WILDLIFE DATA CENTRE

Featured Species – Common Loon

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Although the emergence of modern loons dates back 20 to 30 million years the earliest record for British Columbia was obtained a mere 121 years ago. We do know, however, that Common Loon is a survivor and a long-lived bird and this is partly due to its superb adaptations for an aquatic life. Dense bones (near the specific gravity of water), legs placed far back on the body, muscles with high myoglobin to store oxygen when underwater for long periods, a streamlined body, and a dense coat of waterproof feathers all help with swimming and diving. Also, loons are traditional in their habits and breed and winter at favourite spots.

When the first open water begins to show on ice-covered lakes in the interior of British Columbia Common Loons are not far behind. How they know each year to arrive precisely when puddles and thin lines of open water are available remains a mystery. Once a pair takes up their territory they become very noisy offering wailing cries that continue throughout the rest of the summer period, day and night. Their short courtship period is spectacular with pairs running across the water, diving in unison, and uttering echoing tremolo duets. In winter loons are silent.

Loons may not breed until they are seven years old. Although both parents share incubation and rearing duties they migrate independently of each other and their offspring. Common Loon is a long-lived bird with a low reproductive rate and an adult annual survival rate approaching 91 percent.

Aldo Leopold, in his inspirational book "*Sand County Almanac",* wrote:

> "*The Lord did well when he put the loon and his music in the land*."

To millions of North Americans the haunting yodel of a Common Loon (Figure 1) is the very embodiment of wild places, healthy ecosystems, untainted waters, and an inner sense of personal well being that comes with knowing that loons are alive and well. In British Columbia, our lakes, rivers, marshes, and sea coasts are summer and winter homes to about 10 percent of all loons on the continent. Therefore, we have a significant stewardship responsibility. We have to keep waters clear and unpolluted, fishes in abundance, undisturbed shorelines and islands for nesting, shorelines with tall vegetation, especially cattails and bulrushes, undisturbed during the critical nursery period, and disturbance to a minimum during the bird's stressful winter period.

Figure 1. Common Loon is graceful on the water, elegant in flight, and creates a sense of awe when it is heard at its summer home. Nicola Lake, BC. 22 May 1989 (R. Wayne Campbell).

Wildlife Data Centre Provincial Status – 2008

Common Loon is ***A Species of Conservation Concern*** in British Columbia. Although the provincial population appears healthy, and is considered "not at risk", the designation serves as an early warning for British Columbians since populations in other parts of its North American range are reporting declines. Some of the reasons, including acidification of lakes, heavy metal contamination, human encroachment, and the impacts of climate change may threaten British Columbia loons in the future.

Fish-stocking programs in hundreds of lakes in British Columbia over the past few decades have attracted loons and have contributed to thriving populations that have increased in numbers and range over the past century. In some lakes, however, there is a developing conflict between loons and sport fishing, summer recreational activities, and shoreline cottage developments.

Common Loon has never been listed under the federal Endangered Species Act in the United States and in Canada the Committee on the Status of Endangered Wildlife designates it as a species "not at risk". Common Loon is ranked globally as "demonstrably secure (G5)" by the Nature Conservancy.

In British Columbia, Common Loon is protected under the federal Migratory Birds Convention Act and to a lesser degree by the provincial Wildlife Act (see Jones and van Drimmelen 2007, van Drimmelen and Jones 2007).

At a Glance

Other names: Diver, Great Northern Diver (in Old World).

Similar species: In British Columbia, the Yellow-billed Loon, especially winter and nonbreeding plumage.

Breeding Adult (Figure 2)
- Glossy black head and throat
- Checkered back
- White neck collar
- Red eyes
- Black bill

Figure 2. The adult Common Loon is unmistakable in its checkered black-and-white plumage. Bose Lake, BC. June 2005 (Richard R. Howie).

Winter Adult (Figure 3)
- Dark crown and nape
- Dark back, light below
- Light throat
- No neck collar
- Pale bill, dark upper ridge

Figure 3. In winter the appearance of a Common Loon changes dramatically into a plumage that is darkish above merging into whitish underparts. Kootenay Lake, BC. 8 October 2005 (Alistair Fraser).

Adult in Flight
- Hunch-backed appearance
- Long stout neck

Length
71-91 cm (28-36 in.)

Wingspan
127-147 cm (50-58 in.)

Weight
Males 2,200-6,100 g (4.8-13.4 lbs)
Females 1,468-5,662 g (3.2-12.5 lbs)

Where and When

World Range

In North America, Common Loon breeds mainly on fresh-water lakes throughout the boreal forest region south of the tree line from north-central Alaska east across northern Canada south to the northern United States. It winters primarily along the Pacific coast from the Aleutian Islands south to Baja California, throughout the Gulf of California, and along the west coast of Mexico to Colina, and along the Atlantic coast from Newfoundland south to Florida and the Gulf Coast south to northern Veracruz, Mexico.

Outside the Americas it regularly breeds only along coasts of Greenland and Iceland and winters along coasts of Iceland, the Atlantic coast of Great Britain, and irregularly in other western Palearctic locations south to northwestern Africa.

British Columbia

Current Status: Common Loon is currently a common spring and autumn migrant and summer visitor throughout the entire province. In winter, it is common along the entire coast and locally rare to uncommon on larger lakes in the south-central interior. Provincial populations fluctuate annually but numbers over the long term appear stable to increasing. Some traditional lakes used for breeding in the early 1900s, especially near urban centres (*e.g.*, Elk Lake, Victoria) and developing recreational areas (*e.g.*, Green Lake, Whistler) have been abandoned.

Occurrence: Common Loon is distributed widely throughout British Columbia (Figure 4) including lakes on large offshore islands, and occurs at elevations ranging from sea level to 2,300 m (7,600 ft). It is present year-round on the coast and a few occur year-round in the south-central interior each year. Spring migration occurs from mid-March through early June but generally peaks from late April to early May. In autumn, migration occurs from late August to late November but is most evident during the first half of October. Most of the British Columbia population migrates from interior freshwater breeding sites to winter along coastal marine locations. Small numbers pass the winter on larger ice-free lakes in the southern interior.

In winter, the loon occurs along the entire coast but aggregations are usually less than 25 birds and these are scattered within a specific location. Hundreds of Common Loons, however, aggregate at traditional sites off the mouth of the Fraser River, in Burrard Inlet (Vancouver), off Roberts Bank (Delta), throughout Deep Bay (Parksville), in Haro Strait off southern Vancouver Island, and throughout the Canadian Gulf Islands. In spring migration, major staging areas include Tsawwassen (off the ferry terminal), Lennard Island (Tofino), and Sandspit (Haida Gwaii / Queen Charlotte Islands). In autumn, major staging areas include Cumshewa Inlet (Haida Gwaii / Queen Charlotte Islands), Comox Harbour, Deep Bay, Boundary Bay, and Tsawwassen (off the ferry terminal). In the south-central interior large flocks have been found on Nicola Lake and Okanagan Lake.

The two largest flocks reported in the province was 200 birds off Tsawwassen ferry jetty on 1 September 1990 and 187 birds scattered throughout Deep Bay on Vancouver Island on 21 March 1967.

Breeding: On the coast, Common Loon breeds throughout Vancouver Island, on some of the larger offshore islands along the central and northern mainland coast, on lakes in the vicinity of Prince Rupert, Kitimat, and Terrace, and locally on northeastern Queen Charlotte Islands.

In the interior Common Loon is widely distributed as a breeder east of the coast mountain ranges. Its breeding status at the western edge (*e.g.*, Coast Mountains) of its interior range has yet to be determined (Figure 5).

Habitat

Migration and wintering: During migration, Common Loon is found along the coast on marine bays (Figure 6), inlets, coves, channels, sounds, harbours,

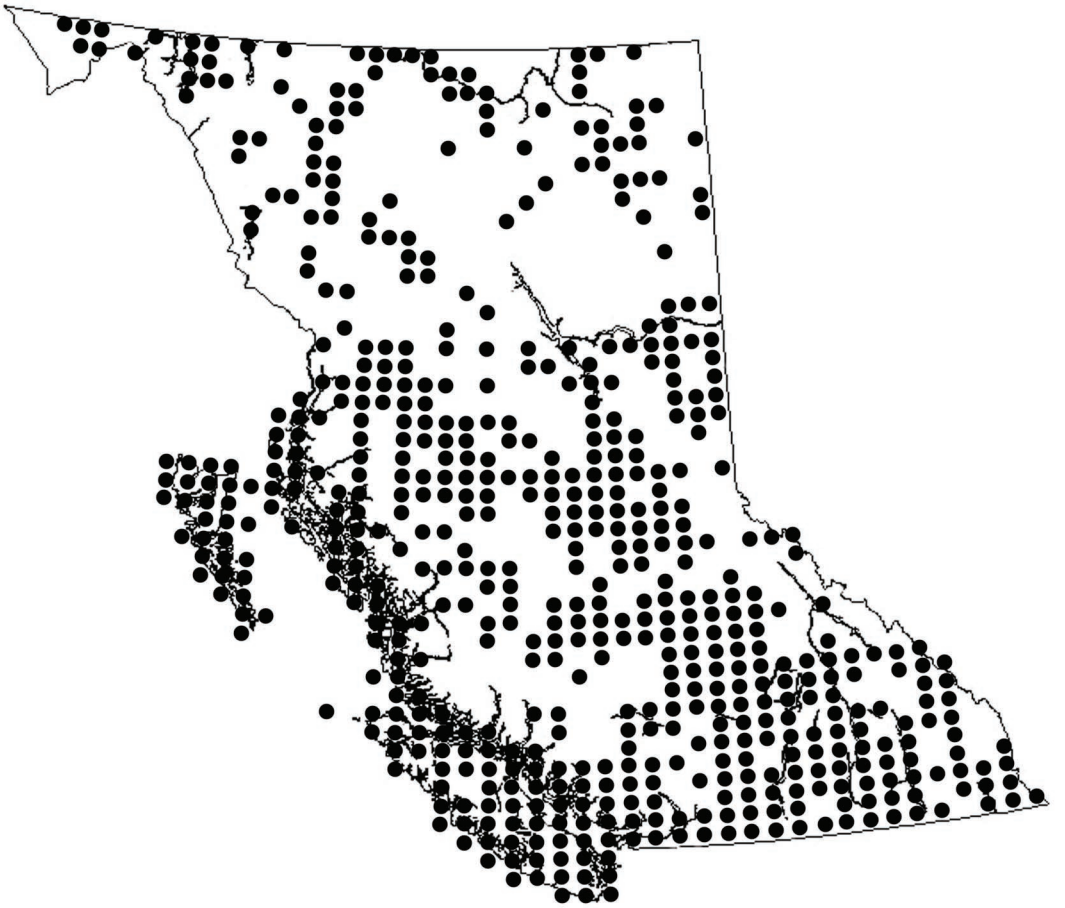


Figure 4. The locations (dots) of confirmed Common Loon occurrences in British Columbia, 1887-2008.

upwellings, estuaries, and other shallow areas where some staging flocks may reach 200 birds. Rarely is it encountered in pelagic waters. In the interior, it frequents large freshwater lakes (Figure 7), large marshes, and slow-moving rivers and backwaters. In winter, a wide variety of protected coastal marine habitats are utilized, and in the interior birds are quick to locate larger lakes that are ice-free.

Breeding: In British Columbia, Common Loon breeds mainly on clear, quiet, large to small freshwater lakes in open and forested situations (Figure 8). Most of these lakes are classified as oligotrophic and are characterized by low productivity, clear water with low nutrient levels (1-10 *ug*/L TP), sparse plant life, and low fish production. Many of these lakes, however, have been stocked with fishes, especially rainbow trout (*Oncorhynchus mykiss*). Most nesting lakes are 25 ha (62 acres) or larger with irregular, indented shorelines and bays. The smallest lake used successfully was 8 ha (20 acres). Suitable emergent shore vegetation (Figure 9), grassy mats, or treed islands with accessible rocky and dirt shoreline and protection from prevailing winds and waves, and a wide-angle view for incubating adults (> 130º) are also important for nesting.

Figure 5. The breeding distribution (black area) of Common Loon in British Columbia.

Figure 7. Each year small numbers of Common Loons frequent lakes, or spend the winter, in southern regions of the interior of British Columbia where lakes remain ice-free. Kootenay Lake near Kaslo, BC. 5 February 1997 (R. Wayne Campbell).

Figure 6. The Strait of Georgia, with its abundant food supply and numerous protected inlets, coves, harbours, and bays, provides significant year-round habitat for Common Loon in British Columbia. Texada Island, BC. 26 June 2001 (R. Wayne Campbell).

Figure 8. In British Columbia, most Common Loons breed on lakes that are clear and contain fishes. Bridge Lake, BC. 2 June 1994 (R. Wayne Campbell).

Loons also nest along clear, slow-moving rivers with deeply indented bays, large marshes and sloughs, and occasionally on open but wooded swamps with fallen branches and trunks. Infrequently, shallow (2.5 m) eutrophic lakes or large marshes, with dense surface patches of pond-lilies and aquatic plants, are used for nesting.

Soon after hatching chicks are led from their nests to nearby nursery areas (see Figure 84), where they can spend up to several weeks maturing protected from weather and predators. This habitat is a critical component of a loon's nesting territory and is quite different from nesting and foraging areas. In British Columbia, nurseries are characteristically in shallow water (*e.g.*, < 2 m deep) along lake shores and contain emergent vegetation as well as sparse to dense collections of floating and submerged aquatic plants (Figure 10). Loon researcher Judith McIntyre suggests nurseries average 1.75 ha (4.3 acres) or about 15 percent of the loon's territory.

Figure 9. Emergent vegetation, such as cattails, bulrushes, and sedges provide nest sites for Common Loons in British Columbia. Tyhee Lake, BC. 30 May 2000 (R. Wayne Campbell).

Figure 10. At Fraser Lake, in the boreal forest region of central British Columbia, Common Loons take their chicks from an island nest site 0.5 kms over open water to their nursery on the west side of the lake. The narrow band of semi-open vegetation includes mixed beds of cattails, bulrushes, sedges, horsetails, and Buck-Bean. 19 June 1998 (R. Wayne Campbell).

Summer Nonbreeding: Immature loons, as well as displaced nesting birds, may be found throughout much of British Columbia from June through August each year. On the coast protected marine environments are preferred where small numbers, usually less than 10 birds, may occur in loose feeding groups. Larger lakes (Figure 11) and marshes are used in the interior.

Annual Occurrence

Common Loon is present in the province throughout the year (Figure 12). On the coast the main period of residency is during the winter months (December through February) with spring and autumn migration having peaks (Figure 13). In summer, few birds are present in the marine environment.

In the interior, the opposite is true. The breeding season is the main resident period (Figure 13) although records for the spring and autumn migration periods also have peak numbers. The winter season (*e.g.*, December through February) has the lowest numbers.

It has been estimated that 30 percent of the entire North American population of Common Loons winters on the Pacific coast. These birds arrive from breeding grounds in Alaska, Nunavut, Northwest Territories, Yukon Territory, British Columbia, Saskatchewan, Washington, and Montana. The estimated autumn migration for this region is 215,000 to 221,000 loons, of which 184,000 to 189,000 are adults and 31,000 to 32,000 are juveniles.

Figure 11. Even though Common Loon may breed on larger lakes, some lakes are also used in migration and by nonbreeders in summer. Puntzi Lake, BC. 27 July 2008 (R. Wayne Campbell).

Coastal fishermen, boaters, and naturalists in British Columbia often remark on their fascination with watching migrating loons off headlands along the coast. Theed Pearse, while watching migrating Common Loons off Little River (Comox) on 11 November 1930 remarked:

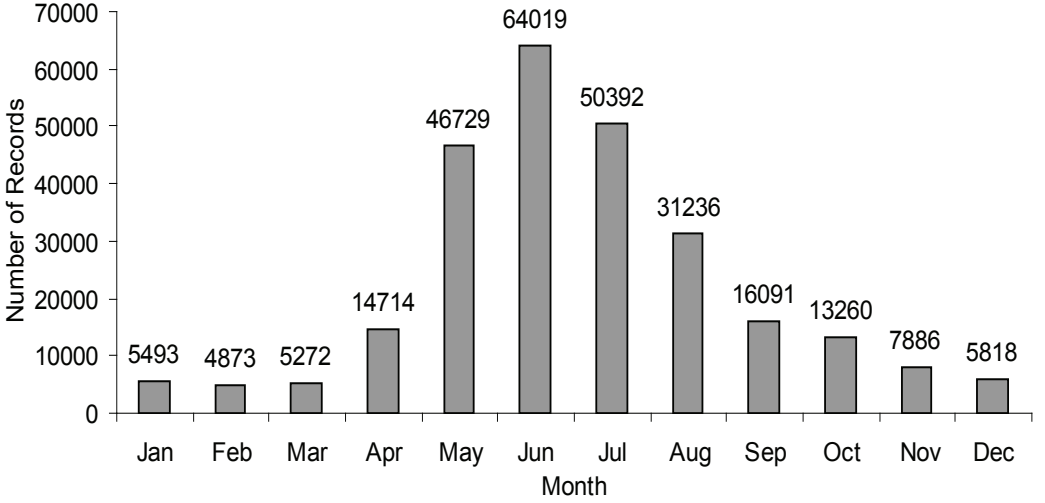


Figure 12. Total occurrence records, by month, for Common Loon in British Columbia, 1887-2008.

"There is no more purposeful flight than the migrating loon. He sweeps along with his methodical powerful strokes, giving the impression that this could be sustained indefinitely."

During the last half of May a spectacular migration of tens of thousands of loons, mostly Pacific Loons (*G. pacifica*), can be observed off headlands on the west coast of Vancouver Island. Interspersed are small numbers of larger Common Loons, usually flying closer to shore (Campbell and Summers 1997).

Common Loon migrates during the day and may travel both short and long-distances each day. Inland it may fly at altitudes of up to 2,500 m through mountain passes (*e.g.*, Pine Pass) to reach breeding grounds.

On the coast of British Columbia, Common Loon is a common spring and autumn migrant and winter resident, and although it breeds on lakes, it is far less common during the summer breeding period along our marine shores where small numbers of nonbreeding birds occur. Highest numbers in summer occur around the Queen Charlotte Islands.

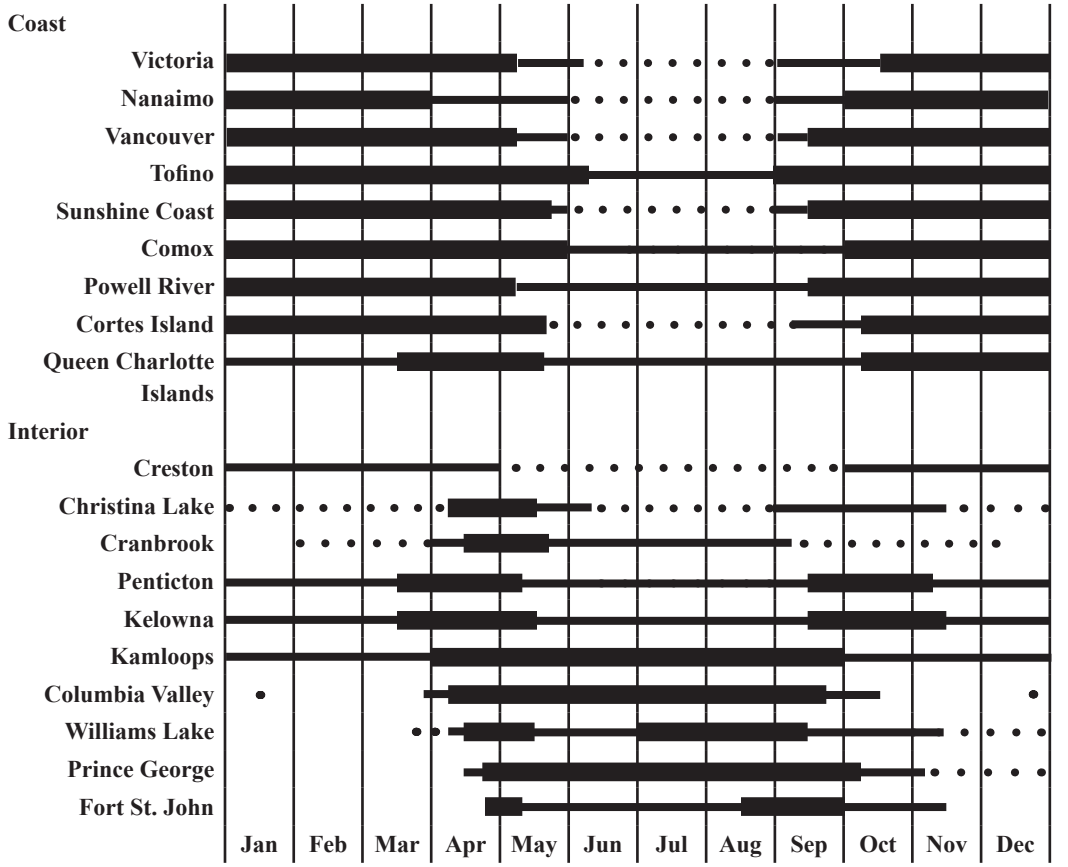
In the interior, Common Loon is also a common spring and autumn migrant and summer resident but only small numbers spend the winter. In summer, a pair of loons must select a breeding site in the interior that has at least a four month ice-free period.

The full breeding period for British Columbia, from nest-building to latest fledging, occurs from 28 March to 17 November, a total of 235 days.

On the coast spring dispersal of winter populations and arriving northward-bound migrants is noticeable in mid-to-late March but the main movement occurs from mid-April to mid-May. The migration corridor occurs mostly in near shore areas within sight of land. Few migrate in the pelagic environment. Some late migrants are still present in early June in some years. The autumn movement is far more protracted than the spring exodus. A few early migrants (perhaps nonbreeders and unsuccessful nesters) may appear in late August but most migrants show up in September with the peak movement occurring in the first half of October. In some years noticeable numbers of migrants may be present along the coast in early November. Large numbers form loose flocks at traditional sites in winter.

In the southern interior, spring migration may be evident during the latter half of March when small flocks of up to a couple dozen loons gather on larger ice-free lakes in southern regions. By the

Figure 13. Annual occurrence of Common Loon for nine coastal and ten interior locations of British Columbia. Locations are listed from south to north for the coast and interior. Thick bars: common; Thin bars: uncommon; Dots: rare; Blank: does not occur.



second week of April the northward movement is pronounced with the peak movement throughout the southern half of the province occurring during the latter half of April and early May. It appears that oblong-shaped Okanagan Lake, 351 km² in area and 111 km long by 6.4 km at its widest point, is the major spring migration corridor in the south-central interior of the province. Other lakes important during spring migration include Shuswap Lake and Williams Lake.

Small flocks of nonbreeding birds, usually one to two-year olds, are scattered throughout the province each summer. On the coast, there is a unique situation that occurs each year on Drizzle Lake, on northeastern Queen Charlotte Islands. The lake is 112 ha in size and is located in an expanse of *Sphagnum* bog and coniferous forest. Drizzle Lake also has a unique population of threespine stickleback that are unusually large for the species and on which loons feed exclusively. During a five-year study at the lake, from 1978 to 1982, biologists Tom Reimchen and Sheila Douglas found Common Loons foraging in the lake from February through November each year. Peak numbers consistently occurred in July with maximum daily numbers ranging from 27 to 60 birds. Common Loons flew to and from the ocean

daily and spent about four hours foraging on the lake each day.

In the interior, larger lakes are used for summering with loose aggregations seldom reaching six birds in late June and increasing slightly in late August (Figure 14). In some years, however, unexplained large flocks may suddenly appear. For example, on Williams Lake, in the Cariboo-Chilcotin region, flocks of 41 loons have been counted on 4 August 1987, and 36 loons on 11 July 1985 and 21 July 1987 (A. Roberts pers. obs.).

Figure 14. St. Mary's Lake near Kimberley is a typical lake in the southern interior of British Columbia that attracts small numbers of nonbreeding Common Loons each summer. 2 May 2005 (R. Wayne Campbell).

Autumn migration may start in late August to early September but the main southward movement occurs during the first two weeks of October. Most migrants have departed by early November in northern areas and by mid-November in southern regions (Figure 13). A few winter on ice-free lakes.

Common Loon (Figure 15) is a widely distributed species in British Columbia and small numbers occur along the coast and throughout the southern interior year-round. Annual historic and current populations are not well documented mainly because information is widely scattered and often not available in a common dataset. Figure 16 - 18 highlight annual numbers for three local areas on the south coast and southern interior and emphasize the importance of near shore habitats for loons.

Figure 15. There are probably hundreds of lakes throughout British Columbia yet to be surveyed that may support breeding Common Loons. One Island Lake, BC. 14 June 1996 (Linda M. Van Damme).

From 1940 to 1966, the late Martin W. Holdom recorded birds in the Crescent Beach area of Greater Vancouver. The area is characterized as a shallow, near shore marine environment. Martin's regular counts of Common Loons spanned 27 years and showed the seasonal significance of small, local habitats for small numbers of loons throughout the year. Annual variation in bi-weekly loon abundance for the 27-year period was minimal (Figure 16). On average three birds were present from January through March with a slight increase during the April migration period. One or two birds spent the summer in the area and in late September and early October migrants built with numbers returning to the winter population of three birds in late October through December.

Occasionally large flocks were reported but these were apparently related to weather conditions or food supply, and all were considered transient. Largest numbers tallied for each month were: January (4), February (15), March (25), April (30), May (8), June (6), July (8), August (12), September (12), October (29), November (30), and December (6).

In the early 1970s weekly counts of loons were carried out at Crescent Beach by volunteers from the Department of Zoology at the University of British Columbia. With the establishment of the Tsawwassen ferry terminal in 1959 there was some concern that the major development may have displaced some wintering and summering birds which may have moved to regions of nearby Boundary Bay. Although

the surveys only lasted three years the numbers were generally consistent with many of Holdom's figures (Figure 16).

North of Crescent Beach, still on the south mainland coast, Ivar Nygaard-Petersen counted loons off the Powell River waterfront in the early 2000s (Figure 17). Again, bi-weekly counts of loons did not fluctuate greatly during the year, thus making it difficult to determine precise migration periods. On average, numbers were slightly higher than for Crescent Beach. Twelve loons in a loose aggregation was the maximum number recorded in spring (2 May 2004) and autumn (24 October 2004 and 10 October 2005). This pattern was also present further south on the Sunshine Coast (T. Greenfield pers. comm.).

In the mid-1940s, Glenn Ryder regularly recorded waterbirds on Okanagan Lake near Kelowna. His observations provide a small window of information on the occurrence and numbers of loons using a tiny portion of the 351 km² lake. It also emphasizes the potential significance of the water body for migrating Common Loons in the province. The migration periods are also better defined than for coastal locations.

The counts (Figure 18) show a gradual build up of loons in mid-to-late March (flocks of 10-15 birds) representing first spring migrants. Numbers peak in late April (40 loons on 28 April 1945) and early May (76 loons on 11 May 1946). Small numbers of non-breeding loons remain during the summer. In autumn, first flocks are noticed in early to mid-September and numbers remained fairly constant through late November. Highest flocks were counted on 22 October 1944 (21 loons) and 19 November 1944 (19 loons). In December, small numbers settle in for the winter.

Monthly Distribution and Relative Abundance

A general synopsis of Common Loon migration, staging, summering, and wintering areas in British Columbia, by month, is shown in Figures 19 to 30. Spring migration occurs mostly in April and May while the return movement occurs mostly in September and October. The caption for each figure summarizes details for each month including significant staging areas.

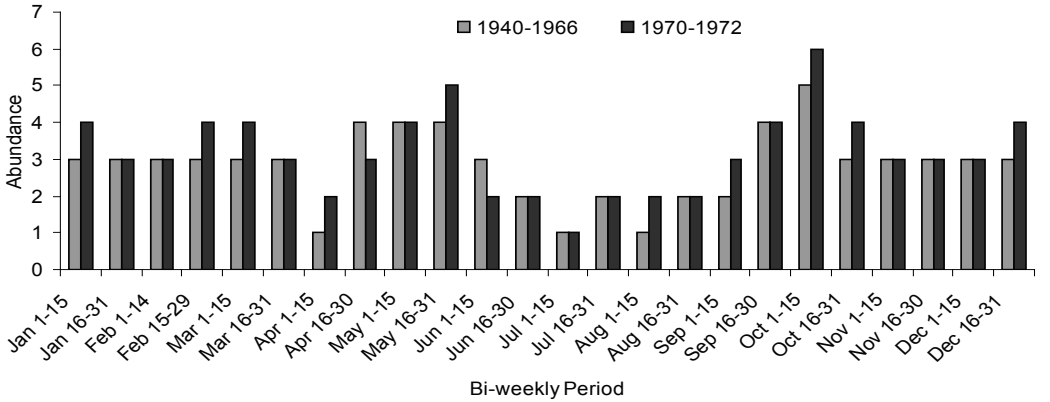


Figure 16. Annual chronology and numbers of Common Loons at Crescent Beach, British Columbia, 1940-1966 and 1970-1972. The count area included the near shore marine environment off the beach. The bi-weekly total is the average number of birds counted for the observation period for all years.

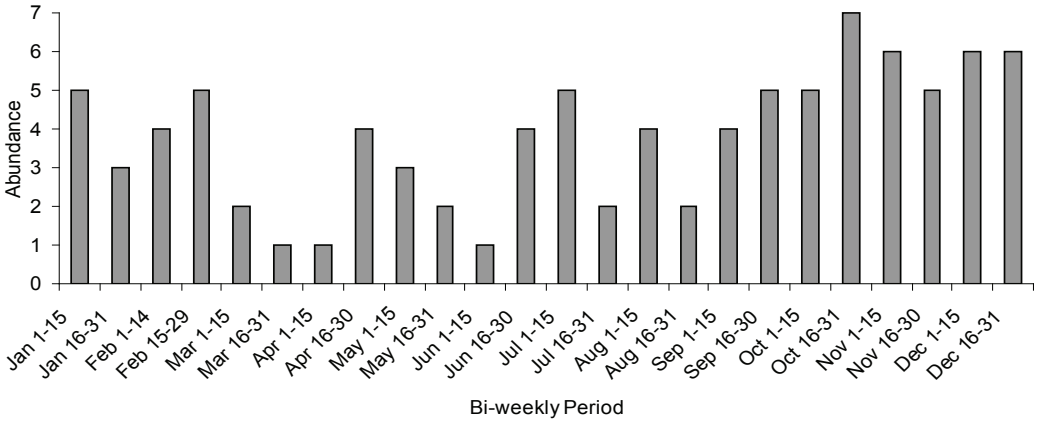


Figure 17. Annual chronology and numbers of Common Loons at Powell River, British Columbia, 2001-2006. The count area included the near shore marine environment along the waterfront. The bi-weekly total is the average number of birds counted for the observation period for all six years.

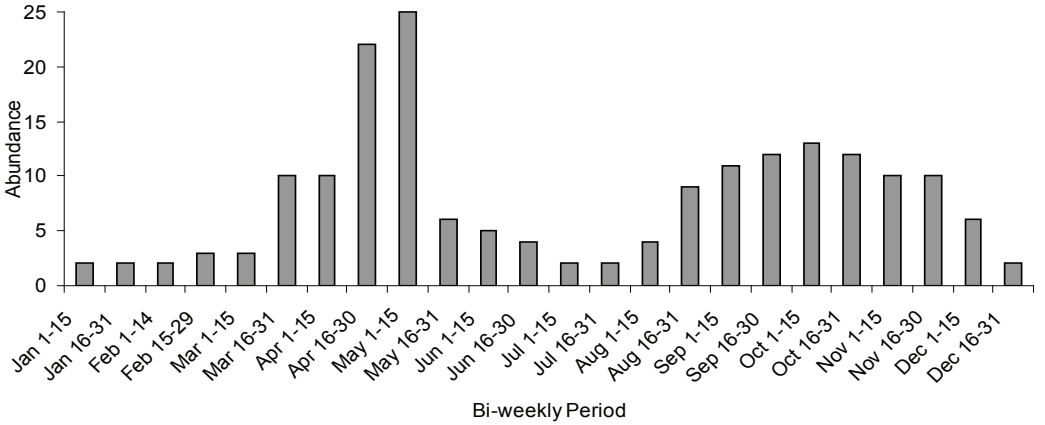


Figure 18. Annual chronology and numbers of Common Loons on Okanagan Lake at Kelowna, British Columbia, 1945-1946. The count area included the lake waterfront along Mission Creek, Poplar Point, "Cameron" Beach, and "Manhattan" Beach. The bi-weekly total is the average number of birds counted for the observation period for all three years.

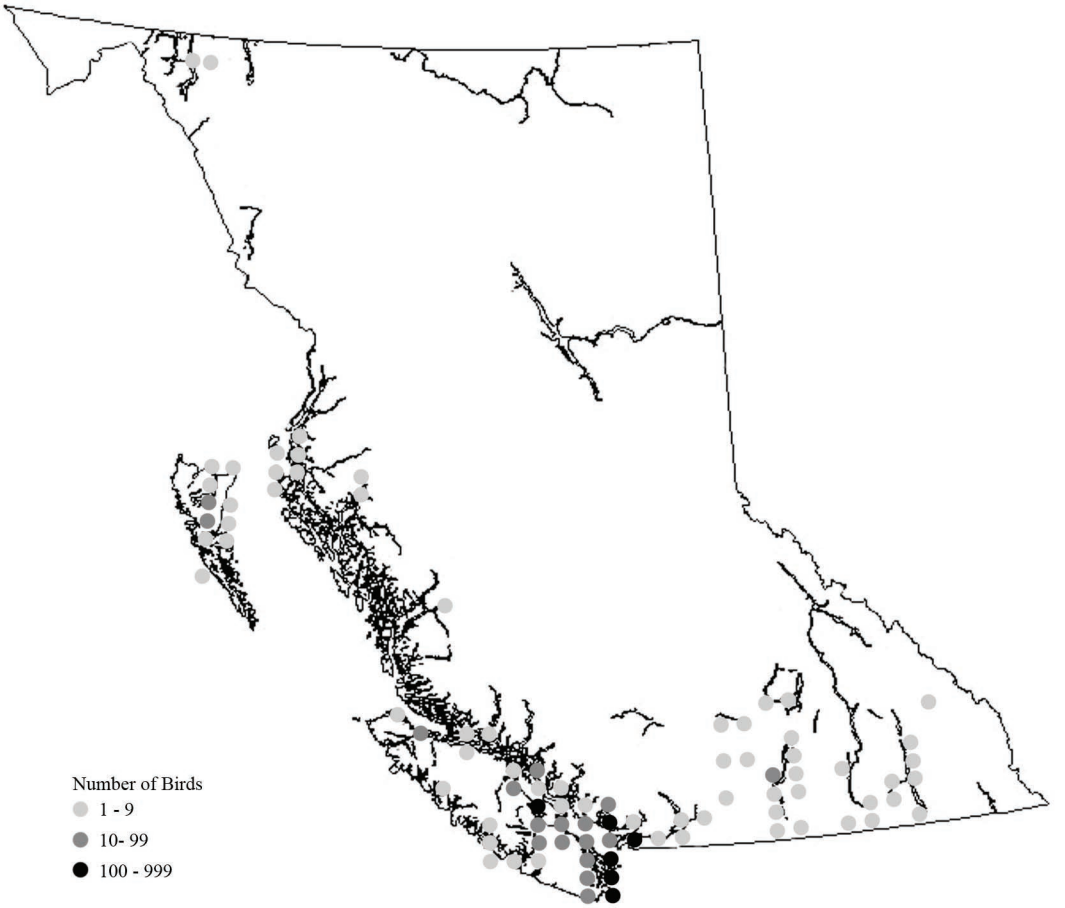


Figure 19. January: ***Coast*** - Well distributed in protected bays, harbours, coves, and inlets throughout Juan de Fuca Strait, Strait of Georgia, at the heads of long inlets on the mainland coast, in sheltered waters along the east side of the Queen Charlotte Islands, and locally in protected waters along the west coast of Vancouver Island. The Strait of Georgia, and to a lesser extent Skidegate Inlet (Queen Charlotte Islands), support the largest populations. Highest numbers occur off southern Vancouver Island, the southern Gulf Islands, and off the Fraser River delta. ***Interior*** - Small numbers are scattered throughout the south-central interior north to the Cariboo-Chilcotin region, on larger, ice-free lakes. Some of these include Okanagan Lake, Christina Lake, Kamloops Lake, and Shuswap Lake. Occasionally, some late departing birds remain on Atlin Lake until freeze-up.

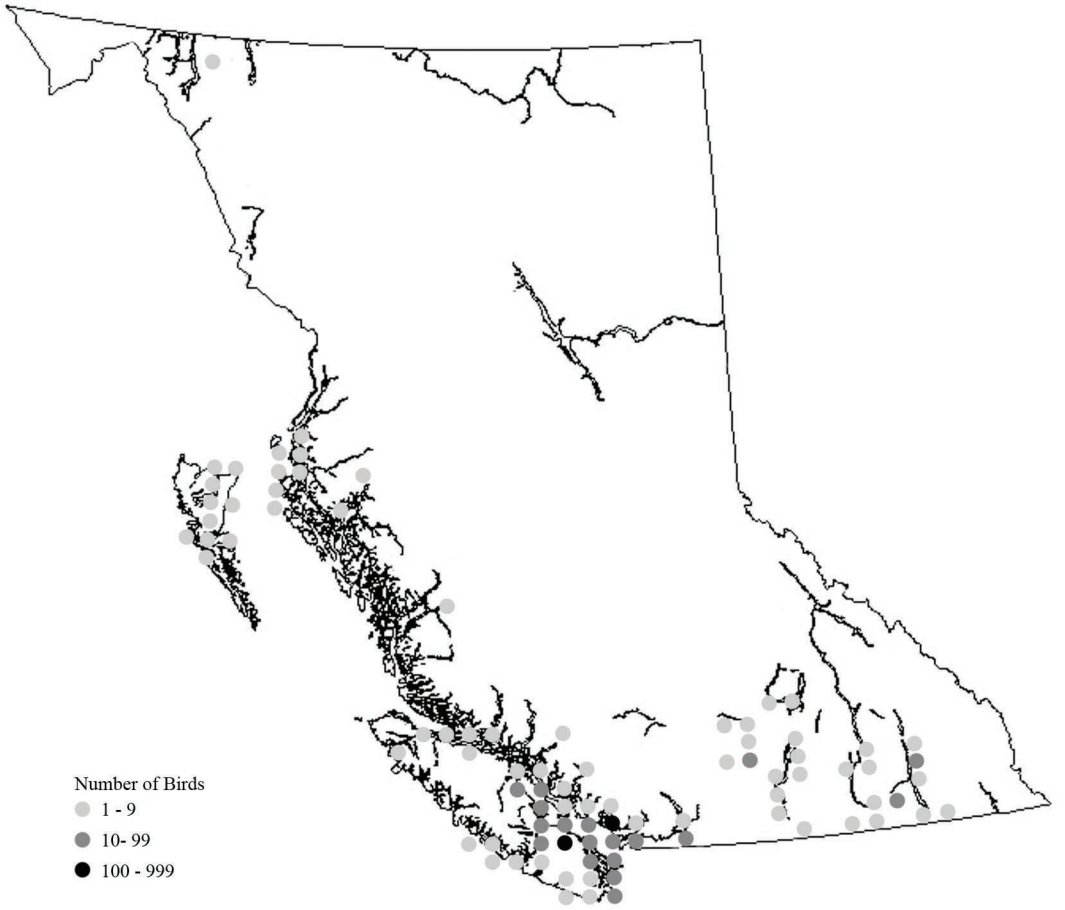


Figure 20. February: ***Coast*** - Populations begin to disperse from major winter aggregations in January to become more evenly distributed, with higher general numbers, throughout the entire Strait of Georgia. Locations of concentrations decreased from six to two sites one of which moved inland to Cowichan Lake. Populations on the north mainland coast and the Queen Charlotte Islands may represent local movements of wintering loons. ***Interior*** - The distribution of wintering birds in January remained relatively unchanged except that small aggregations are beginning to assemble at traditional locations on Kootenay Lake (including West Arm) and Nicola Lake. The wintering loons remained on Atlin Lake until early February.

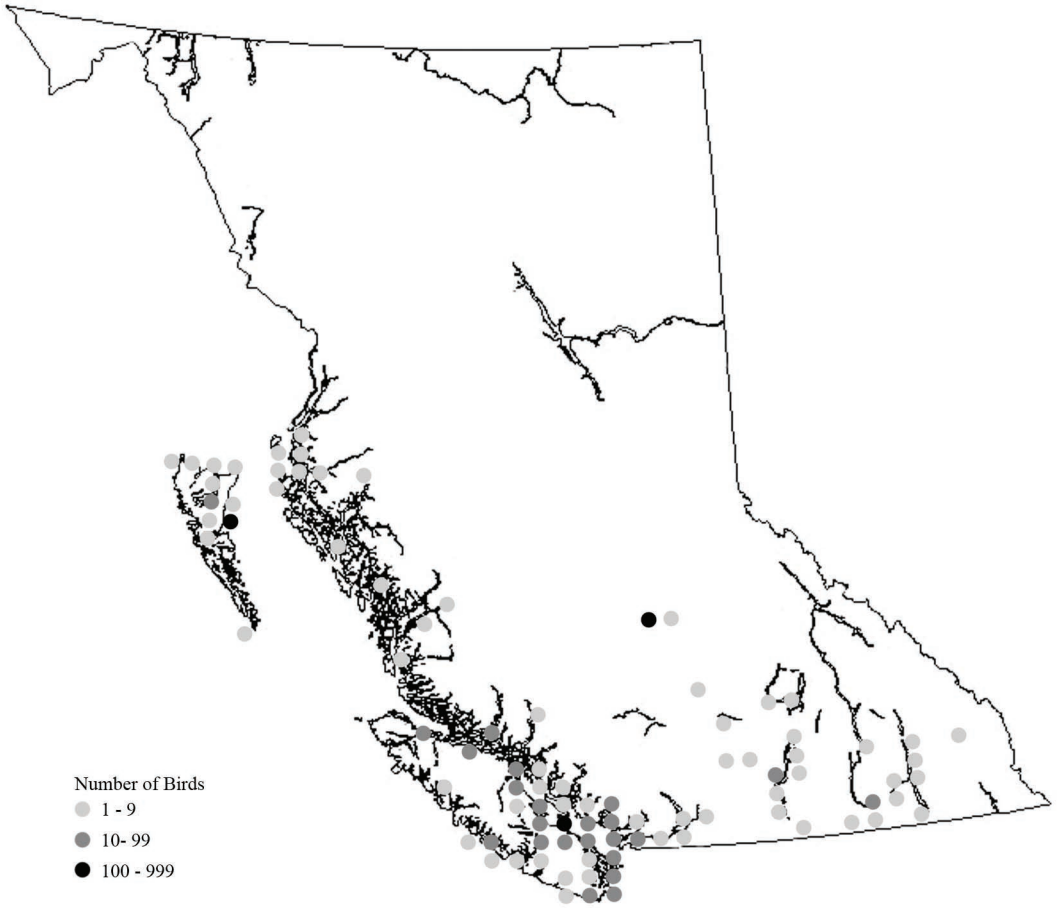


Figure 21. March: ***Coast*** - In late March the spring movement has commenced along the coast with larger numbers occurring in the Strait of Georgia, probably in response to spawning of Pacific herring. The first large staging aggregation on the north coast is evident on the Queen Charlotte Islands in the protected environment of Skidegate Inlet. ***Interior*** - The general holding pattern and dispersal is relatively unchanged from February with the exception of aggregations on Okanagan Lake and an early spring influx on Williams Lake in late March.

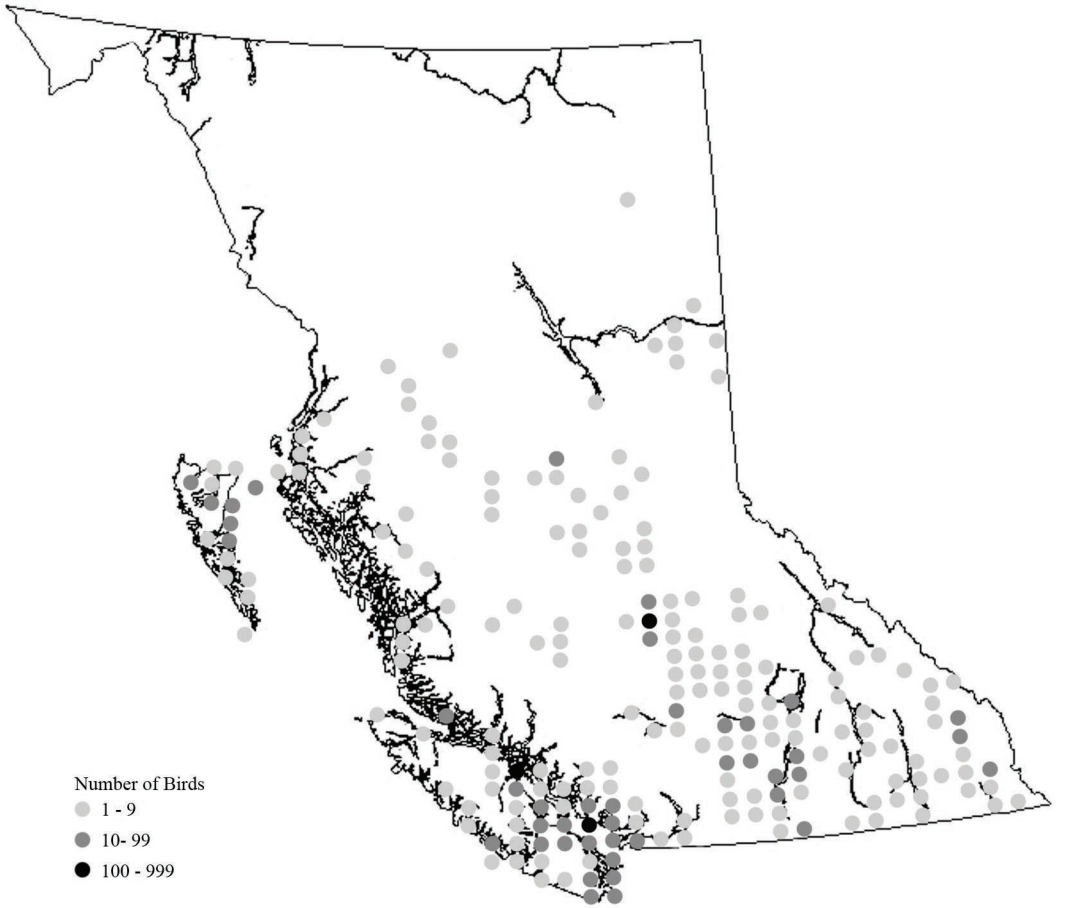


Figure 22. April: ***Coast*** - Spring dispersal and migration is now well underway along the entire coast, with larger numbers being more widely distributed (*e.g.*, Iona Island, 40 birds on 30 April). The largest aggregation was reported in Discovery Passage (Campbell River). Territorial pairs are also dispersing to breeding grounds on lakes in the interior of Vancouver Island. ***Interior*** - Spring migration is now accelerated with staging of up to 134 loons reported on larger lakes in the south-central interior, particularly the Okanagan valley (*e.g.*, Okanagan Lake), Thompson-Nicola region (*e.g.*, Nicola Lake), Shuswap region (*e.g.*, Shuswap Lake) and Cariboo-Chilcotin region (*e.g.*, Williams Lake, 134 loons on 18 April). A few birds have reached ice-free lakes in the central interior and Peace River region but have not yet reached far northern areas.

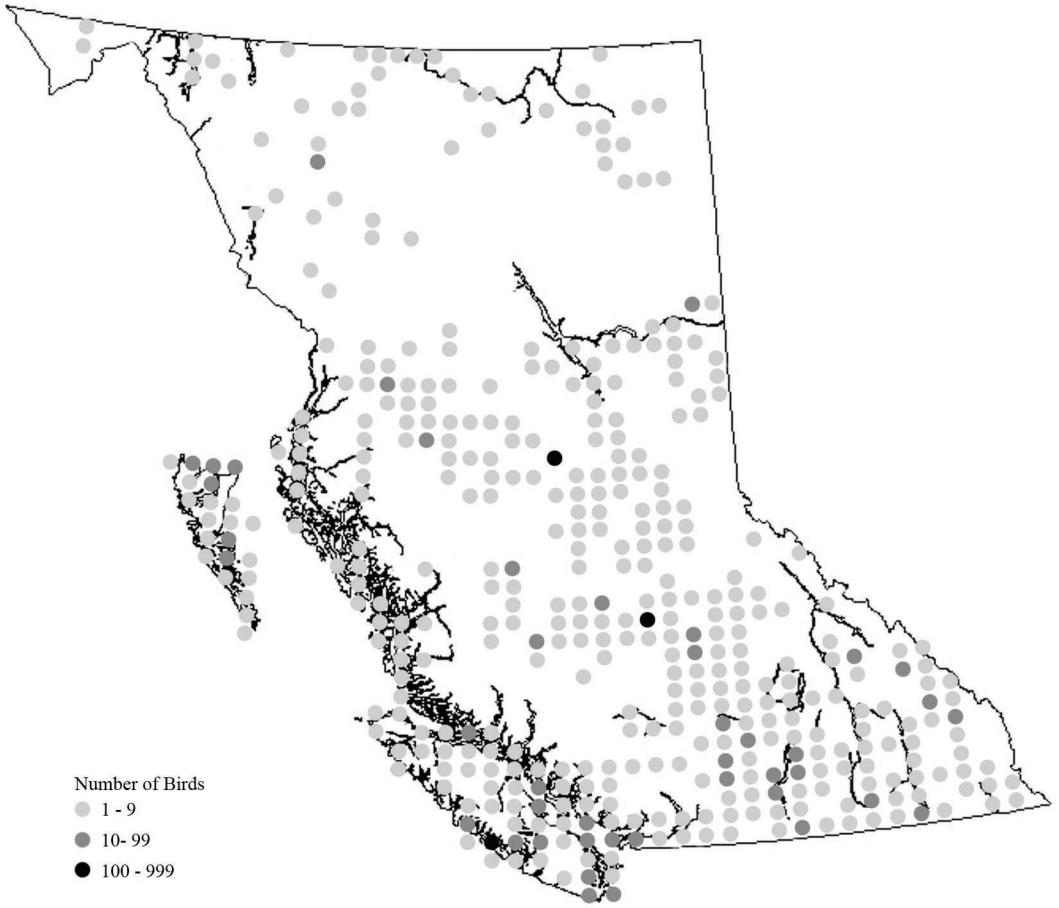


Figure 23. May: ***Coast*** - Spring migration is well advanced with dispersal of staging birds from the Strait of Georgia and Queen Charlotte Islands, along the entire coast and northward into Alaska. The large spring exodus is evident off the outer coast as well, with major numbers staging in the protected waters around Tofino including the harbour, Grice Bay, and McLean Point (*e.g.*, 115 loons from 2-5 May). Nest-building and egg-laying have started for resident loons. ***Interior*** - Some nesting pairs are now established, and breeding has commenced on southern breeding grounds on low elevation lakes. Farther north more staging is occurring on larger lakes (*e.g.*, 110 loons on Williams Lake on 1 May 1982) and general dispersal is nearing completion to northern regions.

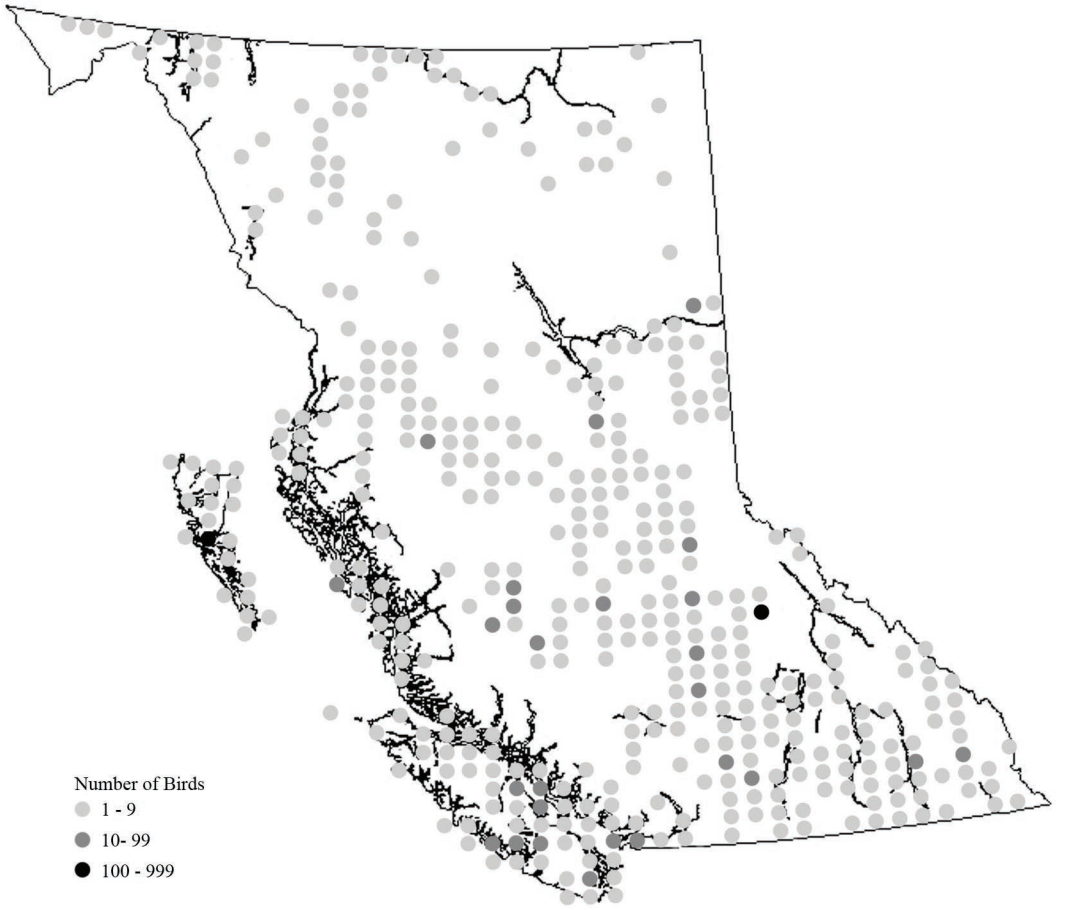


Figure 24. June: ***Coast*** - Late migrants, in small local aggregations, and small numbers of non-breeding summering birds are dispersed along the entire inner and outer coasts. The largest group in the south was 21 loons off Crescent Beach on 21 June and over 100 loons staged in early June in Skidegate Inlet in the north. The first chicks are appearing in some coastal breeding sites. ***Interior*** - Spring migration is now complete and nesting territories are occupied with some chicks already hatching in southern areas. Small aggregations of non-breeding birds are present on some lakes and remain throughout the summer. The largest aggregation were from deep, clear water lakes in Wells Gray Park.

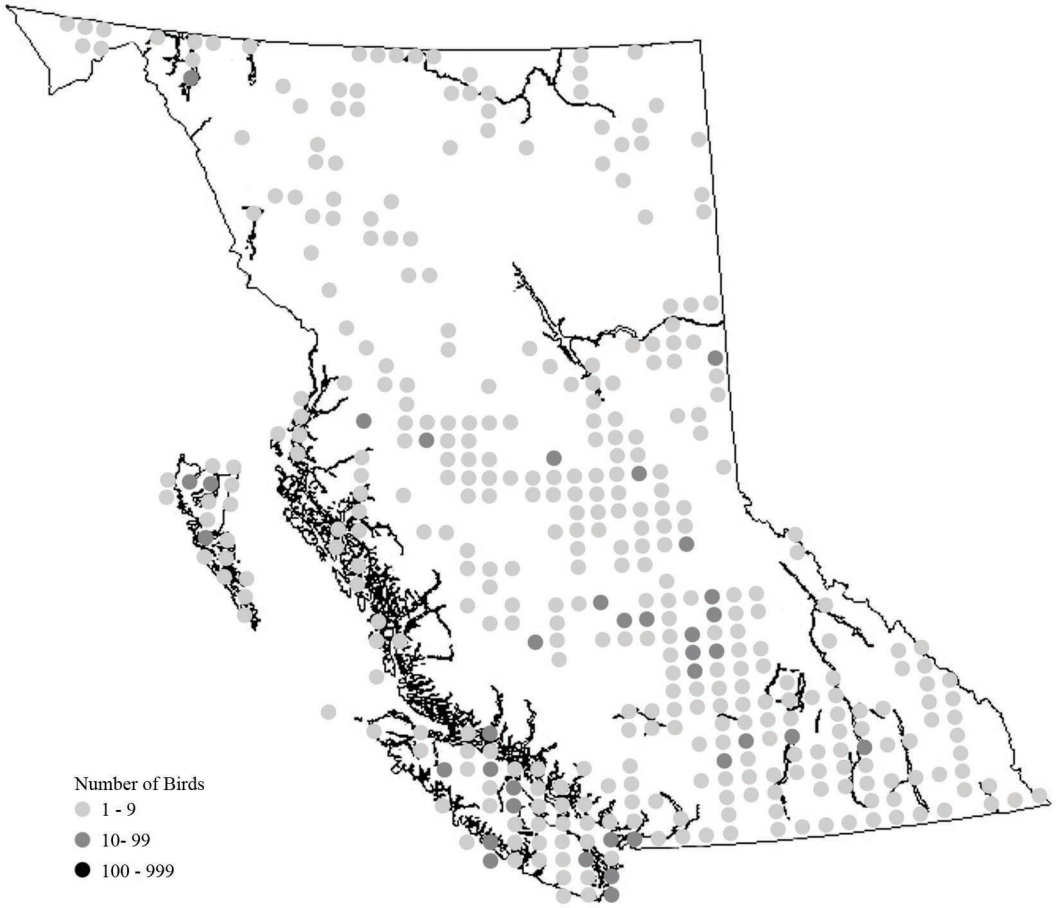


Figure 25. July: ***Coast*** - Nonbreeding loons are widely scattered along the entire inner and outer coast with small to moderate aggregations at favourite feeding areas in protected bays, inlets, harbours, and larger lakes. Largest concentrations are reported from Drizzle Lake on the Queen Charlotte Islands (58 loons on 8 July 1977). ***Interior*** - All successful breeding pairs now have young. Small gatherings of nonbreeding birds are present on larger lakes such as Chilco Lake, Francois Lake, Nicola Lake, Okanagan Lake (north end), Puntzi Lake, Stuart Lake, Swan Lake (Peace River), and Williams Lake (36 in loose flock on 11 July 1985 and 21 July 1987).

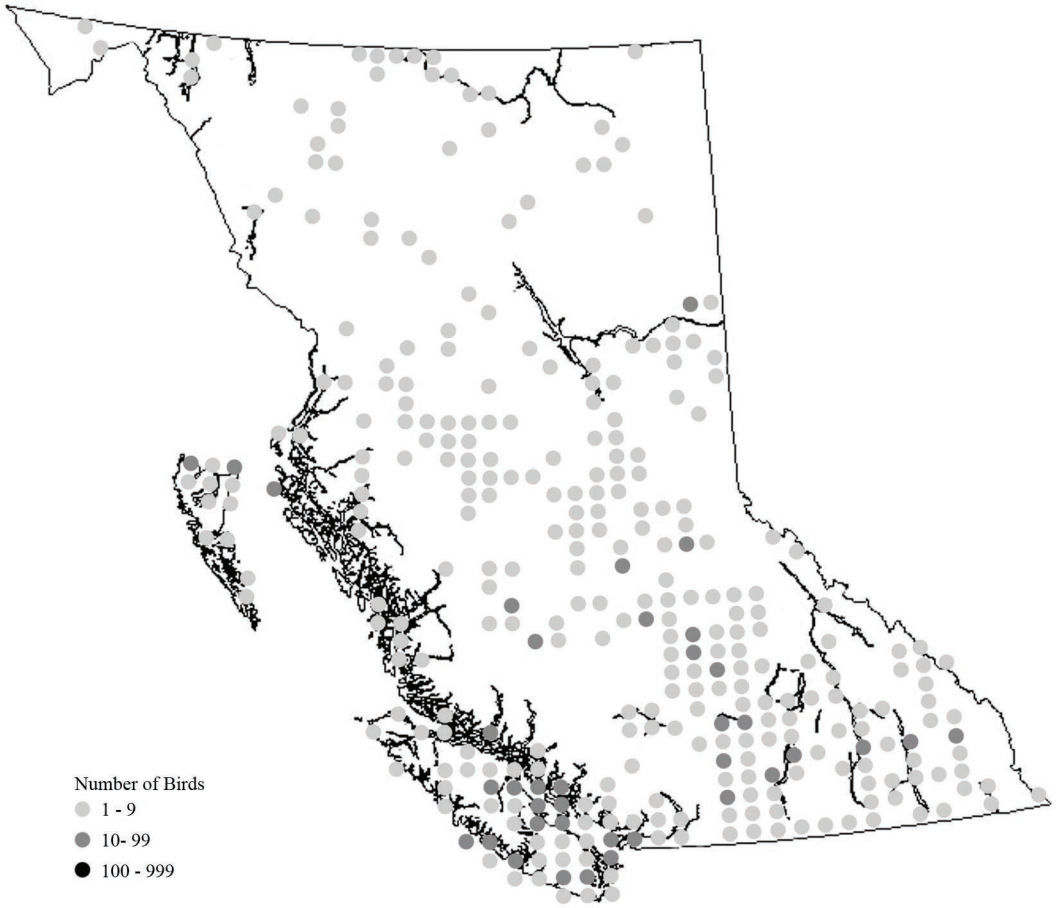


Figure 26. August: ***Coast*** - Small numbers of loons are still scattered along the entire coast from Masset Inlet and Rose Spit on the Queen Charlotte Islands to southern Vancouver Island. Small numbers are also appearing in protected portions along the west coast of Vancouver Island. Aggregations may suggest that small numbers of unsuccessful breeders and nonbreeding birds may be gathering together at local staging areas. Thirty loons at Roberts Bank on 24 August is a large number. ***Interior*** - Most young are growing to the stage where they are ready to fly and breeding season activities are nearing completion. Some loons, probably unsuccessful breeders and nonbreeding birds, are gathering in small flocks on some larger interior lakes (*e.g.*, Williams Lake, 41 loons on 4 August 1987).

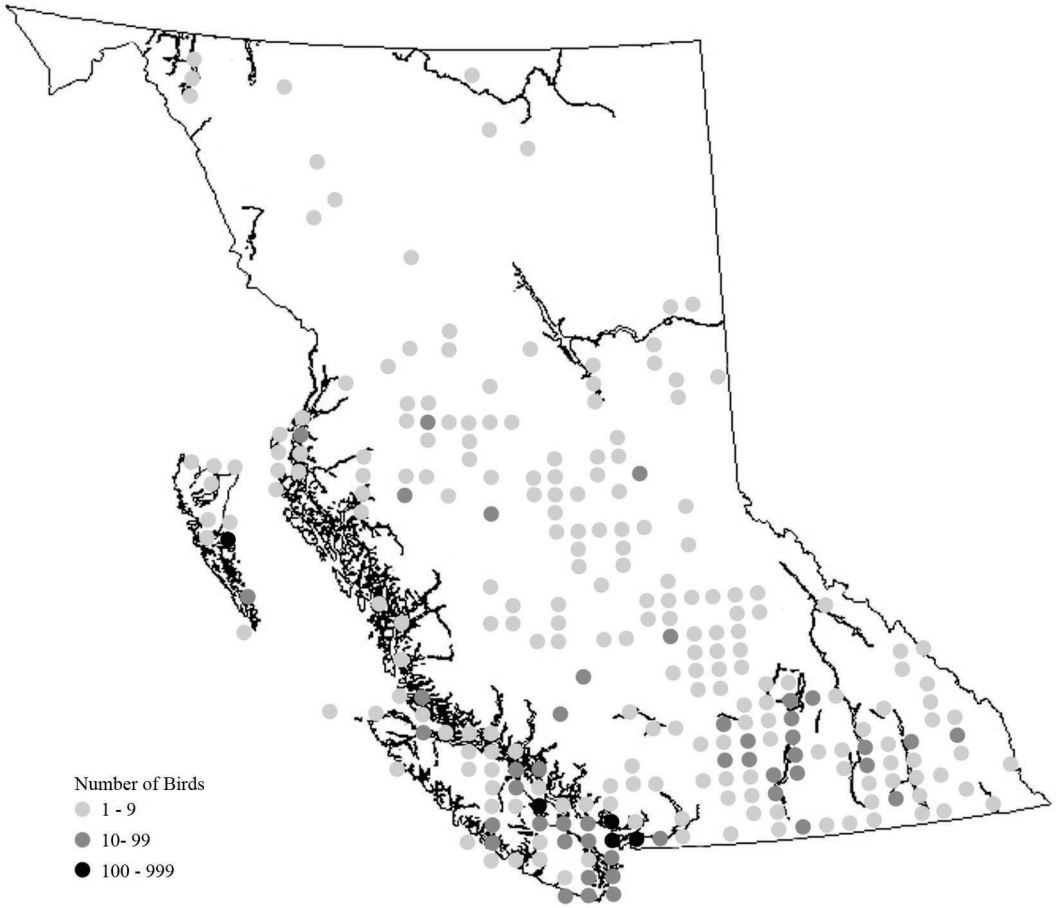


Figure 27. September: ***Coast*** - Autumn migration has commenced along the entire coast, with major staging areas located in Skidegate Inlet (Queen Charlotte Islands) and off Tsawwassen ferry jetty (200 birds on 1 and 11 September) and Boundary Bay (100 birds on 11 September) on the extreme southwest mainland coast. The species is once again widely distributed throughout the Strait of Georgia. ***Interior*** - Much of the far northern breeding population has moved to more southerly regions, with moderately sized flocks gathering on larger lakes throughout the central and southern interior. A few young, not fully capable of sustained flight, are still present on some lakes.

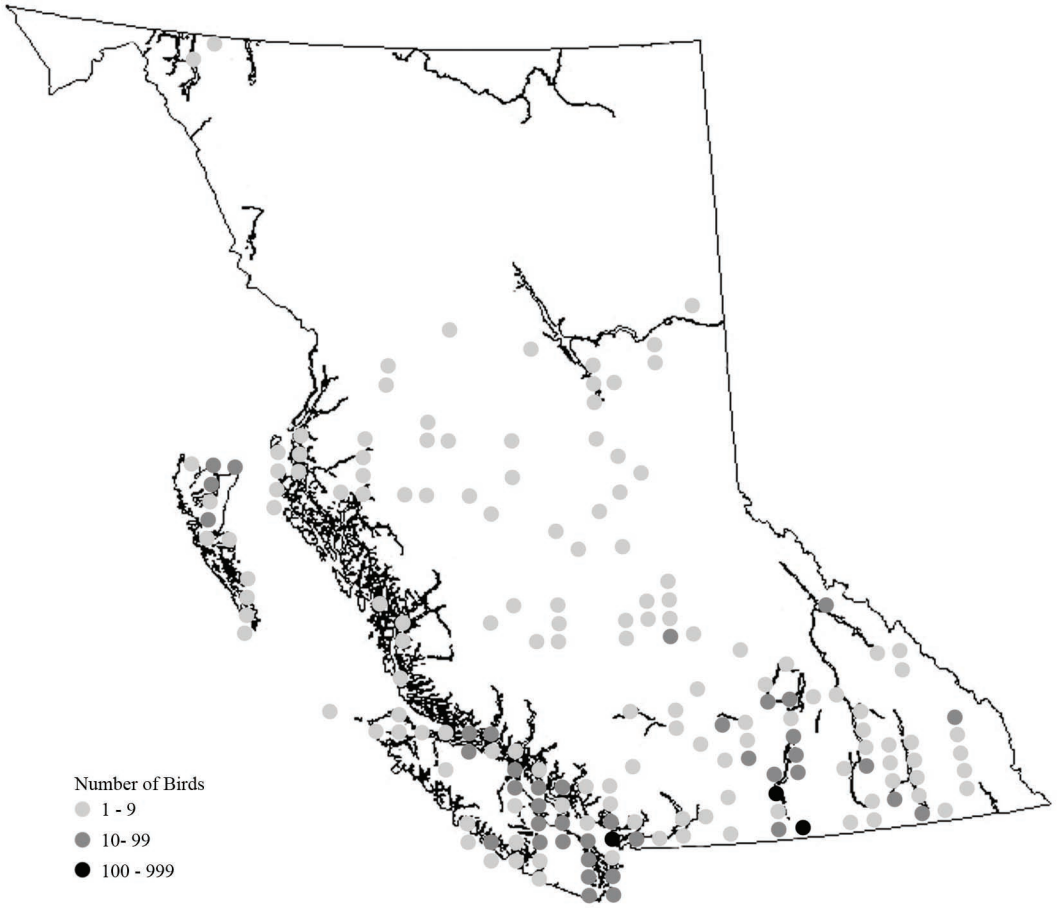


Figure 28. October: ***Coast*** - Autumn migration is peaking with numerous moderate aggregations along the entire coast. Most of the major aggregations off the extreme southwest mainland coast have dispersed further south. ***Interior*** - Populations from northern regions are completely dispersed with the exception of a few birds on Atlin Lake probably arriving from local movements in the Yukon Territory. Small numbers of birds remain on lakes in the central and southern regions with moderate to large numbers staging in loose flocks on larger lakes such as Arrow Lake, Kootenay Lake, Nicola Lake, Okanagan Lake, Osoyoos Lake, and Shuswap Lake.

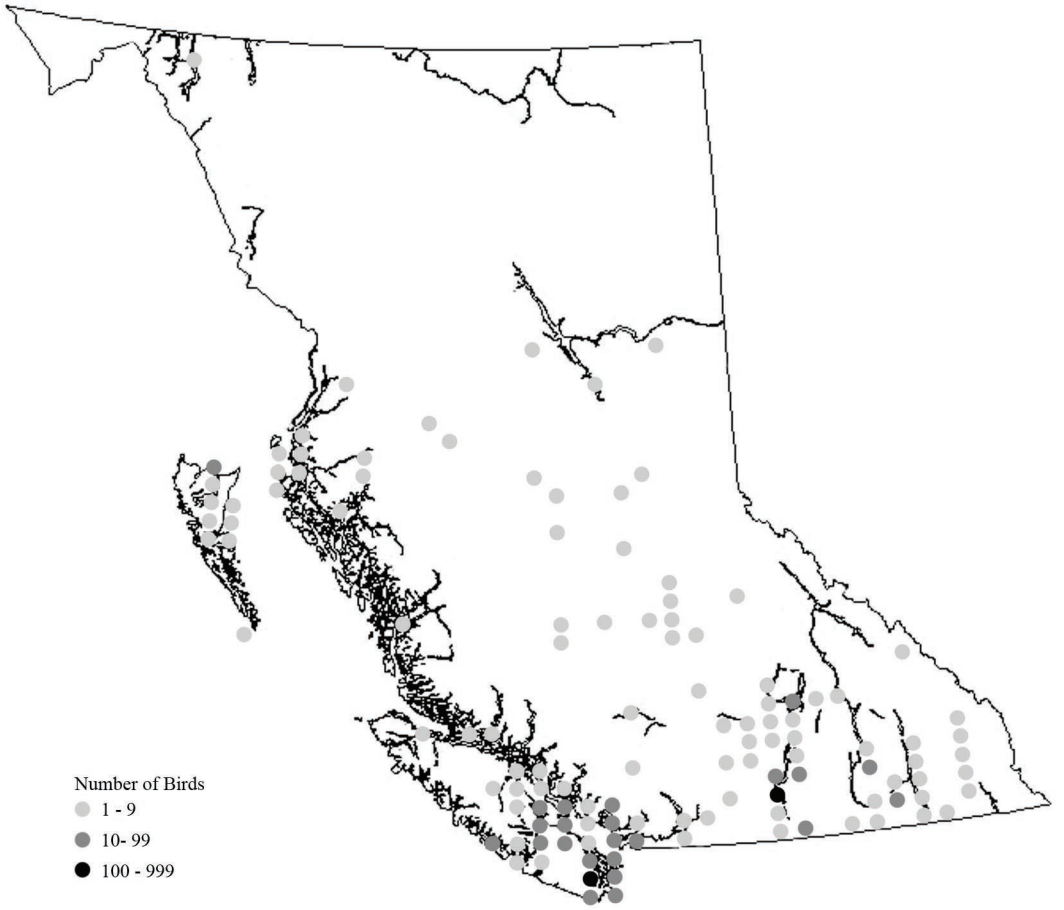


Figure 29. November: ***Coast*** - Most migrants have passed through with moderate aggregations, probably representing most of the wintering population, present off the northern Queen Charlotte Islands and locally throughout the Strait of Georgia. In some years, unusually large aggregations are reported (*e.g.*, 100 birds off Cherry Point on 25 November). ***Interior*** - Most breeders and migrants have dispersed southward from the interior to lakes in the south-central interior of the province and further south. The only major aggregation remaining for the autumn period is on Okanagan Lake.

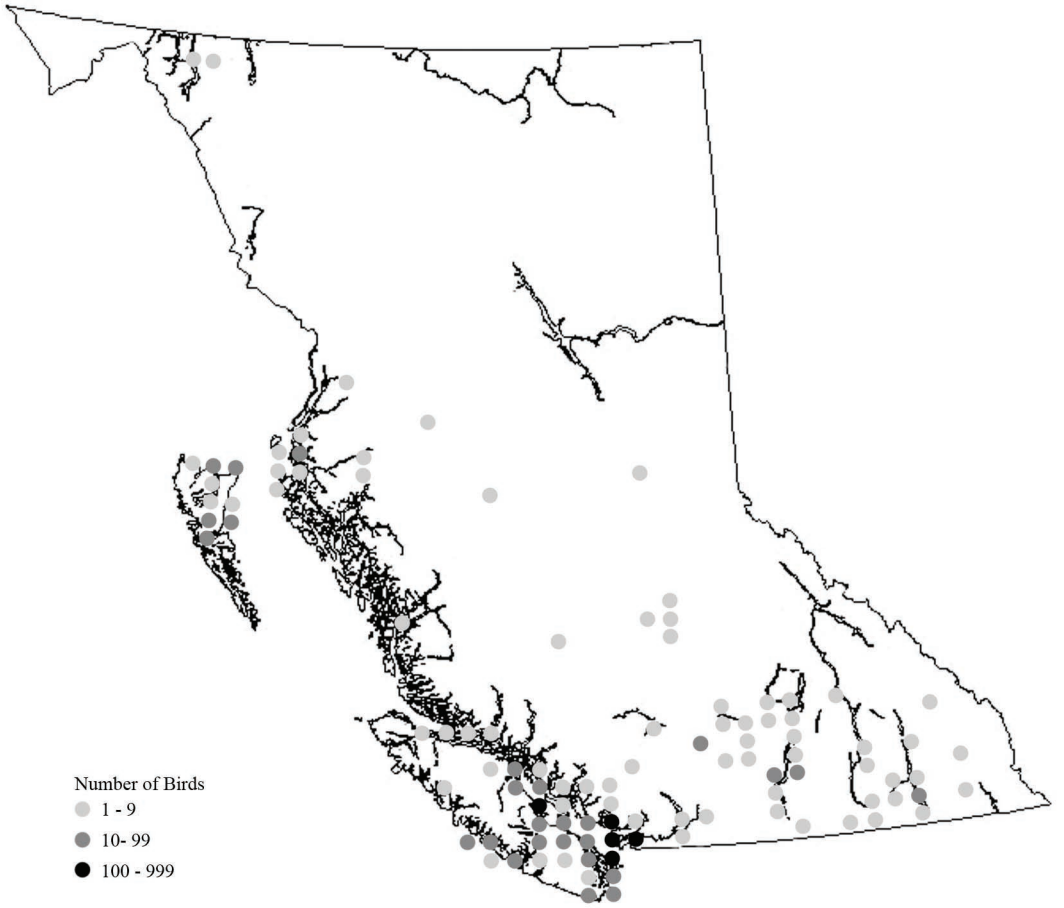


Figure 30. December: ***Coast*** - Wintering populations are established, with moderate to large aggregations found locally along the entire coast including protected bays and harbours on the Queen Charlotte Islands (35 birds on 15 December) and the west coast of Vancouver Island. Major staging areas include specific locations in the Strait of Georgia and Juan de Fuca Strait (*e.g.*, Deep Bay, Roberts Bank, and White Rock). ***Interior*** - Only a few birds remain on large, ice-free lakes, with moderate numbers gathering on Nicola Lake, Okanagan Lake, and West Arm (Kootenay Lake).

Spring Arrival Dates

Like an American Robin heralding spring on the coast with its first full song the arrival of the first loon on thawing lakes in the interior announces the deep freeze is ending. It is an annual event that is witnessed by many but recorded by few. Kris Andrews, who lives on the shore of Williams Lake, has watched this spectacle and gives some insight into the behaviour of arriving loons and the significance of melt water areas. In field notes for 2002 she wrote:

April 4 - 14 Common Loons in front of house.

April 15 - 13-14 Common Loons in morning; 20 Common Loons at 5:30 pm. Seem to be landing one every ½ hour steadily throughout afternoon. Confined by edge of ice. Open [water] *only between causeway and east end of small island on this date. Marsh and northwest end of Williams Lake get ice free earliest each spring. Ice melts progressively east up the lake to the outlet at Sugarcane.*

April 16 – 22 Common Loons at 7:10 am increasing to 39 in afternoon (Figure 31).

April 17 – 40+ Common Loons at 6:00 am.

April 20 – 56+ loons

April 21 – ice completely off the lake.

Early, late, and average spring arrival dates for the coast are difficult to determine because of over-wintering populations at sea and observations year-round from lakes are rarely documented. Even in the southern interior many ice-free lakes support wintering loons making it nearly impossible to identify the "first bird" of the year. Also, in northern areas, it is unusual to have observers living year-round on lakes that freeze completely each year who record annual bird happenings.

Table 1 lists one coast and eight interior locations where lakes freeze completely most years and for which there is some accurate record of the spring arrival of loons. If lakes are frozen upon arrival loons may seek nearby rivers or small melt waters to await break-up.

In the interior, earliest spring arrival dates ranged from 19 March (Nakusp/Burton) to 8 April (Rose Lake), and latest spring arrival dates ranged from 15 April (Rose Lake) to 28 April (Nakusp/Burton). The average known arrival date for six locations

Figure 31. Part of a flock of Common Loons staging on Williams Lake, BC during spring migration. 16 April 2002 (Kris Andrews).

(Christina Lake, Douglas Lake, Nakusp/Burton, Loon Lake, Lac La Hache, Williams Lake) in the interior of British Columbia for the period 1954 through 2006 was 11 April (Table 1). The average for Eagle Lake (21 years) was 22 April, and thus 11 days later, but from a higher elevation lake.

From the mid-1950s through 2006 the average arrival date in the southern interior for three locations (Christina Lake, Loon Lake, Williams Lake) changed from 12 April to 5 April; a difference of 7 days earlier. The greatest difference in average arrival dates occurred at Williams Lake (11 days over 51 years) and is considered significant (see Table 11 on Page 115). The change at Christina Lake was not significant (see Table 11 on Page 115), and nor was the change at Douglas Lake, Eagle Lake, Lac La Hache, and Nakusp/Burton.

Spring Ice-Out

Spring arrival of loons in the interior varies from year to year at any one location and may depend on how early or late the lakes are ice-free. We have numerous reports of loons arriving at frozen interior lakes each spring only to move on in search of open water. Two examples of the correlation between ice-out and loon arrival dates at Christina Lake and Williams Lake in the south-central interior of British Columbia show extreme vagaries.

At Christina Lake (49° 07' 00" N, 118° 15' 00" W) ice-out dates ranged from 28 February to 15 April for 33 years between 1960 and 2006 with an average of 29 March (Table 3). The lake remained open (*e.g.*, ice free) during eight winters including 1961/62,

1967/68, 1981/82, 1987/88, 1998/99, 1999/00, 2002/03, and 2003/04. Common Loons returned to Christina Lake in spring from 28 March to 28 April with an average arrival date (from 49 years) of 12 April (see Table 1). Arrival dates ranged from coinciding with ice-out dates (10 April 1971, 6 April 1972, 6 April 1976, and 2 April 1989) to 52 days (28 February to 20 April 1983) after the lake was ice free. The average arrival of loons after the lake was ice-free was 14.8 days (Table 3). Spring arrival times for loons during ice-free winters ranged from 28 March to 22 April with an average of 10 April, close to the 49-year average of 12 April. In 1996 loons arrived at the lake on 31 March, six days before breakup, and flew to nearby open rivers before returning to the lake.

At Williams Lake (52° 07' 44" N, 122° 08' 27" W) Common Loons arrive before ice-out on the lake (Figure 32). Each year the shallow water at the west end of Williams Lake melts in late March, well before the rest of the lake. Loons, along with large numbers of migrating waterfowl, stop here to rest and feed while waiting for ice-free water elsewhere. Later in spring the edges of this marshy area are favourite nesting sites for one or two pairs of loons. Common Loons returned to Williams Lake in spring (*e.g.*, ice-out years) from 1 to 20 April with an average arrival date of 16 April (Table 3). Arrival dates ranged from one to 15 days (average 6.7 days) before all ice had left the lake. Ice-out at Williams Lake does not appear to reflect climate change but rather the occurrence of strong winds that determines how quickly the ice disappears each spring.

Autumn Departure Dates

Autumn migration is more protracted than the spring movement and some loons wait until freeze-up before they depart. The earliest departures from interior lakes ranged from 15 September (Nakusp/Burton) to 10 November (Rose Lake, Eagle Lake), and latest departures ranged from 13 November (Rose Lake) to 27 December (Williams Lake). The average depature date from interior lakes ranged from 16 October (Nakusp/Burton) to 24 November (Eagle Lake). The average departure date for British Columbia for the lakes that are known to freeze each year is 10 November. (Douglas Lake, Loon Lake, Williams Lake)

Figure 32. Williams Lake is one of the first lakes in the Cariboo-Chilcotin area to thaw and therefore is an important staging area in the interior each spring for migrating Common Loons. Since 1955, the species has arrived 1 - 15 days before ice left the lake. (Anna Roberts).

For the period 1954 - 2006, the average decadal departure date from Williams Lake ranged from 8 November to 2 December (Table 5), and overall is considered significant (see Table 11 on Page 115). From 1970 to 2006, average decadal departure dates ranged from 4 October to 16 December (Table 5), and again represents a significant change (see Table 11 on Page 115). The change in average decadal deparutre dates from Douglas Lake and Eagle Lake suggest later departures, but overall changes are considered non-significant (see Table 11 on Page 115).

Length of Stay

The length of time loons remain in British Columbia on lakes that freeze annually (Figure 33) ranged from 149 days (Nakusp/Burton) to 266 days (Williams Lake) with shorter residency at higher elevations (Table 6). At Williams Lake, loons may now spend up to 73 percent of their total year utilizing resources that the lake provides. With climate change resulting in warmer winters, it is apparent that loons are shifting their winter dependency on coastal regions to some interior lakes that are now remain relatively ice-free (see Page 114).

In the interior, the average decadal length of stay ranged from 175 days (Nakusp/Burton) to 244 days (Williams Lake). The annual period of residency at

Table 1. Early, late, and average arrival dates for Common Loon in select regions of coastal and interior British Columbia, 1954-2006. Locations are listed from south to north for the interior. The average date was calculated by using Julian days (1 Jan = 1; 31 Dec = 365) and then back-converting to a Gregorian (modern) calendar date.

Location	Years	Early	Late	Average	Elevation (m)
Coast					
Anvil Lake	20	13 Mar	9 Apr	26 Mar	18
Interior					
Christina Lake	49	28 Mar	28 Apr	12 Apr	500
Douglas Lake	24	31 Mar	21 Apr	12 Apr	801
Nakusp/Burton	27	19 Mar	28 Apr	12 Apr	650
Loon Lake	42	31 Mar	19 Apr	9 Apr	817
Lac La Hache	12	8 Apr	16 Apr	11 Apr	808
Eagle Lake	21	4 Apr	3 May	22 Apr	1059
Rose Lake	4	8 Apr	15 Apr	11 Apr	1054
Williams Lake	50	28 Mar	21 Apr	10 Apr	565

Table 2. Known spring arrival dates of Common Loon, by decade, for select areas of coastal and interior British Columbia, 1954-2006. Locations are listed south to north for the interior. Date is the average for the decade. The average date was calculated by using Julian days (1 Jan = 1; 31 Dec = 365) and then back-converting to a Gregorian (modern) calendar date.

	1954-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2006
Coast						
Anvil Lake	-	-	-	19 Mar	22 Mar	1 Apr
Interior						
Christina Lake	12 Apr	13 Apr	12 Apr	12 Apr	10 Apr	8 Apr
Douglas Lake	-	-	-	13 Apr	13 Apr	10 Apr
Nakusp/Burton	-	-	18 Apr	13 Apr	9 Apr	8 Apr
Loon Lake	12 Apr	12 Apr	12 Apr	8 Apr	8 Apr	4 Apr
Lac La Hache	-	11 Apr	12 Apr	-	-	-
Eagle Lake	-		-	22 Apr	22 Apr	23 Apr
Rose Lake	-	-	-	-	-	11 Apr
Williams Lake	13 Apr	12 Apr	12 Apr	9 Apr	9 Apr	3 Apr

Table 3. Differences in ice-out and spring arrival dates for the Common Loon at Christina Lake and Williams Lake in the southern interior of British Columbia.

		Ice-out Dates		Spring Arrival Dates		Arrival (days)	
Location	**Years**	**Range**	**Average**	**Range**	**Average**	**Range**	**Average**
Christina Lake	33	28 Feb-15 Apr	29 Mar	28 Mar-28 Apr	12 Apr	0-52[1]	14.8[1]
Williams Lake	12	6 Apr-26 Apr	16 Apr	1 Apr-20 Apr	10 Apr	1-15[2]	6.7[2]

[1] After ice-out

[2] Before ice-out

Table 4. Early, late, and average departure dates for Common Loon in select regions of coastal and southern interior British Columbia, 1955-2006. Locations are listed from north to south for the interior. The average date was calculated by using Julian days (1 Jan = 1; 31 Dec = 365) and then back-converting to a Gregorian (modern) calendar date.

	Years	**Early**	**Late**	**Average**	**Elevation (m)**
Coast					
Anvil Lake	20	8 Aug	7 Sep	24 Aug	18
Interior					
Williams Lake	41	2 Nov	27 Dec	20 Nov	565
Rose Lake	4	10 Nov	13 Nov	12 Nov	1054
Eagle Lake	21	10 Nov	5 Dec	24 Nov	1059
Lac La Hache	12	3 Nov	16 Nov	9 Nov	808
Loon Lake	42	28 Oct	25 Nov	7 Nov	817
Nakusp/Burton	27	15 Sep	21Nov	16 Oct	650
Douglas Lake	23	21 Oct	14 Nov	30 Oct	801

Table 5. Autumn departure dates of Common Loon, by decade, for select areas of coastal and interior British Columbia, 1956-2006. Locations are listed north to south for the interior. Date is the average for the decade. The average date was calculated by using Julian days (1 Jan = 1; 31 Dec = 365) and then back-converting to a Gregorian (modern) calendar date.

	1956-1959	**1960-1969**	**1970-1979**	**1980-1989**	**1990-1999**	**2000-2006**
Coast						
Anvil Lake	-	-	-	26 Aug	31 Aug	15 Aug
Interior						
Williams Lake	8 Nov	10 Nov	11 Nov	12 Nov	4 Dec	2 Dec
Rose Lake	-	-	-	-	-	12 Nov
Eagle Lake	-	-	-	16 Nov	26 Nov	27 Nov
Lac La Hache	-	9 Nov	8 Nov	-	-	-
Loon Lake	4 Nov	2 Nov	2 Nov	6 Nov	15 Nov	19 Nov
Nakusp/Burton	-	-	4 Oct	5 Oct	26 Oct	16 Oct
Douglas Lake	-	-	-	27 Oct	30 Oct	2 Nov

Table 6. Shortest, longest, and average length of stay for Common Loon in select regions of coastal and interior British Columbia, 1954-2006. Locations are listed from south to north for the interior.

	Years	Shortest	Longest	Average	Elevation (m)
Coast					
Anvil Lake	18	124	172	152	18
Interior					
Douglas Lake	23	182	220	201	801
Nakusp/Burton	27	149	238	196	650
Loon Lake	42	195	238	213	817
Lac La Hache	12	203	220	212	808
Eagle Lake	21	198	232	218	1059
Rose Lake	4	179	189	184	1054

Table 7. Average length of stay for Common Loon, by decade, for select areas of coastal and interior British Columbia where lakes freeze annually, 1955-2006. Locations are listed south to north for the interior.

	1955-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2006
Coast						
Anvil Lake	-	-	-	161	162	136
Interior						
Douglas Lake	-	-	-	197	201	205
Nakusp/Burton	-	-	176	175	198	203
Loon Lake	207	204	205	212	222	230
Lac La Hache	-	-	213	212	-	-
Eagle Lake	-	-	-	210	220	220
Williams Lake	210	214	214	218	240	244
Rose Lake	-	-	-	-	-	184

Williams Lake increased by 35 days for an average of 0.7 days per year for the period 1955 to 2006. The average length of stay also increased at Nakusp/Burton by 27 days for the period 1976 to 2006, at Eagle Lake by 11 days for the period 1986 to 2006, and at Douglas Lake by nine days for the period 1983 to 2006 (Table 7).

Family Life

Breeding

Common Loon has a monogamous breeding strategy. It is a solitary nester but if a mate is lost it is usually replaced quickly. Most pairs stay together during the breeding season but spend the winter in different locations. The age of first breeding probably does not occur earlier than four years old but may be as late as eleven years old (D. Evers pers. comm.); the average is six years. When sexually mature pairs breed every year they have a high fidelity to nest sites (Figure 34). There is one brood per year but replacement clutches may be laid if the first nesting attempt occurs early in season. In British Columbia, this has only occurred in the Thompson-Nicola and Cariboo-Chilcotin regions.

Courtship is simple and relatively short and

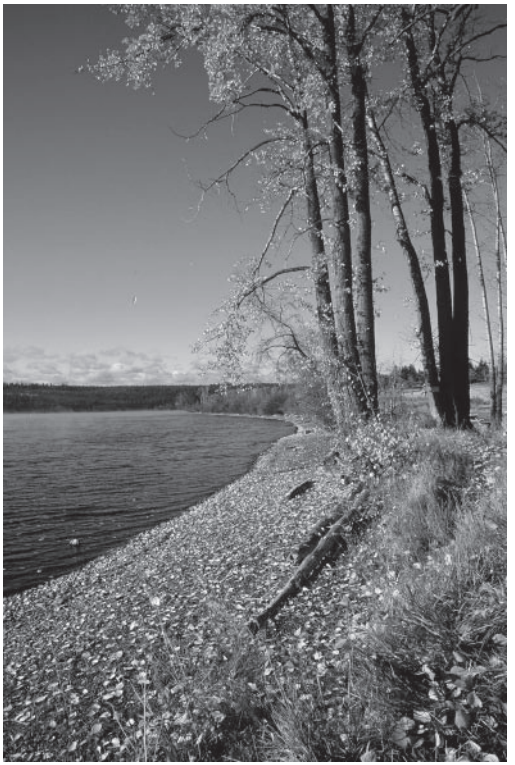


Figure 33. The length of stay for Common Loons on Lac La Hache, BC ranged from 203 to 220 days for 12 years in the 1960s and 1970s. 15 October 1998 (R. Wayne Campbell).

consists of a series of head-turning, bill-pointing, and diving. Copulation always takes place on land, either on a shore, nest, or a semi-solid surface such as a grassy islet.

Annual Cycle: Males may arrive at breeding territories a few days before females just as lakes, rivers, and marshes start becoming ice-free. Arrival times also vary with elevation and latitude. In southern areas of the province pairs may spend four to five weeks on breeding lakes before nesting commences. In northern areas this period may be reduced to a couple of weeks. The full breeding period in British Columbia may extend for nearly six months, from early April in the south (egg-laying) to late September (first flight) in the north. Peak egg-laying occurs from late May through the first half of June while hatching peaks during the last week of June through the first half of July.

Figure 34. The fidelity to a nest site is important each summer for pair formation in Common Loons. This grassy islet, on Nicola Lake, BC is used annually depending on water levels. 27 May 1995 (R. Wayne Campbell). BC Photo 3639.

Figure 35 shows the complete breeding chronology of Common Loon in British Columbia, beginning with nest building in late March and through much of April, and lasting until young-of-the-year depart their natal lake in late September through early November. The peak of breeding, which includes primarily egg-laying, incubation, and the early part of adults tending young, is between 15 May and 1 August.

On the coast, the full breeding period, from first egg to latest known fledging, extends from 21 April through 25 September, a total of 158 days. Among five coastal regions, the period ranged from 103 to 145 days with an average of 124 days (Figure 36). In the interior, the full breeding period extends from 21 April to 14 October, a total of 177 days with an average of 135 days. There is a difference of 51 days between the far northern window and extreme southern interior areas of the province.

The critical period for disturbance for each region is 14 days prior to egg-laying when pair bonding occurs and about two weeks immediately after hatching when chicks are developing in nurseries.

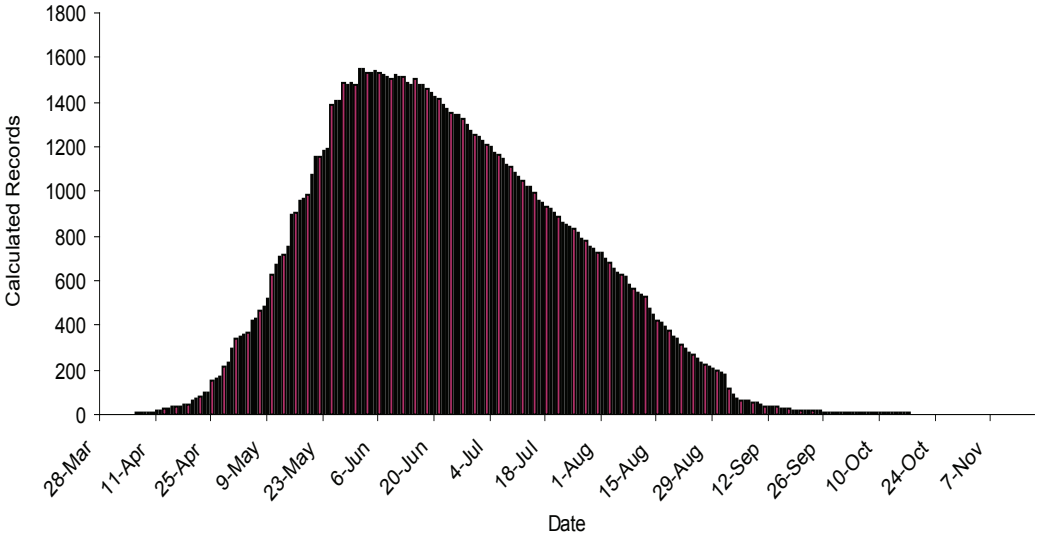


Figure 35. Nesting chronology for Common Loon in British Columbia showing the peak breeding period between, 15 May and 1 August. The figure is based on calculated dates from 2,117 breeding records.

Nests

Common Loon nests on the ground close to the water or on mats of vegetation over water. The nest site is selected by either the male or female and both help with the construction process. Nests, if constructed, are built during the day and adults spend from one to eight days to complete their nest. Some nest sites in British Columbia, especially on wooded islands (Figure 37), are located on a solid, bare shore substrate without any materials and may be reused in successive summers. The longest period for successive reuse of the same nest in British Columbia, at Nimpo Lake, is 9 years (W. Bennie pers. comm.).

Over 46 percent of all nests recorded in British Columbia were situated on the water and built among emergent lake and marsh vegetation (Figure 38). Over 17 percent of nests had no materials with the clutch laid on the bare ground.

The specific location for 412 nests are described as: nest on water among emergent vegetation including grasses, sedges, rushes (Figure 39) bulrushes, and cattails (46.4%), on bare ground on the shore of a lake or large wooded island (17.2%), on a small wooded islet (8.3%), on water in debris collected among fallen tree branches (5.3%), on a partially submerged fallen log (Figure 40), often moss-covered (4.8%), on a Muskrat feeding platform (4.5%), on wind-blown flat collections of cattails and bulrushes (4.2%), on a muskeg islet (3.5%; Figure 41), on human-made nesting platform (2.6%), on an American Beaver lodge (1.9%), among shore rocks (1.0%; Figure 42), and on top of a stump in a lake (0.3%).

All nests had a direct, unobstructed access route to deeper water and were frequently located close to a steep drop-off. Some pairs used deeper American Beaver runways as routes to and from nests. A few pairs of loons have been found tending nests on free-floating and drifting islets of vegetation (*e.g.*, Cleswuncut Lake) and have successfully raised young. On some lakes (*e.g.*, Dina Lakes, Lac du Bois, Stump Lake, Mugaha Creek) loons have successfully nested on platforms placed as part of local conservation projects.

Nest materials, when present, included loose collections of nearby twigs, leaves, branches, and bits of driftwood to well constructed piles of wet vegetation and soil (Figure 43). Specific materials included marsh grasses, bulrushes (*Scirpus*

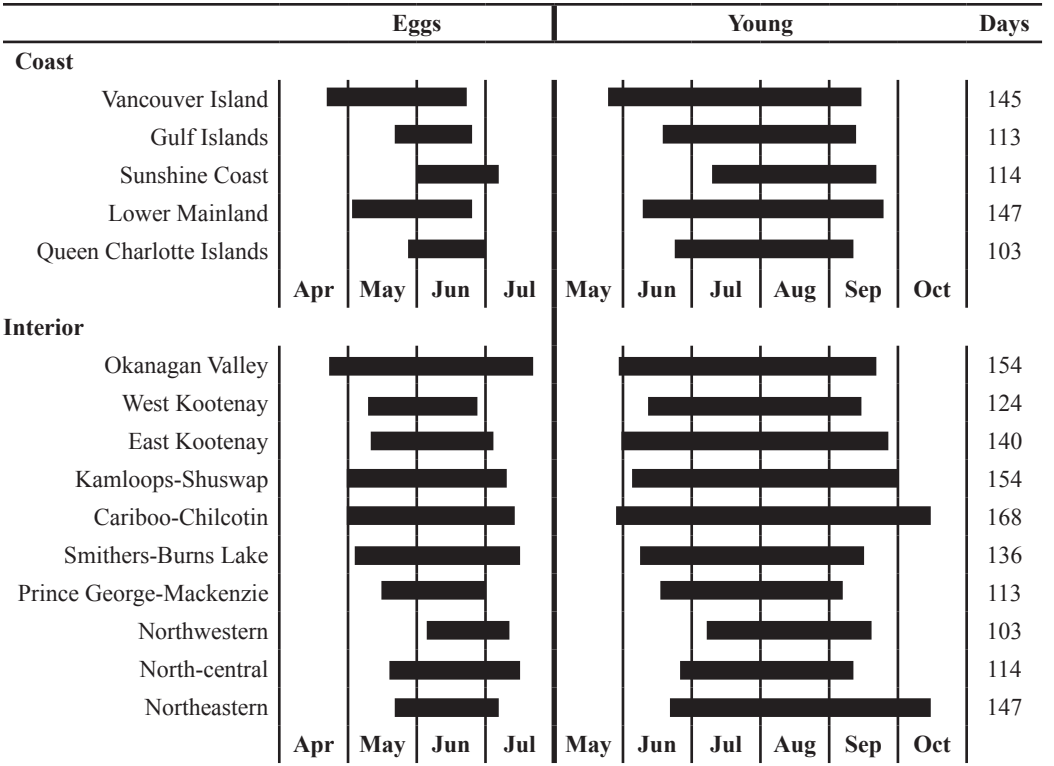


Figure 36. Breeding chronology of Common Loon for five coastal and ten interior regions of British Columbia, 1889-2008 (n = 2,117). Days include the maximum breeding period from first egg to latest known fledging.

Figure 37. The gentle-sloping open bare dirt and rock shores of wooded and shrubby islands in lakes are frequently used for nesting by Common Loons. Wolverine Lake, BC. 5 July 1998 (R. Wayne Campbell).

Figure 38. Most Common Loon nests found in British Columbia are constructed among large beds of emergent plants, often with a "runway" to the site. Tudyah Lake, BC. 2 July 1997 (Linda M. Van Damme).

Figure 39. Common Loon nest built among rushes (*Juncus* spp.) and other aquatic plants forming a tiny islet in a lake. Near Chetwynd, BC. 31 May 2007 (R. Wayne Campbell).

Figure 40. This Common Loon nest was anchored to a partially submerged log in the middle of a lake near Chetwynd, BC. 31 May 2007 (R. Wayne Campbell).

Figure 41. Muskeg islets in lakes provide ideal nest sites for Common Loons as some float with changing water levels. Cleswuncut Lake, BC. 7 June 1996 (Linda M. Van Damme).

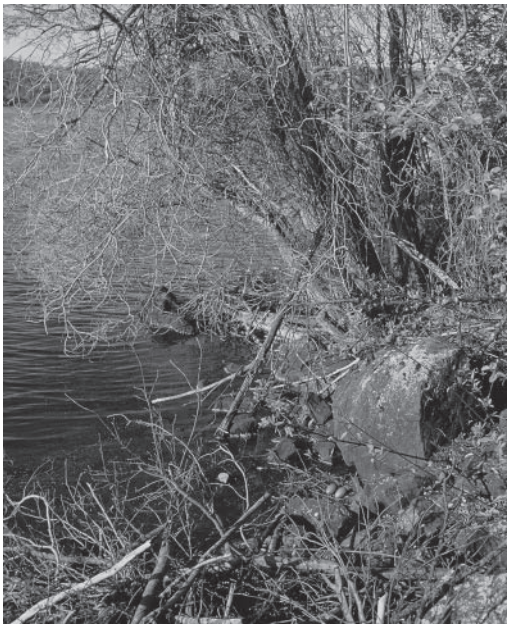


Figure 42. Small openings among rocky shores of islands in lakes are occasionally used as nest sites for Common Loons. Many of these sites are lost due to changing water levels. The nest, with two eggs, is situated at the base of the large boulder. Fraser Lake, BC. 8 June 1996 (R. Wayne Campbell).

Figure 43. A few Common Loon nests are elaborate structures of plant material, like *Sphagnum* moss, that is gathered close to the nest site and built on some anchored substrate. Near Chetwynd, BC. 31 May 2007 (R. Wayne Campbell).

americana), leaves and stems of cattails (*Typha latifolia*), Yellow Pond-lily (*Nuphar variegatum*), Buck-Bean (*Menyanthes trifoliata*), rushes (*Juncus* sp.), sedges (*Carex* sp.), horsetails (*Equisetum* sp.), aquatic weeds, mosses, lichens, twigs, leaves, small stones, coniferous and deciduous seed-casings, live and dead parts of coniferous and deciduous branches (Figure 44), and bits of driftwood and twigs (Figure 45). Over the past decade or so some human material, including plastic combs (Figure 46), string, paper, and a variety of plastics, have been showing up in nests.

Figure 44. Some Common Loon nests contain material that is readily available along the lakeshore including parts of dead and living western redcedar branches, western white pine branches, small cones, mosses, bark chips, lichens, and bits of wood. Summit Lake, BC. 9 June 1988 (Gary S. Davidson).

Figure 45. Loose collections of twigs collected from the water surface or in the immediate vicinity of the nest site form the substrate for Common Loons nesting among rocky shores of islands in lakes. Fraser Lake, BC. 8 June 1996 (R. Wayne Campbell).

The nest itself ranged from 28 to 78 cm (11 to 31 in) in size and weighed up to 20 kg (44 lbs).

Figure 46. Human material, such as plastics, string, rope, and pieces of milk cartons have recently been found more regularly in loon nests in high recreation areas. This pair incorporated a black comb into their nest. One Island Lake, BC. 14 June 1996 (Linda M. Van Damme). BC Photo 3648.

<u>*Eggs*</u>

In 1975, Judith McIntyre wrote in her Ph.D. thesis "*Anyone who has seen a loon egg is apt to remember it first for its size. Any female loon who has ever laid one no doubt remembers it for the same reason.*" Early egg collectors knew this was true!

The egg is sub elliptical to oval in shape. The surface texture is slightly granular to smooth with a ground colour of olive to brown with dark brown and black splotches that vary in size and distribution (Figure 47). Two-egg clutches are laid one to three days apart shortly after the nest is completed. If a clutch is lost early in the nesting season, at least in southern regions of the province, a pair may renest within 10 to 18 days. The average size of the eggs in the replacement clutch are usually smaller in length and breadth.

The average size of an egg is 87 mm (3.4 in) long x 54 mm (2.1 in) wide but varies throughout North America. The second (and third) egg is smaller than preceding eggs. In British Columbia, the number of eggs recorded in a single nest ranged from one to three eggs with the most common being two-egg clutches (n = 421; 69%). Single three-egg clutches have

Figure 47. Common Loon eggs are large, oval in shape, and dark brown, sometimes greenish, with black splotches scattered over the entire surface. Two eggs is the most common clutch size in British Columbia. Fraser Lake, BC. 22 May 1994. (R. Wayne Campbell).

been found at McLure Lake near Smithers (Dennis Horwood), Nimpo Lake in the Cariboo-Chilcotin (Winifred Bennie; Figure 48), and Shawnigan Lake on Vancouver Island (E. M. Anderson).

Both sexes incubate but the amount of time spent by the male or female varies between pairs. The incubation period ranges from 27 to 31 days but averages 28 days. Each adult usually changes incubation duties every two to four hours.

Figure 48. Only three nests in British Columbia have been reported containing three eggs. Nimpo Lake, BC. 23 June 1979 (Winifred M. Bennie). BC Photo 570.

Young

Chicks peep inside the egg before the pipping process begins. The chicks hatch asynchronously, that is at different times. Breaking through the shell and emergence from the egg may take up to 52 hours but usually occurs between 8 and 15 hours. The chicks are semiprecocial, are dry within an hour of hatching, and leave the nest within a day of hatching but are dependent on adults for food (Figure 49). They may be brooded on an adult's back while swimming for up to two weeks. By eight weeks of age young can capture about half of their own food.

Figure 49. Common Loon chicks are dependent on their parents for food from soon after hatching to about eight weeks old. Box Lake, BC. 2 June 1991 (Gary S. Davidson).

New chicks are sooty black with a white belly. When about three weeks old the plumage changes to a brown-gray down and although rapid growth follows, some traces of down are still visible by week seven. By week eight chicks are almost fully feathered and start exercising their wings. First flight takes place at 11 weeks old but may be delayed for up to 13 weeks depending on local situations.

Broods of three young, tended by two adults, have been reported from Bowron Lake (Derek O'Brien) and Six Mile Lake near Wells (Glenn R. Ryder) and a single brood of four young, all the same size, was found at the north end of Lac La Hache (William D. McLaren). There is a report in North America of a pair of loons successfully raising four [possibly adopted] chicks (Timmermans et al. 2004).

Nesting at Williams Lake

From 2001 through 2006 Kris Andrews monitored a nesting pair of Common Loons that returned to a small bay at the west end of Williams Lake (Figure 50; Table 8). The pair occupied an area that was centered between Scout Island on the south, the causeway to Scout Island on the west, and an area along the north shore of the lake extending some 800 m east of the causeway (Figure 51).

The loon territory includes a shallow portion of the lake ranging from <1 m deep around the shore to 3 m deep in the centre of the bay (British Columbia Ministry of Environment bathymetric maps). The dominant emergent vegetation at the edge of this 1-m deep marshy area is bulrush (*Scirpus validus*), and cattail (*Typha latifolia*). In summer, as the water levels

Figure 50. Between 2001 and 2006, Kris Andrews monitored the precise nest location of a pair of Common Loons in a small bay at the northeast end of Williams Lake, BC. 16 May 2005 (R. Wayne Campbell).

Table 8. Annual nesting chronology for a pair of Common Loons at Williams Lake, British Columbia, 2001-2006.

	2001	2002	2003	2004	2005	2006
First Nesting						
Spring arrival	Apr 8	Apr 13	Apr 6	Apr 3	Apr 6	Apr 3
Ice-off lake	Apr 16	Apr 21	Apr 8	Mar 27	Apr 1	Apr 9
Pairing	no[1]	Apr 22	Apr 16	Apr 9	Apr 11	Apr 13
Nest-building	no	no	May 3	Apr 28	Apr 22	May 2
Mating	no	no	no	no	May 7	May 19
Egg-laying	May 20	no	May 13	May 13	May 13	May 23
Number of eggs	2	no	2	2	2	2
Hatch date	Jun 17	no	na	Jun 11	na	Jun 19
Number of young	2	no	na	1	na	2
Nesting abandoned	na[2]	no	Jun 12	na	May 16	na
Second Nesting	na	no	yes	na	yes	na
Mating	na	Jun 23	Jun 19	na	May 27	na
Egg-laying	na	no	Jun 27	na	May 28	na
Number of eggs	na	no	2	na	2	na
Hatch date	na	no	na	na	na	na
Number of Young	na	no	na	na	na	na
Nesting abandoned	na	no	Jul 31	na	May 29	na

[1]No observation but one or two loons in territory.
[2]Not applicable.

drop, the fruiting stems of pondweeds (*Potamogeton* spp.) and native water-milfoils (*Myriophyllum* spp.) can be seen above the water surface. The south side of this marshy area adjoins the islands which make up Scout Island Nature Centre. Here the riparian vegetation is a thick cover of water birch (*Betula occidentalis*), mountain alder (*Alnus incana*), and willows (*Salix* spp.).

A few residential wharves, and a float plane dock, are scattered along the north side of the loon's territory, and a gravel causeway to Scout Island bounds the western edge.

During the six years of observations adults arrived on territory between 3 and 13 April (average 6 April) and from two to eight days before complete ice-out on the lake (Table 8) Ice leaves the west end of the lake first and progresses east. Within 9 - 10 days after arrival loons were paired and exploring their territory, and within 17 to 36 days nest-building started. In 2001 and 2006 the nest site was on the shore of a small island (Figure 51). From 2003 to 2005 loons constructed their nest on the water at the edge of bulrushes. Despite differences in recorded annual arrival and pairing dates the first egg was laid in three of the four nests with complete data on 13 May. Known hatch dates ranged from 11 to 19 June.

Variability in the dates of arrival, pairing, and nest building may be an artifact of frequency of

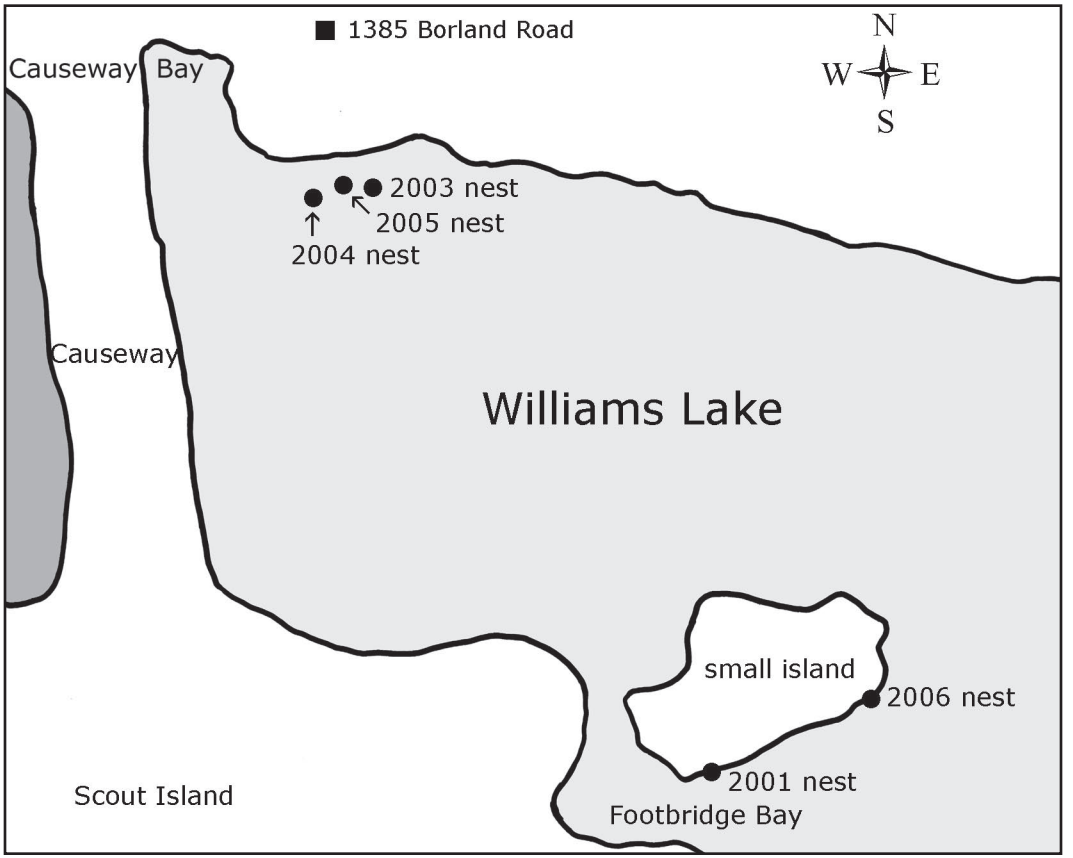


Figure 51. Locations of Common Loon nests in a small bay at the northwestern corner Williams Lake, BC, 2001-2006. (Kris Andrews).

observation and recording, particularly for 2003 and 2006, when the observer was absent frequently during the month of April. Those dates are best estimates from behaviour described in field notes.

Young were raised successfully in 2001 and 2006 and although a chick was seen in 2004 it disappeared soon after hatching. Re-nesting attempts in 2002 and 2005 were unsuccessful with good circumstantial evidence that predation (American Crow, *Corvus brachyrhynchos*), weather (high water combined with strong winds), and float plane traffic within 10 m of an active nest were the causes. Other potential loon egg or hatchling predators that frequent the loon territory are Bald Eagle, Common Raven, Ring billed Gull (*Larus delawarensis*), Herring Gull (*L. argentatus*), Mink (*Mustela vison*), Northern River Otter (*Lontra canadensis*), Red Fox (*Vulpes vulpes*), and Muskrat (*Ondatra zibethicus*)

In 2003, the second set of eggs was abandoned at the end of the normal incubation period and found to be rotten.

Lifespan

Common Loon (Figure 52) is a long-lived bird with an annual survivorship average of 91 percent for adults. Annual survivorship for immatures (first three years) averages 41 percent. It is suspected that some loons may live for 25 to 30 years. The oldest banded bird from observations in North America was 23 years old (D. Evers pers. comm.).

The longest continual annual return to breeding grounds in British Columbia, from an individual that was easily recognizable and monitored by Winifred M. Bennie at Nimpo Lake, was 11 years.

Feeding and Diet

We are not aware of any specific seasonal or geographical food habit study, by stomach analysis, for British Columbia. It is well known that loons feed primarily on live fish but they are also opportunistic predators and take food as it becomes available and can sense prey that is weakened or more readily available than other individuals. Francis (2002) describes in detail this learned behaviour while on a fly-fishing trip to Tahoola Lake, near Little Fort, BC, in late September 1996. He wrote: "*To my surprise I hooked a nice fat 17 inch rainbow* (Figure 53) *that put up a great fight. I was definitely excited now. I carefully released the fish and quickly casted the fly out for another try.*

I guess the fight I had with the rainbow had caught the interest of the pair of loons, because they were now following me about 50 feet back. I had never been this close to a loon before and I felt lucky that I

Figure 52. Common Loons may breed for the first time between four and eleven years old, after which, their survivorship is over 90% for the next 20 years or so. Boundary Lake, BC. 4 September 2008 (Linda M. Van Damme).

Figure 53. Dale Francis, in a fishing float on Tahoola Lake, BC. in September 2007, holding a 17 inch rainbow trout. The fish, soon after being released, was captured by a Common Loon and swallowed.

was awarded such a view. They continued to follow me dipping below the water from time to time.

Shortly after I noticed the loons I hooked into another good-sized rainbow, again it put up a great fight dancing on the surface. This one ran a number of times into the backing on my reel, between the fish and I, we were putting on a pretty good show for the loons. It was then that I noticed something large shooting under my tube. I looked up and the loons were nowhere to be seen. I looked down again to see these shapes propelling themselves through the water back and forth under my tube at fantastic speeds. I continued to fight the fish and managed to get it up to the tube.

By this time the loons had returned to a position now about 30 feet back of my float tube. I gently released the rainbow which was again 17 inches long and just as fat as the first. As I watched the fish swim off, I noticed out of the corner of my eye that one of the loons had disappeared under the surface. A second or so later about 50 feet away the loon surfaces and to my surprise now had my 17 inch rainbow in its mouth head first. The fish's tail was flopping around but the loon had a pretty good grip on it. Next I could not believe my eyes, the loon opened its mouth and throat and in about 4 quick gulps that 17-inch rainbow disappeared whole. I was amazed I had never seen anything like that before, let alone up that close. I felt a little dismayed, here I had played this fish and gently let it go, only to see it eaten alive by a bird. The loon must have been pretty content because it slowly made its way to the other end of the lake. I could not say the same for the second loon as it was still positioned about 30 feet back of me, and it was sure watching my every move.

The second loon no doubt was a little upset that the other one had a full belly. By this time I was starting to feel a little anxious about the close proximity of these birds, you know you start to feel a little vulnerable out in the middle of this lake in a big rubber donut. Anyways I cast the fly out again and started to kick and one flipper broke the surface of the water and made a splash. Well that hungry loon figured that I had another fish on because it disappeared under the surface and began to dart back and forth directly under my tube like a torpedo. This was making me feel uneasy. I was out on this lake by myself with this bird that has a very sharp beak darting all of about five or six feet below me. I got to the point that I would slap the surface with my rod to try and discourage the loon from shooting back and forth underneath my tube.

Well that was it for me. I had had enough of this loon … and I started back towards shore. This loon followed me all the way back to shore and probably got within 20 feet of me. Every time my flipper broke the surface it would make a run at me and I would be there beating it off with my rod…

A friend and I (safety in numbers) went out the next day and those two loons knew what was going on because they ignored George and started following me. The fishing was just as good the first day and once the loons had their fill they left the two of us alone. This was not before I had hooked into a nice fish that one of the loons grabbed in the water. The bird with the fish in its mouth took most of my backing before my leader finally snapped."

Common Loon is a visual predator that prefers pursuing fishes underwater (Figure 54) with an erratic swimming behaviour. Food habit studies in North America show they also prefer prey with small heads, soft scales, slender bodies, and no spines. Only larger prey can be identified in the field since loons capture and swallow small prey underwater. Many lakes in British Columbia have been stocked with salmonids (*e.g.*, trout, salmon, char, whitefish, and

Figure 54. One foraging method for Common Loon to locate prey is to swim along with its head below the water surface peering for fishes. To be successful, underwater visibility must be good with very little obstructing vegetation. Twin Lakes Provincial Recreation Area, AB. 10 June 1995 (Michael I. Preston).

grayling) and these are a common food source during the loon's breeding season from April to September.

Fishes, and other animals, identified from stomach contents of loons in British Columbia collected for museums, shot or found dead, and observed feeding, include: big skate (*Raja binoculata*), bluegill (*Lepomis macrochirus*), bridge lip sucker (*Catostomus catostomus*), brook trout (*Salvelinus fontinalis*), brown bullhead (*Ameiurus nebulosus*), brown trout (*Salmo trutta*), burbot (*Lota lota*), crayfishes (Decapoda), dolly varden (*Salvelinus malma*), emerald shiner (*Notropis atherinoides*), flounder (Pleuronectidae), gunnel (*Pholis* sp.), kokanee (*Oncorhynchus nerka*), lake chub (*Couesius plumbeus*), lake trout (*Salvelinus namaycush*), leeches (Hirudinae), longnose sucker (*Catostomus cabostomus*), northern pike (*Esox lucius*), northern pikeminnow (*Ptychocheilus oregonensis*), Oregon shore crab (*Hemigrapsus oregonensis*), Pacific herring (*Clupea harengus*), Pacific staghorn sculpin (*Leptocottus armatus*), pile perch (*Rhacochilus vacca*), prickleback (Stichеidae), pumpkinseed (*Lepomis gibbosus*), purple shore crab (*Hemigrapsus nudus*), rainbow trout (*Oncorhynchus mykiss gairdnerii*), redside shiner (*Richardsonius balteatus*), sandlance (*Ammodytes americanus*), shiner perch (*Cymatogaster aggregata*), snake prickleback (*Lumperus sagitta*), sculpin (Cottidae), threespine stickleback (*Gasterosteus aculeatus*), tidepool sculpin (*Oligocottus maculosus*), and yellow perch (*Perca flavescens*).

In a study in the central interior of British Columbia, James A. Munro found that 13 of his study lakes had no fishes but adults successfully raised young. His observations showed that adults and young subsisted on mollusks, caddis flies, amphipods, and dragonfly nymphs.

On Drizzle Lake, Queen Charlotte Islands, Common Loons fly daily from near shore marine environments to forage on a large endemic species of threespine stickleback in the 112 ha muskeg lake. It has been estimated that the yearly weight of sticklebacks consumed by Common Loons is over 338 kg.

Occasionally loons choke to death from eating fishes with spines that become lodged in their throat. On 26 June 1972, biologist Dave Hatler watched a Common Loon struggle with a Pacific staghorn sculpin off Tofino, BC for over a minute before the fish dropped free. The exhausted loon rested, gasped for 45 s, then continued to dive and feed. We have two other incidents where loons have been found washed ashore dead with "sculpins" lodged in their throats. Although not identified, these were likely Pacific staghorn sculpins, a near shore, shallow, subtidal species that reaches lengths of 20 to 23 cm in length and possesses both dorsal and anal spines. When feeding on threespine stickleback, loons must first break the spines before swallowing the fish.

Diving duration for Common Loon depends on the time taken to search, pursue, and manipulate prey for swallowing and the depth of the water. Submerged times recorded in North America have ranged from 34 s to just over 64 s. In British Columbia, the mean diving duration has been reported from a few locations including Comox (40 s), Drizzle Lake on the Queen Charlotte Islands (shallow water – 30.4 s; open-water - 41.1 s), Lac La Hache (45 s), Okanagan Lake at Kelowna (41 s), Powell River (43 s), Turtle Island on the central west coast of Vancouver Island (64.4 s), Victoria (39 s), and Williams Lake (38 s).

Mortality in British Columbia

The following summary of deaths reported for Common Loon in British Columbia is only a sample of what we have been able to extract to date from our occurrence and breeding databases, museum catalogues, the annual reports of wildlife rehabilitators, published and unpublished literature, discussions with biologists, reports of concerned citizens, naturalists, reports from fishermen, resort owners, and biological surveys.

It should be emphasized that most deaths go unreported and that the summaries listed below are only from what we have been able to acquire randomly. The statistics are misleading in that they do not represent the total of actual loon deaths, only those reported. Most reports are anecdotal in nature but do provide a surprising array of sources that kill loons in the province.

The causes of 887 deaths reported or observed, separated into 29 categories, include: museum and private collecting (31.7%), indiscriminate shooting (11.6%; see Figure 66), washed ashore dead – marine beach (9.9%), found dead, cause unknown (8.0%), flooding of nests with eggs (6.9%), Bald Eagle predation of chicks and/or small young (4.7%; Figure 55), nest abandoned, reason unknown (4.4%), fresh water and marine fishing – entrapment, entanglement, and lures (3.8%; Figure 56), unidentified predator of eggs and flightless young (3.8%), oil spills (2.5%), emaciated (1.7%), inclement weather - heavy wind, rain and/or hail (1.6%), lead poisoning (1.4%), unidentified mammal predation of eggs (1.4%), diseases (1.2%), recreation canoeists (1.0%), habitat destruction to nest sites (0.9%), trauma (0.8%), nest trampling (0.6%), collisions with power boats (0.6%), ingesting plastics (0.2%), Common Raven (*Corvus corax*) predation of nestlings (0.2%), choking by unidentified marine sculpin (0.2%), collisions with power lines (0.2%), broken wing (0.2%), intraspecific competition with Trumpeter Swan (*Cygnus buccinator*) (0.1%), road kill (0.1%), frozen in ice (0.1%), and Osprey (*Pandion haliaetus*) predation of chick (0.1%).

Some of these mortality categories are discussed in more detail under *Threats to Loons* (see page 107).

Figure 55. At Anvil Lake, on Cortes Island, BC., predation by Bald Eagles at Common Loon nests has contributed to the lack of successful nesting for 20 consecutive years. 7 June 2001 (Christian W. Gronau). BC Photo 3527.

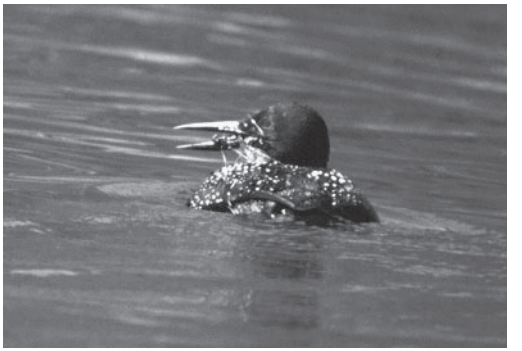


Figure 56. Hooked by fishing lures and entanglement in mono-filament line is a source of mortality for Common Loons at some lakes in British Columbia. Kootenay Landing at south end of Kootenay Lake, BC. 24 July 2003 (Linda M. Van Damme). BC Photo 2037.

Conservation and Management

Most concerns about the future of loons in British Columbia are related to both indirect (*e.g.*, oil spills, chemical contamination, acid rain) and direct (*e.g.*, habitat degradation, shooting, disturbance) issues associated with people. At present, the future is encouraging due to changing attitudes of residents, the development of nongame programs to include all

species in conservation and management activities, and the rapid development and acceptance of public education programs through the media, naturalist and sportsmen clubs, and school curricula.

The challenge, however, is to consider Common Loon in the "big picture" throughout its range in North America. Management decisions should be based on ecological rather than political boundaries. For example, sites considered vulnerable should be identified for sensitive periods during the bird's annual cycle. These "hot spots" might include specific locations where large numbers of loons aggregate in migration and winter and thus become susceptible to oil and chemical spills and human disturbance and harassment. Some spots may require protection seasonally.

Tom Klein, in his wonderful book "Loon Magic" says, *"All loons ask for is a place to live, clean water, some fish to eat and a little privacy. For what loons give to people, that seems a small price to pay."*

Common Loon Populations and Trends

North American Populations

Canada has more lakes than the rest of the world combined so it makes sense that the majority of Common Loons breeding in the world (95%) are found in Canada. The total population of Common Loons breeding in North America is estimated between 252,358 and 264,404 territorial pairs. This figure does not include nonbreeding adults but when included, the estimate increases to between 607,011 and 634,701 loons. Breeding populations in the contiguous United States are well-known, but for Alaska, Canada, Greenland, and Iceland, they are speculative. Most estimates are extrapolated from counts of loons recorded during traditional waterfowl surveys. The quantified information, however, does provide some initial figures for breeding populations and allows some comparison of those in British Columbia to others in the loon's world range.

Figure 57 shows minimum population estimates for provinces, states, and territories in the loon's

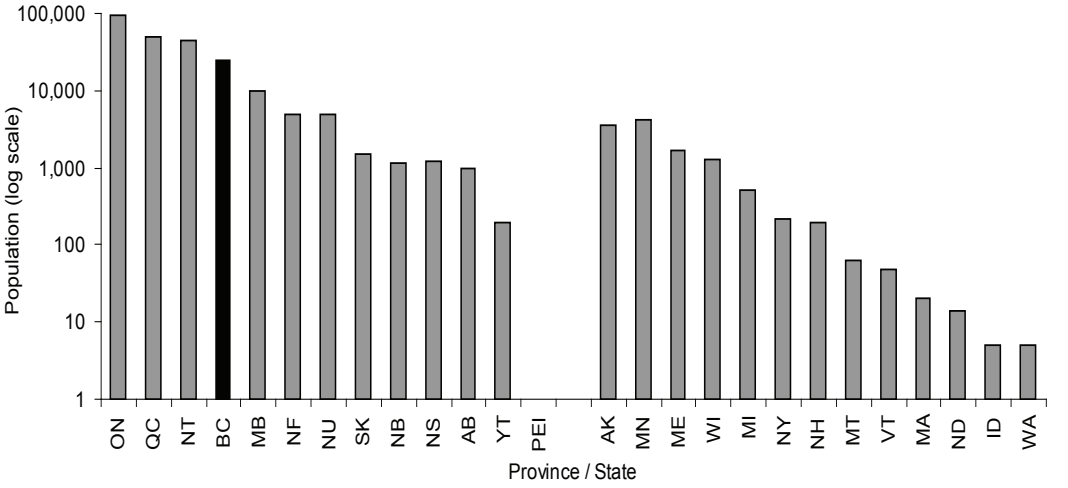


Figure 57. Minimum estimated number of territorial pairs of Common Loons, in decreasing abundance, in Canada and the United States. Initials for provinces and states are: AB – Alberta, AK – Alaska, BC – British Columbia, ID – Idaho, MA – Massachusetts, MB – Manitoba, ME – Maine, MI – Michigan, MN – Minnesota, MT – Montana, NB – New Brunswick, ND – North Dakota, NF – Newfoundland, NH – New Hampshire, NT – Northwest Territories, NS – Nova Scotia, NU – Nunavut, NY – New York, ON – Ontario, PEI – Prince Edward Island (pairs = 1), QC – Quebec, SK – Saskatchewan, VT – Vermont, WA – Washington, WI – Wisconsin, and YT – Yukon Territory.

North American breeding range. Together, Ontario (38%) and Quebec (20%) have nearly 60% of the North American breeding population while British Columbia has about 10%. More than twice as many loons breed in British Columbia than in the 13 American states.

Common Loons also breed on Greenland and Iceland where minimum populations are estimated at a total of 500 pairs.

Figure 58. About 10 percent of the world's population of breeding Common Loons occurs in British Columbia. Gorman Lake, BC. 29 May 2007 (Robert W. Allen).

Through the first half of the twentieth century numbers of loons in North America decreased across the southern limit of their breeding range in the northern United States. From about 1969 through 1989 numbers increased and the general trend throughout North America, especially over the past 25 years, has continued to show a slight increase in populations mainly due to the establishment of reservoirs and other water impoundments as well as educational programs. The historical breeding range in some regions (*e.g.*, United States Great Lakes) is, however, currently shrinking.

Populations in British Columbia

There are many anecdotal accounts of Common Loons decreasing locally in British Columbia, all attributed to human persecution, habitat loss, and disturbance. For example, in his book *An Annotated List of the Birds of the East Kootenay, British Columbia*, Walter B. Johnstone wrote that by 1949 the loon was: "*Formerly a common visitant to most of the lakes in the Dry Forest area. There has been a definite falling off in the population during the last few years, probably owing to persecution by over-zealous and misinformed fishermen. This would seem to be borne out by the fact that most of the breeding pairs are now to be found on lakes without fish populations*."

Summer Populations

In British Columbia, breeding numbers have been reduced or eliminated at some sites on extreme southern Vancouver Island and the Lower Mainland due to urbanization, habitat degradation, and human disturbance.

During extensive field work on the Queen Charlotte Islands since 1967, Dr. Tom Reimchen and Sheila Douglas visited over 400 wetlands during the loon's breeding season, and although he found Common Loons on many of the larger water bodies, breeding was only found on Clearwater Lake, Boulton Lake, and "Little" Coates Lake.

Christmas Bird Counts - Trends

The Christmas Bird Count (CBC) was first introduced to North America on 25 December 1900 when ornithologist Frank Chapman, an early officer of the Audubon Society, proposed counting birds instead of hunting them. These were the early days of the conservation movement, but on that date, history and subsequent tradition was born when Mr. Chapman and 27 other dedicated observers counted birds from 25 different locations and found 90 species of nearly 18,500 individuals. Today, the National Audubon Society oversees the coordination of 53,000 people that volunteer their time to count birds on over 2,000 CBCs; most of which are in North America. Each "official" CBC has a permanent centre point, and the area surveyed is encapsulated by a circle with a diameter of 24.3 kms (15 mi.). There are also many "unofficial" counts that are not registered with Audubon, often in remote areas and with few participants.

The first counts established in British Columbia

were in Vancouver and Ladner during the winter of 1958/1959. Sixteen years later, the first interior CBC was established at Shuswap Lake Park. Since the inception of the CBC in British Columbia, the number of new counts has increased steadily over the years (Figure 59). As of the 106th Audubon CBC (winter 2005/2006), 100 "official" count locations have been established in British Columbia. However, 78 is the most number of counts ever surveyed in a single year (Figure 59). There are 22 CBC's in British Columbia that have more than 25 years of annual count data. Many of these years are consecutive.

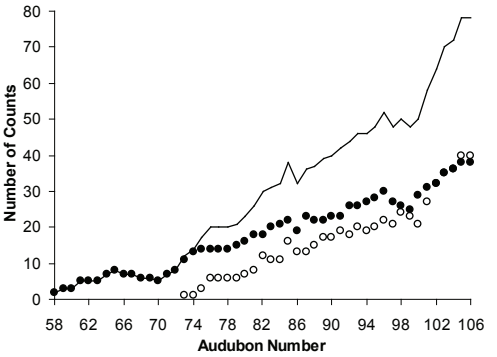


Figure 59. Number of coastal (solid dots) and interior (open dots) Christmas Bird Counts surveyed each winter from 1958/1959 to 2005/2006. Solid line is the total number of counts in British Columbia.

Although largely a social event, there is some scientific merit to the data that can be gleaned to help us understand more about bird distribution and population dynamics. First is the ability to investigate patterns of species occurrence over large geographic areas, and to evaluate whether those patterns are changing with time. Second, and probably more importantly, is the ability to evaluate changes in species abundance over time - or more specifically, to determine a species' trend (Figure 60). Early investigations of trend analysis focussed entirely on the total number of birds counted, but it was soon realized that many factors could influence species' counts. The primary factor resulting in higher bird counts was an increase in the number of people

Figure 60. Estimating numbers and species of birds in large flocks, such as this mixed group of gulls, during Christmas Bird Counts is challenging. Esquimalt Lagoon, BC. December 2004 (R. Wayne Campbell).

counting birds. Simply put, the more people that could cover an area, the more birds would be counted. This is especially true of terrestrial habitats.

Today, trend analysis of CBC data is becoming more complex, with researchers putting more effort into quantifying the amount of different habitat types available to different species, estimating detectability rates of different species, and determining sampling adequacy of different habitats. There is also concern over specific factors that cause species' abundance to change, such as habitat loss, habitat conversion, and climate change. That said, it is generally the trend itself that spurs us to investigate cause, and thus there is value in identifying a trend if one exists. As a general rule for most regularly occurring species, if a trend is present, it should be detectable by using either the total number of birds, or the total number of birds divided by the number of participants (effort-corrected data). The trend can take a variety of functional shapes, including exponential, sigmoidal, cyclical, and linear to name a few. A linear trend is the most often explored trend among common, widespread species that have relatively stable year-to-year fluctuations in abundance. Invasive species,

or species dependent on seed crops (*e.g.,* finches), are examples of species that may not have linear functions.

Counting Loons on Christmas Bird Counts

Because of the aquatic nature of Common Loons in winter (Figure 61), especially on large ice-free lakes and on open ocean, CBCs often poorly sample preferred winter habitats of Common Loons compared to other habitat types suitable for terrestrial, brackish-estuary, riverine, and shoreline species. Consequently, counts of loons usually occur only from a few select vantage points, and rarely are boats used to access areas not visible from land. Of the suitable habitat that is available, it is likely that the relative amount sampled within a CBC area varies among different CBCs, and so comparisons of bird abundance among areas is difficult.

We summarized Common Loon data from all CBC locations in British Columbia to highlight general patterns of occurrence and abundance without correction factors. We also analyzed trends in total bird abundance, and in effort-corrected bird abundance, for counts having at least 20 years of count data, and for which Common Loon occurred on more than 65% of the counts with a mean abundance greater than 1.0 bird per year. A linear regression technique was used for all trend analyses, although other functions may be more suitable. We provide a two-tier scoring system for assessing reliability of our analysis: 1) the analysis is reliable, and supported by statistical validation and assumptions; and 2) the analysis is unreliable, and the data do not satisfy statistical assumptions.

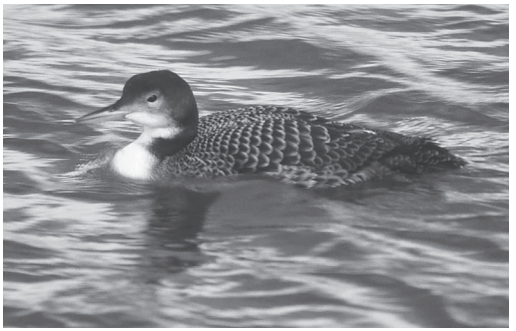


Figure 61. Identifying Common Loons in winter plumage in the interior during Christmas Bird Counts is far less difficult than having to separate four species that are regularly found along the coast. Seebe Dam, AB. 10 December 1992 (Michael I. Preston).

Summary of Common Loon Occurrence from Christmas Bird Count Data

Of 1,467 CBCs from 100 different locations in British Columbia, the Common Loon has been recorded on 949 (64.7%) counts from 67 locations (Table 9). It has been recorded on all 48 coastal counts except Dewdney (where only one count has been conducted), and has occurred on every count from 31 different coastal locations. The Common Loon has occurred on 20 of 52 interior count locations, but only regularly (>70% of the time for counts having at least 10 years of data) at six of these locations (Table 9).

The minimum annual number of Common Loons counted from any CBC location known to have had at least one occurrence ranged from 0 to 76, whereas the maximum ranged from 1 to 242. A high count reported by the National Audubon Society of 618 birds from Comox during the winter of 2004/05 is a suspected typographical error, and has been excluded from our summary and trend analyses. Among coastal counts, the mean number of Common Loons occurring annually ranged from 0.1 to 87.3 birds per location, whereas from interior counts the average was about eight times lower and ranged from 0.1 to 11.3 birds per location (Table 9).

The great variability in loon numbers among locations and years is likely attributable to many factors, including natural population fluctuations, amount of suitable habitat available for loon occurrence, sampling adequacy of those habitats, and volunteer participation (*i.e.,* number of people participating, number of hours spent searching). Other factors that may also play a role in determining how many loons are counted could include weather (*e.g.,* extended freezing periods that reduce open freshwater habitats, excessive rain, wind, or snow that limits visibility), local disturbance issues, or tidal variation and timing of counts at coastal sites.

Table 9. Summary of Common Loon occurrences in British Columbia from Christmas Bird Count (CBC) locations, 1958/59 to 2005/06 (sorted alphabetically within coastal and interior regions). From left to right, columns represent: 1) Name and approximate location of CBC, 2) number of years CBC has been completed, 3) number of years Common Loon has occurred, 4) frequency of Common Loon occurrence, 5) minimum count of Common Loon, 6) maximum count of Common Loon, and 7) average count of Common Loon.

Count Name	**Years Counted	Years COLO Observed	Percent Years Observed	Min. Count	Max. Count	Mean Count
Coastal						
Abbotsford-Mission	6	3	50%	0	4	1.2
Bamfield	19	19	100%	2	21	12.7
Bella Bella	1	1	100%	55	55	55.0
Broughton Strait	12	12	100%	19	88	52.5
Campbell River	30	30	100%	17	132	61.0
Chilliwack	32	8	25%	0	5	0.4
Comox*	45	42	96%	13	160	75.3
Cortes Island	5	5	100%	17	43	32.0
Deep Bay	31	31	100%	14	169	79.6
Dewdney	1	0	0%	0	0	0.0
Duncan	32	31	97%	0	117	33.9
Harrison River	6	4	67%	0	17	4.0
Hecate Strait	4	4	100%	5	47	24.3
Kitimat	28	17	61%	0	6	1.3
Ladner	47	47	100%	9	144	59.5
Langara Island	1	1	100%	3	3	3.0
Lasqueti Island	4	4	100%	1	13	5.0
Little River-Powell River	3	3	100%	3	8	6.0
Lower Howe Sound	3	3	100%	8	23	15.3
Masset	24	24	100%	10	65	32.0
Naden Harbour	2	2	100%	10	51	30.5
Nanaimo	40	40	100%	3	119	45.8
Nanoose Bay	4	4	100%	58	101	79.0
North Saanich	1	1	100%	23	23	23.0
Parksville-Qualicum Beach	15	15	100%	35	242	87.3
Pender Harbour	15	15	100%	11	40	25.8
Pender Islands	40	39	98%	0	209	23.1
Pitt Meadows	33	11	33%	0	3	0.6
Port Alberni	15	14	93%	0	16	6.0

Count Name	**Years Counted	Years COLO Observed	Percent Years Observed	Min. Count	Max. Count	Mean Count
Port Clements	22	18	82%	0	12	3.5
Powell River	2	2	100%	20	27	23.5
Prince Rupert	25	25	100%	2	39	10.2
Rose Spit	20	20	100%	1	64	19.0
Sayward	15	7	47%	0	3	0.9
Sidney-South Saltspring	1	1	100%	76	76	76.0
Skidegate Inlet	24	24	100%	9	87	40.0
Sooke	19	19	100%	11	86	31.2
Squamish	25	21	84%	0	22	7.5
Sunshine Coast	26	26	100%	12	70	38.2
Surrey Municipality	7	7	100%	4	18	8.1
Tahsis Inlet	2	1	50%	0	8	4.0
Terrace	41	3	7%	0	2	0.1
Tlell	3	2	67%	0	28	10.3
Tofino	2	2	100%	13	34	23.5
Vancouver	49	49	100%	6	150	61.9
Victoria	48	48	100%	16	109	60.5
Whistler	15	3	20%	0	2	0.3
White Rock	35	35	100%	24	232	86.1
Interior						
Apex-Hedley	2	0	0%	0	0	0.0
Blaeberry	1	0	0%	0	0	0.0
Bridge Lake	6	0	0%	0	0	0.0
Burns Lake-Francois Lake	15	8	53%	0	10	1.7
Castlegar	1	0	0%	0	0	0.0
Charlie Lake	2	0	0%	0	0	0.0
Clearwater	3	0	0%	0	0	0.0
Cranbrook	22	1	5%	0	1	0.0
Creston Valley	5	1	20%	0	1	0.2
D'Arcy-Birken	4	2	50%	0	1	0.5
Dawson Creek	7	0	0%	0	0	0.0
Fauquier	22	2	9%	0	2	0.1
Fort St. James	19	0	0%	0	0	0.0

Count Name	**Years Counted	Years COLO Observed	Percent Years Observed	Min. Count	Max. Count	Mean Count
Fort St. John	4	0	0%	0	0	0.0
Golden	6	0	0%	0	0	0.0
Hat Creek	2	0	0%	0	0	0.0
Kamloops	22	19	86%	0	4	2.2
Kaslo	5	1	20%	0	1	0.2
Kelowna	21	21	100%	2	22	8.0
Kimberley	14	0	0%	0	0	0.0
Kingfisher	5	0	0%	0	0	0.0
Lake Country	4	4	100%	4	24	11.3
Lake Windermere	6	0	0%	0	0	0.0
Lardeau	9	7	78%	0	8	2.1
Lillooet	6	0	0%	0	0	0.0
Logan Lake	3	0	0%	0	0	0.0
Lower Slocan Valley	1	0	0%	0	0	0.0
Mackenzie	13	0	0%	0	0	0.0
McBride	5	0	0%	0	0	0.0
Merritt	6	0	0%	0	0	0.0
Nakusp	27	3	11%	0	2	0.1
Nelson	10	1	10%	0	1	0.1
North Pine	12	0	0%	0	0	0.0
Oliver-Osoyoos	27	22	81%	0	16	5.7
Pemberton/Mt.Currie	5	0	0%	0	0	0.0
Penticton	30	27	90%	0	17	4.9
Prince George	17	0	0%	0	0	0.0
Princeton	14	0	0%	0	0	0.0
Quesnel	4	0	0%	0	0	0.0
Revelstoke	25	8	32%	0	3	0.5
Rossland-Warfield	2	0	0%	0	0	0.0
Salmon Arm	18	4	22%	0	1	0.2
Shuswap Lake Park	34	24	71%	0	5	1.4
Smithers	29	0	0%	0	0	0.0
The Hazeltons	1	0	0%	0	0	0.0
Trail-Beaver Valley	2	0	0%	0	0	0.0

Count Name	**Years Counted	Years COLO Observed	Percent Years Observed	Min. Count	Max. Count	Mean Count
Vanderhoof	3	0	0%	0	0	0.0
Vaseux Lake	32	19	59%	0	12	1.5
Vernon	31	30	97%	0	22	6.9
Wells Gray	11	0	0%	0	0	0.0
Williams Lake	6	1	17%	0	1	0.2
Yoho National Park	6	0	0%	0	0	0.0

* a suspected reporting error for the winter of 2004/05 has been removed.
** the number of years counted are based on data reported on the Audubon CBC website.

Analysis of Common Loon Trends from Christmas Bird Count Data

As expected, trends for Common Loon were poorly identified for both coast and interior Christmas Bird Count locations (Table 10). Of 46 independent analyses from 23 count locations using total abundance and effort-corrected data, only 37% of all tests produced a significant trend. The raw data and predicted trends for these analyses are shown for each count location by region. They include six locations from Vancouver Island (Figure 62), six locations from the Southern Mainland Coast and Gulf Islands (Figure 63), five locations from the Central and Northern Mainland Coast (Figure 64), and six locations from the Southern Interior region (Figure 65).

Using abundance data only, four coastal and three interior locations had trends that increased significantly (Table 10). However, when corrected for observer effort, only White Rock, Vernon, and Penticton showed the same pattern, suggesting that an increase in those areas is likely real. Where the trend changed from increasing, to stable or decreasing, after correcting for effort, the actual pattern of abundance may be an artifact of observer saturation (*i.e.,* an increase in observers does not result in a proportional increase in loons). Consequently, evaluating the trueness of the trend in these cases is speculative.

Only Squamish showed evidence of a significant decline in abundance both before and after correcting for observer effort. In the first five years of the Squamish count, Common Loon abundance averaged 14.2 birds per count, compared to the last five years where abundance averaged only 0.2 birds per count. Five additional locations showed evidence of decline in the effort-corrected dataset, and included Comox, Duncan, Ladner, Port Clements, and Victoria. With the exception of Port Clements, these counts have had consistently high and increasing numbers of participants throughout the history of their respective counts, and as previously noted, identified declines in Common Loon may be a result of observer saturation.

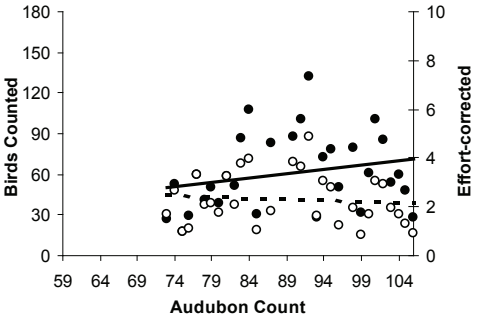
Evidence of stable abundance using both corrected and non-corrected datasets were found for Masset, Prince Rupert, Shuswap Lake Park, and Kamloops. Five additional counts that previously had either an unknown trend (Campbell River and Kelowna), or an increasing trend (Nanaimo, Vancouver, and Oliver-Osoyoos), using total abundance data only, showed a stable trend in abundance after correcting for observer effort.

Among the 23 CBC locations for which trends were analyzed, five did not produce meaningful results using either set of data. These counts were Deep Bay, Pender Islands, Rose Spit, Skidegate Inlet, and the Sunshine Coast. The primary problem with data from these locations, as with data from other sites where trends were unknown using only one of the datasets, was the non-random distribution of statistical error terms. These could perhaps be corrected with a transformation of the data, but

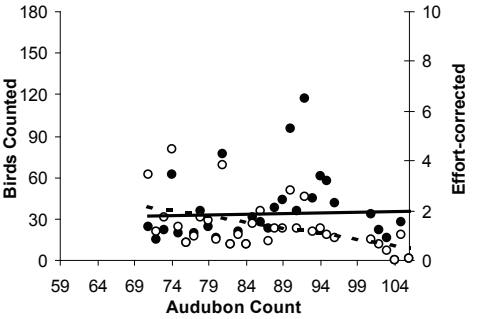
Table 10. Trend estimates of Christmas Bird Count (CBC) data for Common Loon in British Columbia. Total bird abundance is based on the actual number of birds counted. Effort-corrected abundance is the total number of birds divided by the total number of CBC participants. β = rate of change per year, P = level of significance.

Count Name	Trend Period	Total Bird Abundance			Effort-corrected Abundance		
		Trend	β	P	Trend	β	P
Coast							
Campbell River	1972/73 - 2005/06	Unknown [2]	-	-	Stable [1]	-	-
Comox*	1961/62 - 2005/06	Increasing [1]	0.16	0.001	Decreasing [1]	-3.04	0.085
Deep Bay	1975/76 - 2005/06	Unknown [2]	-	-	Unknown [2]	-	-
Duncan	1970/71 - 2005/06	Unknown [2]	-	-	Decreasing [1]	-4.96	0.005
Ladner	1968/69 - 2005/06	Stable [1]	-	-	Decreasing [1]	-7.33	0.007
Masset	1982/83 - 2005/06	Stable [1]	-	-	Stable [1]	-	-
Nanaimo	1972/73 - 2005/06	Increasing [1]	0.23	< 0.001	Stable [1]	-	-
Pender Islands	1970/71 - 2005/06	Unknown [2]	-	-	Unknown [2]	-	-
Port Clements	1984/85 - 2005/06	Stable [1]	-	-	Decreasing [1]	-2.99	0.091
Prince Rupert	1980/81 - 2005/06	Stable [1]	-	-	Stable [1]	-	-
Rose Spit	1986/87 - 2005/06	Unknown [2]	-	-	Unknown [2]	-	-
Skidegate Inlet	1982/83 - 2005/06	Unknown [2]	-	-	Unknown [2]	-	-
Squamish	1980/81 - 2005/06	Decreasing [1]	-0.99	< 0.001	Decreasing [1]	-17.66	< 0.001
Sunshine Coast	1979/80 - 2005/06	Unknown [2]	-	-	Unknown [2]	-	-
Vancouver	1957/58 - 2005/06	Increasing [1]	0.24	< 0.001	Stable [1]	-	-
Victoria	1958/59 - 2005/06	Stable [1]	-	-	Decreasing [1]	-20.37	< 0.001
White Rock	1971/72 - 2005/06	Increasing [1]	0.16	< 0.001	Increasing [1]	13.06	0.002
Interior							
Shuswap Lake Park	1972/73 - 2005/06	Stable [1]	-	-	Stable [1]	-	-
Vernon	1976/77 - 2005/06	Increasing [1]	0.76	0.01	Increasing [1]	43.30	0.005
Oliver-Osoyoos	1979/80 - 2005/06	Increasing [1]	0.58	0.072	Stable [1]	-	-
Penticton	1980/81 - 2005/06	Increasing [1]	0.96	0.002	Increasing [1]	50.34	0.002
Kamloops	1984/85 - 2005/06	Stable [1]	-	-	Stable [1]	-	-
Kelowna	1986/87 - 2005/06	Unknown [2]	-	-	Stable [1]	-	-

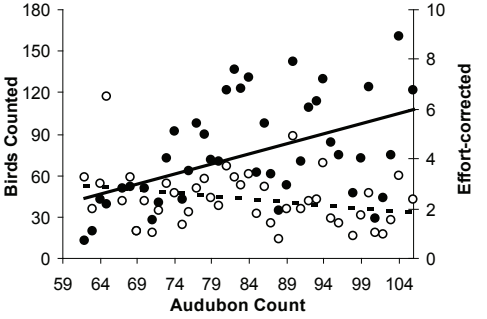
[1] the analysis is reliable, and supported by statistical validation and assumptions.
[2] the analysis is unreliable, and the data do not satisfy statistical assumptions.
* a suspected reporting error for the winter of 2004/05 has been removed.



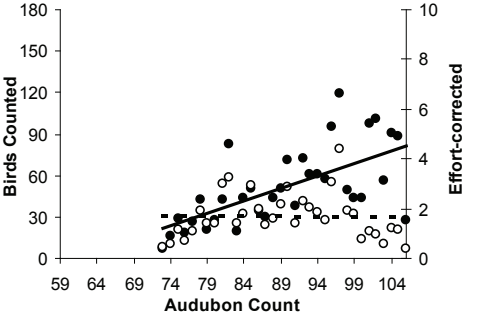
Campbell River



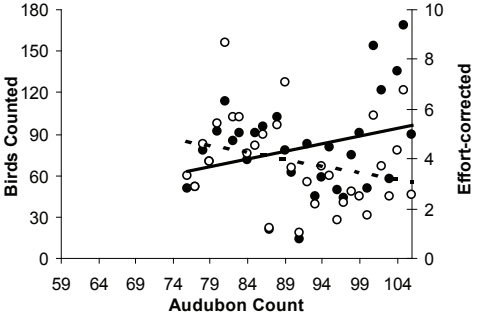
Duncan



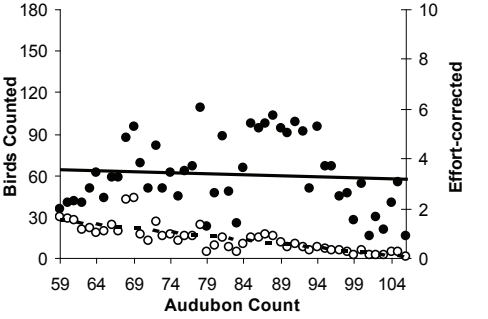
Comox



Nanaimo

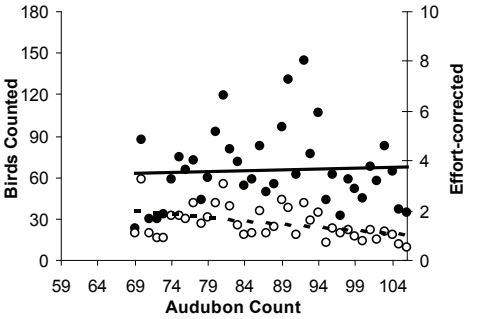


Deep Bay

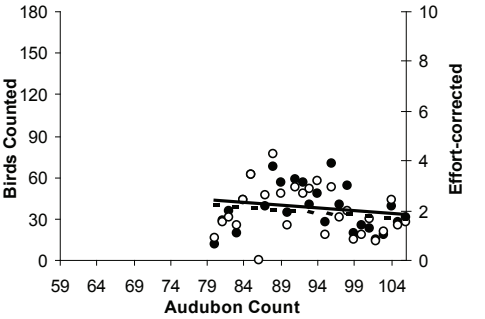


Victoria

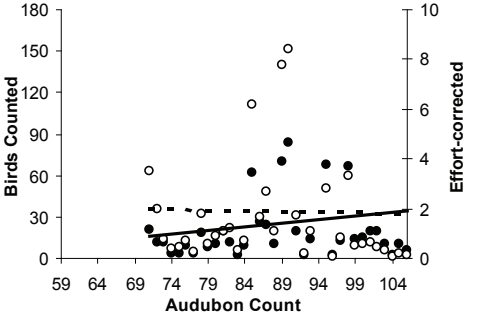
Figure 62. Trends in the total number of Common Loons (left axis: solid dots, solid line) and total number of Common Loons per CBC participant (right-axis: open dots, dashed line) for select Vancouver Island count locations. X-axis is the Audubon CBC count number (*e.g.,* 64 = winter of 1963/1964, 104 = winter of 2003/2004). See Table 10 for analysis and significance of trends.



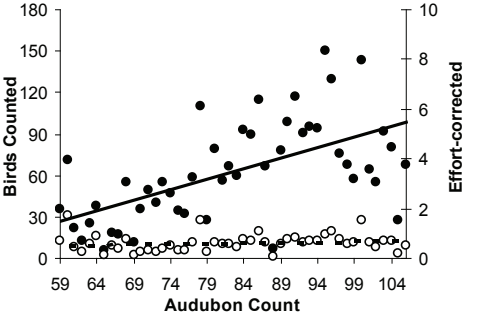
Ladner



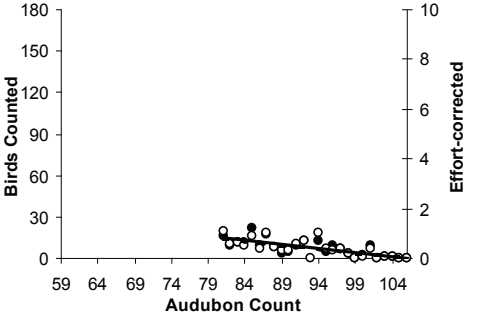
Sunshine Coast



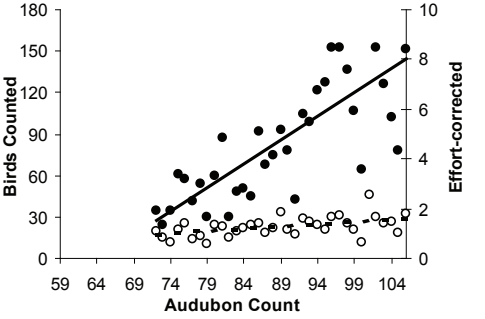
Pender Islands



Vancouver

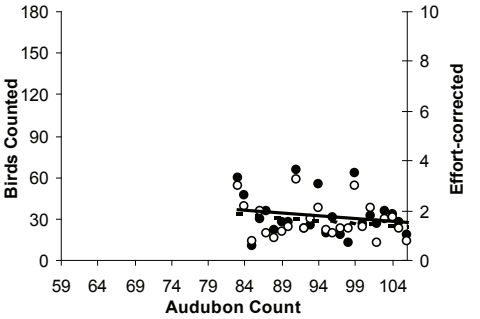


Squamish

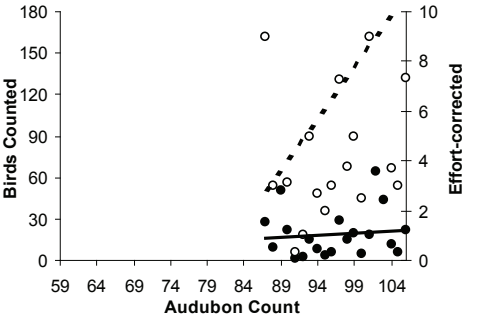


White Rock

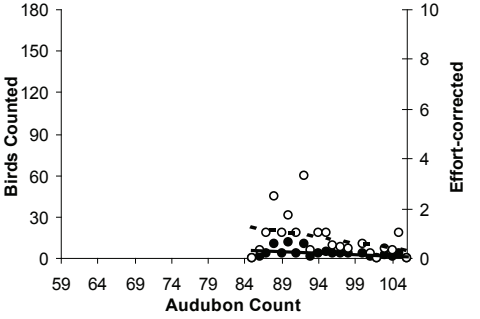
Figure 63. Trends in the total number of Common Loons (left-axis: solid dots, solid line) and total number of Common Loons per CBC participant (right-axis: open dots, dashed line) for select Southern Mainland Coast and Gulf Islands count locations. X-axis is the Audubon CBC count number (*e.g.,* 64 = winter of 1963/1964, 104 = winter of 2003/2004). See Table 10 for analysis and significance of trends.



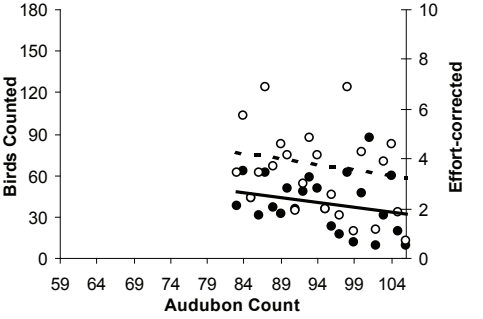
Masset



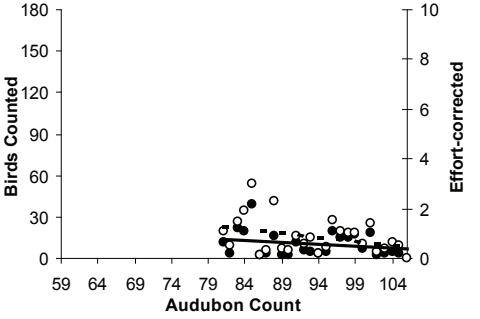
Rose Spit



Port Clements

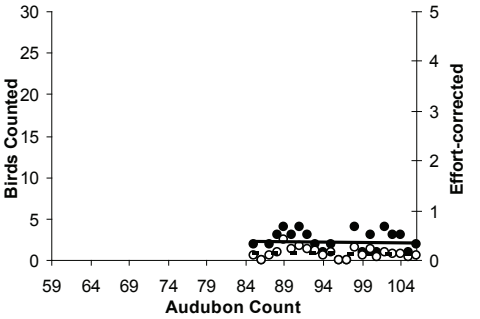


Skidegate Inlet

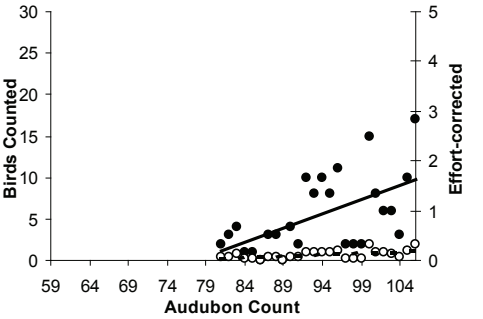


Prince Rupert

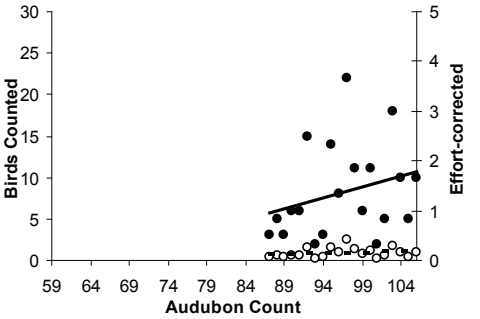
Figure 64. Trends in the total number of Common Loons (left-axis: solid dots, solid line) and total number of Common Loons per CBC participant (right-axis: open dots, dashed line) for select Central and Northern Coast count locations. X-axis is the Audubon CBC count number (*e.g.,* 64 = winter of 1963/1964, 104 = winter of 2003/2004). See Table 10 for analysis and significance of trends.



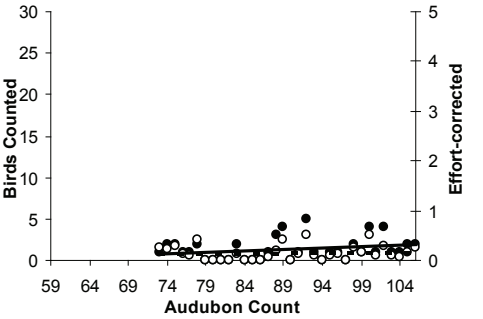
Kamloops



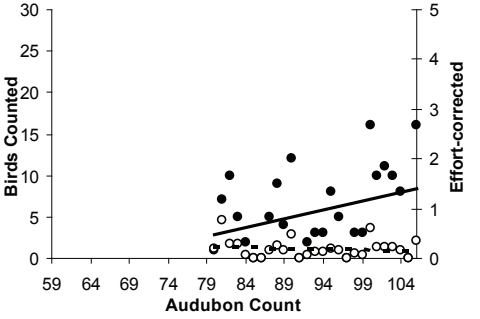
Penticton



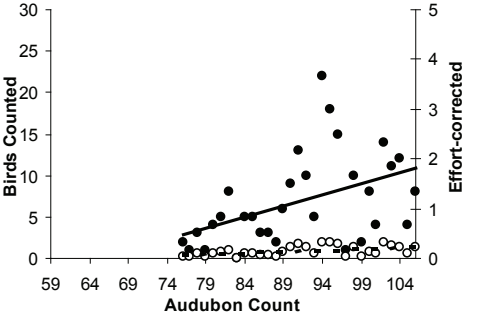
Kelowna



Shuswap Lake Park



Oliver-Osoyoos



Vernon

Figure 65. Trends in the total number of Common Loons (left-axis: solid dots, solid line) and total number of Common Loons per CBC participant (right-axis: open dots, dashed line) for select Southern Interior count locations. X-axis is the Audubon CBC count number (*e.g.,* 64 = winter of 1963/1964, 104 = winter of 2003/2004). See Table 10 for analysis and significance of trends.

interpretation of the trend becomes more difficult.

Throughout British Columbia, trends in abundance of Common Loon appear relatively stable to slightly increasing, especially on interior lakes in the Southern Interior region. All identified decreases in British Columbia were from coastal locations, where results may be confounded by observer saturation. Coastal counts in British Columbia showed considerble annual variability, possibly owing in part to a previously "good" or "bad" breeding season. At the continental scale, similar analyses of North American CBC data have also found that population levels are stable to slightly increasing, despite only a small percentage (~2%) of the total Common Loon wintering area being surveyed.

The future of CBCs for providing reliable trends for Common Loon, and possibly for many other species, would benefit from a method that divides the CBC count area into marine, fresh-water, and terrestrial habitats within a count location, and subsequently recording observer effort (*e.g.,* number of particiapnts, party hours, etc.) within each of those habitats. To some extent, this is already done at a crude level, whereby count coordinators assign parties to specific areas of the count circle. Unfortunately however, the spatial resolution of that data is lost when compilers aggregate the count data for submission to the CBC database.

Threats to Loons in British Columbia

The total effects of human activity on loons migrating, breeding, and wintering in British Columbia are poorly documented but include a variety of threats, both direct and indirect. These include:

Shooting

This activity is under reported, for obvious reasons, but intentional shooting still occurs throughout British Columbia. Historically, loons were killed by anglers because they were perceived as a threat to game fishes. Today the conflict concerns loons that have become accustomed to fishermen and readily take fish from hooks or pursue fish that are released from barbless hooks and are still struggling to swim away.

The impacts in British Columbia are local rather than widespread. Of 86 carcasses brought into the Royal British Columbia Museum from 1973 through 1983, 22 (26%) contained lead shot or bullet wounds. Locally, shooting is still a concern on smaller lakes, especially those with fish-stocking programs. For example, on several lakes between Kamloops and Merritt, sports fishermen in the late 1980s killed at least nine loons where the birds had learned to take fish from hooks as they were being reeled in. While shooting has been stopped the fishermen still discourage loons from following their lines with marbles in slingshots. Shot loons have also been reported from Bridge Lake, Fraser Lake, Green Lake (70 Mile House), Lake Kathlyn (Smithers), Moberly Lake, Parker Lake (Fort Nelson), Surprise Lake (Atlin), Stewart Lake (Chetwynd), Stuart Lake (Fort St. James), Stump Lake (Kamloops), Sunset Lake (Topley), and Tunkwa Lake (Savona).

Mortality from sport shooting during the legal hunting season has occurred in the past (Figure 66) but today it is minor and occurs only infrequently along the coast where loons fly by headlands.

Figure 66. In the late 1960s many water birds, including Common Loons, were shot indiscriminately in southwestern British Columbia during the hunting season. This pile of carcasses, collected in a single day, contained 27 birds representing nine species, including a Common Loon. Iona Island, BC. 25 October 1968 (R. Wayne Campbell).

Fishing – Entrapment, Entanglement, and Lures

Nets, monofilament line, fish traps, and lures (see Figure 67) are a serious threat to Common Loons (as well as Red-throated, Pacific, and Yellow-billed Loons) in both marine and fresh-water commercial and sports fishing activities in North America. Mortalities, involving thousands of loons caught in just a few weeks, have been well documented in the Great Lakes and Great Slave Lake commercial fisheries. The total number drowned each year in nets and traps will probably never be known.

Figure 67. Over the past 20 years or so Common Loons are reported more frequently following sports fishermen and getting caught on lures. Sundance Lake, BC. 30 May 2004 (R. Wayne Campbell).

In British Columbia, Common Loons are incidentally captured in nets set by commercial fishermen at sea and First Nations fishing on lakes and rivers. Deaths are rarely reported so the net impact is unknown. Accidental drowning in nets have occurred during shrimp fishing in Imperial Eagle Channel (Bamfield), near shore gillnet operations, in nets set across clear interior rivers during migration (*e.g.*, Stellako River, west Fraser Lake), and in summer near nesting sites (*e.g.*, Cameron Lake, south of Hudson's Hope). At sea, Common Loon is rarely captured in commercial fish nets in British Columbia (H. R. Carter, pers. comm.).

We have 17 reports of Common Loon accidentally caught on fishing lures, and released, and four incidents of loons found entangled in fishing line (see Figure 56). All of these occurred on interior lakes.

Shoreline Development

Resorts, cottages, marinas, campgrounds, and recreational site developments along lakeshores (Figure 68) have a negative impact on the number of breeding pairs of loons and their productivity. In some cases, loons are forced to nest in marginal habitats. Quite often the shoreline is altered (*i.e.,* habitat degradation), human activity is increased, and shore modification enhances predator densities, especially Raccoons (*Procyon lotor*). Apparently, buildings themselves do not directly affect breeding pairs once the nest site has been selected.

Changes in some lakes, that formerly supported nesting loons, have changed drastically over the past 60 years or so. Okanagan Lake is a large (35,112 ha) oligotrophic lake that in the mid-1930s had nine percent of its shoreline in rooted aquatic vegetation, the nest substrate used by loons. Lakeshore marshes, although scarce in the early years, have now been reduced to only a vestige. In a 42 km stretch of the lake's southwestern shoreline, 80% of its length has been altered by lakeshore housing and cottages (41%), lakeshore riprap (27%), and by parks and swimming beaches (12%). Although never prime nesting habitat for loons the developments are indicative of real and potential threats to other nesting lakes. Such activities can be responsible for declines in local breeding populations.

Nest sites have been relocated, or have disappeared altogether, by shoreline development and human activities at some lakes including Alta Lake, Bridge Lake, Canim Lake, Cultus Lake, Green Lake (Whistler), Jimsmith Lake, Kawkawa Lake, Lac La Hache, Langford Lake, Matheson Lake, Moberly Lake, Monte Lake, 108 Mile Lake, Paul Lake, Peter Hope Lake (Figure 68), Roche Lake, Salmon Lake, Shawnigan Lake, Sheridan Lake, Sunset Lake, Swan Lake (Vernon and Dawson Creek), Tyhee Lake, Watch Lake, and Williams Lake.

The major challenge is to balance the desires of all lake users without compromising the future ecological integrity of lakes. Two excellent "Lakeshore Development Guidelines" for two large regions of British Columbia have been developed by the Fraser-Fort George Regional District (http://www.rdffg.bc.ca) and the Peace River Regional District (Fort St. John). These, and others, discuss

Figure 68. Shoreline developments on some lakes in the British Columbia interior, including rock fill, retaining walls, cottages, and shore access that invites human disturbance, have resulted in abandonment and/or relocation of nest sites for Common Loons. Peter Hope Lake, BC. 31 July 2004 (R. Wayne Campbell).

Figure 69. Increased recreational activities on some lakes in British Columbia have displaced historical nest sites of Common Loon such as this site at the tip of a patch of dense bulrushes at Tunkwa Lake. 30 June 2008 (R. Wayne Campbell).

Figure 70. Tips of land jutting into lakes with beds of emergent vegetation are favourite nest sites for Common Loons but also provide access to deeper water for swimmers. Cameron Lake, BC. 30 May 2004 (R. Wayne Campbell).

lake management issues, lake ecology, impacts from lakeshore development, government policies for use of land and water, and provide mitigating guidelines.

Recreational Use

People and loons like lakes but for different reasons (Figure 69 and 70). In British Columbia, eggs in nests on the edge of reed beds have been washed away by waves from jet skiers, water skiers, and motor boat activities (Figure 71). At Nimpo Lake, fishing and canoe activities too close to lake shorelines have separated newly hatched chicks from their parents resulting in predation by Bald Eagle.

Over the past few years remote-controlled model boats have been identified as a growing threat to loons on some lakes with high human use such as swimming and picnicking. In some cases people have been observed deliberately chasing adults and chicks with the boats that are operated from shore. Sheila Reynolds (pers. comm.) noticed an incident in the East Kootenay on 22 June 2008 "… *When we stopped at Lund Lake near Wardner last Sunday a young couple were racing some model boat which took off into the air - the pair of loons were quite agitated. I talked to them and explained that the adult was swimming rapidly towards them because it might be trying to protect its nest. They didn't know the birds were loons* …"

Nest Trampling

The effects of livestock grazing to nesting loons are minor but do occur. Free-range cattle and horses frequently graze and drink along shores of wetlands where loons are nesting. This has resulted in disturbance and nest abandonment and direct

Figure 71. As long as powered boating activities remain in the centre of lakes and away from shorelines Common Loons and recreationists can both share a common environment. One Island Lake, BC. 3 June 2007 (R. Wayne Campbell).

trampling of three nests. Two instances occurred at Peter Hope Lake where a pair of loons were nesting among a secluded patch of dense bulrushes (*Scirpus americanus*) about 20 m from shore. Falling water levels during the incubation period provided access to the nest site. The third nest, at Douglas Lake, was disturbed frequently by cattle drinking and was later abandoned.

Where Moose occurrence and Common Loon breeding activities overlap, Moose can damage or destroy nests while foraging in wetland habitats (Figure 72). In the summer, Moose forage primarily on wetland plants, including pond lilies, along shores and in deeper shore waters of lakes and marshes. While feeding, or moving to and from favourite feeding locations, they may up-end nests with eggs, resulting in abandonment. A nest in a small patch of cattails at "Boot" Lake, north of Chetwynd was trampled in 2004 and another in marsh grasses at Halfmoon Lake, in the same general area, in 2005 was found abandoned with fresh Moose tracks around it.

Incidental Mortality

Other sources of mortality from British Columbia include frozen in ice on lakes during freeze up, starvation, landing on paved highways during storms in migration, diseases, internal parasites, nest flooding, predation by Golden Eagle, Coyote, and Raccoon, accidental damage from researchers, entanglement from plastic holders of beer or pop cans, and intentional disruption.

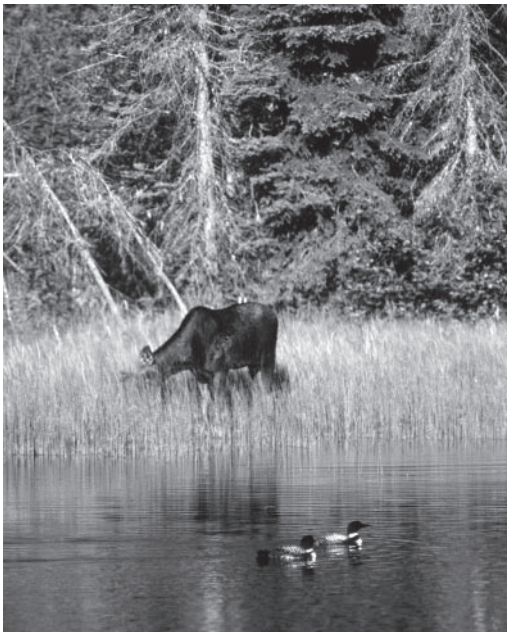


Figure 72. Occasionally, Moose foraging and walking along the shores of lakes and marshes do impact nesting Common Loons. Aid Lake, BC. 15 July 1999 (Douglas Leighton). BC Photo 3642.

Contaminants

The impact of organochlorines (*e.g.*, DDT, PCB, dieldren, and chlordane), heavy metals, and mercury in the aquatic ecosystem, and the incidence of egg-shell thinning, is litle known in British Columbia. However, one study from Pinchi Lake, BC, showed elevated mercury levels that could cause reproductive impairment to Common Loon (Weech et al. 2004).

Museum and Private Collecting

There are 184 Common Loon specimens (adults, immatures, juveniles, and chicks) and 97 eggs preserved in North American museums and private collections from British Columbia. Currently, collecting for museums and scientific research (*e.g.*, food habit studies, contaminant levels) is minimal.

Oil Spills

According to the *Pacific States/British Columbia Oil Spill Task Force* a large ship has an equipment problem, or mechanical failure, along the west coast of North America about once a month that could result in a spill. Spills can also be deliberate and can occur outside the province but with ocean currents may reach our shores. The famous *Nestucca* oil spill off Washington State in 1989 moved northward and fouled Pacific Rim National Park Reserve and Long Beach killing hundreds of marine birds. Oil spills are not restricted to the seacoast. On 1 August 2000 a terrestrial pipeline broke pumping an estimated 264,600 gallons of crude oil into the Pine River near Chetwynd, which killed some of the river's fish and impacted some piscivorous (fish-eating) birds.

Loons, like many other water birds, are susceptible to oil and petroleum spills because they dive rather than fly to avoid contamination and disturbance. Bird species vary in their responses to oil contamination. Common Loons are not as severely impacted as other diving birds (*e.g.*, alcids and sea ducks) on exposed outer coastal areas. For example, less than 200 Common Loons (0.5%) were among the 37,000+ dead birds recovered in Prince William Sound, Alaska in 1989 following the *Exxon Valdez* catastrophe. On western Vancouver Island, it was estimated that <1% of water birds recovered from the *Nestucca* oil spill were loons, and most of these were Pacific Loons.

Adult Common Loons spend eight to nine months on marine habitats, where they occur in near shore intertidal and shallow subtidal zones where oil spills can concentrate. Within this habitat loons are widely distributed, occur as singles or in small groups, and do not form feeding aggregations when they are especially vulnerable to contamination. Small numbers of Common Loons also become contaminated, and die, in urban harbours such as Vancouver and Victoria, due to small local spills of petroleum products from motor boats.

In 1989 the *Pacific States/British Columbia Oil Spill Task Force* was formed to "*strengthen state and provincial abilities to prevent, prepare for, and respond to oil spills.*" Useful information about oil spills in marine environments, is available on the web (see *Diving into the Web* on page 127).

Dams and Fluctuating Water Levels

There are over 2,000 dams in British Columbia. Most are small but 196 are higher than nine metres (Figure 73). They are built to provide drinking water, irrigation, hydroelectricity, flood control, and some have industrial uses. A few of the dams create huge artificial water bodies. For example, the Hugh Keenleyside Dam on the Arrow Lakes has created a reservoir 230 km long. While some of these offer temporary habitat for migrating loons few have successfully used them for nesting. This is mainly due to unstable waters levels. For example, in the Arrow Lakes Reservoir, water levels can rise or fall by 30 cm in a 24-hour period and may fluctuate by as much as 20 metres annually.

While some loons still attempt to nest on these reservoirs most are unsuccessful. At Powell Lake, on the south mainland coast, a pair of loons laid their eggs on top of a wooden piling that was just above water level. Over the next week the lake level dropped and the clutch of two eggs was left high and dry six feet from water. The nesting attempt was abandoned. Floating nesting platforms may be considered as a management tool in some locations.

Figure 73. The Revelstoke Dam, one of four such hydroelectric dams on the Columbia River north of Revelstoke, BC created a reservoir named Revelstoke Lake, that due to fluctuating water levels, is unsuitable for nesting by Common Loons. The Mica Dam reservoir is Kinbasket Lake which is used with varying success each year by nesting Common Loons. North of Revelstoke, BC. 27 April 2005 (R. Wayne Campbell).

Fluctuating water levels from spring runoff also creates problems for nesting loons in the province. S. D. MacDonald, in his reconnaissance of the Cassiar District in northwestern British Columbia from 1 June to 23 August, 1962 wrote "[The Common Loon] *Breeds at Dease Lake, Cold Fish Lake, and Gnat Lakes according to local people. Fluctuating, and abnormally high water levels apparently flooded all nests sites after the eggs were laid. No young were seen anywhere.*" This is primarily a problem on larger lakes.

Throughout British Columbia, American Beavers (*Castor canadensis*) have created large wetlands that support nesting loons. Beaver impoundments may cause flooding in adjacent areas, especially during autumn, winter, and spring, and this often creates conflicts with humans. The provincial government recognizes that beaver wetlands, with associated riparian zones, are valuable habitats for fish and wildlife and have developed guidelines for the protection and/or removal of dams. Beaver dam management guidelines include dam modification and debris management, population management, and dam removal only if absolutely necessary. Alteration or removal of a beaver dam is permitted under the *Wildlife Act* "*to provide irrigation or drainage under lawful authority for the protection of property*" and under the *Water Act* "*for drainage purposes with specific restrictions.*" A provincial permit is required to alter any beaver dam.

At Sundance Lakes, north of Chetwynd in the Peace River region, Common Loons have attempted to nest annually since the late 1980s. Recently, especially during "dry" years, the large beaver dam at the south end is opened resulting in a drastic drop in lake level. In 2004, a pair of Common Loons nested on a small beaver lodge, but their clutch was abandoned due to a three foot drop in water level.

Acid Rain

Although people have been aware of acid precipitation (rain) since the 17th century it wasn't until 1872 when Angus Smith published a book *Acid Rain* that the environmental concern was made public and was known to be a world-wide problem. In the 1960s, commercial and sports fishermen began to report declines in fish numbers and diversity in many lakes throughout North America and soon the problem was being investigated by various levels of governments. Today, in eastern Canada and the northeastern United States, this form of air pollution is a subject of concern to conservationists, biologists, and fishermen who monitor the health of lakes (Figure 74) and their associated flora and fauna.

Acid deposition includes the transformation of sulphur dioxide and nitrogen oxide in the air into secondary pollutants such as sulphuric acid, ammonium nitrate, and nitric acid. Sulphur dioxide, which is responsible for 60 - 70% of global acid deposition, is a byproduct of industrial processes (*e.g.*, ore smelting, coal-fired power generators, natural gas processing), the burning of fossil fuels, and volcanic eruptions. These forms of acid precipitation are found in rain, sleet, snow, fog, and cloud vapour and can be transported in the atmosphere over distances of hundreds of thousands of kilometres. Once the deposited chemicals meet water they are converted into acids. In aquatic ecosystems, such as rivers, streams, ponds, and lakes, this fallout reduces the pH (a scale used to measure the strength of acids and alkalis) and increases the acid content.

The harmful impacts of acid rain, to fish, wildlife, and vegetation, are well known in eastern Canada where it is more of a problem than in western regions. Much of Ontario, Quebec and the Maritime provinces lies on granite bedrock (*e.g.*, Precambian Shield) where the water and soil systems cannot effectively neutralize against acid rain. This is not the case for most of British Columbia, although parts of the west do have similar geology.

Since loons hold traditional nesting territories, acid rain is a hazard that mainly affects their food supply, especially invertebrate and vertebrate prey. Severely acidic lakes cannot support life, but for lakes with low to moderate acidification, loons attempting to nest can be affected, particularly during the developmental stages of the young. In one study in Ontario, a biologist noticed that older Common Loon chicks were dying on lakes with low pH readings (*i.e.,* acidic). It was found that although the chicks could initially be raised on invertebrate and plant material, the absence of fishes eventually resulted in the starvation of maturing young because energy demands could not be met by other foods.

Figure 74. Hundreds of lakes in British Columbia, both large and small, and many of which are used for nesting and staging by Common Loons, are monitored by federal and provincial governments each year for environmental contaminants. Kamloops Lake, BC. 28 May 2007 (R. Wayne Campbell).

In Canada, federal, provincial, and territorial governments have developed *The Canada-Wide Acid Rain Strategy for Post-2000* that serves as a legislative source for reducing emissions that cause acid rain. They are also establishing monitoring programs and carrying out limnological studies on this environmental hazard. Comprehensive, regional databases that include historical information gathered over many decades, such as those established by the Biodiversity Centre for Wildlife Studies (BCFWS) in British Columbia, are critical in assessing changes in the distribution and numbers of migrating, breeding, and wintering Common Loons in provinces and states.

Diseases

In the Great Lakes regions, botulism has been responsible for thousands of loon deaths. Fish (often introduced species) carry the disease, that is a naturally-occurring toxin produced by the bacterium *Clostridium botulinum*, that when consumed results in a paralytic condition in loons. Between 1963 and 1981 an estimated 7,400 loons perished. Fortunately, this disease has not been found in western North America.

Aspergillosus, a fungal disease of the respiratory tract, has been diagnosed in Common Loons in British Columbia. Loons become infected by breathing contaminated air filled with spores that are released freely, and naturally, into the air by the fungus *Aspergillus fumigatus*. Some spores may also be ingested from their food. Although Common Loons have been diagnosed with aspergillosus in British Columbia it is not known how prevalent it is in the population. Elsewhere, two percent of the breeding population carries this disease in Ontario and New England and up to seven percent in loons nesting in Minnesota.

Predation

P.A. Taverner, from his field notes of a museum collecting trip at Comox, British Columbia, reported on 7 August 1922 that: *"[Allan] Brooks told me of loons being captured by eagles* [Bald] *on Comox Bay and I think I saw the same attempt. Heard a great splashing on the bay off camp one morning at low tide. Saw an eagle striking persistently at something in the water, striking with a splash and returning immediately to attempt it again. The while a couple of loons were flying about crying loudly as they do when thoroughly alarmed. Rushing to the tent for my glasses I was gone but a fraction of a minute but when I returned there was nothing in sight. The eagle had gone whether it had succeeded in capturing its prey or not I could not say, probably not (?). I am fairly well satisfied that it was a loon it was striking at and most likely a young one the offspring of the two flying about and protesting, else why the protest? In this clear water it does not seem that any diver could escape the persistent attack of an eagle, it could not hide from him by diving, could be met every time it came to the surface and would certainly eventually be tired out and taken provided the eagle was hungry enough to persevere to the end."*

Climate Change

Climate change has the potential to affect Common Loon in a variety of ways, from changes in the timing of arrival at, and departure from, breeding lakes, to changes in availability of prey as water temperatures affect the vertical distribution of fish. In general, little information exists about the effects of climate change on many bird species, although it is becoming widely acknowledged that a warming climate influences the timing of migration and the distibution of species.

In British Columbia, thanks in part to an enormous bird database spanning more than 120 years, and maintained by BCFWS, there is the opportunity to investigate the effects of climate change on the migration phenology and distribution of several species, including Common Loon. In early 2007, Dr. Fred Bunnell (University of British Columbia) and Michael Preston (BCFWS) were invited by the Smithsonian Institution and Environment Canada to present a paper at the *Climate Change and Biodiversity in the Americas* conference in Panama City, Panama. Their paper, entitled *Avian Response to Climate Change in British Columbia – Towards a General Model* (visit www.wildlifebc.org for a link to the presentation) looked at general effects of climate change on species with different migration tendencies, and breeding and foraging strategies. The results for Common Loon were striking.

Change in the date of arrival at, and departure from, interior breeding lakes was evident for all regions south of 56°, and especially so for the period 1960-1999. In fact, at latitudes south of 53°, arrival and departure times were no longer evident because Common Loon had taken to overwintering rather regularly at several locations. In the central interior, arrival dates changed on average to about 2 weeks earlier, and departure dates changed on average to about 8.5 weeks later (Figure 75). Thus, in this region in the 1990s, Common Loon was present on average for 73.5 days longer than it was in the 1960s; an average annual change of 1.84 days.

In addition to the datasets used to assess arrival and departure times from the central interior of the province, long term data, where arrival and departure times were carefully noted, was available for select lakes (Table 11). Statistically, changes in arrival times were generally not significant, although as indicated for Christina Lake (Figure 76), birds on average arrived earlier, but with considerable year-to-year variation at that location. Change in arrival date was most evident for Williams Lake, with birds arriving in the mid-2000s approximately 10 days early than they were in the mid-1950s. Change in departure date from select lakes was also evident. Birds at Douglas Lake, Nakusp/Burton, and Williams Lake all showed significantly later departure times for the period assessed (Table 11). Remarkably, changes at Williams Lake and Nakusp/Burton have been very similar, with departures being about 30 days later in the mid-2000s than they were in the mid-1950s (Figure 76).

The distribution of Common Loon also appears to be changing, not so much with respect to its overall distribution in British Columbia, but rather in its seasonal distribution. This was most evident through an analysis of winter distribution, particularly in southern parts of the province. In the early 1960s, the

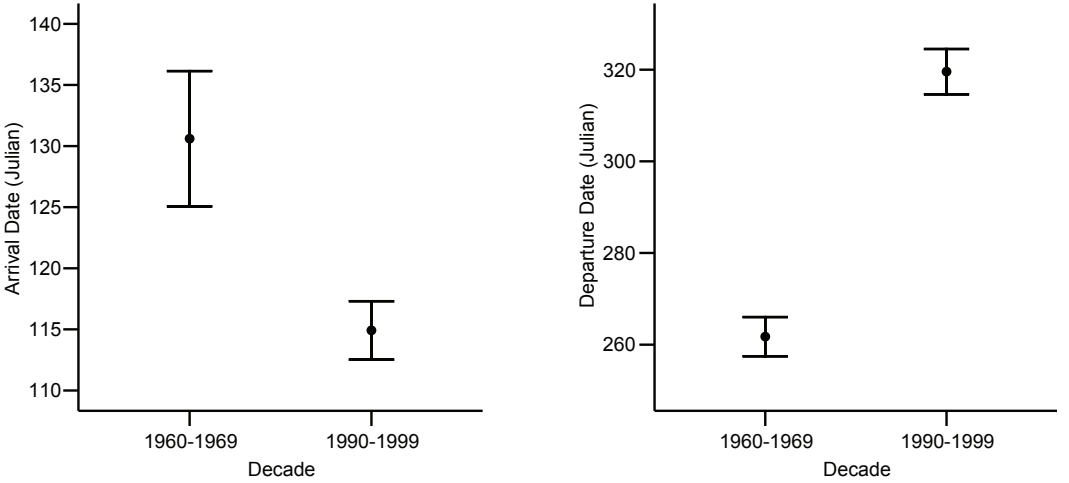


Figure 75. Change in arrival (left) and departure dates (in Julian days) of Common Loon in the central interior of British Columbia (53.00° - 55.00° latitude, 122.00° - 126.00° longitude).

Table 11. Effect of time (years) on the arrival and departure dates of Common Loon at select lakes with long-term monitoring data in British Columbia.

Location	Period	Arrival	*P**	Departure	*P**
Christina Lake	1955 - 2006	Unchanged	0.116	no data	-
Douglas Lake	1983 - 2006	Unchanged	0.238	Stable / Departs later	0.058
Eagle Lake	1986 - 2006	Unchanged	0.364	Unchanged	0.254
Lac La Hache	1964 - 1975	Unchanged	0.770	Unchanged	0.436
Nakusp / Burton	1975 - 2006	Unchanged	0.127	Departs later	0.002
Williams Lake	1954 - 2006	Arrives earlier	< 0.001	Departs later**	< 0.001

*Statistical assumptions for each linear regression test was satisfied.
**An over-wintering bird during the winter of 1997/1998 has been excluded from departure data analysis.

probability of Common Loon wintering in British Columbia at 49° latitude was about 60% (Figure 77). By the late 1990s, that probability increased to about 95%. Similarly the probability of Common Loon at 50° latitude in the 1960 was about 40%, and by the the late 1990s was about 93%. The most remarkable, and rapid, change in probability of overwinter occurrence was at latitude 52°, where in the early 1960s there was 0% probability of occurrence, but in the late 1990s almost 85% probability of occurrence (Figure 77). The change in winter distriution is almost certainly a result of a warming climate, as warmer, milder winters have prevented several lakes from completely freezing over. The benefit to Common Loon, assuming there are enough resources to sustain overwintering on those lakes, is that the energetic cost required for short to moderate migration distances will no longer be needed. Instead, that energy may be conserved for other life activities, such as breeding. A second advantage is that the Common Loons that remain at or near their breeding lakes during winter will be able to establish and defend territories from

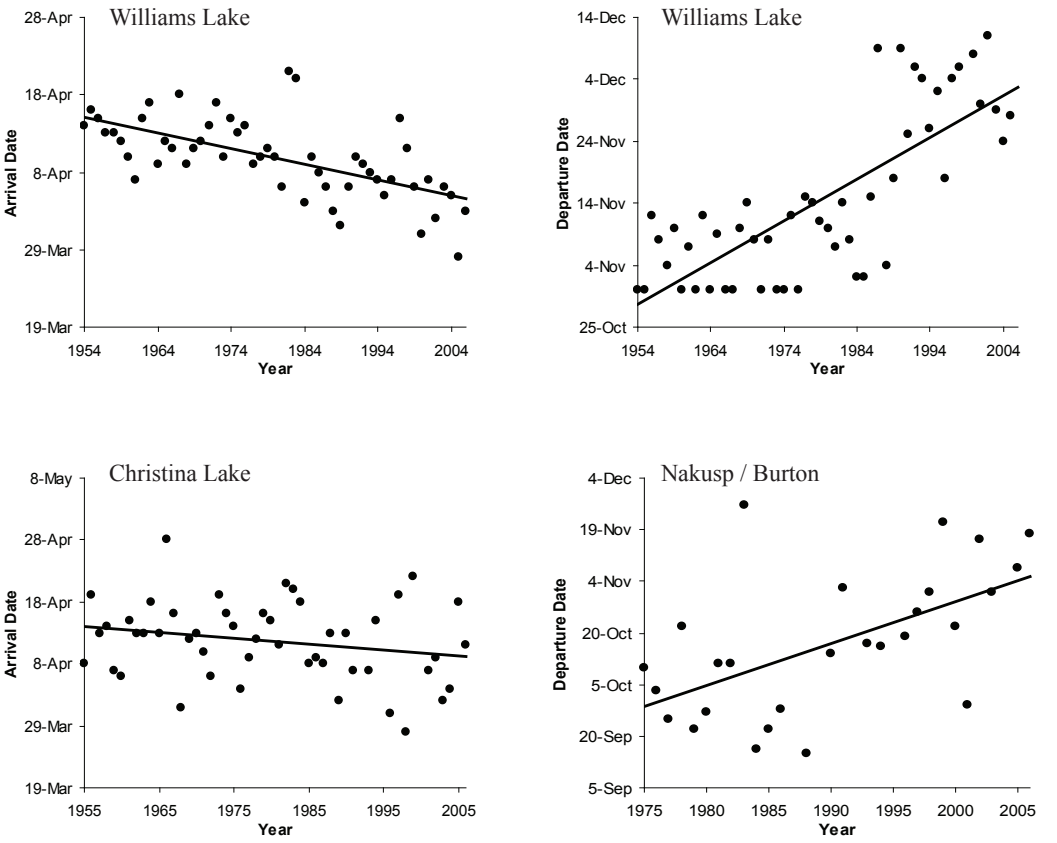


Figure 76. Change in arrival and departure dates at select lakes with long-term monitoring data in British Columbia.

conspecifics that arrive later in the spring. A notable disadvantage of climate change to Common Loon may be the gradual drying of small, shallow lakes in southern portions of its range. The overall result would be a gradual reduction in the availability of suitable breeding habitat.

The implications of climate change, and its subsequent effects on the migration phenology and distribution of most species, are poorly known. It is with little doubt that in the face of climate change, biologists, conservationists, resource managers, and policy-makers will need to consider how to accommodate both known and unknown factors both for the short and long term (Figure 78). Of equal importance will be the continued support of the hundreds of naturalists and field-biologists that continue to faithfully document their field observations, so that in the future, a re-evaluation of Common Loon distribution and migration phenology can be completed.

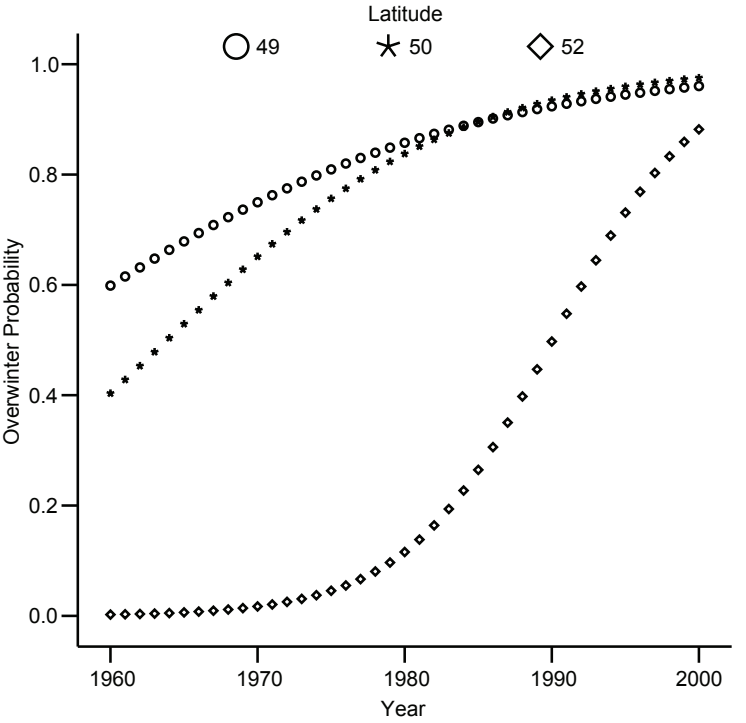


Figure 77. Change in the probability of overwintering of Common Loon at different degrees of latitude in the central interior of British Columbia for the period 1960-2000 (based on December or January occurrences).

Figure 78. Wildlife biologists must start planning for the short and long term future of Common Loon in British Columbia as climate change may create more northern over-wintering sites and alter long-established life history strategies for the species. One Island Lake, BC. 14 June 1996 (Linda M. Van Damme).

Conservation Plan for British Columbia

As humans encroach on wilderness breeding grounds for Common Loon in North America there will be an increasing number of adjustments the species will encounter that will be required to maintain reproductive success in the presence of increased activity. Necessary for this transition phase is a thorough knowledge of the loon's regional natural history, habitat requirements, population distribution, estimates of trends, threats to its survival, monitoring activities, protection status and detailed strategies for safeguarding population health.

We have presented a detailed summary of life history information available for British Columbia. Environment Canada (e.g., Canadian Wildlife Service) is the governing body for the management and protection of Common Loon across Canada while the United States Fish and Wildlife Service is the American counterpart. It has been recommended that a Joint Steering Committee between federal United States and Canadian biologists be formed to develop an integrated Conservation Plan for North America (see Evers 2007). Thirty-six professionals were contacted in Canada and the United States in the early 2000s and their comments were incorporated into a proposed Conservation Plan that would serve a guideline for regional management issues.

We have modified the short-term and long-term recommendations for British Columbia as follows:

1. Monitoring

Objective 1: Improve and network monitoring efforts at regional and seasonal levels appropriate for abundance and associated threats**.**

Strategy 1: Continue high resolution monitoring of breeding populations in the province:

- Focus efforts on areas that have inadequate population estimates (*e.g*., high elevation, north-central, coastal mountains, and inlets).
- Continue to improve and refine survey efforts.
- Integrate geo-referenced information into a centralized and standard web-based database.

Strategy 2: Establish and maintain aerial surveys using a standardized, random sampling scheme by ecosection (see Demarchi *in* Campbell et al. 1990a) to statistically estimate breeding population levels and identify non-breeding aggregations in mid-summer across the province. Although Canada contains 94% of the Common Loon's breeding population, few loon-specific surveys are conducted in any single province.

- Utilize established aerial waterfowl surveys presently being carried out jointly by the United States Fish and Wildlife Service, Canadian Wildlife Service, and Ducks Unlimited Canada throughout Alaska, Yukon Territory, and British Columbia.
- Prioritize aerial surveys for areas of greatest abundance focusing on spring and autumn migration periods and in winter.

Strategy 3: Establish migration stations that have spatial and temporal relevance for long-term tracking of migrant loon populations.

- Design a network of migration stations using standardized protocols (see Campbell and Summers 1997). Network should include existing stations with the addition of others through a consensus of key government and non-profit conservation organizations.
- Prioritize choice of migration stations to maximize coverage of the major migration corridors. Monitoring efforts need an ability to detect statistical differences in population trends for spring and fall migrants along the entire B.C. coast.

Strategy 4: Using Christmas Bird Count data, government and industry aerial surveys, historical field notes, and other information, identify major winter concentrations.

- Design a ranking system of wintering loon concentrations through a cooperative network of governments and non-profit organizations.
- Prioritize areas of loon concentration for regular, high-resolution monitoring efforts. Emphasis needs to include: 1) known important concentrations (*e.g*., Strait of Georgia during Pacific herring spawning),

and 2) concentrations representing unique areas such as freshwater summer and winter sites (*e.g.*, Drizzle Lake on the Queen Charlotte Islands (Reimchen and Douglas 1980) and Okanagan Lake (Cannings et al. 1987).

Strategy 5: Establish a centralized electronic database and reference library for historical occurrence and breeding information for British Columbia to assist with interpretation of monitoring efforts.

- Acquire hard copies of historical references including published and unpublished articles, field diaries, theses, museum collection catalogues, wildlife consulting reports, birdwatcher observations, nest record schemes (see Campbell et al. 2007), and similar information (Figure 79).
- Transfer relevant information on occurrence and breeding, including source, to electronic databases.

Figure 79. Over 50 years of gathering and preserving historical information on wildlife in British Columbia, and a decade to transfer relevant information to electronic databases for the Common Loon, provided sufficient information to evaluate the bird's present status and conservation concerns throughout the province. Victoria, BC. March 2003 (R. Wayne Campbell).

2. Research

Objective 1: Identify potential sink populations in the breeding range based on a population model (see Evers 2004). It states that "*areas identified as potential population sinks have a rate of fledged young per territorial pair less than lambda (0.48) over a six consecutive year time period*."

Strategy 1: Investigate potential population-level impacts.

- Emphasize loon populations generally impacted by landscape-level, multiple stressors such as acidic lakes, mercury availability, marine oil spills (see Burger 1992), lead emissions and accumulation (see Jacks et al. 2001).
- Emphasize loon populations impacted from known localized stressors such as water level fluctuations, incidental netting, and heavy metal contamination.

Strategy 2: Investigate potential local-level impacts.

- Emphasize publicly-owned areas with breeding populations prone to human disturbance and recreation (*e.g.*, Lund Lake, One Island Lake (Figure 80), Peter Hope Lake, and Sunset Lake), especially in provincial and national refuges and parks, and emphasize areas impacted by acid rain (see Acid Rain Committee 1977).
- Emphasize areas impacted by other contaminants including lead, mercury, and persistent bio-accumulative toxins (see Whitehead 1999).

Objective 2: Develop geographic linkages between breeding and wintering populations.

Strategy 1: Use satellite transmitters and newly developed implant techniques to track long-distance movements. Given transmitters are expensive, prioritize.

- Wintering concentration most at risk to anthropogenic stressors (*e.g.*, high-use petroleum shipping corridors where spills will likely occur).

Figure 80. In northeastern British Columbia some larger lakes with nesting Common Loons (*e.g.*, Charlie Lake, One Island Lake, and Swan Lake) also have high recreational use. Identifying areas of traditional nest sites and discouraging disturbance by boaters and fishermen from May through July would assist successful breeding. One Island Lake, BC. 14 June 1996 (Linda M. Van Damme).

- Major migration corridors (*e.g.*, areas on Okanagan, Shuswap, and Williams lakes).
- British Columbia lakes with significant breeding populations.

Strategy 2: Use less expensive means to link winter, migration, and breeding areas with: 1) morphometric and wing-loading measurements, 2) band recoveries, and 3) isotope tracing methods.

Strategy 3: Use newly developed microsatellite techniques to genotype breeding populations. Recent published evidence shows genetic differences among breeding populations. A genetic profile of North American breeding populations will provide science-based compensation options following marine oil spills and other mortality events related to anthropogenic sources.

Objective 3: Develop a web-based information centre that facilitates networking among wildlife field biologists, lab scientists, and museums with active specimen preparation programs.

Strategy 1: Standardize carcass retrieval and submission, necropsy procedure, and tissue bank.

Strategy 2: Network museum reference collections and establish connections with active institutions and individuals that possess carcasses.

Strategy 3: Establish a federal protocol for the disposition and processing of loon carcasses and loons injured during large mortality events.

Objective 4: Use the Common Loon as an indicator of mercury risk to fish-eating wildlife populations.

Strategy 1: Develop a standard long-term monitoring program across North America using loon blood and egg mercury levels to establish spatial and temporal context. Such efforts should concurrently measure overall loon productivity.

- Conduct this program on British Columbia's national and provincial parks of significance (*e.g.*, Bowron Lakes).
- Conduct this program on First Nation lands.

Strategy 2: Use the recently developed wildlife criterion value as a basis for the long-term monitoring program and as a foundation to evaluate mercury risk to other fish-eating wildlife.

3. Education and Information

Objective 1: Develop a web-based information centre to increase awareness of loon conservation needs and integrate standardized geo-referenced databases.

Strategy 1: Develop and establish a centralized digital database on historical occurrence and breeding information in the province.

Strategy 2: Prepare and publish a comprehensive, science-based species profile for the province containing information on migration and breeding chronology, life-history attributes, population trends, threats, mitigation practices, and the effects of climate change (Figure 81).

Strategy 3: Regularly update the species account as new information becomes available and post for a web-based audience.

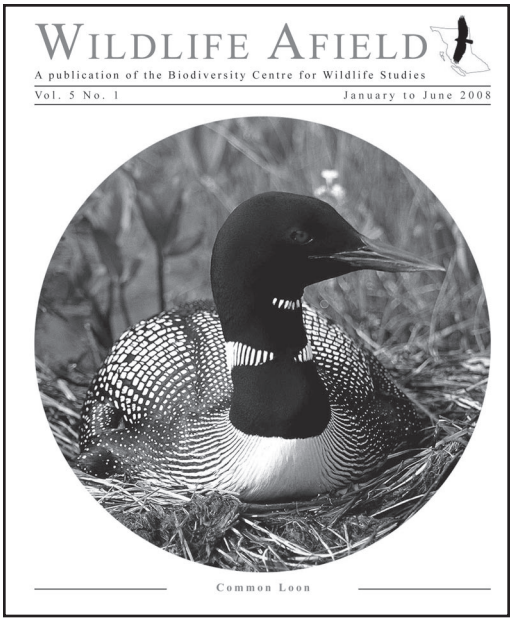


Figure 81. Every "Featured Species" account published in the bi-annual journal *Wildlife Afield* is posted and available as a PDF download six months after it is published. Distribution maps, and additional text as new information becomes available, will be updated regularly.

Strategy 4: Network with North American loon conservation programs to develop databases that compile geo-referenced locations of territorial pairs, their respective success, and other information into a co-operative system.

Objective 2. Promote responsible recreational fishing practices.

Strategy 1: Regulate the use, sale, and possession of lead objects on lakes and rivers.

Strategy 2: Establish and expand lead-exchange and outreach programs in the province.

Strategy 3: Initiate and expand a moratorium on lead usage across all provincial and federal parks and sanctuaries in the province.

Strategy 4: Promote responsible disposal of discarded monofilament line and more persistent retrieval of lost fishing tackle.

Strategy 5: Enhance fishing regulations to include forfeiture of license and/or automatic disqualification during fishing tournaments if loon sanctuaries and enclosures are disregarded.

Objective 3: Promote changes in commercial fishing techniques.

Strategy 1: Evaluate scope and impact of loon take by commercial and subsistence fisheries in the province.

4. Management

Objective 1: Protect loon breeding habitat at a landscape level to minimize further degradation or fragmentation of suitable habitat.

Strategy 1: Integrate territory ranking layer, including digitized nest and brood sites, into existing centralized resource databases for use by resource managers.

Strategy 2: Create a graduated mitigation policy for shoreline projects impacting loon habitat that enforces strict conservation of high quality habitat and allows for responsible development practices on lower quality habitat (Figure 82). Points of consideration include:

- Creation of undeveloped buffer areas of 155 m around known nest and brood sites. Protection of all islands < 5 ha in size on lakes containing loon pairs as well as smaller islets that are traditional nest sites.
- Cluster development on shorelines, leaving areas of undeveloped tracts.

Strategy 3: Establish partnerships between developers and conservation organizations to incorporate low impact use and practices in the deed restrictions of shoreline subdivisions.

Figure 82. A mitigation policy for protecting high quality Common Loon nesting habitat from shoreline developments on lakes is urgently required in British Columbia. Loon Lake, BC. 30 June 2008 (R. Wayne Campbell).

- Limiting the amount of motorized craft allowable on a waterfront property, including the exclusion of all jet-propelled watercraft.
- Limiting horsepower or enforcing headway speed in sensitive areas.
- Include the cost of increased monitoring effort in subdivision fees, lake association fees, or other local fees.
- Restrict construction activities, particularly those involving barges, from occurring during the breeding season.

Objective 2: Implement a territory ranking system to help prioritize conservation efforts.

Strategy 1: Incorporate a ranking system to prioritize efforts to balance time, funding, and energy allotments. Overall productivity (fledged young per territorial pair) provides the best evaluation technique for areas occupied by loons. Protection of these high quality territories should be the highest priority. Productivity ranking categories have been developed for context (Evers et al. 2002).

- Use for management strategies.
- Use for prioritizing land protection.

Objective 3: Protect loon breeding habitat at a local level to sustain area populations due to high public value on loons.

Strategy 1: Enforce site-specific and appropriate restrictions for recreational activities during the critical parts of the breeding season (*e.g.*, during nest initiation, incubation, and the first five weeks post-hatch). This is particularly relevant in public recreational areas (*e.g.*, Loon Lake, Tunkwa Lake, and Williams Lake).

- Rapid localized movement and loud noise such as power boating, personal watercraft, water skiing, and floatplanes.
- Non-motorized craft such as sailing, windsurfing, rowing, and canoeing.
- Prolonged periods of time in a localized area such as certain angling practices.
- Spread of exotic invasive plants such as Eurasian water milfoil.
- Use of chemicals such as 2-4-D used to eradicate invasive species.

Strategy 2: Create site-specific sanctuaries for nesting and nursery areas (Figure 83).

Strategy 3: Establish partnerships between lake

Figure 83. While small vegetated islets offshore may provide a nest site, each pair of Common Loons requires a nearby and safe nursery area. The taller, more extensive, vegetation in these areas is essential for providing adequate protection from predators and weather. 43 km north of Quesnel, BC. 2 June 2008 (R. Wayne Campbell).

associations and conservation organizations to design protective measures at a lake level.

Strategy 4: Establish partnerships between shoreline owners and conservation organizations to encourage voluntary participation, such as providing observational data, deployment and maintenance of protective signs (Figure 84), and assistance in monitoring enclosures and refuges.

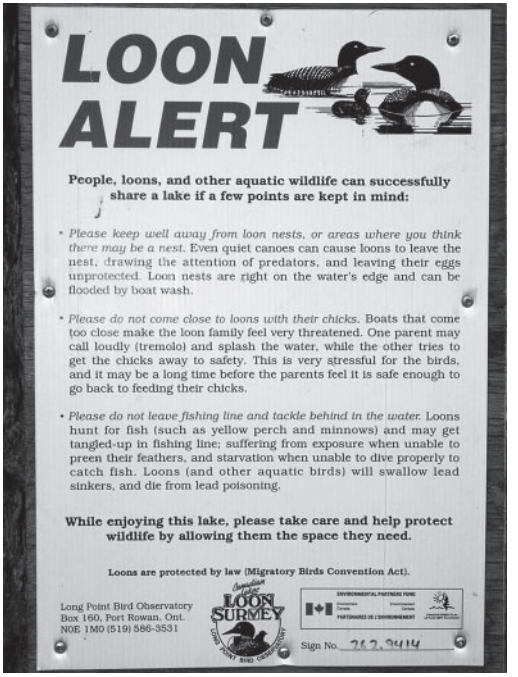


Figure 84. Lakes with breeding Common Loons and high recreational use in British Columbia should be identified and posted with "Loon Alert" signs. Signs should include British Columbia partners. Stoney Lake, BC 10 June 1996 (Linda M. Van Damme).

Objective 4: Develop a standard process to dictate mitigation and/or other management tools that assist resource managers.

Strategy 1: Develop standard mitigation guidelines. For example, unless storage reservoir water levels can be held relatively steady (*i.e.*, < 6 inch increase and < 12 inch drawdown), nesting rafts need to be used (Figures 85 and 111). All peaking reservoirs (*i.e.*, those reservoirs attached to electrical power facilities that daily use water surges) require nesting rafts (see Figures 85 and 111).

Strategy 2: Develop a standard monitoring strategy for the responsible party to use as a way to determine the success of mitigation efforts for enhancing loon breeding habitat. Part of this strategy should require frequent evaluations by provincial, federal, or industry wildlife biologists.

5. Policy

Objective 1: Connect efforts and information within the proposed "Conservation Plan for North America" with other relevant plans.

Strategy 1: Integrate for effectiveness such initiatives as the "North American Waterfowl Management Plan", "Partners in Flight", and "Shorebird Conservation Plan" including other national and regional water bird plans.

Strategy 2: United Nations Environment Program's Global Mercury Assessment.

Objective 2: Investigate, document, and summarize the relevant and most immediate data to assist science-based legislation and policy.

Strategy 1: Regulate anthropogenic air emissions and water effluents of mercury into the environment.

- Develop United States and Canadian legislation to unify current patchwork approach.
- Use developing risk assessments for Common Loon as a basis for assessing ecological health related to mercury.
- Use Common Loon as a national and international indicator for monitoring mercury bio-availability.

Strategy 2: Regulate the use, sale, and possession of lead objects in lakes and rivers.

Figure 85. In March 2007, members of the Williams Lake Field Naturalists (*e.g.*, Tom Foley, Cathy Koot, Fred McMechan, and Jim Sims), concerned about the annual breeding success of Common Loons, built and set out a nesting raft near Scout Island. The entire process was photographed by Jim Sims. The effort required: selecting a nest site (top left), constructing the base (top right), covering the platform with vegetation and dirt (bottom left), and towing the raft to position (bottom right).

- Develop United States and Canadian legislation to unify current patchwork approach.
- Emphasize regulation of lead sinkers and jigs less than 28.3 g and 2.5 cm in length (at its longest axis) that are designed for fishing.
- Promote non-toxic alternatives including steel, ceramic, bismuth, natural granite, tungsten, and recycled glass. Steel most closely matches lead in performance. Zinc is toxic and is not a viable alternative.

Strategy 3: Improve prevention of oil spills.

- Identify highly sensitive ecological areas and assess space and time limits by oil tankers.

Databases

It has been 19 years since the Common Loon account was published in *The Birds of British Columbia* (1990). During that period it remained the standard reference for the province. We were fortunate to have had enough time to compile an extensive database for Common Loon from diaries, field notes, e-mails, telephone messages, museum specimen catalogues, published and unpublished reports, technical literature, and wildlife surveys from our library holdings. Many naturalists, birdwatchers, and biologists also supplied updated information for their regions.

A major source of historical information on

Common Loon in British Columbia was extracted from two provincial bibliographies covering published and unpublished literature from 1866 through 1987. Over 850 articles are listed for Common Loon and most are cross-referenced by author, subject, and geographical region (for quick reference see Campbell et al. 1979, 1988).

The occurrence database for Common Loon is our largest for any species in the province and currently contains 307,996 individual records. We estimate that another 60,000+ records still need to be extracted from a variety of sources including "gray" literature.

This species account is based on 307,996 occurrence records, and 2,117 individual breeding records that include nests with eggs and/or flightless young. The Common Loon account published in *The Birds of British Columbia* in 1990, still the standard reference for British Columbia, was written using 11,438 occurrence and 626 breeding records. It should be noted that the account was written from information compiled on 3 x 5 inch index cards and 4 x 6 inch nest cards. None of the information was available in electronic form and the totals published in *The Birds of British Columbia* do not reflect the actual totals from cards that were used to prepare the account. Because relevant information had to be copied manually to cards, thousands of records were never transferred from source material. It is estimated that the actual "hard copy" information available on cards included about 7,500 occurrence records and 352 nest cards. Since the mid-1990s most of this information, and much more, has been extracted and added to our electronic databases.

The updated databases (2008) show a substantial increase in the number of individual records, new breeding information, increased provincial coverage, and enhanced text that allowed for a more representative species account (Table 11). More importantly, it emphasizes the significance of investing time to compile historical information and digitize it in a common provincial database.

This Common Loon account will be available on our web page www.wildlifebc.org in May 2009.

Retaining Common Loon information in British Columbia, centralized, and not scattered across international and national databases, is becoming more challenging as organizations and individuals see the opportunity to establish their own datasets for "biodiversity". It is our hope that field naturalists, birdwatchers, and biologists will contribute their information regularly to the Biodiversity Centre for Wildlife Studies to keep our comprehensive databases current.

Did You Know?

White Loons

There are only a handful of records of Common Loons in North America showing albino traits in their plumage and of these only two all-white birds have been reported, one from Florida and one from Ontario (Ulmer 1949). Margol McKinney put British Columbia in that elite group when she patiently waited and photographed a pure white loon in the East Kootenay (Figure 86).

Table 11. Differences in distribution information and size of databases used in the Common Loon account published in *The Birds of British Columbia* (BBC) in 1990 with the current account from updated databases housed by the Biodiversity Centre for Wildlife Studies (BCFWS) in 2008.

	Distribution[1]		Database	
	Occurrence	**Breeding**	**Occurrence**	**Nest Record Cards**
BBC	444	152	11,438	626
BCFWS	582	198	307,996	2,117
% Increase	31.1	30.3	2,592.7	238.2

[1]Based on the total number of 1:50,000 National Topographic System grids occupied.

Figure 86. Full albino Common Loon swimming on Haha Lake, BC. 24 July 2007 (Margol McKinney). BC Photo 3643.

Loons as Meteorologists?

John and Theodora Stanwell-Fletcher, in their book *Some Accounts of the Flora and Fauna of the Driftwood Valley Region of North Central British Columbia,* regarding Common Loons and predicting weather, wrote "*The peculiarly lovely clear, high call made just prior to a storm or bad weather, was quite distinct from its usual notes. The Indians of this region called this a song for rain and the observations of the writers confirmed this statement.*"

Living Without Fish

Although loons are primarily fish eaters in British Columbia they can successfully nest and raise a family on lakes without fish. In these situations they opportunistically feed on whatever is most abundant such as snails, clams, caddis flies, amphipods, and dragonfly nymphs.

Loon Cap

In 1909, Francis Kermode, Director of the Provincial Museum, wrote in his account of the Loon (*Gavia immer*) published in *A Visitors Guide to the Provincial Museum*: "*The skin of the Loon is used in Russia to make caps for the head and clothing, etc. Garments made of these are very warm, never inhibiting the least moisture, and are more lasting than could be imagined.*"

Loon's Necklace

The history of the loon is surrounded by a myriad of tales of myth and magic. Some believe that the loon created the earth with mud while other stories tell of a blind boy's eyesight being restored by repeatedly travelling on the loon's back to the bottom of a lake until his eyes were cleared. Being thankful, the boy gave the loon a necklace. On the Pacific coast, a First Nations Medicine Man threw his magic shaman's necklace of dentalium shells over the head of a loon that becomes the white pattern of the necklace.

How Deep?

While loons have been reported to dive to depths of 61 m (200 ft) biologists know that they regularly reach 30 m (100 ft) and that each dive lasts less than a minute (Figure 87).

Beached Birds

The British Columbia Beached Bird Survey is a program designed to collect baseline information on the causes and rate of bird mortality, and to make evaluations of change in numbers over time. Oil pollution is considered one of the major threats to pelagic seabirds and coastal waterbirds, with the physical properties of oil degrading the insulative properties of feathers and thus increasing the risk of exposure.

While early baseline data suggests that the risk is probably relatively high for seabirds and coastal waterbirds in general, the impact on Common Loon appears to be a very small, relative to the total number of birds found dead on beaches. For the period 2002 - 2007, only 17 of 699 (2.4%) recovered carcasses belonged to Common Loon (Figure 88). This does not necessarily mean that Common Loons are not susceptible to catastrophic effects from a local spill where loon populations may aggregate, but it does indicate that background rates of mortality are relatively low.

For more information on the British Columbia Beached Bird Survey, visit: www.bsc-eoc.org/volunteer/bcbeachbird.

Well Named

The scientific name for Common Loon, *Gavia immer*, is more appropriate than for many birds.

Figure 87. While most Common Loons search for food just below the surface they can pursue prey to depths of over 60 m. Twin Lakes Provincial Recreation Area, AB. 10 June 1995 (Michael I. Preston).

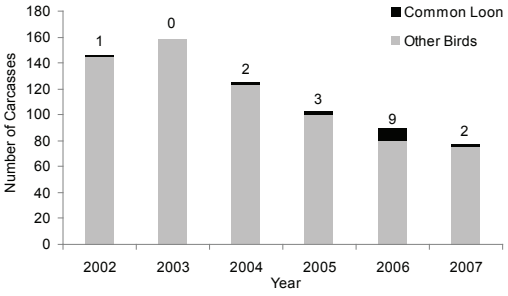


Figure 88. Total number of Common Loon carcasses collected from beaches in British Columbia, relative to carcasses collected for all other species. Note: two loon records were classified as "unknown", but are included to maximum values. Data provided courtesy of Bird Studies Canada.

Gavia is derived from the Scandinavian word for "diving bird" or "water bird" and was first mentioned by Pliny and the philosopher Lucius Appuleius. The species name, *immer*, is from an Icelandic name himbrimi for "surf-roarer" and the English translation *ember* for the ashen or black colour of the loon.

Fish for Life

In Ontario, a biologist determined that adult loons have a daily fish intake of about 960 g and a family, with two young, can consume nearly 423 kg (932 lb) during a single breeding season.

Diving into the Web

Due to concerns about declining populations in northeastern North America, and the real threat from chemical contamination and human disturbance, Common Loon has received a lot of attention by naturalists, government organizations, conservation groups, and researchers. As a result, many non-profit groups have been formed to help educate the public and monitor loon activity locally. Provincial, state, and federal governments have also embarked on programs relating to the plight of Common Loon.

Additional information on the web useful to British Columbians concerned about Common Loon can be found at:

Government of Canada Science and Technology
(http://dsp-psd.pwgsc.gc.ca)

Alaska Loon and Grebe Watch
(www.akloonwatch.net)

Alaska Loon and Grebe Working Group
(www.r7.fws.gov/mbm.loons)

North America Oil Spill Contingency Plan
(www.uscg.mil/hq/g-cp/comrel/factfile/index.htm)

Biodiversity Centre for Wildlife Studies
(www.wildlifebc.org)

BioDiversity Research Institute
(www.briloon.org)

California's Oiled Wildlife Care Network (www.owcn.org)

Canadian Lakes Loon Survey (www.bsc-eco.org)

Committee on the Status of Endangered Wildlife in Canada (www.cosewic.gc.ca/eng/sct5/index_e.cfm)

Global Marine Oil Pollution Information (http://oils.gpa.unep.org/facts/eadmore.htm)

Latest News on oil-Spills (www.oil-spill-web.com/news/latest.htm)

Oil Spill Case Histories: 1967-1991 (http://response.restoration.noaa.gov)

Pacific States/British Columbia Oil Spill Task Force (www.oilspilltaskforce.org)

Patuxent Wildlife Research Centre (http://bna.birds.cornell.edu/bna/)

United States EPA Oil Program Education (www.epa.gov/oilspill/eduhome.htm)

Water Quality in British Columbia (www.env.gov.bc.ca/wat/wq/reference/acidrain/acidrain.hmtl)

Wetlands International Diver/Loon Specialist Group (www.briloon.org/diver.htm)

Acknowledgements - Your Data at Work

Common Loon is a favourite bird for thousands of British Columbians and hundreds have contributed to this updated account. New information, after 1990 when the first volume of *The Birds of British Columbia* was published, was received from the following people, organizations, museums, and government agencies or extracted from literature not searched by 1990. Contributors to the British Columbia Nest Record Scheme who have reported nests and broods of loons over the past 10 years are also listed. An * indicates a deceased individual but one who has left a permanent record in the form of field notebooks and/or publications.

The list is long but it emphasizes the cooperative effort that is required to produce a more representative and detailed summary of the life of Common Loon in the province. Source material came from:

Elizabeth Abbott, (The) Academy of Natural Sciences (Philadelphia, PA), American Museum of Natural History (New York, NY), Astrid Anderson, *E. M. Anderson, Errol Anderson, Morgan Anderson, Ron Anderson, William (Bill) J. Anderson (Figure 89), Kris Andrews (Figure 90), Gerry Ansell, Cathy Antoniazzi (see Figure 102), Rex Armstead, Bob and Linda Armstrong, Bruce and Nancy Armstrong, Janice E. Arndt, *Genevieve Arnold, *Dick Asher, Vicky Atkins (Figure 91), Lloyd Atkins, Australian Museum of Natural History (Sydney), Heather Baines, *Brian E. Baker, Jerry Baker, Stan Baker, Kevin and Samantha Bamsey, P. John Bandy, Ian Barnett, Avery and Letty Bartels, Stephen Bazett, *Derek Beacham, Alice Beals (Figure 91), Alan Bear, Dick Beard, E. A. and Grant Beaumont, Frank L. Beebe, Dorothy Beetstra, Barbara Begg, Kevin Bell, Steve Bell, Edward Bemont, *Fred and Winifred M. Bennie (see Page 129), Michael Bentley, Jennifer Bergen, Ed Beynon, Brian Biever, Jim Biggar, Ray Billings, Maj Birch (Mountainaire Avian Rescue Society), Myrna Blake, Henry Blanchard, Pat Blaylock, Peter F. Blokker, Rick Bonar, Paul Borchert, Jack Bowling, *Dr. Kenneth C. Boyce, British Columbia Fish and Wildlife Branch (Cranbrook, Kamloops, Nanaimo, Prince George, Surrey, and Williams Lake), Brad Boyle, Mark Bradley, Jan F. Bradshaw (Figure 92), Tom Brighouse, John Brigman, Steve Britten, *Allan Brooks, Doug Brown, Gary Brown, Quentin Brown, Valerie Brown, Frank Buffam, Burke Museum (University of Washington, Seattle, WA), Roger Burrows, Clyde H. Burton, *Walter Burton, David Bustard, Robert W. Butler, Christy Butt, Colin Butt, Joan Caldwell, *Elmer Callin, Monica and Orlando Camilletti, Eileen C. Campbell, Lucile Campbell (Figure 93), Marie Campbell, Mildred W. Campbell, *Robert L. Campbell, R. Wayne Campbell, Canadian Wildlife Service (Delta), Peter Candido, Richard J. Cannings, Robert A. Cannings, Sydney G. Cannings, Carnegie Museum (Pittsburgh, PA), Geoff Cattrall, Martin Charles, *G. Clifford Carl, John S. Carlson, W.

Winifred M. Bennie - The Loon Lady

Winnie was born in Vanderhoof in 1926 and raised in Fort St. James, British Columbia. She moved to Williams Lake in 1951 with her passion and love for critters and plants. She was a founding member of the Williams Lake Field Naturalists (WLFN) and over the years served on the executive as secretary, membership co-ordinator, and social convener. Always kind, and thinking of others, she initiated a bursary to a graduating high school student in biology through the WLFN and was instrumental in raising funds each year through a plant and yard sale. In 2006 she was awarded a Life Membership in the natural history club.

Winnie regularly contributed her sightings of birds from her residential home on Yorston Street for publication in *Muskrat Express*, the newsletter of the WLFN. Over the years these jottings turned out to be a valuable contribution to the annual occurrence for many common birds in the Williams Lake area such as House Sparrow, House Finch, Dark-eyed Junco, Song Sparrow, Northern Flicker, Black-capped Chickadee, and Red-winged Blackbird.

During her early years exploring lakes and marshes in the Cariboo-Chilcotin region Winnie quickly realized that her observations could be useful for wildlife conservation and more importantly the protection of habitats for the plants and animals she so enjoyed. She soon became involved in many volunteer programs and maintained an active role for decades. She contributed to the annual Spring Bird Survey, Christmas Bird Count, and Bluebird House Nesting Project organized by the WLFN. She became aware of the British Columbia Nest Record Scheme (BCNRS) through Wayne Campbell in 1971 and soon was recording nests and broods during her travels. Initially, she was overwhelmed with the details required for each card as it interfered with her outdoor experience so she submitted many records on summary sheets. As she became more comfortable with the cards Winnie started to "fill in the blanks" so to speak. And she submitted hundreds over the years.

Her pet project, however, was the Common Loon. In the mid-1950s she and her husband, Fred, purchased property at Nimpo Lake which is located in the Chilcotin about 300 km west of Williams Lake. Here they could enjoy a wilderness experience each summer while watching (and recording) loons and other wildlife. Fred, with help of friends, built a prefab cabin in his backyard in Williams Lake and later had a freightways company haul it out to Nimpo. By the 1960s Winnie and Fred were settled in and soon started to explore the lake by canoe. A special project was searching the shores for loon nests. When young hatched they kept track of their activities as well as the impact Bald Eagle predation had on growing young.

Over the decades Winnie amassed an impressive collection of information on the "Loons on Nimpo Lake" which she wanted to publish one day as a personal story. Each year she summarized her loon findings and passed them on to Wayne Campbell by telephone who acknowledged them in the annual reports of the BCNRS. When her story was completed she promised to send more details. True to her word, in 2004, Winnie mailed specific information for over 90 breeding records which are now being transferred to nest cards.

Winnie passed away in Williams Lake on 21 January 2007 at 80 years.

Dedicating this account to Winifred is recognition of her commitment and contribution to the nesting life of the Common Loon from a remote lake in British Columbia. People at Nimpo Lake still fondly remember her as "The Loon Lady."

Figure 89. During the 1960s a small group of keen birdwatchers started compiling bird sightings from the Greater Vancouver region that would eventually provide the foundation for the four-volume set *The Birds of British Columbia*. Here Bill Anderson, a major contributor for nearly a decade, strolls along the hard-packed sands of Long Beach, BC. September 1968 (R. Wayne Campbell).

Figure 90. Since 2001, Kris Andrews has been carefully monitoring the annual nesting activity of Common Loons from her lakeshore residence at the west end of Williams Lake, BC. Here she is looking for loons on Archie Lake, near Kleena Kleene, BC. 2 April 2006 (Eve Whitehead).

Figure 91. For nearly 30 years, Vicky Atkins (left) and Alice Beals have been recording the occurrence and nesting of Common Loons, and other birds, in the north Okanagan Valley, BC. Swan Lake, BC. 5 November 2006 (Lloyd Atkins).

Figure 92. The status of the Common Loon in the Harrison-Kent-Seabird Island area of the southwest mainland as well as the Chase-Squilax area in the interior of British Columbia has been determined over several decades of birdwatching by Jan Bradshaw. Tranquille, BC. March 2008 (Claudia Hannert).

Caspell, Alice Cassidy, Oskar Cederlof, Jean Chambers, W. Jim Chambers, Doug Chandler, Chris Charlesworth (Figure 94), Rod Chilton, Darcy Christensen, Bill Christie, Murray Clark, *J. O. Clay, A. Cober, D. Code, Aldo Cogrossi, Andy Coleman, Kelly and Jennifer Collard, Cyril Colonel, *John Comer, Stephen Connelly, Charles R. Conner Museum (Washington State University, Pullman, WA), Adrian Cooper, Derek Cooper, Dianne Cooper, Jocelyn Cooper, John M. Cooper, *John

Figure 93. Lucile Campbell has been a faithful and regular contributor to *The Birds of British Columbia* and has helped with this updated account of Common Loon by recording birds in wetlands throughout the Columbia valley. Invermere, BC. 21 February 2007 (Gabriel Senger).

Figure 94. Many birders, like Chris Charlesworth, share their passion for birds by participating in a wide variety of cooperative conservation and survey programs in British Columbia each year. Woods Lake, BC. December 2007 (Sean Connors).

Figure 95. Dorothy Diduck regularly records birds in the East Kootenay region and shares them with others interested in protecting birds in British Columbia. Canal Flats, BC. 9 May 2007 (Larry Halverson).

K. Cooper, Paulo Correia, Evi Coulson, Cowan Vertebrate Museum (University of British Columbia, Vancouver, BC), Creston Field Naturalists, Linnea Cross-Tallman, Chris Czaijkowski, Ed and Monica Dahl, Betty Dale, Mark K. Daly, Grant and Marcia Danielson, S.J. Darcus, *A. R. Davidson, Eleanor Davidson, Evan Davidson, Gary S. Davidson, Brian Davies, Doris Davies, John Davidson, J. Davis, Neil K. Dawe, Cathy Earle, *Gwen deCamp, Dennis A. Demarchi, Andrew Demmel, Pam Dicer, Ruth Dickson, Dorothy Diduck (Figure 95), Jochen Dierschke, *Joseph Dixon, Adrian Dorst, Douglas D. Dow, Rudolf H. Drent, Ducks Unlimited Canada, Linda Dupuis, Linda Durrell, Rainer Ebel, Barry Edwards, R. Yorke Edwards, Alfreida and Lyndon Eldon, Peter W. Elliott, *Maurice Ellison (Figure 96), Anthony J. Erskine, Steve Fairbairn, Peter Endwick, Colleen Erickson, L. Erickson, Anthony J. Erskine, Chris Ecott, L. Anthony Fan, Emilee Fanjoy, T. Farley, Deborah Fast, Beck Finley, Marion Faulkner, Meg Fellowes, Robert S. Ferguson (Figure 97), Field Museum of Natural History, Chicago, IL), Rob Findlay, Robert G. Foottit, Scott Forbes, Trevor Forder, John W. Foster, Dale Francis, Martina Frey, Pierre Friele, D. Lorne Frost, G. N. Garttrell, Bryan R. Gates, Richard E. Gibbs, Arthur Gibson, Line Gillespie, J. Ginns, Tom Girdley, Len Goldsmith, *J. E. Victor and Margaret E. Goodwill (Figure 98), Mark Gardiner, *C. B. Garrett, Tom Godin, Max Gotz, Trevor Goward, Jim Groome, Elizabeth Harris, Heidi and Freddy Hess, Bill Heybroek, Phil Gehlen, Jim Ginns, Hilary Gordon, Orville Gordon, Ted Goshulak, Louise Goulet, Douglas J. Graham,

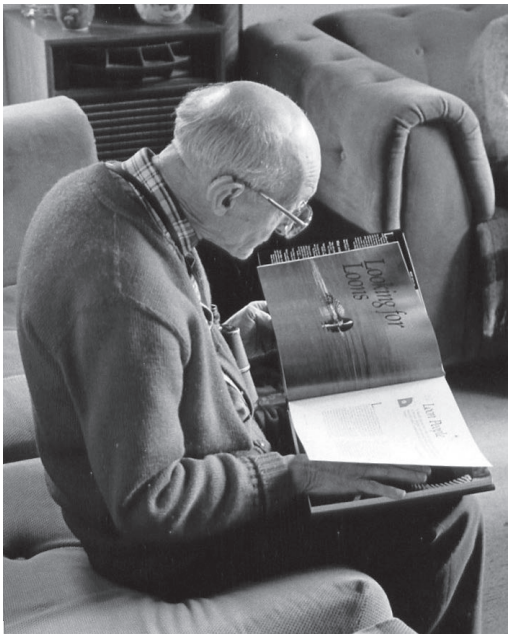


Figure 96. For 56 years, Maurice Ellison recorded birds daily around his home in Trail, British Columbia, and along the Columbia River of the West Kootenay region. This storehouse of information is the only historical record for the area and has been invaluable in preparing this account. Kaslo, BC. May 1987 (Gordon F. Brown).

*James Grant, Al and Jude Grass, *Charles deBlois Green, Tony Greenfield, Christian W. Gronau, Jim Groome, *Charles J. Guiguet, Frank E. Guillon, G. F. Gunville, Miriam and Steven Haavik, Shannon Hackett, Steve Hacking, Douglas J. Haddow, Penny Haering, S. Hall, Jason Hamilton, Larry Halverson (Figure 99), A. M. Hames, Willie Haras (Figure 101), Barry C. Harman, Robert D. Harris, David F. Hatler, Dave and Myrnal Hawes, Robert B. Hay, W. Grant Hazelwood, Todd Heakes, Ruth E. Hellevang, Charles Helm, Ed Hennan, Audrey and Lori Henry, Rose Henry, J. E. Heriot, R. Jerry Herzig , Werner H. (Figure 100) and Hildegard E. Hesse, Edward Hillary, Stefan Himmer, Keith Hobson, Mark Hobson, Steve Aarona and Amber Hocking, Jane Hoek, *Martin W. Holdum, J. H. Holman, Darren Hooper, Gordon Hooper, Tracey D. Hooper, Bill

Figure 97. Much of what is known of Common Loon in the upper Columbia River valley in the East Kootenay region of British Columbia has been provided by Robert (Bob) Ferguson. Abhaihnian Easa Mhoir, Isle of Mull, Scotland, 25 March 2006 (Kenneth Ferguson).

Figure 98. Most birders are not disciplined to record every common bird they see on each field trip. Peggy Goodwill, and her late husband Vic, however were a rare exception. Their daily field notes for over three decades provided monthly distribution patterns for the Common Loon around southern Vancouver Island. Victoria, BC. 15 November 2000 (R. Wayne Campbell).

Hooy, Dennis Horwood, Harold Hosford, Steve Howard, Caroline Hutcheon, Jim Houston, Steve Howard, Robert W. Howe, Richard R. Howie (Figure 101), Bill Hudson, Walter Hughes, *William M. Hughes, British Columbia Hydro (Prince George), *Doug and Marian Innes, John Ireland, Ki Irwin, Evelyn Jaarsma, Ian Jack, Tom Jacobson, Doreen Janzen, Pat Janzen, Elmo Jaar, Barry Janyk, Mildred Jenkins, Ron Jenkins, Hugh Jennings, Wayne Jennings (see Figure 101), Grace Jolly, Paul Jones, Peter W. Jones, Fran Johnson, Rudy Johnson, Steve Johnson, Ann Johnston, Marlene Johnston, *Walter B. Johnstone, Anne N. M. Jones, Donna Jones, Edgar T. Jones, Ian L. Jones, Peter Jones, Doug Jury, Gary W. Kaiser, Terry Kales, Fritz Karger, *Tony and Liz Karup, *Brian M Kautesk, Joan Keene, Leslie Keith, J. Keizer, Ethel Kelly, John Kelly, *J. E. H. Kelso, *Archie Kennedy, Bruce Kennedy, Ian Kennedy, Ken Kennedy, Connie Kent, Joan Kerr, Jason and Jeremy Kimm, Margaret King, Mary Kingsmill, Joan King, Sandra Kinsey, Mary Kirchner, June Kitamura (see Figure 101), Helen Knight, Cathy Koot, W. Douglas Kragh, Nancy Krueger (Figure 102), Dave Laasman, Vi and John Lambie (Figure 103), *Hamilton M. Laing, Marilyn Lambert, J. Land, Laird Law, George Lawson, Adrian Leather, Barbara Leckie, Martin C. Lee, Genevieve Leger, Carole Legere, Douglas A. Leighton, Gary Lelliott, *Enid K. Lemon, Pat Levitt, Molly Lines, Marcia Long, Jack Love, Terry and Ursula Lowrey, George Lucas, Betty and Jim Lunam, *Robert E. Luscher, Mel and Rika Lyne, J. Michael Luz, Alan M. Lyon, Derick MacDonald, Ed MacDonald, S. Macdonald, S. W. MacDonald, *R. R. MacFarlane, John MacGregor, James Mack, S.

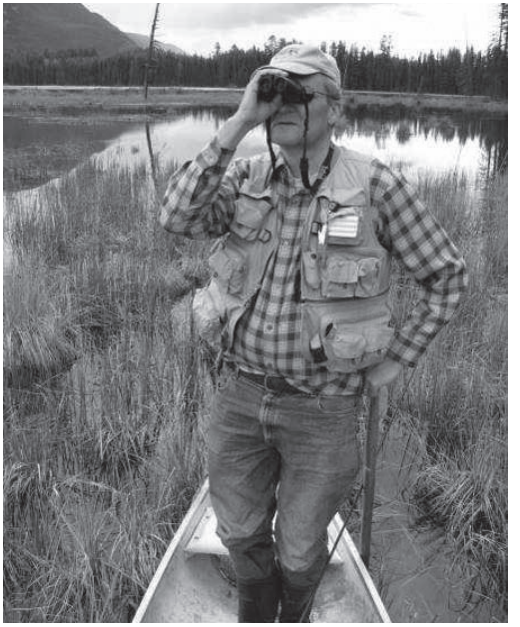


Figure 99. For over three decades Larry Halverson has elevated interest in appreciating, observing, and documenting the life of birds, and other critters, in the East Kootenay region of B.C. during his career as a Parks Canada naturalist. Gaps in the distribution of the Common Loon, especially in the Columbia River marshes, have been filled by Larry and many of his friends. Near Invermere, BC. 29 September 2008 (Richard Halverson).

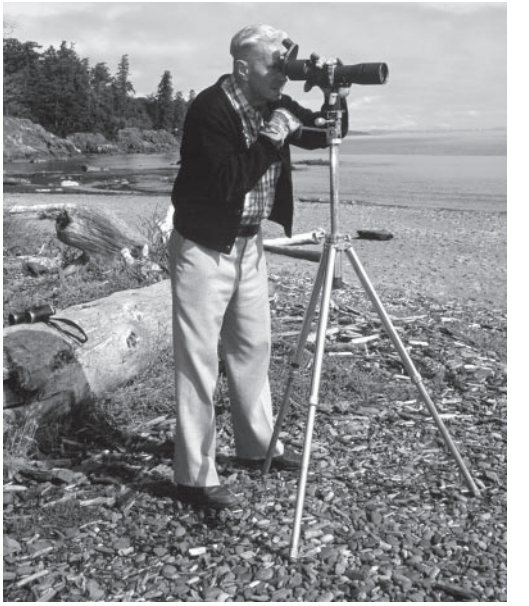


Figure 100. Almost all of the Common Loon information from near-shore marine areas of Metchosin and Royal Roads was submitted regularly by the late Werner Hesse (and his wife Hildegard) including regular counts off Weir Beach, BC. 26 September 2008 (R. Wayne Campbell).

Figure 101. The Heffley Creek-Kamloops-Logan Lake-Merritt area of south-central British Columbia has been well searched for Common Loons by members of the Kamloops Naturalist Club. From left to right, June Kitamura, Willie Haras, Rick Howie, and Wayne Jennings are on a field trip to count swans along the South Thompson River. January 2007 (Kats Kitamura).

D. MacDonald, Jo Ann and Hue MacKenzie, Ken MacKenzie, Alan L. Macleod, Pat MacNamara, Julie and Valerie Madison, *Walter S. Maguire, Diana

Figure 102. For several decades Cathy Antoniazzi (left) and Nancy Krueger have contributed their observations of Common Loons seen during their birding expeditions throughout the province. Tabor Lake, BC., 21 October 2006 (Jack Bowling).

Figure 103. Mike Preston (left) showing John and Vi Lambie samples of how some field notes are organized and tracked at the Biodiversity Centre for Wildlife Studies in Victoria, BC. Vi and John established the Mackenzie Bird Observatory and together, with many volunteers, have documented bird life in an important transition zone between the boreal forest and Peace River parkland region of British Columbia. (R. Wayne Campbell).

Maloff, Murray A. Mark, Patrick W. Martin, Wayne Matkoski, Ron Mayo (Figure 104), Eric McAlary, Don McAllister, Jim McArthur, Bruce McDonald, D. E. McFarland, *Marjorie McFeat, J. McGeoch, A. Jane McGhee, Carolyn McGhee, A. S. McGill, Glen and Isabel McInnes, Peter McIver, Richard McKelvey, Ed McMackin, A. McIntosh, Hugh McLaren, *William D. McLaren, A. McLean, Michael McMann, George McNair, Mac McNair, Bruce McNaughton, C. McNaughton, Martin K. McNicholl, Kevin McPherson, Barbara and Michael Meiklejohn, Mitch Meredith, *Arthur L. Meugens, Roger Meyer, D. Mickie, Harry Middleman, Johnny Mikes, W. Milford, Bob Miller, Hettie and Robert Miller, Roy Mitchell, *Ed Moody, Elaine Moore, Cy

Morehen, Ken H. Morgan, Pearl Morgenstern, Mike Morrell, Art Morris, Ken P. Morrison, William Morris, *Allister Muir, Emily Müller, Scott Müller, D. Munro, *James A. Munro, Ken Munro, Museum of Comparative Zoology (Harvard University, Cambridge, MA), Museum of Natural History (Oregon State University, Corvallis, OR), Museum of Vertebrate Zoology (Berkley, CA), Museum of Zoology (University of Michigan, Ann Arbor, MI), Don Murray, Stuart Murray, Andy Musgrove, National Museum of Natural History (Smithsonian Institution, Washington, DC), Natural History Museum of Los Angeles County (Los Angeles, CA),

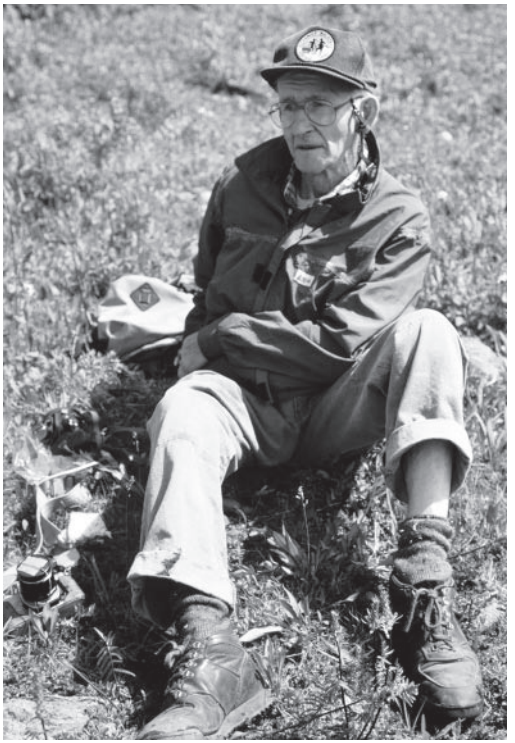


Figure 104. Most of the wildlife information in our databases from the Bella Coola region has been supplied by Ron Mayo. Today, at 86 years old, he still has a passion for wildlife and passes along records of birds from this little known area of the province. Rainbow Range (Tweedsmuir Park), BC. 12 July 1992 (R. Wayne Campbell).

Patrick Naviz, Rob Neaga, Eve J. Neale, *C. F. Newcombe, Gwen Nicol, K. J. Nielson, Andrea Norris, Brent Olsen, Tom W. Parkin, D. F. Penner, Ivar Nygaard-Petersen, Mark Nyhof, Derek O'Brien, Lowell Orcut, Ted Osmond-Jones, Myrna Palmiere, Tom W. Parkin, Louise Parmenter, Mary Pastrick, Trudy Pastrick, Sandi Patterson, *W. Adrian B. Paul, Peabody Museum (Yale University, New Haven, CT), Peace/Williston Fish and Wildlife Compensation Program, *Theede Pearse, Wes Pederson, Lynn and David Pedley, J. Perrin, Ev Person, Vi Peters, Dan Peterson, Brian J. Petrar, Marcia Philips, Alec Phillips, *Roy W. Phillips, W. Phillips, Mark Phinney, Marianne Pickard, Dirk Pidcock, Tom Plath, J. A. Ploos, Rosamond Pojar, Joe and Johnathon Pollack, Doug Pollard, John L. Polson, Jane Porter, Sandra Porter, *Douglas Powell, Gerald A. Powers, G. Allen and Helen Poynter, Michael I. and Joanna Preston, Donald Prime, Roy Prior, Larry Prosser, Sandy Proulx, Provincial Museum of Alberta (Edmonton, AB), Margaret Purdy, *Kenneth Racey, Marilyn Rack, Jennifer Read, T. C. Reid, *Kenneth Racey, Kurt Rack, *William S. Rae, C. Rainville, Don Ramsey, *A. L. Rand, Phil Ranson, Sandy Rathbone, Trish Reid, Tom E. Reimchen, Reto and Sabine Reisen, Frank Reynolds, Sheila Reynolds, Ken Richardson, Betty Richmond, Nancy Ricker, Keith Riding, Ralph W. Ritcey, Anna L. Roberts (Figure 105), Leila G. Roberts, *Syd Roberts, Neil Robins, Jim Robinson, Steve H. Robinson, Wayne Robinson, Ann Rocchi, I. Laurie Rockwell, Joy A. Rodway, Michael S. Rodway, John Rogers, Manfred Roschitz, Glenda Ross, Ian Routley, Royal British Columbia Museum (Victoria, BC), J. Russell, Don Ryder, Glenn R. Ryder, *John G. Sarles, Ron Satterfield, Jean-Pierre L. Savard, Maureen Scharf, Charlie Schilberg, Kim Schmitt, Madelon Schouten, Al Schneider, Bob Schnider, Allan C. Schutz, Greg Scott, Lorraine Scott, Scout Island Nature Centre, Spencer G. Sealy, Don and Barbara Sedgwick, David C. Schutz**,** Brian Self (Figure 106)**,** Walter Sharpe, Chris D. Shepard, Michael G. Shepard, Teresa Shepard, Rachel Shepard, V. Shepard, Peter and Barbara Sherrington, Katherine Shewchuk, *Frank M. Shillaker, Stuart Simpson, Chris Siddle, Ed Silkens, Jim Sims, Jean Simmons, Fred Simpson, John Simpson, George P. Sirk, James R. Slater

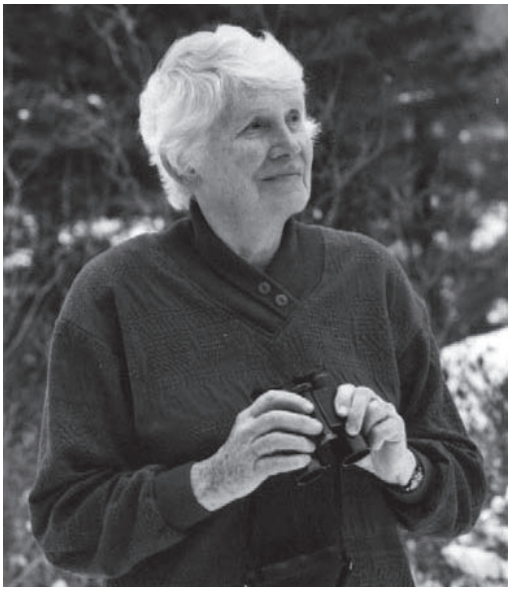


Figure 105. For nearly five decades Anna Roberts has been the main source of information on plants and animals in the Cariboo-Chilctoin region of BC. In the early years there was no one to share her passion but today she plays a lesser role as interest in natural history in the area has surged and others can now deal with the constant demand for information. Williams Lake, BC. December 2006 (Stephen Walker).

Museum of Natural History (University of Puget Sound, Tacoma, WA), Joe Small, Gail Smart, Kay Smith, W. S. Smith, Jim Spencer, Michael Spencer, Prue and Bernie Spitman, Gail Spitler,*William Spreadborough, Eric Springet, *John Stainer, Elsie L. and Glen Stanley, *J. Stainer, Barry and Beryl Stayte, H. A. Stelfox, Andrew Stepniewski, R Tom Sterling, Tom Stevens, Brian Stewart, G. Stewart, David Stirling, I. Stirling, Barbara Stover, Anita Straitman, *Jim Street, Sandra Street, Ken R. Summers, Richard Swanston, *Harry S. Swarth, R. L. Sweet, Pat Swift, Doreen Tait, Yuriko Takahashi, Jeremy B. Tatum, *P. A. Taverner, John Tener, *T. L. Thacker, Ken Thompson, John Thompson, Howard A. Telosky, Harvey Tomlison, Rick Toochin, Michael and Ray Travers, Roger Tremblay, Neil S. Trenholme, Vicki Troup, Jim Tuck, John Turner, Peter Tyedmers, Betty, Danny and Rick Tyson, J. E. Underhill, Mark van Bakel, Linda M. Van Damme, Tore van der Leij, Kevin J. Van Tighem, Ann Vaudry, Floyd and Laura Vaughn, Debbie Verhalle, Kees Vermeer, Judy Vetsch, Karen Vicars, John Vooys, Paul Wadden, *Jean Waite, Frank Walker, Ron Walker (Figure 107), Laura Wallace, Terry Walsh, Sidney L. Waskiewich, Michaela J. Waterhouse, G. Ross Waters, Brad F. Watts, R. Webb, Robin D. Weber, Wayne C. Weber, Robert B. Weeden, Rita Wege, Billy Weistill, Rick West, Betty Westerborg, Western Foundation of Vertebrate Zoology (Camarillo, CA), *Mildred V. White, Al and Irene Whitney, Margaret Whittaker, Karen L. Wiebe, Jean and Sean Wilkinson, Patrick Williston, B. L. Williams, Don Williams, Dorothy and Jack Williams, Williams Lake Field Naturalists, Marilyn Williams, P. Ray Williams, Douglas J. Wilson, Jack Wilson, William G. Wilson, Neville Winchester, *Ben P. Wintemute, Jim Wisnia, Michael Wolfe, Marcus Womersley, Susan M. Wood,

Figure 106. Brian Self (left) with Michael Preston reviewing methodology for bird surveys near Sumas Mountain, B.C. Brian is a long-time birdwatcher and is actively involved with the birding section of the Vancouver Natural History Society. 10 May 2003 (R. Wayne Campbell).

Joe Woodcock, John G. Woods, Chris Wooldridge, David Woolgar, Robert Worona, Kenneth G. Wright, Peter Wright, Richard T. Wright, *J. Wynne, Bob and Francis Young, F. Don Young, Pat Young, Barry Zettergreen, Ellen Zimmerman, Ed Zolinski, and Fred C. Zwickel.

This account has benefited greatly from discussions with the following people, many of whom donated detailed regional information that was especially helpful in updating the loon's annual chronology and change in status in the province: Kris Andrews, Winnifed Bennie, Jack Bowling, Jan F. Bradshaw, Clyde H. Burton, Lucile Campbell, Gary S. Davidson, Dorothy Diduck, Adrian Dorst, Robert S. Ferguson, Tony Greenfield, Larry Halverson, Rose Henry, John and Vi Lambie, Douglas A. Leighton, Ralph McDonald, Roy Mitchell, Eve J. Neale, Ivar Nygaard-Petersen, Peter Olesky, Mark Phinney, Don and Tanya Reese, Tom E. Reimchen, Anna Roberts, Glenn R. Ryder, Ron Satterfield, Walter Sharpe, Chris Siddle, Jim Sims, David Stirling, Howard A.Telosky, Terence R. Wahl, *Jean Waite, Ronald P. Walker, and various members of the Williams Lake Field Naturalists.

While most of the photographs have been taken by the authors we are grateful to Robert W. Allen, Lloyd Atkins, Winifred Bennie, Jack Bowling, Gordon F. Brown, Kenneth Ferguson, Alistair Fraser, Christian W. Gronau, Kats Kitamura, Douglas Leighton, Margol McKinney, Gabriel Sanger, Jim Sims, Stephen Walker, and Eve Whitehead whose images greatly enhanced this account.

Some mortality information was received from Mountainaire Avian Rescue Society in Courtenay, BC. Del Francis provided the article on the loon encounters on Tahoola Lake and his son Dale granted permission to reproduce excerpts from his article.

We thank Bird Studies Canada for supplying BC Beached Bird Survey data, and all the volunteer participants who gathered data for the project.

Barrie Brown-John and Fred McMechan provided details on Winifred Bennie for the dedication.

Thanks to everyone!

Figure 107. Ron Walker (centre) has been birding in the Boundary District of British Columbia travelling frequently between Christina Lake (where he lives) west to Grand Forks for over 50 years. Prior to Ron's arrival, the ornithology of the area, especially distribution and occurrence, was poorly known. Ron also travels around the province and enjoys visiting new places in the world where he has a chance to experience new cultures and, of course, find new birds. Amazon jungle, Peru. 1996.

Literature Cited and Useful References

The technical literature for Common Loon in North America is enormous. The list below, which only serves as an introduction for major source and subject literature as it relates to the life history of Common Loons, their period of occupancy, and conservation concerns in British Columbia represents only a fraction of the hundreds of articles searched for information for this account. Ornithological bibliographies are available for British Columbia, through 1987, and list 944 articles cross referenced by author, 43 subject categories, and location within the province (see Campbell et al. 1979, 1988). These can be consulted for specific references.

All articles with an * indicate a copy is filed in the BCFWS library.

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Burgess, N.M., D.C. Evers, and J.D. Kaplan. 2005. Mercury and other contaminants in Common

Figure 108. Since toxic chemicals can travel around the world in air masses and be deposited anywhere it is important that loon activity be monitored regularly as indicators of the health of lakes and other wetlands in the province. While not all lakes can be sampled for pollutants recording the presence of breeding Common Loons on far northern lakes can be helpful. Surprise Lake, BC. 7 June 1996 (R. Wayne Campbell).

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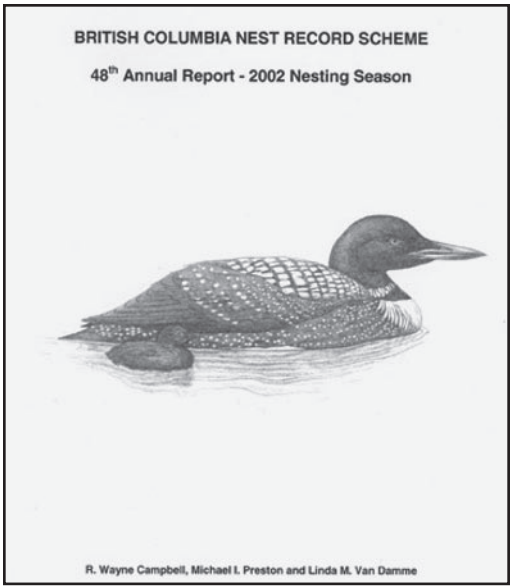

Figure 109. The major source of breeding information on the Common Loon in British Columbia is the British Columbia Nest Record Scheme. An annual report is published each year. Over the 54 years the Scheme has been operating a total of approximately 2,117 breeding records have been amassed from historic and current sources.

Caron, J.A. and W.L. Robinson. 1994. Responses of breeding Common Loons to human activity in upper Michigan. Hydrobiologica 280:431-438.

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Figure 110. An important, but time-consuming, source of breeding information on the Common Loon was obtained from museum collections and archives. S.J. Darcus, during his specimen collecting forays around the province, recorded and photographed many of his findings such as this well constructed Common Loon nest at Vaseux Lake, BC. on 8 May 1931. BC Photo 3122.

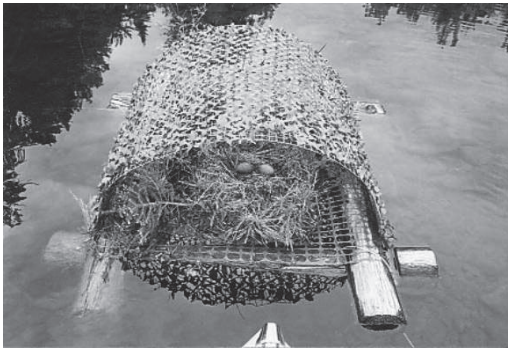

Figure 111. Details for use and construction of artificial nest platforms and avian guards for Common Loon are part of management activities discussed in detail in David Ever's report. This photograph of a raft with a protective wire mesh avian guard is effective in (1) reducing egg exposure to avian predators, (2) lessening raft visibility by recreationists, and (3) increasing the probability that incubating loons remain on the nest during close approaches by recreationists and potential predators. Aziscohos Lake, ME. June 2000 (David C. Evers).

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Figure 112. At Williams Lake, BC it is not uncommon for Western Painted Turtles (*Chrysemys picta*) to sun themselves in close proximity to the Common Loon nests, even when the adult is on the nest incubating. 13 July 2003 (Kris Andrews). BC Photo 3640.

Painted Turtles, *Chrysemys picta bellii*, basking on a nesting Common Loon, *Gavia immer*. Canadian Field-Naturalist 109:456-458. [Figure 112]

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Figure 113. Common Loons, and recreationists like Dale Francis, often share the same habitats each summer in British Columbia. Both can coexist with an informed management and mitigation plan for high-use lakes. Langford Lake, BC. Summer 2007.

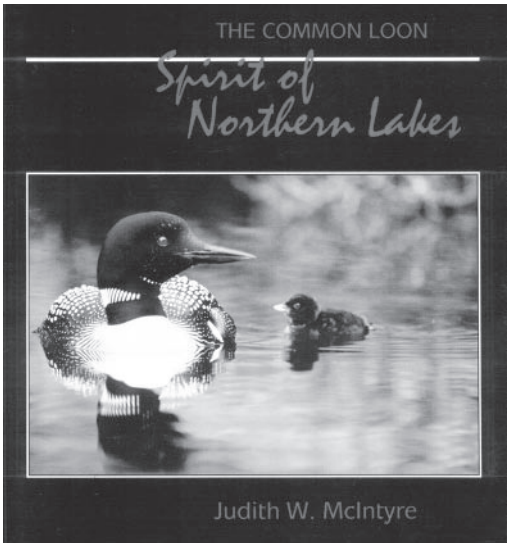

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Figure 115. Lakeshore development guidelines in British Columbia must identify and protect suitable nesting habitat for Common Loons not only from building but also human access to shorelines where a variety of recreational activities can occur including exercising a dog. Charlie Lake, BC. 10 June 2007 (R. Wayne Campbell).

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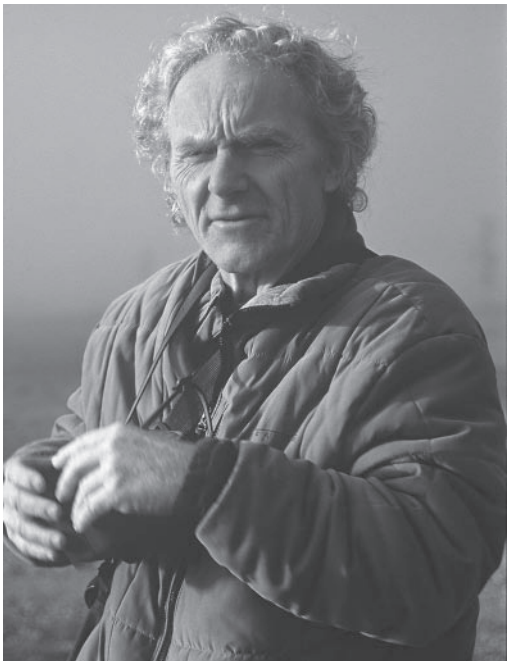

Figure 116. Since 1967, while carrying out long-term research on endemic threespine sticklebacks on the Queen Charlotte Islands, BC., Dr. Tom Reimchen also studied the reproductive and foraging biology of the Red-throated Loon and feeding ecology of Common Loon. Boundary Bay, BC. 30 November 2002 (Michael I. Preston).

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Figure 117. All dead Common Loon chicks, juveniles, and adults should be collected, frozen, and taken to a biologist, veterinarian, or laboratory for analysis of diseases and chemical contamination. Williams Lake, BC. 31 August 2003 (Kris Andrews). BC Photo 3642.

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Figure 118. Free-ranging cows (and horses) can be a serious threat to nesting Common Loons at larger marshes where they trample vegetated shorelines to drink and feed. Sabiston Creek, BC. 25 July 2005 (R. Wayne Campbell).

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About the Authors

A biographical sketch of Wayne and Michael can be found at www.wildlifebc.org.

Linda was presented with an “Honourary Life Membership” in the Biodiversity Centre for Wildlife Studies on 21 November 2006. A brief biography was published in *Wildlife Afield* 4:180-181 in 2007.

David received his B.S. degree in Wildlife Management at Michigan State University in 1984 and his M.S. degree in Ecology at Western Michigan University in 1992. His Ph.D. is from the University of Minnesota in Conservation Biology for which he conducted an analysis of the continental trends and patterns of methylmercury availability in Common Loon. In 1994, he established the nonprofit research

group, BioDiversity Research Institute (BRI). Dave and BRI specialize in working with wildlife as indicators of environmental integrity, particularly for contaminant stressors such as mercury.

As executive director of BRI, Evers oversees a staff of 16 biologists for work with the federal government across the United States. He is an adjunct professor for the Biology Department and the Maine Center for Toxicology and Environmental Health at the University of Southern Maine (USM) and is adjunct at the University of Maine's George Mitchell Environmental Center. Evers has published over 60 peer-reviewed papers and is the senior guest editor of a special 2005 issue in *Ecotoxicology* titled "Biogeographic patterns of environmental mercury in northeastern North America." His recent papers include "Identification and evaluation of biological mercury hotspots in northeastern North America" published in January 2006 issue of BioScience. He has received external funding for more than 80 research projects. Current research and monitoring efforts include teaming with many offices of the USFWS Environmental Contaminants Program and USEPA, including those in Alaska, California, Massachusetts, Maine, New Hampshire, New York, Tennessee, and Virginia. He is actively working with the federal government on developing a national mercury monitoring program.

When Anna first came to live in Williams Lake in 1958 she started to record bird sightings for the area. Later she gave ornithology classes for adults which led to a group of bird watchers carrying out the first Christmas Bird Count for Williams Lake. Anna also compiled an annotated check-list of birds of the Cariboo/Chilcotin region and has participated in the Canadian Breeding Bird Survey for each of the past 34 years. Anna was an early contributor to the British Columbia Nest Record Scheme and co-ordinated information for the Cariboo used in the four-volume set *The Birds of British Columbia*.

Kris Andrews grew up near Victoria, BC. After studies in biology and ecology at the University of Victoria and the University of Aberdeen, Scotland she moved to Williams Lake in 1974 to work for the B.C. government. Most of her 30 years were spent with the Ministry of Environment pollution control section. Upon retirement in 2004 she became interested in birdwatching, spending much time observing birds at Scout Island Nature Centre near her home on Williams Lake. She also volunteers with the Williams Lake Field Naturalists, the B.C. Breeding Bird Atlas Project and the McKenzie and Tatlayoko Bird Banding Observatories.

Selected Quotes on Common Loon

"*No one who has ever heard the diver's music--- the mournful far-carrying call notes and the uninhibited, cacophonous, crazy laughter, can ever forget it.*"
Oliver Austin, 1961

"*The loon is a paragon of beauty. Alert, supple, vigorous, one knows himself to be in the presence of the master wild thing when he comes upon a loon on guard in his native element.*"
W.L. Dawson, 1923

"*If perchance you have never had the good fortune to hear the mournful cry of the common loon, you have missed the full enjoyment of the wilderness. Like the howl of a timber wolf, the bugling of a bull elk and the singing of a humpback whale, the mournful cry of the loon is unique.*"
George Harrison, 1983

"*In the breeding season loons love the solitude of northern lakes where shores are shaded by fir and spruce and where the still pure water seldom mirrors a human face.*"
Edward H. Forbush, 1939

"*The majestic flight and mournful cry of this unique and complex bird once stirred the imagination and spirit of primitive tribes. More recently, the soul of the modern man has also been captured by the sight and sound of this spectral bird winging through the evening dusk to its home and family.*"
Joe Anderlik, 1978

"*The loons are flying above us, still laughing. I would like to laugh as jubilantly.*"
Florence Page Jaques, 1938