Bar-tailed Godwit (*Limosa lapponica*)

Vulnerability: **Presumed Stable** Confidence: High

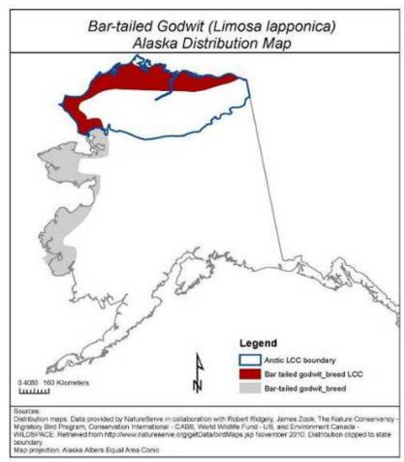
The Bar-tailed Godwit completes one of the most incredible journeys of any bird species, traveling non-stop across the Pacific Ocean from Alaska to Australia and New Zealand during its fall migration. In Arctic Alaska, this species is found most commonly west of the Colville River and is particularly frequent in the Brooks Range foothills (Johnson et al. 2007). On the North Slope, Bar-tailed Godwits nest in moist tussock tundra near wetlands to wet sedge meadows (McCaffery and Gill 2001). They typically forage in shallow, flooded areas on insects but will eat berries upon arrival to breeding grounds (McCaffery and Gill 2001). Current population estimate for North American breeders (*baueri* subspecies) is 90,000 with a declining trend (Morrison et al. 2006).

Range: We used the extant NatureServe range map for the assessment as it closely matched that of the Birds of North America (McCaffery and Gill 2001) and other sources (Bart et al. 2012, Johnson et al. 2007).

Physiological Hydrologic Niche: Conversion of ice roads to all-weather roads, a possible consequence of reduced suitability of winter snow and ice conditions, could impact hydrology at local and regional scales. Shallow tundra wetlands can be adversely affected by road construction and potentially impact availability of invertebrate prey. The extent of such activities will likely be localized.

Physiological Thermal Niche: Compared to other arctic shorebirds, Bar-tailed Godwits breed over a relatively wide latitudinal gradient both near and far from marine shorelines, thus there is no evidence to suggest that they have any thermal sensitivity during nesting. They could actually benefit from warmer temperatures at the northern terminus of their breeding range via reduction in cold stress.

Physical Habitat Restrictions: Although Bar-tailed Godwits do exploit a range of upland to wet tundra habitats for nesting, they depend on water-dominated habitats for foraging during both breeding and post-breeding and so may be negatively impacted by a net drying trend. Because of their flexible habitat use they may be able to better adjust to utilizing drier habitats compared to other shorebird species. Current projections of annual potential evapotranspiration suggest negligible atmospheric-driven drying for the foreseeable future (TWS and SNAP). Thus atmospheric moisture, as an exposure factor was not heavily weighted in the assessment.



Disturbance Regime: Disturbance processes, specifically thermokarst-mediated changes on the landscape, could both destroy and create new nesting and foraging habitat (Martin et al. 2009). More frequent tundra fires (Racine and Jandt 2008) could reduce nesting and foraging habitat although tundra fires will likely be a localized phenomena in the near future.

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.

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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.

Phenological Response: There is evidence suggesting some 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, currently there is no examination of this with Bar-tailed Godwits.

In summary, Bar-tailed Godwits appear to have enough versatility in their life history attributes to enable them to compensate for changes and remain "stable" with regard to climate change at least during the timeframe of this assessment (next 50 years).

Literature Cited

Bart, J., S. Brown, B. Andres, R. Platte, and A. Manning. 2012. North slope of Alaska. Ch. 4 *in* Bart, J. and V. Johnston, eds. Shorebirds in the North American Arctic: results of ten years of an arctic shorebird monitoring program. Studies in Avian Biology.

Ims, R.A., and E. Fuglei. 2005. Trophic interaction cycles in tundra ecosystems and the impact of climate change. BioScience 55: 311-322.

Johnson, J.A., R.B. Lanctot, B.A. Andres, J.R. Bart, S.C. Brown, S.J. Kendall, and D.C. Payer. 2007. Distribution of breeding shorebirds on the Arctic Coastal Plain of Alaska. Arctic 60(3): 277-293.

Martin, P., J. Jenkins, F.J. Adams, M.T. Jorgenson, A.C. Matz, D.C. Payer, P.E. Reynolds, A.C. Tidwell, and J.R. Zelenak. 2009. Wildlife response to environmental Arctic change: Predicting future habitats of Arctic Alaska. Report of the Wildlife Response to Environmental Arctic Change (WildREACH), Predicting Future Habitats of Arctic Alaska Workshop, 17-18 November 2008. Fairbanks, Alaska, USFWS, 148 pages.

McCaffery, B. and R. Gill. 2001. Bar-tailed Godwit (*Limosa lapponica*). In The Birds of North America, No. 581 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

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.

Racine, C. and R. Jandt. 2008. The 2007"Anaktuvuk River" tundra fire on the Arctic Slope of Alaska: a new phenomenon? In D.L. Kane and K.M. Hinkel (Eds.), Ninth International Conference on Permafrost, Extended Abstracts (p. 247-248). Institute of Northern Engineering, University of Alaska Fairbanks.

The Wilderness Society (TWS) and Scenarios Network for Alaska Planning (SNAP), Projected (2001-2099: A1B scenario) monthly total potential evapotranspiration from 5 AR4 GCMs that perform best across Alaska and the Arctic, utilizing 2km downscaled temperature as model inputs. http://www.snap.uaf.edu/data.php.