Black-bellied Plover (*Pluvialis squatarola*)

Vulnerability: **Presumed Stable** Confidence: Moderate

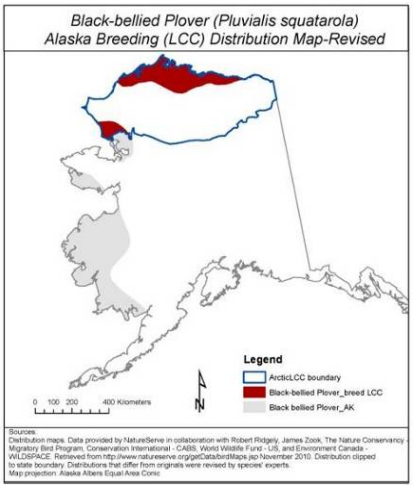
The Black-bellied Plover breeds regularly in Arctic Alaska with the highest numbers concentrated in the central portion of the Arctic Coastal Plain (Johnson et al. 2007). In general, this species tends to choose dry habitats for nesting such as dry heath tundra, exposed ridges, and river banks. They will occasionally nest in wetter tundra habitats but tend to select drier microsites (Paulson 1995). Black-bellied Plovers search for invertebrate prey visually on open tundra during the breeding season. This species winters along the coastlines of North America from southern Canada to Middle America (Paulson 1995). Current Alaska population estimate (*P. s. squatarola*) is 50,000 with a declining population trend (Morrison et al. 2006).

S. Zack @ WCS

Range: We modified the NatureServe range map by expanding the breeding range slightly to the west in the Arctic Coastal Plain based on recent findings (Bart et al. 2012).

Physiological Hydro Niche: Among the factors (see table on next page), Black-bellied Plover ranked "neutral" in many categories. Scores for physical hydrological niche ranged from "decreased to increased vulnerability." This range represents uncertainty both in the direction and intensity of change in arctic hydrology, as well as in the effect this will have on the plover (less or greater vulnerability). If significant tundra drying occurs, this species could experience loss of preferred wet foraging habitat (Bart et al. 2012), although they commonly utilize drier foraging habitats (Paulson 1995). Because they often nest in drier tundra, they may actually benefit from large-scale tundra drying. 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 (most influential on the "hydrological niche" sensitivity category), was not heavily weighted in the assessment. Complex hydrological processes could ameliorate or exacerbate a drying trend (Martin et al. 2009).

Historical Hydro Niche: Conversion of ice roads to all-weather roads, could impact hydrology at local and regional scales (Jorgensen et al. 2010). These changes to hydrology can affect the shallow tundra wetlands in which Black-bellied Plovers forage, reducing water levels, soil moisture and invertebrate abundance.



Disturbance Regime: Climate-mediated thermokarst, could both create and destroy nesting and foraging habitats (Martin et al. 2009).

Interactions with Other Species: Climate change may reduce the amplitude of lemming cycles (Post et al. 2009) and thus could expose this species to greater nest predation pressure if lemmings become less available as alternative prey.

Dietary Versatility: Plovers have a flexible diet and current evidence suggests they take advantage of a wide variety of prey (Paulson 1995) so they would likely not face any negative impacts from a changing prey base.

Black-bellied Plover (*Pluvialis squatarola*)

Vulnerability: **Presumed Stable** Confidence: Moderate

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: The timing of breeding in this species is closely tied to snow melt at some sites (Smith et al. 2010) and so they may or may not be vulnerable to climate changes that alter snow melt patterns.

In summary, Black-bellied Plovers have enough versatility in their life history traits and behaviors on the breeding grounds that will likely enable them to cope and their populations to remain "stable" with regard to climate change at least during the timeframe of this assessment (to 2050).

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.

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.

Jorgensen, J.C., J.M. VerHoef, and M.T. Jorgensen. 2010. Long-term recovery patterns of arctic tundra after winter seismic exploration. Ecological Applications 20:205-221.

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.

Morrison, R.I.G., McCaffery, B.J., Gill, R.E., Skagen, S.K., Jones, S.L., Page, G.W., Gratto-Trevor, C.L., and Andres, B.A. 2006. Population estimates of North American shorebirds, 2006. Wader Study Group Bulletin 111:67-85.

Paulson, D.R. 1995. Black-bellied Plover (*Pluvialis squatarola*). In The Birds of North America, No. 186 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Post E, M.C. Forchhammer, M.S. Bret-Harte, T.V. Callaghan, T.R. Christensen, B. Elberling, A.D. Fox, O. Gilg, D.S. Hik, T.T. Høye, R.A. Ims, E. Jeppesen, D.R. Klein, J. Madsen, A.D. McGuire, S. Rysgaard, D.E. Schindler, I. Stirling, M.P. Tamstorf, N.J.C. Tyler, R. van der Wal, J. Welker, P.A. Wookey, N.M. Schmidt, and P. Aastrup. 2009. Ecological dynamics across the Arctic associated with recent climate change. Science 325:1355-1358.

Smith, P.A., H.G. Gilchrist, M.R. Forbes, J.-L. Martin, and K. Allard. 2010. Inter-annual variation in the breeding chronology of Arctic shorebirds: effects of weather, snow melt and predators. Journal of Avian Biology 41:292-304.

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.

From: Liebezeit et al. 2012. Assessing Climate Change Vulnerability of Breeding Birds in Arctic Alaska. A report prepared for the Arctic Landscape Conservation Cooperative. Wildlife Conservation Society, North America Program, Bozeman, MT., 167pp.