Cackling/Canada Goose (*Branta hutchinsii / canadensis*)

Vulnerability: **Presumed Stable** Confidence: High

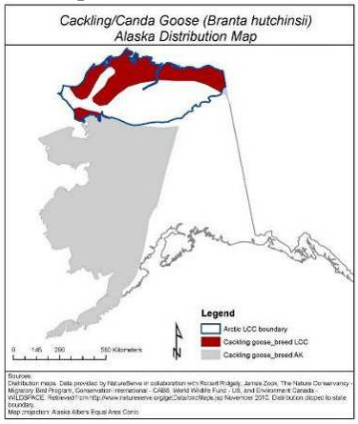
Cackling and Canada Geese were recently split into two species. The Cackling Goose *taverneri* subspecies is thought to be the dominant breeder on Alaska's Arctic Coastal Plain although some evidence suggests they may interbreed with Canada Goose *parvipes* subspecies (Mowbray et al. 2002). Coastal plain Cackling/Canada geese nest in moist sedge shrub tundra with brood rearing in wet sedge meadows, often near the coast (Mowbray et al. 2002). On the coastal plain their diet is dominated by *Carex* spp. (J. Hupp, pers. comm.). Arctic Alaskan populations winter primarily in w. Washington and Oregon as well as n. California (Mowbray et al. 2002). The Alaskan Arctic Coastal Plain population is estimated at ~8,000 with a stable population (Larned et al. 2012).

Range: We used the extant NatureServe map for the assessment as it matched the Birds of North America range description (Mowbray et al. 2002). It should be noted that most birds occur near Teshekpuk Lake (J. Hupp, pers. comm.).

Physiological Hydro Niche: Reliance on particular hydrologic conditions was ranked as the greatest potential source of vulnerability for the Cackling/Canada geese. This response was driven primarily by this species close association with moist/wet sedge communities and large lakes for both nesting and foraging. A drying trend could have negative impacts by reducing availability of suitable habitats. 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.

Human Response to CC: All-weather roads (necessitated by a warming climate and shortened ice road season) associated with energy extraction activities could impact breeding and molting habitats, particularly near Teshekpuk Lake. However, combined sources of human activity related to climate change mitigation will likely be minimal and localized in the near future.

Physiological Thermal Niche*:* Because this species is distributed across a broad thermal range in North America they are likely not impacted or could benefit from warming temperatures, reducing stress related to early season cold temperatures.



Disturbance Regime: Climate-mediated disturbance processes, namely thermokarst, could both create and destroy foraging and nesting habitats through both ice wedge degradation and draining of thaw lakes (Martin et al. 2009). Likewise, predicted increased coastal erosion and resulting salinization (Jones et al. 2009) could both negatively and positively affect nesting and staging birds by destroying and creating nesting, foraging, and molting habitats.

Dietary Versatility: Because this species complex relies so heavily on *Carex* spp. as a diet source, any reduction in this food source related to climate could have negative consequences.

Genetic Variation: Current mitochondrial DNA evidence suggests Cackling/Canada geese have

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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.

high genetic diversity (Scribner et al. 2003) and so would likely cope well with climate-mediated impacts that exert influence across their range. ***Interactions with Other Species***: In terms of "interactions with other species", it is possible that nest predation by red fox could increase as this species' range may expand northward moving in from boreal regions (Pamperin et al. 2006) and geese would not be able to defend nests as successfully as against the smaller arctic foxes. Also, climate changes may make lemming cycles less regular (Ims and Fuglei 2005) and thus could expose this species to greater nest predation pressure if lemmings no longer become periodically superabundant. ***Phenological Repsonse***: Arrival data collected on the Colville River Delta (J. Helmericks, unpub. data) are currently being analyzed. Even if their arrival dates have advanced (like other North Slope geese; D. Ward, pers. comm.) it is unknown if they can synchronize timing to changing schedules of other phenomena (e.g. spring green up timing).

In summary, this assessment suggests that Cackling/Canada Geese will likely be able to adapt to climate changes projected to occur in Arctic Alaska in the next 50 years.

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