

EAST LIMESTONE ISLAND FIELD STATION

FIELD SEASON REPORT 2013



SUMMARY

This was Laskeek Bay Conservation Society's 24th field season on East Limestone Island, Laskeek Bay, Haida Gwaii. The 2013 season ran from 3 May to 12 July, bringing 25 volunteers and 106 visitors to the island. Project Limestone was back this season bringing 29 students and 9 teachers/chaperones to the island. Ancient Murrelet chick departures at Cabin Cove were the highest recorded since 2007. No raccoons were detected on the island this season. Black Oystercatcher surveys were conducted in both Laskeek Bay and in Gwaii Haanas. We censused Glaucous-winged Gull colonies in Laskeek Bay and found 295 active nests at three colonies. Pigeon Guillemots used 16 of the 28 nest boxes at Lookout Point. Eight Cassin's Auklet nest boxes were active, and 4 chicks fledged by 10 July. Four near-shore sea surveys were completed and Marbled Murrelet counts were higher than in 2012. Two Hecate Strait sea surveys were completed. Marine mammal sightings this season included 12 Humpbacks, 1 Grey whale, 6 Minke whales, 7 Harbour porpoises and 5 different groups of Killer whales. Seventeen wildlife trees were active: 11 with Red-breasted Sapsuckers, 1 with Chestnut-backed Chickadees, 1 with Hairy Woodpeckers, 1 with Northern Flickers, 1 with Brown Creepers and 2 with Red-breasted Nuthatches. Both the Common Raven and Peregrine Falcon nests were active, but no Bald Eagle nests were confirmed active this season.

Prepared by Jake Pattison and Vivian Pattison
Reviewed and Edited by Laskeek Bay Conservation Society
Box 867, Queen Charlotte, BC, V0T 1S0

TABLE OF CONTENTS

EDUCATION AND INTERPRETATION PROGRAM.....	2
Project Limestone	3
Volunteers	3
Visitors	3
Staff	4
Student Intern	4
RGIS.....	4
RESEARCH AND MONITORING PROGRAMS	4
Ancient Murrelets <i>Synthliboramphus antiquus</i>	4
Black Oystercatchers <i>Haematopus bachmani</i>.....	8
Glaucous-winged Gulls <i>Larus glaucescens</i>	11
Pigeon Guillemots <i>Cephus columba</i>	12
Cassin’s Auklets and Fork-tailed Storm Petrels	13
Sea Surveys	14
Marine Mammals.....	14
Wildlife Trees	15
NATURAL HISTORY.....	16
Daily Bird Checklist.....	16
Raptors and Corvids.....	17
Plants.....	17
Introduced Species	18
CONCLUSION	20
ACKNOWLEDGEMENTS	21

INTRODUCTION

Laskeek Bay Conservation Society (LBCS) is a non-profit organization committed to increasing the appreciation and understanding of the natural environment through biological research, interpretive programs and public involvement. The field station at East Limestone Island has been in operation for 24 consecutive field seasons and over this period LBCS has developed diverse long-term monitoring projects in Laskeek Bay. Volunteers assist researchers with data collection in order to study the abundance, distribution, and life history of wildlife in Laskeek Bay. This information helps us understand the fluctuations in marine and terrestrial ecosystems and gives a baseline against which we can describe changes in the future due to introduced species, marine pollution, global climate change, extreme weather events, and other threats to coastal ecosystems.

EDUCATION AND INTERPRETATION PROGRAM

LBCS provides opportunities for public involvement in research and monitoring activities through Project Limestone, our volunteer program, and interpretive tours. Students, volunteers and visitors come to our field camp and participate in the projects that are occurring throughout the season. By bringing people to our camp and encouraging participation in research activities, we hope to increase public awareness of local conservation issues, and increase public knowledge of the natural history of Laskeek Bay.

Project Limestone

Project Limestone brings local students to Limestone Island to learn about natural history and participate in Ancient Murrelet research. The students are lead on an interpretive tour, which crosses the island and ends at Lookout Point. They learn about the natural history and geography of the area, and are introduced to the various projects that we run. They then assist with the Ancient Murrelet capture work from 10:30 pm to 2:30 am. The students learn about Ancient Murrelet life history as they help to capture, weigh, and release chicks. In past years students have spent only one night on the island, returning to their camp at Vertical Point the next morning. This year, due to a camping closure at Vertical Point, two groups stayed on the island for a full 24 hr visit. Along with participating in Ancient Murrelet night work, these students had time to observe and learn about the birds and introduced species on Limestone Island, scan Laskeek Bay for marine mammals, and learn how to find and observe wildlife trees.

This year four student groups visited Limestone Island. There were a total of 29 students from grades 3 to 12, and 9 teachers / chaperones. Two groups of students came from Queen Charlotte Secondary School, on 15 May and 17 May. The Living and Learning School (Queen Charlotte) arrived on 19 May, and Tidal Elements (Masset) on 20 May. Project Limestone began in 1991, and to date 632 students have visited the island as part of this program.

Volunteers

Volunteers play an important role in the operation of the field camp on Limestone Island. They generally stay for one week, and help staff with research and monitoring projects, camp maintenance, and daily chores. Volunteer contributions of time and energy are essential to keep the field camp going and to continue long-term data collection. LBCS provides a unique opportunity for the general public to be involved in long-term research in a remote field camp.

This year we had 25 volunteers who contributed 147 volunteer days to projects on Limestone, in other areas of Laskeek Bay, and in Gwaii Haanas. Most volunteers stayed one week, but one stayed for two weeks, and one for 4 days. Eight volunteers had visited or volunteered on the island in previous years. Volunteers were from many parts of the world: 9 were from Haida Gwaii, 10 from other parts of BC, 1 from Ontario, 1 from Saskatchewan, 1 from Quebec, 1 from California, 1 from Denmark, and 1 from Germany.

Visitors

The LBCS visitor program provides an opportunity for tour groups to visit Limestone Island and receive an interpretive tour of the island from a staff member. While visitors walk across the island, they are introduced to the natural history of the area and the monitoring and research projects we are involved in. LBCS aims to bring about greater understanding of the natural world and increased awareness of local conservation issues through the visitor program.

Most visitor groups who stop on Limestone Island are partaking in ecotourism excursions into Gwaii Haanas. This year we had visits from 7 tour groups: *Island Roamer* on 21 May, 29 May, and 15 June, *Island Odyssey* on 4 June, and *Maple Leaf* on 29 May, 24 June and 27 June. Other visitors were the crew of the Island Bay (2 people), a group doing research in Gwaii Haanas (5), and a group from BC Parks (4). In total there were 106 visitors to the island throughout the field season.

Staff

LBCS staff this year were Blair Weinberg, Field Camp Coordinator; Jake Pattison, Camp Supervisor (June/ July); Ainsley Brown, Camp Supervisor (May) and Assistant Biologist/Interpreter (June/July); and Vivian Pattison, Assistant Biologist/Interpreter (May).

Student Intern

In 2010, LBCS began a program that provides students in biology or environmental studies with an opportunity to gain valuable hands-on field experience as an Intern on Limestone for a six week period. This year's intern was Emily Grubb, from Kincardine, Ontario, a recent graduate of Trent University. Working closely with LBCS staff biologists, she contributed 39 days to projects on Limestone Island and in Laskeek Bay, including 5 days of BLOY survey work in Gwaii Haanas and assisted with field work and writing reports.

RGIS

The Research Group on Introduced Species was again conducting research in the Laskeek Bay area this spring. Project BAMBI, a four year project focused on understanding deer behaviour and how it changes in response to predation risk, is in its third year. Although the camp on Reef Island was not utilized this spring by RGIS, one student from France, Helene Malcuit, was working on Limestone Island from 3 May until 7 June. RGIS will be doing more work on Limestone and in Laskeek Bay in August.

RESEARCH AND MONITORING PROGRAMS

Ancient Murrelets *Synthliboramphus antiquus*

Chick capture work

Chick-capture funnels 5-8 were monitored in Cabin Cove beginning on 7 May. Funnels were closed nightly to capture departing chicks from 22:30-2:30 for the period of 7-19 May and 11:00-2:30 after 19 May to compensate for increasing day length. Funnels were checked at regular 15 minute intervals and the date, time, location (funnel number) and mass for each departing chick was recorded. Funnel protocol is kept constant across years so that the number of chicks departing gives a consistent index of the overall breeding population. Capture work ends after two consecutive nights with no chick captures in any of the funnels. This season the first chicks arrived the night of 13 May and the last on 1 June. A total of 136 chicks were captured in funnels 5 to 8 (Fig. 1). Peak night of departures (15 chicks captured) occurred on 21 May. Chick numbers recorded this season in funnels 5-8 were the highest recorded since 2007 (Table 1).

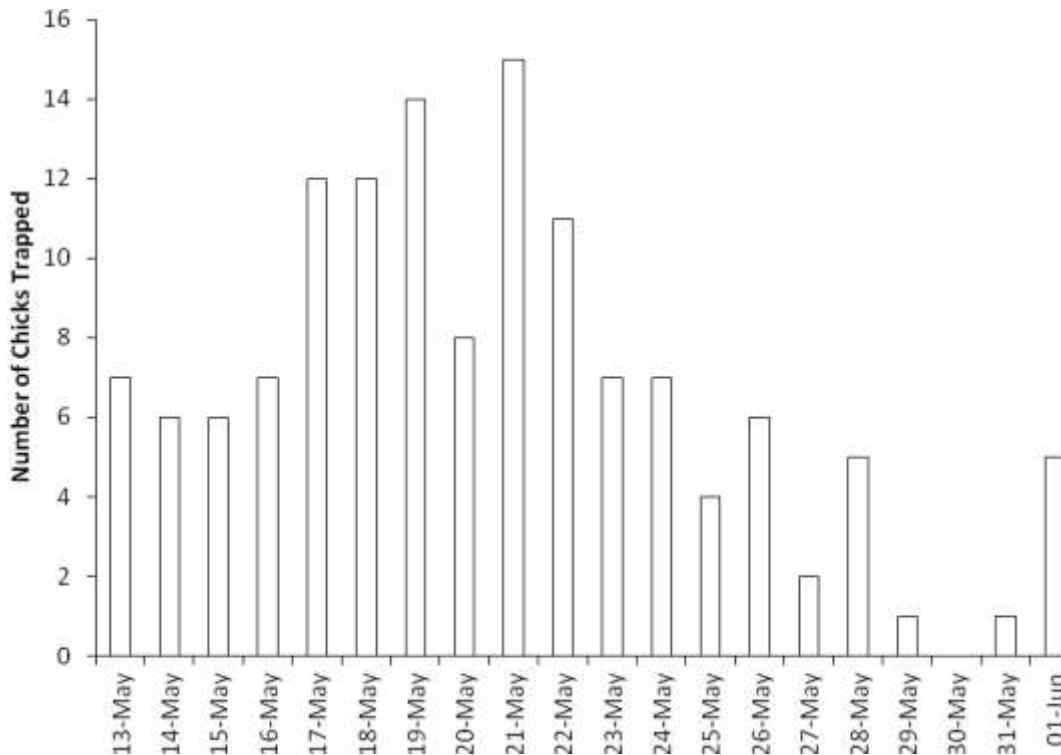


Figure 1. Nightly chick captures, Funnels 5-8, East Limestone Island, 13 May – 1 June 2013.

Table 1. Summary of chick departures, peak nights and totals for funnels 5 to 8 on East Limestone Island 2006 to 2013.

<i>Year</i>	<i>First night with chicks</i>	<i>Peak night</i>	<i>Peak count</i>	<i>Last night</i>	<i>Total days</i>	<i>Total chicks</i>
2006	10-May	21-May	24	30-May	21	197
2007	15-May	4-Jun	16	12-Jun	29	166
2008	12-May	14-May	13	3-Jun	23	125
2009	10-May	18-May	16	29-May	20	104
2010	8-May	21-May	19	2-June	26	121
2011	11-May	15-May	11	9-June	30	106
2012	12-May	17, 22-May	14	31-May	20	110
2013	13-May	21-May	15	1-June	20	136

Funnels 5 & 6

As of this season, funnels 5 and 6 have been monitored continuously for 24 years, and are the primary means of assessing the long-term population trend in the Cabin Cove colony area. The location of the funnels has not changed during this period and therefore represents the same geographic area of the colony year to year. Funnels 7&8 were installed in 2006 flanking funnels 5&6 to see if the colony area had shifted, contributing to a decline at the two original funnels. This season funnels 7&8 captured 24 more chicks than in 2012, while 5&6 were only up by 2 chicks. The reason for this trend in 2013 is unknown, and was not noted in previous years. It

seems likely that shifts in the colony area could be related to the major blow-down events of 2010/2011.

A total of 85 chicks were captured this season in funnels 5 and 6 which is slightly higher than the number captured in 2012 and 2011 and similar to the number in 2010. The lowest number of chicks to date was in 2009 (Fig. 2). First chicks arrived on 13-May and peak night (11 chicks) occurred on 22 May (Table 2). Chick captures continued until 1 June this season for a total of 20 days with chicks (Table 2).

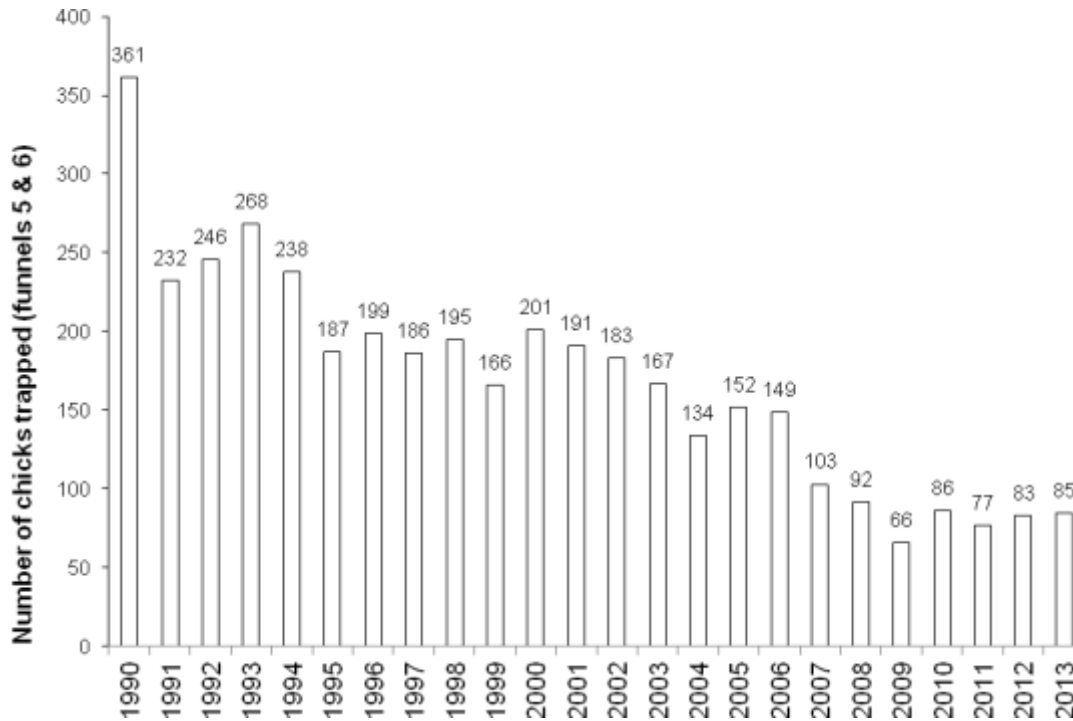


Figure 2. Total Ancient Murrelet chick captures at funnels 5 and 6 East Limestone Island, 1990-2013.

Table 2. Summary of chick departures, peak nights and totals from funnels 5 and 6 on East Limestone Island, 1990 to 2013.

Year	1st night with chicks	Peak night	Peak count	Last night	Total days	Total chicks
1990	13-May	20-May	28	15-Jun	34	361
1991	10-May	25-May	22	05-Jun	27	232
1992	14-May	22-May	29	02-Jun	20	246
1993	12-May	18-May	39	04-Jun	24	268
1994	08-May	20-May	29	06-Jun	30	238
1995	11-May	23-May	18	12-Jun	33	187
1996	11-May	18-May	17	07-Jun	28	199
1997	13-May	28-May	22	05-Jun	24	186
1998	11-May	20-May	23	20-Jun	41	195

1999	11-May	21-May	22	09-Jun	30	166
2000	11-May	21-May	22	06-Jun	27	201
2001	11-May	19-May	21	15-Jun	36	191
2002	09-May	21-May	33	01-Jun	24	183
2003	11-May	21-May	19	03-Jun	24	167
2004	08-May	16,17-May	15	01-Jun	25	134
2005	07-May	19, 23-May	12	05-Jun	30	152
2006	10-May	21-May	20	31-May	22	149
2007	15-May	04-Jun	16	12-Jun	29	103
2008	13-May	20,22,23-May	8	03-Jun	22	92
2009	12-May	18,19-May	10	29-May	20	66
2010	8-May	21-May	16	2-June	25	86
2011	11-May	21-May	9	9-June	30	77
2012	13-May	22-May	12	31-May	19	83
2013	13-May	22-May	11	1-June	20	85
Average ± SD	11-May ± 2 days	21-May ± 3.8 days	20 ± 7.9 chicks	6-Jun ± 5.5 days	27 ± 5.5 days	169 ± 72 chicks

North Cove

North Cove funnels 1-4 were heavily impacted by the blow-down events of 2010/11. Only funnel 4 and a small portion of funnel 3 remain intact, and we again set cameras on these two funnels to monitor chick departures from this area. Infrared motion activated cameras (Reconyx PC900) were set at the mouth of each funnel on 8 May and left in place until 13 June. A wooden chute was installed at each funnel mouth in front of the camera to make sure that departing chicks reliably triggered the camera. A total of 55 chicks were recorded between 13 May and 5 June with the peak departure (7 chicks) occurring on 21 May. Fourteen chicks departed from funnel 3 and 41 from funnel 4. The 41 from funnel 4 compares to the 51 chicks that departed from this funnel in 2010 prior to the blowdown.

Gathering grounds

Ancient Murrelets enter and leave the breeding colony at night and in late afternoon and evening the birds gather on the water in areas called gathering grounds, where they wait until it is sufficiently dark before entering the colony. Both breeding and non-breeding birds are thought to gather in these areas and engage in important social interactions. The Limestone Island gathering ground is located between Low Island and Limestone Island. Between 5 May and 20 June we conducted standardized 10 minute counts of birds on the gathering grounds. The highest count occurred on 30 May, with a total of 86 birds observed. Counts averaged (\pm SD) 20.7 ± 23.0 this season, an increase from last season 15.5 ± 15.4 , but lower than 2011 (43.7 ± 36.2).

Point counts

We conducted point counts in the colony area to monitor the activity of adult birds. Five minute counts were conducted in Cabin Cove at approximately 2:30 each night for the period of 21 to 30 May. The maximum count, (6 birds 41 calls) occurred on 29 May.

Band Recoveries & Recaptures

Recapture of adult birds was phased out in 2003. However, we still opportunistically capture adult birds that are trapped in funnels or are otherwise easily captured along the trail. We also scan feather piles, raven pellets and other predation remains looking for bands. One band was recovered in 2013 from a BAEA pellet found at the base of BAEA-4. This bird (band #1313-62633) was banded as a chick in funnel 6 in 1995. There were no banded birds recaptured in 2013.

Predation transects

In previous years we checked for predation remains along 5 fixed, 20m wide transects. These transects were heavily impacted by blow-down and have not been monitored since 2011. See the 'Raccoons' section below for a description on the use of cameras to detect the presence of raccoons.

Population Trends & Social Attraction

The breeding population of Ancient Murrelets has been declining over time (Fig 2). The number of departing chicks in funnels 5&6 declined by 56% between 2006 and 2009, likely due to the presence of raccoons in 2007 and 2009. The last survey of the colony was completed in 2006 and estimated \pm SE 509 ± 132 breeding pairs compared to the estimate of 1273 ± 254 in 1995. Chick numbers have rebounded slightly since 2009 and stabilized in these two funnels (Fig 2). When funnels 7&8 are taken into account, 2013 represents the highest chick departures since 2007, and could signal an increasing trend in the Cabin Cove colony area. The extent to which breeding continues in the North Cove colony is surprising. Despite the extreme blow-down, chick numbers have only declined by ~20% in funnel 4 since it was last monitored in 2010.

In 2013 we continued the social attraction work that we began in 2011. Colony sounds were broadcast from a single megaphone located behind the cabin. Playback occurred on 8 nights, 0:00-2:00am between 21 and 30 May.

Black Oystercatchers *Haematopus bachmani*

Background

Oystercatchers are large, conspicuous shorebirds that are easily studied because of the relative ease with which nesting sites can be located. Because they are entirely dependent on the intertidal system, these birds are also thought to be a good indicator species for this ecosystem. LBCS has been monitoring the breeding population of Black Oystercatchers in Laskeek Bay annually since 1992 (except in 2011).

LBCS conducted Black Oystercatcher surveys in both Laskeek Bay and in Gwaii Haanas in 2013. A summary of the Laskeek Bay survey is below. For details on the two 5-day surveys within Gwaii Haanas, please consult the separate report titled "2013 Black Oystercatcher survey in Gwaii Haanas". Methodology for shoreline surveys and territory visits followed the methods outlined in the Gwaii Haanas report. Survey maps of the Laskeek Bay area are produced by Gwaii Haanas and included as an appendix in the Gwaii Haanas report.

Site occupancy and reproductive success

Oystercatcher territories were visited in Laskeek Bay between mid-June through to the middle of July. We visited and searched on foot all territories known to be occupied by breeding pairs in the last three survey years. Territories not active in the last three survey years were scanned during shoreline surveys, but not visited on foot. All shoreline segments were completed during the first survey, however due to time constraints shoreline surveys were dropped during the second survey of Laskeek Bay, and only territories occupied in the last 3 survey years were visited. Shoreline

surveys followed the same protocol developed for the Gwaii Haanas surveys and involved scanning shoreline areas from ~50m offshore at 11 km/hr (2500rpm) to search for new territories.

Out of 44 territories visited, 33 were occupied by an alarmed adult pair, or had other conclusive evidence of breeding in 2013 (e.g. eggshell membranes and prey present at scrape). Of these, 24 were active, that is there were live eggs or chicks present on at least one visit. Four new territories were found this year. During the first survey (conducted between 13-22 June), we found 29 eggs and 8 chicks, and during the second survey (7-11 July) we found 16 eggs and 7 chicks.

Banding and re-sighted birds

Birds banded in previous years have a combination of one metal band on the right leg that carries a unique number and a colour band combination that indicates the year of banding as well as the area where the bird was banded. Metal bands are permanent, while the plastic bands tend to be lost over time. All oystercatchers seen during the course of the season were checked for bands as this gives us information on the age and dispersal of these birds. There were 27 sightings of banded birds in Laskeek Bay (Table 3) and 7 sightings in Gwaii Haanas (Table 4). The oldest bird sighted again this year was banded as an adult in 2000 on the Skedans Islands (territory SKE-6). We were able to read the band number this year (0785-63024) indicating that the adult is now at least 17 years old, based on a 4 year minimum age of breeding. This likely the oldest known age individual of the species, 15-16 years being the maximum reported from other banding programs.

Table 3. Banded Black Oystercatchers re-sighted in Laskeek Bay, 2013.

Band combination (Left - Right)¹	Location seen / Territory ID	Year Banded	Banded as Adult or Chick
W - UB/M	ELI-4	Unknown	Unknown
UB - UB/M	SLW-4	Unknown	Unknown
UB - UB/M	SLW-4	Unknown	Unknown
UB - UB/M	SLW-8	Unknown	Unknown
UB - UB/M	LOW-1	Unknown	Unknown
UB - UB/M	SKE-12	Unknown	Unknown
AL - B/M	SKE-6	2000	Adult
UB - UB/M	SKE-6	Unknown	Unknown
UB - Y/M	SKE-10	2007	Chick
UB - UB/M	REE-10	Unknown	Unknown
UB - UB/M	REE-6	Unknown	Unknown
UB - UB/M	KNG-3	Unknown	Unknown
UB - Y/M	Louise Island	2007	Chick
UB - UB/M	Reef Island	Unknown	Unknown
UB - UB/M	Reef Island	Unknown	Unknown
UB - UB/M	REE-11	Unknown	Unknown
UB - UB/M	REE-11	Unknown	Unknown
UB - UB/M	REE-1	Unknown	Unknown
UB - UB/M	Reef Island (close to REE-2)	Unknown	Unknown
UB - UB/M	Reef Island (close to REE-2)	Unknown	Unknown

Band combination (Left - Right)¹	Location seen / Territory ID	Year Banded	Banded as Adult or Chick
UB - UB/M	Reef Island (close to REE-2)	Unknown	Unknown
UB - UB/M	CUM-1	Unknown	Unknown
UB - UB/M ²	East Limestone Island	Unknown	Unknown
UB - UB/M ²	Louise Island	Unknown	Unknown
UB - Y/M ²	East limestone Island	2007	Chick
UB - UB/M ²	Reef Island	Unknown	Unknown
UB - UB/M ²	Reef Island	Unknown	Unknown

¹Band codes: UB = unbanded (birds can lose bands), M = metal, Or = orange, W = white, LG = Light Green, R = Red, Bk = Black, Br = Brown, Y = Yellow, DB = dark blue.

²Incidental sightings in Laskeek Bay which occurred outside of designated survey.

Table 4. Banded Black Oystercatchers re-sighted in Gwaii Haanas, 2013.

Survey	Band combo (Left -Rt)¹	Location seen / Territory ID	Year Banded	Banded as Adult or Chick
1	UB - DB/M	560-3-1	2006	Chick
1	DB - DB/M	530-6-1	2006	Chick
1	UB - OR/M	530-3-2	2004	Chick
1	UB - OR/M	LOS-11	2004	Chick
2	DB - DB/M	560-3-1	2006	Chick
2	UB - OR/M	530-3-2	2004	Chick
2	UB - OR/M	LOS-11	2004	Chick

¹Band codes: UB = unbanded (birds can lose bands), M = metal, OR = orange, DB = dark blue, W = white, LG = light green.

Chick Diet

Oystercatchers feed their chicks hard-shelled invertebrates which they bring intact to the breeding territory. We collected prey remains from 20 territories this year in order to quantify average diet composition fed to chicks. Limpets were the primary prey (79%), followed by chitons (14%), and mussels (6%) (Fig. 3). These three prey items made up more than 99% of the diet, consistent with what has been found in past years. It is interesting to note that there were more chitons than mussels consumed this year, which is a significant decline in mussel consumption from last year (23% mussels). Diet composition was similar in Gwaii Haanas (Fig 3).

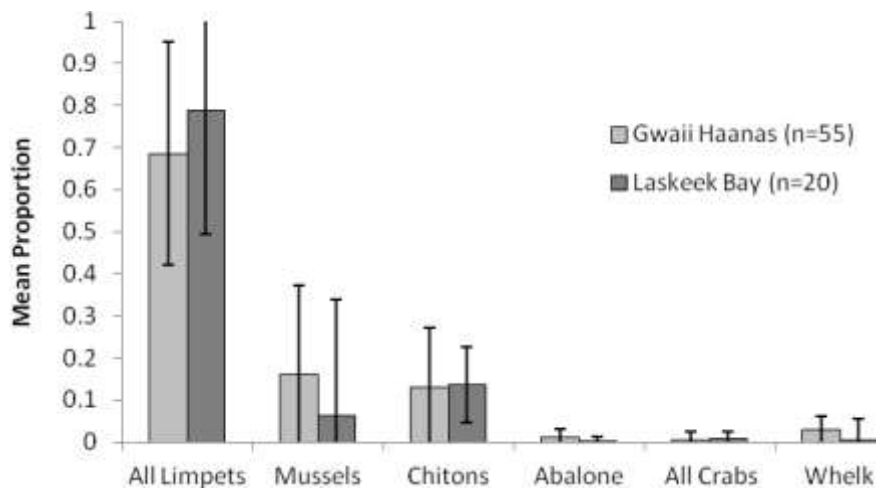


Figure 3. Black Oystercatcher chick diet from prey collections in Laskeek Bay and Gwaii Haanas 2013. Error bars are \pm SD.

Glaucous-winged Gulls *Larus glaucescens*

Since 1992, LBCS has been censusing gull colonies within Laskeek Bay (Fig. 4). This year, we visited the known colonies on Kingsway Rock, Low Island Cumshewa Island and Lost Islands. No gulls were seen by boat at the Skedans Islands therefore this area was not searched on foot. Two GWGU adults were seen sitting on suspected nests on the South side of Reef island during the 19 June BLOY survey. Because they were on a cliff we could not check the area on foot. At each of the visited colonies the number of active nests (those containing either eggs or chicks) was recorded. Lost Island, the largest colony in the area had a total of 213 active nests (16 June), followed by Kingsway Rock with 81 nests (19 June) and Low Island with 1 nest (13 June). In total we counted 295 nests on these three colonies containing either 1 egg (7% of nests), 2 eggs (16%), or 3 eggs (76%). Six nests on Kingsway Rock were found with hatched chicks, and one dead chick was found in a nest on Lost Islands. The total number of nests counted this season was above the long-term average (\pm SD) of 258 ± 67 .

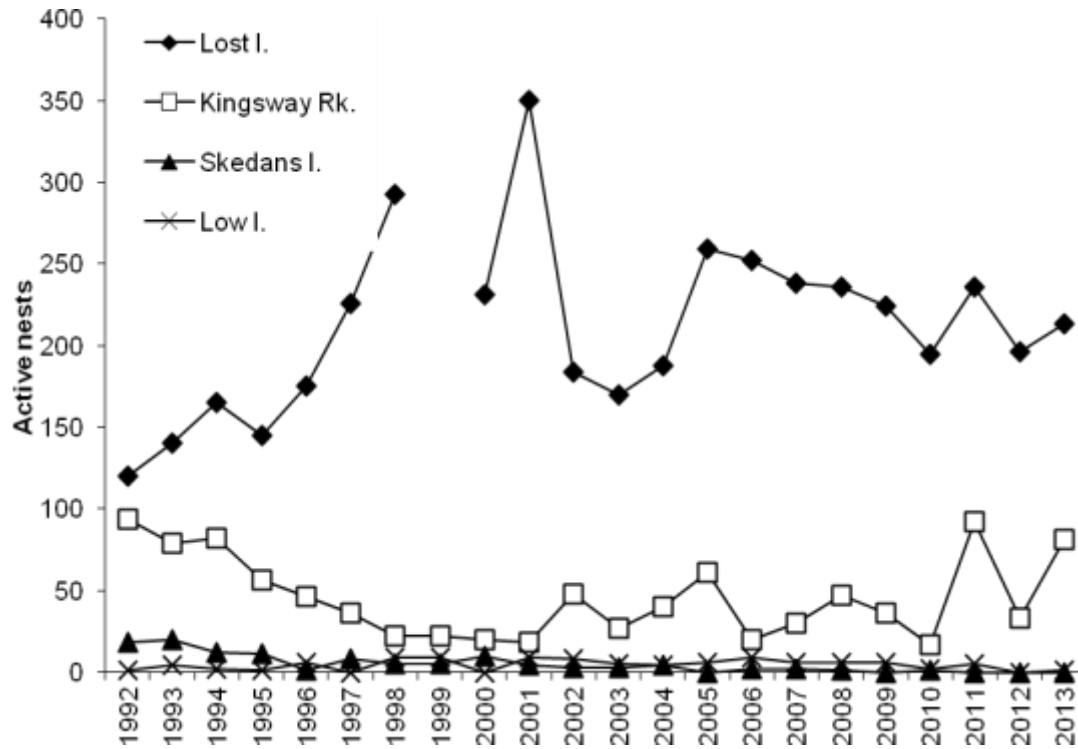


Figure 4. Glaucous-winged Gull nests containing eggs or chicks at four colonies in Laskeek Bay, 1992-2013.

Pigeon Guillemots *Cepphus columba*

There are 28 Pigeon Guillemot nest boxes at Lookout Point. Boxes #1-10 were installed in 2001 and boxes #11-28 in 2010. The use of nest boxes 1-10 has stabilized at a high occupancy level (Fig. 5).

Boxes were checked at the beginning of the season to ensure they were intact. Boxes were then checked at the end of the season (10 July), to determine if they had eggs or chicks. Ten of the 10 original boxes were active, all containing chicks. Six of the 18 new boxes were active: five with chicks and one with a dead egg. There was one dead chick found in box P2.

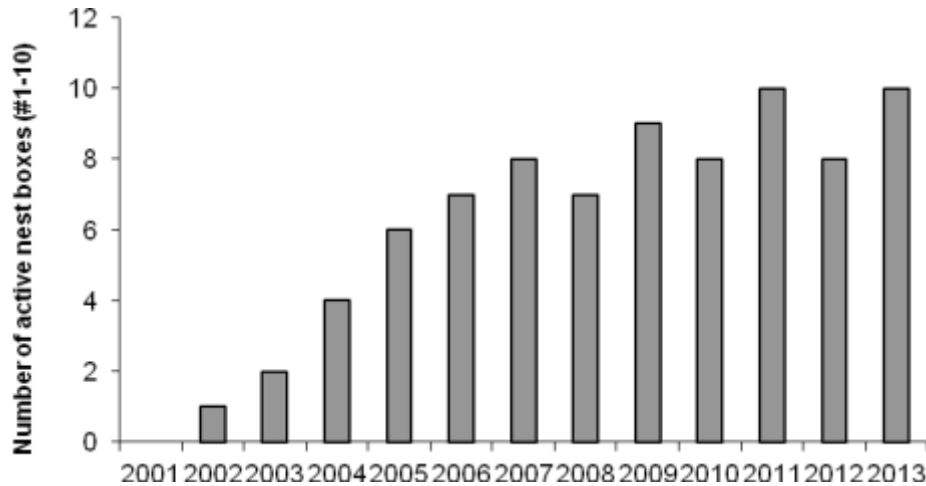


Figure 5. Use of nest boxes #1-10 by Pigeon Guillemots, Lookout Point, East Limestone Island, 2001-2013.

Cassin's Auklets and Fork-tailed Storm Petrels

Ptychoramphus aleuticus and *Oceanodroma furcata*

Small populations of Cassin's Auklets and Fork-tailed Storm Petrels breed on Limestone Island. Like Murrelets, these species are nocturnal burrow nesters and are only active in the colony at night. Breeding activity on the island has fluctuated over the years, partly attributed to predation by introduced raccoons. In previous seasons we monitored several locations on the island for breeding activity and noted increasing activity in recent years. We did not monitor natural burrows this season, as it was decided that it would be more productive to complete a more thorough survey of breeding activity every 3-5 years.

Cassin's Auklet nestboxes were monitored again this year at both Lookout Point and at the East Coast plots. Knock-down sticks were placed at the entrances of all nest boxes early in the season and were checked every 4-5 days.

A total of 41 nest boxes were monitored at the East Coast plots (North and South), and 25 at Lookout Point. Eight boxes contained chicks: six at North Plot (#9,18,25,16,23,31) and two at Lookout Point (#6, 7). Chicks were weighed at 5-7 day intervals and 7 chicks were banded. Four chicks had fledged, one had died and three were remaining as of 10 July. Cassin's Auklet chicks did considerably better this season compared to 2012, when the majority of chicks did not survive to fledge.

The amount of Storm petrel activity this season was similar to average, based on the number of days the species was recorded in the daily bird checklist (2013=30, 2012= 32, 2011 = 30, 2010 = 36, 2009 = 31, 2008 = 28, 2007 = 34). Petrels were heard frequently at night during the murrelet season, particularly in the area NE of funnel 6 and more infrequently near Lookout Point.

Sea Surveys

Boat surveys are conducted throughout the season to monitor the distribution and abundance of marine birds and mammals encountered along pre-determined 100m wide strip-transects in Laskeek Bay. The objective of these surveys is to develop a strong baseline data-set for marine wildlife in the Laskeek Bay area as well as to specifically monitor the abundance and distribution of Marbled Murrelets (*Brachyramphus marmoratus*), a forest canopy nesting seabird that is provincially red listed and designated as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). These surveys have been conducted since 1991 and represent a very important dataset within the province.

Near-shore surveys

Near-shore surveys cover the inshore waters as far North as Cumshewa Island and South to Haswell Island. Four near-shore surveys were completed this year: 9 and 25 May as well as 9 and 23 June. On these surveys we counted 21 species: Bald Eagle, North western Crow, Marbled Murrelet, Pigeon Guillemot, White-winged Scoter, Pelagic Cormorant, Brant, Common Loon, Ancient Murrelet, Rhinoceros Auklet, Harlequin Duck, Long-tailed Duck, Red-necked Grebe, Red-neck Phalarope, Bufflehead, Goldeneye, Northern Shoveler, Surf Scooter, Glaucous-winged Gull, Black Oystercatcher, and Pacific Loon. This is an increase from 2012 and is likely due to the fact that we were out early in May when many migratory birds visit the area. A total of 115, 175, 101, and 125 Marbled Murrelets were counted on the 9 May, 25 May, 9 June, and 23 June surveys, respectively. These numbers are much higher than 2012 and more similar to numbers of previous years.

Hecate Strait surveys

This survey takes us approximately five nautical miles into Hecate Strait, and allows us to see species that tend to stay farther from shore. We completed two Hecate Strait survey this year, on 27 May and 23 June. On these surveys we counted 11 Species: Common Murre, Sooty Shearwater, Cassin's Auklet, Rhinoceros Auklet, Ancient Murrelet, Glaucous-winged Gull, Pacific Loon, Common Loon, White-winged scoter, Pigeon Guillemot, and Red-necked Phalarope.

Marine Mammals

We kept a daily record of all marine mammal sightings, with the exception of Harbour seals (*Phoca vitulina*) and Stellar sealions (*Eumetopias jubatus*). These species are counted at specific haulouts during sea surveys in order to keep an index of population trends. The results of this season's sightings are summarized in Table 5.

Table 5. Total counts of marine mammals from sea surveys, sea watches and other sightings, 2006-2013[†].

Species (common name)	Scientific name	2013	2012	2011	2010	2009	2008	2007	2006
Dall's porpoise	Phocoenoides dalli	0	0	8	0	0	0	0	0
Northern elephant seal	Mirounga angustirostris	0	0	0	0	0	0	0	0
Fin whale	Balaenoptera physalis	0	0	0	0	0	0	0	0
Grey whale	Eschrichtius	1	1	1	0	0	0	0	1

	robustus								
	Phocoena								
Harbour porpoise	phocoena	7	4	19	0	10	0	1	4
	Megaptera								
Humpback whale	novaeangliae	12	14	193	86	102	261	203	91
Killer whale	Orcinus orca	16	13	49	11	14	18	26	4
	Balaenoptera								
Minke whale	acutorostrata	6	2	1	0	0	1	3	1
	Lagenorhynchus								
Pacific white-sided dolphin	obliquidens	0	0	0	46	334	0	81	365
	Zalophus								
California sea Lion	californianus	0	0	1	1	0	0	4	0

†Harbour seal *Phoca vitulina* and Steller sea lion *Eumetopias jubatus* sightings are not reported here. Sightings do not necessarily reflect number of individuals, as individuals may be recorded more than once.

Humpback whales

As in 2012, there were far fewer humpback sightings this year than in previous years. Four boats (*Island Roamer*, *Mapleleaf*) reported seeing large numbers of humpbacks further south in Hecate Strait, particularly off the mouth of Juan Perez sound.

Killer whales

There were five sightings of Killer whales this season, four in Laskeek Bay and one in Gwaii Haanas. We were able to take ID photographs during three of these encounters. Our ID photographs are sent to the Killer whale database at the Pacific Biological Station in Nanaimo. Two of the transients identified were quite old: transient female T011 (~50 years) and bull T011A (35 years).

Steller's sea lions

There are several sealion haulouts in Laskeek Bay. The largest of these is on the East end of Reef Island and there are smaller haulouts on the Skedans Islands, Cumshewa Rocks and Helmet Island. We regularly count the number of individuals on the Reef and Skedans haulouts. The maximum number counted this season was 465 individuals at Reef (8 May) and 115 at Skedans Islands (8 May). Occasionally we sight branded sea lions that have been individually marked by researchers in Alaska. No branded sealions were seen in 2013. No California sea lions were seen or heard this year.

Other species

There were three other marine mammal species sighted this season. A Grey whale was seen on 26 May, just off of Limestone Island, travelling south. Six Minke whales were seen this year, which is the highest number of sightings in any season since before 2006. There were a total of 7 harbour porpoises seen in 2012.

Wildlife Trees

LBCS has been monitoring cavity nesting birds on Limestone Island since 1990. Wildlife trees (dead standing snags used by cavity nesting birds) were monitored opportunistically from 1990-94, and since 1995 there has been a systematic effort each year to cover the island thoroughly looking for active trees. Through this monitoring program, LBCS has amassed a long-term data set on tree use across many years, showing the importance of these trees as habitat for cavity

nesting species. A total of 146 wildlife trees have been identified over the past 24 field seasons. New access trails have been established following the 2010/2011 blow-down, allowing some of the more difficult trees in the blow-down area to be monitored.

We had a total of 17 active trees this season, occupied by six different species. Seven trees were newly identified in 2013. Eleven nests were occupied by Red-breasted Sapsuckers, one by Chestnut-backed Chickadees, one by Hairy Woodpeckers, one by Northern Flickers, one by Brown Creepers and two by Red-breasted Nuthatches (Table 7). This was the first Northern Flicker nest on East Limestone since 2006.

Table 7. Wildlife tree activity on East Limestone Island in 2013. †

Tree #	Cavity Nester	Tree Species	Fledge Date*
66	RBSA	Hw	6-7Jun
72	RBNU	Ss	30-May – 2-Jun
91	RBSA	Ss	10-11Jun
98	RBSA	Ss	15-16Jun
107	RBSA	Ss	14-15Jun
109	RBSA	Ss	11-13Jun
116	RBSA	Ss	16-17Jun
129	RBSA	Hw	6-7Jun
134	RBSA	Hw	10-11Jun
137	NOFL	Ss	22-23May
140	HAWO	Ss	03-Jun
141	BRCR	Ss	27-29May
142	RBNU	Hw	1-3Jun
143	RBSA	Hw	7-9Jun
144	RBSA	Hw	10-11Jun
145	RBSA	Ss	16-17Jun
146	CBCH	Ar	Predated

†RBSA = Red-breasted Sapsucker, NOFL = Northern Flicker, RBNU = Red-breasted Nuthatch, HAWO = Hairy Woodpecker, CBCH = Chestnut-backed Chickadee, BRCR = Brown Creeper, Ss = Sitka spruce, Hw = Western hemlock, Ar = Red Alder.

*For dates given as a range, fledging may have occurred on any day between the dates given.

NATURAL HISTORY

Daily Bird Checklist

Throughout the field season, we keep a daily record of all bird species seen or heard within Laskeek Bay. The peak number of species was 47 on 9 May. There were a total of 70 species recorded over 63 days. Many species were recorded every day: Common Raven, Northwestern Crow, Black Oystercatcher, Red-breasted Sapsucker, Bald Eagle, Chestnut-backed Chickadee, and Pacific Wren. Many less frequently observed species were recorded this year as well, such as Horned Grebe, Green-winged Teal, Wandering Tattler and Northern Saw-whet Owl. The last recorded sighting of a Saw-whet Owl on Limestone Island was in 2006. We also had records of some birds that are very rarely seen in Laskeek Bay: Yellow-billed Loon, Ruddy Turnstone and Northern Shoveler. Pine Siskins were seen or heard most days (54 days out of 63), and we noticed large flocks of these birds in the canopy, but also close to the ground where they could be easily observed. According to a visiting naturalist, abundant Pine Siskins are a province-wide phenomenon this year.

An error was found in the bird checklist species totals for 2010 and 2012. The correct totals are 57 and 62 respectively.

Raptors and Corvids

Like cavity nesting birds, we make a concerted effort through the season to keep track of other nesting birds including Bald Eagles, Peregrine Falcons, Common Ravens and Northwestern Crows.

This year we had no confirmed nesting Bald Eagles on Limestone Island, although one nest was possibly active. An adult bird was observed sitting on the nest in tree BAEA-6 on 22 June, and adult birds were seen in the tree at other times, but chicks were never observed in the nest.

A pair of Peregrine Falcons once again nested on the south cliffs this year. The nest was not in the same place as last year. It had been moved along the cliff to the south-west. The nest was first observed on 24 May. One adult was seen sitting close by, and three downy chicks were in the nest. It is unknown when the chicks fledged.

Peregrine Falcons have nested on Limestone Island discontinuously since research began in 1990. During the first 9 years (1990-1998), an active nest was observed in all years except 1992. During the next 8 years (1998-2006) there was no nesting activity observed. For the past 7 years (2007-2013) there has again been an active nest, generally with 2-3 young observed. The nest has always been on the south cliffs, although the position has shifted somewhat between years.

As in past years, one pair of Common Ravens nested on the island. The nest site was no longer in tree CORA-2, which has been the nest site since the major blowdown on the island in 2010. This year a new nest was found (CORA-3). Adult ravens were seen in the nest, and there was evidence of use around the nest, such as pellets and fresh crab shells, but chicks were never seen at this site. Young ravens were seen and heard on the island by early June, so we know they nested nearby, and it is likely that CORA-3 is the new nest site.

Plants

There are relatively few wildflowers and berry bushes left on Limestone Island as a result of heavy browsing by introduced deer. Most flowering plants are now found restricted to cliff areas where the deer cannot reach them. Although Limestone Island hosts a high density of deer, the steep cliffs provide some deer-free habitat. Throughout the season we keep a record of the dates on which particular species are first observed in bloom. For example, this year we recorded sightings of blooming shore blue-eyed grass (*Sisyrinchium littorale*), northern rice-root (*Fritillaria camschatcensis occidentalis*), monkey flower (*Mimulus guttatus*), and red columbine (*Aquilegia formosa*); these species tend to be common in areas with no deer, but are otherwise rarely seen.

A number of rare plants are present on Limestone due to the unique limestone geology which is uncommon on the rest of Haida Gwaii. These plants are showy Jacob's ladder (*Polemonium pulcherrimum*), few-flowered shootingstar (*Dodecatheon pulchellum*), Richardson's geranium (*Geranium richardsonii*), and cut-leafed anemone (*Anemome multifida*). All were found to be blooming by late May/early June. Tufted saxifrage (*Saxifraga cespitosa*) was also found blooming again this year. This was unexpected, as the plants were thought to have been washed away in the winter of 2010.

Three other plants of interest were identified by LBCS director Jan Oord when he was on Limestone Island during the first week of June. Several plants of Menzie's pipsissewa (*Chimaphila menziesii*) were identified close to the cabin. This was the first location on Haida Gwaii where this species was found, and the colony continues to persist. Jan found another interesting species on the south side of Cassin's Tower. This plant, Field locoweed (*Oxytropis campestris*) has never been recorded on Limestone Island previously, and there are very few records from the rest of Haida Gwaii.

Invasive plants that have become established on Limestone include bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), prickly Sow-thistle (*Sonchus asper*), and wall lettuce (*Lactuca muralis*). This year Jan found marsh cudweed (*Gnaphalium uliginosum*), another introduced invasive plant. Initially only one plant was found beside the main trail (marker 245), but this species was then found to be abundant at the end of the ridge trail, from marker 132 to Cassin's Tower. No invasive plant control work has been done on Limestone in the past three years.

Introduced Species

Sitka Black-tailed Deer *Odocoileus hemionus*

Deer were intentionally introduced to Haida Gwaii in 1878 and in several years between 1911 and 1925 to provide game meat for local people. Because they have no major predators on the islands, the deer population has reached very high density and has dramatically impacted plant communities, particularly in the forest understory. LBCS is a partner in the Research Group on Introduced Species (RGIS, www.rgisbc.com) which has carried out extensive research on this topic in Laskeek Bay as well as on the rest of Haida Gwaii.

RGIS is currently working on a project entitled BAMBI (Behavioral Adjustments to Mitigate Biodiversity loss). This study looks at how the deer of Haida Gwaii have adapted to life in the absence of predators, and the role that fearless behaviour plays in helping deer maintain high densities on islands with severely browsed understories. In previous years, the researchers and local support assistants have been based at the field camp on Reef Island and worked there as well as on East Limestone Island and Kunga Island. In the fall of 2012 an RGIS crew conducted deer capture sessions on Reef, East Limestone and Kunga Islands, and another capture session is planned for the fall of 2013. Also this year, one RGIS masters student was based on Limestone Island during the LBCS field season. She was studying deer behaviour using baited camera traps.

On Limestone Island, there is only one of the original three deer exclosures remaining since the blow-down in 2010. This exclosure was again badly damaged in the last winter and repaired in early May. Despite repeated damage, the exclosure still highlights the contrast between browsed and unbrowsed areas. The understory vegetation (huckleberry, salal, ferns, and young trees) inside this exclosure is almost entirely absent from areas that deer can access. We are also noticing that a consequence of the blow-down is the creation of many small refugia on top of turned up roots. Spruce and huckleberry regeneration is particularly abundant.

We continued to record all deer sightings on Limestone Island this year to assist with the BAMBI project. The date/time, location, tag colour/number, collar and sex were recorded along with any behavioural notes.

Raccoons *Procyon lotor*

Raccoons were introduced in the early 1940s to provide local trappers with a source of employment. Raccoons (as well as rats) are one of the largest threats to ground and burrow

nesting seabirds on Haida Gwaii. With few defenses against mammalian predators, birds such as Ancient Murrelets, Cassin's Auklets and Fork-tailed Storm Petrels are very vulnerable to raccoon predation and typically experience rapid declines where these predators become established in colonies.

Raccoon predation is an ongoing concern on Limestone Island. During 1990 and 1991 there was considerable raccoon presence on the island and very high rates of predation. Based on predation rates observed during earlier visits to the island, it is reasonable to assume high levels of predation for the period of 1983-1989 as well (see LBCS Science Report #3 for further discussion). Raccoons were removed from the colony in 1992 and predation rates dropped dramatically. Raccoons were again present in 1993, 1994 and were suspected in 1995 and 2001. More recently a raccoon was removed from the island in 2007, and raccoon presence was confirmed again in 2009. No raccoons have been confirmed present on Limestone since 2009.

Due to the large raccoon population on Louise Island it seems likely that raccoons will continue to disperse to Limestone in future years. It is therefore very important to initiate spring surveys for raccoons to eliminate them from the colony before birds begin breeding in early April. By the time field camp opens in early May, a raccoon could have already had a considerable impact on the colony.

This year, cameras were set up and surveys took place early in the season. On 25 February, a crew set up two infrared cameras baited with cans of fish. One was at Anemone Cove, where raccoons crossing to Limestone from Vertical Point would likely be intercepted, and another was set in Cabin Cove, in the Ancient Murrelet colony. The cameras were in place continuously until the staff arrived to begin the field season on 3 May. On 10 March and 12 March, a crew conducted evening and nighttime surveys of East Limestone, West Limestone and the adjacent shoreline of Louise Island. No raccoons were sighted on East or West Limestone, but a total of 6 were seen on Louise Island, 5 of which were killed.

Monitoring for raccoons continued throughout the field season, with one camera baited and checked regularly in Anemone Cove. In early May an attempt was made to verify that the baited camera would capture photos of raccoons if they were in the area. A different camera, also baited with cans of fish, was set in a location on Louise Island where raccoons are sighted often. Unfortunately, the bait was destroyed early on, so the experiment was inconclusive. Because of intensive and prolonged monitoring, we are certain there were no raccoons on the island this spring. In addition to early surveys on the island and the baited LBCS cameras, RGIS had 12 baited infrared cameras capturing photos almost continuously throughout the Ancient Murrelet breeding season (May-early June). These cameras were baited with apples to attract deer. Previous experiments with camera traps in Skidegate Inlet have shown that raccoons are attracted to apples, therefore if any raccoons had been on the island they most likely would have been photographed on one of the many cameras. Although all cameras captured many photos of deer, ravens, squirrels and deer mice, no raccoons were observed.

Red Squirrels *Sciurus vulgaris*

Squirrels were introduced to Haida Gwaii in 1950 to aid in cone gathering for the forest industry. Squirrels may have been introduced to Limestone directly at this time. Squirrels are now well established on Limestone and are known to be a nest predator on various songbird species (see www.rgisbc.com).

Since 2007, we have been conducting squirrel surveys on Limestone to measure the annual abundance of squirrels. Over time we hope to describe population cycles of this introduced

species and gain a better understanding of the consequences of squirrel presence. Six squirrel surveys were completed this season.

CONCLUSION

This season was our 24th year of research, monitoring, and environmental education in Laskeek Bay. Since 1990, LBCS has focused on developing baselines and long-term data sets for the marine and terrestrial ecosystems of Laskeek Bay, as well as providing volunteers, students and visitors the chance to visit our research camp. The society remains dedicated to long-term monitoring and engaging the public in addressing local conservation issues.

After a very serious decline in Ancient Murrelet numbers in the years 2006-2009, we are now seeing what might be the beginning of an increasing trend, as chick departures in 2013 were greater than any year since 2007. A concerted effort to keep raccoons off the island during the breeding season is likely the largest factor responsible for reversing the downward trend. It is still unclear what the long-term implications of the blow-down of 2010/2011 will be for the murrelet colony.

The lessons that we learn from our research on Limestone Island are of great importance when considering the prospects of other colonies threatened by introduced raccoons and rats as they continue to disperse throughout the many islands of Haida Gwaii.

Along with the core long-term monitoring programs, LBCS also hopes to incorporate more island restoration techniques in future field seasons.

ACKNOWLEDGEMENTS

Laskeek Bay Conservation Society would like to thank all those organizations which provide financial support to our programs. In the 2013 field season, these included:

- Baillie Fund
- Environment Canada – Canadian Wildlife Service, Pacific Region
- Gosling Foundation
- Human Resources and Skills Development – Canada Summer Jobs
- Mountain Equipment Co-op
- Northern Savings Credit Union
- NSERC Promo-Science
- Parks Canada and Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve and Haida Heritage Site
- Province of British Columbia - BC Gaming

We would also like to thank the individuals and businesses who support us throughout the year, with great service, donations and assistance in many forms. We especially thank:

- Anne Hansen
- Bluewater Adventures
- City Centre Stores
- Highlander Marine Services
- Isabel Creek
- Maple Leaf Adventures
- Moresby Explorers

Finally, we thank:

- Our staff and all the volunteers at East Limestone Island
- LBCS Directors for their time and efforts
- Dr. Tony Gaston for advice and guidance during the season
- Jean-Louis Martin and the Research Group on Introduced Species