Middleton Island Gosling Capture, Husbandry and VHF-Radio Tracking
2008-2009 Activity

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INTRODUCTION

Middleton Island (59.435 N x 146.328 W) is located in the Gulf of Alaska approximately 118 km south of Cordova, AK (Fig. 1). It is approximately 8 km long and 1.6 km wide. Large colonies of several sea bird species occur on Middleton. Except for rabbits (*Oryctolagus cuniculus*) introduced in the mid-1950's, there are no land mammals present. Prior to the early 1980's, Canada geese were not summer residents on Middleton Island. After a small breeding population became established numbers grew rapidly to approximately 1,400 adults and has stabilized at that size for the last 12 years. The rapid growth of the population to its current size indicates high productivity and recruitment. The proportion of young estimated during June surveys since 1996 was consistently high averaging 39% (S.D. = 5.5; range = 31.0% - 48.2%) with an average annual production of 890 goslings (S. D. = 172.9; range = 673 – 1,220 goslings; Petrula et al. 2008a). This high productivity can undoubtedly be attributed to the lack of mammalian predators.

For management purposes, Canada geese from Middleton Island and nearby islands in Prince William Sound (PWS) are considered subpopulations of the dusky Canada goose (*Branta canadensis occidentalis;* see Bromley and Rothe 2003). Only Middleton geese are included in the dusky population index because estimates of PWS geese have not been generated. Dusky Canada geese nest primarily on the Copper River Delta (CRD) east of Cordova, AK (Fig 1). The number of dusky Canada geese have declined from 20,000 – 25,000 in the 1970s to between 12,000 and 15,000 in the 1990s (Bromley and Rothe 2003). The index for dusky Canada geese reported for 2007 was slightly over 12,000 birds; 11% being Middleton Island geese (Larned and Stehn 2008). The primary reason for the decline has been attributed to recurrent low productivity and subsequently low recruitment resulting from increased depredation of adults, eggs and goslings on the CRD breeding grounds (Grand et al. 2006, Fondell et al. 2008). The proportion of young on the CRD since 1996 varied considerably averaging 21.3% (S. D. = 10.7; range = 7.2% - 47.2%) with an estimated average annual production of 1,168 goslings (S. D. = 793.6; range = 446 – 3,416 goslings; Petrula 2008b).

Because geese from the CRD, PWS and Middleton Island are in close proximity during the summer months and they winter sympatrically, exchange among locations is likely, but not yet documented. We suspect that geese from Middleton Island disperse to surrounding areas because 1) the number of adults has remained relatively constant during the past 12 years, and 2) production of young is consistently high. We hypothesized that juvenile birds were more likely to disperse than adults. Thus, our goal was to radio-mark approximately 10% of the goslings produced on Middleton Island in 2008. Investigating the possibility that geese from Middleton

Island and PWS contribute to the CRD population is considered a high priority research objective.

METHODS

We traveled to Middleton Island via a twin-engine aircraft (DC-3) on June 24, 2008. We choose this time period because 1) our biennial Canada goose survey was scheduled for 2008 and is conducted in late June, thereby reducing costs for a separate capture trip; 2) we knew from previous visits to the island that up to 4 week old goslings could be captured on foot during this time period; 3) we did not know if an adequate number of goslings of the appropriate size could be captured later in the summer. We attempted to capture goslings during a three day period. Four to 5 people would walk in a line through brood rearing areas identified from previous visits. When a family group was flushed goslings were run down on foot. All goslings that could be collected in the field that were > 16 days old were transported via pet kennels mounted to pack frames to an enclosure on the west side of the island where they were held approximately 4 weeks until large enough to hold a VHF radio transmitter mounted to a neck collar (green with white alphanumeric coding). Morphological measurements were taken and a web-tag was applied to the foot of most goslings so individuals could be identified during subsequent processing. Age was estimated by plumage development. The neck collar and transmitter weighed approximately 42 grams. Transmitters are expected to last for approximately 45 months at a pulse rate of 40 ppm with an 80 ppm mortality mode. We did not capture our goal of 80 goslings during the 3-day effort. Consequently, the responsibility of increasing our sample size was delegated to the individual who remained on the island to monitor and care for the captive flock. A return trip to the island was made in late July when additional goslings were captured, radio transmitters were deployed and the goslings were released.

Captive goslings were held in an 80' x 80' pen constructed with 1" x 1/2" mesh nylon netting supported by 4' aluminum poles pounded into the substrate (Fig. 2). Light line and flagging tape was strung between the tops of the aluminum poles to deter potential avian predators. The pen was partitioned into quarters with netting that was removed sequentially allowing goslings access to new foraging areas. An 8' x 16' x 4' framed shelter, opened at one end, was constructed in the middle of the enclosure. The floor of the shelter was covered in straw and two-250W heat lamps were suspended from the ceiling. Three-5' feeders and two-5 gallon water dispensers were placed at the entrance of the shelter. Prior to full development of contour feathers, goslings were confined to the shelter during evenings and provided with supplemental heat to reduce the risk of hypothermia during periods of inclement weather. Approximately 3 oz/bird of 18% protein layer mash was feed daily for the first week after capture then supplemented with a commercial scratch feed for the remainder of their confinement. Skunk cabbage was occasionally collected to increase the proportion of green plant material in the diet. Grit collected locally in the form of crushed gravel was provided periodically. A small drainage bisected the enclosure supplying fresh water (Fig. 2).

With cooperation from U.S.F.W.S. DMB Region 1, Oregon Department of Fish and Wildlife, and Oregon State University, we plan to monitor radio-marked geese from Middleton Island during winter months in Oregon. AK Dept Fish and Game plans to conduct surveillance flights on Middleton Island, the Copper River Delta and Prince William Sound during summers until transmitters fail.

RESULTS

We retained 34 goslings during a 3-days capture effort on our initial visit to Middleton in late June. Average age of goslings on the day of capture (n=32) was 19-22 days (S. D. = 2.3 days) and weights averaged 980 grams (S. D. = 194.6; range = 670 – 1,600 grams) which varied among age and sex classes (Fig. 3). Culmen length averaged 30.5 mm (S. D. = 1.94; range = 27.5 – 35.6) and total tarsus length averaged 84.5 mm (S. D. = 5.05; range = 74.6 – 96.9 mm). Release weights 26-27 days later for 27/32 goslings for which we have capture weights averaged 1,983 grams (S. D. = 277.35; range = 1,450 – 2,450 grams), slightly more than twice the average capture weight (Fig. 3). Culmen length averaged 37.0 mm (S. D. = 1.83; range = 34.0 – 43.4 mm), and total tarsus length averaged 97.9 mm (S. D. = 4.78; range = 87.6 – 108.3).

Twenty-nine and 14 additional goslings were captured from early-mid July, and 23-25 July, respectively. Capture weights were not recorded for these birds. Four goslings died while in captivity for unknown reasons and 5 goslings were slightly too small to hold a neck collar during final processing, consequently we deployed 66/75 radio transmitters (38 females, 25 males, 3 unknown). Five collars had to be replaced because they were slipped and found in the pen the day after attachment. Goslings were released on July 24 and 25; 1-2 days after receiving a neck collar. The vegetation in the pen by the time of release was intensively grazed (Fig. 2). Body, tail and wing feathers were well developed at release. Primary feathers varied in size (Fig. 4). Heads and necks were mostly the coloration of adults with mixed down, and well defined cheek patches (Fig. 5). One bird was observed in short flight at release, while others will require additional primary growth to attain flight capability. Although not quantified, it appeared that birds captured later in the project, and not held, were lighter, smaller structurally, but had more developed flight feathers than birds held in captivity. The day after release most collared birds were observed foraging in an open meadow, some with unmarked family groups. We suspect that goslings will remain on Middleton until October before migrating south to wintering areas. One radio-marked female was depredated in early August (USGS-BRD Kittiwake personnel) on Middleton and the transmitter was recovered. Eight green collars were observed on Middleton 4 December 2008 by a commercial pilot while on standby duty.

Radio Monitoring

Oregon: Oregon Department of Fish and Wildlife (ODFW) personnel as well as researchers from Oregon State University conducted 3 telemetry flights in the Willamette Valley during winter 2008/09. The first flight was on December 28, 2008 and an ODFW biologist covered most goose habitat from Ankeny NWR north to Sauvie Island. Two Middleton Island radio signals were detected on this flight. On February 28, 2009 OSU researchers conducted a telemetry flight for marked dusky geese and listened for Middleton Island geese concurrently. Areas covered were from Basket Slough NWR south to Fern Ridge Reservoir. A single radio signal, which was not heard on the previous flight, was detected on this flight. Neither of the previously heard signals was detected, however, flight paths only slightly overlapped. A third flight was conducted on April 3, 2009. An ODFW biologist covered the entire Willamette Valley from Sauvie Island to Fern Ridge Reservoir and did not detect any radio signals. OSU researches noted nearly all of their marked dusky geese had departed by earlier in the week so this outcome was not surprising.

Ground based radio telemetry was also conducted by OSU researchers and ODFW goose check station personnel during times when they we conducting goose collar surveys from December-March. Most areas of the Willamette Valley, in addition to costal Tillamook County were surveyed at least once and no radio signals were ever detected from the ground.

ODFW staff received 3 or 4 reports of hunters observing green collars but no collar codes were obtained. The green collars geese reported in the Willamette Valley were all near areas were radio signals were detected during the December flight and may represent those geese. Additionally, one green radio collar was reportedly observed by a hunter from Tillamook County. No flight was conducted there but all available goose habitats that could be monitored from roadways were searched from the ground.

Alaska: Tracking Middleton Island geese in Alaska during 2009 was initiated on the Copper River Delta. While conducting the Dusky Canada Goose survey in late May USFWS pilot/biologist Bill Larned listened for radio-marked geese throughout their breeding range from the Bering glacier to the west Copper River Delta. Radios were also monitored while crossing Prince William Sound during travel back to Anchorage. No radios were detected.

Mike Petrula traveled to Middleton Island on 2 June 2009. Listening from the plane and from various vantage points on the island he detected 25 collars, 17 of which were in mortality mode. An additional 7 collars were recovered by USGS-BRD personnel stationed on the island. Three of the collected collars were associated with decomposed carcasses suggesting that these birds did not depart the island during fall 2008. Collars without a nearby carcass may have been slipped or the carcass transported elsewhere. Thirty-three collars from the original marked population were not detected. None of the radios heard in Oregon the previous winter were heard on Middleton. Because all of the recovered collars were still transmitting we believe undetected collars were not present on the island.

A survey of Prince William Sound (PWS) and the west Copper River Delta was conducted from 26–29 June 2009. Areas in east PWS known to support Canada geese (Boswell Bay, Makaca Point, Hinchinbrook Island, Montague Island, Green Island, and portions of Port Fidalgo, Port Gravina and Sheep Bay) were surveyed (Fig. 6). Survey conditions were ideal. No radios were detected.

DISCUSSION

Previous radio-marking efforts of Middleton Island Canada geese indicates that adults winter in Oregon (Willamette Valley) sympatrically with dusky Canada geese that nest on the Copper River Delta. We expected that radio-marked goslings from Middleton would also winter at these locations. Only 3 of 65 radio-marked birds were heard in Oregon during the winter subsequent to their capture in Alaska.

That 7 collars were recovered (3 associated with carcasses), and 17 collars in mortality mode were detected on Middleton suggests that mortality and possibly slipped collars occurred before migration, and combined, accounted for the large proportion of collars not making it to wintering areas in Oregon. Tim van Nus (Seabird crew leader BRD-stationed on Middleton during

summer 2009) reported that many dead unmarked goslings were discovered along the coast and in the uplands beginning mid-August 2009. Below is his email correspondence:

> "I just checked the sheet with the results from the whole island carcass trip covering all the beaches between August 11-14 (which was around the time when the goslings started to die); there are 10 individuals on there (most on the E & S side of the island) including 9 juv & 1 ad. But as I said this is when they started to die; when I walked only a small section of the NE (far NE spit to the tidal pond in NE) a few days later, I already found 4 fresh ones; on the beach from the military pond > S for about 1.5 km I found 10 individuals (all juvs.): a wild guess for the island would be a total of about 100 goslings dead on the beach by that time (mostly on the E & S side where also the foraging areas are, but most carcasses end up here cause of the currence).
> Then there were the individuals that died on the land areas; these were mainly noticed in the current lowland: I remember 3 fresh indviduals laying dead between the ship trail and the ship; some Chucagh personell that visited the island in the last week of August told me they were surprised by the amount of dead ~50 d. old goslings laying around on their trip around the south. They saw a few of 'm that were about to die. Maybe another 100 juvs or so on the land areas?
>
> There were large families hanging around the buildings, grazing on the short grassy patches made by the rabbits, many of the juvs here were in bad shape (and very light) (see photo)

Low recruitment because of high gosling mortality prior to migration, perhaps through nutritional stress (reached carrying capacity) is worth additional investigation, and may also explain why 8 collared individuals were observed on Middleton in early December. However, a large proportion (51%) of collars were unaccounted for on traditional wintering areas in Oregon and potential summer range in Alaska. Either significant mortality occurred during migration, or goslings from Middleton dispersed to locations outside search areas.

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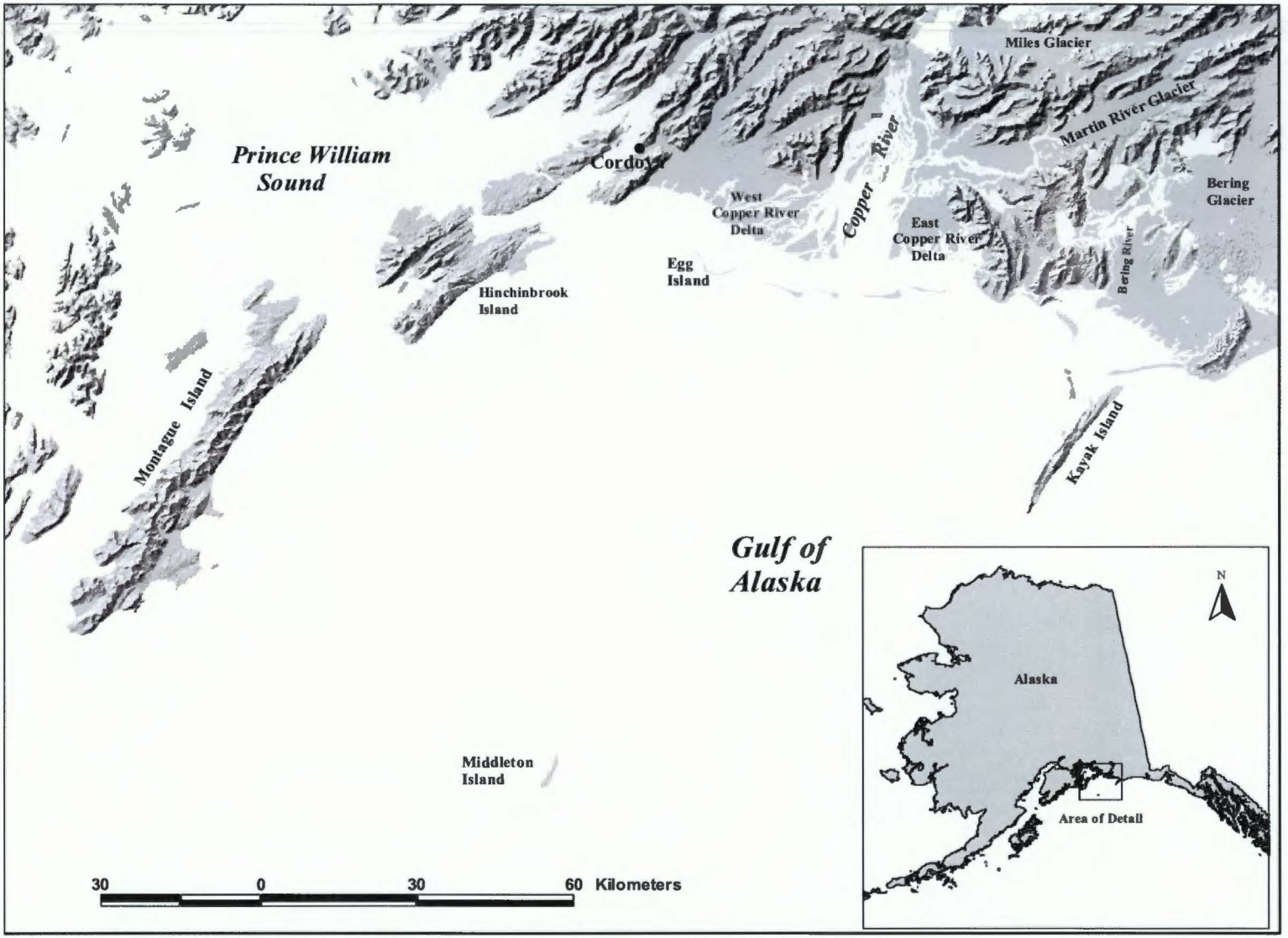

Fig. 1. Map showing location of Middleton Island and Copper River Delta, Alaska.

Fig 2. Enclosure used to restrain captive Canada goose goslings on Middleton Island, AK in 2008.

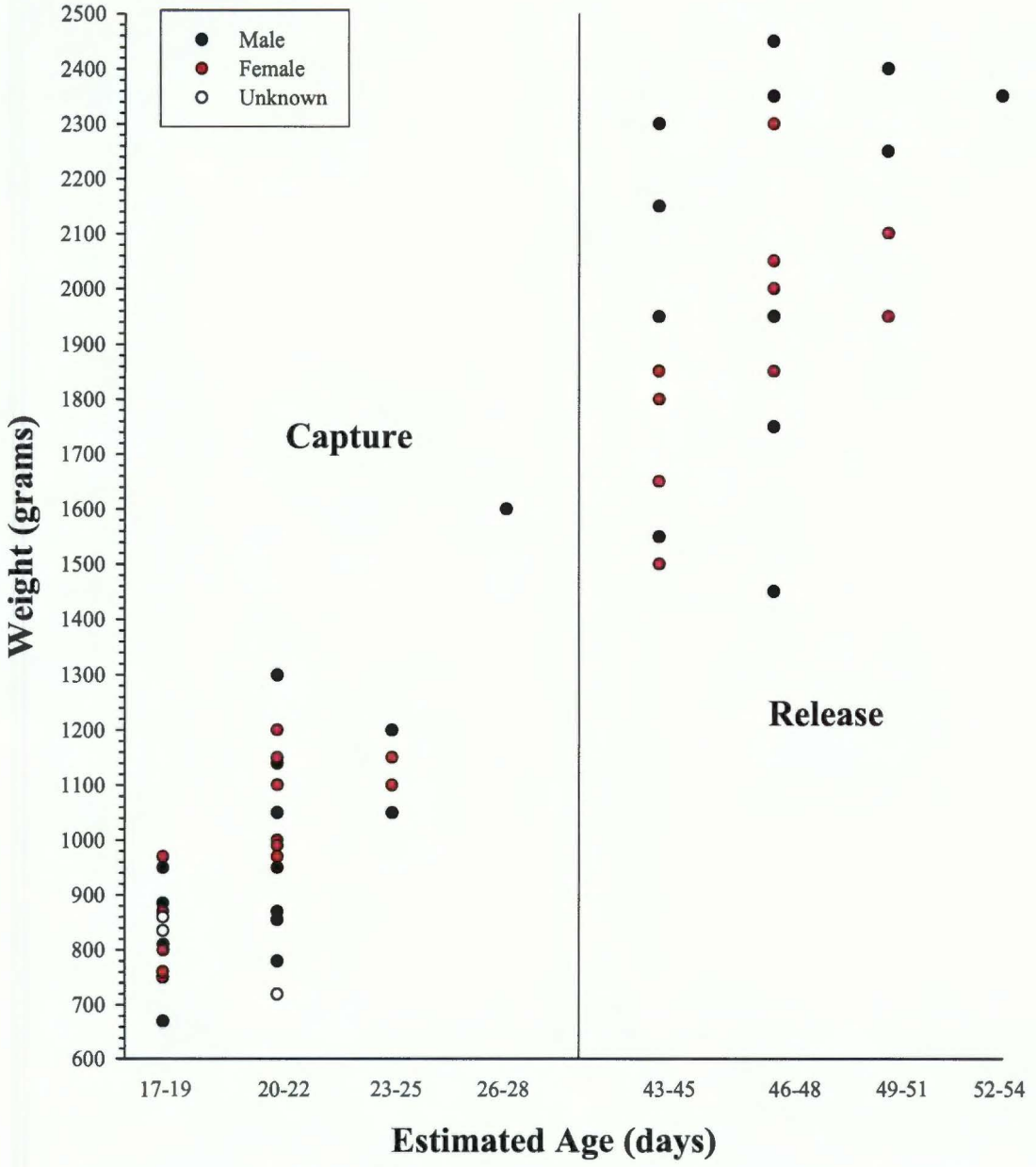

Fig. 3. Weight, sex and age of Canada goose goslings at capture (n=32) and release (n=27) on Middleton Island, AK in 2008. Goslings were captured between 26-28 June and released 24-25 July.

Fig. 4. Variation in primary wing feather development at release for Middleton Island Canada goose goslings.

Fig. 5. Middleton Island Canada goose goslings prior to release from captivity in 2008.

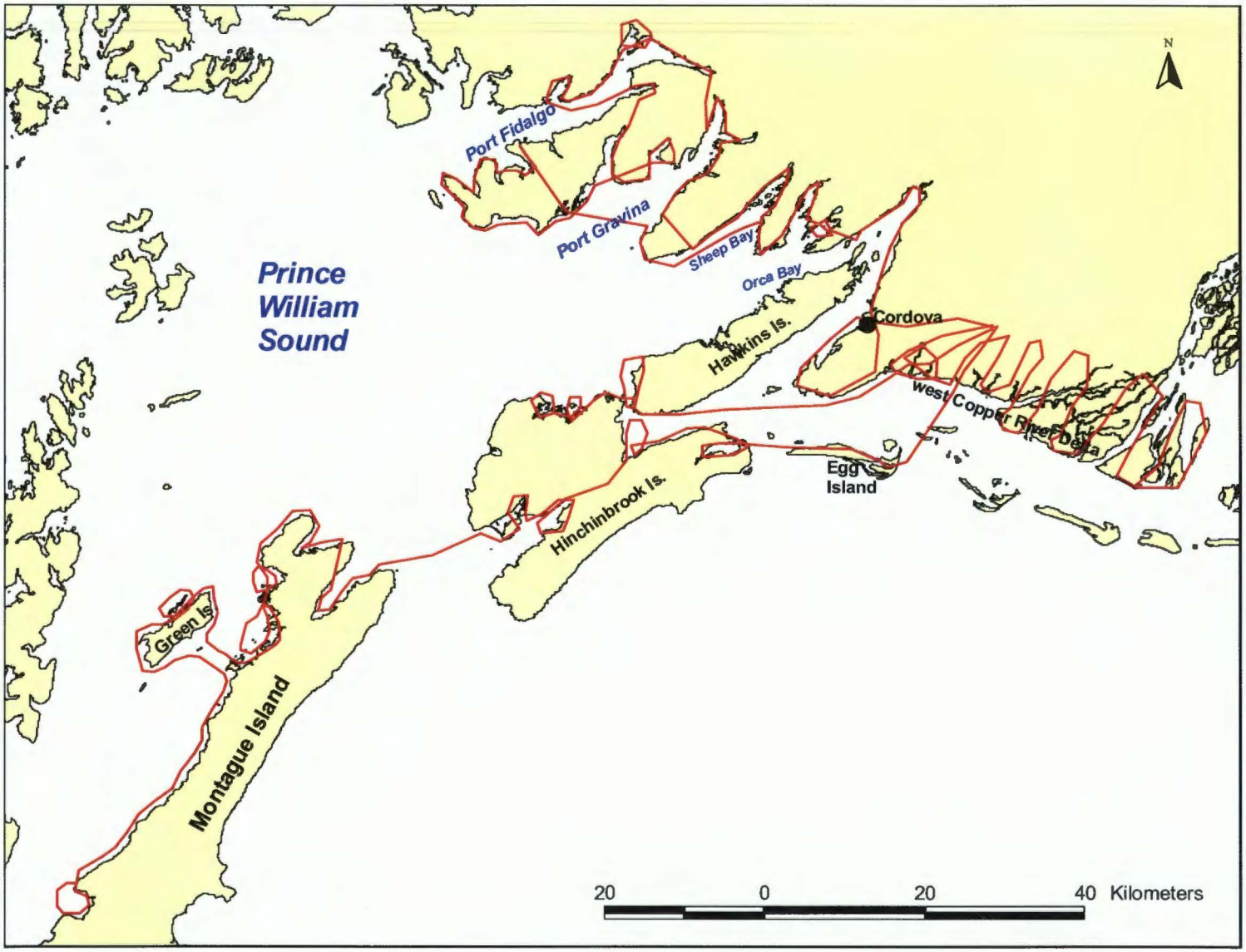

Fig. 6. Approximate flight path for monitoring radio-marked Canada geese captured on Middleton Island.