# Prioritizing Emperor Goose Information Needs and Harvest Management Actions in Alaska


## OBJECTIVE & METHODS

Emperor goose harvest in Alaska was legally re-authorized in 2017 after a 30-year closure, but goose numbers remain low. The objective of this study was to draw upon expert opinion to clarify research, harvest management, and conservation priorities for emperor goose.

We conducted three successive rounds of iterative surveys, called a Delphi process, to gather expert opinion. We identified 115 potential survey participants and compared responses between groups to identify differences and similarities in perspectives (Table 1). Among participants representing Native Management (n=16), 9 represented regions within the emperor goose breeding areas and 7 represented regions within wintering areas. The survey was conducted online and distributed by email in July–December 2020.

Table 1. Participation in the three survey rounds of the Delphi process.

| Participant groups | All potential participants | Round 1 | Round 2 | Round 3 |
|---|---|---|---|---|
| Native representation in management | 29 | 16 | 11 | 10 |
| Non-governmental conservation organizations | 13 | 7 | 5 | 5 |
| State and federal management and research | 58 | 36 | 29 | 29 |
| Federal and university research | 15 | 11 | 10 | 10 |
| Total | 115 (100%) | 70 (61%) | 55 (79%) | 54 (77%) |

## RESULTS

We asked participants to rate the degree of impact of factors that may affect the emperor goose population size or growth. All groups, except Native Management, rated the impacts of spring-summer hunting on the emperor goose population as being higher than the impacts of fall-winter hunting (Table 2).

In survey round 1, the top-rated information priorities focused on harvest assessment (improve precision and geographic coverage of harvest estimates and determine the impact of harvest) (results not presented here). Considering responses to round 1, participants in round 2 identified assessment of emperor goose survival and population status as the top-rated priorities (Table 3). In round 3, 91% of participants agreed that priorities were appropriately ranked in round 2, thus clarifying a focus for future research.

In all survey rounds, outreach and education was the top-ranked harvest management and conservation priority (Table 4). The Native Management group ranked “institute bag limits during spring-summer season” and “establish harvest quotas in the spring-summer season” significantly lower than other groups and “cessation of egg harvesting” significantly higher than other groups. Among harvest management actions directly aimed at reducing harvest mortality, those with highest support by the Native Management group involved extending or reexamining (adjusting) the timing of the spring-summer 30-day closure.

## CONCLUSIONS

Perspectives on impacts of harvest during the breeding season were a main point of divergence between Native Management and other participant groups. Research priorities to refine survival estimates for the whole annual cycle can help clarify impacts of harvest and other factors that may limit the Emperor Goose population and determine where and how to focus management efforts.

Despite broad support of outreach and education, information by itself is often insufficient for achieving desired behavior changes. Removing barriers and providing incentives and disincentives are also important components of effective resource management.

Formally identifying areas of agreement and disagreement among stakeholders is key for collaborative management. Stakeholders may provide input in diverse ways and rates. Complementary paths for participation and decision-making safeguard against shortcomings of individual processes.

Table 2. Degree of impact of factors that may affect Emperor Goose population size or growth. Ratings were based on a 5-point scale from "no impact" (1) to "very strong impact" (5). Superscript letters indicate items for which differences in ratings between groups were statistically significant; ratings that do not share a letter are significantly different.

| | Mean weighted rank | | | | |
|---|---|---|---|---|---|
| | Groups combined | Native manage-ment | Conser-vation | Research and management | Research |
| Spring-summer hunting of adult birds | 3.7 | 2.5[a] | 3.6[a,b] | 4.1[b] | 4.0[b] |
| Changes to ecosystem (…) due to global climate change | 3.4 | 3.6 | 3.8 | 3.2 | 3.4 |
| Adult mortality due to weather/environmental factors (…) | 3.3 | 3.2 | 3.8 | 3.2 | 3.2 |
| Juvenile mortality due to environmental factors | 3.3 | 3.5 | 3.3 | 3.3 | 2.7 |
| Chick mortality due to weather/environmental factors | 3.3 | 3.5 | 3.2 | 3.4 | 3.2 |
| Predation of eggs and chicks (e.g., foxes, gulls) | 3.2 | 3.4 | 2.8 | 3.2 | 3.2 |
| Fall-winter hunting of adult birds | 3.0 | 2.6 | 3.0 | 3.0 | 3.2 |
| Spring-summer hunting of juvenile birds | 2.9 | 2.2[a] | 2.8[a,b] | 3.2[b] | 2.9[a,b] |
| Egg harvesting | 2.7 | 2.9 | 2.4 | 2.8 | 2.5 |
| Fall-winter hunting of juvenile birds | 2.5 | 2.5 | 2.8 | 2.5 | 2.5 |

Table 3. Ranking of main information priorities to inform Emperor Goose management (survey round 2). Differences in responses between participant groups only occurred in survey round 1. High ranks indicate high priority.

| Information and research priorities | Mean weighted rank |
|---|---|
| Refine survival estimates for the whole annual cycle (…) | 5.0 |
| Refine population survey methods to better assess population status | 4.2 |
| Improve precision and geographic coverage of estimates of amount of harvest in Alaska | 4.1 |
| Determine the impact of harvest on the Emperor Goose population (…) | 4.1 |
| Determine limiting factors for Emperor Geese breeding on the Yukon-Kuskokwim Delta | 4.0 |
| Obtain information about wintering ecology and limiting factors during the winter | 3.5 |
| Coordinate with Russia to conduct population surveys (…) | 3.2 |

Table 4. Ranking of main conservation and management actions to protect Emperor Goose. High ranks indicate high priority. Superscript letters indicate items for which differences in ratings between groups were statistically significant; ratings that do not share a letter are significantly different.

| Conservation and harvest management actions | Mean weighted rank | | | | |
|---|---|---|---|---|---|
| | Groups combined | Native manage-ment | Conser-vation | Research and management | Research |
| (…) Outreach and education to reduce mortality by harvest | 7.3 | 8.7 | 6.2 | 7.4 | 6.8 |
| Protect nesting and brood rearing habitats | 5.6 | 7.0 | 6.8 | 4.9 | 6.1 |
| Extend the spring-summer 30-day closure | 5.5 | 4.3 | 5.6 | 5.9 | 5.3 |
| Institute bag limits during spring-summer season | 5.1 | 2.8[a] | 5.0[a,b] | 5.2[a,b] | 6.3[b] |
| Protect staging and wintering habitats | 5.0 | 5.7 | 5.8 | 4.6 | 5.3 |
| Reexamine timing of regional 30-day closure (…) | 5.0 | 5.7 | 5.4 | 5.1 | 4.2 |
| Establish harvest quotas for the spring-summer season (…) | 4.5 | 2.5[a] | 5.4[a,b] | 4.5[b] | 5.0[a,b] |
| Cessation of egg harvesting | 3.5 | 6.2[a] | 1.2[b] | 3.6[a,c] | 2.8[b,c] |
| Increase enforcement of harvest regulations | 3.4 | 2.2 | 3.8 | 3.7 | 3.2 |

Lara F. Mengak[1], Liliana C. Naves[1], and Jason L. Schamber[2] (2022) Survival estimates and hunter education are priorities for the collaborative harvest management of emperor goose in Alaska. Ornithological Applications https://doi.org/10.1093/ornithapp/duac036.

Alaska Department of Fish and Game Division of Subsistence[1] and Division of Wildlife Conservation[2]. Funding: U.S. Fish and Wildlife Service Pittman-Robertson Federal Aid in Wildlife Restoration Act (grant F19AF00506) and Alaska Department of Fish and Game-Division of Subsistence. ADF&G complies with ADA requirements as posted at http://www.adfg.alaska.gov/index.cfm?adfg=home.ada_statement.
16 November 2022