

BREEDING RECORDS OF BIRDS OF PREY ON EAST LIMESTONE ISLAND SINCE 1990

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ABSTRACT

The nesting activity of eagles, falcons, ravens and owls has been studied on Limestone Island since 1990. Annual surveys have recorded nest activities, locations and species occurrences. In 2002, all known nest trees were measured and previous breeding records compiled. A total of 10 nests from five species have been located on the island, with nesting density as high as 1 pair per 12 ha in some years. As many as four species have nested successfully in one year. All nests (except falcons) were built in Sitka spruce trees and most were either adjacent to or within the Ancient Murrelet colony. There are five bald eagles nests on the island, and at least one was active in all but three years. Peregrine Falcons were known to nest on the island for seven years, producing at least one chick in all active years. The concentration of Ancient Murrelets breeding on the island provide a predictable food supply for these birds and may explain the diversity and density of their nests.

INTRODUCTION

Birds of prey are conspicuous members of the bird community in Haida Gwaii (Queen Charlotte Islands). Several species, like falcons and eagles, rely heavily on seabirds, for example Ancient Murrelets *Synthliboramphus antiquus*, during their breeding season (Nelson 1990, Vermeer et al 1984, Gaston 1992). Nesting records of predatory birds have been collected in many parts of Haida Gwaii, including a long-term study of Peale's Peregrine Falcon *Falco peregrinus pealei* on Langara Island (Nelson and Myres 1976) and a comprehensive report of marine raptors nesting within the entire archipelago (see Harfenist et al. 2002). On East Limestone Island, the Laskeek Bay Conservation Society has recorded breeding records of eagles, falcons, owls and ravens since 1990.

Bald eagles *Haliaeetus leucocephalus* are a common resident of Haida Gwaii and populations are relatively dense (Campbell et al 1990). Eagles generally nest near the ocean, often building very large structures. Nests can be up to 6 m across and weigh as much as 1 tonne. Although much less common than eagles, the concentration of Peale's Peregrine Falcons in the province is highest in Haida Gwaii (Campbell et al 1990). Ancient Murrelets dominate their diet during the breeding season and adult carcasses can be seen on the ledges outside their eyries (C. French, pers. comm.). British Columbia has 75% of the population of this coastal sub-species and because poaching is a conservation concern for all falcons, specific nesting locations are generally not published (Harfenist et al 2002).

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Less common than both falcons and eagles, Northern Saw-whet Owls *Aegolius acadicus brooksi* are an uncommon resident of Haida Gwaii. There are as many as five breeding records for this species (Campbell et al 1990), including one for Limestone Island (Tarver 2002). Adult Saw-whet Owls are small (~ 100g) and feed on invertebrates, small mammals and birds, including Ancient Murrelet chicks. Owing to their secretive and nocturnal habit, courtship and territorial calling is often the only indication of their presence.

Finally, Common Ravens *Corvus corax* are a common resident of Haida Gwaii. Their diet includes both Ancient Murrelets and marine invertebrates. There are currently only eight published nest records for Haida Gwaii (Campbell et al 1997).

The purpose of this paper was to compile and summarise the nesting records of eagles, falcons, owls and ravens on Limestone Island since 1990.

METHODS

East Limestone Island is a 48 ha island in Laskeek Bay, supporting approximately 1,200 breeding pairs of Ancient Murrelets. Most of the island is forested with mature Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*) and red alder (*Alnus rubra*). This forest is typical of other late succession old growth stands, with gaps forming primarily from windthrow and decay.

Beginning in 1990, staff and volunteers of Laskeek Bay Conservation Society recorded the presence and absence of avian predators of Ancient Murrelets on East Limestone Island. Up to three methods were used to note the activity of these birds: checks of known, or suspected, nest trees; completion of daily bird checklists; and annual island-wide nest searches. The nest summaries presented here were compiled from annual Field Season Reports (1990-2002), Science Reports (1990-2001), and natural history notes recorded by staff and volunteers on the island. All nest trees were measured in 2002 for tree height, diameter and if visible from the ground, nest height.

RESULTS

In all years, at least one, and at most four, bird-of-prey species have nested on Limestone Island (Table 1). Bald eagles were the most common breeder (nesting in all seasons except 1996-1998) followed by falcons, ravens and saw-whet owls. Sharp-shinned Hawks *Accipiter striatus*, which prey mainly on small songbirds, have also nested four times on Limestone Island. All species except Sharp-shinned Hawks were observed on the island each year, regardless of nest confirmation.

In 2002, there were five eagle nests on Limestone Island, possibly six (Figure 1). On average, each eagle nest was used 3 times in 13 years (range 1-5) with an average of 1 active nest per year (range 0-2) (Table 2). All nests were built in Sitka spruce trees with an average height of 30.7 m (range 16-45m) and diameter at breast height of 143 cm (range 95-223 cm) (Table 3). Average nest height was 24.5 m (range 8-36 m). Nests were built at the top (n=2), middle (n=2) or two-thirds of the way up (n=1) dead and live trees. Four nests were more than 10 m from the forested edge and one nest was in a tree on a tall, rock outcrop on an exposed southeast shore. A sixth nest may be in a large tree (227 cm diameter and ca. 40 m high) near an unmarked trail. Dense mistletoe obscures a view of the trunk but birds behaved and vocalised in patterns typical of other active Bald Eagle nests on the island (J. Smith pers. obs).

Table 1
Birds-of-prey nesting on East Limestone Island 1990-2002.
Legend: A-adults seen/heard on nest, no chicks observed, Ac-adults and chicks seen/heard at nest, Y-
adults present on island, blank-no data.

Year	Bald Eagle	Peregrine Falcon	Northern Saw-whet Owl	Common Raven	Sharp-shinned Hawk
1990	A	Ac		Ac	
1991	A	Ac	Y	Y	
1992	A	Y	Y	Ac	
1993	Ac	Ac	Y	A	
1994	Ac, Ac	Ac	Y	Ac	
1995	Ac, Ac	Y	Y	Y	
1996	Y	Ac	Y	Y	
1997	Y	Ac	Y	Y	Ac
1998	Y	Ac	Y	Y	Ac
1999	Ac, A	Y	Y	Y	A
2000	Ac	Y	Y	Y	Y
2001	Ac	Y	A	Ac	A?
2002	Ac	Y	Y	Y	Y

Table 2
Bald Eagle (BAEA) nest activity 1990-2002.
Legend: A-adults seen/heard on nest, no chicks observed, Ac-adults and chicks seen/heard at nest
(with number of chicks), X-nest not active and blank-no data available.

Year	Nest number (with species code)					Summary
	BAEA-1	BAEA-2	BAEA-3	BAEA-4	BAEA-5	
1990	A					A
1991	A					A
1992	A					A
1993	Ac -1					Ac -1
1994	Ac -1		Ac -1			Ac -1, Ac -1
1995	X		Ac -1	Ac -1		Ac -1, Ac -1
1996	X		X	X		X
1997	X		X	X		X
1998	X			X		X
1999	X	A	Ac -1	X		Ac -1, A
2000	X	X	X	X	Ac -1	Ac -1
2001	X	X	X	X	Ac -1	Ac -1
2002	X	Ac -1	X	X	X	Ac -1

Table 3
Nest descriptions, East Limestone Island; all trees are Sitka spruce unless indicated.

Tree No.	First active	Location of nest tree	Tree status	DBH (cm)	Tree Ht (m)	Nest Ht (m)
BEA-1	1990	Spring Valley; top of the spring, west of camp	dead	171.9	36.2	36.2
BAEA-2	1999	North of S-plot; WT 78	dead	121.6	31.4	31.4
BAEA-3	1994	Crow Valley; southwest of WT 52	dead	223	45.2	27.2
BAEA-4	1995	North shore, ~ 10m from shore, best seen from water	live	95	25	20
BAEA-5	2000	Cassin's Tower; on top of tower	live	101.5	15.8	7.9
BAEA-6	2002?	South ridge; west of WT 61, WT 19	live	227.9	40 (est.)	-
CORA-1	1992	Along main trail, 48 m south from stake 430 m	live	223	45.2	27.2
CORA-2	1990	150 m along trail from Boat Cove to Alder Bluffs	live	-	40 (est.)	20 (est.)
SSHA-1	1997	Along main trail, north of trail near stake 380 m	Unknown	-	-	-
NSOW-1	2001	Wildlife tree 1, ~10 m NE of cabin	dead	130	15.1	7.9

Peregrine Falcons have nested on Limestone Island for half of the last thirteen years (Table 1) and each time, produced chicks. Falcons were seen or heard each year both on Limestone and Louise Island, but nesting was not always confirmed.

Common Ravens were present and active on the island during all years but nests were only confirmed or reported four times (Table 1). Ancient Murrelet remains, including severed wings, bones, eggshell fragments and stainless steel bands, helped identify one Common Raven nest tree – a large Sitka spruce, 223 diameter and 45 m high (Table 3). A nest was not visible from the ground but was considered active and successful when fledglings were seen at, or near, the nest tree in 1994 and 2001.

Northern Saw-whet Owls have called after dusk each year except 2002 when a nest was found. LBCS staff member Joelle Fournier found a nest in a Sitka spruce snag (Wildlife Tree 1), about 15 m from the cabin (*see* Tarver 2002). The owls used an abandoned Northern Flicker (*Colaptes auratus*) nest cavity in a Sitka spruce snag. The snag broke during the winter of 2001-02 and an intact nest cup was found the next spring.

Finally, Sharp-shinned Hawks were known to nest on Limestone Island at least four times in the last six years (Table 1). The first confirmed sign of nesting was in 1997 when two adult hawks displayed breeding behaviours for several months (e.g. repeated calling from one area, frequent flying into and out of same area, adults with prey) and two fledglings were later observed near the nest site in July. Adults, and occasionally juvenile, Sharp-shinned hawks were active in the same area of the island for the next three years. The nest tree was estimated to be about 75 m north of the 380 m stake on the main trail.

DISCUSSION

In the Gulf Islands, and other locations in British Columbia, eagles nest close to the shoreline, presumably because this places them close to a food supply (Vermeer et al 1987, Harfenist et al 2002). Throughout their range, Bald Eagles also nest in tall trees, that are structurally sound, to support the weight of their large nest, provide good visibility and ease of take-off and landing. All of the eagle nest trees on Limestone Island were either alive or in early stages of decay (bark > 50%). Most nests were in the forest interior, at the top of tall trees, and not at the extreme edge or shoreline. The only nest tree on the shoreline lasted two years before falling apart. This nest was built on the southeast corner of the island and exposed to frequent southeast gales.

All raptor and owl species that nested on Limestone Island (and depend upon Ancient Murrelets for food) nested within or very close to, the murrelet colony. There are 1,200 breeding pairs of Ancient Murrelets on East Limestone Island and an additional 5,000 pairs on nearby Reef Island (Rodway et al 1988). Reef Island has the same diversity of avian predators as Limestone Island, with up to four of these species recorded breeding in one year during the 1980s (Gaston 1992). Additional nesting and roosting sites also occur on other islands within Laskeek Bay - Bald Eagles nest on Low, South Low, Louise and Skedans Islands, and Peregrine Falcons are known to nest on both Louise Island and Reef Island.

Given the secretive nature of some species, nest attempts on Limestone Island may be unobserved. Some species, like saw-whet owls, occupy small nest holes and do not typically return to the same nest site each year. Their nesting activities are more inconspicuous than other species, like eagles, that occupy large nests year after year. Saw-whet owls do not have long-term pair bonds or well-formed territories, adding to the difficulty of detecting nesting activities. Northern saw-whet owls use old Northern Flicker or Hairy Woodpecker (*Picoides villosus*) cavities, as well as natural cavities. Neither of these woodpecker species are particularly abundant on Limestone Island (Smith 2002), however Red-breasted Sapsucker (*Syphyrapicus ruber*) nest holes are more common and might be big enough for saw-whet owls. Gaston (1992) found Ancient Murrelet chicks to be part of their diet on Reef Island so it is not surprising that saw-whet owls nested near the edge of the most dense part of the colony (557 burrows/ha, Rodway et al 1988). The nest was near the research cabin and an enhanced population of deer mice (*Peromyscus maniculatus*), which could be an additional source of food for adults or nestlings; pellets need to be analysed to confirm whether saw-whet owls consume deer mice on Limestone Island.

The observed diversity and density of avian predators at East Limestone Island is somewhat higher than might be expected for an island of 48 ha. Nearby Reef Island, about 5 times as large, usually supports 2 breeding pairs of ravens, 1-2 pairs of peregrines, 2-3 active eagle nests and sometimes one pair of Sharp-shinned Hawks and one or more pairs of Saw-whet Owls in a given year (A.J. Gaston, pers. comm.). Although the entire raptor and owl community of East Limestone Island does not breed every year, prey populations support up to four species to successfully breed; the existence of a breeding population of 1,200 pairs of Ancient Murrelets may partly explain this concentration. Ancient Murrelets have evolved several strategies to avoid predators (e.g. burrow nesting, nocturnal habit) and likewise, avian predators have evolved hunting mechanisms to capture prey (e.g. crepuscular foraging). The continuous record of nesting success and species occurrence will increase our understanding of the long-term use of raptor nest sites in Haida Gwaii and the structure of this avian predator-prey relationship in Laskeek Bay.

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Figure 1
Nesting locations of birds of prey on East Limestone Island since 1990.

