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Earliest Well-Described Tree Nest of the Marbled Murrelet: Elk Creek, British Columbia, 1955

Glenn R. Ryder[1], R. Wayne Campbell[2], Harry R. Carter[3], and Spencer G. Sealy[4]

[1]*#302, 2888 – 273 Street, Aldergrove, British Columbia, Canada V4W 3M6*

[2]*2511 Kilgary Place, Victoria, British Columbia, Canada V8N 1J6*

[3]*Carter Biological Consulting, 1015 Hampshire Road, Victoria, British Columbia, Canada V8S 4S8*

[4]*Department of Biological Sciences, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2*

Abstract

Recently discovered in old field notes, a Marbled Murrelet (*Brachyramphus mamoratus*) nest was found on a branch of a bigleaf maple (*Acer macrophyllum*) at Elk Creek, near Chilliwack, British Columbia, in 1955. This nest is the earliest tree nest that has been well-described for this enigmatic species and only the second deciduous tree nest known (i.e., most nests have been found in coniferous trees or on the ground). This nest pre-dates by 19 years the famous tree nest, discovered in California in 1974, but was found 24 years after the first well-described (1931) ground nest in Alaska and two years after the first confirmed (1953) coniferous tree nest in British Columbia. The deciduous tree nest and shells from two hatched eggs under coniferous trees some distance away in the same area indicate at least three pairs of Marbled Murrelets nested in the Elk Creek drainage in 1955.

Introduction

The Marbled Murrelet (*Brachyramphus marmoratus*) is a small, widely distributed alcid encountered year-round in marine nearshore waters along the west coast of North America from the Aleutian Islands, Alaska, to southern California. It lays a single egg on a tree branch, on the ground, or in cavities among rocks from <1 km to 100 km inland on large islands and the mainland (Nelson 1997). Since the species' description in 1789, nesting remained a mystery for almost two centuries. In the early 20th century, efforts to find the first nest increased but by the 1950s, a nest had not yet been accepted by the scientific community and the species was referred to as the "Enigma of the Pacific" (Guiguet 1956). In British Columbia, the Marbled Murrelet has been considered a breeding species since the 1860s, based mainly on: (1) presence of adults in breeding plumage with brood patches, developing ova, or in one case a shelled egg in the oviduct and (2) fledglings discovered inland (Figure 1) or observed at sea with egg teeth still showing and wisps of natal down (Sealy 1974, Carter and Sealy 1987, 2010, Campbell et al. 1990b, Rodway et al. 1992).

Impetus to find and fully describe Marbled Murrelet nests was renewed in the 1970s, after the 1967 discovery of two chicks that dropped from a branch or branches of a western red cedar (*Thuja*

plicata) that was felled near Holberg, British Columbia, although these nest sites were not described in detail (Harris 1971). A short time later, the first study of Marbled Murrelet breeding biology (based largely on birds observed and collected at sea) was conducted at Langara Island, British Columbia, in 1970-1971 (Sealy 1974, 1975a). In August 1974, the now-famous tree nest of the Marbled Murrelet was discovered by a tree surgeon removing branches from an old-growth Douglas-fir (*Pseudotsuga menziesii*) in the Santa Cruz Mountains on the central coast of California (Binford et al. 1975). This nest was the first of the Marbled Murrelet that was fully accepted by the scientific community. In 1978, a well-described ground nest was found on East Amatuli Island, Alaska (Simons 1980). Efforts to find nests increased further in the late 1980s and early 1990s, as concerns for the conservation of the species developed. Loss of old-growth forests and mortality in gill nets and oil spills were first documented on the west coast of Vancouver Island, British Columbia, in 1979-1982 (Carter and Sealy 1984, Sealy and Carter 1984), and were later recognized to exist throughout most of its range (Marshall 1988, Carter and Morrison 1992). This species was listed as threatened in Canada (Committee on Status of Endangered Wildlife in Canada [COSEWIC]), as well as in California, Oregon, and Washington (federal and state endangered species acts), in 1990-1992. In 2003, the Marbled Murrelet was included as a threatened species under the federal Species at Risk Act (SARA) in Canada. With an infusion of funding and newly developed methods to locate nests (i.e., audio-visual surveys, tree climbing, radio telemetry), at least 155 nests had been discovered by the mid-1990s (Nelson 1997).

Carter and Sealy (2005) reviewed many of the early discoveries of nesting evidence for the Marbled Murrelet and pointed out that a 1931 ground nest in southeastern Alaska (Gabrielson and Lincoln 1959, Drent and Guiguet 1961) actually was the first confirmed nest in North America, and other confirmed ground nests in Alaska also were found in 1959 and

Figure 1. This recently fledged Marbled Murrelet was picked up on a street in Chilliwack, British Columbia, in 1987 and transported to Stanley Park, Vancouver, about 90 km west, where it was banded and released on the ocean; the young bird weighed 140 g (see Campbell et al. 1990b). *Photo by Ivan Polivka, 7 July 1987.* BC Photo 1242 (see Campbell and Stirling 1971).

1962 (Mendenhall 1992). Discovery of a recently dead adult and eggshell fragments in an old-growth western red cedar felled near Masset, Haida Gwaii, British Columbia in 1953 (Guiguet 1956) was the first confirmed nest record in British Columbia, even though the nest site itself was not described. Manley and Kelson (1995) first provided detailed descriptions of nests on the branches of old-growth Sitka spruce (*Picea sitchensis*) in British Columbia in 1990 and 1991 in the Walbran Valley, Vancouver Island.

We provide details of a nest of the Marbled Murrelet discovered in a bigleaf maple (*Acer macrophyllum*) at Elk Creek, British Columbia, in 1955 and also provide other evidence of nesting in this area at this time. Eggshell fragments found on the ground a short distance away from the known nest location, but not directly under coniferous nest trees, suggest two additional tree nests. This information was recently re-discovered in GRR's old field notes.

Discovery of a Nest and Two Eggshells at Elk Creek, British Columbia

The following text was extracted (with later perspective noted in square brackets) from detailed field notes recorded during a camping trip by GRR and his brother Donald in the vicinity of the headwaters of Elk Creek on 11 and 12 June 1955. The site (UTM [NAD 83] 10U E586334 N5438222 or 49.090791ºN, 121.817484ºW) is located between Elk Mountain and Mount Thurston, about 12.0 km southeast of downtown Chilliwack, British Columbia (i.e., corner of Hocking Avenue and Young Road) and 6.2 km southeast of agricultural fields in East Chilliwack. Elk Creek flows into the Chilliwack River. The nest location is 1.4 km north of the Chilliwack River, 10.4 km north of the U.S.-Canada border, and 62 km inland from the nearest saltwater at Bellingham Bay, Washington.

"**June 11, 1955** – During our hike through the old-growth forestlands, we came upon some remains of half an egg shell [#1] on the mossy forest floor. I placed the shell in a small jar I had in my pack and I will take it home and check it out with my egg book [Reed 1904]. The trees were not climbable." [Note: The 1898 "Marbled Murrelet" egg figured in Reed (1904), allegedly taken on Chichagof Island, Alaska, actually is a misidentified Ancient Murrelet egg that likely originated from St. Lazaria Island or Forrester Island, Alaska (Carter and Sealy 2005, 2011). However, Ancient Murrelet eggs generally resemble Marbled Murrelet eggs in size and markings; a black-and-white photograph used in Reed (1904) did not show the colour although "buff" was indicated in the caption. Given the similarity to the description of the egg in Reed (1904) and other sources, eggshell #1 was later identified by GRR as that of a Marbled Murrelet (see GRR's colour description for this eggshell below, at the end of his quoted field notes) and GRR surmised that it had fallen from the upper branches of a western red cedar or Douglas-fir; both species grew closely together, without branches for the first 100 feet (31 m). The length of eggshell #1 was about 2¼ inches (~5.7 cm).]"

"**June 12, 1955** – My brother and I had been hiking in the forest area about the 1,000 foot [350 m] level. Among the old-growth western redcedars and Douglas-firs, was a large broad-leaf [bigleaf] maple whose branches were thickly laden with mosses. I looked at them with my field glasses but could not see a bird on them. [Note: The Ryder brothers were looking for Marbled Murrelet nests in trees because of finding eggshell #1 that had apparently fallen out of a tree on 11 June.]"

"I got out my rope loops and other ropes and placed a couple around the tree trunk and started going up. My brother wished me luck as I made my way up to some branches. After getting up to the many branches, I did not need the loops but I kept my back pack on me with ropes. I had climbed up to the start of the tree's crown, about 80 feet [24 m], and started looking for evidence of nesting on the mossy branches including white on the mosses. Suddenly there it was! I said, "Wow, what a find!"

"I moved nearer to the nest to get a better look at the murrelet and as I did I thought it was going to take flight as the incubating bird moved ahead on the nest a little. I then noticed an egg and the bird did not wish to leave its nest so I believed the egg was near to hatching. The adult bird settled down on its nest again and seemed less nervous of me so I took out my notebook and made some notes and field sketches as I sat on a mossy branch in comfort. I did some field sketches fast and would fill in more

Figure 2. An incubating adult Marbled Murrelet on its nest on a mossy bigleaf maple branch near Elk Creek, British Columbia, discovered on 12 June 1955. *Drawing by Glenn R. Ryder.* BC Photo 3780.

details later [Figure 2]."

"My brother said, "How are you doing up there and did you find anything?" I told him, "yes, a find of a lifetime." I climbed back down the tree to the ground. I told my brother that a good camera would have come in handy but I did the next best thing and made a sketch of the bird on its mossy nest."

"We hiked more of the woodlands in the area and found the remains of another egg shell [#2] on the forest floor. [Note: Although not described in notes, egg shell #2 was similar to eggshell #1 and also was found under western red cedars and Douglas-firs.] We hiked for some time and did not locate any more eggshells. Back at camp, I sketched the eggshell [#1; Figure 3]. The egg shell showed a greenish-yellow background with irregular spotting of brown. Other dark-to-light areas also showed a pale purplish with some gray on the egg shell."

There is no doubt in our minds that this was a Marbled Murrelet nest, based on the close study of the adult and careful description of the nest. The drawing clearly shows an adult Marbled Murrelet in

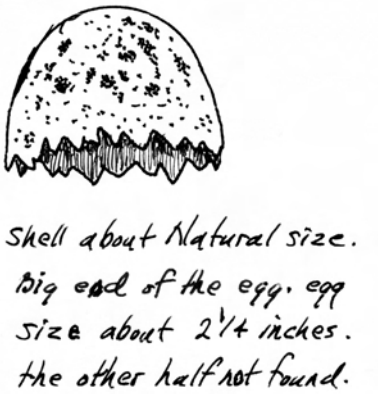

Figure 3. A portion of the larger end (~5.7 cm long) of a Marbled Murrelet eggshell found below an old-growth western red cedar in a second-growth Douglas-fir forest near Elk Creek, British Columbia, on 11 June 1955. *Drawing by Glenn R. Ryder.* BC Photo 3781.

breeding plumage sitting motionless in incubation posture on the nest on a relatively high moss-covered branch, which is consistent with tree nest sites and the incubating behaviour of adults for this species (Nelson 1997, Bradley and Cooke 2001). The nest site on the mossy platform was ringed by a thick layer of whitish feces (Figure 2). Not recorded in field notes, GRR actually reached out and felt the dry, crusty feces (while he sketched the nest from a neighbouring branch) that seemed to have been deposited in previous years. Fecal rings have been noted at other nests, but they are produced only by the developing chick, usually do not persist until the following breeding season and have not been reported to be as thick as the Elk Creek nest (Nelson 1997). Little is known about how and when fecal rings degrade but they certainly persist into late summer and early fall when they can be found by tree climbers searching for murrelet nest sites (e.g., Manley and Kelson 1995, Jordan and Hughes 1995). In northern California, the fecal ring at one nest (where a chick fledged on 4 July 2003) was observed with year-round video and was visible for at least 3 months (until October) and at most 6 months (until January) – this wide range reflected difficulty in detecting the ring with video as the ring degraded and under different light conditions (Hébert and Golightly 2006; R.T. Golightly, pers. comm.).

In the Elk Creek nest, the egg had not yet hatched on 12 June. We suspect that this site had been used in previous years, and the ring of feces was produced by one or more chicks reared previously. Reuse of the same nest site has been documented at several nests within years (i.e., replacement eggs but not double broods) and between years (Hébert et al. 2003, Hébert and Golightly 2006, Burger et al. 2009, Golightly and Schneider 2011). The stage of the Elk Creek nest, apparently late incubation, was too early for another chick to have died or fledged from this nest earlier in 1955. This highly unusual buildup and persistence of a large fecal ring at the Elk Creek nest site by June may have reflected: (1) successful fledging at this same site in several successive years, which resulted in the buildup of the large fecal ring; and (2) large bigleaf maple leaves accumulating on the nest site in early fall and, in association with winter freezing, this protective cover may have prevented rain, insects, etc. from breaking down this fecal ring over the winter. More work is needed to evaluate this possibility but we consider such large fecal rings to be atypical.

The size, colouration and markings of eggshell #1 also are consistent with eggs of the Marbled Murrelet (Kiff 1981, Day et al. 1983, Carter and Sealy 2005). The jagged edge of the equatorial region of the shell suggests the egg had been chipped by the chick's egg tooth during hatching. The unbroken half of the eggshell with breakage roughly along the equator also suggests hatching. While the egg also could have been broken in half by an avian predator, usually eggs depredated by avian or mammalian predators or scavengers are found in many small pieces or have more irregular breakage often with holes or bent edges (HRC, personal observations of depredated eggs of Scripps's Murrelet *Synthliboramphus scrippsi*). Unfortunately, the egg membranes for eggshells #1 and #2 were not carefully examined or described by GRR; papery opaque membranes pulling away from the shell with blood-filled veins generally signify a hatched eggshell, whereas broken eggshells usually have a shiny surface without any visible blood that adheres closely to the eggshell (Schwemm et al. 2005). Observations of hatched or broken eggshells on the forest floor, often at the base of suspected nest trees, have been observed elsewhere (e.g., Becking 1991, Kerns and Miller 1995, Naslund et al. 1995). No other bird species of similar size and appearance of the eggshells, nest type, and range could be confused with a Marbled Murrelet in this area. The general similarity of eggshells #1 and #2 suggests that eggshell #2 also was from a Marbled Murrelet egg. GRR considered that eggshells #1 and #2 apparently had fallen from two coniferous tree nests because bigleaf maples or other deciduous trees were not present above or near these eggshells. GRR did not determine the individual conifers from which these eggshells likely fell.

Nesting Habitat

Elk Creek, part of a watershed for the Municipality of Chilliwack, falls within the Biogeoclimatic Unit described as Coastal Western Hemlock, dry maritime subzone [CWHdm] (Campbell et al. 1990a). About the turn of the 20th century, fire and logging greatly impacted forests in the area, resulting in second-growth

forest about 100 years old in the early 2000s or about 50-70 years old in 1955 (Grozier 2003). Large second-growth Douglas-firs predominated by the early 2000s, with a few old-growth western red cedars, estimated up to 250 years old, as isolated trees or in small clusters, scattered throughout the area. This type of forest often has been referred to as a "residual old-growth forest." When we viewed the nest coordinates using Google Earth, we found the general area is currently characterized by patches of forest surrounded by grassy fields, apparently maintained by grazing. Bigleaf maples occur widely on the edges and in openings within this second-growth forest and can grow rather quickly to large sizes with moss-covered horizontal branches potentially suitable for nesting by murrelets in a few decades. Significant loss of conifers apparently has occurred in this area, which likely began long before 1955 but may have continued after 1955. Major loss of old-growth conifers may have encouraged some murrelets to nest in large bigleaf maples in this area in 1955 (although similar use of deciduous trees near areas with lost conifers has not been reported elsewhere) but some murrelets also appeared to remain nesting in nearby conifers in 1955.

These three nests occurred in relatively close proximity at Elk Creek in 1955. Although generally considered to nest solitarily, nests have been found in nearby trees in other areas (e.g. Naslund et al. 1995). Recent radar surveys in 2002 provided evidence of continued use of remaining forested habitats by small numbers of Marbled Murrelets at Chilliwack River and Elk Creek (Manley and Cullen 2002). However, renewed effort is needed to determine whether nesting continues near Elk Creek, a challenge we pose to interested naturalists.

We suspect that the two murrelet nests indicated by eggshells under conifers most likely were located in small clusters of old-growth western red cedars in 1955, because murrelets are not known to nest in single isolated old-growth conifers and most if not all second-growth Douglas-firs would not have developed branches with suitable nest platforms by 50-70 years old in 1955. Elsewhere along the west coast of North America, breeding habitat in forests where nests have been located has been described as "old-growth coniferous" or "mature-coniferous with old-growth components" (e.g., remnant trees). Two nests in Oregon, however, were in 60- to 70-year-old coniferous forests with extensive dwarf mistletoe (*Arceuthobium* sp.) infections that provided suitable nest platforms (Nelson 1997; S.K. Nelson, unpublished data). An important microhabitat for tree-nesting Marbled Murrelets is large-diameter limbs that are used as nest platforms, with or without epiphytic growth (Manley 1999, Burger 2002). Limbs of smaller diameter, however, are sometimes used when damage or epiphyte growth provide platforms of adequate size and shape. Murrelet nests in 50- to 70-year-old second-growth Douglas-firs with suitable platforms would be highly unusual.

Marbled Murrelet nests in forests have been found at elevations from near sea level to about 1,000 m (Nelson 1997). The Elk Creek nest was about 305 m elevation and represents the earliest nest in British Columbia discovered in a deciduous tree and the first reported in a bigleaf maple. Only one other Marbled Murrelet nest has been found in a deciduous tree, a red alder (*Alnus rubra*), in Toba Inlet, Desolation Sound, British Columbia in 2000 (Bradley and Cooke 2001). Use of large deciduous trees is thought to be extremely limited; however, naturalists and researchers may find more nests in these sites in the future now that such nesting is becoming more widely known.

Evidence for Far-Inland Occurrence and Lake Use in the eastern Fraser River Valley

Records of fledglings near Hope (1947) and Chilliwack (1987) (Campbell et al. 1990b, Rodway et al. 1992) provided the most convincing evidence of far-inland breeding in the eastern Fraser Valley, British Columbia prior to publication of details of the 1955 Elk Creek nest and two egg shells in this paper. Hope is the farthest inland location (about 101 km from Port Moody, British Columbia) with suspected breeding (Rodway et al. 1992). Multiple observations of Marbled Murrelets in summer and winter at nearby Harrison Lake (24 km north of the nest site and 76 km from Port Moody; 21,780 ha) in 1926-1981 and Cultus Lake (11 km west of the nest site and 48 km from Bellingham Bay, Washington; 627 ha) in 1932-1964 further suggested widespread nesting in this area (Carter and Sealy 1986). Brooks (1928) reported a female with a well-developed ovum collected by R.M.

Stewart at Harrison Lake in April 1928 that strongly suggested breeding in that area, although the bird had fed at the lake and its stomach was "full of small fish which looked like salmon fry [*Oncorhynchus* or *Salmo* sp.]." Forested nesting habitats in the eastern Fraser Valley have been reduced by logging and clearing for agriculture and urbanization, but many areas may not have had potential nesting habitats, especially along the large flood plain of the Fraser River.

In 1955, GRR also observed Marbled Murrelets at two lakes in this area:

(1) on 28 May, one adult was observed at the south end of Chilliwack Lake below an old logging road (31 km east of the nest site and 85 km from Bellingham Bay; 1,210 ha). GRR notes were: "On water surface resting in the deep green clear water near roadside. We [GRR and brother Donald] watched this bird for a few minutes. It then dove under the water and went down deep and was gone." Adult Marbled Murrelets have been seen often on lakes in British Columbia (Carter and Sealy 1986); and

(2) on 25 June, two Marbled Murrelets were observed "resting" at Wahleach Lake (18 km northeast of the nest site and 80 km from Bellingham Bay; 460 ha), a natural lake modified for hydroelectric power with the completion of Wahleach Dam in 1952 that raised the water level by about 5-20 m. GGR notes were: "They turn out to be a Adult with a young Murrelet at its side now away from a nest somewhere in the forests of area. Adult is a Darkish Bird overall the Juvenile has a Dark Back and top of It's [sic] head, white to whitish on sides, white throat whitish ear area. No eye ring Dark head comes down below eye. Bill Black or Blackish. White to whitish scapulars. Primaries are Black. Wish we had a camera." We have no doubt that the whitish bird was a juvenile. While observing an adult Marbled Murrelet in breeding plumage on a lake is not unusual, this observation is only the third of a juvenile or fledgling on a lake (Carter and Sealy 1986) and provides additional strong evidence of breeding in this region of British Columbia.

On the outer coast of British Columbia, breeding Marbled Murrelets feed predominantly on Pacific Sandlance (*Ammodytes hexapterus*), immature Pacific Herring (*Clupea harengus*), and planktonic crustaceans obtained by diving near shore (Sealy 1975b, Carter 1984). The closest marine foraging area for the Elk Creek nest site is 62 km southwest in Bellingham Bay, although it is only 68 km to Drayton Harbor, Washington and 77 km to Port Moody. Carter and Sealy (1986) documented feeding on freshwater lakes of varying sizes and depths in British Columbia and suggested that far-inland breeding and winter occurrences (likely related mainly to attendance at nesting areas) near Harrison and Cultus lakes is facilitated by feeding in freshwater lakes. Hobson (1990) demonstrated that some Marbled Murrelets survive mainly on freshwater prey for periods of time, but this is most likely to occur on lakes in undeveloped areas without human disturbance. In 1955, suitable nesting habitat was available for Marbled Murrelets in the Elk Creek area that was accessible to freshwater foraging areas potentially as far inland as Harrison Lake and Chilliwack Lake, as well as marine foraging areas in northern Washington and north of Vancouver.

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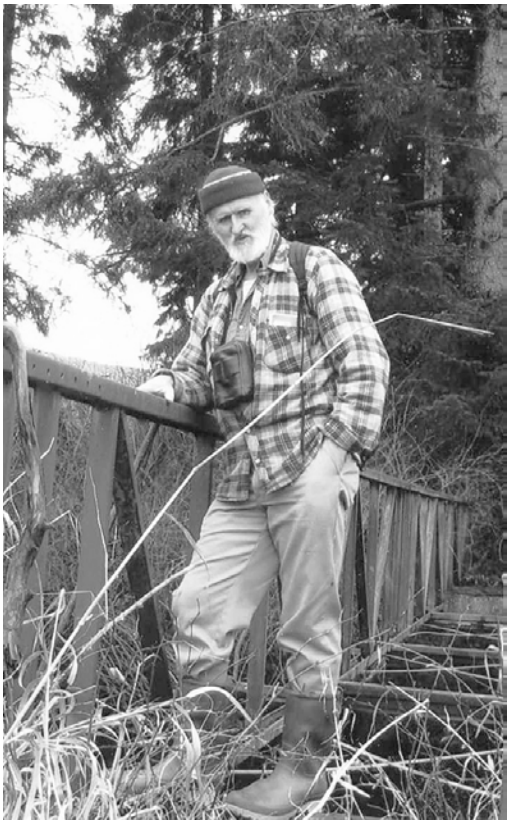
About the Authors

Glenn, one of the province's most experienced naturalists, has spent much of his life exploring habitats in British Columbia and documenting in detail their associated flora and fauna. Glenn recently received the Steve Cannings award from the British Columbia Field Ornithologists for his contributions to our knowledge of birds and other animals in the province.

See author sketches for Carter on page 46 and Campbell and Sealy on page 48 in this issue.



Glenn R. Ryder. *Photo by Phil Henderson.*