COSEWIC
Status Appraisal Summary

on the

Ancient Murrelet
Synthliboramphus antiquus

in Canada

SPECIAL CONCERN
2014

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

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COSEWIC
Assessment Summary

Assessment Summary – November 2014

Common name
Ancient Murrelet

Scientific name
Synthliboramphus antiquus

Status
Special Concern

Reason for designation
Approximately half of the global breeding population of this burrow-nesting seabird occurs on Haida Gwaii, British Columbia. Recent survey information for the species is limited and the overall population trend is unknown. There is, however, evidence of declines at some breeding colonies on the west coast of Haida Gwaii, although populations may be increasing at some colonies on the east coast. The species is exposed to a number of threats including predation from introduced predators, habitat degradation, exposure to oil and oceanographic changes. The species may become Threatened if these threats are not appropriately managed.

Occurrence
British Columbia, Pacific Ocean

Status history
Designated Special Concern in April 1993. Status re-examined and confirmed in November 2004 and November 2014.

COSEWIC
Status Appraisal Summary

Ancient Murrelet — Guillemot à cou blanc

Synthliboramphus antiquus

Range of occurrence in Canada: British Columbia

Status History

Designated Special Concern in April 1993. Status re-examined and confirmed in November 2004 and November 2014.

Evidence (indicate as applicable):

Wildlife species:

Change in eligibility, taxonomy or designatable units: yes ☐ no ☒

Explanation: No change since last assessment.

Range:

Change in Extent of Occurrence (EO): yes ☐ no ☒ unk ☐

Change in Index of Area of Occupancy (IAO): yes ☐ no ☒ unk ☐

Change in number of known or inferred current locations*: yes ☐ no ☒ unk ☐

Significant new survey information: yes ☒ no ☐

Explanation:

No additional data on EO, IAO or the number of locations since last assessment. EO and IAO have, however, been recalculated using current methodology (see Technical Summary). There is new survey information for some colonies (see next section).

* Use the IUCN definition of “location”

Population Information:

Change in number of mature individuals: yes ☒ no ☐ unk ☐

Change in population trend: yes ☐ no ☐ unk ☒

Change in severity of population fragmentation: yes ☐ no ☒ unk ☐

Change in trend in area and/or quality of habitat: yes ☒ no ☐ unk ☐

Significant new survey information yes ☒ no ☐

Explanation:

At the time of the last assessment in 2004 the population estimate for Langara Islands was 10,365 +/- 2,011

(SE) pairs based on survey work conducted in 1999. The conclusion at the time was that the colony had not recovered following predator removal (Drever 2002). Shortly after the assessment in 2004, however, the colony was surveyed again and the population was estimated at 24,037 +/- 4,073 pairs. Also following the assessment, the 1999 estimate was revised to 13,014 +/- 2,525 pairs based on an improved calculation of colony surface area (Regehr *et al*. 2006). So, based on the new survey information from 2004 (24,037 +/- 4,073 pairs) and the revised estimate of the population from 1999 (13,014 +/- 2,525 pairs), it appears that the population showed a substantial increase between 1999 and 2004 (Regehr *et al.* 2007). Unfortunately, this information only came to light after the previous COSEWIC status report was completed, and so is not documented in the previous status report.

More recent survey information from other colony islands, however, indicates some declines in burrow occupancy rates for this species. Some small seabird colony islands off the west coast of Haida Gwaii have been surveyed a number of times over the last 30 years. Comprehensive surveys were first carried out on the islands of Englefield Bay (Saunders, Helgesen, Little Helgesen, Carswell, Lihou, Instructor, Rogers, and Luxmoore islands) in 1986, when they were found to support an estimated 19,000 pairs of Ancient Murrelets (7% of the Canadian breeding population at the time; Rodway *et al.* 1990). Several of these colonies were resurveyed in 1993, 2004, and 2011.

By 1993, Saunders, Helgesen, Little Helgesen, and Instructor islands had been seriously affected by the arrival of Raccoons (*Procyon lotor*), an introduced predator (Gaston & Masselink 1997).

In 2004, repeat surveys on Saunders, Helgesen, Little Helgesen, and Instructor islands indicated no recovery of seabird populations, despite the removal of Racoons from Helgesen and Little Helgesen islands in 1995 (Gaston *et al.* 2011). Indeed, there was no sign of breeding on Saunders Island or Little Helgesen in 2004.

In 2011, Saunders was visited again and Helgesen, Little Helgesen, and Lihou were systematically resurveyed (at least in part), using the same methods as the original survey in 1986 (Gaston *et al.* 2011). Again, there was no evidence of breeding on Saunders or Little Helgesen islands as in 2004. In 2011, sample burrows on the southern and central sections of Helegesen Island indicated an occupancy rate of 0.11 compared with 0.63 in 1986, a decline in the population estimate of ~90% (Gaston *et al.* 2011). Surveys on Lihou Island in 2011 indicated an occupancy rate of 0.12 (Gaston *et al.* 2011), as compared to the Haida Gwaii mean of 0.63 in 1986 (Lihou was not surveyed in 1986). If the overall population estimate in 1986 reflected the population on Lihou at that time, then a decline in the breeding population on Lihou Island of ~50% occurred between 1986 and 2011.

A major blow-down of forest on several of the Laskeek Bay colony islands in the winter of 2010-11 reduced the amount of nesting habitat available to Ancient Murrelets (Gaston *et al.* 2011). Given the other habitat issues this species is experiencing (e.g. invasive species), additional habitat loss of this kind could have potential consequences at the population level by limiting suitable breeding sites further. Recent evidence from East Limestone Island, part of the Laskeek Bay colony islands, indicates that the number of chicks produced has fallen sharply in areas where the trees have fallen down (T. Gaston, pers. comm. 2014).

Burrow occupancy has been assessed at a couple of larger colonies, one off Haida Gwaii's west coast (Frederick Island) and one off the east coast (George Island), somewhat regularly since the 1990s (L. Wilson &. M. Lemon, unpubl. data). In the late 1990s (1998), Frederick Island had burrow occupancy rates of 73%. By the mid-2000s, occupancy rate had declined to 41% (in 2005), but this was a poor year for seabird productivity in the region generally (Sydeman *et al*. 2006). In 2013, burrow occupancy at Frederick Island remained low at 47%, but in 2014 rates had increased to 58% (L. Wilson pers. comm. 2014). In the mid-1990s (1996), George Island had occupancy rates of 83%. Occupancy has remained relatively high at George Island (74% in 2003; 73% in 2008; 76% in 2013) since that time, although surveys in 2014 showed a drop in occupancy rates to 65% (L. Wilson pers. comm. 2014).

In general, it is very difficult to assess population trends for this species because estimates depend crucially on an assessment of occupancy rates. Breeding colonies are rarely visited and reliable data are extremely sparse. Even cursory assessments of occupancy are rare, with often decades between successive visits,

leaving a lot to best guesses in the calculation of colony population estimates. Table 1 shows estimates for known Ancient Murrelet colonies. Many of these are out of date, or problematic in some way (e.g. were very cursory or included only a very limited area of the colony) but constitute the only existing data. As such, drawing conclusions from them is extremely difficult.

Collectively, however, it seems that at least some of the larger colonies on the east coast of Haida Gwaii (Rankine, George, Ramsay islands) are relatively stable or increasing (Table 1). Notably, colonies in this region are thought to be less impacted by introduced mammalian predators, but are apparently declining at sites where predators have been confirmed. On the west coast, however, occupancy rates appear to be significantly lower than historical norms, with all but Langara Island thought to be declining (by up to 90%) or simply unknown (Table 1).

In summary, there are no reliable estimates of overall population size and trend for Ancient Murrelets in Canada. The existing information suggests that approximately 25% of the breeding population is found at colonies considered to be increasing, 12% at colonies considered stable and 34% at colonies considered to be decreasing. The trend for the remaining 29% of the breeding population is unknown (Table 2).

Threats:

Change in nature and/or severity of threats: yes ☐ no ☐ unk ☒

Explanation:

All limiting factors and threats previously considered in the 2004 status assessment (introduced mammalian predators, oceanographic changes, habitat destruction/loss, oil exploration, disturbance, and commercial fisheries) still apply.

Introduced predators

Introduced mammalian predators continue to impact this species. In the decade following the eradication of Norway Rats (*Rattus norvegicus*) on Langara Island in the mid-1990s, there was a rapid expansion in colony area, initially associated with a decrease in burrow density, and then a gradual increase in burrow occupancy (Bertram 1995, Taylor *et al.* 2000, Regehr *et al.* 2007). Large areas of suitable habitat remain uninhabited by Ancient Murrelets on Langara Island, however, and the availability of nesting habitat is not considered to be limiting the expansion of the colony (Major *et al.* 2012). Likewise, some islands, which either did or could potentially support Ancient Murrelet breeding populations, have been cleared of rats since 2012 by the Gwaii Haanas Park Reserve and Haida Heritage Site (GHPRHHS) management. This has created further potential breeding habitat (GHPRHHS pers. comm.). Raccoons remain a serious predator on easily-accessible islands (i.e. close to shore) in Englefield Bay and elsewhere.

Relatively recently, Ancient Murrelet populations were reported to be stable or increasing on all monitored colonies in Canada known to be free from introduced predators (Regehr *et al.* 2007, Gaston *et al.* 2009, Rodway & Lemon 2011), and the population increase at Langara Island was thought to indicate that ecological conditions in the region remained highly suitable for Ancient Murrelets (Gaston *et al.* 2009).

The most recent monitoring surveys, however, indicate declines in burrow occupancy rates at some colonies where mammalian predators have either been removed or were never introduced (Gaston *et al.* 2011, T. Gaston pers. comm. 2013). The cause(s) of these recent declines in burrow occupancy are unknown, but they appear to be unrelated to predation or disturbance by introduced predators. Notably, the status of storm-petrels on some of the same colony islands (Little Helgesen and Lihou) remains unchanged since the 1986 surveys (Gaston *et al.* 2011), suggesting that mammalian predators are not the main culprit, as one would expect all small, burrowing seabirds to be affected in some manner.

Thus, these recent declines in burrow occupancy may be the direct or indirect result of some other known

threat (such as those referred to below), or indication of an emerging threat not previously considered.

Oceanographic changes

Long-term changes in oceanographic conditions, driven by climate change, are thought to have considerable impact on the health and abundance of seabird populations (Veit *et al*. 1996, Sydeman *et al*. 2001). Higher sea surface temperatures in spring, for example, are associated with decreased reproductive success in seabirds (Bertram *et al*. 2001), including Ancient Murrelets (Gaston & Smith 2001, Shoji *et al*. 2012).

More sudden ecosystem changes, brought about by regime shifts, also affect seabird communities, usually indirectly through the abundance, availability, and/or timing of their plankton or fish prey populations (Anderson & Piatt 1999, Gaston *et al*. 2009).

At Canadian colonies that are not suppressed by introduced mammalian predators, however, Ancient Murrelets appear to be either stable or increasing, suggesting that oceanographic conditions are still suitable for this species (Gaston *et al*. 2009).

Habitat destruction/loss

In Canada, Ancient Murrelets generally nest in burrows dug in soft soils or in cavities under tree roots. Storm-driven blow-downs can disturb habitats by removing the tree canopy and/or blocking access to the ground. These disturbances to habitat quality will potentially worsen with climate change, if predictions on the increasing frequency and intensity of storms are accurate (Dale *et al*. 2001). Logging activities can destroy habitat by removing the forest canopy and/or compacting the soil. Natural forest succession also opens up previously unsuitable habitat, however, as trees grow up to a suitable canopy height. As discussed above (Introduced predators), the presence of introduced mammalian predators causes effective habitat loss, by altering the suitability of otherwise good quality habitat.

Oil exploration

Large hydrocarbon reserves are known to exist off the BC coast, and the Queen Charlotte Sound area has significant oil production potential (Schofield *et al*. 2008). The majority of these resources are present in the Queen Charlotte Basin, in the Hecate Strait region, which falls under federal jurisdiction. An informal federal moratorium on tanker traffic and exploratory drilling, initiated in 1972, is currently in place in the Hecate Strait. The provincial government of BC has requested that the federal moratorium on drilling be lifted, but, as yet, this situation appears to be unresolved. If exploratory drilling is allowed and commercial production follows, however, oil slicks and sheens will form around platforms from currently allowable operational discharges (O'Hara & Morandin 2010) and the risk of a medium- to large-scale oil spill event in the area will increase. Chronic oiling from small-scale oil spills and tank flushing currently exists in the region (O'Hara & Morgan 2006). Aerial surveillance for oily discharges has increased since the last assessment, but in the marine waters occupied by the species, where surveillance effort has been relatively low, analysis of surveillance data up to 2006 did not demonstrate a decrease in detection rate in response to increased surveillance (O'Hara *et al*. 2013). Indeed, there is growing evidence that illegal discharges have been simply displaced in time (increased nighttime discharges in areas under Dutch Aerial Surveillance: B. Vollaard pers. comm. 2013, as cited in Serra-Sogas *et al.* 2014) and space (no evidence of increased compliance of international regulations for oil discharge rates: Gullo, 2011). This suggests that illegal discharges may be increasing in areas with less or no surveillance. Chronic oiling could also worsen with increasing tanker traffic; marine waters in Hecate Strait and Dixon Entrance are both predicted to see increases associated with the proposed Northern Gateway Project (National Energy Board and Canadian Environmental Assessment Agency 2013).

Disturbance

The activities of boaters, kayakers, and campers may unintentionally disturb seabird breeding colonies. Fishing lodges have been established on the southern end of Langara Island, and activity at these facilities (which include tourist services such as boat and helicopter tours of the area) may prevent Ancient Murrelets

from breeding in nearby Henslung Cove, formerly a high density area of the colony (D. Bertram, pers. comm. 2014).

Commercial fisheries

Bycatch in commercial and small-scale fisheries remains an important and pervasive threat to seabird populations worldwide (Croxall *et al*. 2012), including the inshore and offshore waters of BC. Bycatch in gillnets may have had a significant role in the decline of Ancient Murrelets at Langara Island (Bertram 1995). Fisheries also interact as competitors with seabirds, and the overfishing of forage fish or other marine resources can have direct or indirect impacts on the health of marine bird populations.

Protection:

Change in effective protection: yes ☐ no ☒

Explanation: No apparent changes in effective protection; all previous conservation status listings (provincial, federal, continental, global) remain in effect.

Rescue Effect:

Change in evidence of rescue effect: yes ☐ no ☒

Explanation:

The likelihood of rescue is unknown. The species is considered *Highly Imperilled* in Alaska (U.S. Fish & Wildlife Service 2006), and Asian populations are known to be subject to mortality from gill-net fisheries (DeGange & Day 1991). There are recent indications, however, of increases in some parts of Alaska due to predator eradication (T. Gaston pers. comm. 2014). Overall immigration is possible, although general declines in outside populations and a potential for introduced predators to limit breeding sites in Canada could decrease the likelihood of rescue.

Quantitative Analysis:

Change in estimated probability of extirpation: yes ☐ no ☐ unk ☒

Details: Not done.

Summary and Additional Considerations:

Identifying trends in the Canadian population of Ancient Murrelets is extremely difficult. Colonies are visited relatively rarely and accurate surveys are practically impossible. Colony population estimates are generally based on establishing a burrow density and an occupancy rate in a sample of regularly distributed plots, then extrapolating up to the colony scale. Determining occupancy is very difficult and variation in occupancy rate, particularly, due to differences in estimation methods or poor reproductive years, can therefore influence colony estimates greatly.

Since the previous COSEWIC assessment and update status report, there have been some gains and some losses in colony population estimates, although many of the colonies have not been surveyed since that time (Fig. 1, Table 1).

Introduced mammalian predators continue to take a heavy toll on this species at some colonies, especially on

those islands that are readily accessible to highly mobile predators, such as Raccoons, simply because they are located close to the coast (Table 1). Some sites where predators have been removed, even well over a decade ago, have seen a very slow recovery, while others have shown little or no indications of recovery.

At some colonies, the causes of recent and sudden declines in burrow occupancy appear to be unrelated to the existence or former presence of introduced predators. These declines in burrow occupancy may be the direct or indirect result of some other existing threat, or an emerging threat not previously considered that could influence the survival and/or breeding probability of Ancient Murrelets.

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TECHNICAL SUMMARY

Synthliboramphus antiquus

Ancient Murrelet Guillemot à cou blanc

Range of occurrence in Canada: British Columbia, Pacific Ocean

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines (2008) is being used) Birds begin breeding at 3-4 years and breed for an average of 4.5 years.	7-8 yrs
Is there an inferred continuing decline in number of mature individuals? Declines apparently occurring for some portion of the breeding population, but an overall trend is not available	Unknown.
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Unknown.
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Unknown.
Are the causes of the decline clearly reversible and understood and ceased?	No.
Are there extreme fluctuations in number of mature individuals?	No.

Extent and Occupancy Information

Estimated extent of occurrence Based on minimum convex polygon and excluding colonies that are assumed to be extirpated	8,957 km²
Index of area of occupancy (IAO) (Always report 2x2 grid value). IAO based on 2 X 2 grid over each breeding colony	96 km²
Is the population severely fragmented?	No.
Number of locations*	> 10 locations
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No.
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	Unknown.
Is there an [observed, inferred, or projected] continuing decline in number of populations?	N/A

* See Definitions and Abbreviations on COSEWIC website and IUCN 2010 for more information on this term.

Is there an [observed, inferred, or projected] continuing decline in number of locations?	Possible.
Is there an inferred continuing decline in area and quality of habitat? A major blow-down of forest on several colony islands in the winter of 2010-11 may have negative consequences at the population level. If predators continue to establish themselves on colony islands, they could contribute to ongoing declines.	Yes.
Are there extreme fluctuations in number of populations?	No.
Are there extreme fluctuations in number of locations?	No.
Are there extreme fluctuations in extent of occurrence?	No.
Are there extreme fluctuations in index of area of occupancy?	No.

Number of Mature Individuals (in each population)

Population	**N Mature Individuals**
Total based on crude and, for many colonies, outdated estimates of burrow occupancy (Table 1).	540,000

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not done.

Threats (actual or imminent, to populations or habitats)

Introduced mammalian predators Habitat destruction/loss Disturbance Oil exploration Oceanographic changes Commercial fisheries – competition

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? The species is considered *Highly Imperilled* in Alaska and Asian populations are known to be subject to mortality from gill-net fisheries. There are recent indications, however, of increases in some parts of Alaska due to predator eradication.	
Is immigration known or possible?	Possible.
Would immigrants be adapted to survive in Canada?	Yes.

Is there sufficient habitat for immigrants in Canada?	Likely, although introduced predators could reduce the number of suitable sites.
Is rescue from outside populations likely?	Unknown.

Data-Sensitive Species

Is this a data-sensitive species? No.

Status History

COSEWIC: Designated Special Concern in April 1993. Status re-examined and confirmed in November 2004 and November 2014.

Status and Reasons for Designation

Status:	**Alpha-numeric Code:**
Special Concern	None
Reasons for Designation: Approximately half of the global breeding population of this burrow-nesting seabird occurs on Haida Gwaii, British Columbia. Recent survey information for the species is limited and the overall population trend is unknown. There is, however, evidence of declines at some breeding colonies on the west coast of Haida Gwaii, although populations may be increasing at some colonies on the east coast. The species is exposed to a number of threats including predation from introduced predators, habitat degradation, exposure to oil and oceanographic changes. The species may become Threatened if these threats are not appropriately managed.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Does not meet criterion. Population trends are unknown.
Criterion B (Small Distribution Range and Decline or Fluctuation): Does not meet criterion. EO is below 20,000 km² and IAO is below 5,000 km², but is not severely fragmented and exists in more than 10 locations. Although there may be a continuing decline in area, extent and quality of habitat, there are no extreme fluctuations in EO, IAO, number of locations, or number of mature individuals.
Criterion C (Small and Declining Number of Mature Individuals): Does not meet criterion. Population size is above the thresholds.
Criterion D (Very Small or Restricted Population): Does not meet criterion. Population size, IAO and the number of locations are above the thresholds.
Criterion E (Quantitative Analysis): There are no quantitative analyses available.

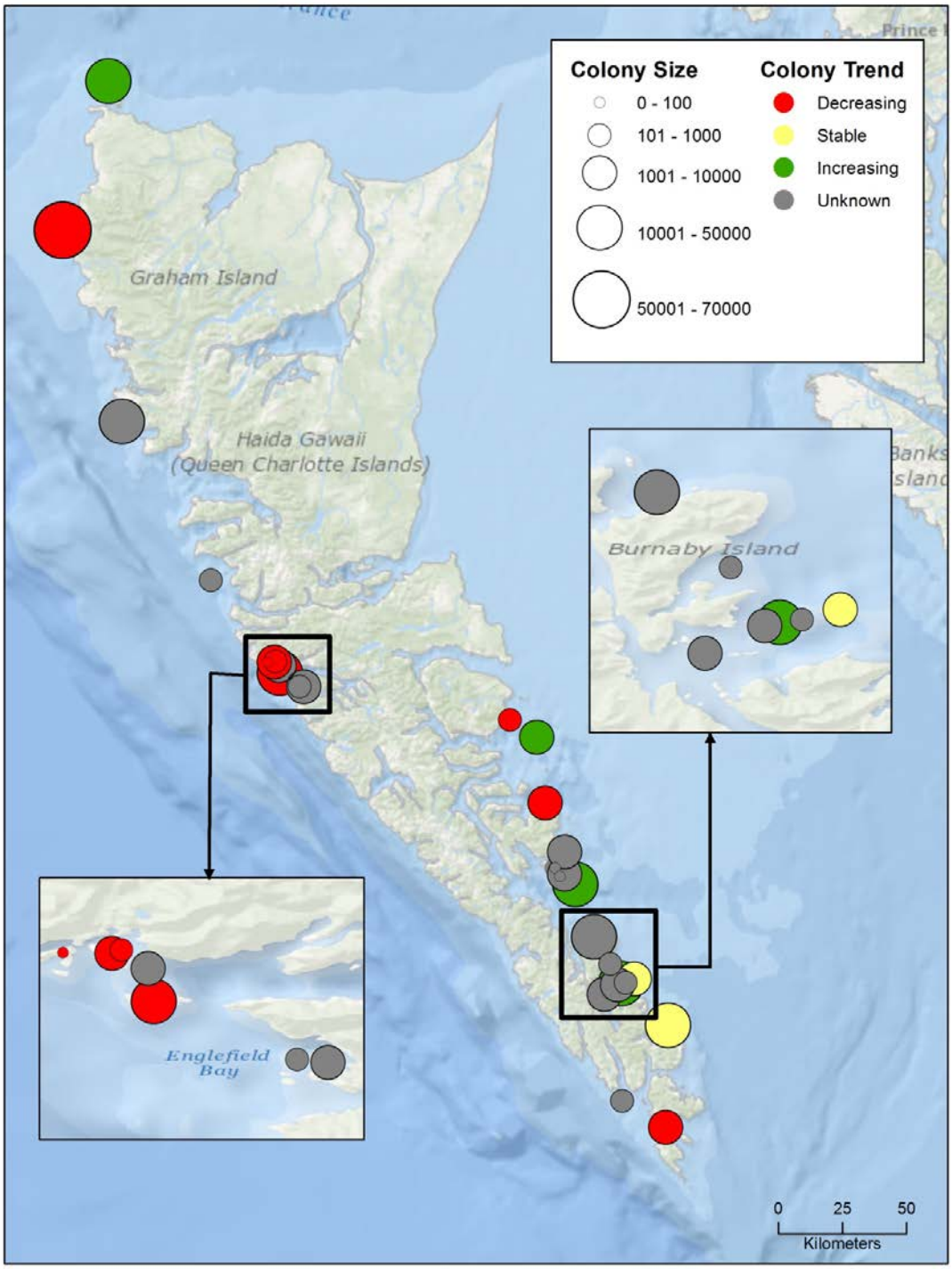

Figure 1. Map of Ancient Murrelet breeding colonies in Haida Gwaii/Queen Charlotte Islands, British Columbia. Circle size indicates estimated population, and colour represents population trend, where known.

Table 1: Population estimates and trends for Ancient Murrelet colonies in Haida Gwaii/Queen Charlotte Islands, British Columbia.

Site	No. of pairs	Year	Trend[a]	Source	Notes (from comments by Moira Lemon and Tony Gaston)	Predators / Issues Documented[b]
West coast of Graham Island						
Langara Island	24,000	2004	↑	Regher *et al*. 2007	Increasing trend 1993 – 2004 determined from population transect surveys; but major decline from historical estimates	Rat*****
Frederick island	70,000	1998	↓	Lemon & Gaston 1999; Rodway *et al*. 1994	1980 pop estimate was 68,000. Population estimates stable to 1998; but survey results in 2005 were quite a bit lower. There is an estimate worked out for 2005, but it contains errors, so must be revised. Burrow density was highest in the 1980 survey, and is lower (likely statistically significant) in both subsequent surveys, with the lowest in the most recent survey in 2005 (burrow density about half of 1980 density). Of the 5 surveys, occupancy rates were highest in 1998. Recent surveys in 2013 and 2014 show occupancy rates of 47% and 58.1%, respectively. These rates have increased since 2005 (41%), but remain below the 1998 occupancy rates of 73%.	
Hippa Island	40,000	1983	**?**	Rodway *et al*. 1994		
Marble Island	1,000	1977	**?**	Rodway *et al*. 1994; Campbell & Garrioch 1979	Estimate is from BC Provincial Museum surveys. Not surveyed by CWS in 1980s sweep.	
West coast of Moresby Island						
Saunders Island	0	1986	↓	Rodway *et al*.1990	Downward trend since 1970s Museum surveys, and likely extirpated now – no sign of breeding was found in 2004 and 2011.	Raccoon
Little Helgesen Island	0	2011	↓	Gaston & Masselink 1997; Gaston *et al*. 2011	Supported almost 900 pairs in 1986, but appears to have been extirpated sometime between 1993 and 2004.	Raccoon*****
Helgesen Island	600	2011	↓	Gaston & Masselink 1997; Gaston *et al*. 2011	Low occupancy rate in 2011 suggests an island-wide decline of 80-90% since 1986.	Raccoon*****
Willie Island	10s	1986	**?**	Rodway *et al*. 1990		
Carswell Island	1,700	1986	**?**	Rodway *et al*. 1990		
Lihou Island	12,140	1993	↓	Rodway *et al*. 1990; Gaston & Masselink 1997; Gaston *et al*. 2011	Burrow density increased between 1986 and 1993 in the densest region of the colony, but recently a large decline in occupancy rate suggests an island population decline of 50% since 1993.	
Luxmoore Island	1,000	1986	**?**	Rodway *et al*. 1990		
Rogers Island	1,700	1986	**?**	Rodway *et al*. 1990		
Cape Kuper	10	1986	**?**	Rodway *et al*. 1990		

Site	No. of pairs	Year	Trend[a]	Source	Notes (from comments by Moira Lemon and Tony Gaston)	Predators / Issues Documented[b]
SGaang Gwaii	200	1985	**?**	Rodway *et al*. 1990		
East coast of Moresby Island						
Kunghit Island	0(?)	2004	↓	Harfenist 1994; J.M. Hipfner, *unpubl data*	Supported 3,600 pairs in 1993. The two colony areas (Annis Pt and Jenkins Pt) on Kunghit were visited in 2004 and no nesting colony was evident.	Raccoon, Rat
Rankine Island	26,000	1984	↔	Rodway *et al*. 1988; Rodway & Lemon 2011	A population transect survey was also done in 2000, which gave same estimate, suggesting stable trend. Monitoring plots surveyed at 5 year intervals from 1984 - 2010 also show stable trend.	
Bolkus Island	9,900	1985	**?**	Rodway *et al*. 1988		
Skincuttle Island	2,200	1985	**?**	Rodway *et al*. 1988	Harfenist *et al*. (2002) list this site as having Raccoons, but a survey soon after the original sighting (1992) found no signs here or, and no sign of their presence has been observed since.	Raccoon?
George Island	17,000	1996	↑	Lemon 1997; Lemon & Gaston 1999; Rodway & Lemon 2011	Overall, an increasing trend documented from both the population transect surveys (1985 & 1996) and the monitoring plot scheme where plots have been surveyed approximately every 5 years or more, from 1985 to 2014. Occupancy rates increased from a low of 71% in 1991 to a high of 84% in 2013. Monitoriing in 2014 indicated an occupancy rate of 65%, but the trend has generally been increasing since monitoring began. Harfenist *et al*. (2002) list this site as having Raccoons, but a survey soon after the original sighting (1992) found no signs here, and no sign of their presence has been observed in recent years, 2008 or 2013.	Raccoon?
Jeffrey Island	1,000	1985	**?**	Rodway *et al*. 1988		
East Copper Island	6,000	2003	↔	Lemon 2003	The increase in population estimate since 1985 survey is not statistically significant.	
Howay Island	300	1985	**?**	Rodway *et al*. 1988		
Alder Island	14,000	1985	**?**	Rodway *et al*. 1988	Harfenist *et al*. (2002) list this site as having Raccoons, but it is not clear what the original source for that record is.	Raccoon?
Ramsay Island	18,000	1984	↑	Rodway *et al*. 1988; Rodway & Lemon 2011; Drever 2012	Increasing trend documented from the monitoring plot scheme where plots have been surveyed every 5 years, from 1984 to 2012.	
Hotspring Island	<10	1984	**?**	Rodway *et al*. 1988		
House Island	2,600	1984	**?**	Rodway *et al*. 1988		
Murchison Island	20	1984	**?**	Rodway *et al*. 1988	Rats eradicated 2013	Rat
Agglomerate Island	2,200	1985	**?**	Rodway *et al*. 1988		

Site	No. of pairs	Year	Trend[a]	Source	Notes (from comments by Moira Lemon and Tony Gaston)	Predators / Issues Documented[b]
Dodge Point (Lyell Isl.)	8,300	1992	↓	Lemon & Gaston 1999; Lemon 1993		Rat
Reef Island	10,000	2006	↑	Gaston, pers. comm.		Major blow-down
Limestone Island - East	500	2006	↓	Gaston, pers. comm.		Major blow-down, Raccoon
Limestone Island - West	<50	2006	↓	Gaston, pers. comm.		Raccoon
Total	**≈ 270,000 pairs or 540,000 mature individuals**					

[a]Trend: ↑ = increasing, ↓ = decreasing, ↔ = stable, ? = unknown

[b]mostly from Harfenist *et al*. 2002; * = predator believed to have been eliminated.

NOTE: Apparently extirpated from at least three former colonies in recent years (Little Helgesen, Kunghit and Saunders – included in Table 1), and extirpated from 10 former colonies before that (Lucy, Cox, Instructor, Boulder, Sea Pigeon, High, Arichika, Bischof, Tar, and Skedans islands – not included in Table 1).

Table 2. The number of pairs and proportion of the total population estimate in Ancient Murrelet colonies thought to be increasing, decreasing, stable, or unknown.

Colony Trend	*n*	No. of pairs estimated to be breeding at these colonies	Proportion of estimated total breeding population at these colonies
↑ Increasing	4	69,000	25%
↔ Stable	2	32,000	12%
↓ Decreasing	9	91,640	34%
? Unknown	18	77,360	29%
Total	**33**	**270,000**	

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2014)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment Canada / Environnement Canada
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Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.