

Red Knot (*Calidris canutus*)

Vulnerability: Presumed Stable

Confidence: High

The Red Knot, *roselaari* subspecies, is a relatively uncommon breeding shorebird in Arctic Alaska. They typically nest in coastal alpine habitats, preferring sparsely vegetated and broad alpine ridgelines and dome tops (Harrington 2001, J. Johnson, pers. comm.). There is little information on breeding season diet in this species however; field observations suggest a varied diet from insects to plant materials (e.g., lichens, leaves, berries) (Harrington 2001). During May, knots occur in coastal lagoons adjacent to suitable nesting habitats. These lagoons apparently serve as foraging and resting sites preceding dispersal to nesting areas (J. Johnson, pers. comm.). This subspecies winters at sites along the Pacific Coast from California down into Central America. Current population estimate for *roselaari* is 20,000 (Morrison et al. 2006) although newer estimates place it at approximately 17,000 (J. Lyons, unpublished data).

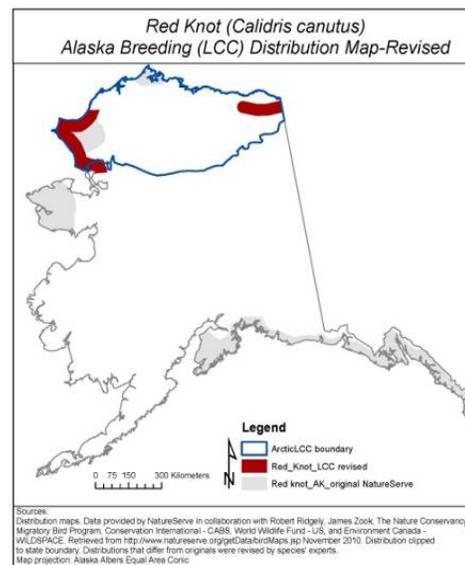


Range: We modified the NatureServe breeding range map based on new evidence and expert opinion (J. Johnson, unpublished data). We removed the Barrow breeding area as there is no recent evidence of breeding there. We constrained the western portion of their breeding range to within 50km of the coast based on their association with coastal alpine habitats and recent surveys (J. Johnson, unpublished data). Finally, we included breeding range in the northeastern Brooks Range within the Arctic Refuge as there is strong suspicion of nesting there (J. Johnson, pers. comm.).

Physiologic Thermo Niche: Among the indirect exposure and sensitivity factors in the assessment (see table on next page), Red Knots ranked neutral in most categories. This species is associated with cold-adapted alpine habitats and so it may be sensitive to changes in thermal conditions (i.e. warming) that are likely to occur in this region (<http://www.snap.uaf.edu/>).

Physical Habitat Restrictions: Although Red Knots nest in relatively arid habitats some individuals (>50%) that nest near the coast forage in coastal habitats throughout the

breeding season. Also, just prior to breeding they depend on coastal lagoons for foraging and resting which may provide a temporal buffer for knots that arrive when inland sites are still covered by snow (J. Johnson, pers. comm.). Like other shorebirds, Red Knots utilize coastal habitats post-breeding as well (J. Johnson, unpublished data, Taylor et al. 2010). Loss or alteration of coastal lagoons as a result of climate-mediated erosion and overwash from increased storm frequency (Jones et al. 2009) would likely have an adverse effect on knots.



Dietary Versatility: Red Knots have an omnivorous diet and current evidence suggests they can take advantage of a wide variety of prey and so would likely not be impacted by changes in prey base associated with climate change.

Red Knot (*Calidris canutus*)

Vulnerability: Presumed Stable

Confidence: High

Vulnerability Factors	D	SD	N	SI	I	GI	Unknown or N/A
B1. Sea level rise			*				
B2a. Natural barriers			*				
B2b. Anthropogenic barriers			*				
B3. Human response to CC			*				
C1. Dispersal/Movement			*				
C2ai. Historical thermal niche (GIS)			*				
C2aii. Physiological thermal niche			*	*			
C2bi. Historical hydro niche (GIS)			*				
C2bii. Physiological hydro niche			*	*			
C2c. Disturbance regime			*	*			
C2d. Ice & Snow habitats			*				
C3. Physical habitat restrictions		*	*				
C4a. Biotic habitat dependence			*				
C4b. Dietary versatility		*	*				
C4d. Biotic dispersal dependence			*				
C4e. Interactions with other species			*	*			
C5a. Genetic variation							*
C5b. Genetic bottlenecks							*
C6. Phenological response		*	*	*			*
D1. CC-related distribution response							*

D=Decrease vulnerability, SD=Somewhat decrease vulnerability, N=Neutral effect, SI=Slightly increase vulnerability, I=Increase vulnerability, GI=Greatly increase vulnerability.

Interactions with Other Species: Climate change may reduce the amplitude of lemming cycles (Ims and Fuglei 2005) and thus could expose this species to greater nest predation pressure if lemmings become less available as alternative prey. In addition, this species will communally feed and flock with other shorebirds during breeding and migration and will join other shorebird species in mobbing potential predators during the nesting season (Harrington 2001) but it is unknown if these behaviors increase species persistence.

Phenological Response: Although not demonstrated in Red Knots, there is evidence suggesting shorebirds are able to track phenological changes associated with a warming climate at least in terms of nest initiation (J. Liebezeit and S. Zack, unpublished data; D. Ward, pers. comm.). However, it is unknown if they can synchronize timing to other organisms changing schedules that they depend on (e.g. invertebrate prey).

In summary, Red Knots will likely experience some negative impacts from climate change however these will be slight and, overall, they have enough versatility in their life history

traits and behaviors and remain “stable” with regard to climate change at least during the timeframe of this assessment (to 2050).

Literature Cited

- Harrington, Brian A. 2001. Red Knot (*Calidris canutus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/563>. doi:10.2173/bna.563
- Ims, R.A. and E. Fuglei. 2005. Trophic interaction cycles in tundra ecosystems and the impact of climate change. *BioScience* 55: 311-322.
- Jones, B.M., C.D. Arp, M.T. Jorgenson, K.M. Hinkel, J.A. Schmutz, and P.L. Flint. 2009. Increase in the rate and uniformity of coastline erosion in Arctic Alaska. *Geophysical Research Letters* 36, L03503.
- Morrison, R.I.G., B.J. McCaffery, R.E. Gill, S.K. Skagen, S.L. Jones, G.W. Page, C.L. Gratto-Trevor, and B.A. Andres. 2006. Population estimates of North American shorebirds, 2006. *Wader Study Group Bulletin* 111:67-85.
- Taylor, A.R., R.B. Lanctot, A.N. Powell, F. Huettmann, D. Nigro and S.J. Kendall. 2010. Distribution and Community Characteristics of Staging Shorebirds on the Northern Coast of Alaska. *Arctic* 63(4): 451-467.