Seabird responses to a rapidly changing Pacific Arctic: findings from ArCS project

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The Pacific Arctic region is experiencing rapid oceanographic changes linked to recent warming trends. Little is known how these changes might affect seabirds breeding in the region. St. Lawrence Island is located in the northern Bering Sea, and is home to 2 million breeding seabirds. As a part of the ArCS project, we conducted a multi-year study of the breeding, wintering and foraging ecology of five species of seabirds on this island (fish-eating thick-billed and common murres, black-legged kittiwakes; plankton-eating crested and least auklets), to understand potential effects of recent changes in sea-ice conditions on their populations. During the summers of 2016-2019, we monitored the seabird numerical changes, their reproductive performance, and levels of nutritional stress incurred by breeding birds. We tracked seabirds' summer and winter movements using bird-borne GPS devices and geolocators. We found that the breeding success and number of breeding seabirds have changed across the four successive summers. Plankton-eating crested and least auklets experienced near-total breeding failures in 2018 and 2019, the years of historically low spring sea-ice extent in the northern Bering Sea. Breeding numbers of thick-billed murres were much lower in 2018 than in 2016, 2017, and 2019, associated with a mass-mortality event recorded for this species in 2018 (Will et al. 2020a). Both plankton- and fish-eating species experienced higher levels of nutritional stress in years when sea-ice concentrations were lower in February (Will et al. 2020b). Our tracking data showed that all species foraged over the shallow shelf north of St. Lawrence Island during the breeding season (Will et al. 2020b), but migrated further south into the North Pacific during the winter (Takahashi et al. 2020). Seabird breeding number, success, and nutritional stress results indicate that most seabirds breeding on St. Lawrence Island have been negatively affected by changes in the food-web structure associated with Arctic warming. Our results also indicate that inter-annual variability in the sea-ice dynamics may have profound ecosystem consequences in the Pacific Arctic. Such ecosystem changes might have important social impacts, as the harvest of seabirds and marine mammals by indigenous people living in this region provides a critical food resource and preserves their culture and language.

References

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