

## Historic Low Levels of Sea Ice Threaten Polar Bears In Arctic Ecosystem

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According to Stirling and Derocher (2012), climate warming continues to affect the Arctic at comparatively faster rates than the rest of the planet. Post et al. (2009) reported that Arctic warming has been occurring at rates two to three times that of the global mean temperature increase (0.4 degrees Celsius). The World Wildlife Federation (2016c) adds that, “Arctic sea ice is decreasing at an average rate of 13.5% per decade due to climate change.” Annual ice cover and thickness are shrinking in all seasons, and ice breakup is occurring up to three weeks earlier, as well (Stirling & Derocher, 2012). Stirling and Parkinson (2005) add that over the past twenty years, “there has been considerable documentation of significant reductions in several parts of the Arctic, thinning of multiyear ice in the polar basin and seasonal ice in Hudson Bay, and changes in the dates of breakup (7–8 days earlier per decade) and freeze-up of the sea ice, likely as a result of climate warming.” The combination of these changes in Arctic sea ice threatens the survival of the native polar bear population, as it serves as their primary habitat.

Polar bears (*Ursus maritimus* or “sea bear”) live in five nations including Canada, the Kingdom of Denmark (Greenland), Norway, Russia, and the United States (World Wildlife Federation [WWF], 2015). Polar bears still inhabit most of their historic range in 19 subpopulations (total population estimated at 20,000–25,000); yet, 8 or 9 of these subpopulations are thought to be declining. “Climate warming causes unidirectional changes to annual patterns of sea ice distribution, structure, and freeze up” (Stirling & Derocher, 2012). According to Derocher, Lunn, & Stirling (2004), as sea ice thins it becomes more fractured and labile; it

moves more easily with winds and currents. This endangers pregnant females which must exert more energy walking and swimming to their traditional denning areas (Derocher et al., 2004). If warming and subsequent ice loss continues at its current predicted rate, polar bears may disappear from the southern portions of their range in James and Hudson bays. While polar bears may persist in the northern Canadian Arctic Islands and northern Greenland for the foreseeable future, their long-term viability, with a much-reduced global population size, is uncertain (Stirling & Derocher, 2012).

Sea ice is the primary habitat of polar bears, “especially over the biologically reproductive waters of the continental shelf where ringed seals (their primary prey) are most abundant” (Stirling & Derocher, 2012). Glacial ice serves as polar bears’ primary hunting ground. They hunt ringed seals to conserve fat stores to provide them enough energy to survive each year, which is now accompanied by extended periods when food is not as plentiful (Stirling & Derocher, 2012). Cosimo (1990) and Etkin (1991) suggested that historically, polar bears fasted for four months in the James and Hudson Bay regions during the summer. All bears in the Hudson Bay region must fast for four months during the ice-free season; however, pregnant females must fast for eight months. They give birth in maternity dens at nearly the same time the other bears return to the ice to hunt seals (Stirling & Parkinson, 2005). If the annual ice-free period continues to lengthen, nutritional stress on polar bears will increase until they could potentially no longer store enough fat to reproduce. Declining body condition could lead to lowered reproductive rates, reduced survival of cubs, and increased human-bear problems (Cosimo, 1990; Etkin, 1991).

Climate warming has triggered the earlier arrival of spring with each passing year. An earlier spring means a prolonged ice-free (open-water) period. Furthermore, warmer

temperatures bring rain in late winter, creating the potential for polar bear dens to collapse, crushing mother and cubs beneath the heavy weight of the snow (Cosimo, 1990; Etkin, 1991). The longer ice-free periods give polar bears less time to hunt, which affects them in several detrimental ways. Decreased hunting time means less food. Less food means longer periods of fasting; lower body condition; decreased access to denning areas; fewer and smaller cubs; decreased survival of cubs and bears of all ages; and, ultimately, potential subpopulation decline toward eventual extinction (Stirling & Derocher, 2012).

The longer open-water season in their southern ranges forces polar bears to seek alternate food sources. Accordingly, they wander into northern communities, creating more confrontations between themselves and humans (Stirling & Derocher, 2012). According to David Miller (WWF-Canada president and CEO), “While waiting for the ice to freeze, some scavenge food along the coast, and are attracted to communities” (WWF, 2016c). Polar bears’ powerful sense of smell attracts them to human waste, stored food, dog teams, and animal carcasses, which brings them into greater conflict with Arctic people (WWF, 2016b).

More bears have been appearing around settlements, hunting camps, and sometimes in locations in which they had never been seen before. Sterling and Parkinson (2005) reported that the increased number of polar bear sightings in four eastern Canadian Arctic communities led Inuit hunters to believe that the polar bear population was increasing. The increased number of bears was mistakenly interpreted as evidence that populations were growing; yet, the opposite was true (Sterling & Parkinson, 2005). Polar bears had been forced into those domesticated areas because their normal food supply was unavailable due to the longer ice-free period. Now, the bears faced the additional threat of human predators.

As the world's largest terrestrial carnivore, polar bears pose a risk to human life and property. Between September and December 2015, the hamlet community of Arviat, Nunavut, Canada experienced 190 encounters with polar bears, two of which were killed due to threat to human life (WWF, 2015). Attacks on human and property continue to rise; over twenty direct attacks have been reported in recent years (WWF, 2016b). However, the WWF is successfully reducing the number of polar bears killed despite an increasing frequency of human-bear interactions. In the Arviat region, WWF has reduced the average number of killings from 8 per year in 2010 to one per year since (WWF, 2016c). Additionally, WWF-Canada has devised further collaborative efforts through polar bear patrols to reduce the number of encounters between polar bears and people. Daily patrols in peak bear season (September-December) utilize many tools (cracker shells, rubber bullets, beanbags, flares, and live rounds) to deter bears from communities. Similar patrol teams in several districts in Russia have had a success rate of zero kills (WWF, 2016c).

Additional global initiatives have been set to protect polar bears and the Arctic ecosystem and to slow the effects of climate warming. As 2016 has seen a record-breaking warm Arctic winter, these efforts have become even more significant. The Paris Agreement (December 2015) adopted a deal that lays the foundation for long-term efforts (though voluntary) to fight climate change. As the first agreement of its kind, it includes a long-term temperature increase goal of less than 2 degrees Celsius. This sends a strong signal that all nations' governments are committed to following the latest science. Similarly, Canada and the U.S. agreed to several Arctic initiatives in March of this year, stressing the need to act "on both mitigating climate change and on Arctic conservation to reduce the impacts of change already being experienced"

(WWF, 2016a). These efforts to protect and conserve the Arctic ecosystem will help protect polar bears and prevent their impending extermination.

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