Black Brant

Class: Aves
Order: Anseriformes

Branta bernicla nigricans

Note: Black Brant, B. bernicla nigricans, is the only subspecies of Brant in Alaska. The term "Pacific Brant" refers to 2 disjunct breeding populations: Black Brant and Western High Arctic Brant, which share common staging and wintering grounds (Lewis et al. 2013; USFWS 2018).

Review Status: Peer-reviewed **Version Date:** 15 February 2018

Conservation Status

NatureServe:	*Agency:*		
G Rank: G5	ADF&G: Species of Greatest Conservation Need	IUCN:	Audubon AK: Yellow
S Rank: S4	USFWS:	BLM:	

Final Rank

Conservation category: **II. Red**

high status and either high biological vulnerability or high action need

Category	Range	Score
Status	-20 to 20	12
Biological	-50 to 50	4
Action	-40 to 40	-20

Higher numerical scores denote greater concern

Status - variables measure the trend in a taxon's population status or distribution. Higher status scores denote taxa with known declining trends. Status scores range from -20 (increasing) to 20 (decreasing). **Score**

Population Trend in Alaska (-10 to 10) 6

Suspected to be declining. Numbers on the Yukon-Kuskokwim Delta declined in the 1980s (Ward et al. 1997; PFC 2002), and recent surveys suggest continued declines (Wilson 2016; USFWS 2018; Sedinger et al. 2019). There is some evidence to suggest that the breeding population on the Arctic Coastal Plain is declining as well (Leach et al. 2017b; Sedinger et al. 2019). Fall and winter indices of Pacific brant, which includes subspecies that breed in Alaska and in northern Canada, have been declining by 3% per year since 2009; this difference is not statistically significant (USFWS 2018).

Distribution Trend in Alaska (-10 to 10) 6

Suspected declines. Density and extent of nests on the Yukon-Kuskokwim Delta, where most of the Alaskan population breeds, appears to be declining (Fischer and Stehn 2015; Wilson 2016; Saalfeld et al. 2017). Nesting declines appear to be related to poorer-quality foraging habitat at brood-rearing areas, leading to declines in gosling and first-year survival (Sedinger and Nicolai 2011).

Status Total: 12

Biological - variables measure aspects of a taxon's distribution, abundance and life history. Higher biological scores suggest greater vulnerability to extirpation. Biological scores range from -50 (least vulnerable) to 50 (most vulnerable). **Score**

Population Size in Alaska (-10 to 10) -10

Population size >25,000. Most population estimates combine Black Brants that breed in Alaska, eastern Russia, and northern Canada; Sedinger et al. (2019) proposed a population estimate of 161,504 (average for 2012-2015). Annual estimates for Alaska are available as population indices based on summer aerial surveys. On the Yukon-Kuskokwim Delta, the total indicated brant index in 2018 was 26,400 (20,500-32,300) (USFWS 2018). On the Arctic Coastal Plain, the total indicated brant index in 2017 was 18,200 (10,600-25,800) (USFWS 2018).

Range Size in Alaska (-10 to 10) 4

Most of the population breeds on the Yukon-Kuskokwim Delta (YKD), though breeding colonies are scattered along Alaska's western and northern coasts from the YKD north to the Arctic Coastal Plain (see Fig. 1; PFC 2002). Approximately one-third of the population winters at the lower end of the Alaska Peninsula, primarily in Izembek Lagoon (PFC 2002; D. Ward, USGS, pers. comm.). Wintering range is most restricted and is estimated at <10,000 sq. km.

Population Concentration in Alaska (-10 to 10) 10

During the breeding season, nearly 90% of the population nests on the Yukon-Kuskokwim Delta, where 5 major colonies have been reported (PFC 2002). During fall and spring migration, the entire Black Brant population stages near Izembek Lagoon during spring and fall migration (PFC 2002). We therefore rank this question as A- Single site.

Reproductive Potential in Alaska

Age of First Reproduction (-5 to 5) -3

Females reach sexual maturity between 2 to 3 years of age (Sedinger et al. 1995; Lewis et al.

Number of Young (-5 to 5) 1

Clutch size can range from two to six eggs, with an average of four eggs per clutch (Leach et al. 2017a).

Ecological Specialization in Alaska

Dietary (-5 to 5) 1

During nonbreeding season, typically feeds on intertidal (e.g. salt marsh) and aquatic plants and green algae. Eelgrass is a particularly important food source on their wintering ground (Ward et al. 2005). During breeding and molting, feeds on graminoids, forbs, and mosses (Lewis et al. 2013). Grazing lawns of Carex subspathacea and C. ramenskii are critical forage for goslings (PFC 2002; Person et al. 2003). Studies suggest that gosling growth rates are tied to the availability of grazing lawns (Sedinger et al. 1995; Fondell et al. 2011). Because grazing lawns are created by the foraging behavior of adult geese, their availability is directly dependent on adult abundance. Population declines may therefore be accentuated by the density-dependent relationship between adult abundance and gosling forage availability (Fondell et al. 2011).

Habitat (-5 to 5) 1

Typically nests in wet, graminoid meadows within 5 km of the coast (Lewis et al. 2013; Saalfeld et al. 2017). Important habitats include salt marshes, river deltas, large lakes, mudflats, and small, freshwater islands (Lewis et al. 2013; Saalfeld et al. 2017). Salt marsh habitat is less uncommon on the Arctic Coastal Plain (PFC 2002; Weller et al. 1994; Ward et al. 2005). Overwinters in shallow estuaries and intertidal mudflats (Lewis et al. 2013). For the purpose of this assessment, grazing lawns and eelgrass meadows are considered in the 'Dietary specialization' section, and are not considered here.

Biological Total: 4

Action - variables measure current state of knowledge or extent of conservation efforts directed toward a given taxon. Higher action scores denote greater information needs due of lack of knowledge or conservation action. Action scores range from -40 (lower needs) to 40 (greater needs). **Score**

Management Plans and Regulations in Alaska (-10 to 10) -10

Protected by the Migratory Bird Treaty Act (MBTA 1918). The Pacific Flyway Council manages the Pacific Brant population, which includes Black Brant, across its entire range (PFC 2002). The plan includes criteria that, if met, would trigger harvest closure. Black Brant on the Yukon-Kuskokwim Delta are also managed by the Goose Management Plan (https://catalog.data.gov/dataset/the-yukon-kuskokwim-delta-goose-management-plan). Subsistence and recreational harvest is subject to bag limits and closed seasons (ADFG 2020c; AMBCC 2020). Egg gathering is prohibited on the Yukon-Kuskokwim Delta and on the North Slope (AMBCC 2020).

Knowledge of Distribution and Habitat in Alaska (-10 to 10) -10

Distribution is well-known. Major wintering, breeding, molting, and staging areas have been identified (see Appendix A in PFC 2002). Several studies have examined habitat associations on breeding grounds on the Yukon-Kuskokwim Delta and the Arctic Coastal Plain (see Ward et al. 2005 for a brief review and references in Habitat Specialization section).

Knowledge of Population Trends in Alaska (-10 to 10) -2

Population indices are obtained from annual surveys conducted on breeding grounds on the Yukon-Kuskokwim Delta and the Arctic Coastal Plain, and surveys on wintering and staging grounds where Black Brant co-occur with Western High Arctic Brant (B. b. bernicla) (USFWS 2018). These surveys cover the vast majority of Black Brant's range in Alaska and provide annual population indices with estimates of uncertainty that can be used to estimate trends over time (USFWS 2018). Harvest information and band recoveries have also been used to estimate population size and trends (Sedinger et al. 2019).

Knowledge of Factors Limiting Populations in Alaska (-10 to 10) 2

Factors limiting population dynamics are somewhat known. First-year survival appears to be an important factor limiting population dynamics on the Yukon-Kuskokwim Delta (Fondell et al. 2011; Sedinger and Nicolai 2011). Factors affecting first-year survival include: predation, high-quality rearing habitats i.e. grazing lawns, inclement weather, intraspecific competition, and the energetic costs of long-distance migration (Flint et al. 1995; Sedinger et al. 1995; PFC 2002; Ward et al. 2004; Fondell et al. 2011; Van Dellen 2016). The importance of density-dependent versus density-independent factors on habitat quality varies between colonies (Fondell et al. 2011). Some colonies are not increasing despite low predation and high grazing pressure (i.e. availability of grazing lawns), suggesting that our knowledge of what limits populations remains incomplete (Fondell et al. 2011).

At wintering and stopover sites, climate change and seagrass availability may be important factors influencing populations and their distribution (Ward et al. 2005; Sedinger et al. 2011; Stillman et al. 2015; Leach et al. 2017b). For example, the number of individuals that overwinter on the Alaska Peninsula is affected by regional climate patterns (e.g. the Pacific Decadal Oscillation), winter severity, and the presence of ice cover, likely because these factors influence the availability of seagrass and energetic demands (Ward et al. 2009).

Overharvesting may have been historically responsible for population declines on the Yukon-Kuskokwim Delta (Ward et al. 1997; PFC 2002). Harvest limits were reduced in the 1980s and are no longer thought to be a main contributor to population declines (PFC 2002; Ward et al. 2004; Leach et al. 2017b). The prevalence of parasites for individuals nesting on the Arctic Coastal Plain appears low (Ramey et al. 2014).

Action Total: -20

Supplemental Information - variables do not receive numerical scores. Instead, they are used to sort taxa to answer specific biological or management questions.

Harvest:	Substantial, regulations
Seasonal Occurrence:	Year-round
Taxonomic Significance:	Population
% Global Range in Alaska:	>10%
% Global Population in Alaska:	≥75%
Peripheral:	No

References

Alaska Department of Fish and Game (ADFG). 2020c. 2020-2021 Migratory game bird hunting regulations summary. Anchorage, AK, USA.

Alaska Migratory Bird Co-Management Council (AMBCC). 2020. Regulations for the 2020 Alaska Subsistence Spring/Summer Migratory Bird Harvest. Office of the Alaska Migratory Bird Co-Management Council, U.S. Fish & Wildlife Service, Anchorage, AK, USA.

Fischer, J. B., and R. A. Stehn. 2015. Nest population size and potential production of geese and spectacled eiders on the Yukon-Kuskokwim Delta, Alaska, 1985-2014. Page 54. Unpublished report, U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK, USA.

Flint, P. L., J. S. Sedinger, and K. H. Pollock. 1995. Survival of juvenile Black Brant during brood rearing. The Journal of Wildlife Management 59(3):455-463. DOI:10.2307/3802451

Fondell, T. F., P. L. Flint, J. S. Sedinger, C. A. Nicolai, and J. L. Schamber. 2011. Intercolony variation in growth of Black Brant goslings on the Yukon-Kuskokwim Delta, Alaska. Journal of Wildlife Management 75(1):101-108.

Leach, A. G., A. W. van Dellen, T. V. Riecke, and J. S. Sedinger, J. S. 2017a. Incubation capacity contributes to constraints on maximal clutch size in Brent Geese Branta bernicla nigricans. Ibis, 159: 588–599. DOI:10.1111/ibi.12480

Leach, A. G., D. H. Ward, J. G. Sedinger, M. S. Lindberg, W. S. Boyd, J. W. Hupp, and R. J. Ritchie. 2017b. Declining survival of black brant from subarctic and arctic breeding areas. Journal of Wildlife Management 81(7):1210-1218. DOI:10.1002/jwmg.21284

Lewis, T. L., D. H. Ward, J. S. Sedinger, A. Reed, and D. V. Derksen. 2013. Brant (Branta bernicla), version 2.0. In Rodewald, P. G., ed. Birds of North America. Cornell Lab of Ornithology, Ithaca, NY, USA. DOI: 10.2173/bna.337

Migratory Bird Treaty Act (MBTA). 1918. U.S. Code Title 16 §§ 703-712 Migratory Bird Treaty Act.

Naves, L. C. 2015. Alaska subsistence bird harvest, 2004-2014 data book. Special Publication No. 2015-05, Alaska Department of Fish and Game, Division of Subsistence, Anchorage, AK, USA.

Person, B. T., M. P. Herzog, R. W. Ruess, J. S. Sedinger, R. M. Anthony, and C. A. Babcock. 2003. Feedback dynamics of grazing lawns: coupling vegetation change with animal growth. Oecologia 135(4):583-592.

Pacific Flyway Council (PFC). 2002. Pacific Flyway Management Plan for Pacific Population of Brant. Report prepared for the Pacific Flyway Council and the U.S. Fish and Wildlife Service, Pacific Flyway Study Committee, Portland, OR, USA.

Ramey, A. M., J. A. Reed, J. A. Schmutz, T. F. Fondell, B. W. Meixell, J. W. Hupp, D. H. Ward, J. Terenzi, and C. R. Ely. 2014. Prevalence, transmission, and genetic diversity of blood parasites infecting tundra-nesting geese in Alaska. Canadian Journal of Zoology 92(8):699-706. DOI:10.1139/cjz-2014-0041

Saalfeld, S. T., J. B. Fischer, R. A. Stehn, R. M. Platte, and S. C. Brown. 2017. Predicting waterbird nest distributions on the Yukon-Kuskokwim Delta of Alaska. Journal of Wildlife Management 81(8):1468-1481. DOI: 10.1002/jwmg.21322

Sedinger, J. S., and C. A. Nicolai. 2011. Recent trends in first-year survival for Black Brant breeding in southwestern Alaska. The Condor 113(3):511-517. DOI: 10.1525/cond.2011.100218.

Sedinger, J. S., P. L. Flint, and M. S. Lindberg. 1995. Environmental influence on life-history traits: Growth, survival, and fecundity in Black Brant (Branta bernicla). Ecology 76(8):2404-2414. DOI: 10.2307/2265816

Sedinger, J. G., J. L. Schamber, D. H. Ward, C. A. Nicolai, and B. Conant. 2011. Carryover effects associated with winter location affect fitness, social status, and population dynamics in a long-distant migrant. American Naturalist 178(5):E110-E123. DOI: 10.1086/662165

Sedinger, J. S., T. V. Riecke, A. G. Leach, and D. H. Ward. 2019. The black brant population is declining based on mark recapture. Journal of Wildlife Management 83(3):627–637. DOI: 10.1002/jwmg.21620

Stillman, R. A., K. A. Wood, W. Gilkerson, E. Elkinton, J. M. Black, and D. H. Ward. 2015. Predicting effects of environmental change on a migratory herbivore. Ecosphere 6:art114. DOI:10.1890/ES14-00455.1

U.S. Fish and Wildlife Service (USFWS). 2018. Waterfowl population status, 2018. U.S. Department of the Interior, Washington, D.C., USA.

Van Dellen, A. W. 2016. Molt and breeding ecology of Black Brant at the Tutakoke River colony. PhD thesis, University of Nevada, Reno, NV, USA.

Ward, D. H., E. A. Rexstad, J. S. Sedinger, M. S. Lindberg, and N. K. Dawe. 1997. Seasonal and annual survival of adult Pacific brant. Journal of Wildlife Management 61:773-781.

Ward, D. H., J. A. Schmutz, J. S. Sedinger, K. S. Bollinger, P. D. Martin, and B. A. Anderson. 2004. Temporal and geographic variation in survival of juvenile Black Brant. The Condor 106(2):263-274.

Ward, D. H., A. Reed, J. S. Sedinger, J. M. Black, D. V. Derksen, and P. M. Castelli. 2005. North American Brant: Effects of changes in habitat and climate on population dynamics. Global Change Biology 11:869-880. DOI:10.1111/j.1365-2486.2005.00942.x

Ward, D. H., C. P. Dau, T. L. Tibbitts, J. G. Sedinger, B. A. Anderson, and J. E. Hines. 2009. Change in abundance of Pacific Brant wintering in Alaska: Evidence of a climate warming effect? Arctic 62(3):301-311.

Weller, M. W., K. C. Jensen, E. J. Taylor, M. W. Miller, K. S. Bollinger, D. V. Derksen, D. Esler, and C. J. Markon. 1994. Assessment of shoreline vegetation in relation to use by molting black brant Branta bernicla nigricans on the Alaska Coastal Plain. Biological Conservation 70:219-225. DOI:10.1016/0006-3207(94)90166-X

Wilson, H. M. 2016. Aerial photographic surveys of brant colonies on the Yukon-Kuskokwim Delta, Alaska, 2015. U.S Fish and Wildlife Service, Migratory Bird Management, Waterfowl Management Branch. Anchorage, AK, USA.

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