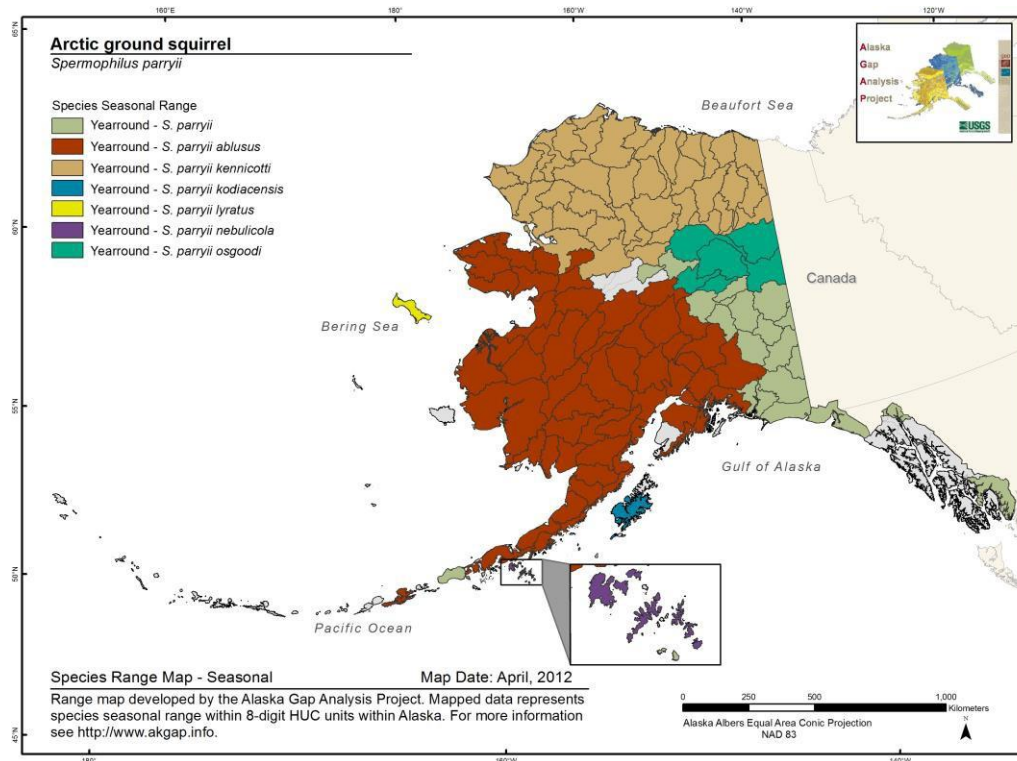
Arctic Ground Squirrel *Spermophilus parryii*

Range Map and Distribution Model Summary

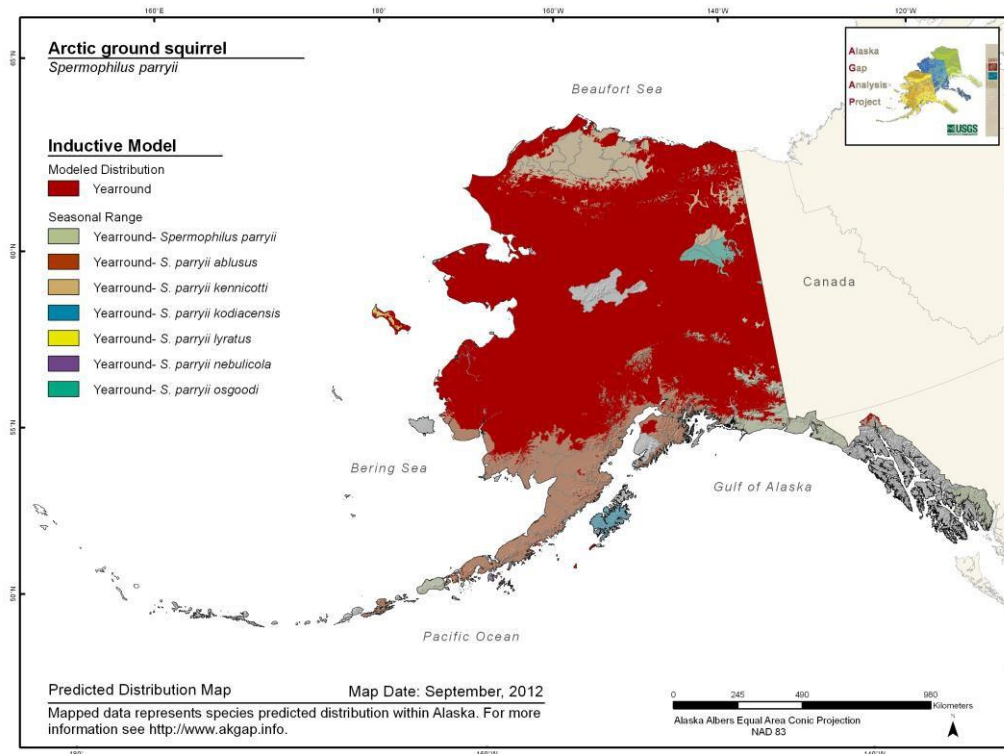
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.562**

**Model Quality
Summary:**
Low

Habitat Description

Tundra, subalpine brushy meadows, roadsides, riverbanks, lakeshores, sandbanks permafrost-free areas with loose soils and early successional vegetation. Well-drained habitats often associated with sand dunes or eskers. Digs extensive burrow systems. Found from sea level to well above tree line (Buck and Barnes 1999).

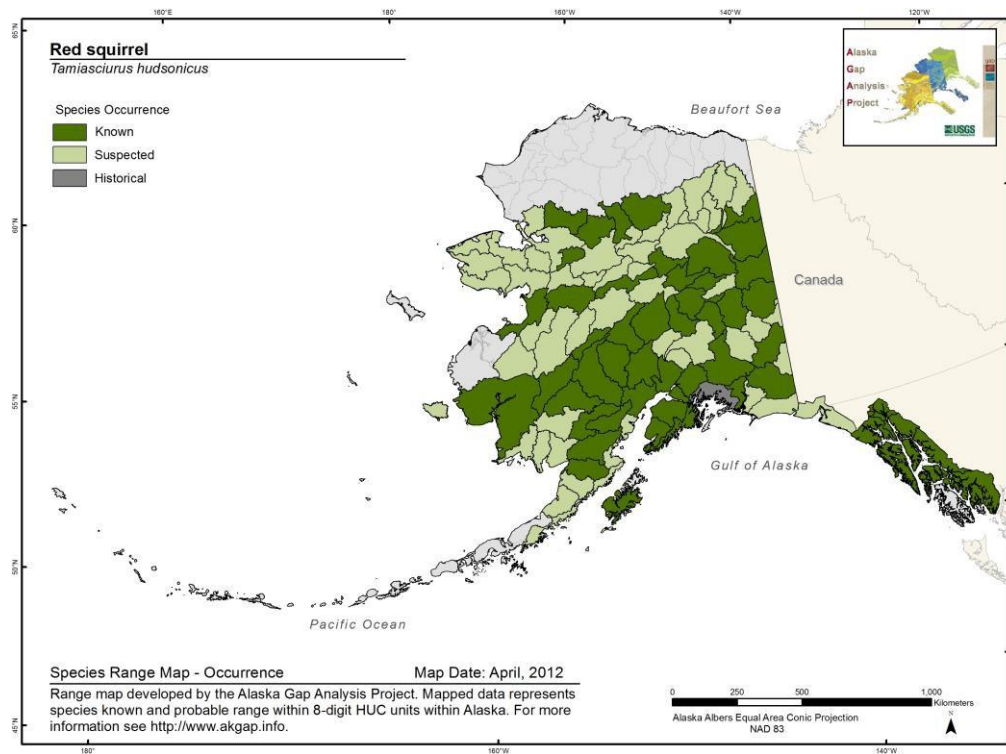
References

Buck, C. L. and B. M. Barnes. 1999. Temperatures of hibernacula and changes in body composition of arctic ground squirrel over winter. *Journal of Mammalogy* 80: 1264-1276.

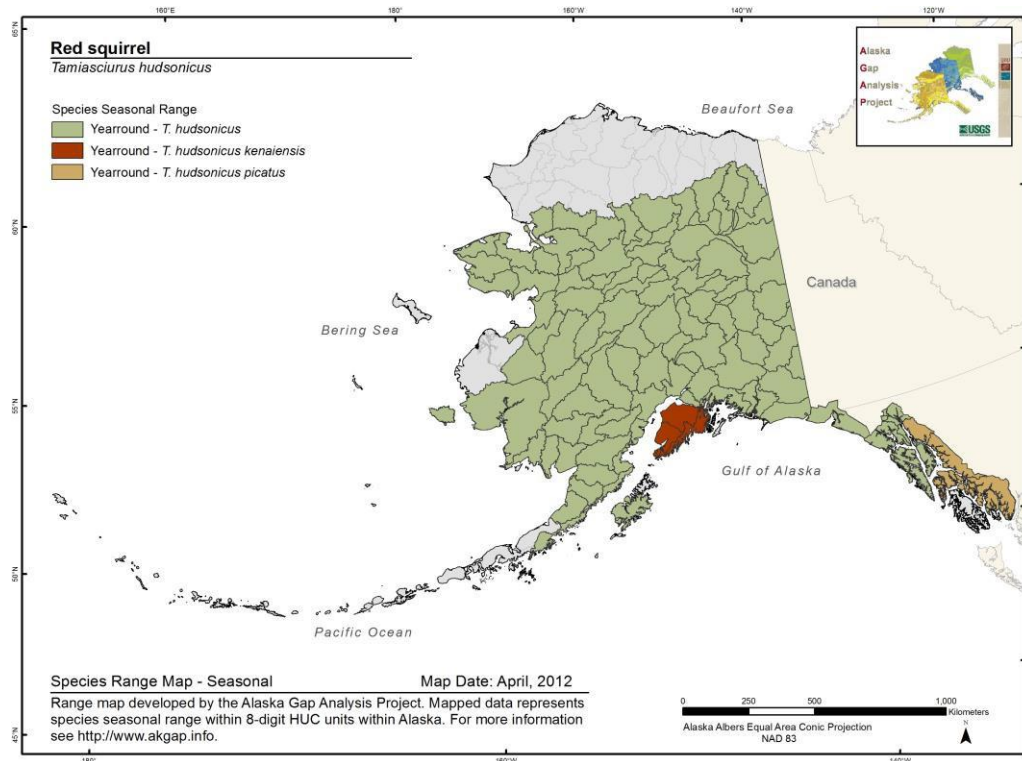
Red Squirrel *Tamiasciurus hudsonicus*

Range Map and Distribution Model Summary

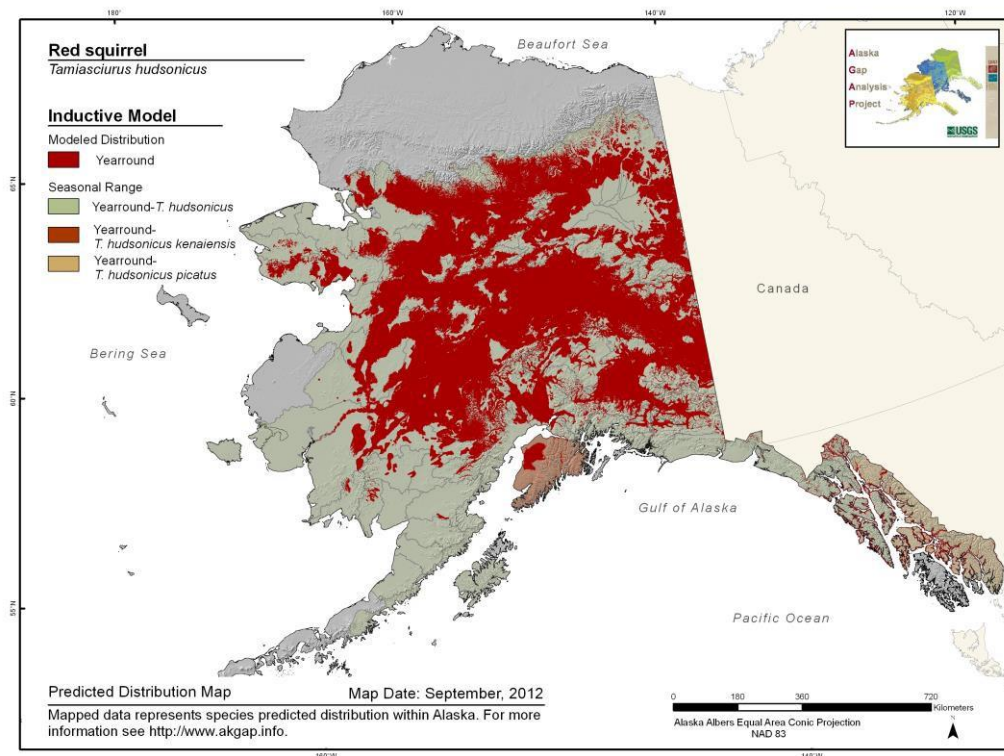
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.773**

**Model Quality
Summary:**
Moderate

Habitat Description

Prefers coniferous forests, but also found in mixed hardwood forests. In northern Alaska, occur beyond tree line in riparian shrub thickets (Banfield 1974, Bee and Hall 1956, Wolff and Zasada 1975). Typically avoid clearcuts (Bakker and Van Vuren 2004).

References

Bakker, V. J. and D. H. Van Vuren. 2004. Gap-crossing decisions by the red squirrel, a forest-dependent small mammal. *Conservation Biology* 18:689-697.

Banfield, A. W. F. 1974. *The mammals of Canada*. University of Toronto Press, Toronto, Canada. 438 pp.

Bee, J.W. and E.R. Hall. 1956. *Mammals of northern Alaska on the Arctic Slope*. Univ. Kansas Mus. Nat. Hist. Misc. Publ. No. 8. 309 p.

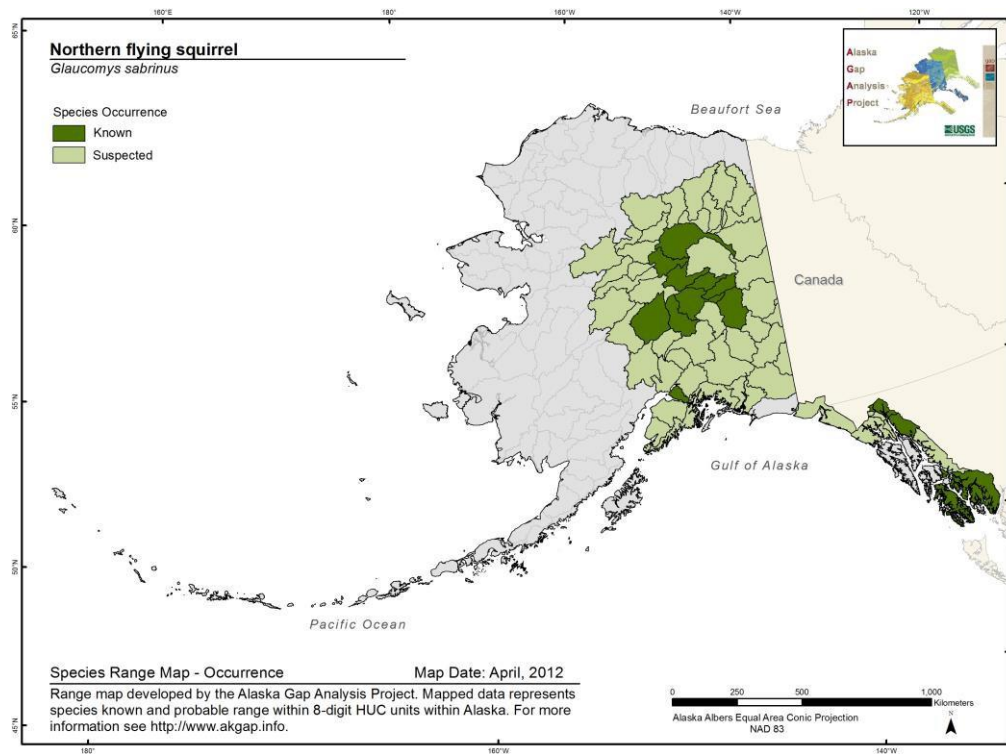
Wolff, J. O. and J. C. Zasada. 1975. Red squirrel response to clearcut and shelterwood systems in Interior Alaska. USDA, USFS Research Note, PNW-255.

Northern Flying Squirrel

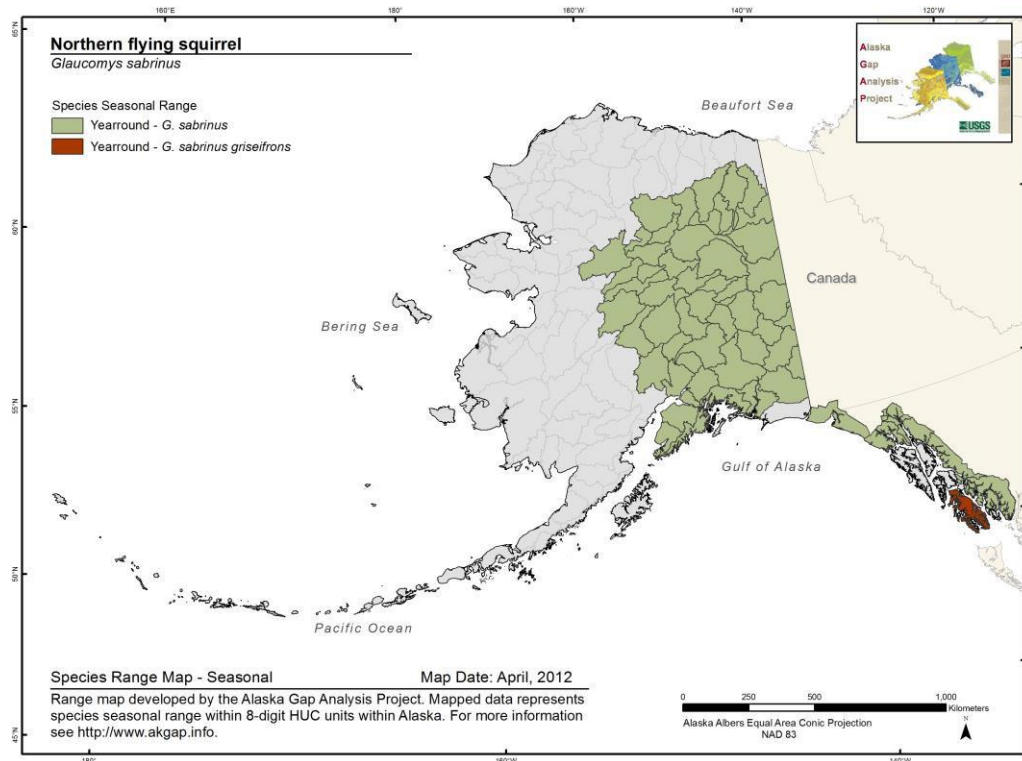
Glaucomys sabrinus

Range Map and Distribution Model Summary

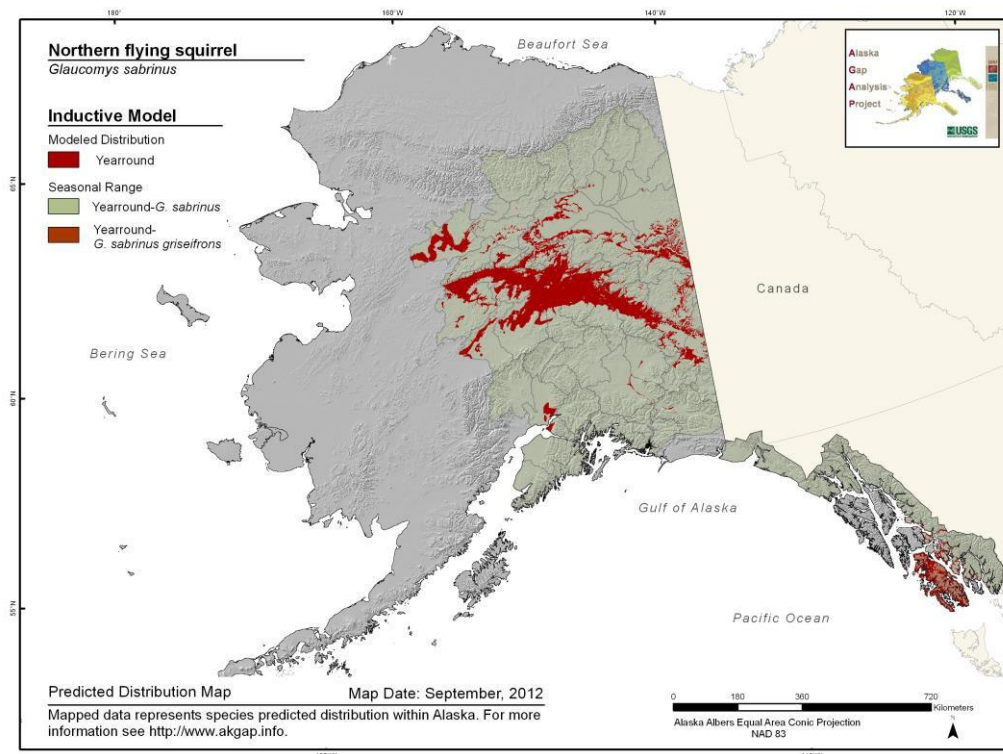
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.739**

**Model Quality
Summary:**
Moderate

Habitat Description

In Alaska, inhabits a variety of boreal and coastal forests. Thought to be closely associated with mature and old-growth forests, although specific requirements are unknown (MacDonald and Cook 2009). In Southeast Alaska, upland old-growth and western hemlock found to be the primary habitat (Smith and Nichols 2003). Den sites in natural tree cavities or woodpecker holes (Mowrey and Zasada 1984, Weigl and Osgood 1974). Uses old growth forests for nesting sites (Weigl 1978, Mowrey and Zasada 1984). Optimal conditions have been reported as cool, moist, mature forest with abundant standing and down snags (NatureServe 2007a). Important characteristics include density of large trees, and snags, shrub and canopy cover, prevalence of old-forest features (decayed downed wood, density of large diameter trees) and an abundance of truffles (Smith 2007). Microhabitat use was highly correlated to vaccinium understory cover (Smith et al. 2005). Winter habitat in BC not limited to old-growth (Cotton and Parker 2000).

References

- Cotton, C. L., and K. L. Parker. 2000. Winter habitat and nest trees used by northern flying squirrels in subboreal forests. *Journal of Mammalogy* 81:1071-1086.
- MacDonald, S. O. and J. A. Cook. 2009. *Recent Mammals of Alaska*. University of Alaska Press, Fairbanks, AK.
- Mowrey, R.A. and J.C. Zasada. 1984. Den tree use and movements of northern flying squirrels in interior Alaska and implications for forest management. Pp. 351-365. In: Meehan, W.R., T.R. Merrell, Jr. and T.A. Hanley (eds.). *Fish and wildlife relationships in old-growth forests. Proceedings of a symposium ... held in Juneau, Alaska, 12-15 April 1982*. American Institute of Fishery Research Biologists.
- NatureServe. 2007a. NatureServe: Animal Data for Download. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/getData/animalData.jsp>

Smith, W. P. 2007. Ecology of *Glaucomys sabrinus*: habitat, demography, and community relations. *Journal of Mammalogy* 88:862-881.

Smith, W.P. and J.V. Nichols. 2003. Demography of the Prince of Wales Flying Squirrel, an endemic of southeastern Alaska temperate rain forest. *Journal of Mammalogy* 84:1044-1058.

Smith, W. P., J. V. Nichols, and S. M. Gende. 2005. The northern flying squirrel as a management indicator species of north temperate rainforest: test of a hypothesis. *Ecological Applications* 15(2): 689-700.

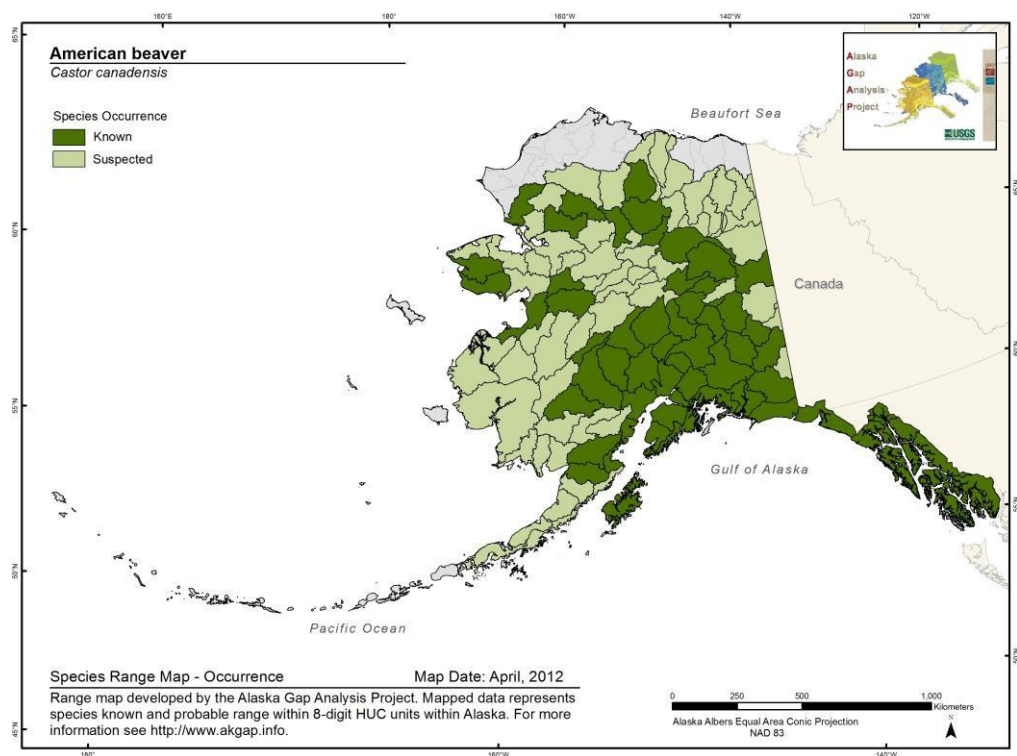
Weigl, P.D. 1978. Resource overlap, interspecific interactions and the distribution of the flying squirrels, *GLAUCOMYS VOLANS* and *G. SABRINUS*. *Amer. Midl. Naturalist* 100(1):83-96.

Weigl, P.D. and D.W. Osgood. 1974. Study of the northern flying squirrel, *Glaucomys sabrinus*, by temperature telemetry. *Amer. Midl. Naturalist* 92:482-486.

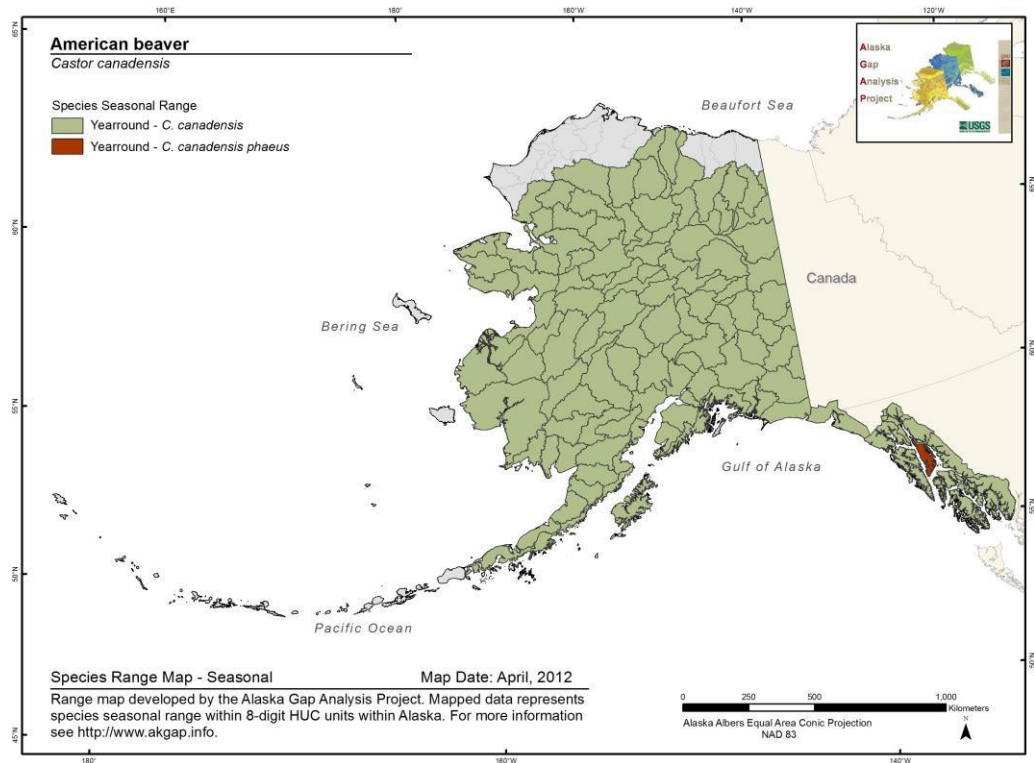
American Beaver *Castor canadensis*

Range Map and Distribution Model Summary

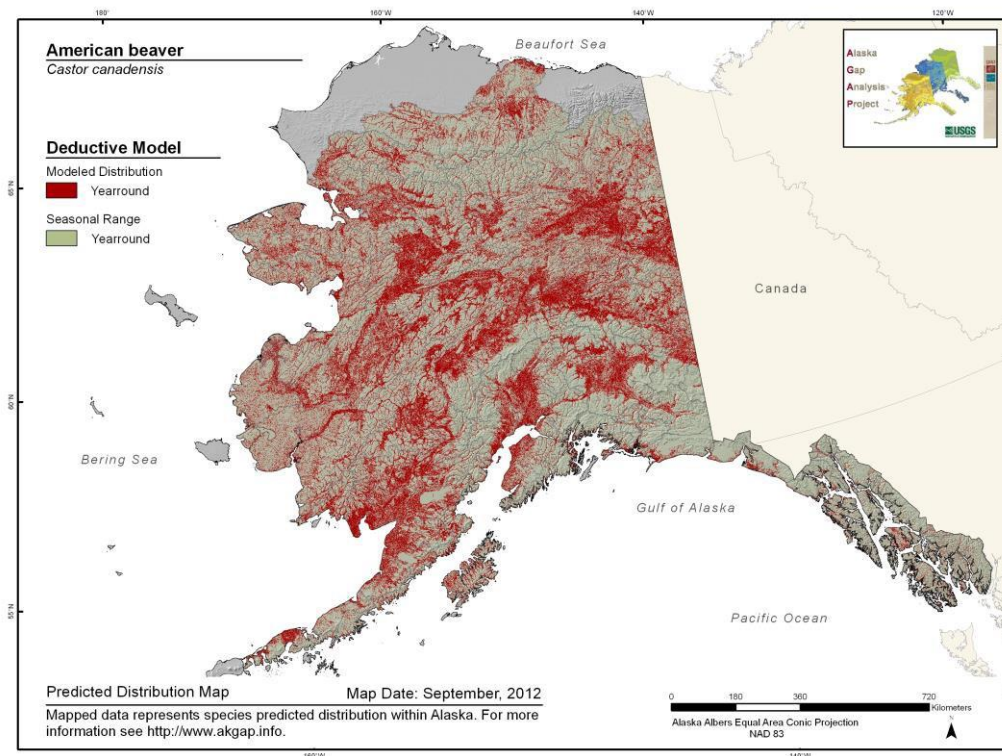
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.531**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits lakes, ponds, marshes, rivers, streams, and most permanent source of water from sea level to 3400 m in mountains. Prefer low gradient streams, ponds, and small mud-bottomed lakes with dimmable outlets (Slough and Sadleir 1977, Beier and Barrett 1987, Novak 1987a, McComb et al. 1990). Beavers readily occupy artificial ponds, reservoirs, and canals if food is available. They generally avoid lakes with strong wave action or fluctuating flow or water levels and fast-moving streams. One study found that 68 percent of the American beaver colonies recorded in Colorado were in valleys with a stream gradient of less than 6 percent. No beaver colonies were recorded in streams with a gradient of 15 percent or more. Valleys that were only as wide as the stream channel were unsuitable beaver habitat, while valleys wider than the stream channel were frequently occupied by beavers (Munther 1981). In larger rivers (9th order or larger streams), beavers use floodplains and backwaters. In the north, they require water that is deep enough such that it does not freeze to the bottom and allows the accumulation of a substantial food pile beneath the ice. Beavers are associated with deciduous tree and shrub communities (NatureServe 2007b), including riparian areas of mixed coniferous-deciduous forests and deciduous forests containing abundant foods and lodge building material such as quaking aspen (*Populus tremuloides*), willows (*Salix* spp.), alders (*Alnus* spp.), red-osier dogwood (*Cornus sericea*), and cottonwoods (*Populus* spp., Patric and Webb 1953, Allen 1983). Marshes, ponds, and lakes are often occupied by American beavers when an adequate supply of food is available. Beavers generally forage no more than about 300 feet (90 m) from water; however, foraging distances of up to 656 feet (200 m) have been reported (Allen 1983).

References

Allen, A. W. 1983. Habitat suitability index models: beaver. FWS/OBS-82/10.30 (Revised). Washington, DC: USDI, USFWS. 20 p.

Beier, P., and R. H. Barrett. 1987. Beaver habitat use and impact in Truckee River basin, California. *Journal of Wildlife Management* 51:794-799.

McComb, W. C., J. R. Sedell, and T. D. Buchholz. 1990. Dam-site selection by beavers in an eastern Oregon basin. *Great Basin Naturalist* 50:273-281.

Munther, G. L. 1981. Beaver management in grazed riparian ecosystems. In: J. M. Peek and P. D. Dalke, eds. *Wildlife-livestock relationships symposium: Proceedings 10*; [Date of conference unknown]; Coeur D'Alene, ID. Moscow, ID: University of Idaho, Forest, Wildlife and Range Experiment Station: 234-241.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Novak, M. 1987a. Beaver. Pages 283-313 in M. Novak, et al. editors. *Wild furbearer management and conservation in North America*. Ontario Ministry of Natural Resources.

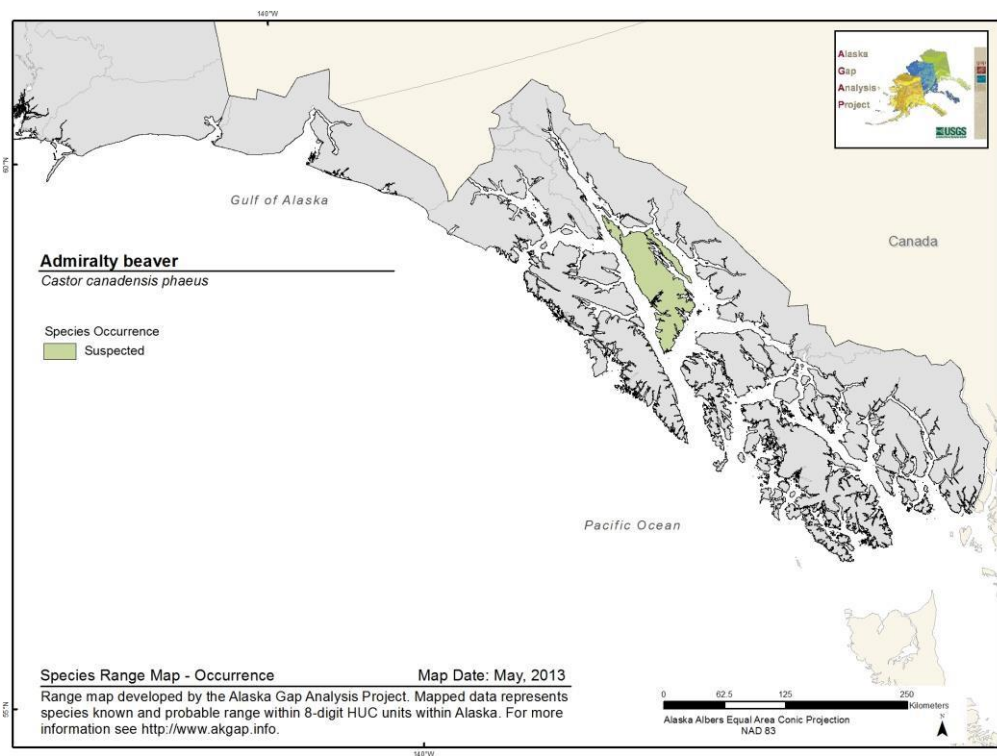
Patric, E. F. and W. L. Webb. 1953. A preliminary report on intensive beaver management. *North American Wildlife Conference*. 18(33): 533-539.

Slough, B. G., and R. M. F. S. Sadleir. 1977. A land capability classification system for beaver (*Castor canadensis*). *Canadian Journal of Zoology* 55:1324-1335.

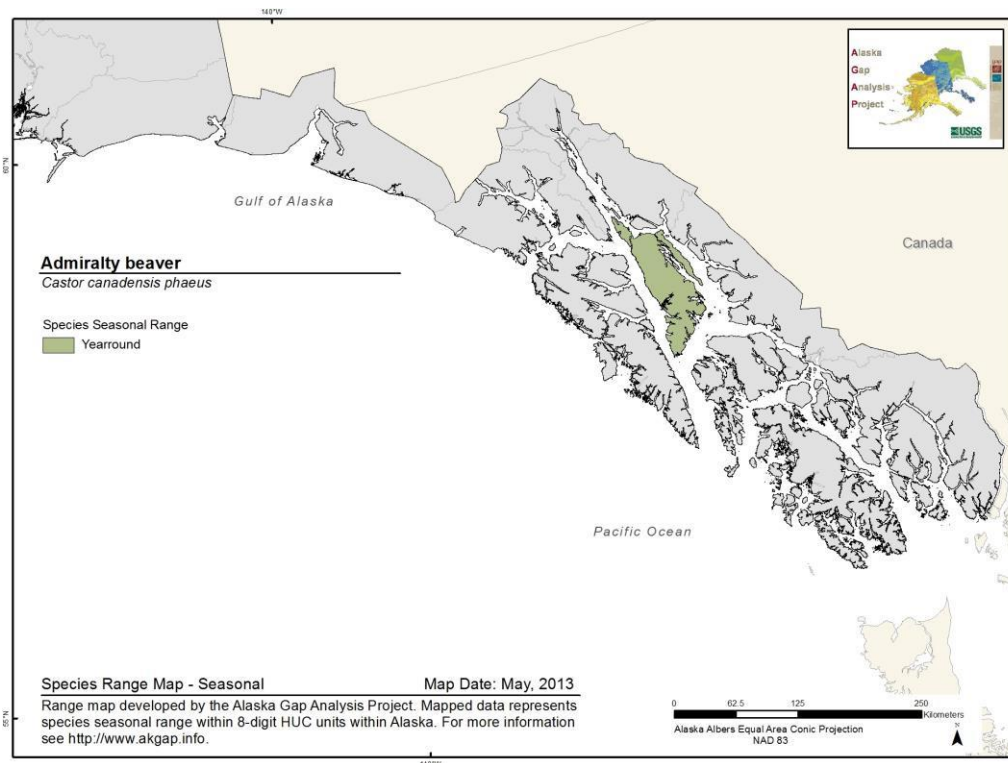
Admiralty Beaver *Castor canadensis phaeus*

Range Map and Distribution Model Summary

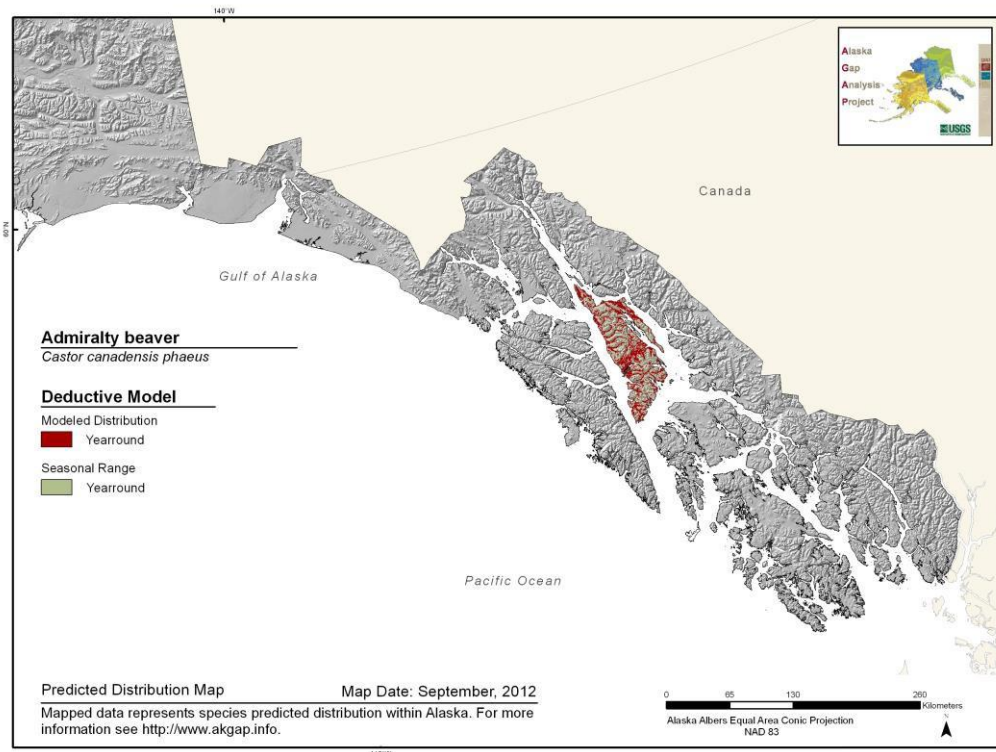
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Inhabit lakes, ponds, marshes, rivers and streams (MacDonald and Cook 2003). They prefer low gradient streams (which they modify), ponds, and small mud-bottomed lakes with dammable outlets (Slough and Sadleir 1977, Beier and Barrett 1987, Novak 1987a, McComb et al. 1990). Beavers readily occupy artificial ponds, reservoirs, and canals if food is available. They generally avoid lakes with strong wave action and fast-moving streams. Waters with greatly fluctuating flow or water levels generally are poor habitat. In larger rivers (9th order or larger streams), beavers use floodplains and backwaters. In the north, they require water that is deep enough such that it does not freeze to the bottom and allows the accumulation of a substantial food pile beneath the ice. Beavers are associated with deciduous tree and shrub communities (NatureServe 2007b).

References

Beier, P., and R. H. Barrett. 1987. Beaver habitat use and impact in Truckee River basin, California. *Journal of Wildlife Management* 51:794-799.

MacDonald, S. O. and J. A. Cook. 2003. Mammal inventory of Alaska's National Parks and Preserves: Gates of the Arctic National Park and Preserve. NPS Alaska Region, Inventory and Monitoring Program Annual Report 2002.

McComb, W. C., J. R. Sedell, and T. D. Buchholz. 1990. Dam-site selection by beavers in an eastern Oregon basin. *Great Basin Naturalist* 50:273-281.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

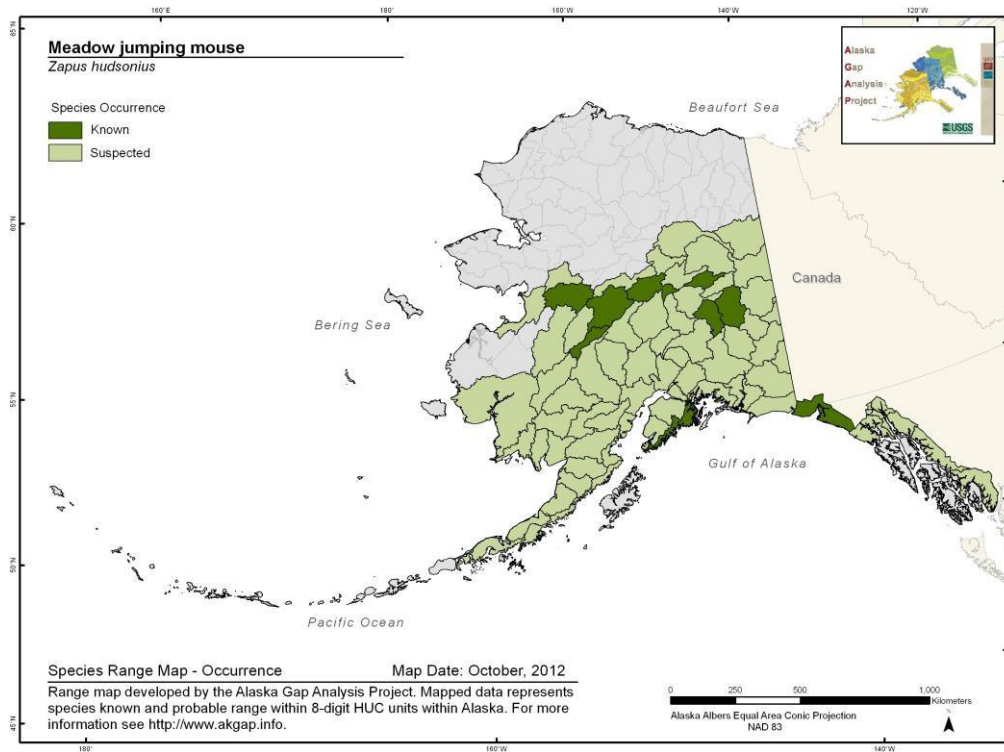
Novak, M. 1987a. Beaver. Pages 283-313 in M. Novak, et al. editors. *Wild furbearer management and conservation in North America*. Ontario Ministry of Natural Resources.

Slough, B. G., and R. M. F. S. Sadleir. 1977. A land capability classification system for beaver (*Castor canadensis*). *Canadian Journal of Zoology* 55:1324-1335.

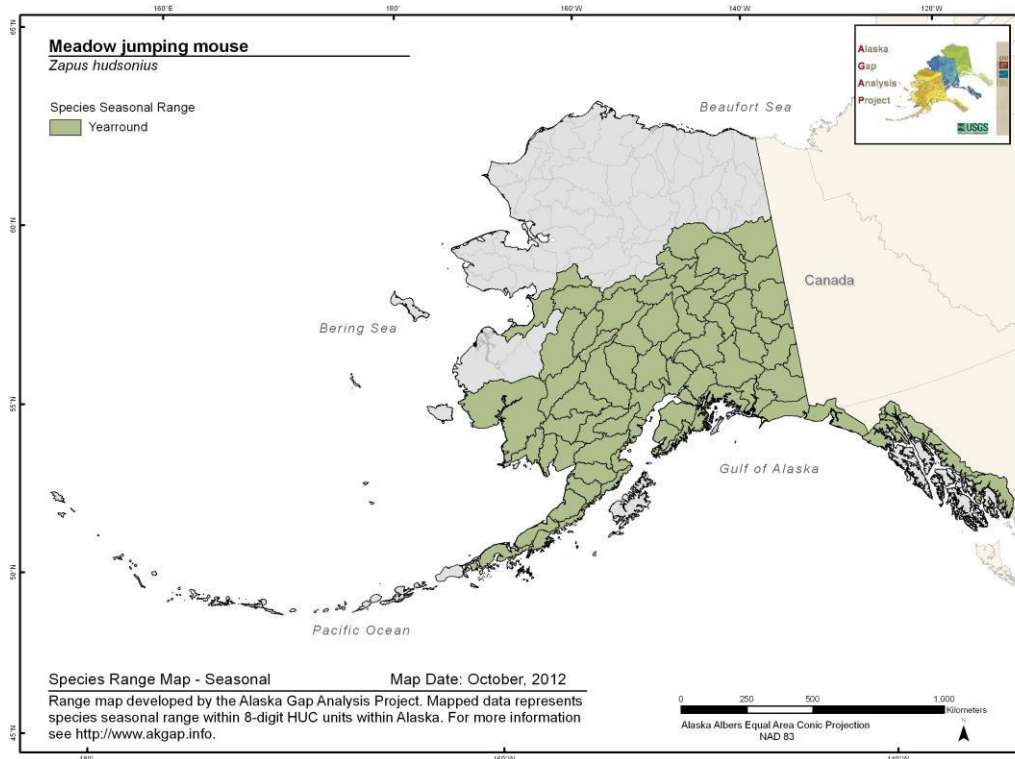
Meadow Jumping Mouse *Zapus hudsonius*

Range Map and Distribution Model Summary

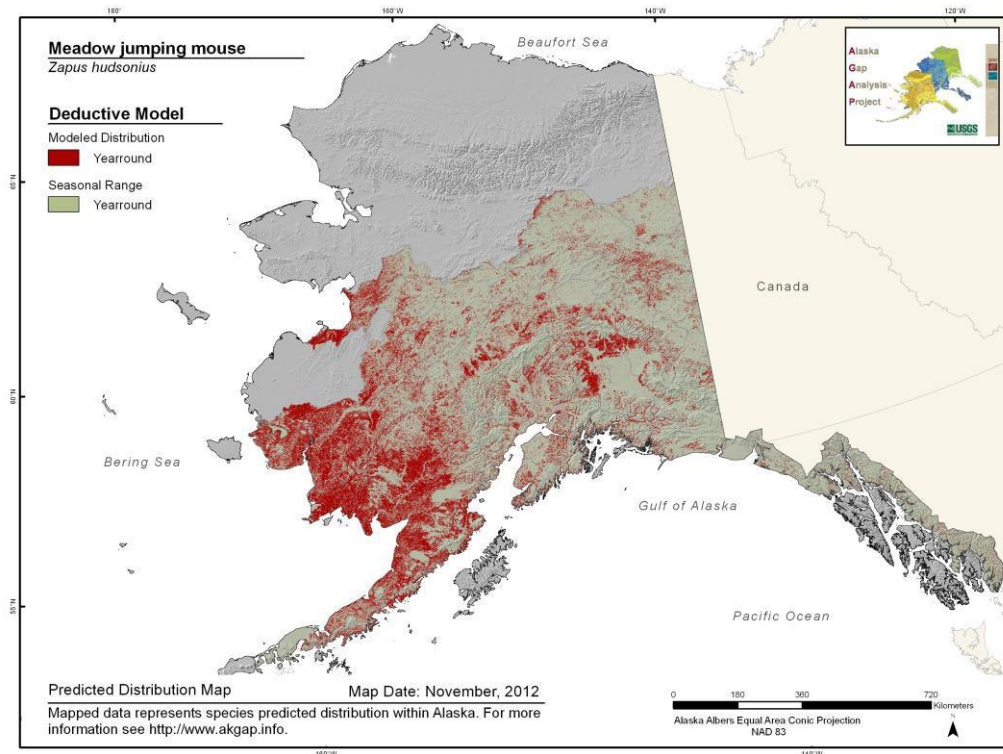
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.521**

**Model Quality
Summary:**
Low

Habitat Description

May be widespread in a variety of herbaceous meadow and shrub habitats, but typically more abundant in a lowland thick mosaic of vegetation along ponds, streams, and marshes. May require standing water nearby. In winter, hibernate underground in well-drained soils (MacDonald and Cook 2007). Avoids heavily wooded areas (NatureServe 2007b).

References

MacDonald, S.O. and J.A. Cook. 2007. Mammals and amphibians of Southeast Alaska. The Museum of Southwestern Biology, Special publication 8:1-191. University of New Mexico, Albuquerque, NM.

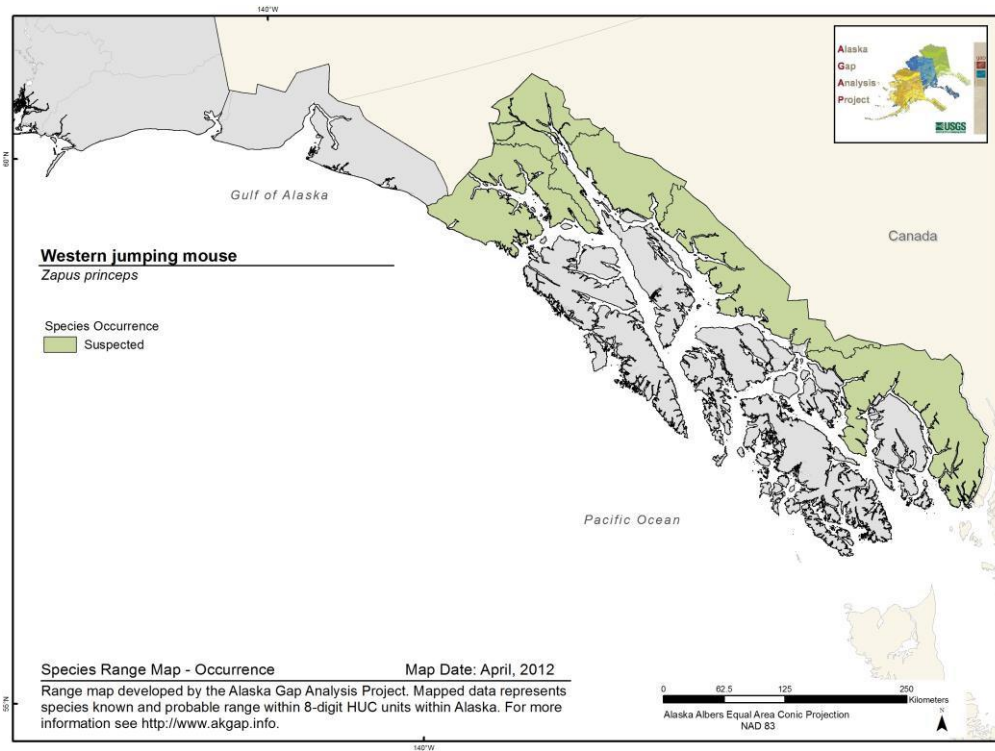
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Western Jumping Mouse

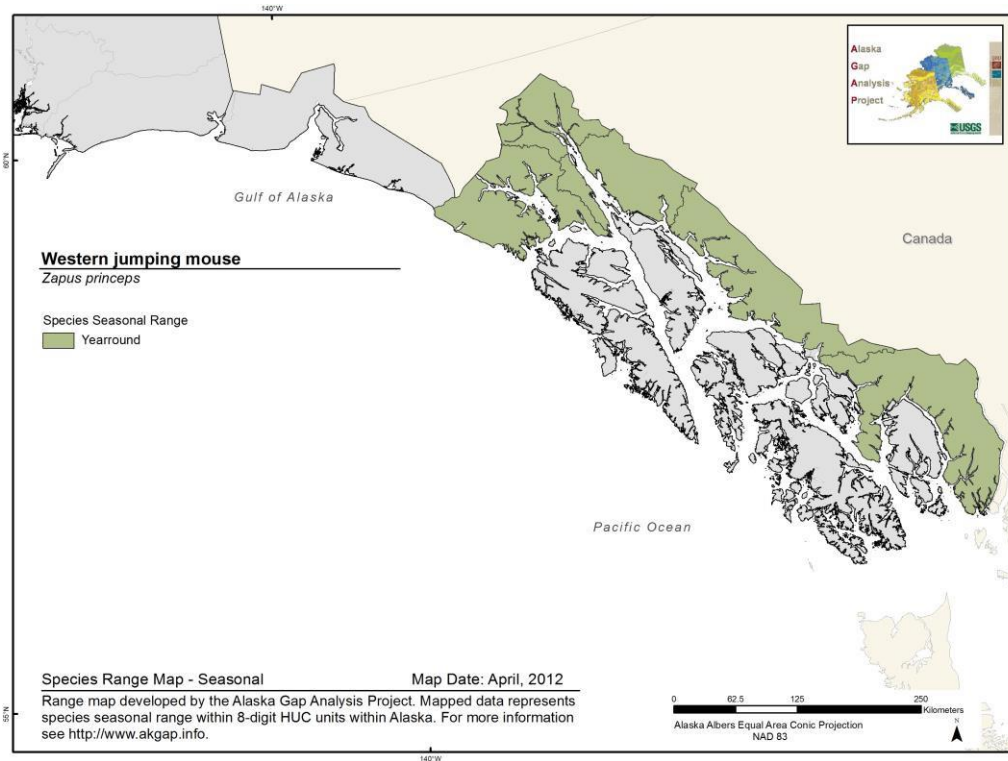
Zapus princeps

Range Map and Distribution Model Summary

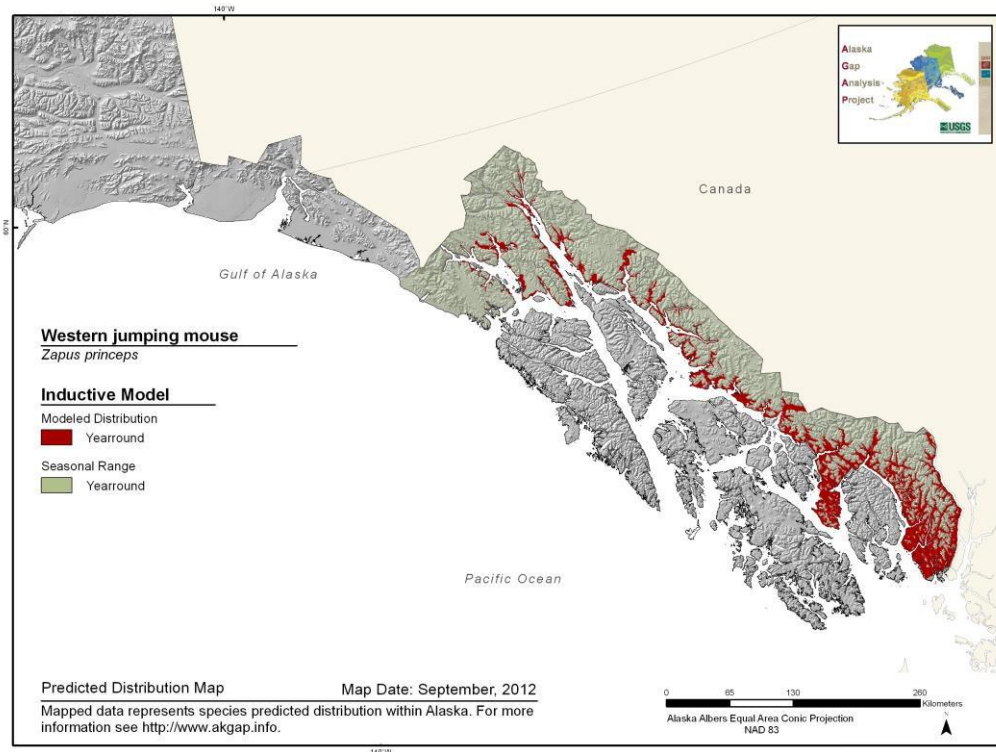
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Occurs from high mountain meadows to riparian streamsides, ponds, and marshes in lowlands where moist soils support a dense canopy of grasses, forbs, and shrubs. Hibernate in dry nest chamber during winter (Cranford 1999). Build nests in tall grass at base of tall willow clumps (MacDonald and Cook 2009).

References

Cranford, J. A. 1999. Western jumping mouse, *Zapus princeps*. Pp. 668-669, in *The Smithsonian book of North American mammals* (D. E. Wilson and S. Ruff, eds.). Smithsonian Institution Press, Washington D. C., in association with the American Society of Mammalogists.

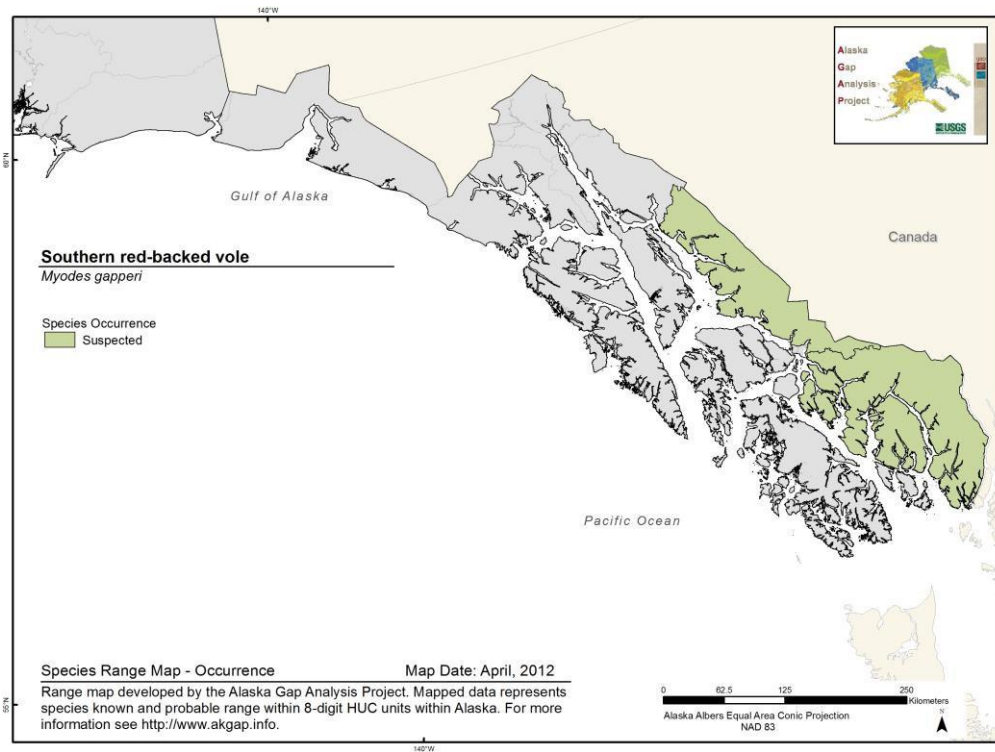
MacDonald, S. O. and J. A. Cook. 2009. *Recent Mammals of Alaska*. University of Alaska Press, Fairbanks, AK.

Southern Red-backed Vole

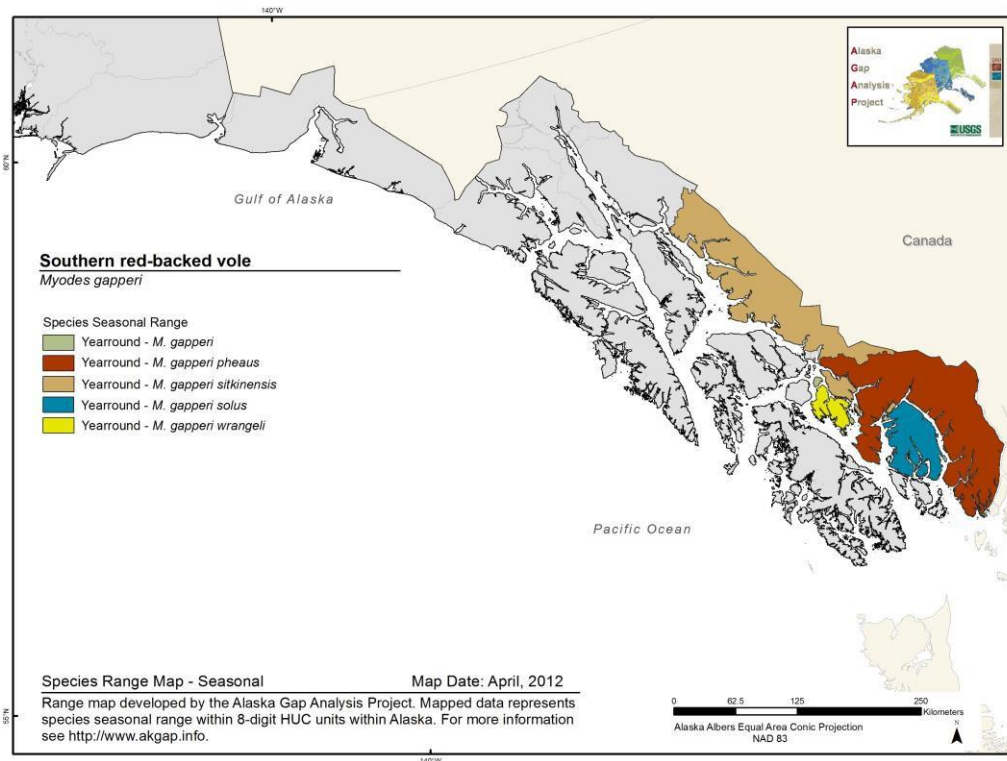
Myodes gapperi

Range Map and Distribution Model Summary

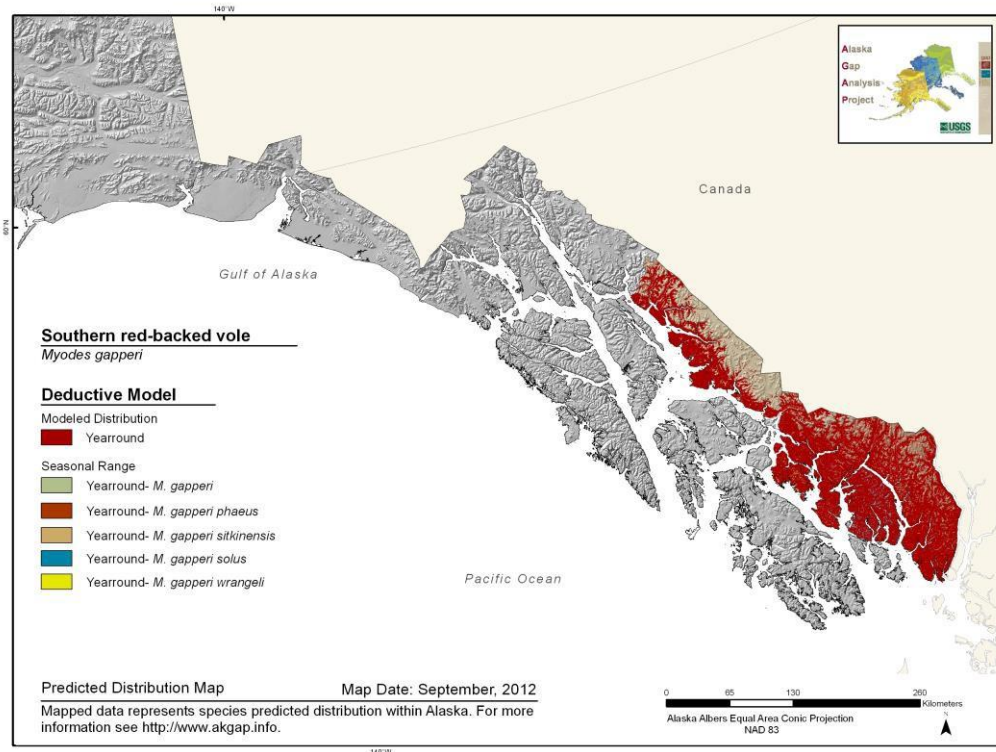
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.874**

**Model Quality
Summary:**
Moderate

Habitat Description

Habitat generalists inhabiting a variety of habitats, especially forest, woodland, and shrub habitats (MacDonald and Cook 2009). Prefers cool, mesic old-growth or second-growth deciduous, coniferous, or mixed forests, especially areas with large amount of ground cover. Regardless of forest type, voles favor mesic habitats and moist micro-environments. Muskegs and associated scrub and mixed-conifer forests of southeastern Alaska are not likely to support breeding populations of *C. gapperi*, however, black spruce (*Picea mariana*) peatlands of boreal forest apparently do support viable populations (Smith and Nichols 2004).

References

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

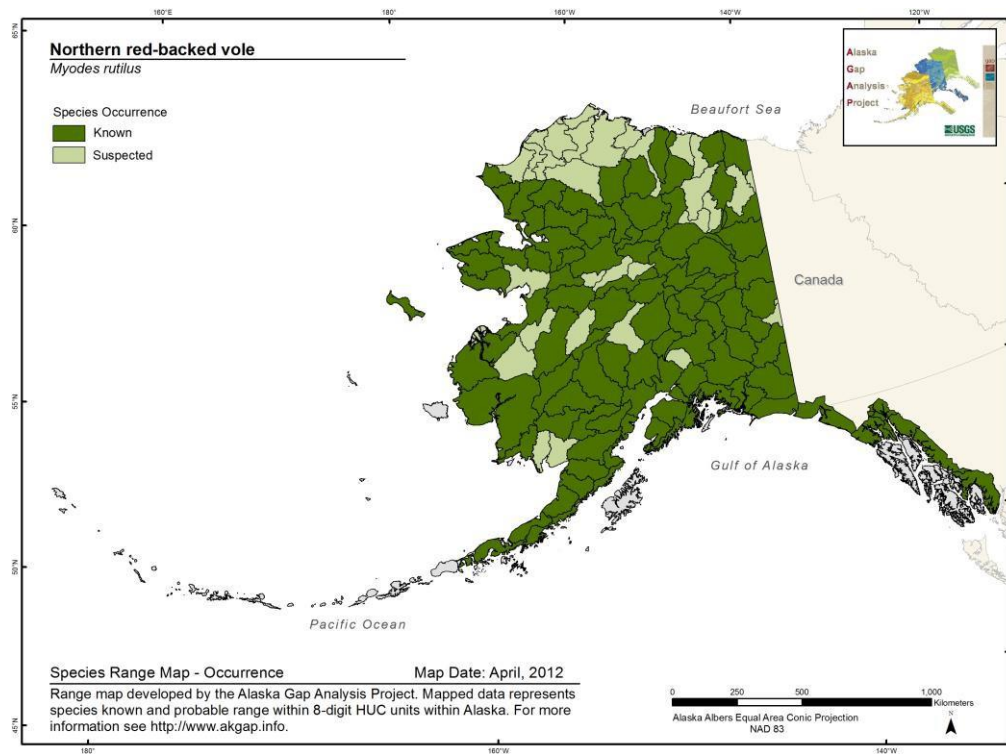
Smith, W. P. and J. V. Nichols. 2004. Demography of two endemic forest-floor mammals of southeastern Alaskan temperate rain forest. *Journal of Mammalogy* 85:540-551.

Northern Red-backed Vole

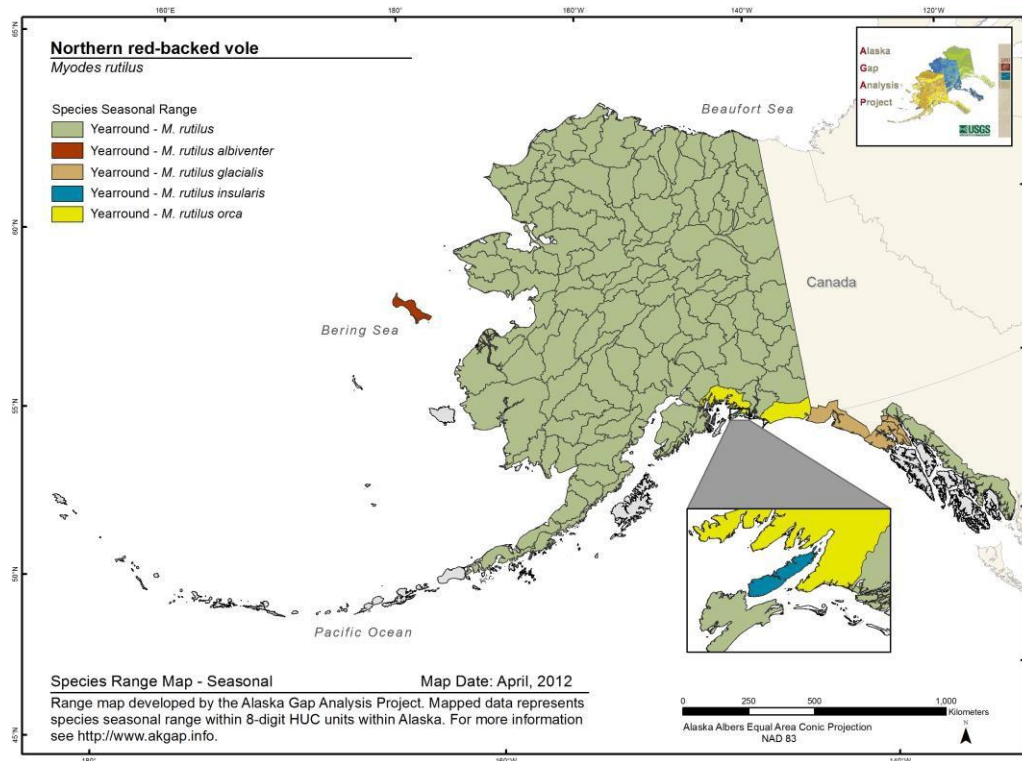
Myodes rutilus

Range Map and Distribution Model Summary

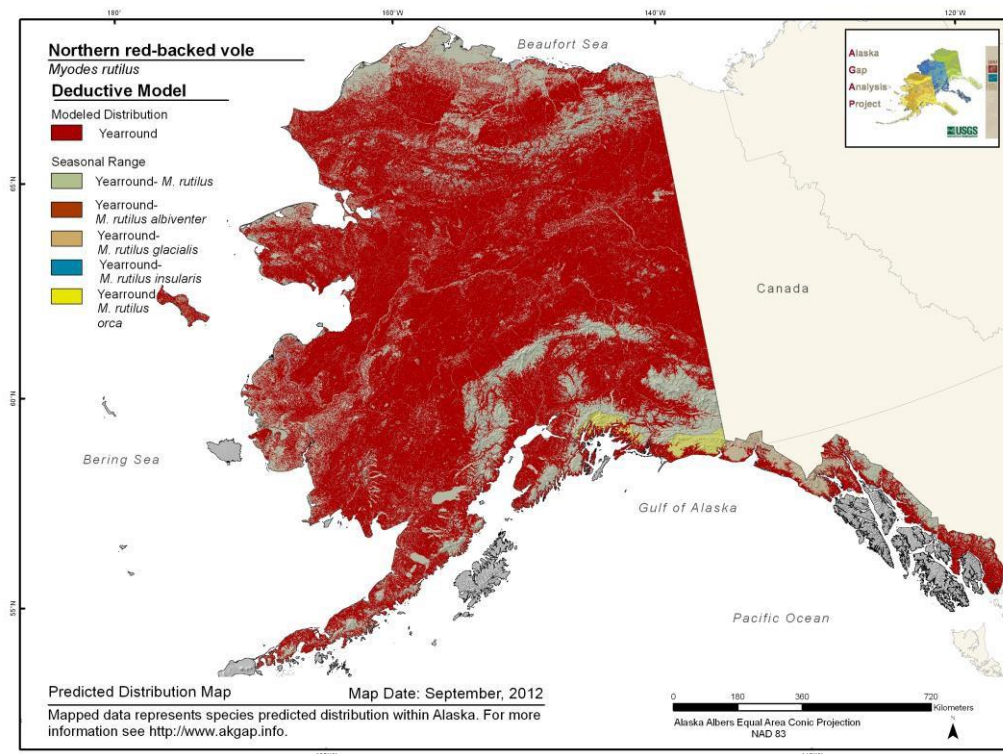
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

Model Evaluation Statistic (AUC): No AUC

Model Quality Summary:
Not validated

Habitat Description

At the species level, occupies a variety of habitat types, especially forest, woodland, and shrub habitats (Guthrie 1968, Kessel et al. 1982, MacDonald 1980, West 1974, West 1979). Dry tundra and alpine, damp forest floor in northern spruce forests and taiga (NatureServe 2007b).

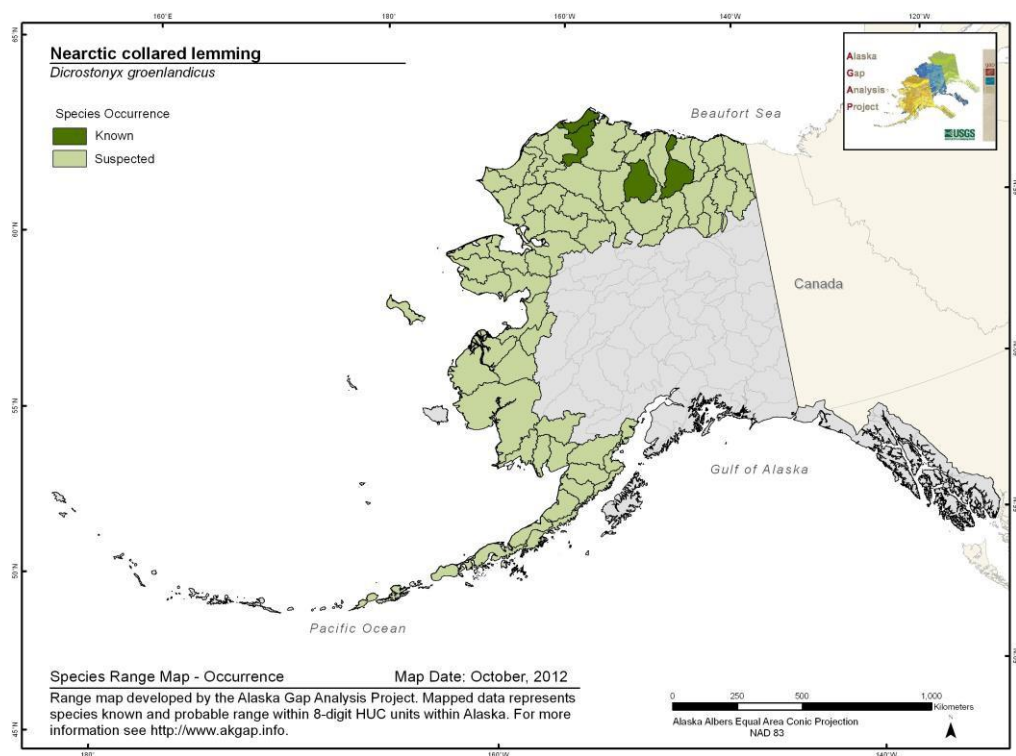
References

- Guthrie, R. D. 1968. Paleoecology of a late Pleistocene small mammal community from interior Alaska. *Arctic* 21: 223-244.
- Kessel, B., S. O. MacDonald, D. D. Gibson, B. A. Cooper, and B. A. Anderson. 1982. Birds and nongame mammals baseline studies. Susitna Hydroelectric Project Environmental Studies Phase I Final Report to the Alaska Power Authority.
- MacDonald, S. O. 1980. Habitats of small mammals and birds: Evaluating the effects of agricultural development in the Delta Junction area, Alaska. Unpublished report for the State of Alaska, Department of Natural Resources, Division of Lands and Water Management, Fairbanks.
- NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- West, S. D. 1974. Post-burn population response of the northern red-backed vole *Clethrionomys rutilus*, in Interior Alaska. Unpublished thesis. University of Alaska Fairbanks.
- West, S. D. 1979. Habitat responses of microtine rodents to central Alaskan forest succession. Unpublished dissertation. University of California, Berkeley.

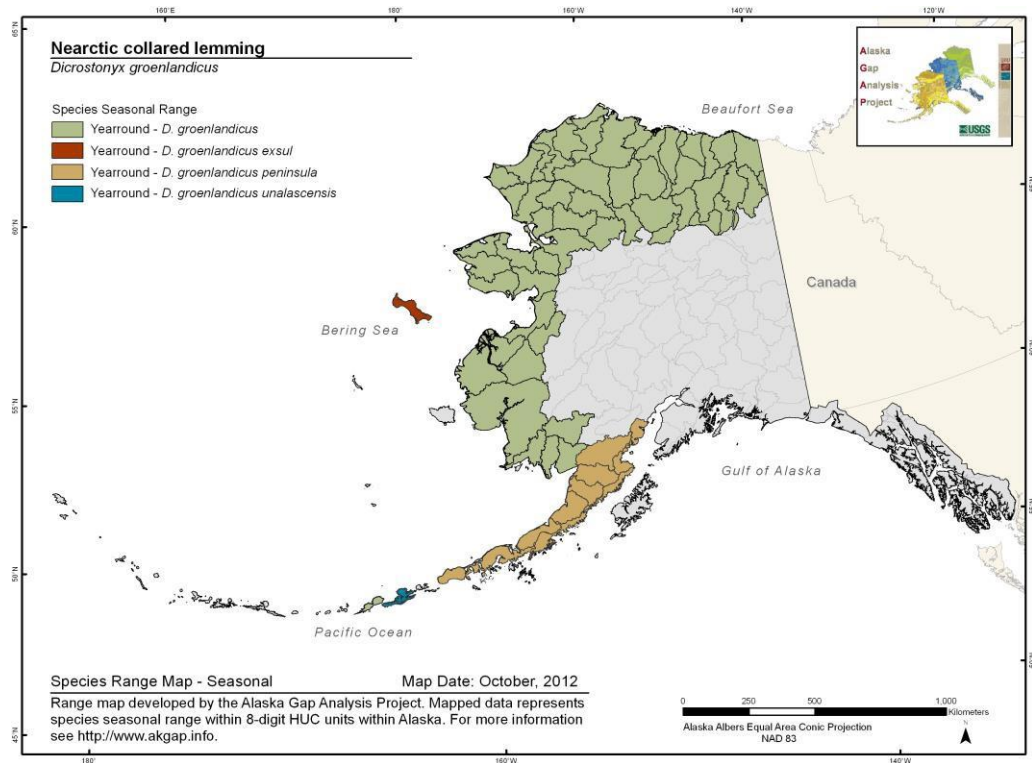
Nearctic Collared Lemming *Dicrostonyx groenlandicus*

Range Map and Distribution Model Summary

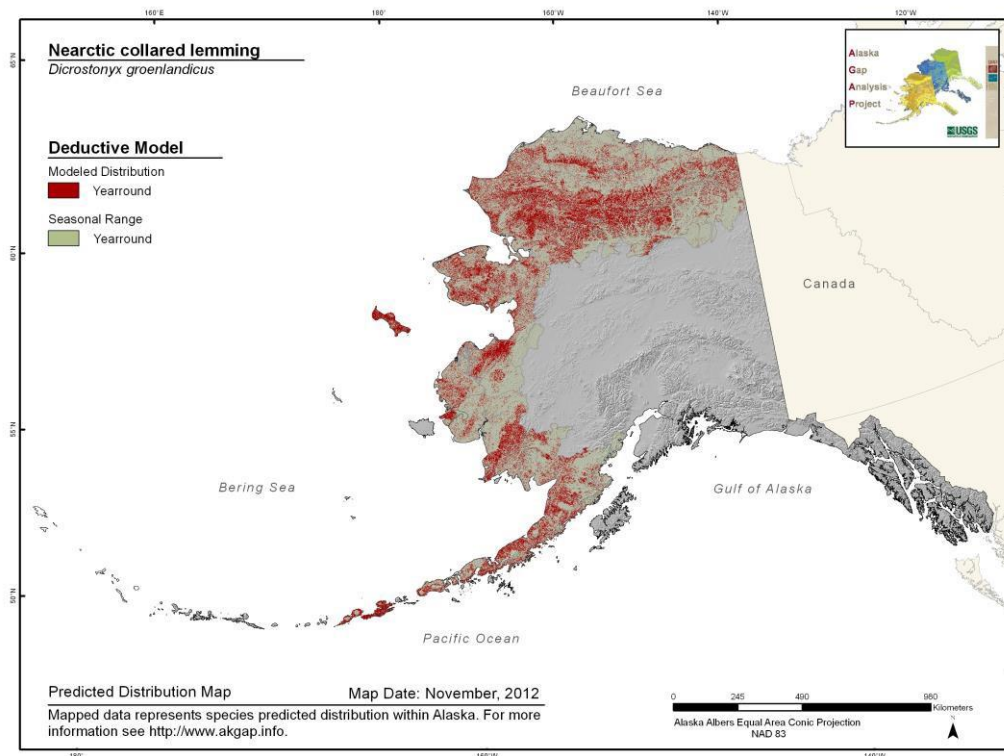
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.5**

**Model Quality
Summary:**
Low

Habitat Description

Generally inhabit Arctic tundra; often found in relatively dry, high, and rocky tundra habitats such as ridges and hummocks and habitats with an abundance of willow (*Salix* spp.) shrubs (Banfield 1974, Predavec and Krebs 2000). Closely associated with cotton-grass sedges (Bee and Hall 1956). Occupies runways beneath snow; also tunnels down to permafrost level. In a study of microhabitat use in northern Canada, collared lemmings preferred tundra with high hummocks, high percent cover of plants (especially *Salix lanata*) and numerous burrows (Predavec and Krebs 2000).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

Bee, J.W. and E.R. Hall. 1956. Mammals of northern Alaska on the Arctic Slope. Univ. Kansas Mus. Nat. Hist. Misc. Publ. No. 8. 309 p.

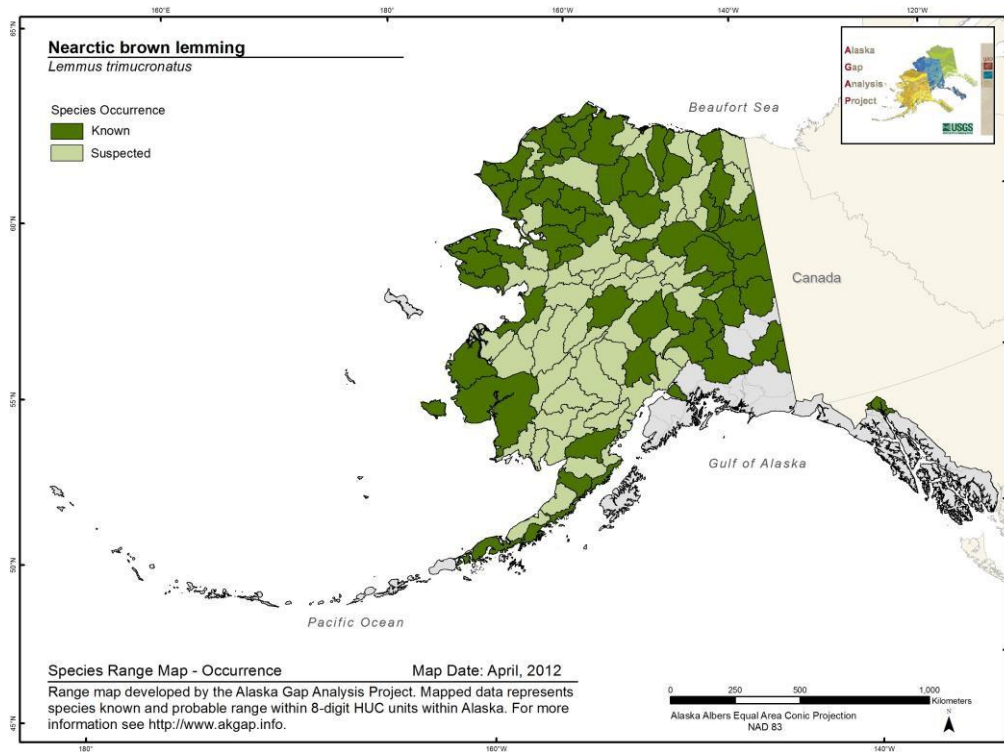
Predavec, M. and C.J. Krebs. 2000. Microhabitat utilisation, home ranges, and movement patterns of the collared lemming (*Dicrostonyx groenlandicus*) in the central Canadian Arctic. Canadian Journal of Zoology 78:1885-1890.

Nearctic Brown Lemming

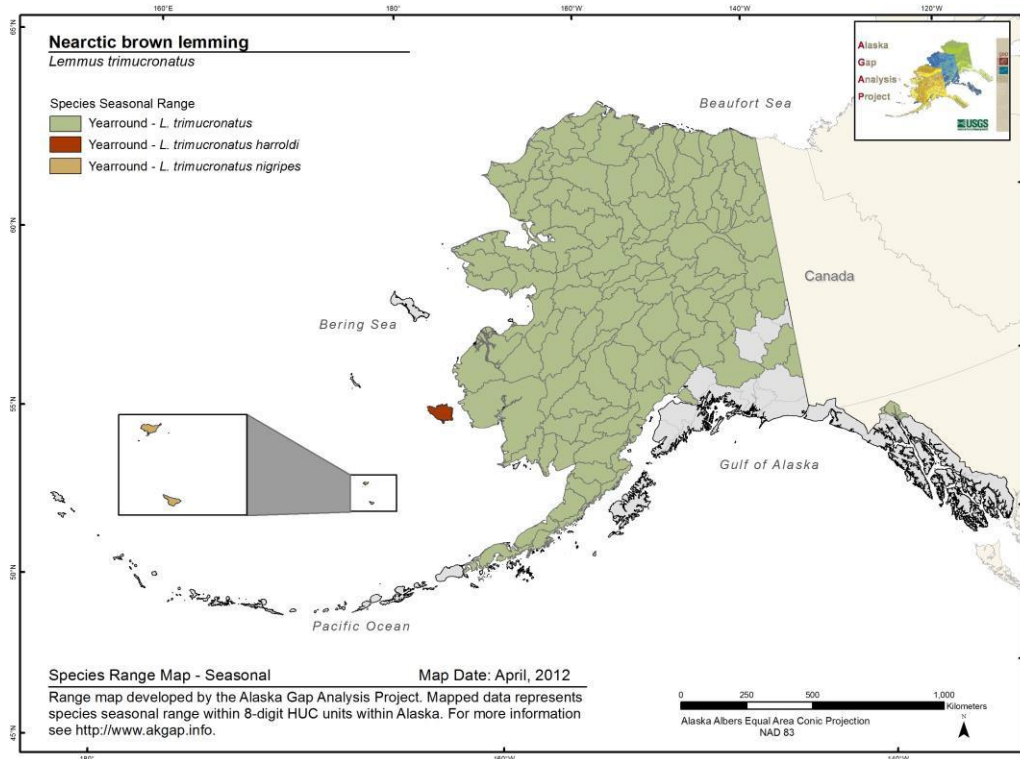
Lemmus trimucronatus

Range Map and Distribution Model Summary

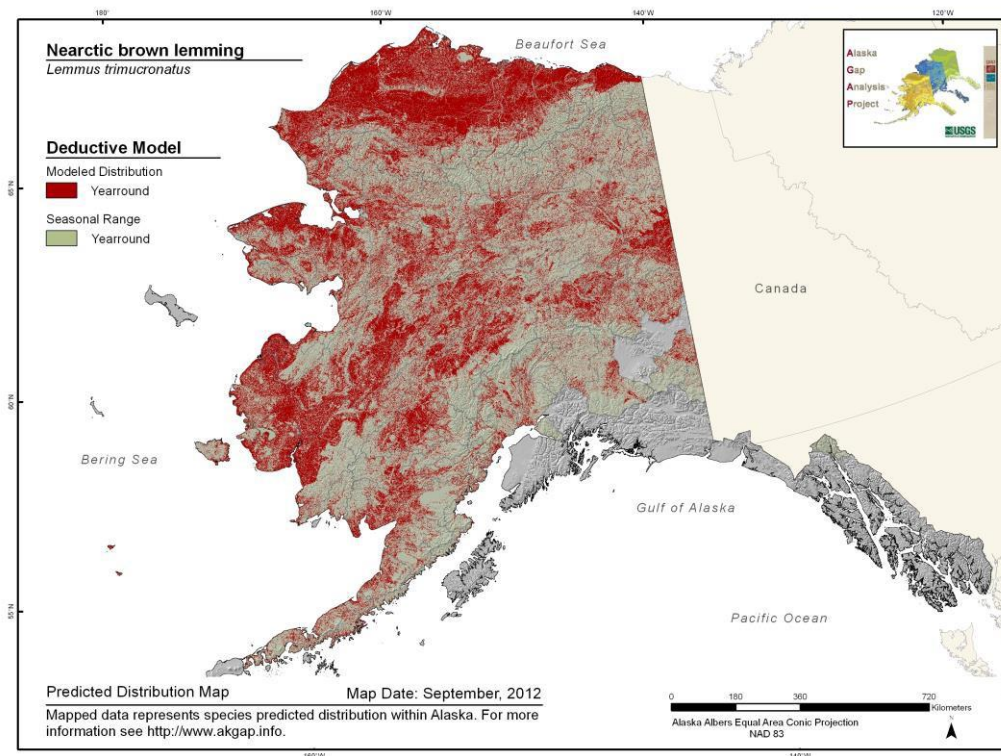
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Species inhabits a variety of arctic, alpine tundra and taiga habitats (Pitelka and Batzli 1993). At lower elevations (as with this subspecies) occurs within spruce bogs and wet meadows and above tree line associated with wet sedge-grass tundra (Buckley and Libby 1957, Kessel et al. 1982). Strongly associated with polygonal mesic habitats. Seasonal patterns in habitat use observed in Barrow Alaska with brown lemmings using higher, drier habitats during early summer and shifting to lower, wetter habitats once flooding recedes and during winter. All patterns were related to food availability, specifically clipped shoots during winter (Batzli et al. 1983).

References

Batzli, G. O., F. A. Pitelka, and G. N. Cameron. 1983. Habitat use by lemmings near Barrow, Alaska. *Holarctic Ecology* 6:255-262.

Buckley, J. L., and W. L. Libby. 1957. Research and reports on aerial interpretation of terrestrial bioenvironments and faunal populations. Arctic Aeromedical Laboratory, Fairbanks, Alaska, Technical Report 57-32.

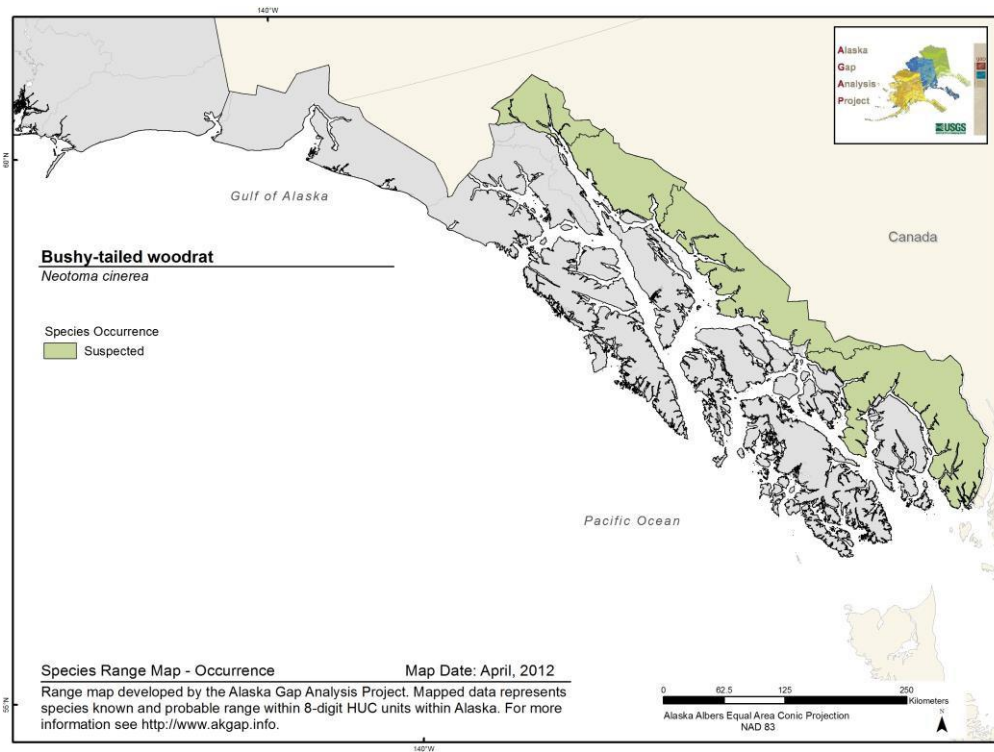
Kessel, B., S. O. MacDonald, D. D. Gibson, B. A. Cooper, and B. A. Anderson. 1982. Birds and nongame mammals baseline studies. Susitna Hydroelectric Project Environmental Studies Phase I Final Report to the Alaska Power Authority.

Pitelka, F. A. and G. O. Batzli. 1993. Distribution, abundance, and habitat use by lemmings on the north slope of Alaska. Pp. 213-236 in *The Biology of Lemmings* (Stenseth, N. C. and R. A. Ims, eds). Academic Press, New York.

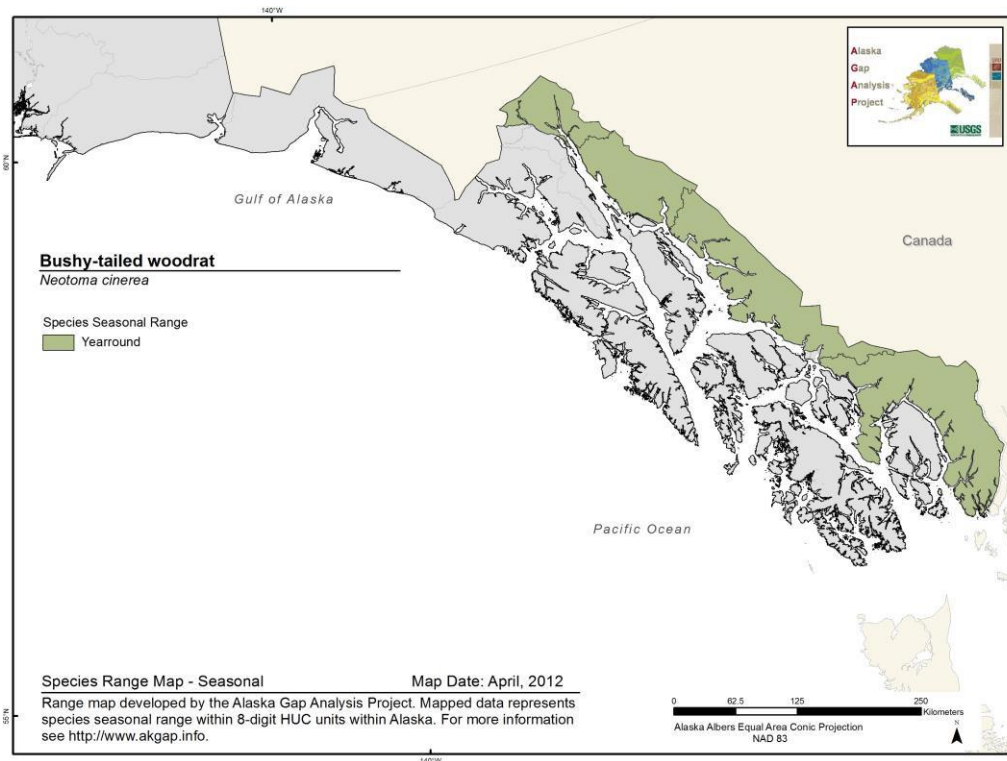
Bushy-tailed Woodrat *Neotoma cinerea*

Range Map and Distribution Model Summary

Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model

No model available.

Model Summary

Model Type:

Rejected all models

Model

Evaluation

Statistic

(AUC): No

AUC

Model Quality

Summary:

Not validated

Habitat Description

The availability of rock shelters may be a more important resource for the bushy-tailed woodrat than the associated plant community (Finley 1958, Escherich 1981, Carey et al. 1999). Inhabits mountains, cliffs, talus slopes, caves, and rock outcrops, both in forests and open deserts with rocky substrates; also in deserted buildings and mine shafts from sea level to the summit of mountains (Banfield 1974, Smith 1997). Inhabit areas from sea level to 14,110 feet (4,300 m) and are most often associated with montane habitats (Escherich 1981, Grayson et al. 1996, Stukel 1999). Bushy-tailed woodrats are arboreal rodents, associating primarily with ponderosa pine, Douglas-fir, spruce (*Abies* spp.), and quaking aspen (*Populus tremuloides*) forests (Finley 1958, Escherich 1981, Maser 1981). In western Oregon and western Washington, bushy-tailed woodrats preferred mature (>80 years), unmanaged upland Douglas-fir-western hemlock streamside forests more than young (35 to 80 years), "managed" streamside forest. Streams in this habitat were narrow, deeply cut, and associated with forested boulder fields (Carey et al. 1999).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

Carey, A. B., C. C. Maguire, B. L. Biswell, and T. M. Wilson. 1999. Distribution and abundance of *Neotoma* in western Oregon and Washington. *Northwest Science*. 73(2): 65-80.

Escherich, P. C. 1981. Social biology of the bushy-tailed woodrat, *Neotoma cinerea*. Berkeley, CA: University of California Press. 132 p.

Finley, R. B., Jr. 1958. The woodrats of Colorado: distribution and ecology. In: E. R. Hall, H. S. Fitch, and H. B. Tordoff, eds. [Book title unknown] 10(6). Lawrence, KS: University of Kansas Publications, Museum of Natural History: 213-552.

Grayson, D. K., S. D. Livingston, E. Rickart, and M. W. Shaver III. 1996. Biogeographic significance of low-elevation records for *Neotoma cinerea* from the northern Bonneville Basin, Utah. *The Great Basin Naturalist*. 56(3): 191-196.

Maser, C. 1981. Land mammals. In: *Natural history of Oregon Coast mammals*. Gen. Tech. Rep. PNW-133. Portland, OR: USDA, USFS, Pacific Northwest Forest and Range Experiment Station: 35-371.

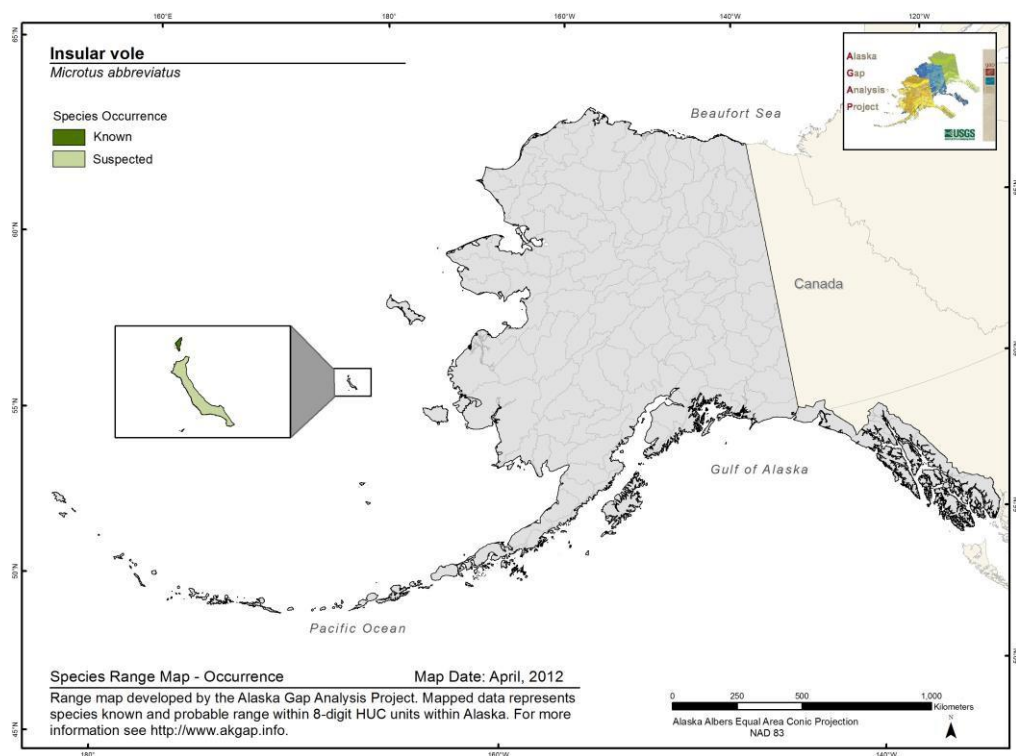
Smith, F. A. 1997. *Neotoma cinerea*. *Mammalian Species* (564):1-8.

Stukel, E. D. 1999. Dakota Natural Heritage: The woodrats. *South Dakota Conservation Digest*. 66(3): 22-23.

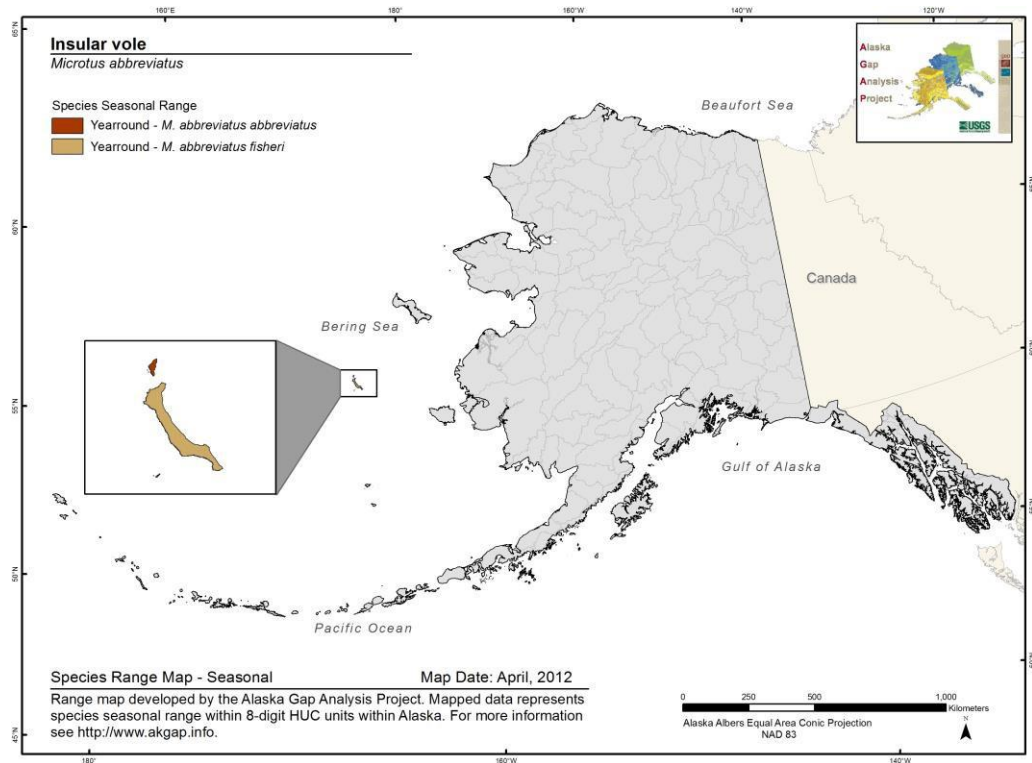
Insular Vole *Microtus abbreviatus*

Range Map and Distribution Model Summary

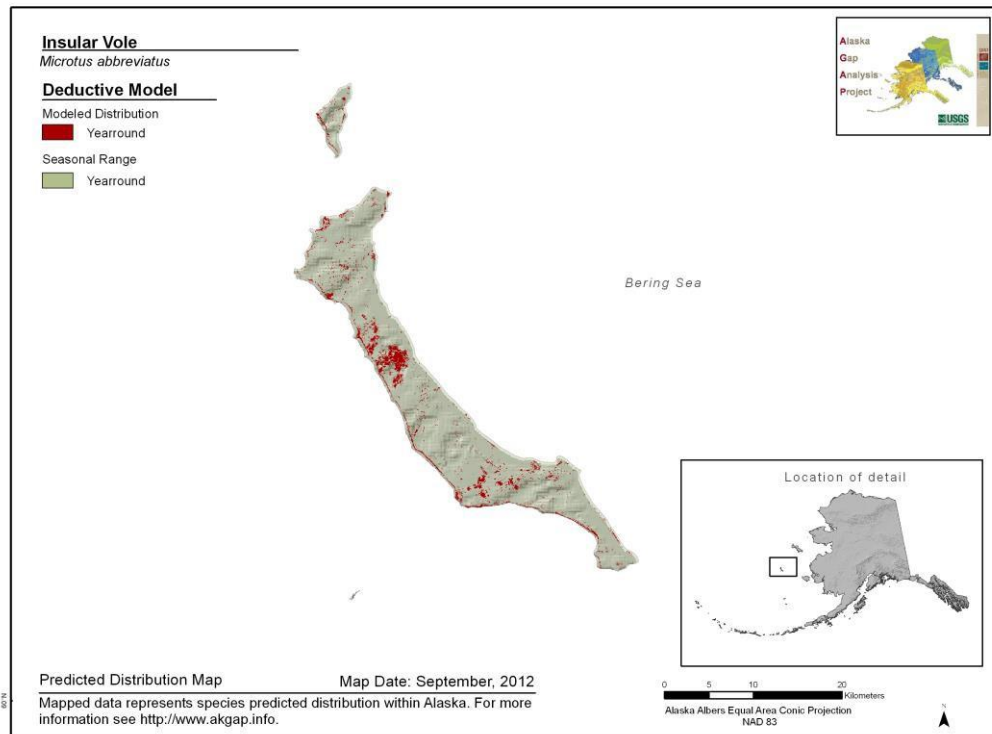
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): No
AUC**

Model Quality Summary:
Not validated

Habitat Description

Colonies are found in vegetation of moist, relatively well-drained lowlands, at lower elevations on mountain slopes, beach ridges where rye grass grows, and lower slopes of islands. Burrow systems often near rocky outcrops and small streams (Cook and Klein 1999, Rausch and Rausch 1968). They were not found in dry lowlands or areas with much standing water (Rausch and Rausch 1968).

References

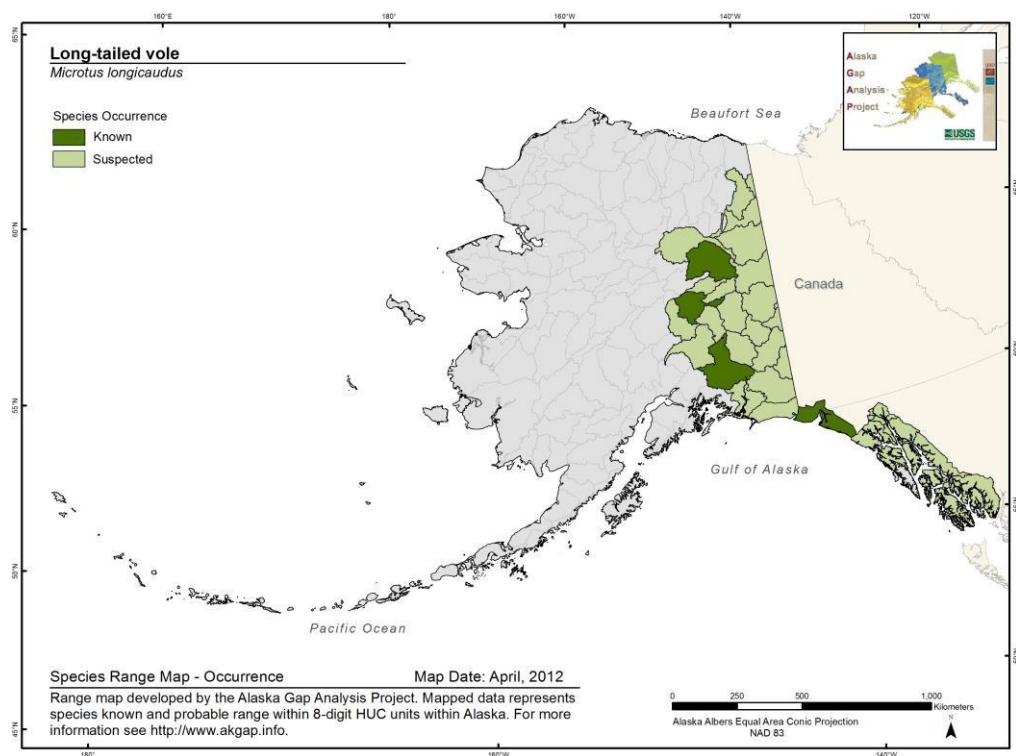
Cook, J. A. and D. R. Klein. 1999. Insular vole, *Microtus abbreviatus*. Pp. 623-624, in The Smithsonian book of North American mammals (D. E. Wilson and S. Ruff, eds.). Smithsonian Institution Press, Washington D. C., in association with the American Society of Mammalogists.

Rausch, R. L. and V. R. Rausch. 1968. On the biology and systematic position of *Microtus abbreviatus* Miller, a vole endemic to the St. Mathew Islands, Bering Sea. *Zeitschrift fur Saugetierkunde* 33: 65-99.

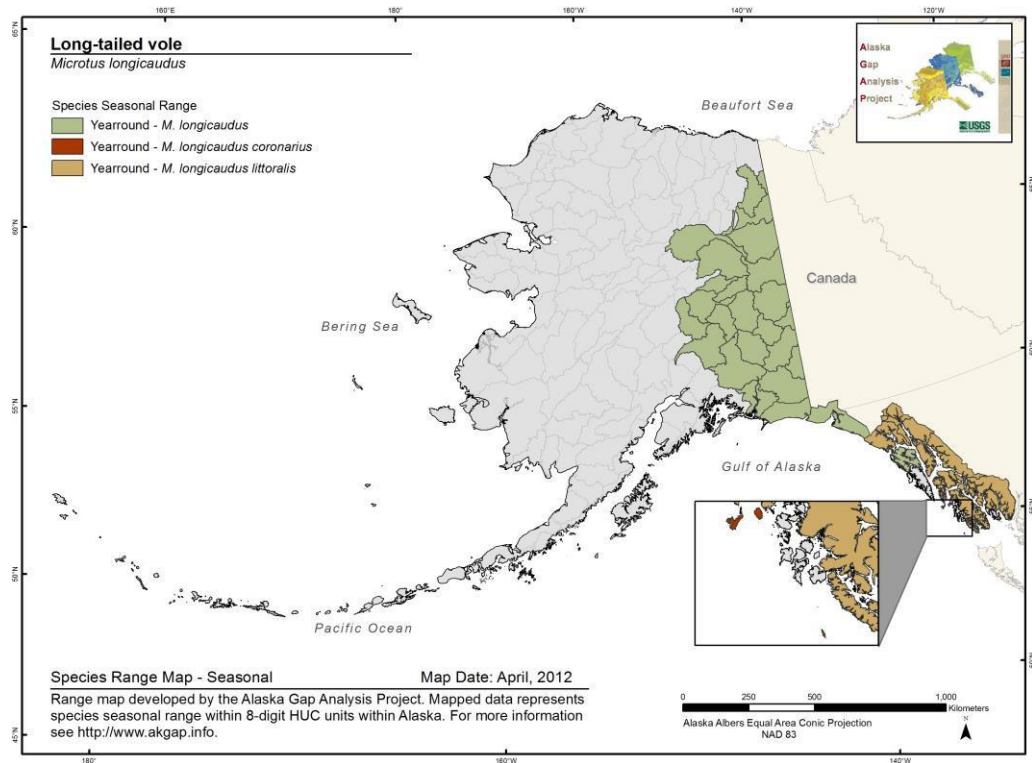
Long-tailed Vole *Microtus longicaudus*

Range Map and Distribution Model Summary

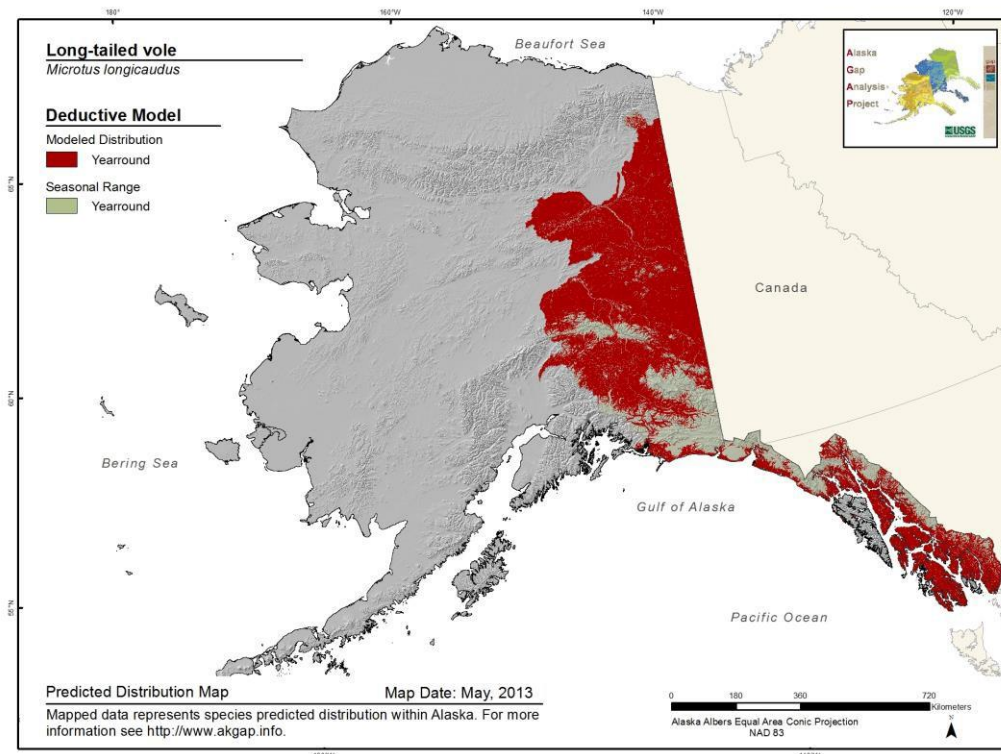
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.711**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabits a wide variety of habitats, including grassy openings in forests, dense coniferous forests, moist meadows, shrub thickets, rocky mountain slopes and tundra, and around streams, lakes, and marshes (Banfield 1974, NatureServe 2007b). Occurs near forest-edges and cut or burned forest (NatureServe 2007b). On Chichagof Island associated with alder compared to conifer patches (Hanley 1996). On Prince of Wales, 7-10 year old stands of spruce - western hemlock forests were more productive for voles compared to other seral stages. Understory was more shrubby and there was a higher probability of occurrence in areas with low upper canopy cover and high lower canopy cover. Densities were also positively correlated with log and herb cover (Van Horne 1982). At higher elevations thought to occupy meadow habitats (Dalquest 1948, Findley et al. 1975, Jenkins 1948).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

Dalquest, W. W. 1948. Mammals of Washington. University of Kansas, Lawrence.

Findley, J. S., A. H. Harris, D. E. Wilson, and C. Jones. 1975. Mammals of New Mexico. University of New Mexico Press, Albuquerque.

Hanley, T. A. 1996. Small mammals of even-aged, red alder - conifer forests in Southeastern Alaska. Canadian Field-Naturalist 110: 626-629.

Jenkins, H. O. 1948. A population study of the meadow mice (*Microtus*) in three Sierra Nevada meadows. Proc. Calif. Acad. Sci. (4th Ser.), 26: 43-67.

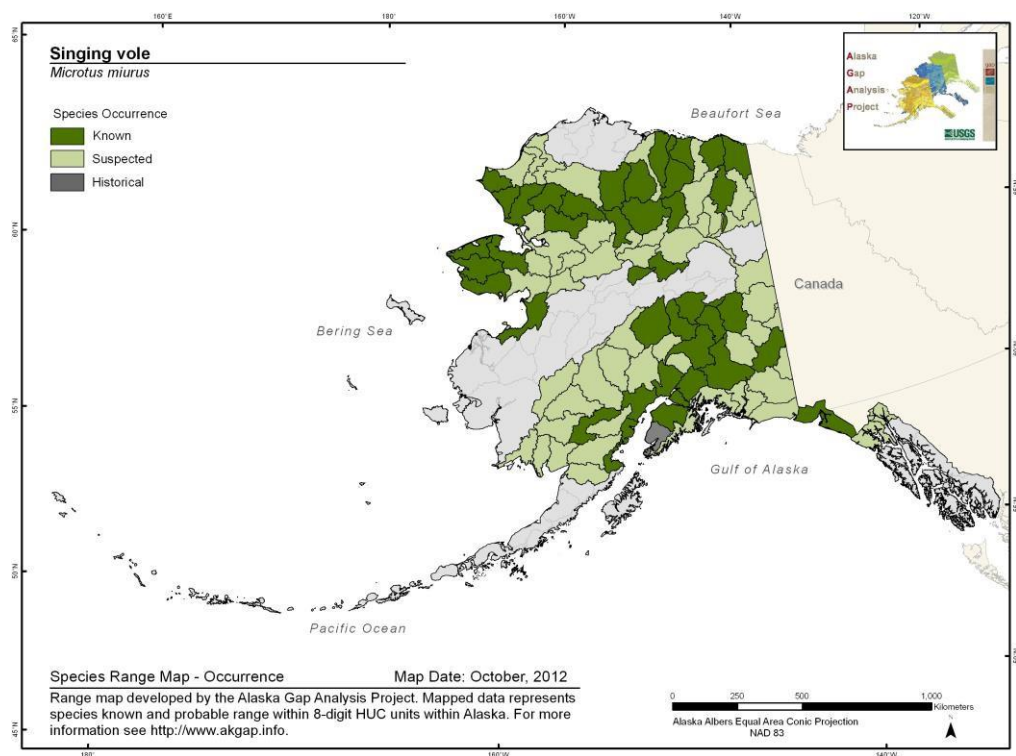
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Van Horne, B. 1982. Demography of the longtail vole *Microtus longicaudus* in seral stages of coastal coniferous forest southeast, Alaska. *Canadian Journal of Zoology* 60: 1690-1709.

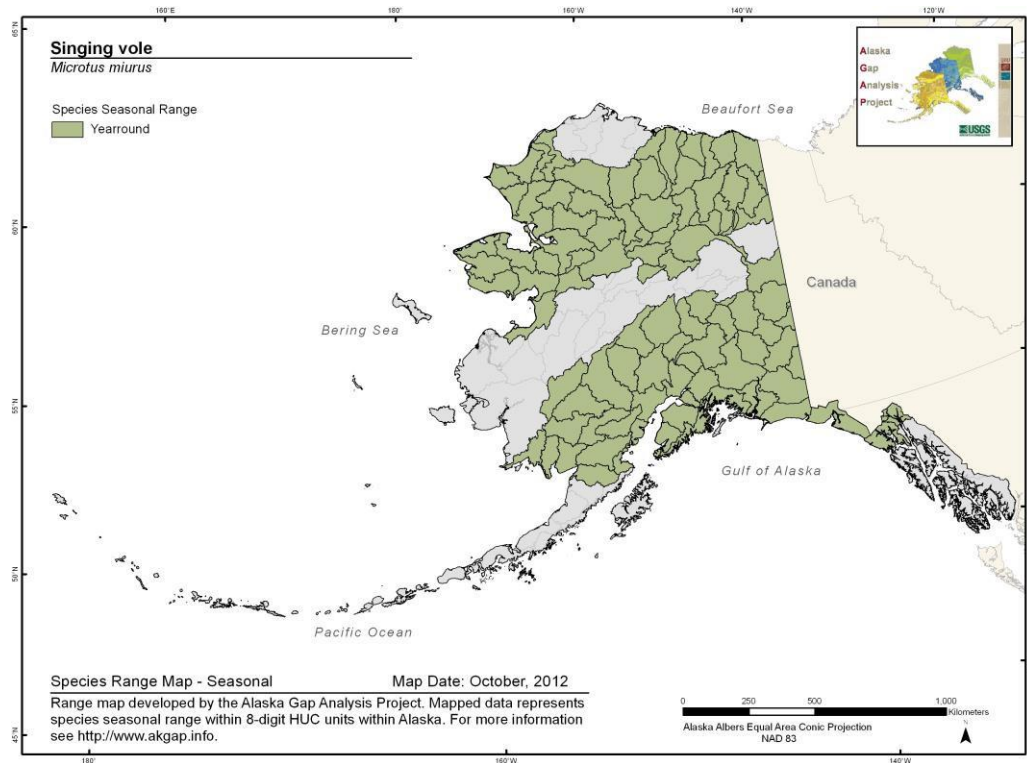
Singing Vole *Microtus miurus*

Range Map and Distribution Model Summary

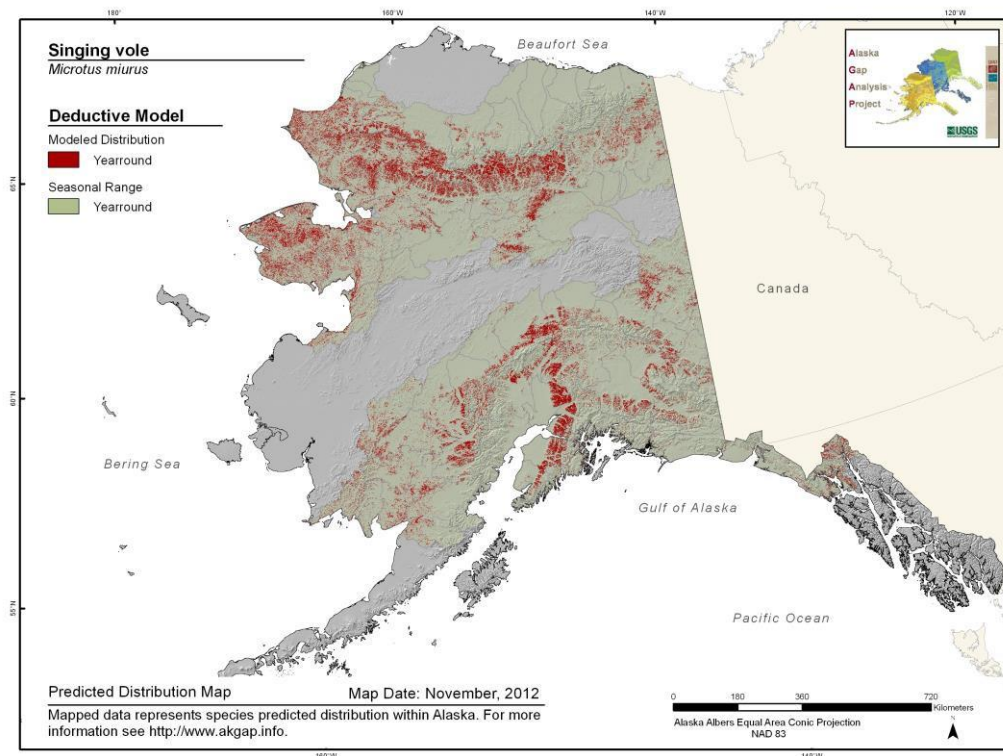
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.632**

**Model Quality
Summary:**
Low

Habitat Description

Inhabits a variety of tundra and taiga-tundra habitats on well-drained sites, sometimes along streambanks and near or above tree line. Burrow systems are associated with willows and rocky areas (Batzli and Henttonen 1993, Bee and Hall 1956, Douglass 1984, Galindo and Krebs 1985, Murie 1961, Quay 1951, Rausch 1953a, Youngman 1975). Occurs on slopes, benches, streambanks, areas with scattered dwarf willows, wet tundra (Burt and Grossenheider 1976, Musser and Carleton, in Wilson and Reeder 1993).

References

- Batzli, G. O. and H. Henttonen. 1993. Home range and social organization of the singing vole (*Microtus miurus*). *Journal of Mammalogy* 74: 868-878.
- Bee, J.W. and E.R. Hall. 1956. Mammals of northern Alaska on the Arctic Slope. Univ. Kansas Mus. Nat. Hist. Misc. Publ. No. 8. 309 p.
- Burt, W. H., and R. P. Grossenheider. 1976. A field guide to the mammals. Third edition. Houghton Mifflin Co., Boston. 289 pp.
- Douglas, R. J. 1984. Ecological distribution of small mammals in the DeLong Mountains of northwestern Alaska. *Arctic* 37: 148-154.
- Galindo, C. and C. J. Krebs. 1985. Habitat use by singing voles and tundra voles in the southern Yukon. *Oecologia* 66: 430-436.
- Murie, A. 1961. A naturalist in Alaska. Devin-Adair Co., New York.
- Quay, W. B. 1951. Observations on mammals of the Seward Peninsula, Alaska. *Journal of Mammalogy* 32: 88-99.

Rausch, R. L. 1953a. On the status of some arctic mammals. *Arctic* 6: 91-148.

Wilson, D. E., and D. M. Reeder (editors). 1993. *Mammal Species of the World: a Taxonomic and Geographic Reference*. Second Edition. Smithsonian Institution Press, Washington, DC. xviii + 1206 pp. Available online at: <http://www.nmnh.si.edu/msw/>.

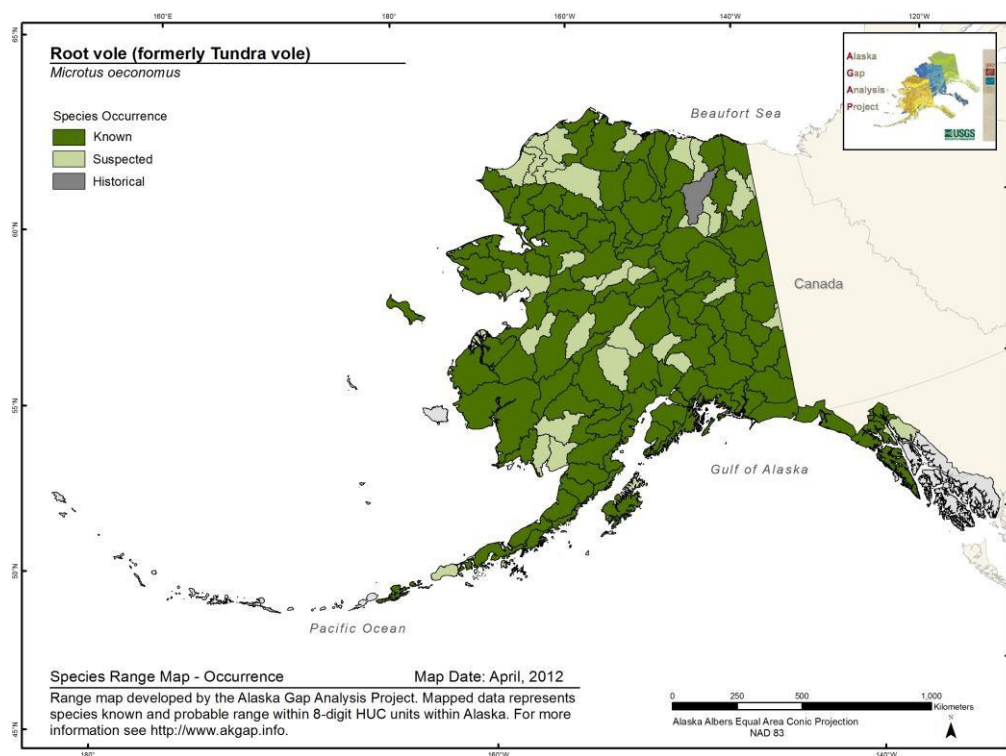
Youngman, P. M. 1975. *Mammals of the Yukon Territory*, National Museums of Canada, Ottawa, *Publications in Zoology* 10:1-192.

Root Vole (formerly Tundra Vole)

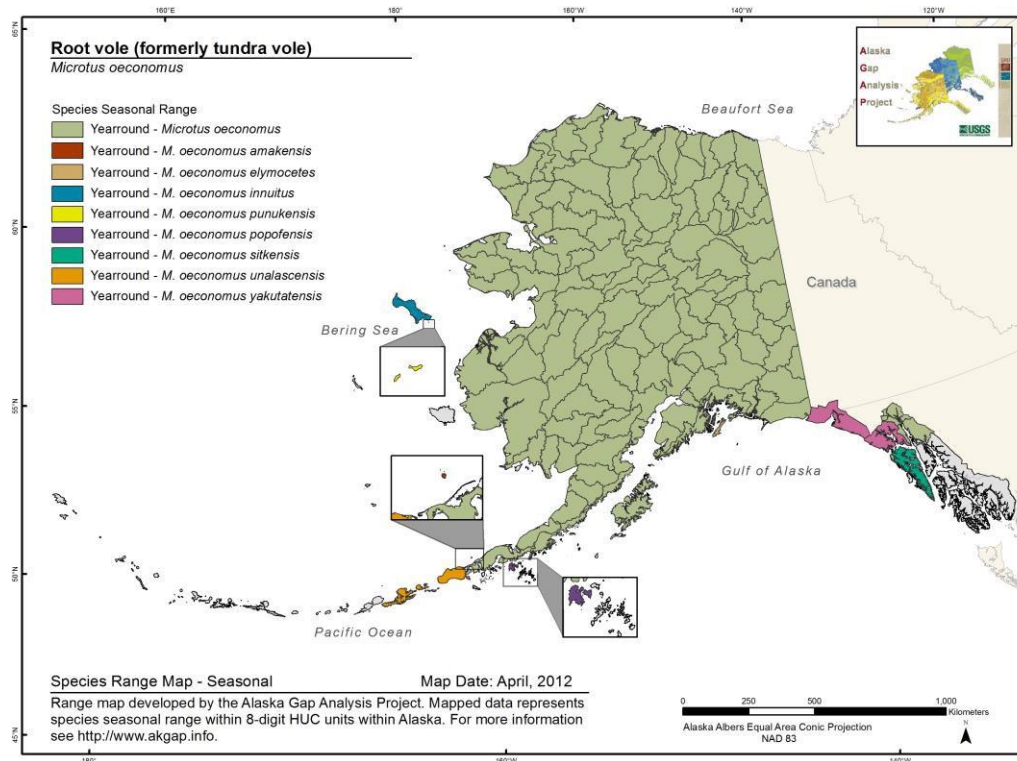
Microtus oeconomus

Range Map and Distribution Model Summary

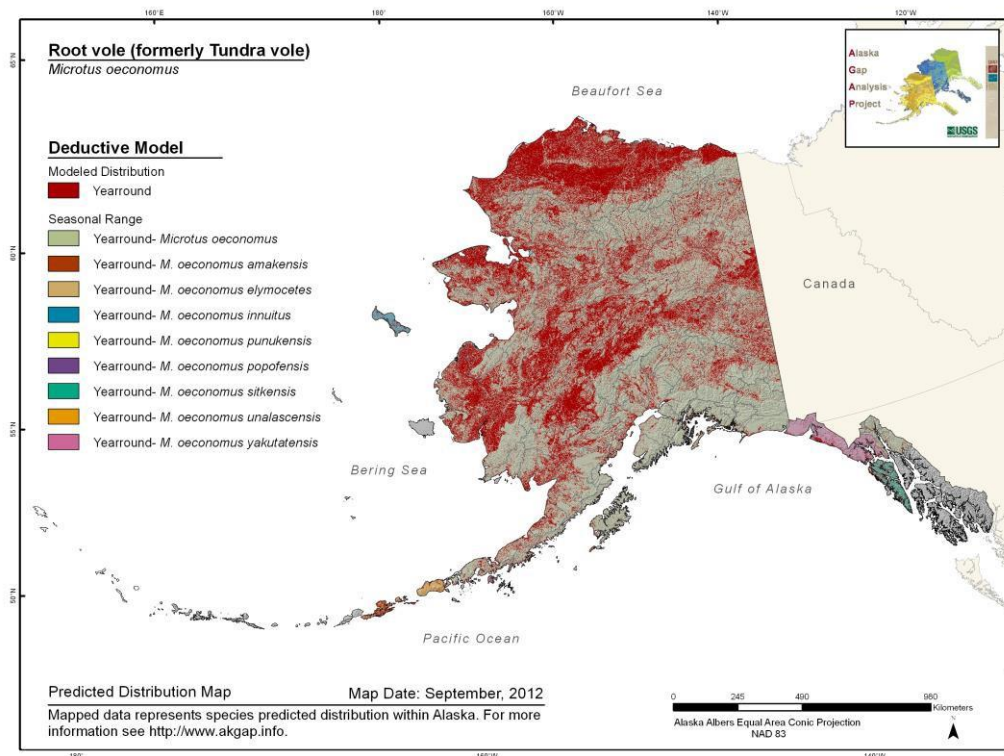
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.544**

**Model Quality
Summary:**
Low

Habitat Description

Root Voles, in general, inhabit a variety of open herbaceous- dominant habitats at various elevations (Banfield 1974, Lance and Cook 1998b), occurring most abundantly in wet sedge and grass-forb meadows and bogs (MacDonald and Cook 2009). Associated with early successional habitats when grasses and woody perennials dominate. Also found in wet muskegs, subalpine meadows and from shoreline to alpine, including forests. May move to higher elevations in winter where live subnivean (Heller 1910, Wetzell 1958, Rose and Birney 1985, Hanley and Rose 1987, Weintraub and Cook 1992, Lance 2002).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

Hanley, T. A., and C. L. Rose. 1987. Influence of overstory on snow depth and density in hemlock-spruce stands: Implications for management of deer habitat in southeastern Alaska. Res. Note PNW-RN-459. Portland, OR: USDA,USFS, Pacific Northwest Research Station. 11p.

Heller, E. 1910. Mammals of the 1908 Alexander Alaska Expedition, with descriptions of the localities visited and notes on the flora of the Prince William Sound region. Univ. Calif. Publ. Zool. 5(11):321-360.

Lance, E. W. 2002. Montague Island vole: a conservation assessment. Gen. Tech. Rep. PNW-GTR-542. Portland, OR: USDA, USFS, Pacific Northwest Research Station. 14 p.

Lance, E. W. and J. A. Cook. 1998b. *Microtus oeconomus* (Pallas 1776), tundra vole. Pp. 97-99, in North American rodents: Status survey and conservation action plan (D. J. Hafner, E. Yensen, and G. L. Kirkland, Jr., eds.). IUCN/SSC Rodent Specialist Group. Gland, Switzerland, and Cambridge, UK.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

Rose, R. K., and E. C. Birney. 1985. Community ecology. In: Tamarin, R. H., ed. Biology of New World *Microtus*. Special Publication No. 8. Shippensburg, PA: The American Society of Mammalogists: 310-339.

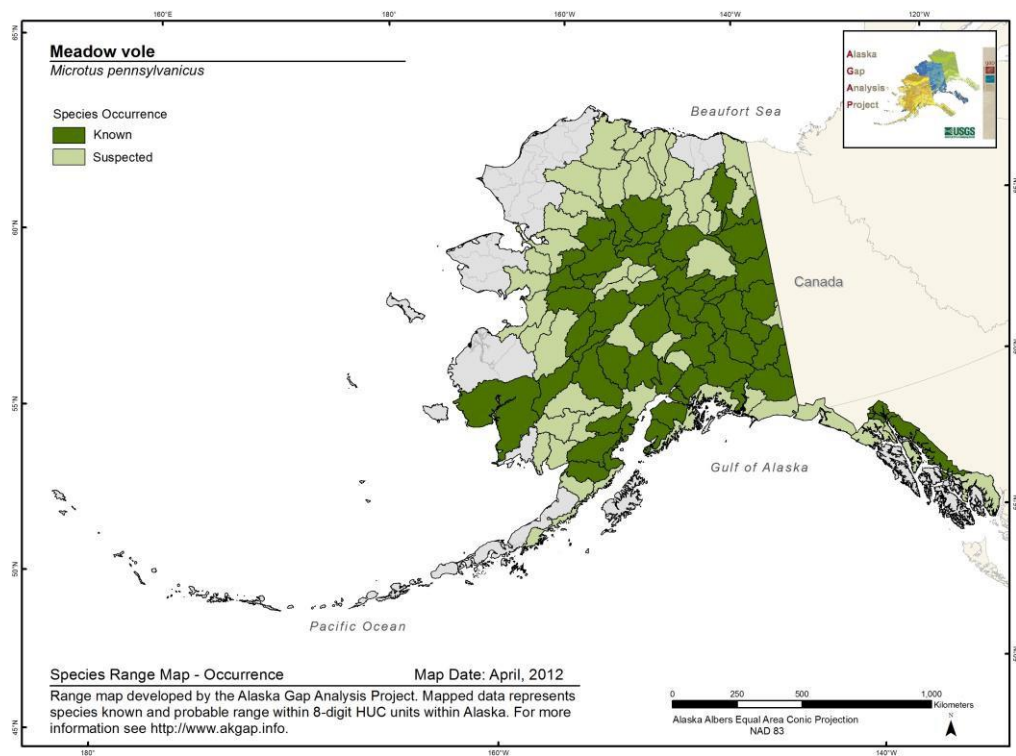
Weintraub, E. and J. A. Cook. 1992. Taxonomic status and ecology of the Montague Island vole (*Microtus oeconomus elymocetes*). Cordova, AK: Chugach National Forest, Cordova Ranger District.

Wetzel, R. M. 1958. Mammalian succession in midwestern floodplains. *Ecology*. 39: 262-271.

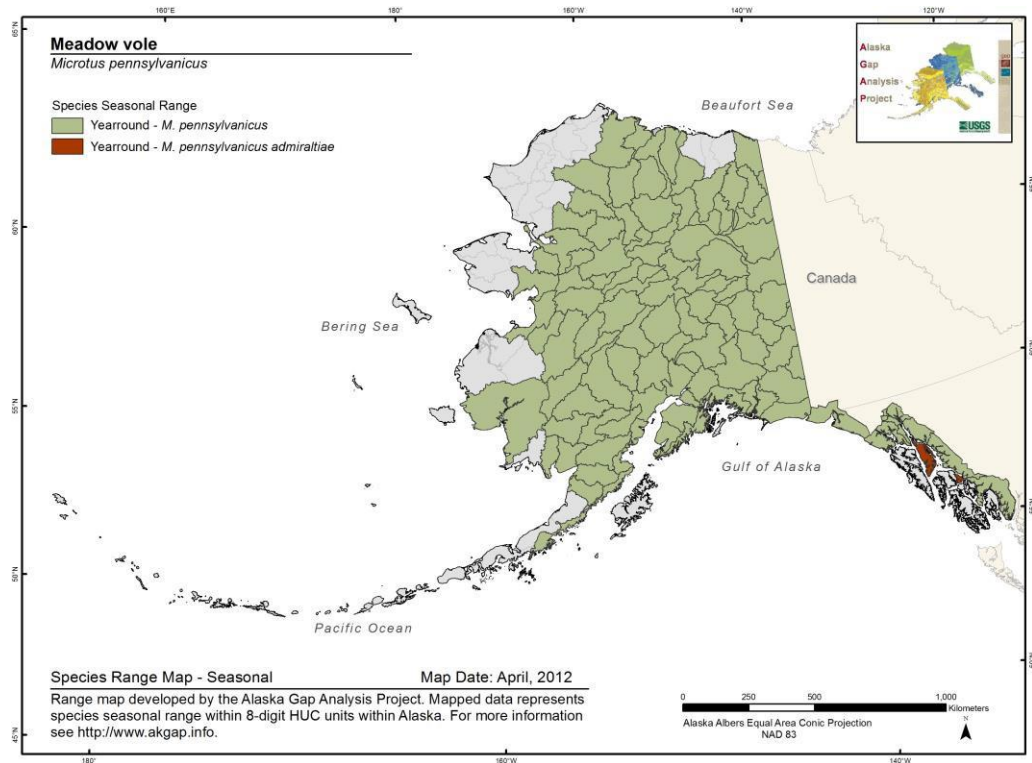
Meadow Vole *Microtus pennsylvanicus*

Range Map and Distribution Model Summary

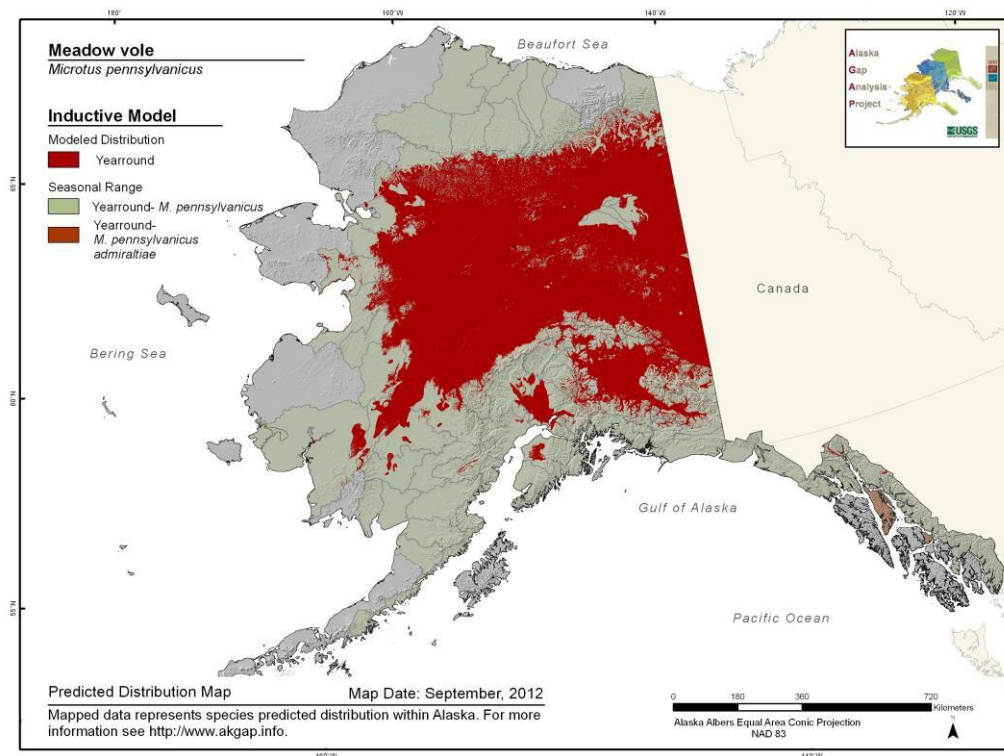
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.787**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabits open herbaceous habitats such as grassy meadows, fields and marshes; often in wet areas in riparian situations. Needs loose organic soils for tunneling (NatureServe 2007b).

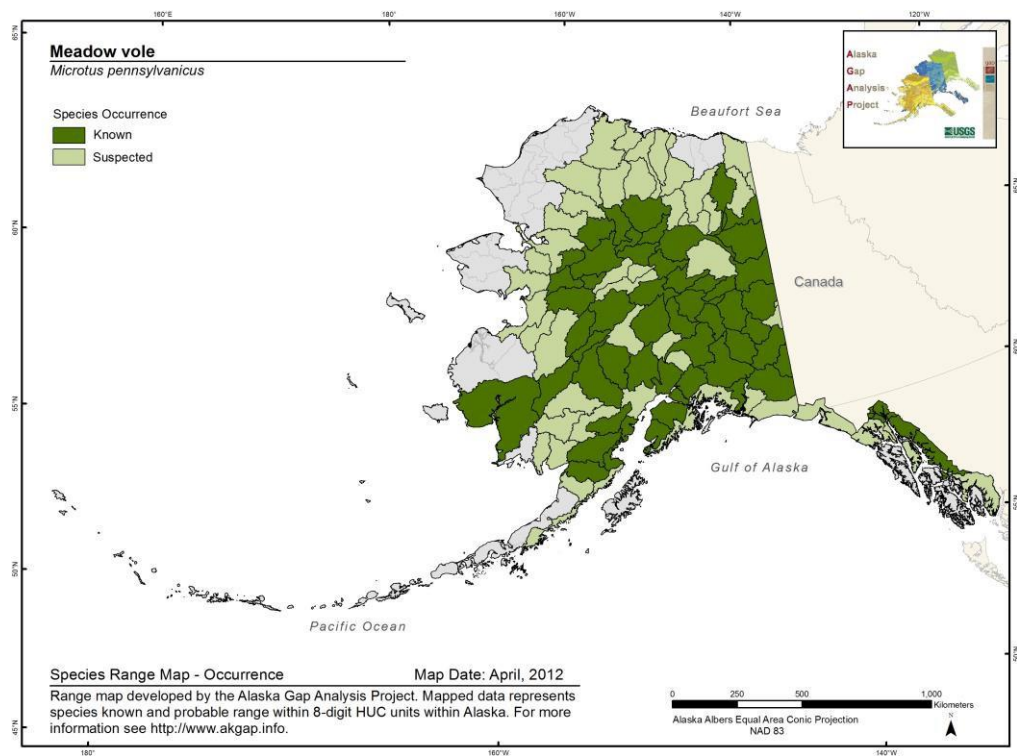
References

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

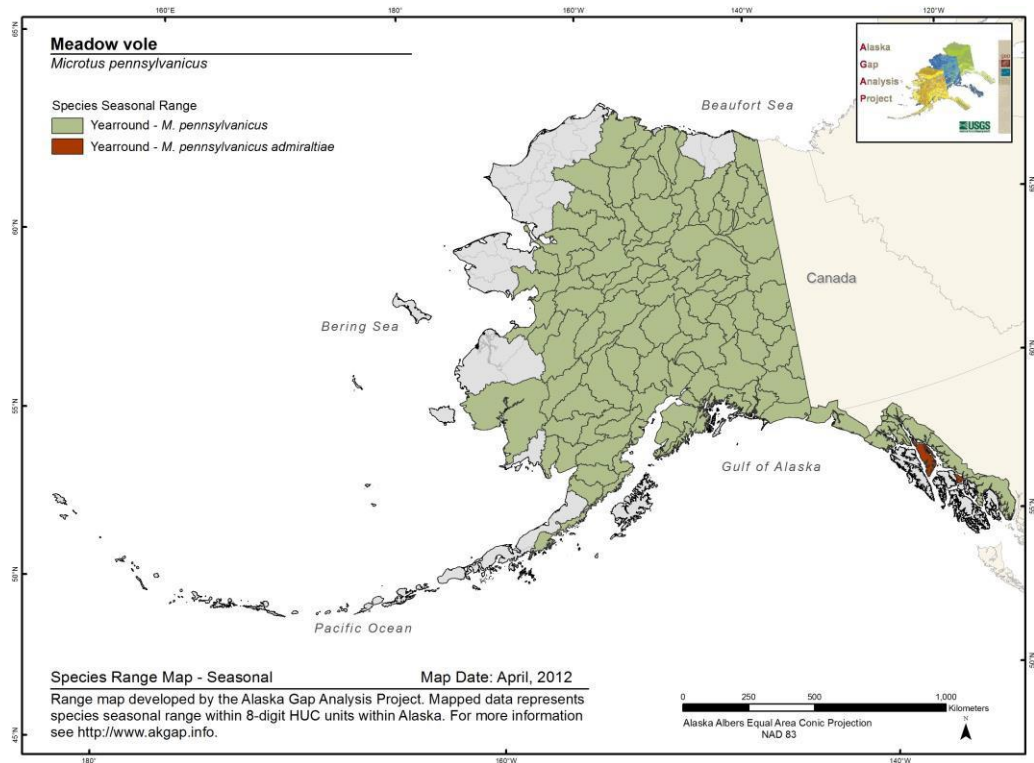
Admiralty Meadow Vole *Microtus pennsylvanicus admiraltiae*

Range Map and Distribution Model Summary

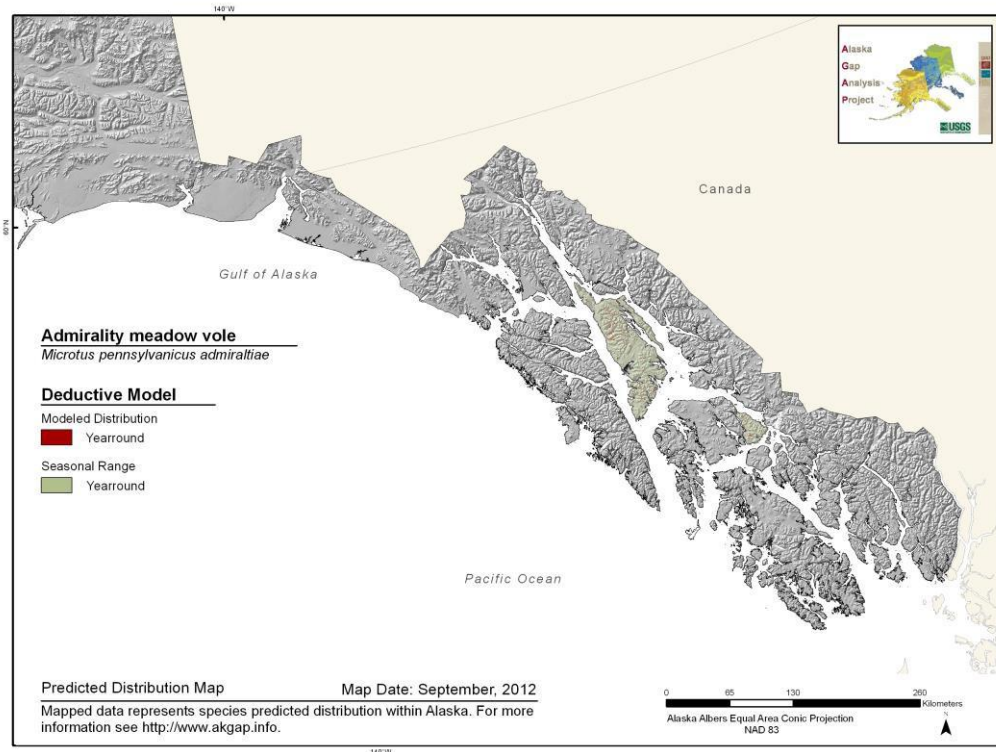
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Inhabits open herbaceous habitats such as grassy meadows, fields and marshes; often in wet areas in riparian situations. Needs loose organic soils for tunneling. Nests in these tunnels, under rocks or logs, or in self-constructed grassy clumps (NatureServe 2007b).

References

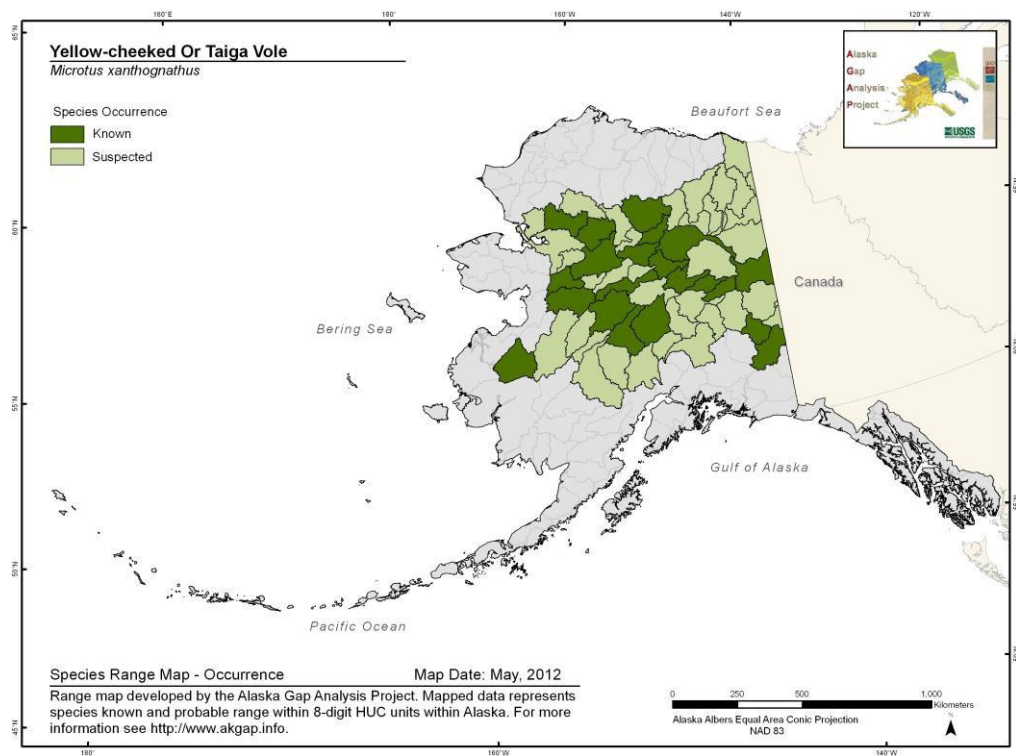
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Yellow-cheeked or Taiga Vole

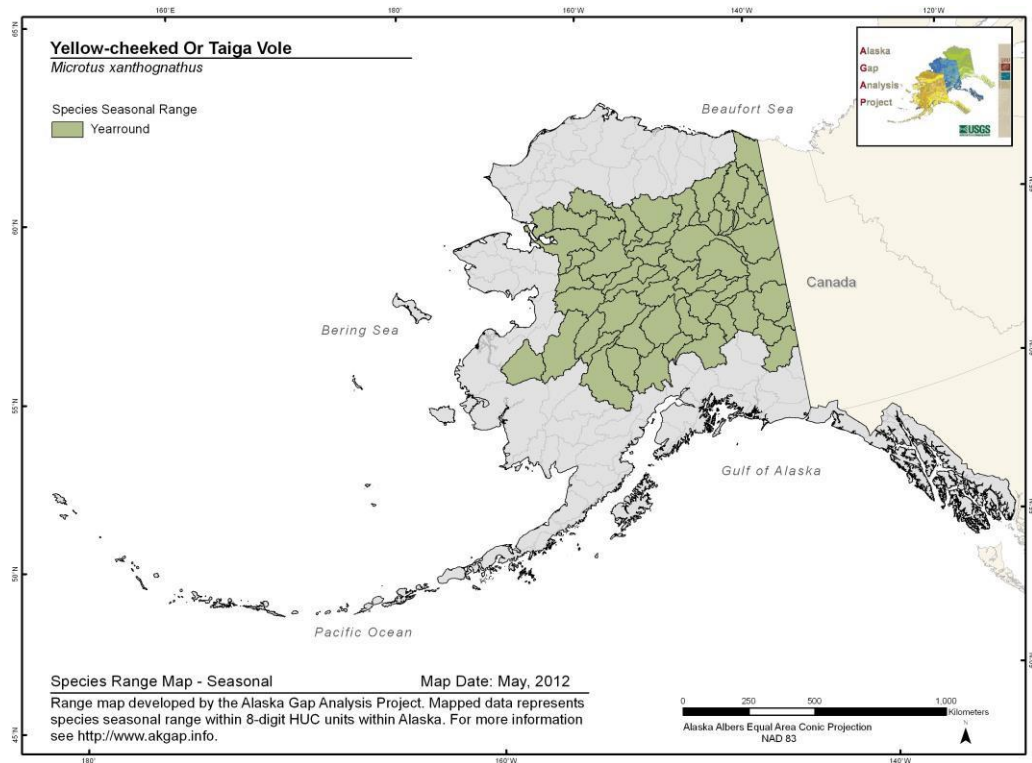
Microtus xanthognathus

Range Map and Distribution Model Summary

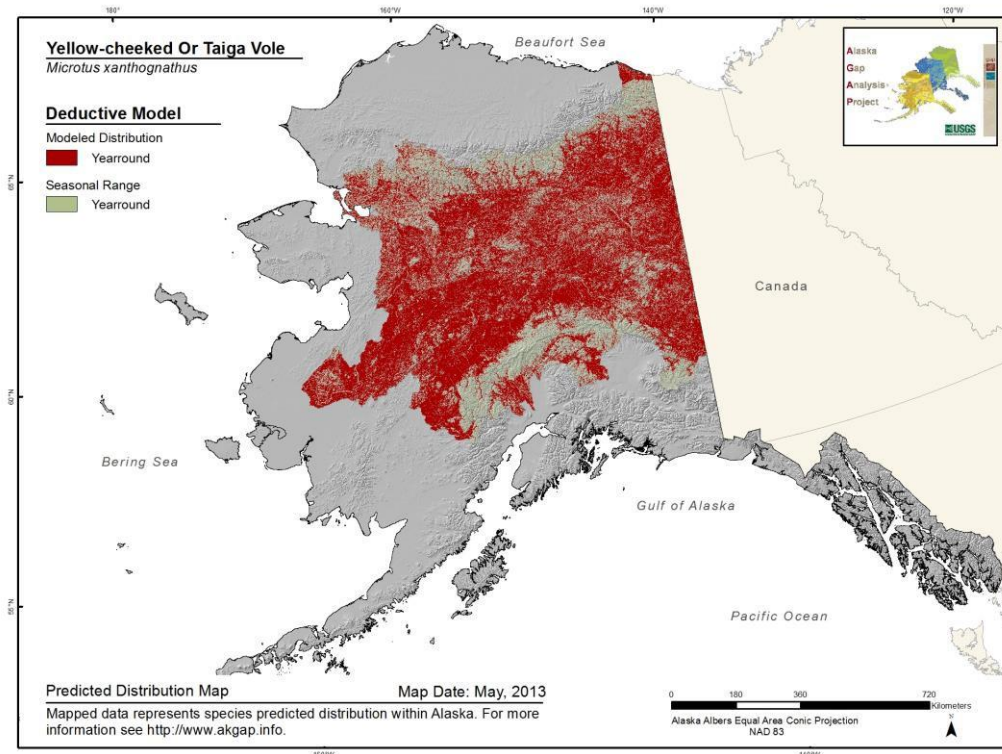
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.594**

**Model Quality
Summary:**
Low

Habitat Description

Inhabit fire-successional and riparian, boreal, sphagnum forest habitats (especially spruce) near stream or moist areas, including tundra, bogs, marshes (Conroy and Cook 1999, Youngman 1975, NatureServe 2007b).

References

Conroy, C. J. and J. A. Cook. 1999. *Microtus xanthognathus*. Mammalian Species 627:1-5.

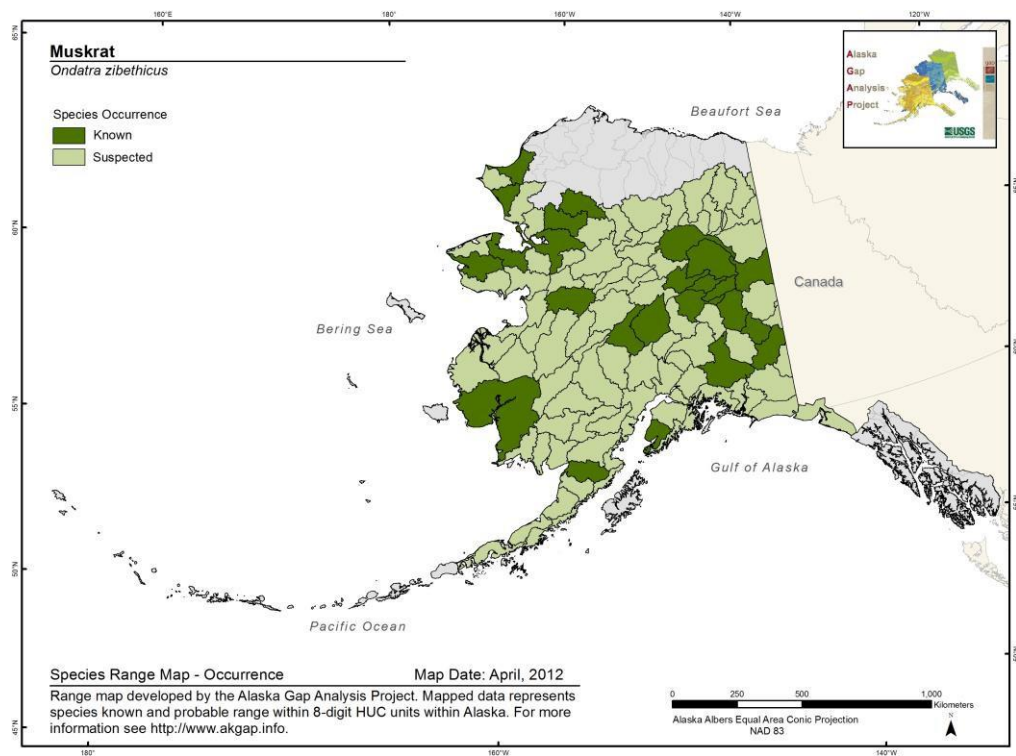
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Youngman, P. M. 1975. Mammals of the Yukon Territory, National Museums of Canada, Ottawa, Publications in Zoology 10:1-192.

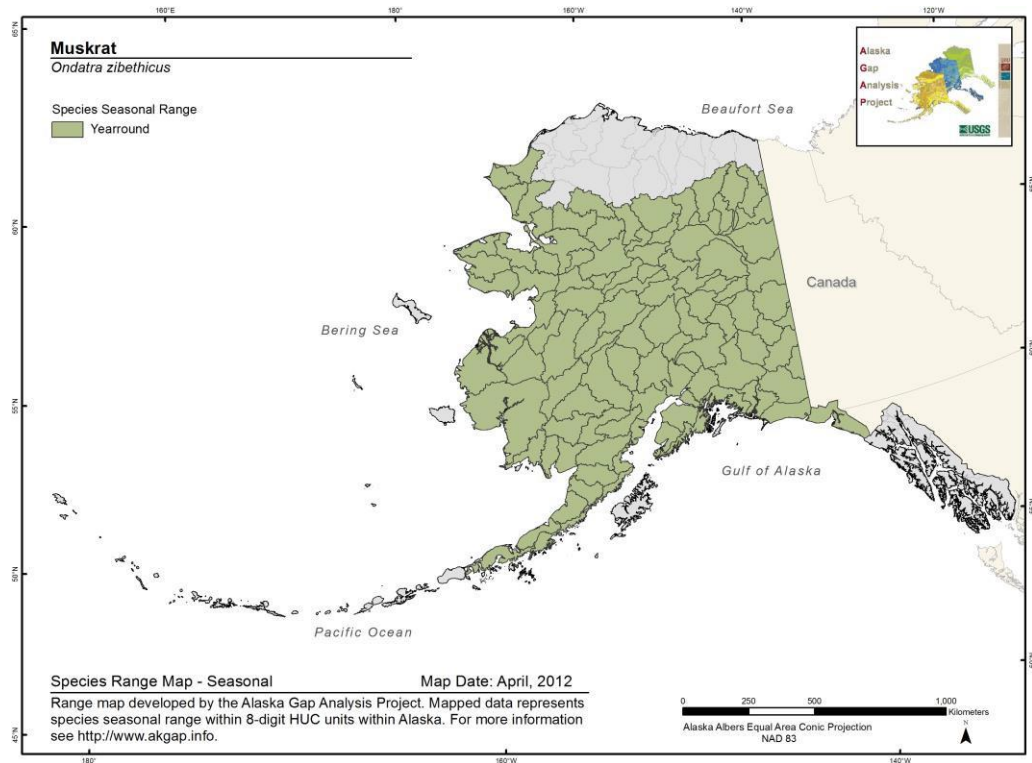
Muskrat *Ondatra zibethicus*

Range Map and Distribution Model Summary

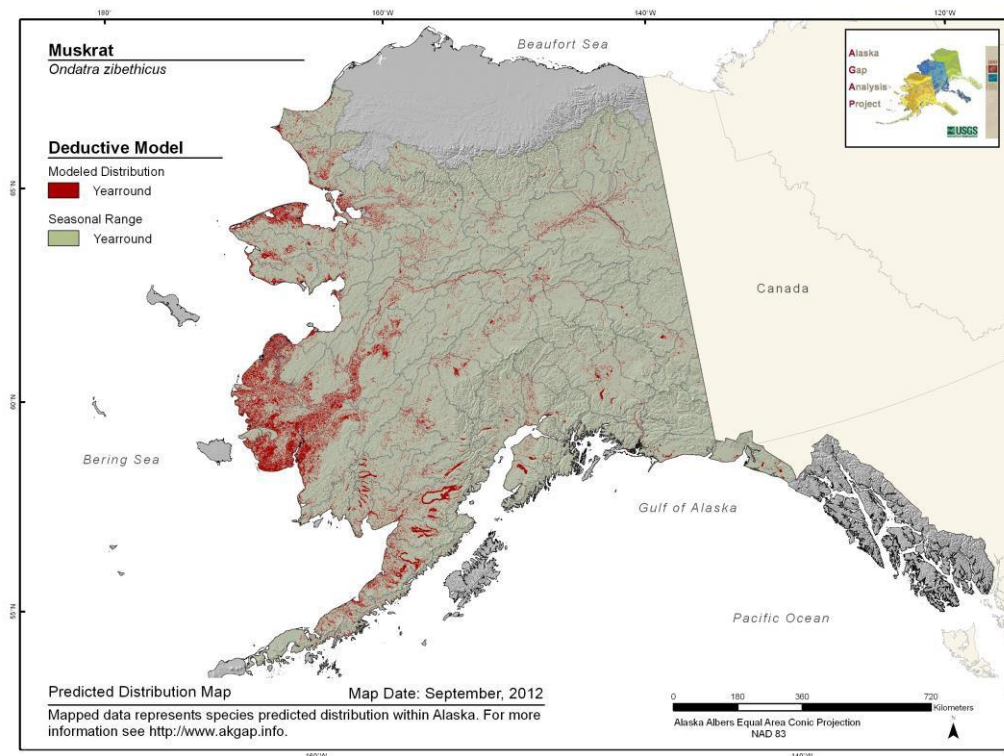
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.517**

**Model Quality
Summary:**
Low

Habitat Description

Inhabit fresh, brackish, and saltwater marshes, ponds, lakes, rivers, and streams (Banfield 1974, Willner et al. 1980). Most abundant in areas with cattails (Caire et al. 1989). Common muskrat populations tend to be higher in areas with dense aquatic, emergent vegetation that is surrounded by terrestrial herbaceous vegetation. Forested riverbanks usually do not support common muskrat populations. High quality habitat is characterized by 50 percent or more of an area having dense emergent species, although if habitats become "choked" with vegetation, common muskrat numbers will be low (Allen and Hoffman 1984).

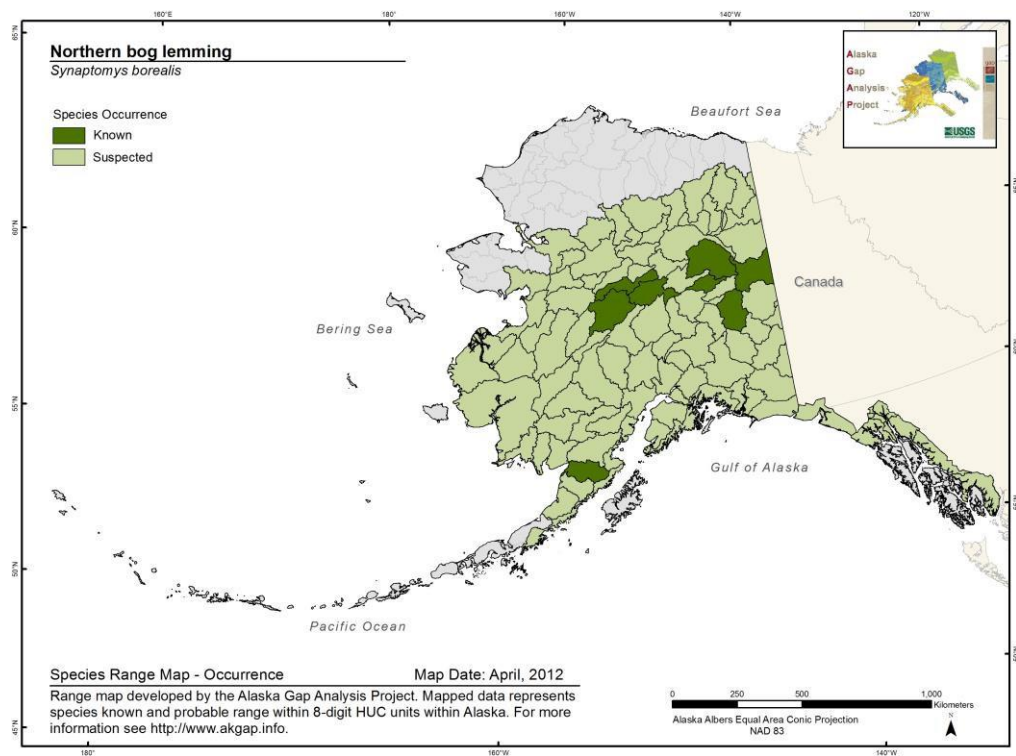
References

- Allen, A. W. and R. D. Hoffman. 1984. Habitat suitability index models: muskrat. FWS/OBS-82/10.46. Washington, DC: USDI, USFWS. 27 p.
- Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.
- Caire, W., J. D. Tyler, B. P. Glass, and M. A. Mares. 1989. Mammals of Oklahoma. University of Oklahoma Press, Norman. Oklahoma. 567 pp.
- Willner, G. R., G. A. Feldhammer, E. E. Zocker, and J. A. Chapman. 1980. ONDATRA ZIBETHICUS. American Society of Mammalogists, Mammalian Species No. 141. 8 pp.

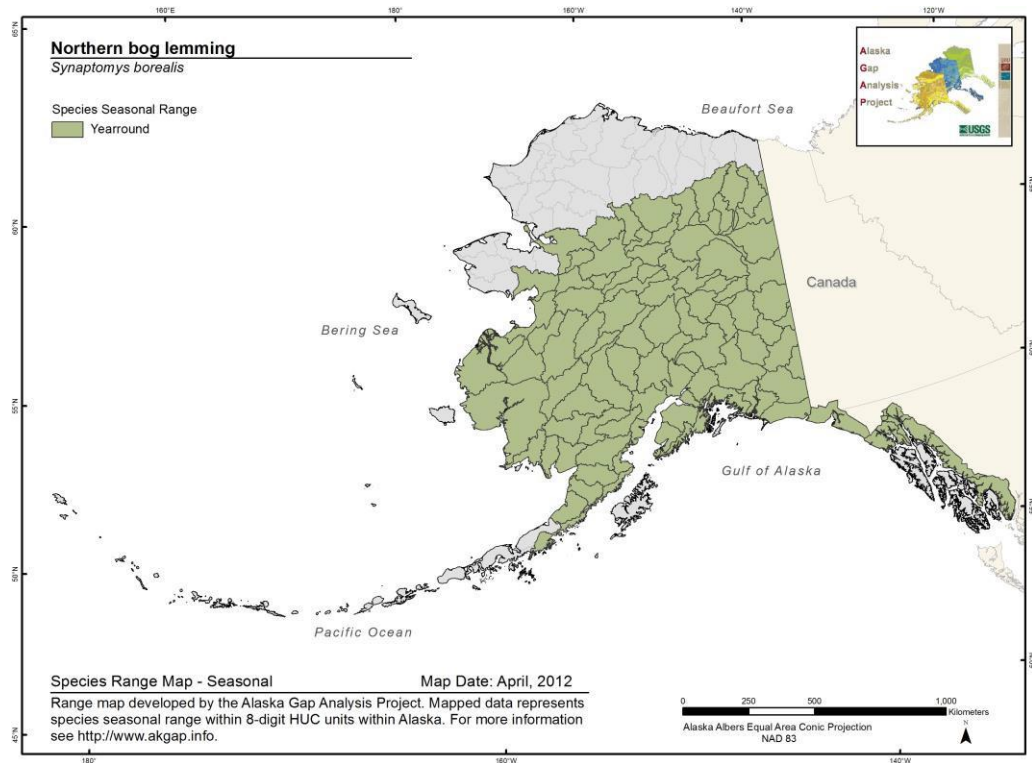
Northern Bog Lemming *Synaptomys borealis*

Range Map and Distribution Model Summary

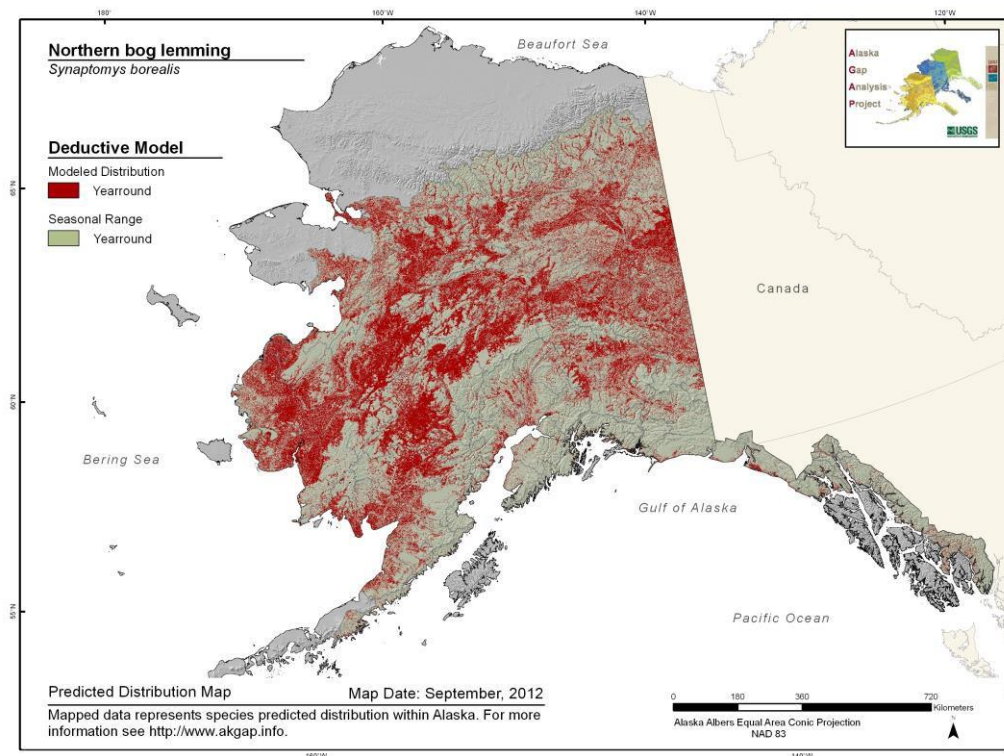
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Restricted to open habitats including damp meadows, marshes, bogs, and fens with an abundance of grasses, sedges, mosses, and low shrubs (Banfield 1974). Inhabits sphagnum bogs, wet meadows, moist mixed and coniferous forests; alpine sedge meadows, krummholz spruce-fir forest with dense herbaceous and mossy understory, mossy streamsides (Clough and Albright 1987). In Alaska, occupy cold bog or spring areas mostly in boreal forests, but can also be found near rocky cliffs (Whitney 1994, MacDonald et al. 2003).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

Clough, G. C., and J. J. Albright. 1987. Occurrence of the northern bog lemming, *SYNAPTOMYS BOREALIS*, in the northeastern United States. *Canadian Field-Nat.* 101:611-613.

MacDonald, S. O., E. Lance, and J. A. Cook. 2003. Draft: Conservation status of selected Alaska mammals. USFWS Candidates Workshop.

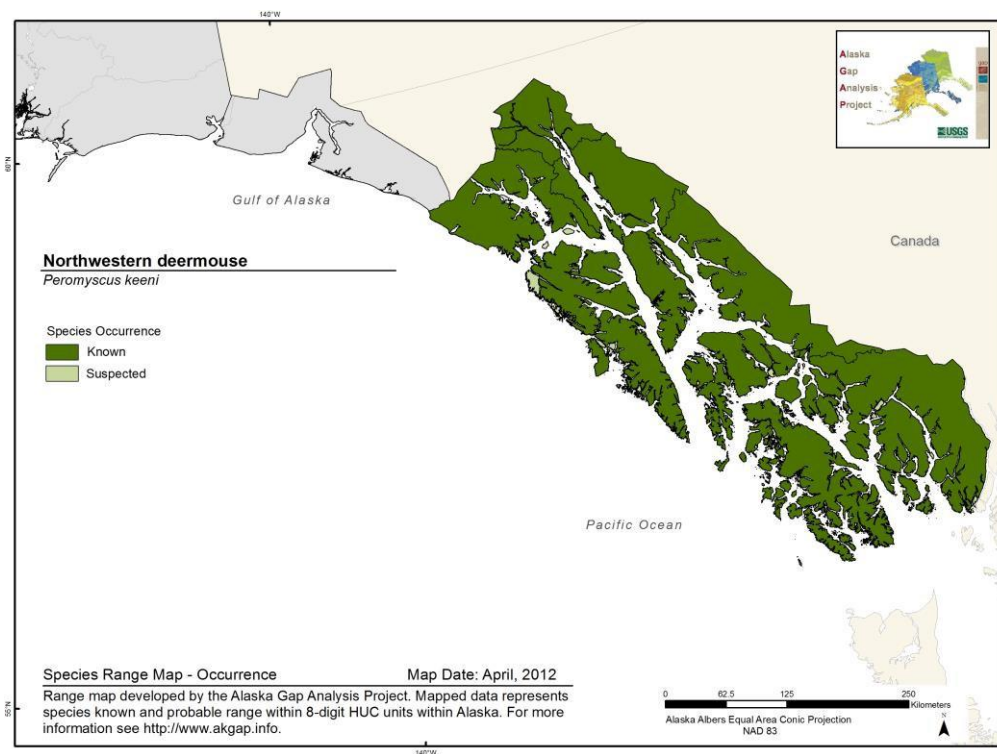
Whitney, P. 1994. Lemmings. Wildlife Notebook Series, ADF&G, Division of Wildlife Conservation.

Northwestern Deermouse

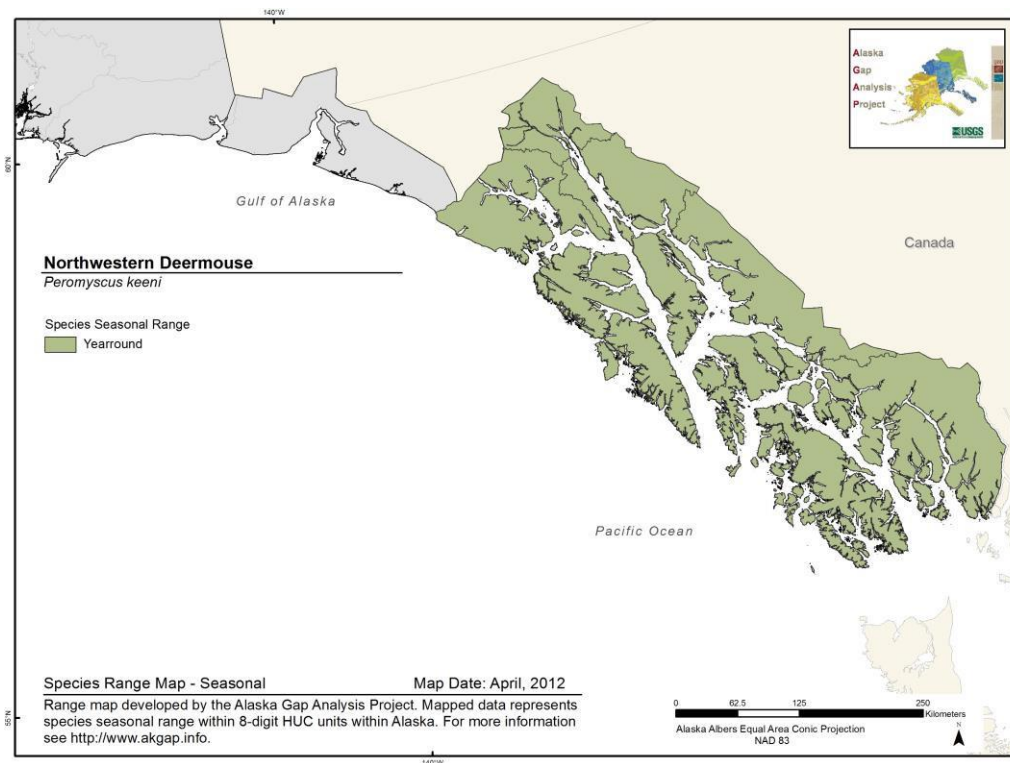
Peromyscus keeni

Range Map and Distribution Model Summary

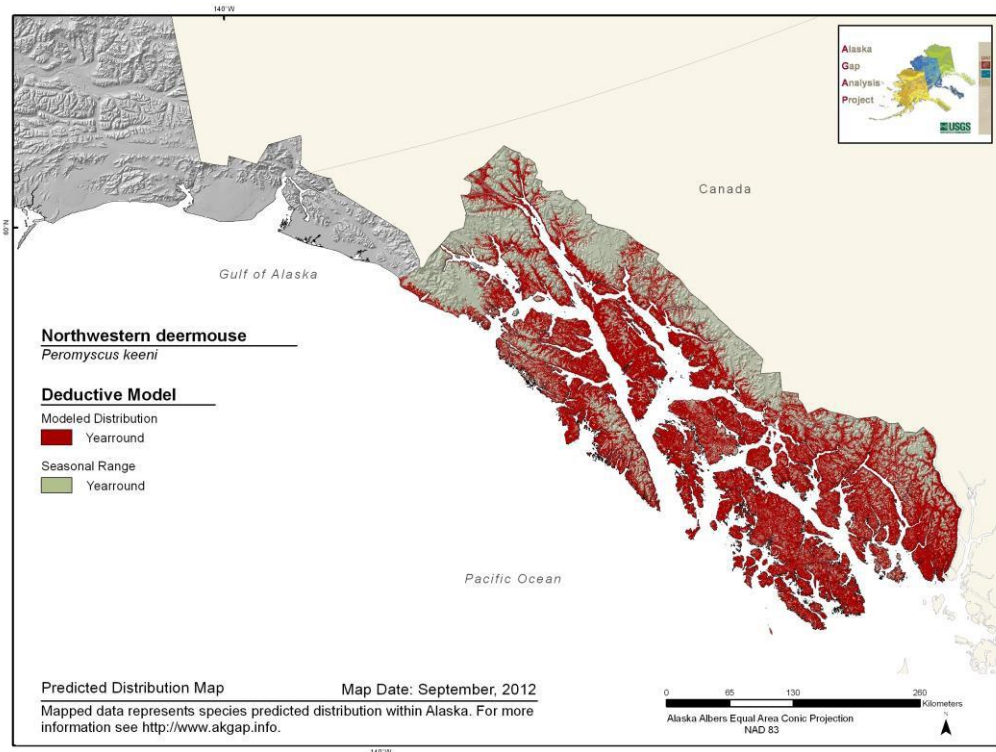
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Inhabit very wide variety of habitats at various elevations. In Southeast Alaska, favor the forest beach edge and have been observed high in large spruce and hemlock trees (MacDonald and Cook 2007). Also a common inhabitant of old-growth riparian and upland forests in southeastern Alaska. At lower elevations, often associated with edge vegetation, along logging roads, or around the periphery of small islands. They appear to avoid closed-canopy forested habitats. Fond of buildings, especially during winter (Smith and Nichols 2004).

References

MacDonald, S.O. and J.A. Cook. 2007. Mammals and amphibians of Southeast Alaska. The Museum of Southwestern Biology, Special publication 8:1-191. University of New Mexico, Albuquerque, NM.

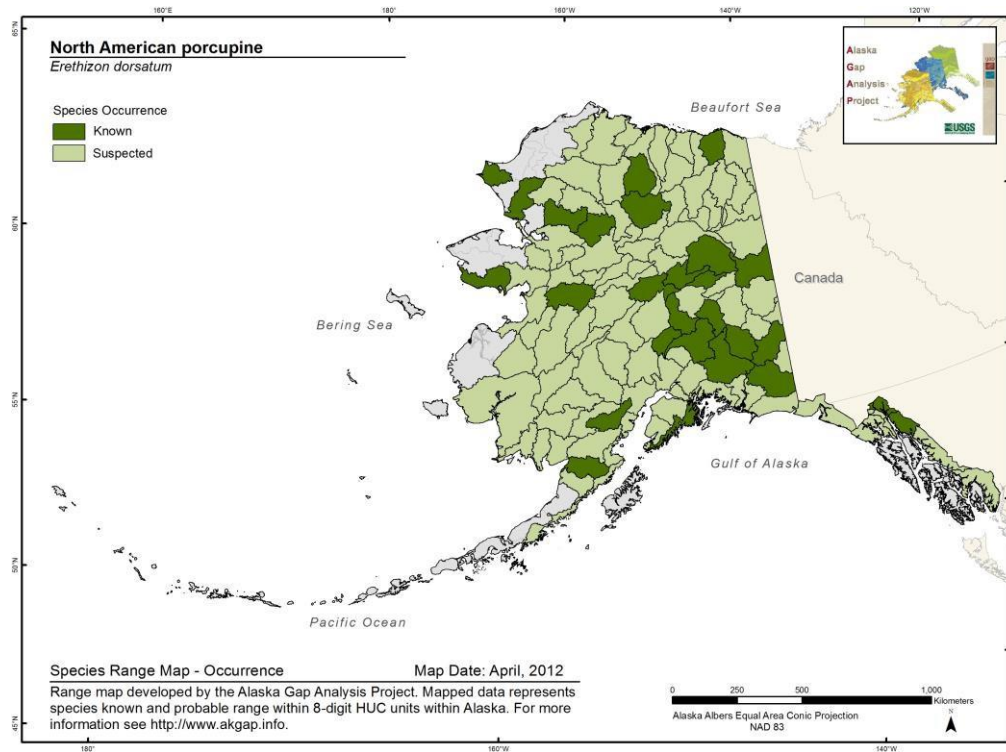
Smith, W. P. and J. V. Nichols. 2004. Demography of two endemic forest-floor mammals of southeastern Alaskan temperate rain forest. *Journal of Mammalogy* 85:540-551.

North American Porcupine

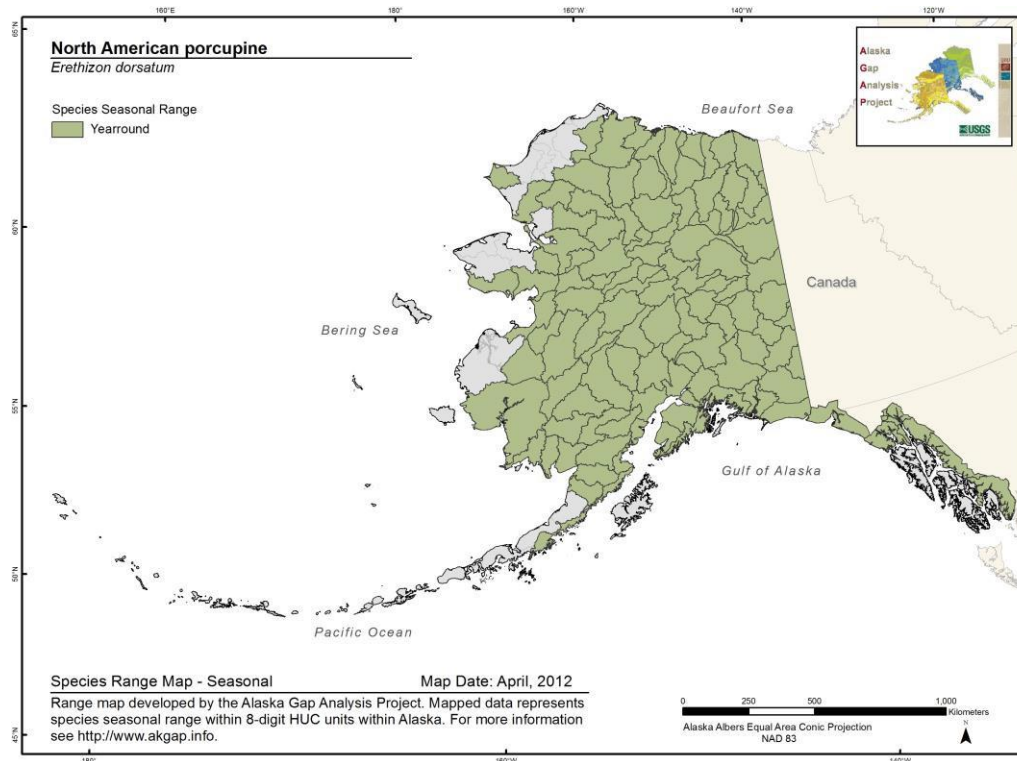
Erethizon dorsatum

Range Map and Distribution Model Summary

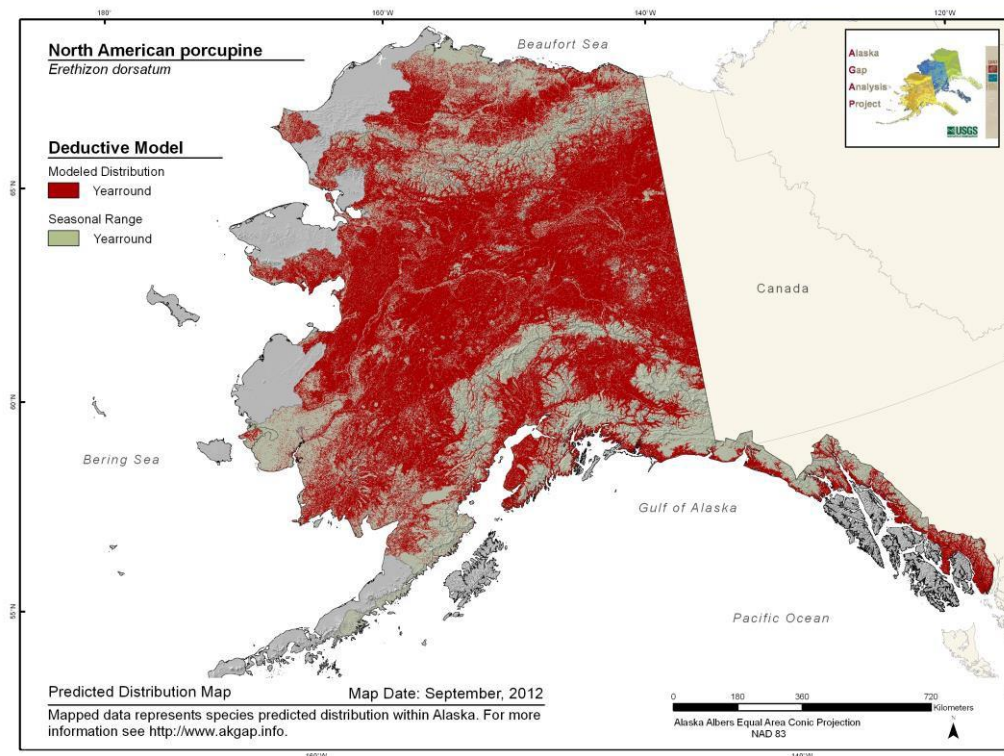
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Occurs in a wide variety of habitats from closed forests to open shrub tundra and from sea level to high elevations (MacDonald and Cook 2007). Prefers coniferous and mixed forests; also inhabits riparian zones, grasslands, shrublands, and deserts in some parts of the range. May shelter in dense conifers in winter (NatureServe 2007b).

References

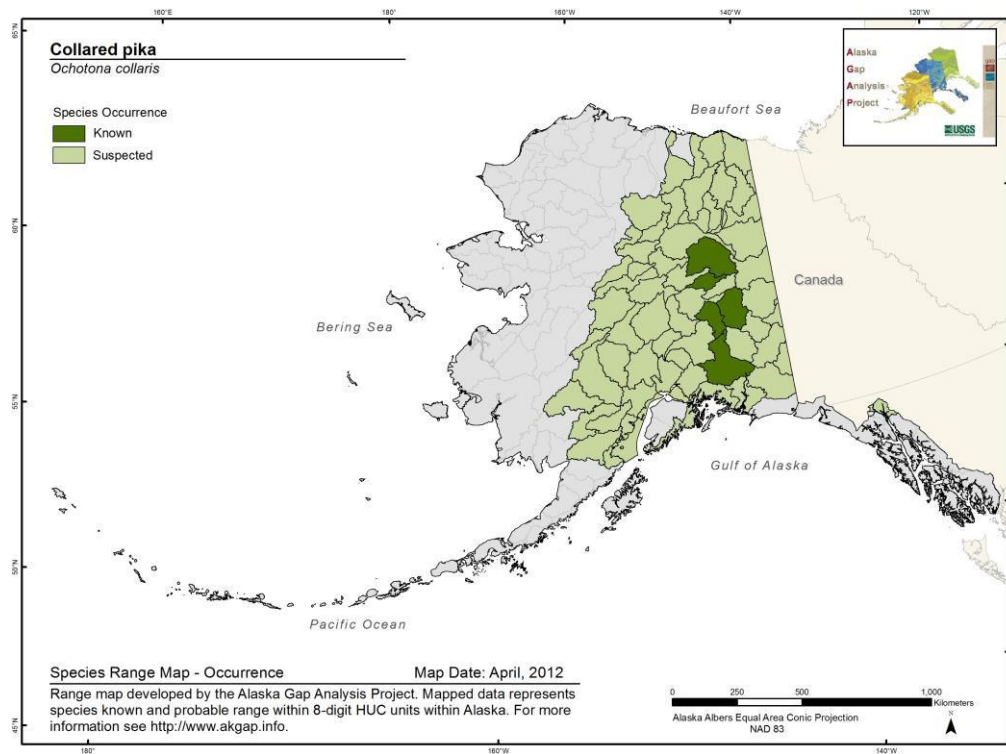
MacDonald, S.O. and J.A. Cook. 2007. Mammals and amphibians of Southeast Alaska. The Museum of Southwestern Biology, Special publication 8:1-191. University of New Mexico, Albuquerque, NM.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

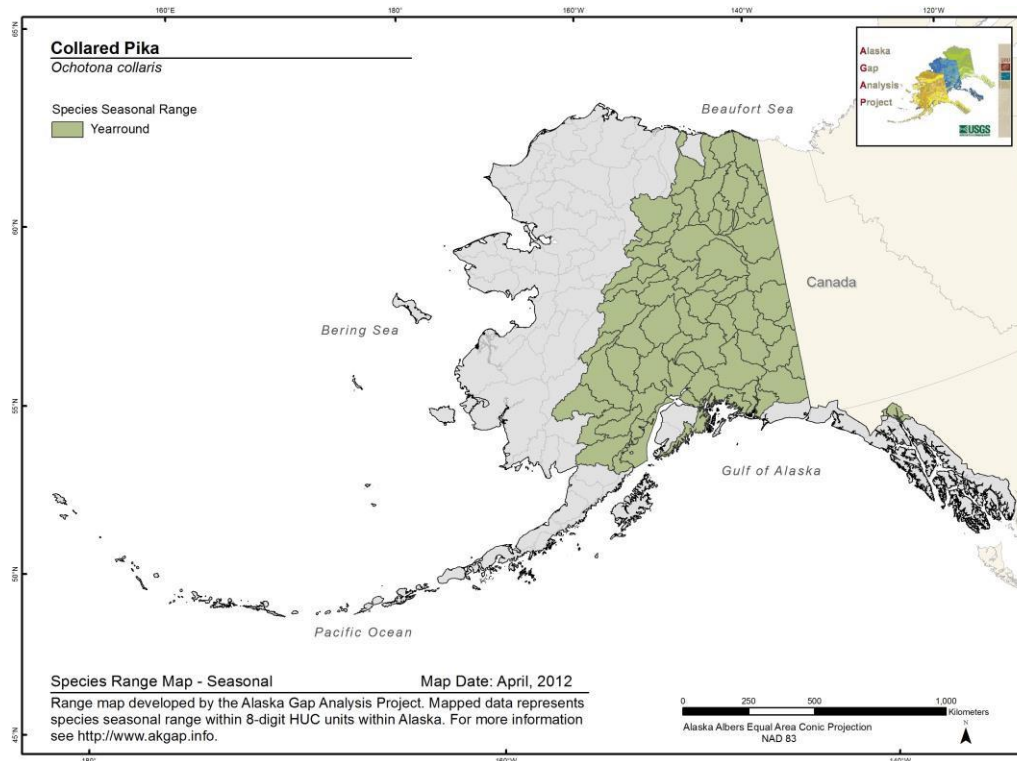
Collared Pika *Ochotona collaris*

Range Map and Distribution Model Summary

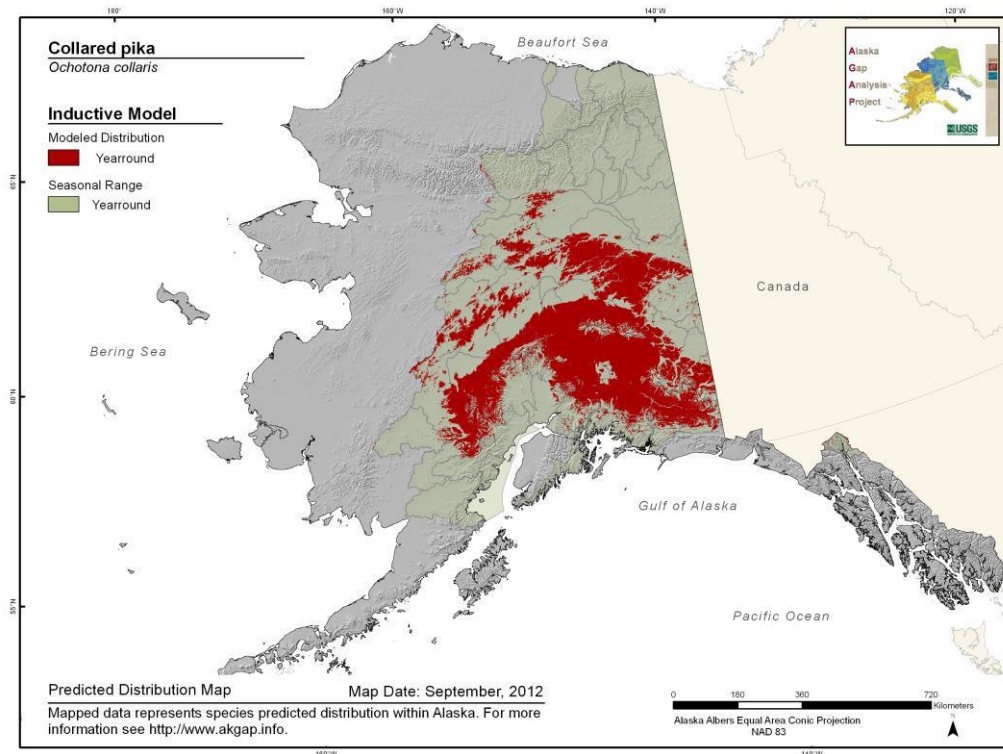
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.858**

**Model Quality
Summary:**
Moderate

Habitat Description

Form colonies in mountainous terrain, in rock slides, talus slopes, and large boulders near meadows or vegetation patches. Usually above timberline but occasionally in forested valleys and near sea level (MacDonald and Jones 1987). Near Lake Louise, pikas were found in a forested valley of white spruce-birch-willow more than 180m from talus; burrows were in rocks scattered among the trees (Rausch 1962).

References

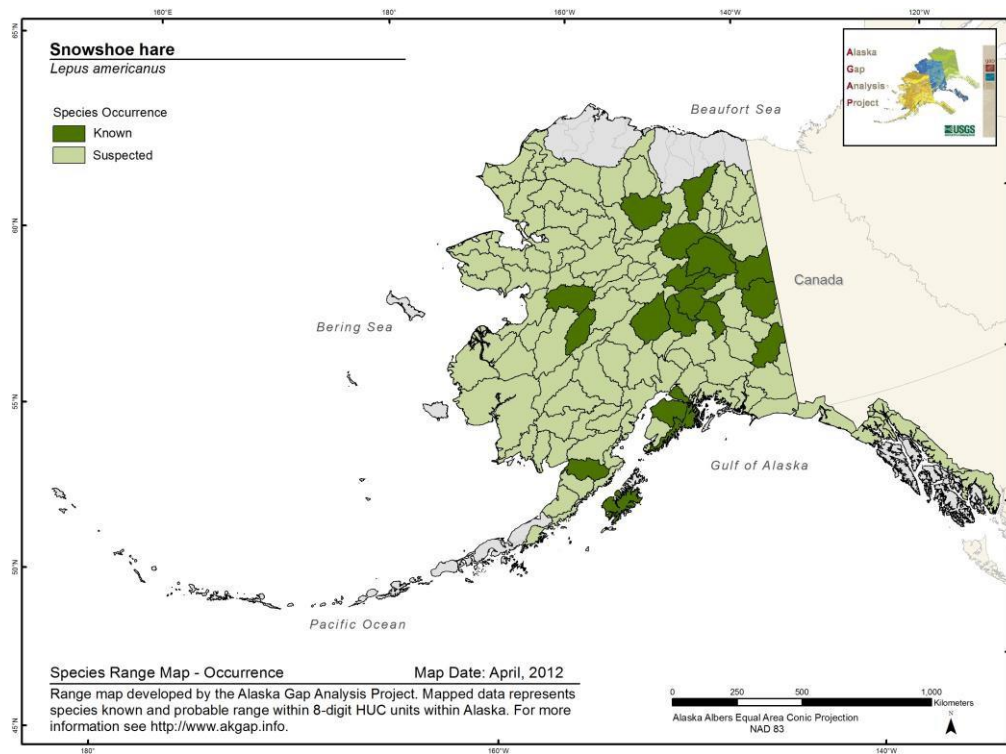
MacDonald, S.O. and C. Jones. 1987. *Ochotona collaris*. Am. Soc. Mammal. Mammal. Species, No. 281.

Rausch, R. L. 1962. Notes on the collared pika, *Ochotona collaris* (Nelson), in Alaska. Murrelet 42: 22-24.

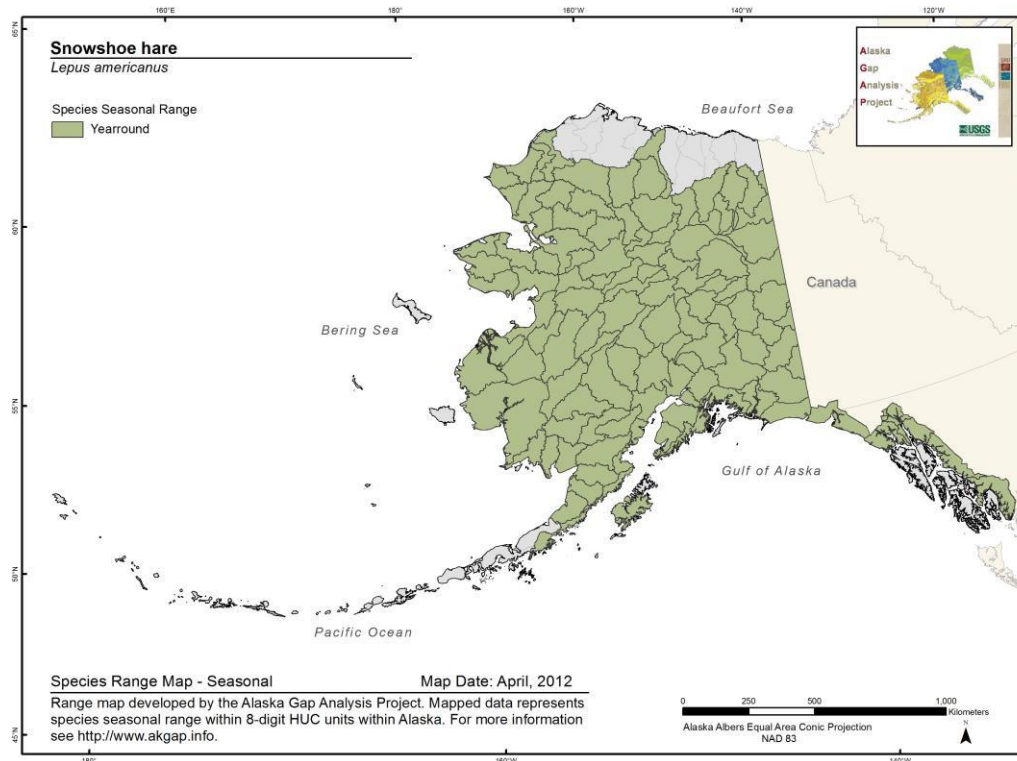
Snowshoe Hare *Lepus americanus*

Range Map and Distribution Model Summary

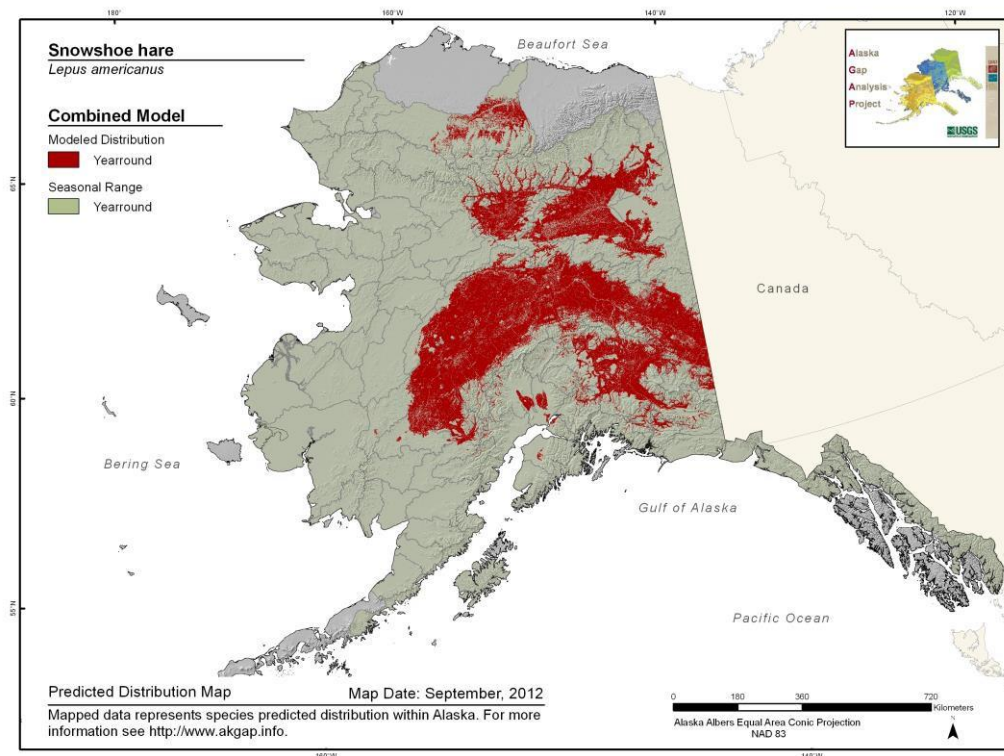
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.809**

**Model Quality
Summary:**
Moderate

Habitat Description

Hares inhabit forests, shrubby woodlands, and riparian shrub thickets (Banfield 1974, Wolff 1980). Prefers the dense cover of coniferous and mixed forests; abundant understory cover is important. Coniferous swamps and second-growth areas that are adjacent to mature forests, and alder fens and conifer bogs, are also utilized. Often found in ecotones (NatureServe 2007b).

References

Banfield, A. W. F. 1974. The mammals of Canada. University of Toronto Press, Toronto, Canada. 438 pp.

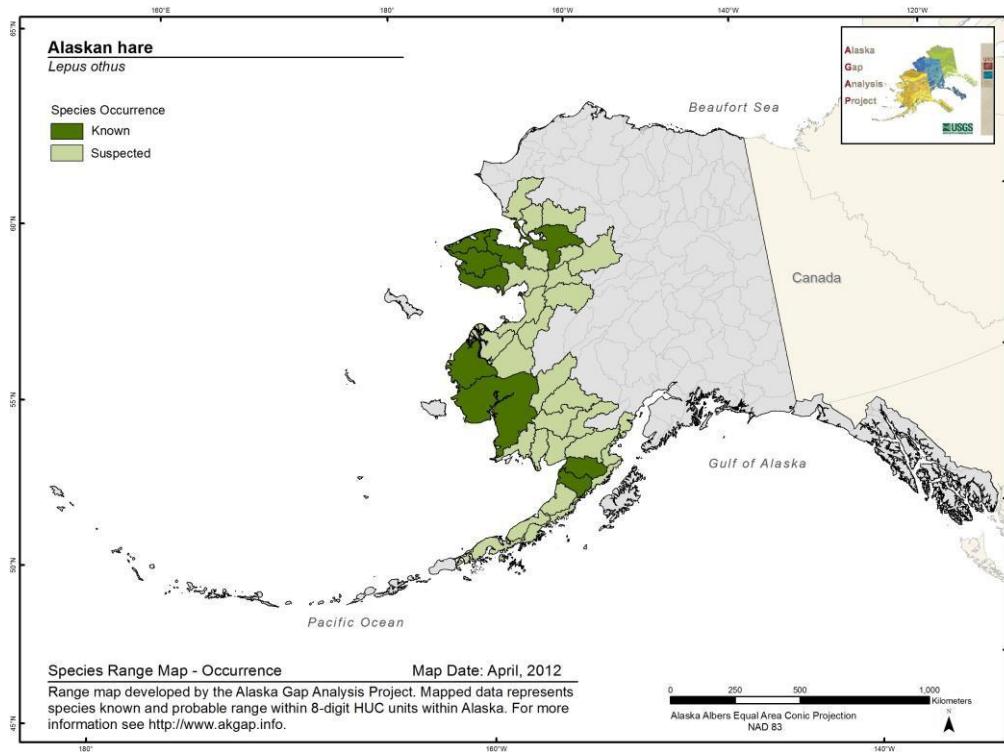
NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Wolff, J. O. 1980. The role of habitat patchiness in the population dynamics of snowshoe hares. Ecological Monographs 50: 111-130.

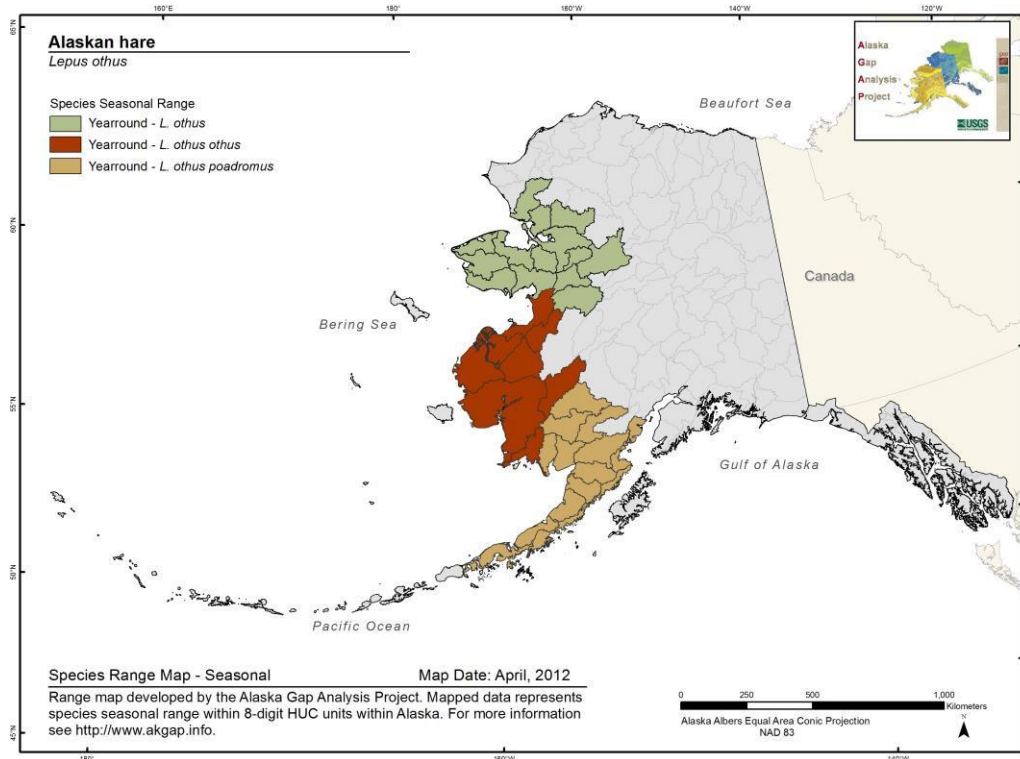
Alaskan Hare *Lepus othus*

Range Map and Distribution Model Summary

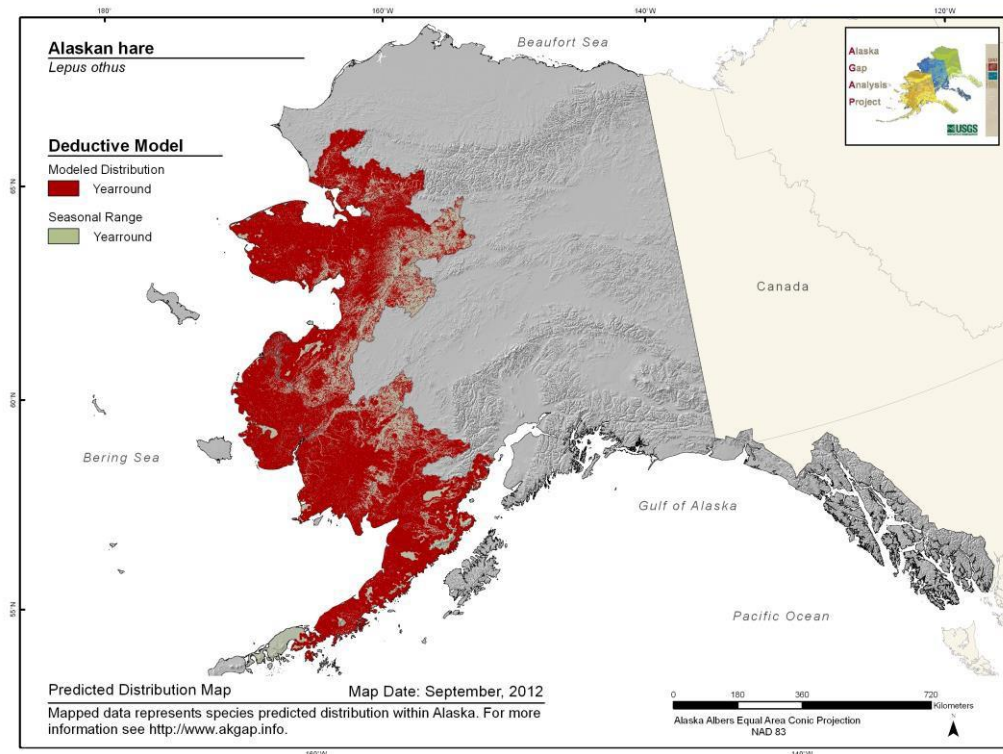
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Deductive

**Model
Evaluation
Statistic
(AUC): 0.871**

**Model Quality
Summary:**
Moderate

Habitat Description

Inhabit a variety of coastal tundra habitats and shrub communities along streams (Klein 1995). Terrestrial habitats of arctic and maritime tundra (Klein 1995). Tundra, alluvial plains, coastal lowlands, alder thickets, sedge flats, wet meadows; basically open tundra, but uses brush where it is available when they are not foraging (Best and Henry 1994).

References

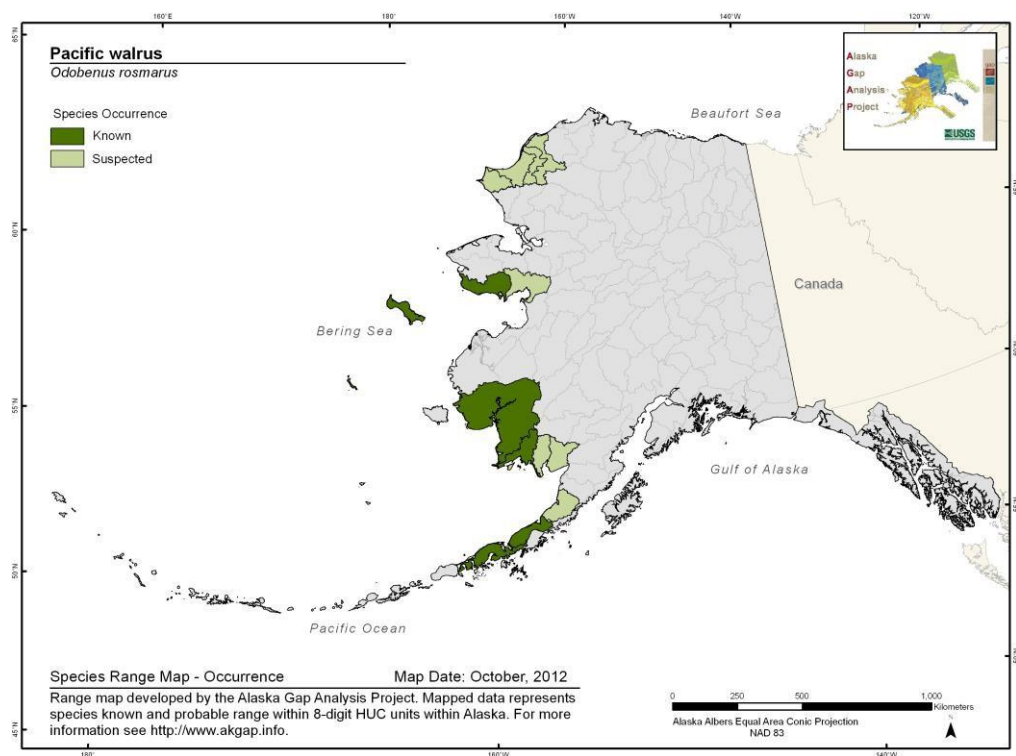
Best, T.L., and T.H. Henry. 1994. *Lepus othus*. Am. Soc. Mamm., Mammalian Species No. 458:1-5.

Klein, D.R. 1995. Tundra or arctic hares. Page 359 In: E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, M.J. Mac (eds.) *Our living resources: a report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems*. USDI, National Biological Service. Washington, DC. 530 p.

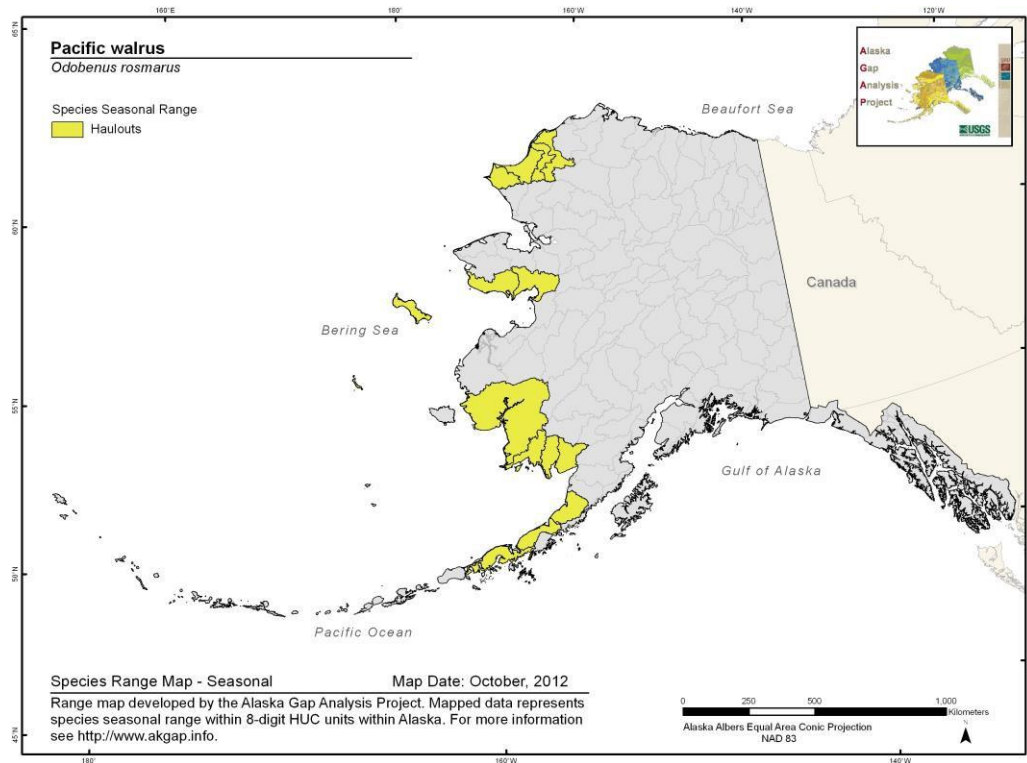
Pacific Walrus *Odobenus rosmarus*

Range Map and Distribution Model Summary

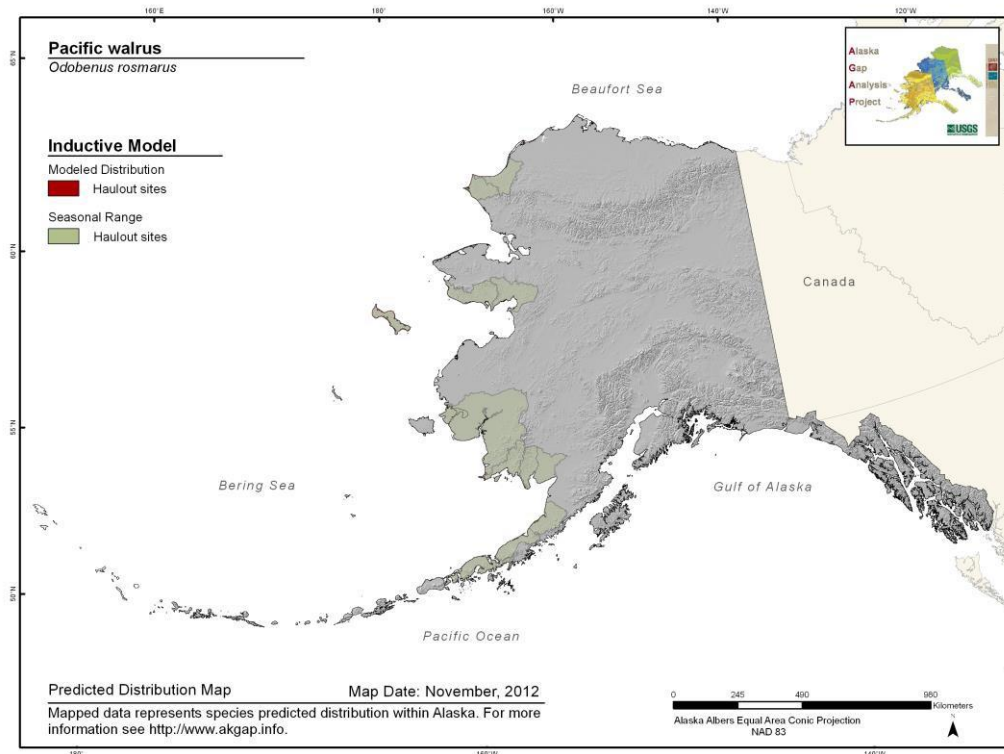
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.641**

**Model Quality
Summary:**
Low

Habitat Description

Moving pack ices used by females during summer for pupping and all individuals in winter for resting, and molting (MacDonald and Cook 2009). Males use secluded rocky shores and islands, beaches and coastal headlands for summer resting and molting sites. Does not haulout on shores with permanent human occupation (Richard and Campbell 1988).

References

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

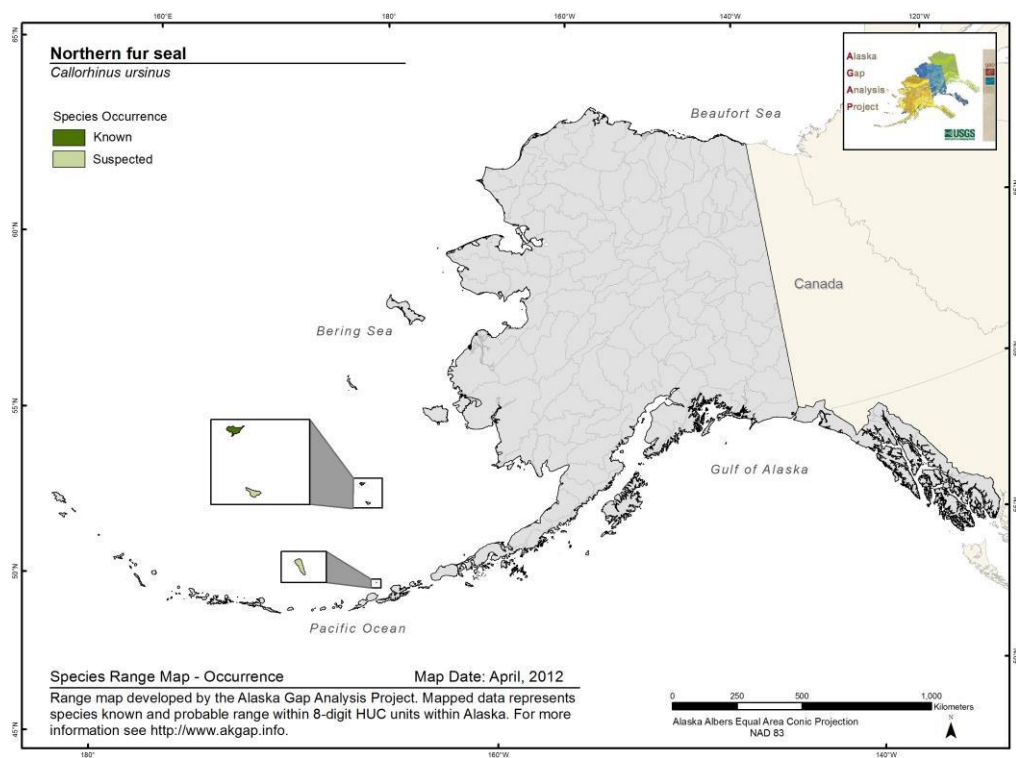
Richard, P. R., and R. R. Campbell. 1988. Status of the Atlantic walrus, *Odobenus rosmarus rosmarus*, in Canada. Canadian Field-Nat. 102:337-350.

Northern Fur Seal

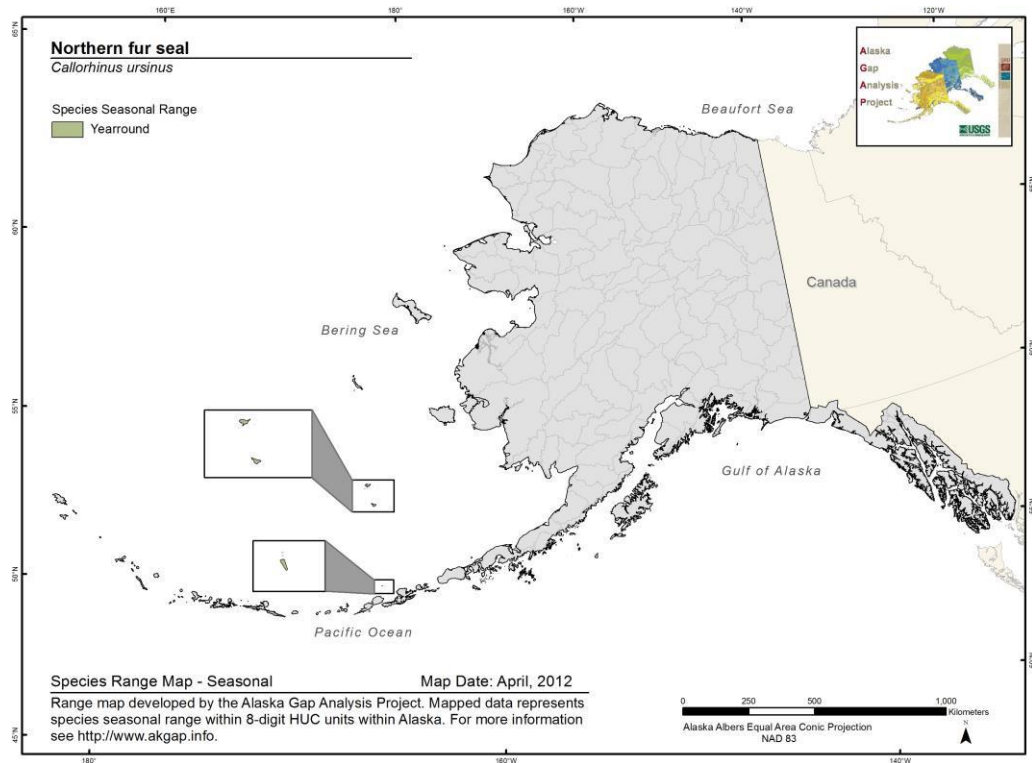
Callorhinus ursinus

Range Map and Distribution Model Summary

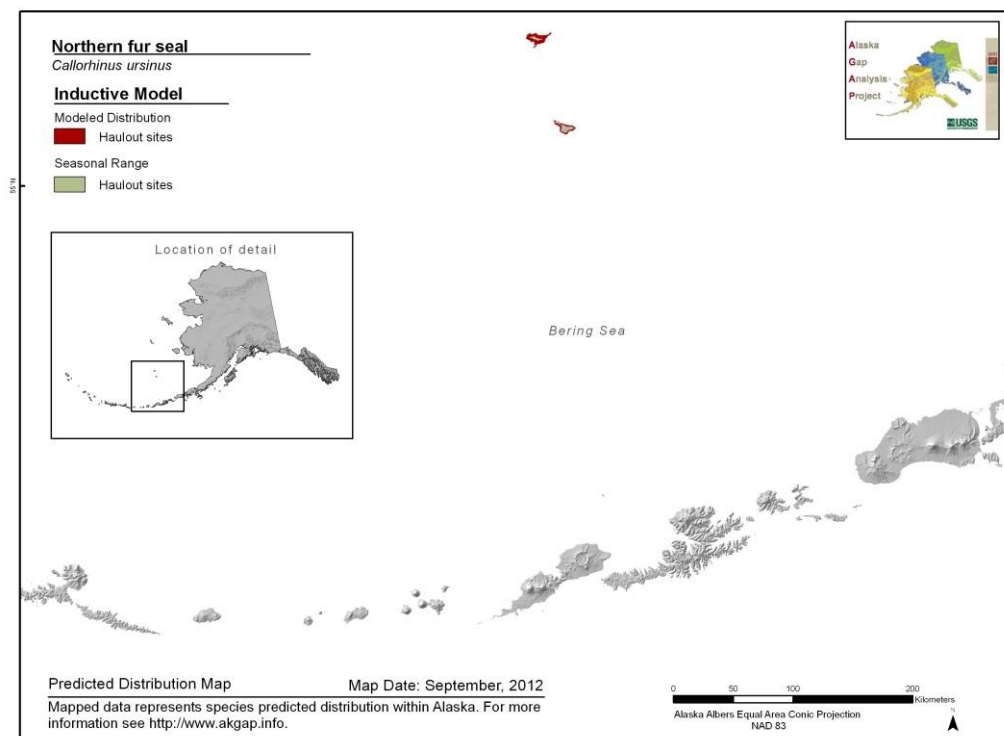
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC):** No
AUC

**Model Quality
Summary:**
Not validated

Habitat Description

Open ocean and coastal waters. Hauls out on islands only to breed; uses rocky shores during breeding season (NatureServe 2007b).

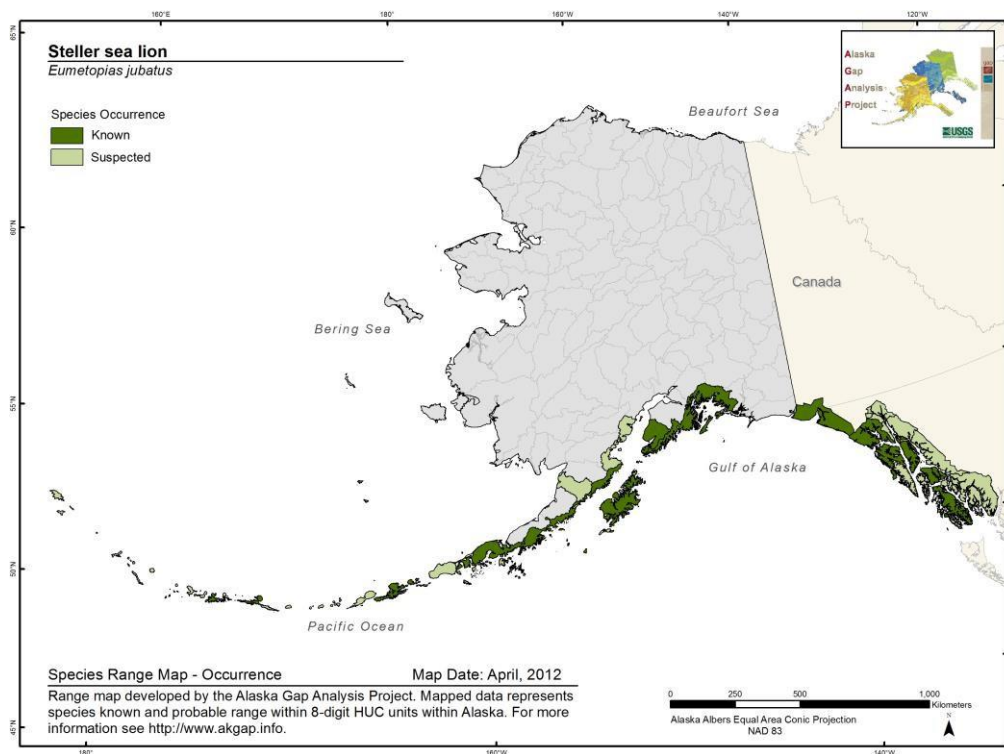
References

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

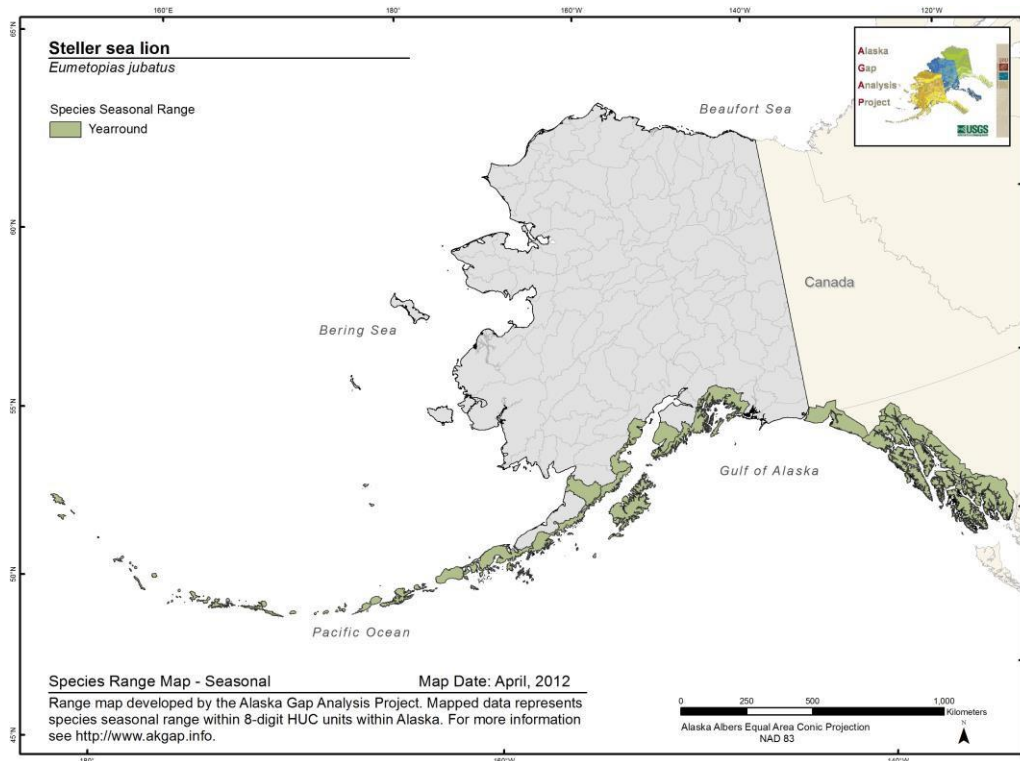
Steller Sea Lion *Eumetopias jubatus*

Range Map and Distribution Model Summary

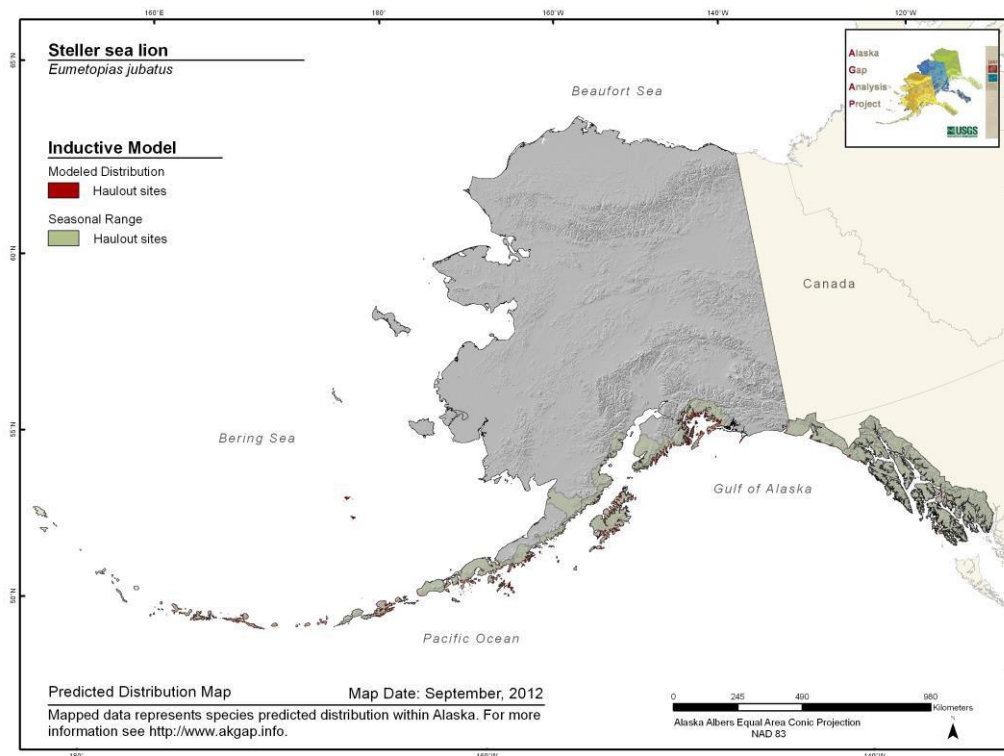
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.61**

**Model Quality
Summary:**
Low

Habitat Description

Rookeries generally occur on beaches of remote islands with difficult access for humans and other mammalian predators (Sea Lion Recovery Plan Team 1991). The beaches can be sand, gravel, cobble, boulder, or bedrock. Female sea lions tend to select locations for pupping that are gently sloping and protected from waves (Sandegren 1970). Rookery sites may be used as haulout sites during the nonbreeding season. Independent juveniles usually avoid rookeries (Gentry 1970, Sandegren 1970, Calkins and Pitcher 1983, Hoover 1988). From about two weeks after birth, the pups begin to spend increasing amounts of time in the intertidal areas and swimming near shore. Haulout locations include exposed rocks, reefs, beaches, jetties, breakwaters, navigational aids, floating docks, and sea ice. Selection of both rookery and haulout sites appears to depend on a number of factors including substrate type, degree of exposure to wind and waves, proximity to food resources, tradition of use, season, and the degree of human disturbance (Gentry 1970, Sandegren 1970, Calkins and Pitcher 1983, Hoover 1988).

Forage near shore and over the continental shelf (Reeves et al. 1992). Habitually hauls out on sea ice (Rice 1998). While offshore, the sea lions are most often found within 35 km of shore (Kenyon and Rice 1961, Fiscus and Baines 1966, Fiscus et al. 1976, Bonnell et al. 1983) but may range out to several hundred kilometers offshore. The distance sea lions move offshore varies seasonally, with fewer animals being sighted at sea during the summer (Fiscus et al. 1976, Bonnell et al. 1983).

References

Bonnell, M.L., M.O. Pierson, and G.D. Farrens. 1983. Pinnipeds and sea otters of central and northern California, 1980-1983: status, abundance and distribution. Part of investigator's final report for contract #14-12-0001-29090. Prepared for U.S. Minerals Management Service. Center for Marine Studies, Univ. of California, Santa Cruz.

Calkins, D.G. and K.W. Pitcher. 1983. Population assessment, ecology and trophic relationships of Steller sea lions in the Gulf of Alaska. Final report. Pp.445-546. In: Environmental assessment of the Alaskan Continental Shelf. Final reports of principal investigators. Vol. 19. December 1983. U.S. Dept. Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Oceanography and Marine Services, Ocean Assessments Division.

Fiscus, C.H. and G.A. Baines. 1966. Food and feeding behavior of Steller and California sea lions. J. Mamm. 47(2):195-200.

Fiscus, C., H. Braham, and R. Mercer. 1976. Seasonal distribution and relative abundance of off-shore marine mammals in the western Gulf of Alaska: Kodiak Island to Umnak Island. Quarterly report. Pp. 265-271. In: Environmental assessment of the Alaskan Continental Shelf. Vol. 1. Principal investigators' reports, October-December 1976. National Oceanic and Atmospheric Administration, Environmental Research Laboratories, Boulder, CO.

Gentry, R.L. 1970. Social behavior of the Steller sea lion. Ph.D. thesis. Univ. of California, Santa Cruz, CA. 113 p.

Hoover, A.A. 1988. Steller sea lion, *EUMETOPIAS JUBATUS*. Pp. 159-193. In: Lentfer, J.W. (ed.). Selected marine mammals of Alaska: species accounts with research and management recommendations. Marine Mammal Commission, Washington, DC.

Kenyon, K.W. and D.W. Rice. 1961. Abundance and distribution of the Steller sea lion. J. Mamm. 42(2):223-234.

Reeves, R. R., B. S. Stewart, and S. Leatherwood. 1992. The Sierra Club Handbook of Seals and Sirenians. Sierra Club Books, San Francisco, California. xvi + 359 pp.

Rice, D.W. 1998. Marine mammals of the world: systematics and distribution. Society for Marine Mammalogy, Special Publication Number 4. ix + 231 pp.

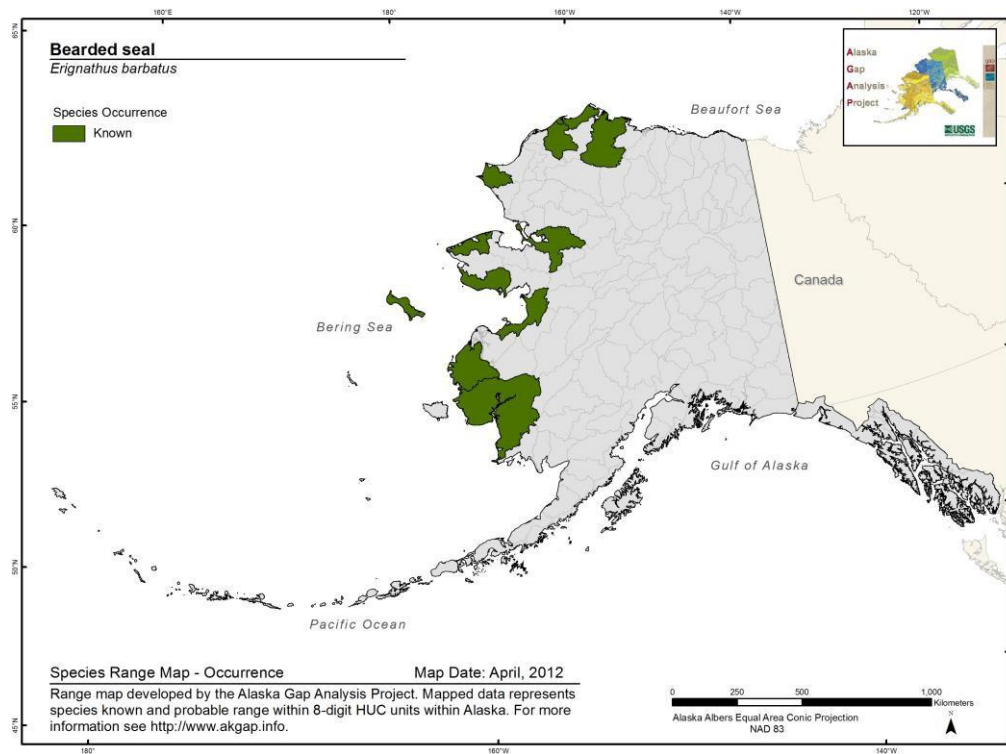
Sandegren, F.E. 1970. Breeding and maternal behavior of the Steller sea lion (*EUMETOPIAS JUBATA*) in Alaska. M.S. thesis. Univ. of Alaska Fairbanks, Fairbanks, AK. 138 p.

Sea Lion Recovery Plan Team. 1991. Recovery plan for the Steller sea lion (*EUMETOPIAS JUBATUS*), final revision. Multi-agency cooperative report. October 3, 1991. 119 p.

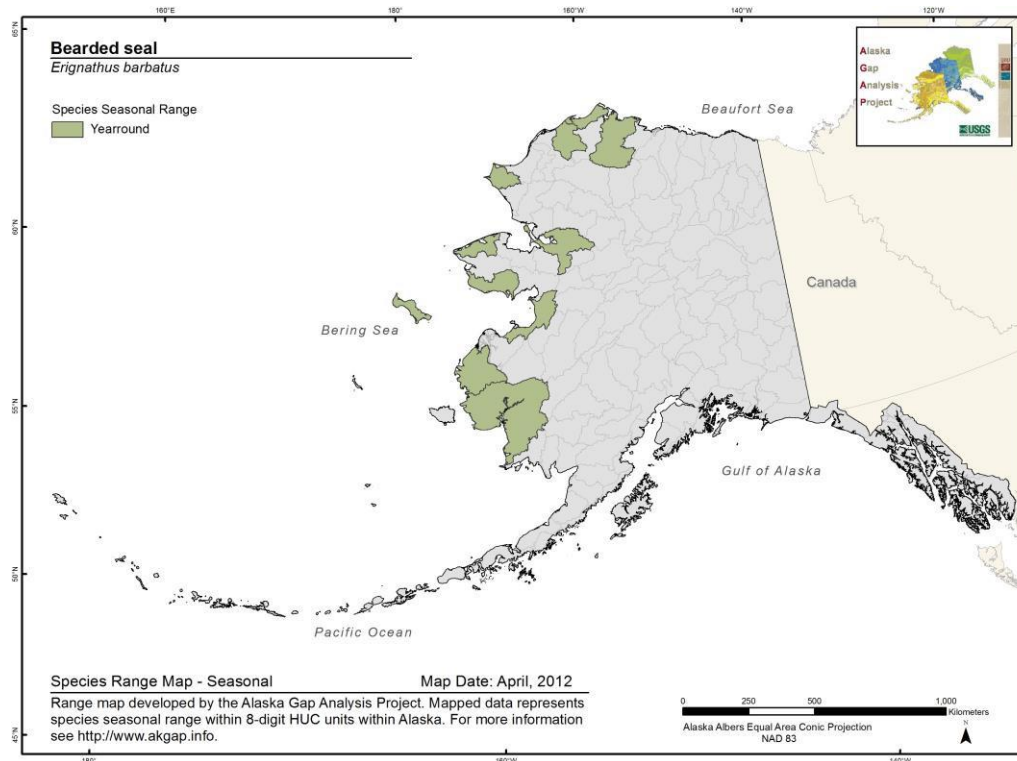
Bearded Seal *Erignathus barbatus*

Range Map and Distribution Model Summary

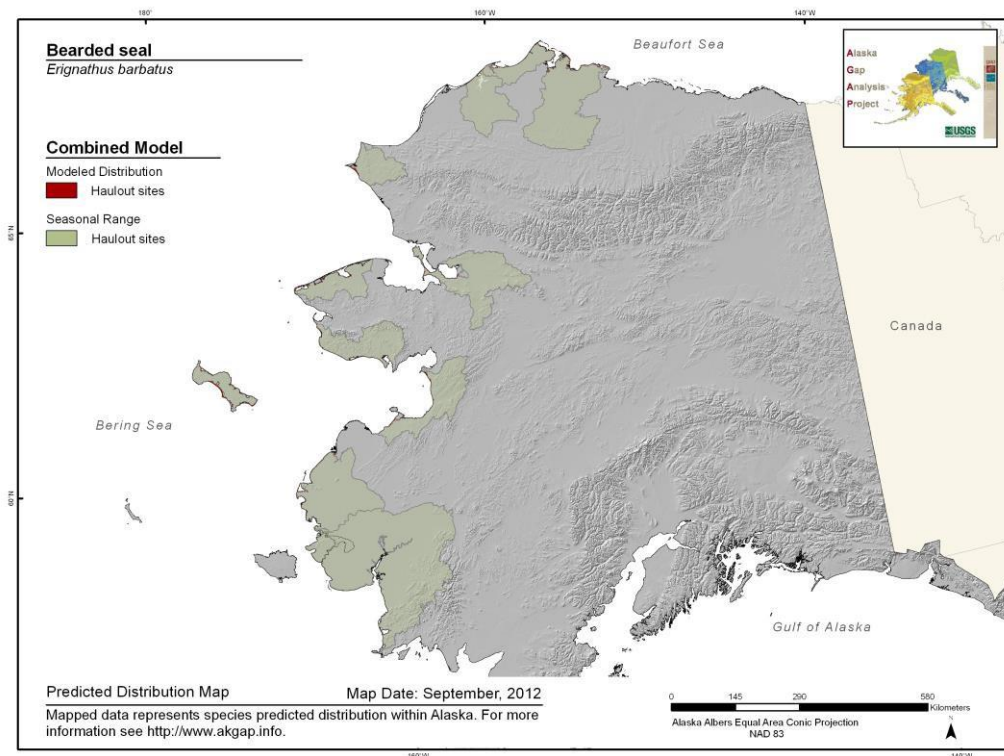
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.654**

**Model Quality
Summary:**
Low

Habitat Description

Associated with moving pack (sea) ice; prefers relatively shallow waters (less than 130 m) due to benthic feeding habits (NatureServe 2007b). Pups are born on surface of ice. Stable ice not necessary (Frost, personal communication), but tends to avoid shorefast ice and thick, unbroken drift ice (Wynne 1993). Bearded seals in some parts of their range occupy areas that are ice free (e.g. Anadyr region of Russia; Frost, personal communication). During summer and spring molt, haul out on gravel beaches. During winter, may make breathing holes in fast ice bordering high arctic polynyas (Burns 1981, Reeves et al. 1992).

References

Burns, J. J. 1981. Bearded seal. Pages 145-170 In Handbook of Marine Mammals (Ridgway, S. H. and R. J. Harrison, eds.). Vol. 2. Academic Press, NY.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

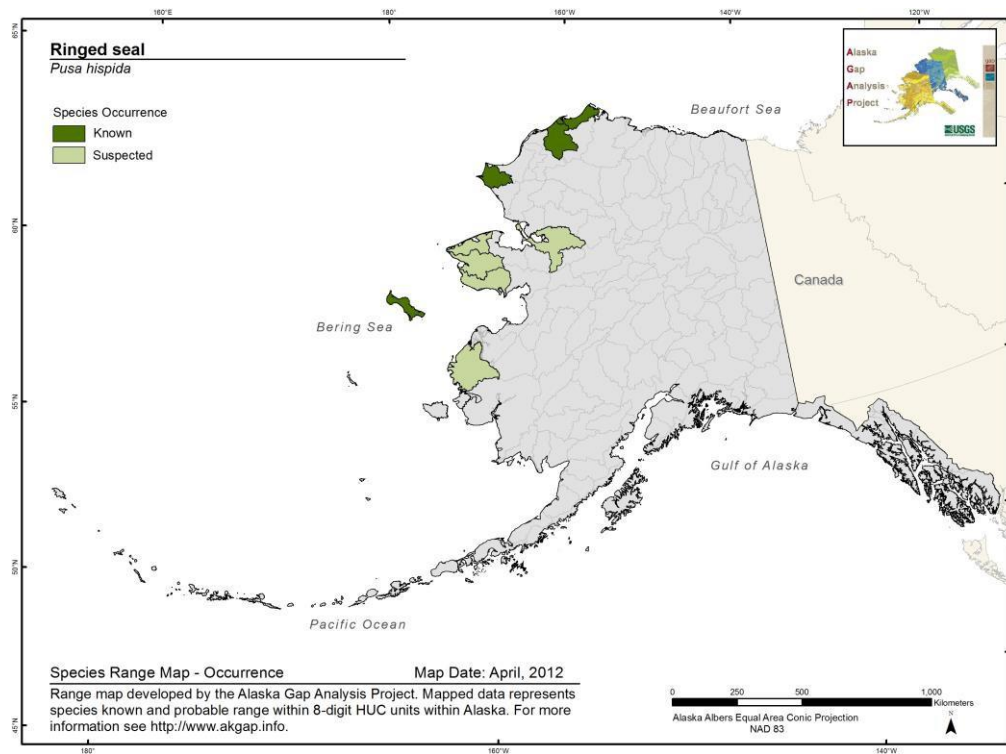
Reeves, R. R., B. S. Stewart, and S. Leatherwood. 1992. The Sierra Club Handbook of Seals and Sirenians. Sierra Club Books, San Francisco, California. xvi + 359 pp.

Wynne, K. 1993. Guide to marine mammals of Alaska. Alaska Sea Grant College Program, University of Alaska, Fairbanks. 75 p.

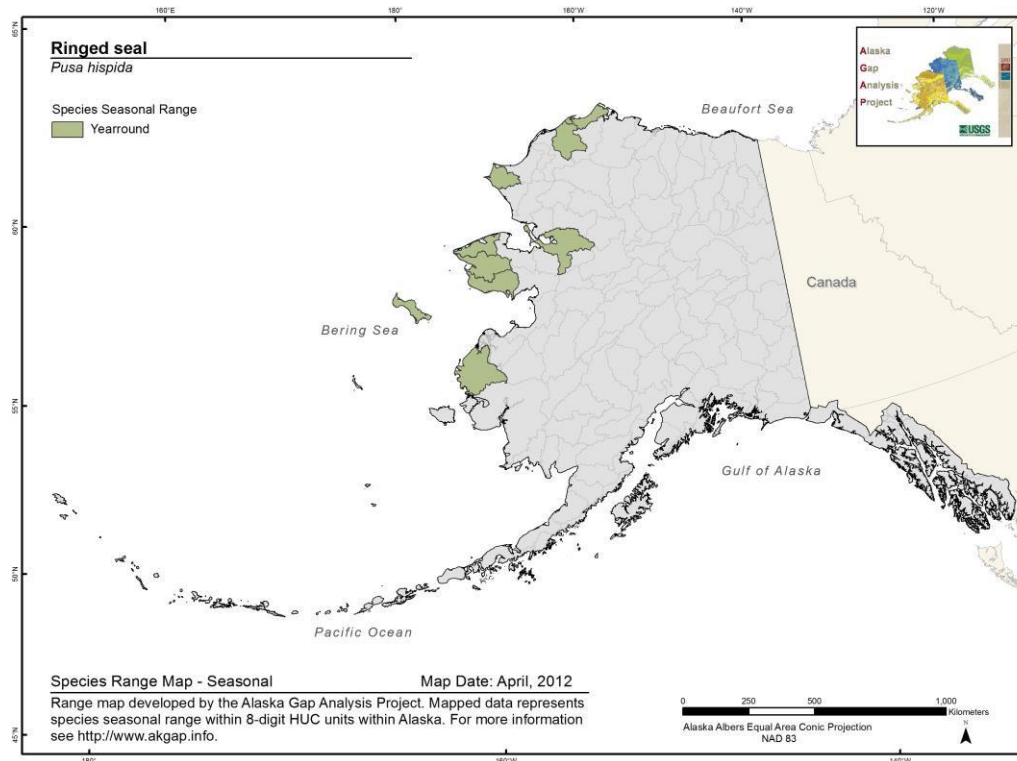
Ringed Seal *Pusa hispida*

Range Map and Distribution Model Summary

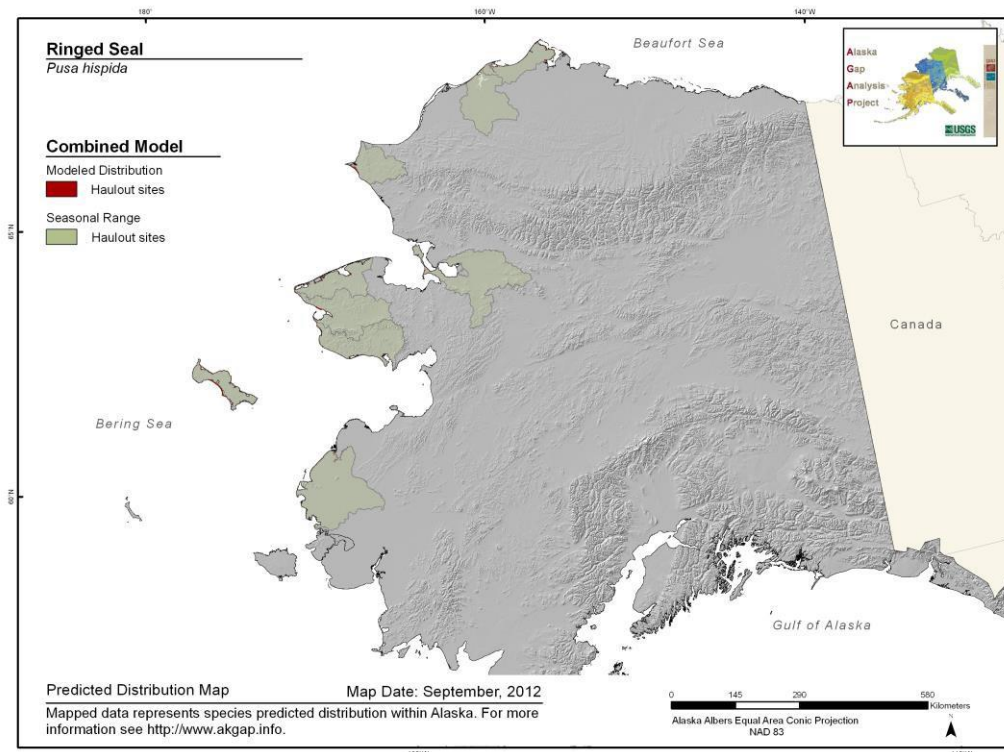
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Combined

**Model
Evaluation
Statistic
(AUC): 0.637**

**Model Quality
Summary:**
Low

Habitat Description

Associated with sea ice throughout the year. In winter, occupies landfast and shore ice and, in other seasons, migrate with the advance and retreat of pack ice (Burns 1978). Although the primary breeding habitat of the ringed seal is land-fast ice over the continental shelf along Arctic coasts, bay, and inter-island channels – they are also abundant and have pups in drifting pack ice, both nearshore and offshore (Laidre et al. 2008 and sources therein). Females pup in snow dens in March and April (Eley 1994).

Nonbreeders occur in flow zone and moving pack ice during breeding season; congregate along leads in ice in late spring. In summer all age classes and both sexes occur along edge of permanent ice pack and in near-shore ice remnants. Some, mainly juveniles, occupy ice-free areas through the summer. In most areas pups born in den made under snow by female or in natural snow cave, above breathing hole through ice (Frost and Lowry 1981).

References

Burns, J. J. 1978. Ice seals. Pp. 193-205, in Marine mammals of eastern North Pacific and Arctic waters (D. Haley, ed.). Pacific Search Press, Seattle.

Eley, T. J., Jr. 1994. Ringed seal. Alaska Department of Fish and Game Wildlife Notebook Series. [Http://www.adfg.state.ak.us/pubs/notebook/marine/rin-seal.php](http://www.adfg.state.ak.us/pubs/notebook/marine/rin-seal.php) (accessed 26 March 2007).

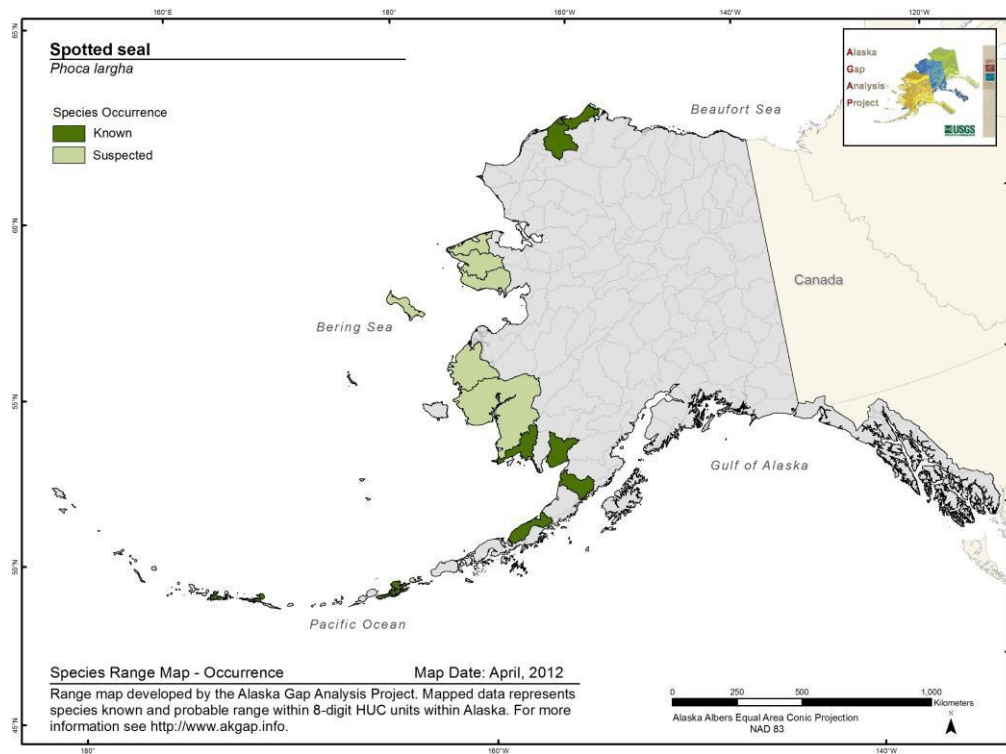
Frost, K.J. and L.F. Lowry. 1981. Foods and trophic relationships of cetaceans in the Bering Sea. IN: D.W. Hood and J.A. Calder (eds). Eastern Bering Sea Shelf oceanography and resources. Vol. 2. Univ. of Washington Press, Seattle, WA.

Laidre, K. L., I. Stirling, L. F. Lowry, O. Wiig, M. P. Heide-Jorgensen, and S. H. Fergusen. 2008. Quantifying the sensitivity of Arctic marine mammals to climate-induced habitat change. Ecological Applications, 18(2) supplement, 2008, pp S97-S125.

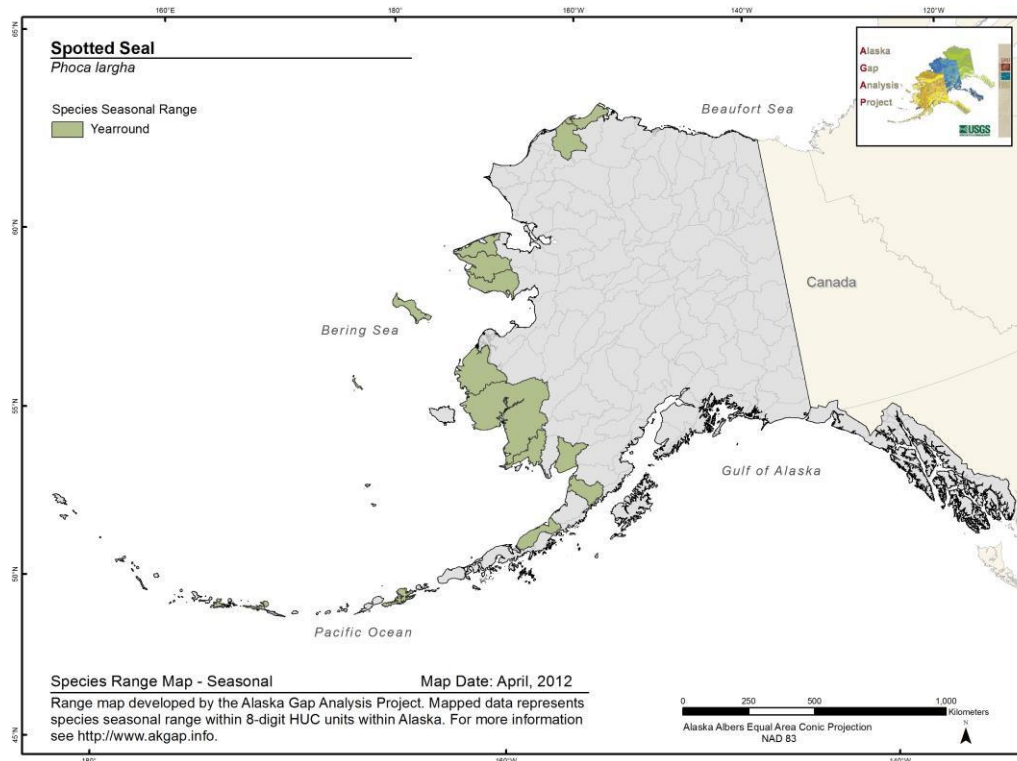
Spotted Seal *Phoca largha*

Range Map and Distribution Model Summary

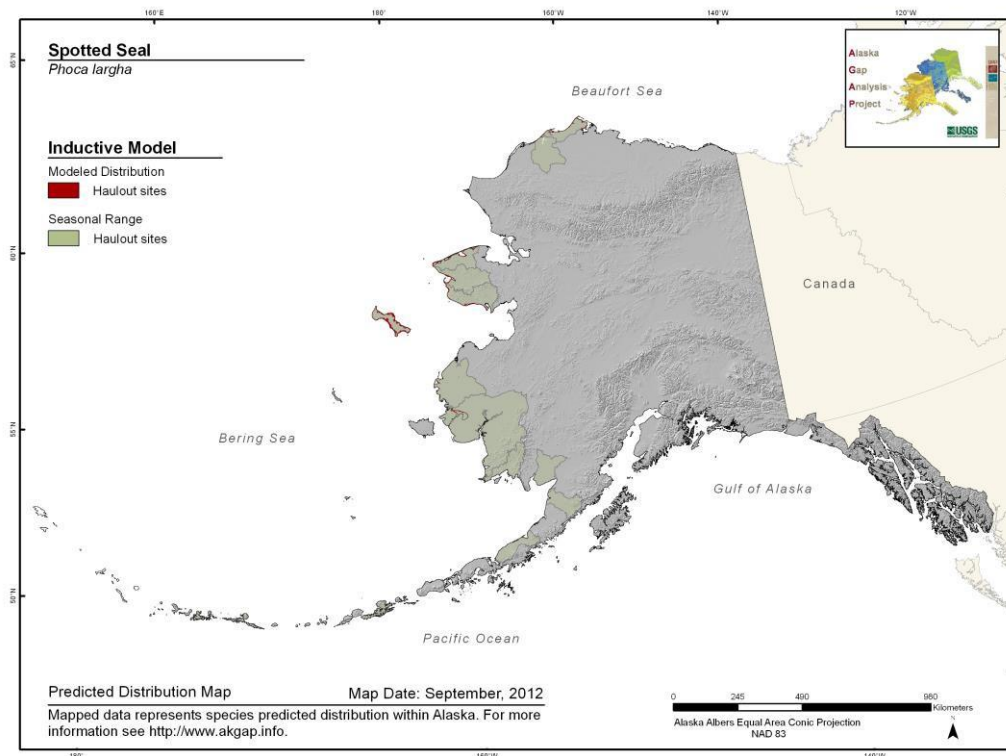
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.792**

**Model Quality
Summary:**
Moderate

Habitat Description

Closely associated with sea ice from late autumn to early summer. Young are born on drifting pack ice. Lives in coastal waters during ice-free months (Burns 1978). Occurs in estuaries and embayments in late summer and fall. Rests ashore on tide exposed rocks and (in winter) on ice floes. During open-water season, often hauls out on sandbars and beaches (NatureServe 2006).

References

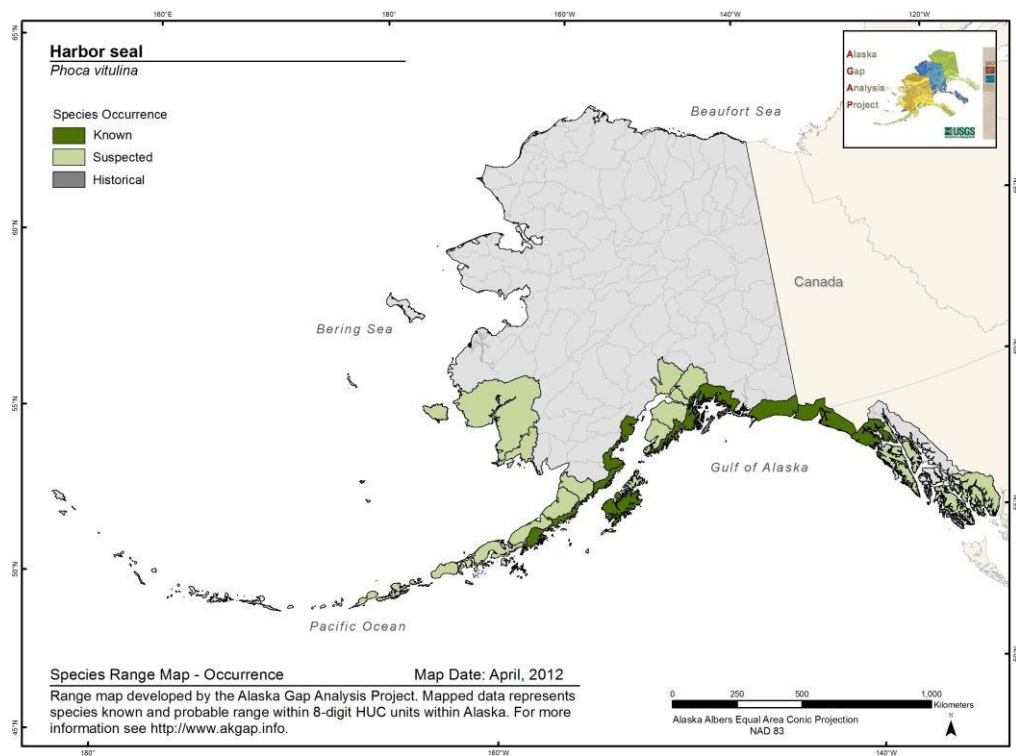
Burns, J. J. 1978. Ice seals. Pp. 193-205, in Marine mammals of eastern North Pacific and Arctic waters (D. Haley, ed.). Pacific Search Press, Seattle.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life. Version 5.0. NatureServe, Arlington, VA. Available <http://www.natureserve.org/explorer>.

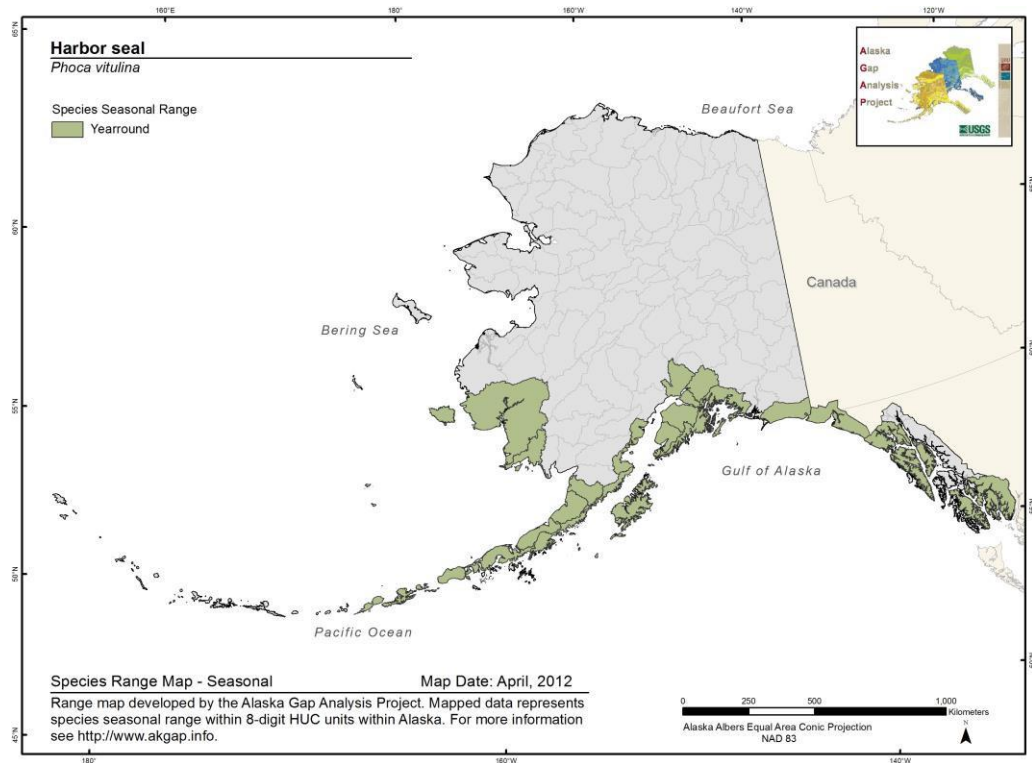
Harbor Seal *Phoca vitulina*

Range Map and Distribution Model Summary

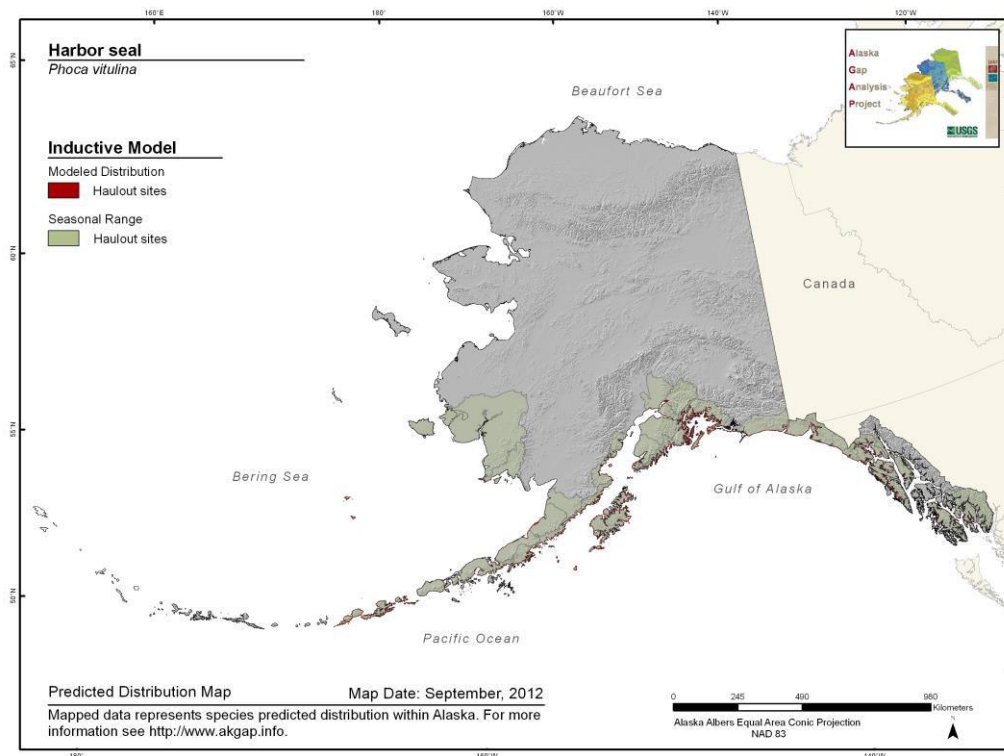
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.76**

**Model Quality
Summary:**
Moderate

Habitat Description

Coastal waters to about 10 miles offshore, bays, harbors, coastal rivers, lakes. Most common in protected areas such as bays or inlets. Some frequently occur in freshwater bodies connected to the ocean and possibly resident freshwater in Lake Iliamna (Alaska). Haul outs on isolated mudbanks, rocky islets, rocky or sandy shores, intertidal ledges, reefs, and glacial and sea ice (Scheffer 1958, Boulva and McLaren 1979, Johnson and Jeffries 1977, Burns and Gol'tsev 1984, Hoover 1988, Reeves et al. 1992). Pups are born on shore, often in an intertidal area; secluded sites and areas beyond strong wave action (NatureServe 2007b).

References

Boulva, J. and I.A. McLaren. 1979. Biology of the harbor seal, *Phoca vitulina*, in eastern Canada. Bull. 200. Fisheries Research Board of Canada, Ottawa, ON, Canada. 24 pp.

Burns, J.J. and V.N. Gol'tsev. 1984. Comparative biology of harbor seals, *Phoca vitulina* Linnaeus, 1758, of the Commander, Aleutian, and Pribilof Islands. Pp. 17-24 in: Fay, F.H. and G.A. Fedoseev (eds.). Soviet-American cooperative research on marine mammals. Vol. 1. Pinnipeds. NOAA Tech. Rep. NMFS 12. U.S. Dept. Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Hoover, A.A. 1988. Harbor seal, *Phoca vitulina*. Pp. 125-158 in: Lentfer, J.W. (ed.). Selected marine mammals of Alaska: species accounts with research and management recommendations. Marine Mammal Commission, Washington, DC.

Johnson, M.L., and S.J. Jeffries. 1977. Population evaluation of the harbor seal (*Phoca vitulina richardsi*) in the waters of the State of Washington. Marine Mammal Commission, Washington, DC. 27 pp.

NatureServe. 2007b. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

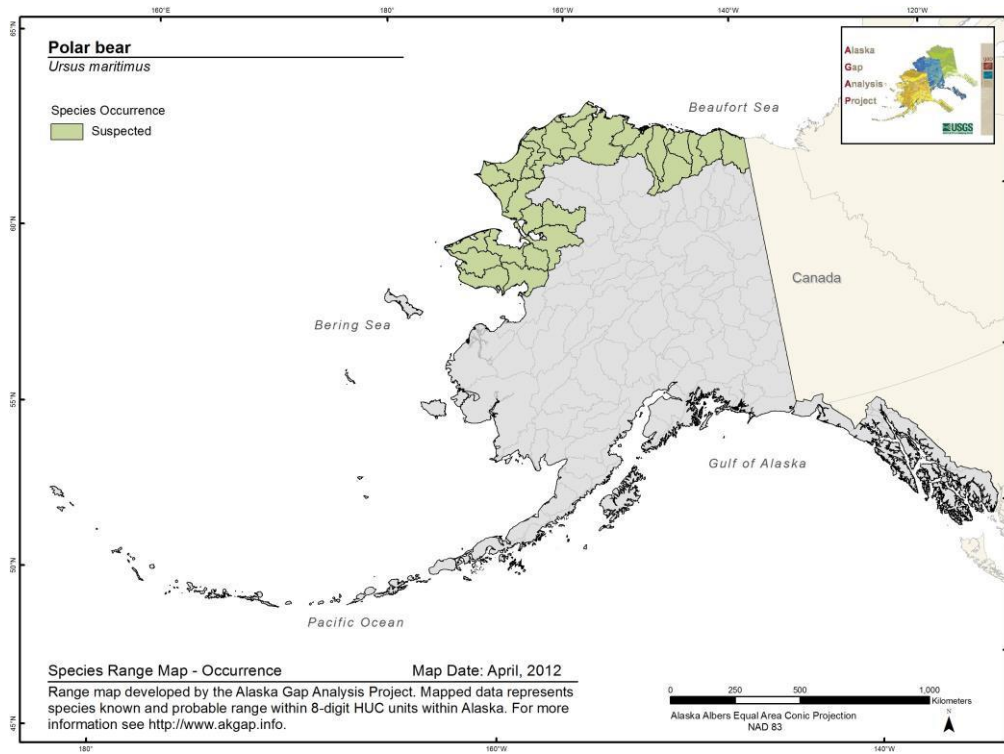
Reeves, R. R., B. S. Stewart, and S. Leatherwood. 1992. The Sierra Club Handbook of Seals and Sirenians. Sierra Club Books, San Francisco, California. xvi + 359 pp.

Scheffer, V. B. 1958. Seals, sea lions, and walruses, a review of the Pinnipedia. Stanford University Press, Stanford, CA.

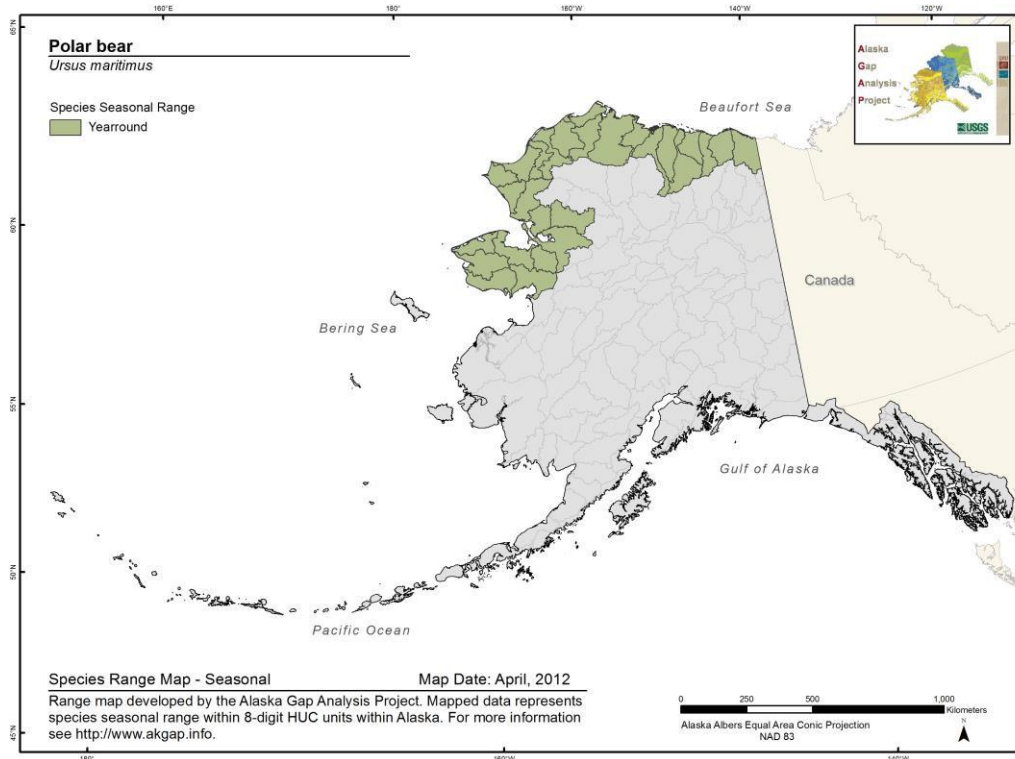
Polar Bear *Ursus maritimus*

Range Map and Distribution Model Summary

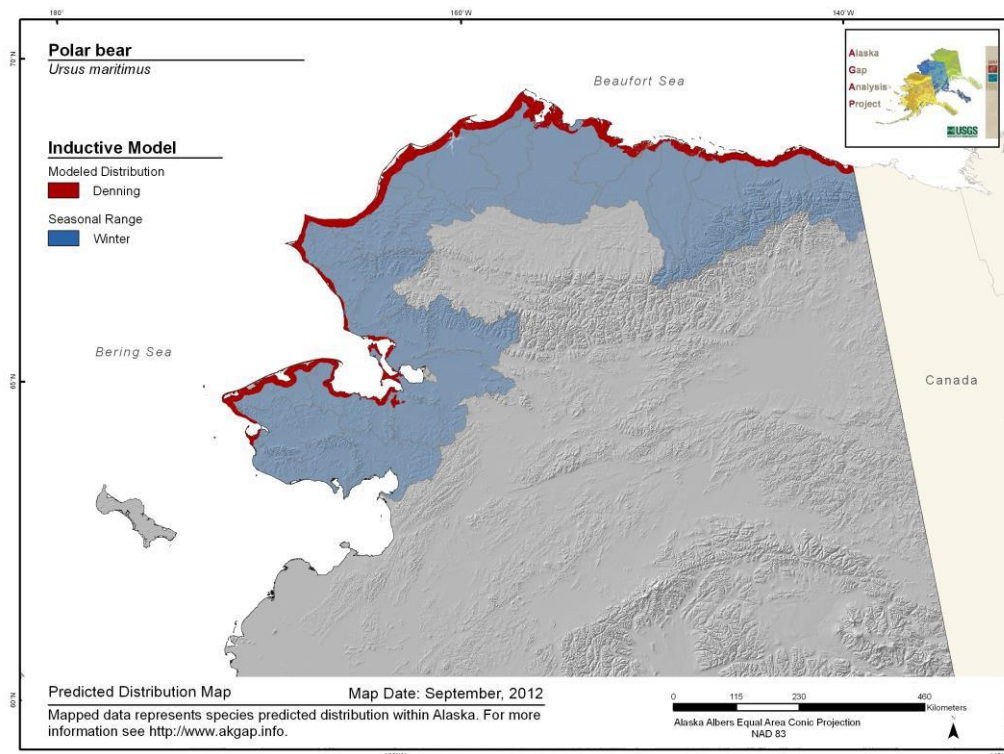
Range Map- Occupancy



Range Map- Seasonality



Final Distribution Model



Model Summary

Model Type:
Inductive

**Model
Evaluation
Statistic
(AUC): 0.885**

**Model Quality
Summary:**
Moderate

Habitat Description

Polar bears are closely tied to arctic pack ice. They prefer areas with ice that is periodically active, such as at the interface of landfast ice and drifting pack ice along the arctic coasts or near polynyas. Polar bears, are most commonly observed in or near shore zones where ice is constantly moving, opening up and reconsolidating, rather than pelagic areas which are of lower productivity (Stirling and Smith 1975; Pomeroy 1997; Stirling 1997). Sometimes they wander inland as much as 150 km from the coast. In the Bering and Chukchi Seas, Alaska, where sea ice melts in summer, bears migrate up to 1000 km to remain with the southern ice boundary (Amstrup 2003). Pregnant females remain on or near land in dens through winter while males and non-breeders winter on sea ice (Derocher and Stirling 1990). In Alaska, polar bears den most commonly on offshore islands and associated heavy, stable ice from the mouth of Colville River to Brownlow Point (MacDonald and Cook 2009). Occasionally den on shorefast ice and river bottoms from Kuparuk River to Point Hope (ADF&G 1973).

References

ADF&G. 1973. Alaska's wildlife and habitat. Anchorage, Alaska. 144 pp. + maps.

Amstrup, S.C. 2003. Polar bear, *Ursus maritimus*. Chapter 27 (Pp. 587-610) in: Wild mammals of North America: biology, management, and conservation. Edited by G.A. Feldhamer, B.C. Thompson, and J.A. Chapman. John Hopkins University Press, Baltimore, Maryland.

Derocher, A. E. and I. Sterling. 1990. Distribution of polar bears (*Ursus maritimus*) during the ice-free period in western Hudson Bay. Canadian Journal of Zoology 68:1395-1403.

MacDonald, S. O. and J. A. Cook. 2009. Recent Mammals of Alaska. University of Alaska Press, Fairbanks, AK.

Pomeroy, L. R. 1997. Primary production in the Arctic Ocean estimated from dissolved oxygen. *Journal of Marine Systems*. 10:1-8.

Stirling, I. 1997. Importance of polynyas, ice edges, and leads to marine mammals and birds. *Journal of Marine Systems*. 10(1-4):921.

Stirling, I., and T. G. Smith. 1975. Interrelationships of Arctic Ocean mammals in the sea ice habitat. *Circumpolar Conference on Northern Ecology*. 2:129-136.