

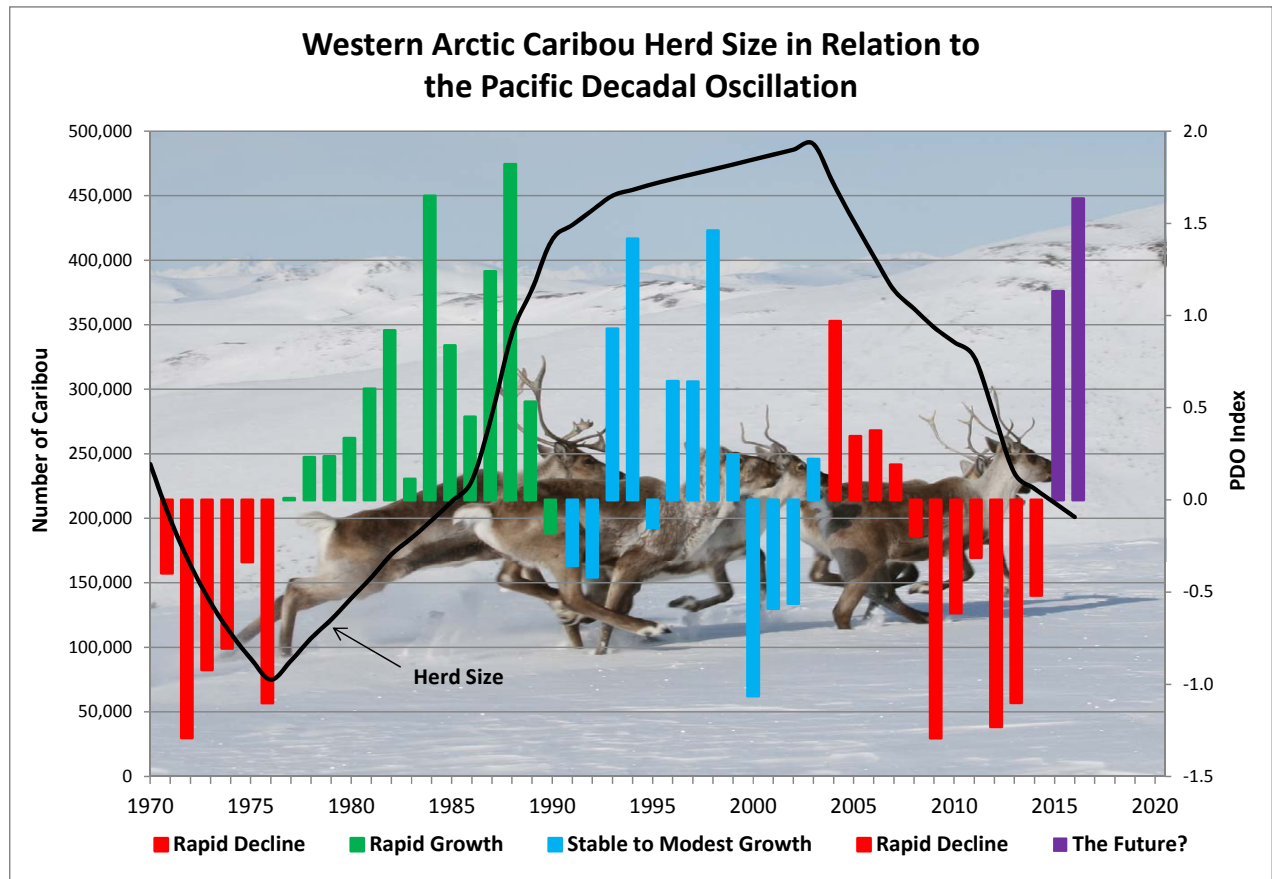


Caribou: Nomads of the North

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Caribou (*Rangifer tarandus*) are an iconic Arctic species. With a circumpolar distribution ranging from the temperate rain forest to polar deserts, the species is highly adaptable both physiologically and behaviorally. Yet, caribou populations face many challenges, such as climate change and industrial development, and are in decline in many portions of their range.

Numbering nearly 500,000 caribou in 2003, the Western Arctic Herd (WAH) was the largest herd in Alaska and one of the largest on the planet. By 2016, the herd had declined to 201,000 (ADFG 2016). Habitat, climate, predation, human influences, population density-dependent factors, insects, parasites, diseases, competition with other species, and other factors can influence caribou populations (Joly and Klein 2011). It remains unclear which of these drivers is most important in the decade-long decline of the WAH; particularly difficult winters may have contributed. Population crashes and irruptions in the WAH have been linked to a long-lasting, large-scale climate cycle known as the Pacific Decadal Oscillation (PDO; Joly et al. 2011). Declines are associated with the “negative” phase of the PDO (colder years), while increase with the “positive” phase (warmer years; Figure 1).



Caribou are known to have the longest terrestrial migrations on the planet. WAH caribou are no exception, with individuals traveling up to 2,737 miles (4,404 km) per year

Figure 1. Population size (from Alaska Department of Fish and Game) of the Western Arctic Herd (black line) for 1970-2013 and the strength of the Pacific Decadal Oscillation (PDO, colored bars). Large declines in the herd have coincided with negative (“cold”) phases of the PDO and rapid growth with the positive (“warm”) phase. (K. Joly and D. DiFolco)



Caribou often form large aggregations in July, seen here in Noatak National Preserve, in response to intense insect harassment.
NPS photo courtesy of Kyle Joly

(Joly and Cameron 2015). As the herd has declined, its home range (roughly the size of Montana) has also shrunk. This phenomenon has been documented in other herds as well

(e.g., Messier et al. 1988). Despite having a smaller home range, travel by individual caribou increased during the population decline (Joly and Cameron 2015). One possible explanation is that the quality of the herd's range has declined.

Harvest of WAH caribou is dominated (>90%) by subsistence hunters that live within the range of the herd. Hunting likely had limited impact on the herd when it numbered 500,000 caribou, however, as the herd continues to decline, its influence has increased. High numbers of harvested cows could accelerate the herd's decline. Cautious management of the harvest is essential until the trajectory of the herd reverses.

The WAH faces an uncertain future. Will the decade-long decline continue, causing hardship across this vast and wild region? Is the strong positive PDO of the past couple of years (Figure 1) a harbinger of herd recovery? Caribou populations are known to naturally oscillate at the decadal scale (Gunn et al. 2003, Joly et al. 2011), however, climate change and rapid industrial development may hinder the natural recovery of the WAH and other herds around the Arctic.

While tolerant of an extreme range of temperature, climate change could negatively impact caribou in myriad of ways. Warmer temperatures could lead to more wildfires, reducing the abundance of lichens, the primary winter forage of caribou (Joly et al. 2012). Warmer temperatures combined with early successional habitats promoted by increased fire may also allow for more shrubs and moose (*Alces alces*), and thus predators such as wolves (*Canis lupus*), which could affect caribou populations (Joly et al. 2012). These conditions may also enhance insect populations that torment caribou during the short Arctic summer. Not all

impacts of climate change may be detrimental to caribou. Warming temperatures could lengthen the growing season in the Arctic and increase the abundance of summer forage.

Industrial development continues to expand across the Arctic and the pace of that development is predicted to increase as warming renders the region more accessible. Currently, the only major development in the range of the WAH is the Red Dog Mine, which includes the mine itself, a port and related facilities, and an industrial road connecting the two. Initial anecdotal evidence suggested that the impacts of the operation were limited; however, more contemporary, quantitative studies have revealed otherwise. Dust trailing behind ore-hauling trucks is carried by the wind, affecting habitat for miles, including into Noatak National Preserve (Hasselbach et al. 2004). Disturbance associated with the road has also been implicated in altering the migratory patterns of the WAH. Substantial numbers of WAH caribou can be delayed for more than a month on their fall migration south when they encounter this lone, well-controlled road (Wilson et al. 2016). These effects need to be considered as agencies analyze a new proposal by the State of Alaska to construct a 200-mile long road through Gates of the Arctic National Park and Preserve from the existing contiguous road system into northwest Alaska, one of the world's largest remaining roadless areas, to mine prospects in the Ambler region. Long-distance migrations are imperiled globally, therefore protecting the migratory corridors for the WAH is critical. What does the future hold for the WAH? As the millennia-old Inuit saying goes...

*"No one knows the way of the
wind and the caribou"*

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