

## Section 5. Summary of Operation.

An ongoing study of the population ecology of arctic-nesting waterfowl, specifically lesser snow, Ross's, greater white-fronted, and cackling geese, king eiders, long-tailed ducks, and red-breasted mergansers, has occurred annually in Queen Maud Gulf Migratory Bird Sanctuary since 1991. The primary field site is Karrak Lake, the site of one of the largest known lesser snow and Ross's goose nesting colonies in the Sanctuary. Each year, the abundance of each of the above-mentioned species nesting in the area is estimated, as are metrics associated with population dynamics, such as clutch size, egg survival, nest survival, and adult survival. These metrics are invaluable for addressing management concerns of harvested species, both within Canada and internationally within North America. Further, factors thought to influence reproductive ecology, such as spring chronology, meteorological conditions, and small mammal abundance, are monitored in order to explain annual variation in productivity. Dynamics of various pathogens are investigated in arctic fox, small mammals, and geese. Surveys and sampling of vegetation is conducted to investigate the impact of nest-building and grazing by geese on plant communities, and the impact loss of vegetation may have on other species. Research on population ecology of arctic fox is also conducted, as well as less-intensive studies on gulls, arctic terns, loons, shorebirds and passerines. Observational data on bears, wolverines, and wolves are also recorded.

Specifically, the following details wildlife sampling and export of samples from Queen Maud Gulf Migratory Bird Sanctuary (extracted from CWS permit amendment application, January 2015):

1. Harvest 100 Lesser Snow Geese and 100 Ross's Geese annually (shotgun and rifle) for anatomical dissections. Tissues (brain, lung, liver, spleen, skeletal muscle, ovaries, oviductal eggs), cloacal and oral swabs, and blood samples will be exported to Saskatchewan for analysis.
2. Harvest 50 King Eiders and 50 Long-tailed Ducks annually (shotgun and rifle) for anatomical dissections. These carcasses will be exported to Saskatchewan for analysis.
3. Manipulate and monitor nests and contents (measure/mark eggs, add/remove eggs) of waterfowl (Lesser Snow, Ross's, Cackling Geese, King Eiders, Long-tailed Ducks, Red-breasted Mergansers) and other birds (Arctic Tern, Glaucous and Herring/Thayer's Gulls, Red-throated and Arctic Loons).
4. Collect eggs from nests (Lesser Snow, Ross's Geese, one egg from each nest) for a maximum of 200 per year. Samples will be exported to Saskatchewan for analysis.
5. Capture nesting sea duck females (up to 120 King Eiders, 30 Long-tailed Ducks, 5 Red-breasted Mergansers). Birds will be weighed, measured, fitted with standard USFWS/CWS leg bands, and a small sample of head feathers and a blood sample (1.5 mL) from each bird will be collected and exported to Saskatchewan for analyses.
6. Capture geese (up to 15,000, adults and juveniles; Lesser Snow, Ross's, Cackling, Greater White-fronted) during the flightless period with corral-type nets (helicopter assisted). Birds are weighed, measured, and fitted with standard USFWS/CWS leg bands. Blood samples and cloacal swabs from 500 birds will be collected and exported to Saskatchewan. Ten each of Lesser Snow and Ross's Geese will be fitted with GPS PTT transmitters (satellite transmitters).
7. Opportunistically collect and export for analysis birds found dead (eggs, whole or part of carcasses).
8. Capture arctic fox (up to 30 adults and 30 juveniles) and mark with plastic ear tags. Animals are immobilized with Telazol, weighed, sexed, and measured. A blood sample from each animal will be extracted and exported to Saskatchewan for analysis, as well as many as 200 scat samples collected opportunistically from captured foxes or recovered from den sites.
9. Sampling of small mammals (collared and brown lemmings, red-backed voles). Three traplines, each run for 10 consecutive nights, each consisting of 25 snap traps will be monitored. Carcasses will be exported to Saskatchewan for analysis.
10. Live-capture of small mammals (collared and brown lemmings, red-backed voles). Each trapping session (4 trapping grids) is 48 hours in duration, and traps are checked about 6 times per session. Upon capture, unmarked animals are marked with PIT tags, and identification of animals previously marked are determined with a PIT tag reader. Weight, sex, and reproductive status (lactating: yes/no) are recorded.
11. Collection of ectoparasites (fleas, lice, ticks) isolated from dead foxes (opportunistically encountered), geese (collected), small mammals (collected from traplines), goose nests, and fox dens. Samples will be stored in ethanol and exported to Saskatchewan for analysis.

All of the above have been approved previously (or applications pending for renewal) by the Canadian Council on Animal Care, University of Saskatchewan.

We are also requesting permission to host film crews or photographers, as requests are received.

A research station, established in 1991, is located at the main field site at Karrak Lake (67°14'N, 100°15'W). It consists of six plywood buildings ranging in size from 8x12' to 20x20' (see attached schematic) and is occupied by 3-20 personnel annually during 5 May to 20 August, for approximately 600 person-days per year. A 12x16' cabin was constructed approximately 15 km north of the Karrak Lake Research Station in 2010, at 67°21'N, 100°21'W (see attached schematic). Over time, the goose nesting colony has grown substantially and the nesting distribution has shifted to the north-west, such that the Karrak Lake Research Station is now located at the colony periphery. Increasingly, many regions are becoming difficult to access by foot, and this new cabin facilitates easier access to much of the colony. It is occupied for less than 50 person-days per year. Perry River (reserve status) is occupied for approximately 50 person-days per year during mid July, for the purpose of marking Cackling and White-fronted Geese. By far, the majority of the work is based out of the Karrak Lake Research Station, focusing on the light goose nesting colony in that region.

Access to the study is by air, and surveys are conducted throughout the Sanctuary. Both fixed-wing (twin otters) and helicopters are used. Twin otters are used to transport field crews, fuel, food and equipment to field stations and fuel caches. Helicopters are used for surveys, occasionally (~10 days per year) to deliver ground crews to remote areas of the colony, consolidate empty fuel drums, and to capture flightless geese. Snow machines are used early in the field season, prior to arrival by geese. Canoes and small boats fitted with 16 hp outboard motors are used to traverse Karrak Lake, and nearby Adventure Lake. The main mode of transportation is on foot, and most regions of the main colony at Karrak Lake are visited at least twice per season.

Fuel caches are positioned in March, and locations are subject to snow conditions/pilot decisions. Annual updates of exact fuel cache locations will be provided after positioning. Fuel caches are located at:

location	type	lat/long	end August 2014	to position March 2015
Atkinson Point River	fuel cache	67.771500, 103.032667	2 jet	6 jet
Karrak Lake	cabin / fuel cache	67.237633, 100.259554	19 jet, 7 gas, 7 propane	18 jet
Perry River	cabin / fuel cache (airstrip)	67.699460, 102.212657		12 jet
Perry River	fuel cache (E of cabin)	67.69333, 102.18183	6 jet	-

#### Section 6. Potential Impacts.

Land: Impact is minimal, and almost entirely restricted to 1-2 hectares at each Research Station.

Restoration plans are to remove all evidence of habitation once research projects are complete. Aircraft landing strips at Karrak Lake are on ice only and therefore land is not damaged; at Perry River the airstrip (mud flat) is marred with tire tracks, but little vegetation exists in this habitat.

Water: Water is used for domestic purposes only, and grey water is disposed by soil leaching. Minimal gas/oil from boating activities is deposited into Karrak Lake and nearby Adventure Lake, as fuel tanks are filled on shore. Minimal impact.

Flora: Some disturbance to flora is limited to 1-2 hectares at each Research Station, as pits are dug for disposal of sewage and organic waste. Pits are backfilled with soil, and vegetation colonizes these areas within 5 years. Minimal impact. Vegetation sampling for research activities is largely observational (non-destructive); some above-ground sampling of biomass may be conducted at vegetation enclosures distributed in the Karrak Lake region.

Wildlife: Geese avoid nesting within 100 m of Research Stations. Garbage is incinerated and buried regularly, to avoid attracting bears. Travel by boats and snowmobiles likely disturbs wildlife, but temporarily.

Air: Incineration of domestic garbage at Research Stations expels pollutants, but because waste is incinerated at high temperatures, this is minimal.