

PREDATION BY RACCOONS ON ANCIENT MURRELETS

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INTRODUCTION

Seabird islands all over the world are faced with threats posed by introduced species and East Limestone Island (ELI) is no exception. A particular concern for burrow nesting seabirds in Haida Gwaii is the threat of non-native raccoons *Procyon lotor* that dig up burrows to take eggs and defenceless adults that have not evolved any way of protecting themselves against these invaders.

Raccoons were introduced to Haida Gwaii in the early 1940s to provide an alternate source of fur for trappers after the local sea otter population was decimated. Because raccoons have no natural predators in the archipelago their population has grown and spread across the islands. Raccoons are

believed to pose a risk to seabirds nesting on islands within 1 km of a source area (Harfenist et al. 2000) and they have been implicated in the disappearance of seabirds on Helgesen and Saunders islands (Gaston & Masselink 1997) and declines on East and West Limestone Islands that occurred in the early 1990s (Hartman et al 1997, Gaston 2007)

In 2007 a raccoon was active on ELI and it was believed responsible for digging up Ancient Murrelet burrows (ANMU), predated on adult birds, chicks and eggs. This report outlines our experience with the raccoon in 2007 and examines the impact of predation on the ELI colony.

EVENTS IN 2007

We first considered the possibility that raccoons were present on the island at camp start up on 29 April when two volunteers came across an ANMU head. Accounts of raccoon predation on seabirds nesting at Limestone in the 1990s refer to a 'distinctive style of predation' in which ANMUs were decapitated and then left uneaten. Over the course of the next two weeks we discovered 11 dug up ANMU burrows: one burrow contained a depredated egg and three showed evidence that an adult had been predated, one of which contained two intact eggs. The contents of the burrows were of particular interest because previous reports from Limestone suggested that raccoons almost certainly remove eggs from seabird burrows. Resident River otters *Lutra Canadensis* were also considered suspects because they are known to predate on adult birds but do not necessarily take eggs.

We did not detect any raccoons on West or East Limestone on our first night time raccoon survey by boat on 12 May. Predation transects conducted at first light provided our first firm indication that a raccoon was active on ELI. On 19 May we found six headless ANMU carcasses on our transects and further investigations across the island turned up another three more decapitated birds (Fig 1). The nature of the bird remains was consistent with raccoon predation.

We set up four baited raccoon traps in the areas where the carcasses were found. We checked and re-baited these traps regularly for the remainder of the season. Traps were baited with different combinations of: marshmallows, canned fish, fresh fish carcasses, eggs and peanut butter. We had

no success with the baited traps and incidentally caught four Common Ravens and two Red Squirrels.

On our way to conduct the second night time raccoon survey on 27 May we confirmed that a raccoon was indeed on the island when we spotted a raccoon at Boat Cove. This sighting prompted a visit on 6 June by provincial Conservation Officers (CO) to eliminate the offending raccoon(s). Efforts were launched solely by boat at night and the COs succeeded in removing several raccoons from Louise Island but none from either of the Limestone islands. We continued to find decapitated adults and excavated burrows containing remains of predated adults and eggs. And for the first

time on record, we found two decapitated chicks, apparently dug out from their burrow.

On 18 June a CO returned to direct two night hunts for raccoons by boat. During this visit the CO helped ELI staff to improve the raccoon trap set-ups on the island. Raccoons are apparently hesitant around the metal traps (Fig. 2) and the more natural the traps appear, the more likely raccoons will enter. Ideally traps should be placed in cave-like settings (ie: in rotted out tree trunks) and camouflaged using moss, dirt and bark (Fig 3). The CO also mentioned that creating scent trails by dragging bait along a path leading up to a trap might help to attract raccoons.



Figure 2
Metal traps are less appealing to raccoons if they are placed in the open



Figure 3

Camouflaged raccoon traps on East Limestone, 2007. Traps are more appealing to raccoons if they are placed in dark, cavernous locations such as a rotted out tree trunks and camouflaged with bark, soil and moss. Red arrows point to trap entrances

Despite unfavourable weather conditions (rain and winds: SE 40 knots) the crew succeeded in removing 2-3 raccoons from Louise I. but none from ELI. A second night of surveys with the CO turned up no raccoons. On 20 June the crew carried out a survey around ELI just before dusk. Weather conditions were favourable and a

raccoon was spotted on top of the cliffs above Anenome Cove. The crew managed to tree the raccoon and the individual was shot and killed. No more signs of raccoon activity were evident on ELI after that day and a raccoon survey on 9 July detected no raccoons on either of the Limestone Islands.

RESULTS FROM PREDATION TRANSECTS

Once per week starting 12 May, we counted the number of carcasses, depredated eggs, feather piles, wings, and dug-up burrows (see Laskeek Bay Research 4 for a detailed description of classifications) located along five, 20m wide strip transects. Transects ranged in length from 100m to 200m, totalling 800m of transects. Based on the 2006 census (Lemon 2006), the 1.6 hectares covered by our predation transects represents 12.7% of the current ANMU breeding colony on ELI.

Counts were started at first light in order to locate signs of predation before scavengers altered or removed evidence. We found 40 adult ANMU predations (feather piles, wings or headless carcasses), five fresh diggings, six depredated eggs and three headless chicks (Table 1). Some of the eggs and chicks were found in or nearby burrows that were recorded as dug up. Counting feather piles, wings and carcasses, mean \pm (SE) density was 29 adult birds predated/ha \pm 8.7 which equals 364 birds for the entire colony.

Table 1
Predation remains found on transects in 2007 at East Limestone Island

Date	Feather piles or wings	Burrow diggings	Carcasses	Eggs or chicks
12 May	3	0	0	2 eggs
19 May	7	1	6	1 egg
26 May	1	3	0	2 eggs
3 June	11	1	0	1 egg
10 June	11	0	0	3 headless chicks

Outside of transects we found another 17 dug up burrows (2 contained depredated eggs and three contained adult remains), six headless adult carcasses and one adult head. Three of adults killed by the raccoon were banded (the raccoon was believed responsible because birds were either headless or the remains were found inside excavated burrows). One of these predated birds was originally banded as a breeding adult occupying a monitored burrow in 2003. The other

two birds were banded as chicks that departed from funnels # 3 and #6, banded in 2004 and 2005, respectively (Table 2). ANMUs typically start breeding between 3-4 years old (Gaston 1990) and thus the two year old bird banded as a chick in 2005 was probably attending the colony as a prospector. Thus the raccoon on Limestone in 2007 apparently targeted not only breeding adults but also prospecting birds.

SUMMARY

Ancient Murrelets are 'blue listed' by the province of British Columbia and are considered of 'special concern' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) because they are especially vulnerable to threats posed by introduced species, such as raccoons. Our estimate of the number of

birds killed could explain the decline in the number of Ancient Murrelet chicks that we observed this season. A portion of the predations on our transects were clearly the result of the raccoon which targeted prospecting birds, breeding adults, chicks and eggs, consequently posing a serious threat to this small colony.

RECOMMENDATIONS

The proximity of the colony to nearby islands with raccoons means that this introduced species will continue to pose a threat to burrow nesting seabirds on ELI. Our experience this season has highlighted a few important considerations / recommendations:

1) Boat and walk through surveys for raccoons should ideally be conducted before birds arrive at the colony and throughout their incubation period. The Limestone field crew arrives at the end of April (once eggs are near hatching) and raccoons that are present on the island will already have had

serious impacts on prospecting birds, breeding adults and developing eggs.

2) The traps set out in 2007 did not work. Traps should be set out using the methods suggested by the COs ie: placing them in dark, cavernous locations, camouflaging the traps (Fig. 3) and ideally baiting them with fresh fish.

3) As indicated in earlier reports, it is imperative that predation transects are checked at first light. Within hours of

discovering headless carcasses that were otherwise intact, the remains were inverted, cleaned out, turned in to feather piles or missing altogether.

4) Relying on COs to remove raccoons from ELI is not the most effective strategy for eliminating raccoons from the colony because this requires a combination of conditions come together: COs have to be available and tides, weather and raccoons have to cooperate.

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