

**EVERMANN'S ROCK PTARMIGAN SURVEYS AT AGATTU ISLAND,  
ALASKA, 8-28 JUNE 2008**



Photo: R.S.A. Kaler

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## INTRODUCTION

Restoration of natural biodiversity following removal of introduced predators is a primary objective of the Alaska Maritime National Wildlife refuge. Historically, the Aleutian Islands had no native terrestrial mammals west of Umnak Island, therefore, when arctic foxes (*Alopex lagopus*) were deliberately introduced to many of the Aleutian Islands for the purpose of fur production during the 18<sup>th</sup> to 20<sup>th</sup> centuries, many native populations of birds were dramatically impacted (Bailey 1993, Williams et al. 2003, Gibson and Byrd 2007). Depredation of eggs, young and breeding birds by foxes led to population declines and local extirpation of seabird, waterfowl, and landbird populations on many islands. Since 1949, refuge personnel have made concerted efforts to eradicate foxes and other alien species from Aleutian Islands with trapping, toxicants and interspecific competition (Ebbert and Byrd 2002). Today, only a handful of islands continue to be occupied by foxes.

Following the successful removal of foxes, the recolonization of available islands by extirpated bird species sometimes requires additional management efforts, such as a translocation and reintroduction program, in order to expedite a species recovery. In the case of Evermann's rock ptarmigan (*Lagopus muta evermanni*), a unique dark plumaged subspecies endemic to the Near Islands group (Attu, Agattu, Shemya, Nizki and Alaid) located at the westernmost end in the Aleutian Archipelago (Fig. 1), predation by foxes extirpated this species from every island in its historic range except Attu (Murie 1937; 1959). In 1968, the U.S. Fish and Wildlife Service (USFWS) began removing foxes from Agattu and by the late-1970's foxes were no longer present (Bailey 1993, Ebbert and Byrd 2002). Although migratory elsewhere in Alaska, rock ptarmigan in the Aleutian Islands are resident (Holder and Montgomerie 1993) and may explain why despite Agattu being fox-free for 30 years, no ptarmigan had crossed the 50 km straight from Attu to reestablish a population at Agattu Island.

In 2003, after conducting comprehensive pre-release surveys indicating ptarmigan were not present at Agattu, the Alaska Maritime National Wildlife Refuge initiated a four-year translocation program (2003-2006) to restore a population of ptarmigan to the island. The latter two years (2005-2006) included a radio telemetry study to measure post-release survival, reproductive success and population viability of recently reintroduced ptarmigan (Kaler 2007). At the end of the 2006 breeding season, the Evermann's rock ptarmigan population consisted of 26 known pairs and exhibited demographic values (clutch size, nest success, productivity, adult survival) similar to those reported for mainland populations used for comparative purposes (Watson 1965, Weeden 1965, Cotter 1999, Kaler 2007).

Despite this positive outlook, continued monitoring of the reintroduced population is warranted, as the population remains small and vulnerable to stochastic processes. Continued monitoring will also help guide decisions about future reintroductions of ptarmigan elsewhere in the Aleutian Islands. Therefore, we initiated post-establishment monitoring of ptarmigan at Agattu incidental to our study of Kittlitz's murrelets (*Brachyramphus brevirostris*) during the summer of 2008. The persistence of ptarmigan

sign (feathers, pellets) allowed the determination of habitat use, so it is relatively straightforward to detect expanded use of suitable habitat which would be expected in a newly established population like the one at Agattu.

Surveys were conducted in June 2008 to quantify the number of territorial male ptarmigan at Agattu. This report summarizes the results of those surveys. Our objectives were two-fold: 1) provide a baseline measure of the number of territorial male rock ptarmigan breeding at Agattu Island, and 2) evaluate the survival of individuals color banded during the 4-year reintroduction study. Detection of unmarked individuals was evidence of *in situ* reproduction by newly established birds. Resighting of marked birds provided baseline estimates of survival for this insular population of ptarmigan.

## METHODS

*Study Area.*--Agattu Island (52.43° N, 173.60° E) is part of the Near Islands group found farthest west in the Aleutian Archipelago and has an area of 22,474 ha. Agattu is primarily covered by maritime tundra that lies below 230 m elevation with one mountain range covering approximately one-third of the island with a maximum elevation of 634 m.

Weather data were collected at Binnacle Bay (Fig. 1) from 1 June to 26 August 2008. Daily mean minimum and maximum temperatures during the three month period were 5.3 °C (range 1.8 to 8.3 °C) and 16.2 °C (range 14.9 to 17.5 °C), respectively. Average monthly precipitation during the three month period was 8.2 cm (range 6.3 to 11.2 cm). Wind velocities at Agattu averaged 28 kilometer per hour; gusts of 55-115 kilometers per hour were not uncommon.

*Field Methods.*--Following methods outlined by Taylor (2000) and modified for use at Agattu Island, counts of ptarmigan were conducted along census routes between 15:00-22:00 (Aleutian Standard Time) during the time period when females usually are incubating (8-28 June; Kaler 2007) and males are within their territories (Holder and Montgomerie 1993). Each census route was surveyed three to five times during the incubation period to detect territorial males. Call playback of male rock ptarmigan included Flushing Song (“AAHR-aa-a-AAAH”), Flight Song (“ah-AAH-ah-AAAAH”) and Growl Call (“Ooww-AAAAA”; Holder and Montgomerie 1993). Calls were broadcast at 250 to 300 m intervals along routes walked at elevations between 225 to 400 m above sea level, to elicit responses from males in the area. At each stop, a short series of calls were played, followed by a 2-minute wait. If there was no response, the broadcast procedure was repeated once more prior to moving to the next stop. All ptarmigan observed or heard within 400 m were plotted on a topographic map. If territorial males responded by flying to the recorded call, we plotted the bird’s location at the point of origin or center of its territory. Weather conditions influence ptarmigan activity, thus, counts were conducted only during days with winds  $\leq 25$  kph and visibility  $\geq 400$  m distance.

All previously translocated ptarmigan, and some birds reared at Agattu, were individually marked with either one aluminum numerical band and one color band (batch marked; 2003-2004) or one numerical band and three colored leg bands (2005-2006). To

quantify survivorship of marked ptarmigan in 2008, we attempted to determine whether detected individuals were banded. These observations were made both during population surveys and while collecting data on other field studies at Agattu. By resighting marked individuals at Agattu, a coarse baseline value of ptarmigan survivorship can be obtained for this insular ptarmigan population.

## RESULTS

Fifty-nine playback stations were located at elevations between 225 to 400 m above sea level (Fig. 1) and were visited two to five times each during the survey period between 8-28 June. Survey stations were established both at previously known territories, as well as areas unoccupied in 2005 and 2006. Most playback stations were located on rock outcroppings or areas with subtle relief, many of which had sign of ptarmigan use (i.e., pellets, feathers).

Counts of territorial males/breeding pairs of rock ptarmigan resulted in the detection of 27 territorial males (Fig. 2). This number is similar to the 26 territorial males recorded at the end of the translocation period in 2006 (Fig. 3) and should be considered a minimum count as it is unlikely that all territorial males were detected at Agattu.

Eight territories were detected in locations where no males, or sign of ptarmigan, had been detected previously during the radio telemetry study in 2005 and 2006. However, density of territories in 2008 appears to be more dispersed compared to the previous years (Fig. 2, Fig. 3). Additionally, signs of use by ptarmigan were found at lower elevations than had been detected in 2005 and 2006 (below 225m). These observations may be due to expansion of home ranges during winter (greater amounts of snow at higher elevation may have forced ptarmigan to forage at lower elevation) or it may indicate that the population is expanding and new habitats are being colonized. At the time of our arrival at Agattu in late-May 2008, much of the montane area was covered with snow, more so than had been seen during the years of translocations.

Attempts were made to resight color bands on all ptarmigan during playback surveys, as well as during the course of other field work at Agattu. Two males were detected with a single aluminum leg band, but had lost either the single color band (from batch-marked ptarmigan; 2003-2004) or all three color bands (uniquely marked ptarmigan; 2005-2006; Fig. 4). In addition, two snowy owl pellets found at Agattu contained aluminum and color bands from marked ptarmigan; one female captured at Agattu released at Agattu in 2003 and one female captured and marked at Agattu in 2006 (Fig. 4). It is difficult to age pellets, however, they were located in areas that had been traveled through multiple times in 2006 and had not been detected, suggesting the predation events likely occurred after August 2006.

Two ptarmigan nests were located during the 2008 season and provide a coarse estimate of timing of clutch initiation. One nest was initiated 2 June and contained 9 eggs; the second nest was initiated 5 June and also contained 9 eggs. These clutch sizes and

initiation dates are similar to those reported for 2005 and 2006 breeding seasons (mean clutch initiation date = 8 June; mean clutch size = 9 eggs).

## **DISCUSSION**

According to our population estimate based on the number of territorial males at Agattu in 2008, the ptarmigan population appears to be stable during the two years post-translocation. Population size is an important criterion to monitor in a reintroduced program since it has been shown to be a major factor in determining a population's persistence for a variety of animal species and taxa (Jones and Diamond 1976, Soule et al. 1988, Rosenzweig 1995, Foufopoulos and Ives 1999). The larger a population, the more resilient it is to random environmental events that may directly reduce population size or have negative influence on survival or reproduction.

Continued monitoring will provide a more robust measure over time, however, if reproductive success of breeding hens is similar to values observed in 2005 and 2006, then the population should continue to increase. Indeed, the detection of rock ptarmigan territories, as well as sign of rock ptarmigan in areas previously without sign or presence of ptarmigan, indicate that available habitats continue to be recolonized and the population is expanding.

Our initial assessment of the population at Agattu is promising and supports the use of translocation to restore island populations of terrestrial birds in the Aleutians. However, the population's small size may be vulnerable to stochastic events or deleterious effects of inbreeding and we recommend the continued use of population surveys at Agattu to measure the population's persistence over time.

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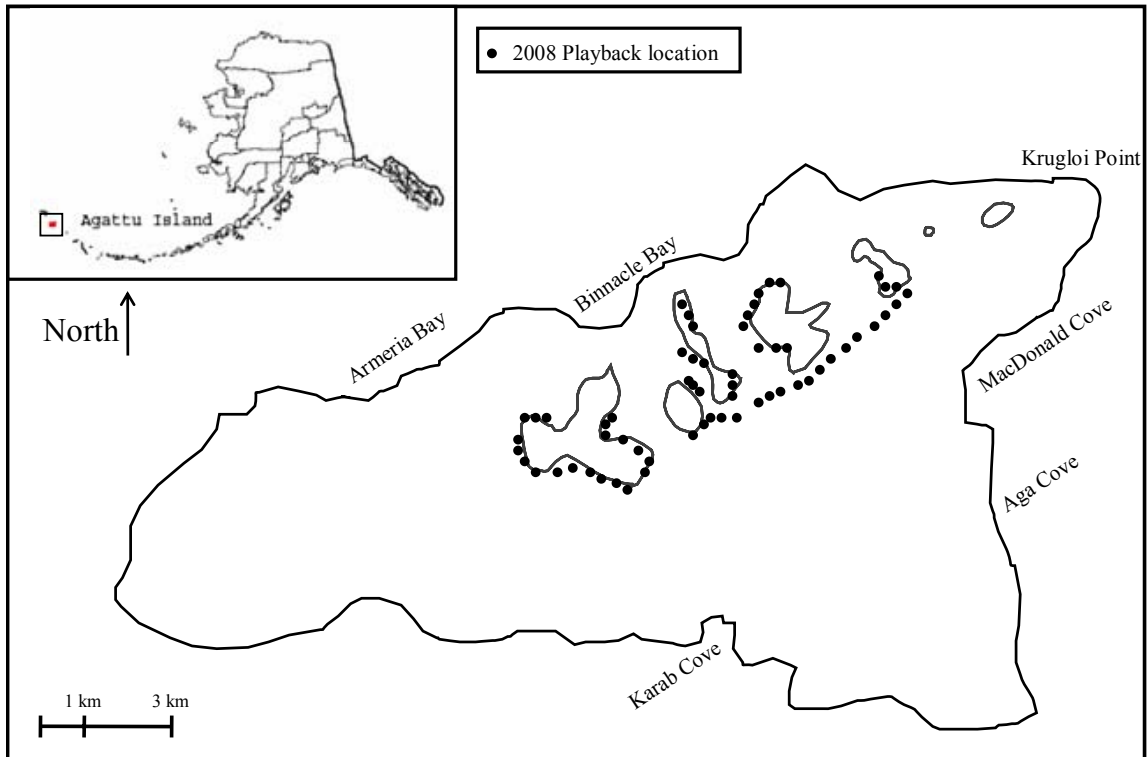


Figure 1. Study location of reintroduced Evermann's rock ptarmigan, Agattu Island, Alaska, 2008. Outline of mountains in northeast portion of island represent 300 m contour lines of alpine area. Points mark playback stations used for population survey of Evermann's rock ptarmigan.

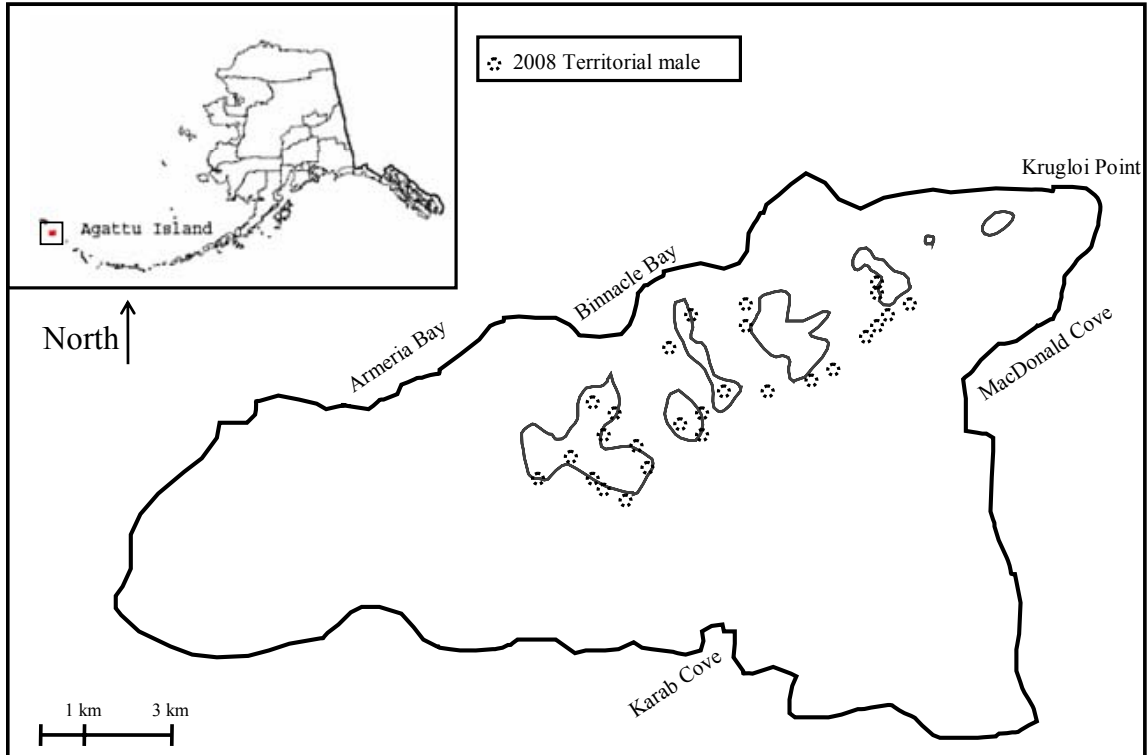


Figure 2. Study location of reintroduced Evermann's rock ptarmigan, Agattu Island, Alaska, 2008. Outline of mountains in northeast portion of island represent 300 m contour lines of alpine area. Dashed circles mark locations of territorial Evermann's rock ptarmigan detected during surveys in 2008.



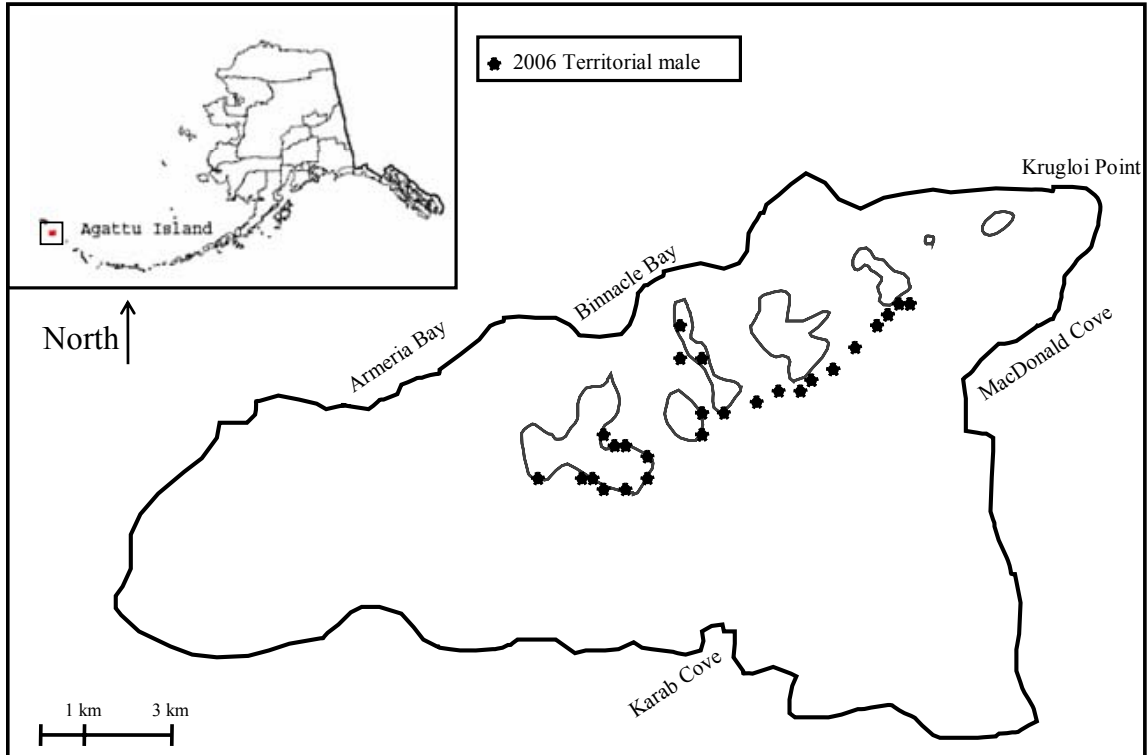


Figure 3. Study location of reintroduced Evermann's rock ptarmigan, Agattu Island, Alaska, 2008. Outline of mountains in northeast portion of island represent 300 m contour lines of alpine area. Solid dashed circles mark locations of territorial Evermann's rock ptarmigan in 2006.

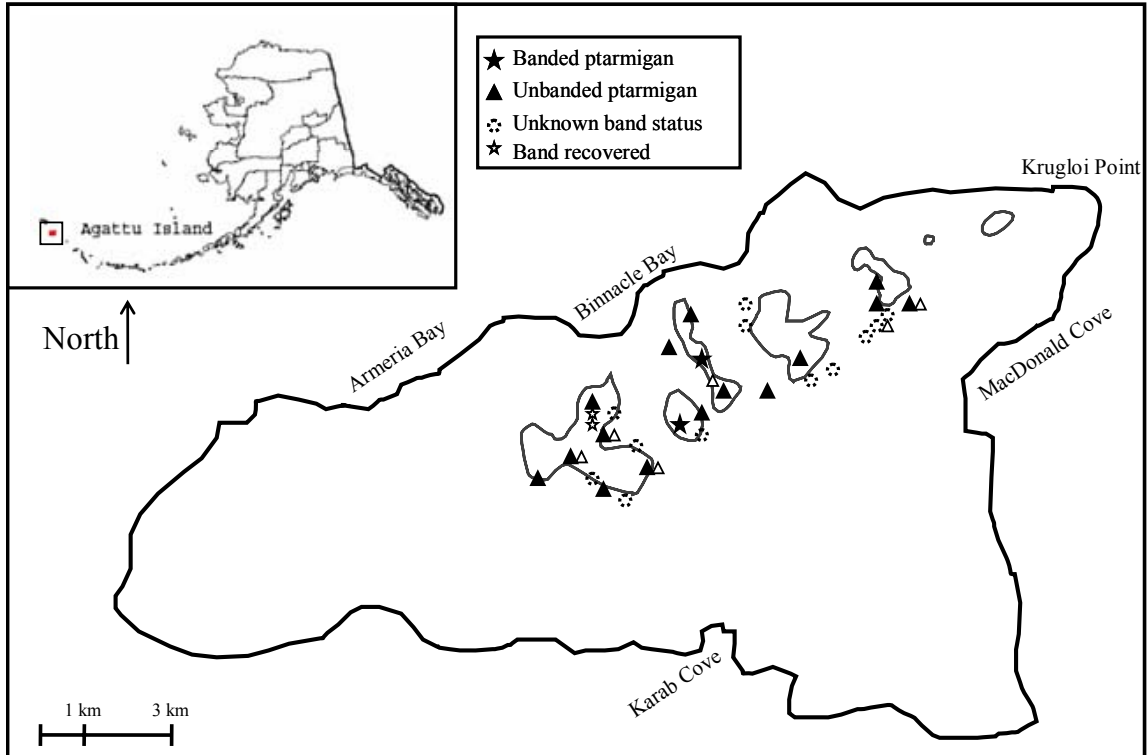


Figure 4. Study location of reintroduced Evermann's rock ptarmigan, Agattu Island, Alaska, 2008. Outline of mountains in northeast portion of island represent 300 m contour lines of alpine area. See legend in figure for symbol definitions.