Brant (*Branta bernicla*)

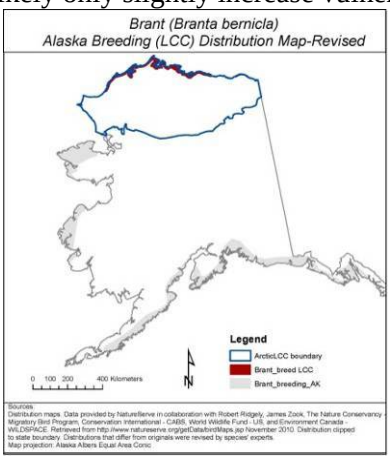
Vulnerability: **Moderately Vulnerable** Confidence: Moderate

The Brant is a small goose well known in Alaska for the tens of thousands of individuals that molt in the Teshekpuk Lake area of the coastal plain during the late summer. In Arctic Alaska, this species typically nests within 8 km of the coast although in the National Petroleum Reserve – Alaska (NPR-A) can nest up to 30 km inland (Reed et al. 1998, D. Ward, pers. comm.). Brant often nest in colonies near the upper edge of salt marshes along sloping seacoasts or on estuarine deltas, although in areas where salt marshes are less common, they will be more dispersed, nesting near small ponds and freshwater marshes (Reed et al. 1998). Brant subsist on a vegetarian diet and during breeding primarily focus on just a few species of sedges and grasses (Reed et al. 1998). Alaskan breeders spend their winters along the Pacific Coast of North America as far down as Baja California (Reed et al 1998). Current Pacific Brant population (which includes the sizeable Y-K delta breeders) is estimated at approximately 125,000 (Arctic Goose Joint Venture 2008).

Range: For this assessment, we adjusted the NatureServe Map to more closely reflect the range map depicted in the Birds of North America account as the latter more accurately represented this species' range based on multiple accounts and expert opinion (Johnson and Herter 1989, Reed et al. 1998, D. Ward, pers. comm.).

Sea Level Rise: Because Brant rely on coastal areas for breeding, foraging, and especially molting/staging in the Arctic LCC area, they would most likely be negatively impacted by predicted sea level rise and a disturbance regime of increased storm surge frequency and salt water intrusion (IPCC 2007, Jones et al. 2009). Their ability to shift to nesting habitats that are less susceptible to such phenomena is possible as they are known to nest further inland in some places, albeit in lower numbers than near the coast (Reed et al. 1998).

Human Response to CC: All-weather roads (necessitated by a warming climate and shortened ice road season) associated with energy extraction activities could impact Brant, particularly near Teshekpuk Lake, however other sources of human activity related to climate change mitigation (e.g. wind farms) will be much less pervasive in the near future so would likely only slightly increase vulnerability.



Physiological Hydro Niche: Brant response to changing hydrological conditions could range from slight to greatly increased vulnerability (see table below) as they are reliant on coastal wetlands that are periodically inundated by salt water and nesting areas could be negatively impacted directly through potential tundra drying and indirectly as some nest predators may be able to more readily access nesting sites previously surrounded by water. Current projections of annual potential evapo-transpiration 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.

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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.

Dietary Versatility: Brant rely on just a few wetland plant species for forage (*Carex subspatheca* and *Puccinellia phryganodes*). Although they do eat other plants, it is possible that a significant reduction in availability of these species (via tundra drying or other events) could negatively impact Brant populations.

Interactions with Other Species: Brant are known to sometimes nest in the territory of predatory birds for protection, particularly Russian populations (Summers et al. 1987). However; it is unknown how a changing climate would alter this behavior and if it would confer a positive or negative outcome toward nesting success.

Phenological Response: There are long-term data sets on Brant in northern Alaska and they do indicate that timing of nesting has advanced about 10 days since the 1970s (D. Ward, pers. comm.). Although this provides some evidence that Brant can keep pace with climate changes, it is unknown how they can adjust to the changing phenology of the plant species they depend on for forage.

In summary, the accumulation of potential sources of vulnerability, particularly with regard to this species' heavy reliance on coastal and wetland habitats for breeding, foraging, and molting, resulted in this species ranking as moderately vulnerable in all three climate change projections we considered.

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