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Western Meadowlark // Sturnelle de l'Ouest (*Sturnella neglecta*). Photo: Katelyn Luff.

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Editors' Message

Rob Warnock and Barbara Bleho

Welcome to the first issue of *Picoides* in 2023. We hope everyone had a great winter holiday and start to the year and are continuing to be safe during the never-ending pandemic.

In Matt Reudink's first President's Report, he discusses the new Student Discovery Award and the upcoming in-person SCO-AOS conference in London, ON this summer led by Greg Mitchell for SCO-SOC. The Student Discovery Award is designed to help reduce barriers for student SCO-SOC members from equity groups. In his report, Matt repeated the commitment to true equity, diversity, and inclusivity in SCO-SOC.

This issue's feature article is about ovaries and eggs as proxies for breeding in Marbled Murrelet by Spencer Sealy. There is lovely bird artwork by Olivia Maillet in this issue and an update on the third Breeding Bird Atlas project in Ontario. In addition, there are research summaries by the 2022 Baillie Award winner, Andrew Beauchamp, the second 2022 Taverner Award winner, Sarah Dobney, and the 2022 Fred Cooke Award winner, Brandon Edwards. Long Point Observatory is offering the Young Ornithologists Workshop (YOW) again this August. The 2023 YOW notice is on page 16. And of course, the latest Avian Conservation and Ecology Table of Contents is included in the issue. Check them all out!

The next *Picoides* deadline is May 15, 2023. We look forward to your next submission. Without submissions, there is no *Picoides*. We also welcome your feedback as it your publication and we wish everyone a safe, healthy end of winter and start of spring.

FRANÇAIS—Message des éditeurs – Rob Warnock et Barbara Bleho

Bienvenue au premier numéro de *Picoides* de 2023. Nous espérons que vous avez tous passé d'excellentes fêtes et un bon début d'année et que vous continuez à être sain de corps et d'esprit pendant cette interminable pandémie.

Dans le premier rapport du président, Matt Reudink parle de la nouvelle bourse Découverte Étudiante et de la prochaine conférence de la SOC-AOS en personne à London, ON, cet été, dirigée par Greg Mitchell pour la SOC-SCO. La bourse Découverte Étudiante est conçue pour aider à réduire les obstacles que peuvent rencontrer les étudiants membres de la SOC-SCO qui sont issus de groupes minoritaires. Dans son rapport, Matt a réitéré l'engagement envers une véritable équité, diversité et inclusivité au sein de la SOC-SCO.

L'article de fond de ce numéro porte sur les ovaires et les œufs en tant qu'indicateurs de reproduction chez le guillemot marbré, par Spencer Sealy. Ce numéro contient également de magnifiques illustrations d'oiseaux réalisées par Olivia Maillet et une mise à jour du troisième Atlas des oiseaux nicheurs de l'Ontario. En outre, vous trouverez des résumés de recherche du lauréat du prix Baillie 2022, Andrew Beauchamp, de la deuxième lauréate du prix Taverner 2022, Sarah Dobney, et du lauréat du prix Fred Cooke 2022, Brandon Edwards. L'observatoire de Long Point propose à nouveau un stage pour jeunes ornithologues (SJO) en août prochain. L'avis 2023 de l'SJO se trouve aux page 16. Et bien sûr, la plus récente table des matières de Avian Conservation and Ecology est incluse dans le numéro. Assurez-vous de consulter toutes les sections de ce numéro !

La prochaine date limite pour *Picoides* est le 15 mai 2023. Nous attendons avec impatience votre prochaine soumission. Sans votre participation, il n'y a pas de *Picoides*. Nous vous invitons également à nous faire part de vos commentaires sur cette publication et nous vous souhaitons une fin d'hiver et un début de printemps en santé.

Message du président

Matt Reudink

C'est un honneur d'écrire mon premier message du président dans *Picoides* pour la SOC-SCO. Je suis membre de la SOC-SCO depuis environ deux décennies maintenant et je suis honoré d'être à la barre pour aider à guider la société au cours des deux prochaines années. Heureusement, je ne suis pas seul et j'ai le privilège de travailler avec Dr Danielle Ethier en tant que nouvelle vice-présidente/présidente élue.

Je veux commencer par remercier chaleureusement Dr Nicky Koper pour son leadership au cours de sa présidence. Ce sont de grands souliers à chausser, surtout compte tenu du succès de nos nombreux nouveaux programmes et initiatives. En particulier, je tiens à remercier Nicky d'avoir encouragé le travail sur l'équité, la diversité et l'inclusivité au sein de la SOC-SCO. Notre comité EDI a été tout simplement incroyable dans le rôle proactif qu'il a joué pour aider à guider nos nouvelles politiques et initiatives. Nicky a détaillé l'excellent travail accompli par le comité EDI dans son dernier message de présidente, mais je tiens également à ajouter que nous avons maintenant officiellement lancé notre Prix Découverte Étudiante. Ce prix vise à éliminer les obstacles et à promouvoir la diversité et l'inclusion au sein de la communauté ornithologique du Canada et est offert aux étudiants qui s'identifient comme faisant partie de groupes privés d'équité. Il y a beaucoup de travail à faire, mais mon objectif principal sera de continuer à soutenir le travail en cours et de veiller à ce que la SOC-SCO soit une société ouverte et inclusive et dont nous pouvons tous être fiers d'en faire partie.

Comme tant d'événements, la pandémie a mis un frein majeur à notre capacité à nous rencontrer en personne. Bien que nous ayons été obligés de passer au virtuel pour notre conférence de 2022, le fait de nous concentrer sur les étudiants et les chercheurs en début de carrière nous a permis de revenir à l'un des principes fondamentaux de notre société: soutenir la croissance des ornithologues en début de carrière. Personnellement, j'ai été épaté par la qualité du travail présenté à la conférence (et surtout soulagé de ne pas devoir être en concurrence avec eux pour un emploi).

Cet été, nous pourrons enfin nous voir en personne lors de notre rencontre à London, Ontario avec l'ASO. Je tiens à dire un immense merci à Dr Greg Mitchell pour coprésider cette conférence et à tous les membres et conseillers qui mettent leur temps et énergie pour siéger sur les comités et de faire de la réunion de cet été un succès. Coprésider une conférence est un travail demandant, stressant et souvent ingrat. Un merci sincère à tous ceux qui se sont portés volontaires pour la conférence (et Greg, je te dois du café à volonté à London).

C'est une tâche intimidante que d'assumer le rôle de nouveau président de la SOC-SCO. C'est la société où je me sens chez-moi du temps où j'étais aux études graduées et je suis extrêmement reconnaissant à notre exécutif, à notre conseil et à nos membres pour tout le travail qui est fait pour s'assurer que notre société soit ouverte et accueillante pour *tous* en ornithologie.

ENGLISH— President's Message – Matt Reudink

It's an honour to write my first President's Message in *Picoides* for the SCO-SOC. I've been a member of the SCO-SOC for just shy of two decades now and I'm humbled to be at the helm, helping to guide the society over the next couple years. Thankfully I'm not alone and I have the privilege of working with Dr. Danielle Ethier as our new Vice-President/President-Elect.

I want to begin by saying a massive thank you to Dr. Nicky Koper for her leadership during her presidency. These are big shoes to fill, especially considering the success of our many new programs and initiatives. In particular, I want to thank Nicky for fostering work on equity, diversity, and inclusivity within the SCO-SOC. Our EDI committee has been nothing short of incredible in the active role they've taken in helping guide our new policies and initiatives. Nicky expounded on the great work the EDI committee has done in her last president's message, but I also want to add that we have now officially launched our Student Discovery Award. This award is aimed at removing barriers and promoting diversity and inclusion within the ornithological community in Canada and is offered to students who identify as being from equity-denied groups. There is much work to be done, but my primary focus will be on continuing to support the work that has started and ensure that the SCO-SOC is an open and inclusive society and one that we can all be proud to be a part of.

Like so many events, the pandemic put a major damper on our ability to meet in person. Though we were forced to go virtual for our annual meeting in 2022, shifting our focus to students and early career researchers allowed us to get back to one of the core principles of our society—supporting the growth of early-stage ornithologists. Personally, I was blown away at the quality of the work presented at the conference (and more than a little glad I'm not competing for jobs against these folks).

This summer, we'll finally be able to see each other face-to-face during our meeting in London, Ontario with the AOS. I want to say a huge thank you to Dr. Greg Mitchell for co-chairing this meeting and to all the members and councilors that are taking the time and energy to sit on committees and make this summer's meeting a success. It's a time-consuming, stressful, and often thankless job to co-chair a meeting. A sincere thank you to all of you volunteering for the conference (and Greg, I owe you bottomless coffees in London).

It's an intimidating task to step into the role as the new President of the SCO-SOC. This is the society that I've called home since I was an early graduate student and I'm incredibly thankful to our executive, our council, and our membership for all the work that's going into ensuring that this is a society is an open and welcoming home to *everyone* in ornithology.

2022 SCO-SOC Award Reports

Taverner Award 2022 Progress Report

Sarah Dobney, Ph.D. Candidate, University of Windsor

Sarah Dobney with receiver. Photo courtesy of Sarah Dobney.

I am a PhD student at the University of Windsor studying vocal communication in Savannah Sparrows (*Passerculus sandwichensis*). As part of my PhD research, I study vocal development of young male Savannah Sparrows, a songbird that exhibits imitative vocal learning. Specifically, I aim to understand how the nestling acoustic environment relates to the quality of the adult song that nestlings learn. To answer this question, I study an island population of Savannah Sparrows, which has been the focus of reproductive and vocal research for several decades. This population has been studied by my PhD supervisor, Dr. Dan Mennill, for the last decade, and by a collaborative team of researchers from the University of Guelph, Williams College, and Bowdoin College for many decades. In this population, males often return to breed close to their natal nest. By using historic and current data from this population, I can address questions about how songs heard from the nest influence adult learned song quality.

Three Savannah Sparrow (*Passerculus sandwichensis*) nestlings and egg in nest. Photo: Sarah Dobney.

For the last two breeding seasons, I travelled to Kent Island, NB, to collect song recordings of all breeding male Savannah Sparrows. As part of a collaborative field team, I helped locate nests, and assisted with colour-banding nestling and adult Savannah Sparrows for individual identification. This allowed me to track which individuals were born within the study area and to detect instances when nestlings returned to breed within the study area. For each returning male, I used song recordings collected from the bird's natal summer to measure the number of adult male neighbours, and the song rate and song complexity of the father and other nearby males. I compared these natal environment variables to the complexity of the song learned by each returning male. I combined my own data with historical recordings collected by my supervisor and previous students from our research team.

Over the last two field seasons, I conducted a study of the nestling acoustic environment. I used an acoustic recorder with two microphones: one mounted above a Savannah Sparrow nest (adult position) and another mounted inside the nest (nestling position). I recorded Savannah Sparrows as they spontaneously sang from various locations around the nest. After

carefully measuring sound amplitude of the paired recordings of each song, I found that songs are more attenuated when recorded from inside the nest. This has implications for any animal listening to song from inside a ground nest, including Savannah Sparrows or any bird nesting in a grassland habitat. An improved understanding of the acoustic limitations by the nest are important for research on early life vocal learning, to better understand which adult singers act as vocal tutors.

To date, I have collected data for 41 returning male Savannah Sparrows, from 2016-2022. I plan to collect more data for any additional returning males in 2023 or 2024. I feel so lucky to have the opportunity to conduct this research into the ontogeny of vocal learning. I am deeply thankful to the Society of Canadian Ornithologists and Birds Canada for their generous support.

2022 Baillie Award Report

Post-breeding Movement of Migratory Songbirds in Coastal Georgian Bay

Andrew T. Beauchamp, PhD Candidate, University of Western Ontario

For temperate breeding songbirds, the time between the completion of nesting and the start of fall migration is an important yet understudied life-history stage. During this time, referred to as the post-breeding period, adult songbirds recover from raising young and undergo molt of wing, tail, and body feathers. Recently independent hatch-year birds continue physiological and physical development and may need to leave natal territories to find sufficient food, safety from predators, and possibly to prospect the region for future nesting sites. Towards the end of the summer, birds of both age classes must prepare for fall migration by accumulating the energy to power the first migratory flights south.

Figure 1. A Song Sparrow (*Melospiza melodia*) captured and radio tagged on a coastal island. Photo: A. Beauchamp.

Understanding the spatial scale of these behaviours is key to making informed land management and conservation decisions intended to benefit migratory birds during the post-breeding period and throughout the annual cycle. In Ontario, the mosaic of forests, wetlands, and rocky islands that comprise coastal Georgian Bay provides a diverse array of habitats for songbirds, yet it is uncertain how this complex landscape influences the movement of birds during the critical post-breeding period. Island habitats can elevate inter and intra-specific competition for resources and limit dispersal to new habitats. Impeded pre-migratory fattening due to resource depletion and competition could also cause birds to seek alternate habitat patches or delay migratory departure. These effects may also be sex or age-class specific due to the unique challenges faced by these groups during the post-breeding period.

My research aims to fill the gaps in our understanding of the post-breeding movements of songbirds in the fragmented coastal habitat of eastern Georgian Bay. Following on my first field season in 2021, this past summer was spent capturing songbirds on island and mainland sites along a 15 km stretch of coast extending north from Go Home Bay. A typical day of research would begin around dawn with loading the equipment into our Zodiac boat and navigating through the maze of rocks and islands to properties stewarded by the Georgian Bay Land Trust (GBLT), our regional partner in this research. To measure movement throughout the summer and into fall migration, we deployed radio tags on three species of songbird common in the region: Song Sparrow (*Melospiza melodia*), Ovenbird (*Seiurus aurocapilla*), and Red-eyed Vireo (*Vireo olivaceus*) (Figure 1). The presence of tagged birds was subsequently monitored at the local scale using a portable receiver (Figure 2), with birds tracked to a precise location when feasible. We also deployed five automated radio receiver stations to supplement an existing station run by the GBLT in the region. These stations, part of the Motus Wildlife Tracking System, (Figure 3) were used to monitor the regional presence of tagged birds and determine migratory departure date from the area. In total, we deployed 89 radio tags in 2022, attaining a good balance between island and mainland sites, species, and age classes. Between June and October, 1124 presence-absence point checks were conducted at individual capture sites and 207 positions were recorded

Figure 2. Tracking radio tagged birds on an island Georgian Bay. Photo: J. Kusack.

while manually tracking birds. These data are currently under analysis in a mark-recapture framework to test how landscape and individual characteristics influence survival, movement away from the capture site, and migratory departure date.

The post-breeding behaviour of songbirds in the coastal Georgian Bay is poorly understood, yet the proximity of this crucial breeding and stopover habitat to major urban centres necessitates regional conservation and land management planning that is effective and scientifically informed. My research will help to reveal the extent that individual songbirds use both island and mainland habitat in coastal Georgian Bay during the post-breeding period. Understanding the interconnection between these complex habitats will allow for better informed decisions regarding the use and conservation of habitat in coastal Georgian Bay, to the benefit of breeding and migratory birds in this UNESCO biosphere reserve.

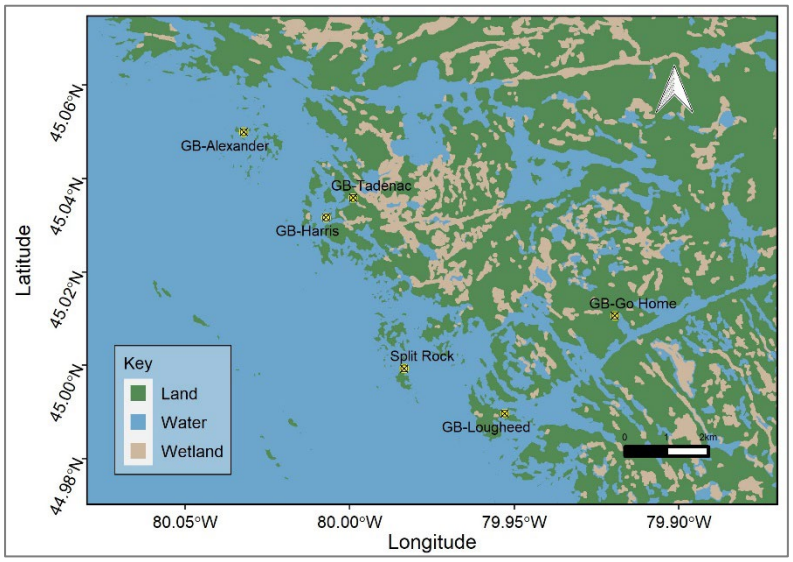

Figure 3. The study region showing the six automated radio receiver stations, part of the Motus Wildlife Tracking System. Map layer data from DMTI Spatial and Land Information Ontario.

I would like to acknowledge the support of my supervisors Dr. Yolanda Morbey and Dr. Chris Guglielmo, as well as Dr. Marek Allen, Jennifer Evans, Patricia Rokitnicki, Bill Lougheed, Eleanor Proctor, Aaron Rusak, and others for their assistance in the field and with this research. This research would not have been possible without the support of the Georgian Bay Land Trust and the Mitacs Accelerate program, The Society of Canadian Ornithologists - Société des ornithologistes du Canada, Birds Canada, The Lake Huron Centre for Coastal Conservation, Environment and Climate Change Canada, and the Natural Sciences and Engineering Research Council of Canada.

2022 Fred Cooke Award Report

Refining Estimates of Detectability in North American Landbirds Using Data from Autonomous Recording Units

Brandon Edwards, PhD Candidate, University of Alberta

I spent a semester working at the University of Alberta, partially in the Bioacoustics Unit led by Dr Erin Bayne, and partially working with Dr Elly Knight at the Boreal Avian Modelling project. Prior to this project, I had very little experience in the world of ARUs, neither in the analysis realm and especially not in the data collecting realm. Given my background in statistical ecology (and therefore lack of actual field experience), I used this research visit as an opportunity to both gain a new analytical skill in ARU data analysis, and to try on a "field biologist" hat by doing some work in the field.

On the analysis side, my overall goal was to try to create or refine methods of estimating detection probability in birds by using data collected by ARUs. Detection probability has several conservation implications, ranging from generating estimates of local density, to estimating population sizes, to making decisions about where and when to monitor. The NA-POPS project has collected point count data from across Canada and the US to generate estimates of detection probability for over 300 species of landbirds across the continent (Edwards et al. 2022). However, a major missing piece in this detectability database is the addition of the growing amount of data collected by ARUs, and so I wanted to do a PhD chapter exploring the use of ARU data in this detectability estimate database.

Photo courtesy of Brandon Edwards.

Because detection probability in birds requires that we have estimates of detection distance (i.e., the distance at which a human can detect a singing bird, given it sings), a major problem to solve is coming up with a way to estimate distance to a singing bird, when all that is available is an audio recording. Luckily, methods such as localization (Hedley et al. 2017) exist, whereby a bird that is singing inside a grid of ARUs can be "localized" by noting differences in time-of-arrival of the bird song to different ARUs. However, this process has not yet been automated for large-scale localization efforts of thousands of ARU datapoints. Therefore, I have been working on developing scripts to automate this process so that any data collected via localization methods can be simply analyzed to automatically estimate distances to singing birds. This automation can then be used to incorporate the thousands of ARU datasets into the NA-POPS database.

On the field work side, I spent a day in the field with Dr Knight, as well as some other folks at Alberta Biodiversity Monitoring Institute, assisting her with piloting a new protocol for ARU data collection. This field day was an invaluable experience for me; it is easy enough for statisticians to say exactly how field protocols *should* be done, but the limitations of what you must work with in the field mean that you can only collect data as best as you can given the environmental conditions. These nuances are easy to miss on the analysis side of things, and so that first-hand reminder will be useful moving forward in my work as a statistical ecologist.

This project is still in its early stages, and I continue to work with Dr Bayne and Dr Knight on a weekly basis to further refine these methods. I look forward to continuing to work on this project as part of my PhD thesis, and to continue to shed light on the importance of accounting for detectability in conservation decisions.

Edwards, B. P. M., A. C. Smith, T. D. S. Docherty, M. A. Gahbauer, C. R. Gillespie, A. R. Grinde, T. Harmer, D. T. Iles, S. M. Matsuoka, N. L. Michel, A. Murray, et al. (2022). Point Count Offsets for Estimating Population Sizes of North American Landbirds. Ibis:ibi.13169.

Hedley, R. W., Y. Huang, and K. Yao (2017). Direction-of-arrival estimation of animal vocalizations for monitoring animal behavior and improving estimates of abundance. Avian Conservation and Ecology 12:art6.

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Student contributions wanted for *Picoides*!

SCO-SOC encourages students to submit material for *Picoides*. In particular, we would like each issue to feature abstracts of at least one or two recently published theses. They must be from students at a Canadian university, but need not necessarily focus on Canadian birds. Abstracts should be 250-400 words long, preferably accompanied by one or two relevant photos.

We also welcome articles describing aspects of student research in greater detail; these should focus on a subject relevant to Canadian ornithology, require references, and may be up to 1,000 words long, again preferably accompanied by one or two photos. See the SCO-SOC Information page for submission details.

Feature Article

Ovaries and Eggs as Early Proxies for Clutch Size and Laying Dates of the Marbled Murrelet

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Introduction

The Marbled Murrelet (*Brachyramphus marmoratus*) was among the last species of bird in North America to give up the secret of its nest and egg. Arthur Cleveland Bent, author of the multi-volume series *Life Histories of North American Birds*, was acutely aware of this gap in knowledge. At the request of William Leon Dawson, Secretary of the recently established Museum of Comparative Oology administered at the Santa Barbara Museum of Natural History, Bent was asked to call "…the attention of oölogists to certain species of birds, on the North American list, whose nest and eggs have never been found, or about whose nesting habits so little is known as to make the need of further information especially prominent." He responded, cautiously, stating "The author does not pretend 'to know it all' about American birds' eggs, but his extensive investigations, in his efforts to gather information for the Life Histories, have probably brought to light most of our knowledge on the subject." Bent (1920, p. 15) extolled the care required to identify eggs, stating:

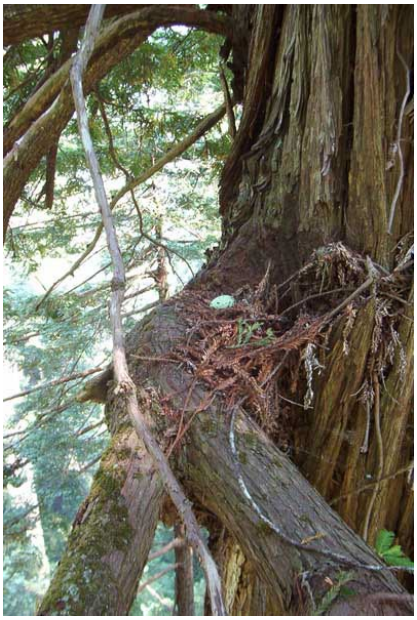
Adult Marbled Murrelet in breeding plumage. Courtesy of the Macaulay Library, Cornell University, and photographer, Brian Sullivan.

> Unfortunately, eggs usually do not identify themselves; in most cases the value of an egg, as a scientific specimen, depends almost wholly on the care exercised by the collector in identifying it with certainty, on his integrity and ability as an ornithologist and on the honesty of those through whose hands it has passed since it was collected. There are many eggs in collections, probably some in every collection, which have been wrongly identified through carelessness, ignorance or even intentional fraud. In writing his Life Histories and in these notes the author has attempted to ignore all such specimens, but he may have been mistaken himself in some cases.

Bent's caution was prophetic, because the oological history of the Marbled Murrelet is one of misidentification, and even fraud. His list of species whose nests and eggs remained incompletely described appeared in the first volume of the short-lived *Journal of the Museum of Comparative Oology*, published in 1920. Not surprisingly, the Marbled Murrelet was on this list, along with 12 other species whose nest and/or egg had been incompletely described, or not at all. Only a single egg of another species in the Alcidae, Whiskered Auklet (*Aethia pygmaea*), was available to Dawson (1920) for use in his revision of this family, based on egg characteristics. Bent (1920, p. 15) summarized the status of the eggs identified as laid by the Marbled Murrelet:

> Although this is a common bird along the coast from northern Washington to Unalaska, a fairly accessible region, its nest has never been found and the only authentic egg in existence was taken by Mr. Geo. G. Cantwell from the oviduct of a bird shot in the Prince of Wales Archipelago on May 23, 1897. It is now in the National Museum collection, No. 28,473, and is figured in the Life Histories of North American Diving Birds. There are two eggs in the National Museum collection, taken in 1866, near Sitka, Alaska, by Fred Bischoff, which are supposed to be of this species, but there is considerable doubt about them. An egg in Mr. Charles E. Doe's collection, taken by Mr. A.H. Dunham, north of Nome, Alaska, looks authentic, but the locality is far outside the known breeding range of the species and it looks very much as if some mistake had been made. All other supposed eggs of this species which have come to the author's attention seem to have been wrongly identified.

Before the first confirmed nest was discovered, clutch size and laying dates of the Marbled Murrelet were derived from descriptions of ovarian development and contents of oviducts of egg-laying females. However, the accuracy of those descriptions varied and some descriptions were in error as to whether one or two eggs were laid. Laying dates and clutch size based on those early descriptions have been clarified here by taking a closer look.



The single egg of the Marbled Murrelet, Redwood Creek watershed, Redwood National and State Parks, Humboldt County, California, August 8, 2002. Photo credit: J. Brett Lovelace.

Bent's suspicion regarding the two eggs noted above was borne out – the eggs were laid by Kittlitz's Murrelets (*B. brevirostris*) (Kiff 1981, Day et al. 1983). The story behind Cantwell's (1898) egg — one of luck, followed by bad luck — is elaborated on below, but despite three additional fully shelled (calcified) eggs removed from oviducts in ensuing years, we were no closer to determining the number of eggs Marbled Murrelets laid, or where. Confirmation came slowly. Attempts to confirm identities of eggs discovered away from a nest site, for example, on the forest floor (laid there? carried there? fell there?) were inconclusive (e.g., Gabrielson and Lincoln 1959, Drent and Guiguet 1961, Kiff 1980, Day et al. 1983, Carter and Sealy 2005). The Marbled Murrelet's single, medial brood (incubation) patch, not "two lateral bare brood patches" (Gaston and Jones 1998, p. 198), suggested a one-egg clutch, but auklets of the genus *Aethia* develop two functional brood patches but lay one-egg clutches, so this was not enough to go on. Clues about whether one or two eggs were laid emerged from another source, specimens collected by early ornithologists, and from ova (singular, ovum) dissected from reproductive tracts and generally referred to as eggs, even in ornithology textbooks (e.g., Gill 2007). Collectors sought this species on the chance that oviducts would yield fully shelled eggs, but only three were obtained from the many specimens taken before the first nests were discovered. Most descriptions of egg development (e.g., Gill 2007), refer to the ovum as an egg, but I refer to the ovum that develops into a fully shelled egg.

Collectors seldom noted ovarian development with their specimens, but in the case of the Marbled Murrelet, several collectors included this information, perhaps realizing it would add a dot on the map of the species' breeding range or provide an approximate laying date. The accuracy of the descriptions varied, however, and the question remained whether the Marbled Murrelet laid one egg or two. Years later, the one-egg clutch was confirmed when Sealy (1974) tracked ovarian maturation in specimens collected during the breeding season for a diet study off Langara Island, Haida Gwaii, and from the dozens of nests discovered by ornithologists in the ensuing decades that have contained a single egg (Nelson 2020).

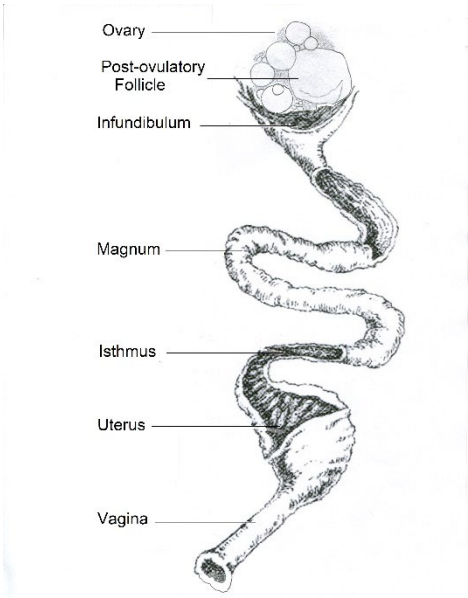


Figure 1. Diagram of avian reproductive tract showing ovary with preovulatory follicles, one postovulatory follicle, and oviduct (modified from Figure 2B and Gill 2007).

When to lay, one egg, or two?

Without nests to observe, I accessed information on clutch size and laying dates of the Marbled Murrelet from museum specimens and published descriptions of the species' early breeding status. For the historic record, errors and misleading information that led some ornithologists to conclude that Marbled Murrelets laid two eggs are corrected.

Background on the sequence of egg formation

Lewin's (1963) detailed descriptions and elegant diagrams, which cover the reproductive development of California Quail (*Callipepla californica*) over the annual cycle, provide a backdrop for comparison of observations of egg development in reproductive tracts of the Marbled Murrelet. The reproductive organs of the breeding female bird are diagrammed in Figure 1 and guide interpretation and correction of errors in descriptions of egg devekopment. The female gonad, or ovary, mature and enlarged during the breeding season, releases an ovum, from the ovarian follicle, leaving a postovulatory follicle that signals an ovum has been ovulated. The ovulated ovum enters the oviduct, is fertilized in the infundibulum, and layers of albumen and the shell membranes are added as the egg proceeds down the oviduct. The shell gland in the uterus adds pigments as the final step, before laying. The so-called "second egg" noted by more than one collector probably referred to a preovulatory follicle that formed in tandem with the primary ovum, and would

have served as a "back-up" if the first egg failed (see Hébert et al. [2003] for records of re-nesting). Incubation of the first egg results in resorption of the "extra" preovulatory follicles, which become atretic. Involution of postovulatory follicles occurs rapidly. Figure 2 shows (A) a fully developed ovum prior to ovulation plus smaller preovulatory follicles, and (B) one postovulatory follicle and five enlarged preovulatory follicles, as in 2A, one of which could develop into a second egg, if required (see also Sealy 1974).

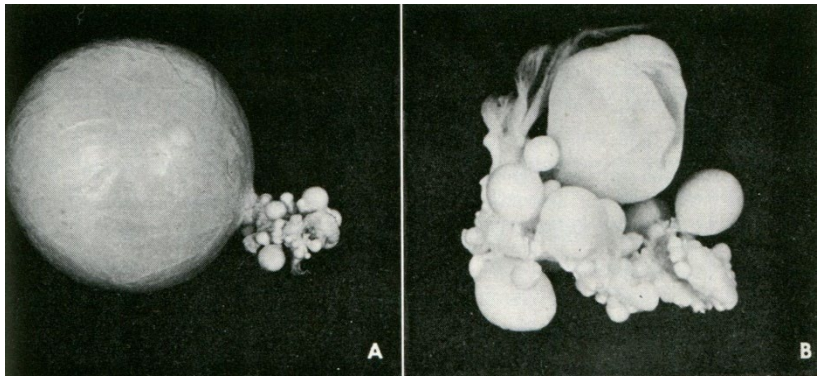


Figure 2. Marbled Murrelet ovaries. A, mature ovarian follicle (diameter, 32.0 mm), June 22, 1970; B, postovulatory follicle (diameter, 9.3 mm), June 6, 1970. Specimens collected off Langara Island, Haida Gwaii, British Columbia).

Estimation of laying date

Completely shelled eggs would have been laid later in the evening of collection or early the following morning, thus providing a precise laying date. In most birds, the ova's passage through the oviduct usually takes about 24 hours, but in some species it may be up to a week (Gill 2007). The length of time from ovulation until the ovum passes through the oviduct in the Marbled Murrelet is unknown, but I used a 24-hour interval to estimate laying date when an ovum or unshelled egg was present in the oviduct. The time required to lay a "pea-sized" preovulatory follicle (described by some collectors) or a mature, unovulated ovum (Figure 2A) is more difficult to pinpoint, but because it would be more than 24 hours, I used 48 hours to estimate laying date in these cases.

Rounding out the accounts are highlights of naturalists' experiences during quests for the egg of this difficult-to-study species. Additional notes on reproductive condition of specimens included in the accounts below were obtained from curators of the following museum collections: American Museum of Natural History (AMNH), Carnegie Museum of Natural History (CM), Denver Museum of Nature and Science (DMNS), Los Angeles County Museum (LACM), Museum of Comparative Zoology (MCZ), Royal British Columbia Museum (RBCM), San Diego Museum of Natural History (SDMNH), United States National Museum (USNM), and University of Alaska Museum (UAM).

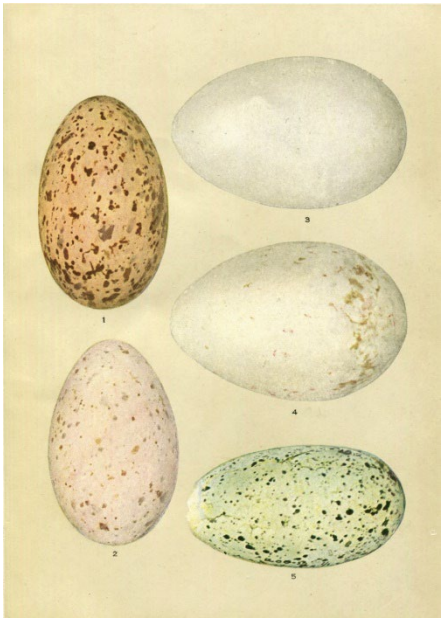


Figure 3. Plate 48 *in* Bent (1919, p. 238): 1 and 2, eggs of Ancient Murrelet (*Synthliboramphus antiquus*); 3 and 4, Rhinoceros Auklet (*Cerorhinca monocerata*); and 5, Cantwell's Marbled Murrelet egg.

Alaska

1897. Cantwell's (1898) egg (Figure 3) was taken at Prince of Wales Island (approximately 57°28′ N, 135°16′ W), on May 23, 1897. Cantwell had loaned his "scattergun" to a local boy who wanted to shoot ducks, but he was requested also to bring back some "divers" (Marbled Murrelets). The boy brought back four and said he thought one had an egg in it, which he confirmed by pressing the abdomen until they heard the sound of an eggshell breaking. Cantwell removed the fully shelled egg from the oviduct and patched the shell as best he could. The egg was figured by Bent (1919, plate 48) and resides in the USNM under the catalogue number noted above by Bent (C. Milensky, pers. comm., January 21, 2021). The date of collection was entered into the original catalogue as May 22, 1897, and repeated in the caption for the egg figured in Bent (1919, p. 238), apparently due to a transcription error. This egg would have been laid that night or early the following morning. **Egg-laying date: May 23/24, 1897** (see also Table 1)**.**

Cantwell's egg stood as the first positively identified egg of the Marbled Murrelet (Kiff 1980), but the species' nest remained undescribed for more than 70 years (Carter and Sealy 2005). Cantwell did not give up, however, because he still hoped to obtain an unbroken egg of the Marbled Murrelet, "a perfect specimen", in his words. Among the specimens the local boys brought Cantwell in response to a later promise of a reward, "many" of the dissected birds had "incomplete eggs", whereas others had already laid, which were presumably confirmed by the presence of postovulatory follicles, but this was not stated. Cantwell never secured another completely shelled egg of the Marbled Murrelet, in Alaska, or later in Oregon (see below).

1914. Willett (1915) noted at Forrester Island (54°48′ N, 133°31 W), southeast Alaska, "one bird taken [LACM 21783] at this time [July 25, 1914] was an adult female which, according to the condition of the sexual organs, had nested some time previously." Was a postovulatory

follicle evident or had the ovary and its follicles, and oviduct, regressed? Willett (1920) noted further, "the majority of the eggs of the Marbled Murrelet are deposited between May 10th and 20th…"; again, it is not known on what basis this was stated.

1920. Near Wrangell (56°28′ N, 132°22′ W), April 23, 1920, Bailey (1927) reported "a female … which had evidently laid an egg, and had another ready for the shell [DMNS 9327, taken by Muriel E. Bailey]; another specimen with an egg nearly ready to be laid was taken at Glacier Bay June 12." Bailey's reference to the condition of first female is confusing, and suggests that two eggs were produced, the "second" fully shelled, but on what evidence was the statement that a "first" egg had been laid? Were there two post-ovulatory follicles? Bailey surely would have noted, and preserved, the egg that was "nearly ready to be laid" if it had been fully shelled. **Estimated egg-laying dates: April 23/24, June 13/14, 1920.**

1920-1922. Willett (1926) described the reproductive condition of three Marbled Murrelets. The first female, taken at Wrangell on April 15, 1920, "contained an egg as large as a large pea", an ovum that probably would have ovulated within a day or two to become the yolk. This female "had not yet attained full summer plumage." For comparison, a female Marbled Murrelet taken near Langara Island, Haida Gwaii, on May 14, 1971 had an ovum 10.8 mm in diameter, about "pea-size", in addition to four additional preovulatory follicles, 2.8-4.0 mm, and no brood patch (Sealy 1972, p. 279). **Estimated egg-laying date: April 17/18, 1920.**

The second specimen was taken at Craig (55°28′ N, 133°8′ W) on May 16, 1921. According to the label of LACM 21782, it "… contained an egg (no shell) 1.15 in[ches] in diameter", which probably ovulated the next day. The third female, also taken at Craig, had ovulated and albumen and soft-shelled membranes were present when collected on May 15, 1922. Neither post-ovulatory follicle nor smaller ova was mentioned, but Willett (1926) noted intuitively that "Dissection of breeding females, as well as the size of the incubating patch on breeding birds of both sexes, indicate, as Brooks [1926] has remarked, that the usual set consists of one egg only." Brooks (1926) had noted several Marbled Murrelets, of both sexes, "show[ed] a fresh incubating patch 1½ by ¾ inches; this is not of sufficient size to allow two eggs to be covered." **Estimated egg-laying date: May 16/17, 1921.**

1941. Jewett (1942) collected a female (SDMNH 21818) off Pleasant Island, Icey Strait, near Glacier Bay (58°22′ N, 136°00′ W), southeast Alaska, on July 13, 1941, which "was found to be carrying a perfectly formed well-marked egg, apparently ready to be deposited in a nest." He added, "[t]he ovaries [sic] showed no indication that any eggs had been laid, and no others were in the process of development." Jewett did not note the postovulatory follicle that should have been visible (see also Gabrielson and Lincoln 1959, p. 488). The broken egg was preserved (USNM B40125); the condition of the reproductive tract of a second female taken, on July 15, 1941 (USNM 589658), was not noted. **Egg-laying date: July 13/14, 1941.**

Marbled Murrelet, Glacier Bay, Alaska. Photo credit: Glen A. Fox.

1968. Jean Bédard collected five female Marbled Murrelets in Glacier Bay (approximately 58°35′ N, 136°7′ W) in May and June 1968. UAM 7004, May 28, "no brood patch. Ovary very enlarged, ready to receive follicle"; UAM 7005, May 30, "collapsed [postovulatory] follicle still 10 mm, recent laying. Oviduct regressed to about half-size; laying 3-4 days previous?" UAM 7008, June 4, "fully developed brood patch, unshelled egg in lower part of the oviduct, albumen present, no shell yet"; UAM 7011, June 11, "fully developed brood patch. Oviduct enlarged at maximum, ready to receive follicle"; UAM 7018, June 16, "flaccidity of oviduct is sure sign of recent breeding, regressed to half of full size." E**stimated egg-laying dates: UAM 7005: June 1/2, 1968, UAM 7008: June 5/6, 1968.**

1977. A shelled egg was removed from a bird collected by W.A. Lehnhausen and S.E. Quinlan near Montague Island (60°52′ N, 147°25′ W), Prince William Sound, on June 12, 1977 (Mendenhall 1992). Specimens of the putative pair were catalogued as UAM 3623 (♀) and UAM 3624 (♂), whereas the egg was deposited in the AMNH (Egg/Nest 17936), not USNM, as Mendenhall stated. Catalogue data provide the most complete description of the brood patch and condition of the reproductive tract on the day of laying: "Weight, 250 grams, fully shelled egg in oviduct, ruptured [postovulatory] follicle 13.9 x 9.0 mm; largest [preovulatory] follicle 4.3 m[m] diameter, paired bird, collected with male… Brood patch 33 x 21 mm, not vascularized, but no down. Egg 57.3 x 36.3 mm, 45 grams…" As far as I am aware, these data permit the only calculation of mass of an unincubated egg (45 g) as a proportion of the female's mass (250 g), which, at 18%, is 1.8% more than Sealy's (1975) calculation based on Schönwetter's (1963) estimate of the weight of the shell (see also Nelson 2020). **Egg-laying date: June 12/13, 1977**.

1986. A putative pair "in breeding condition" (UAM 5355, ♂; UAM 5356, ♀) was taken by M.E. Isleib at Massacre Bay, Attu Island (52°50̇ N, 173°14̇ E), on June 1, 1986 (Mendenhall 1992). The diameter of the ovary's largest ovum was 9.5 mm, or "pea-sized." Specimens from which primary follicles of comparable size were dissected were taken off Langara Island, Haida Gwaii, on May 5, 14 and 22, 1971 (Sealy 1972, p. 279). **Estimated egg-laying date: June 3/4, 1986**.

British Columbia

1928. Confusing was the report of a Marbled Murrelet taken by Ronald M. Stewart about 90 km inland at Harrison Lake (49°33̇ N, 121°51̇ W) on April 28, 1928: "… a female which, upon dissection, proved to have two well[-]formed eggs in her. One [ovum] was almost perfect and over an inch in length, the other less than half formed" (Brooks 1928, also see Drent and Guiguet 1961, p. 82). Apparently interpreted as a two-egg clutch, the soon-to-be-ovulated "perfect" ovum was probably similar to the stage of development of the primary ovum shown in Figure 2A; the second "half formed" egg referred to a preovulatory follicle. This bird (RBCM 6167; Figure 4) was growing new feathers on the chin, throat and a few breast feathers at the same time as it was developing an ovum, a condition noted in other Marbled Murrelets specimens collected in this region (Norris et al. 2007; see also Carter and Stein 1995). The bird's well-developed brood patch is visible when the abdominal feathers are parted (Figure 4). The date of collection given on the labels, April 25, 1925, is incorrect, apparently the result of a transcription error in which "8" became "5" during cataloguing (L. Kennes, pers. comm., January 19, 2021; also see Carter and Sealy 1986). Stewart's original label, if one had accompanied the specimen in the first place, was removed during cataloguing. The specimen was taken from one of "seven or eight pairs" and bears the same locality and plumage as reported by Brooks (1928), but it lacks a collector's name. Young (1930) received this record second-hand, stating in error that this Marbled Murrelet was collected "in the spring of 1927, which contained in its oviduct a fully developed egg." **Estimated egg-laying date: April 29/30, 1928.**

Figure 4. Marbled Murrelet (RBCM 6167) taken by Ronald M. Stewart at Harrison Lake, British Columbia. The date of collection, given incorrectly as April 25, 1925, should be April 28, 1928. The underparts are predominantly in winter plumage, with well-developed brood patch visible in the insert. Courtesy of Royal British Columbia Museum.

1934. George Miksch Sutton shot a Marbled Murrelet near Mitlenatch Island (53°43̇N, 127°38̇ W) off Campbell River on the east coast of Vancouver Island, on May 23, 1934, "from the oviduct of which was subsequently taken an unbroken, perfectly formed, well-marked egg" (Sutton and Semple 1941: plate 19 [top]). Written earlier for a broader readership, Sutton (1936, pp. 167-168) told of the collection of this egg, accompanied by his friend John Semple,

> On our 193[4] expedition to British Columbia, we took the only perfect egg of the Marbled Murrelet extant in zoological collections today. We collected it on May 23, thirty-seven years to the very day after the first egg and only other known specimen was taken by George Cantwell, along the Alaskan coast. The Cantwell specimen unfortunately was broken; ours was not. We took it from the body of a bird shot near Mitelnach [sic], an islet that lies just east of Vancouver Island. We are proud indeed of this egg. But we know no more today than did our forefathers a hundred and fifty years ago about the actual nest of the Marbled Murrelet. We suspect that two eggs comprise a full set. We suspect the nest is a mere depression in the ground, or the bare, rocky bottom of a crevice. But we do not know. Some enthusiastic Eastern youngster, just out of college and eager to win his spurs, ought to bid his friends good-by [sic], travel to Vancouver Island, have a long talk with 'Mack' Laing, and set out to find the Murrelet's nest.

Why Sutton believed the Marbled Murrelet laid two eggs is puzzling. He said nothing about additional ovarian follicles or the structure of the brood patch, nor was clutch size mentioned in the description of the egg (Sutton and Semple 1941). Regarding the nest site, Sutton (1936, p. 167) speculated that "[his] guess [was] as good as anyone's", but laying two eggs was just "suspicion". He apparently never believed the typical nest site would turn out to be in the canopy of a tree! I located additional information catalogued with Sutton's specimens, CM P115631 (adult) and CM E3118 (egg), but there were no additional notes on ovarian development, and the sex of this specimen was transcribed in error as a male (see below). As only one Marbled Murrelet was collected on May 23, 1934, the specimen

catalogued with the egg shown in Figure 5 must have been mislabeled or the female was not preserved, which is unlikely (Stephen Rogers, pers. comm., January 18, 2021). Application of molecular techniques may confirm the sex. Sutton wanted to obtain a Marbled Murrelet's egg and to that end he collected several adults, all catalogued in the CM, but only one yielded a shelled egg. Following collection of the egg, Sutton and Semple (1941) searched unsuccessfully for a nest on this treeless island. **Egg-laying date: May 23/24, 1934.**

Figure 5. Marbled Murrelet (CM P115631, apparently mistakenly catalogued as an adult male, from which a shelled egg (CM E3118) was removed from the oviduct. The adult was taken by George Miksch Sutton and John B. Semple near Mittlenatch Island off the east coast of Vancouver Island, British Columbia, May 23, 1934. Courtesy of Carnegie Museum of Natural History.

Sutton and Semple were guests of Hamilton Mack Laing at his home in Comox, which served as their base from their arrival on April 25, 1934. Percy A. Taverner of the National Museum of Natural History (now Canadian Museum of Nature) had given Laing the opportunity to assist the Carnegie Expedition as guide and collector. Laing claimed the murrelet's egg for Comox because Mitlenatch Island is near his home (Munro and Cowan 1947, Drent and Guiguet 1961).

1936. Thomas T. McCabe and Elinor B. McCabe (*fide*, Dickenson 1953, p. 155), "… noted ova up to 15 mm. in diameter in [four female Marbled Murrelets] collected at Swanson Bay [53°00' N, 128°30' W; between May 6 and 23] 1936." The specimens (MCZ 282433 (ovum, 5.5 mm), -438, -439 [Figure 6], -440) were the only female Marbled Murrelets collected that year with developing follicles. That the collectors noted the stage of ovarian development in the Marbled Murrelet, but not for most other species taken, suggests their intention was to add information on the timing of laying of this species. **Estimated egg-laying dates: MCZ 282433: May 8/9** and MCZ **282439: May 25/26, 1934.**

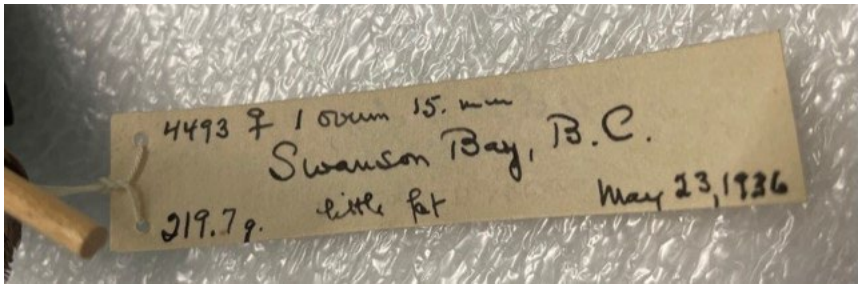


Figure 6. Label of Marbled Murrelet (MCZ 282439) taken by T.T. McCabe and E.B. McCabe in Swanson Bay, British Columbia, May 23, 1936. Dissection of the reproductive tract revealed one preovulatory ovum 15 mm in diameter. Courtesy of Museum of Comparative Zoology.

Washington

1914. Rathburn (1915) reported "a number of [Marbled Murrelets] in breeding plumage" were taken in the Puget Sound region by D.E. Brown in 1914. One of those females taken on May 23, "contained an egg an inch in diameter." This is the specimen, although actually taken a day earlier, to which Jewett et al. (1953, p. 323) referred, stating that the bird was collected in Pierce County (approximately 47°4 N, 122°7 W) on May 24, 1914, and "… contained a nearly full-sized egg." These authors apparently referred to a primary ovum about to be ovulated (see Figure 2A). **Estimated egg-laying laying date: May 24/25, 1914.**

1918. Cantwell reported that of three female Marbled Murrelets collected at the mouth of the Columbia River (46°14 N, 124°3 W) between May 10 and 18, 1918 (Jewett *et al.* 1953, p. 322), "… 2 [birds] contained 2 eggs each, and the third, one. The egg of this third example was about 1½ inches in diameter, and the breast of the bird showed a bare area, as if she had been sitting." Cantwell erred in referring to the primary ova and second less-developed ovarian follicle (his "second eggs") in each of the first two females. In the case of the third female, there was no need to imply that the bird was already incubating because the brood patch in this species begins to develop before the egg is laid (Sealy 1974). An ovum was probably equivalent in size to the fully developed ovum shown in Figure 2A; according to additional details Cantwell provided to Taylor (1921), the egg was "in the oviduct", thus ovulation had occurred but apparently albumen was not evident. **Estimated egg-laying date: May 19/20, 1918.**

Table 1. Marbled Murrelet laying dates derived from dissections of reproductive tracts of egg-laying females.

Region	Location	Year	Laying Date
Alaska	Prince of Wales Island (57°28′ N, 135°16′ W)	1897	May 23/24[a]
Alaska	Wrangell (56°28′ N, 132°22′ W)	1920	April 23/24[b], June 13/14[b]
Alaska	Wrangell	1920	April 17/18[b]
Alaska	Wrangell	1920	April 17/18[b]
Alaska	Craig (55°28′ N, 133°8′ W)	1921	May 16/17[b]
Alaska	near Glacier Bay (58°22′ N, 136°00′ W)	1941	July 13/14[a]
Alaska	Glacier Bay (~ 58°35′ N, 136°7′ W)	1968	June 1/2[b], June 5/6[b]
Alaska	Montague Island (60°52′ N, 147°25′ W)	1977	June 12/13[a]
Alaska	Attu Island (52°50′ N, 173°14′ E)	1986	June 3/4[b]
British Columbia	Harrison Lake (49°33′ N, 121°51′ W)	1928	April 29/30[b]
British Columbia	Mitlenatch Island (53°43′N, 127°38′ W)	1934	May 23/24[a]
British Columbia	Swanson Bay (53°00′ N, 128°30′ W)	1934	May 8/9[b], May 25/26[b]
Washington	Pierce County (~ 47°4 N, 122°7 W)	1914	May 19/20[b]
Washington	Columbia River (46°14′ N, 124°3′ W)	1918	May 24/25[b]

[a] Laying date is accurate to the nearest day, derived from calcified egg dissected from oviduct.
[b] Estimated to within two days based on the stage of the ovum in the uterine region of the oviduct.

Synopsis

On clutch size

Collecting a Marbled Murrelet's egg was paramount on the minds of many early ornithologists before nests were discovered, and interest in whether one egg, or two, was laid was evident in their writings and in notes written on labels that accompanied many specimens. Some ornithologists, who suggested two-egg clutches, believed that a second egg was produced from one of the several preovulatory follicles that normally develop during the egg-laying stage. Confusion was compounded when murrelet chicks were reported dropping out of trees felled by loggers. Those records certainly pointed to tree nesting, but the question of whether one- or two-egg clutches were laid was prolonged. The first case involved two chicks that allegedly dropped out of a tree felled by loggers in the Sultan River Basin, Washington, in 1950. Both were found on the ground "close together" (Carter and Sealy 1987), but L.L. Leschner (pers. comm., January 12, 2021) recalled later only that a single young was reported by Fred Hosea, officer with Washington State Department of Game. If two young were involved, questions were whether they were reared in the same nest, whether there were two active nests in the same tree, or whether the second young was knocked out of an adjacent tree when the first tree fell. Evidence accumulated in subsequent decades supports the latter explanation because no more than one active nest has been recorded in the same tree in the same year, but multiple nests have been reported in the same tree in different years (Nelson 2020).

Questions emerged again when two nestlings fell out of the canopy during logging operations on Vancouver Island in 1967. Harris (1971) reported on two flightless nestlings near Holberg, on the northwest coast of Vancouver Island, British Columbia. He described the excitement: "On August 14, 1967, my curiosity was aroused by a telephone message that two young, flightless birds with webbed feet dropped out of tree being felled by loggers on Vancouver Island. I asked my caller, Mrs. Belanski of Holberg, B.C., to ship the birds immediately. One bird killed in the fall had been destroyed, but the other was in Mrs. Belanski's home and was sent by air the next day." With egg tooth intact, the Marbled Murrelet arrived in Vancouver but died three days later. According to the report, the specimen was deposited in the RBCM but it cannot be located (L. Kennes, pers. comm., January 12, 2021). Despite chicks that fell out of the canopy, four fully shelled eggs, and descriptions of numerous eggs at various stages of development, the Marbled Murrelet's clutch size remained unconfirmed until egg development tracked over the entire breeding season confirmed the one-egg clutch (Sealy 1974).

On timing of breeding

Developing eggs also provided the earliest breeding records from Washington to Alaska (no records from California and Oregon), all within a portion of the species' currently recognized breeding range (Nelson 2020). This was noted in particular by Rathburn (1915) who reported a specimen with a developing ovum taken in the Puget Sound region in 1914, who stated, "It would thus appear that this locality may be within the southern portion of the breeding range of this species." Not revealed previously were egg-laying dates accurate to the day and

estimates to within two days for other developing eggs, dates that are as accurate as many dates backdated from hatching at nests under observation.

According to information derived from nests studied and summarized by Nelson (2020), the Marbled Murrelet's egg-laying season spans March to August, which, when broken down by region, allows for comparison of egg-laying dates determined by dissection. For example, in Washington, egg-laying spans late April-late July (1 gonadal "date" for late May [1914], 1 late May [1918]); British Columbia, early May-mid-July (1 late April [1928], 2 late May [1897, 1934]; and Alaska, mid-May-late July (2 late April [1920], 2 late May [1897, 1921], 5 early June [1920, 1968, 1977, 1986], 1 late June [1920], and 1 early July [1941]. Three eggs were laid a few days outside the respective spans of laying outlined by Nelson (2020): all were laid in late April, two eggs in southeastern Alaska and one in British Columbia. The murrelet taken on Harrison Lake, British Columbia (Figure 4), was in the early stages of transitioning to breeding plumage. The collector, Ronald Stewart, reported this record to Brooks (1928), who noted this bird, one of "seven or eight pairs" observed that day, "is in almost complete summer plumage as to the upper surface [back] and upper throat, and with only a few of the dark summer feathers on the lower surface, nor is there any indication of a moult on the lower [ventral] parts." Had these birds visited this inland lake regularly that winter, or was their first visit in late April as a precursor to the breeding season? Brooks's comment that the birds "are frequently seen on this lake in winter" suggested use throughout the winter (see also Carter and Sealy 1986).

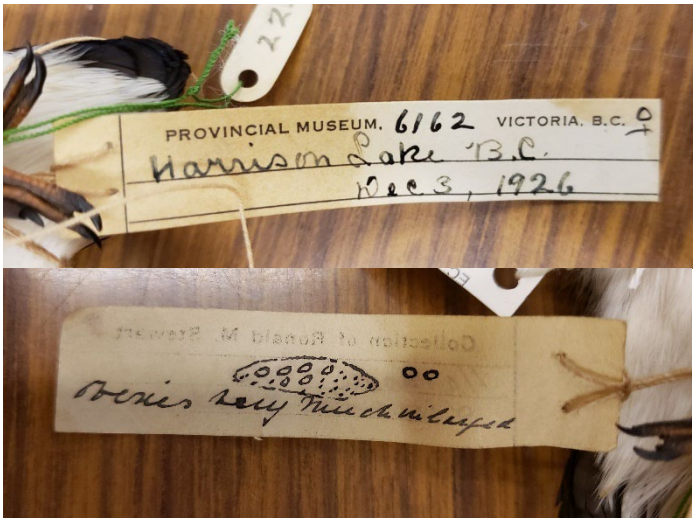


Figure 7. Front and back of label of Marbled Murrelet (RBCM 6162) taken by Ronald M. Stewart on Harrison Lake, British Columbia, December 3, 1926. Stewart's sketch of the ovary depicted several undeveloped follicles typical of the nonbreeding season.

Stewart was living in nearby Chilliwack, British Columbia, at the time, having arrived in 1926 (Campbell et al. 1990); he soon collected his first Marbled Murrelet (RBCM 6162), of six observed, on Harrison Lake on December 3, 1926, "with ovary very much enlarged" (Stewart 1927). Stewart actually sketched an ovary (Figure 7) with several undeveloped follicles typical of females during the non-breeding season. This record and others reported subsequently on Harrison Lake (Carter and Sealy 1986) suggest this lake and others nearby were used over the course of the non-breeding season but whether the same individual or a succession of individuals was involved was not known.

Re-examination of early dissections of reproductive tracts of egg-laying Marbled Murrelets, before nests were known, confirms that one-egg clutches are laid and provides laying dates to the nearest day for four fully shelled eggs removed from oviducts and estimates to within two days for others. This information and errors corrected in the historic record backdrop the new knowledge of the species' breeding biology that has emerged in recent decades.

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Ornithological News and Announcements

2023 Long Point Bird Observatory Young Ornithologists' Workshop

Long Point Bird Observatory is looking for keen young birders to apply for the 2023 Doug Tarry Young Ornithologist Workshop. Two workshops will be held this year, **August 4-11** and **August 18-24**. Participants will receive hands-on training in field ornithology centered in Long Point, Ontario including bird banding, censusing, field identification, birding trips, preparing museum specimens, guest lectures, and more! Twelve of Canada's most promising ornithologists between the ages of 13-17 will be selected to attend. Applications are due **May 30, 2023**. For more information and an application form, contact LPBO at lpbo@birdscanada.org, or visit www.birdscanada.org/lpbo

LPBO has been conducting youth training workshops since 1975 and established the Doug Tarry Natural History Fund and Young Ornithologists' Workshop & Internships in 1991 thanks to the generosity and foresight of the humanitarian and naturalist, Doug Tarry. The workshops have since nurtured the interests and skills more than 200 of Canada's best and brightest scientists, field biologists, and naturalists.

The cost of the workshop is $500/person, which is heavily subsidized by funding provided by Long Point Bird Observatory and the Doug Tarry Natural History Fund. The fee covers all direct costs of the workshop (accommodation, meals, workshop travel, equipment and materials, special activities while at Long Point, and professional staff with a 2:1 Participant to Instructor ratio at all times). Participants are responsible for their own transportation to and from Long Point, but pickups at the nearest airport/train stations can be arranged.

Atelier pour jeunes ornithologues 2023 à l'observatoire d'oiseaux de Long Point

L'observatoire d'oiseaux de Long Point recherche de jeunes ornithologues enthousiastes pour participer à l'atelier pour jeunes ornithologues Doug Tarry 2023. Deux ateliers auront lieu cette année, du 4 au 11 août et du 18 au 24 août. Les participants recevront une formation pratique en ornithologie de terrain centrée sur Long Point, en Ontario, comprenant le baguage d'oiseaux, le recensement, l'identification sur le terrain, des excursions ornithologiques, la préparation de spécimens de musée, des conférences et bien plus encore!

Douze des ornithologues les plus prometteurs du Canada, âgés de 13 à 17 ans, seront sélectionnés pour y participer. La date limite de candidature est fixée au 30 mai 2023. Pour obtenir de plus amples informations et un formulaire de candidature, contactez l'OOLP par courriel à lpbo@birdscanada.org, ou visitez le site www.birdscanada.org/lpbo.

L'OOLP organise des ateliers de formation pour les jeunes depuis 1975 et a créé le Fond Doug Tarry pour l'histoire naturelle and les stages pour jeunes ornithologues en 1991 grâce à la générosité et à la clairvoyance de l'humanitariste et naturaliste Doug Tarry. Depuis, les ateliers ont permis de développer les passions et les compétences de plus de 200 scientifiques, biologistes de terrain et naturalistes parmi les meilleurs et les plus brillants du Canada.

Le coût de l'atelier est de 500$ par personne, largement subventionné par des fonds fournis par l'observatoire d'oiseaux de Long Point et le Fond Doug Tarry pour l'histoire naturelle. Ces frais couvrent tous les coûts directement liés à l'atelier (hébergement, repas, déplacements, équipement et matériel, activités spéciales à Long Point, et personnel professionnel avec un ratio participant/instructeur de 2:1 en permanence). Les participants sont responsables de leur propre transport vers et depuis Long Point, mais il est devrait être possible pour quelqu'un d'aller vous chercher à l'aéroport ou à la gare la plus proche.

Ontario Breeding Bird Atlas-3: Engaging the province's birders with a new interactive StoryMap

Natasha Barlow, Ontario Projects Biologist, Birds Canada

Mapping the distribution and abundance of the approximately 300 species of breeding birds in Ontario can only be done with the help of hundreds of volunteer Citizen Scientists. This is possible through the third Ontario Breeding Bird Atlas – a collaborative 5-year project (2021-2025) that will collect data to guide environmental policies and conservation strategies for years to come.

To showcase the importance of the data collected by the province's birders, Birds Canada, in partnership with the Atlas team (Environment and Climate Change Canada, Ontario Field Ornithologists, Ontario Nature, and Ontario Ministry of Natural Resources and Forestry), have created an immersive StoryMap. The StoryMap explores the purpose of the Atlas, includes interactive maps, highlights engagement with Indigenous communities, and more.

Participating in the Atlas is easy – if you're a birder observing species in Ontario during the breeding seasons, we want and need your data! Atlassing is enjoyable, challenging, and provides invaluable data for bird conservation. Join a community of passionate birders using their talents and local knowledge to help conserve birds. Visit the StoryMap to learn why your participation is crucial in ensuring Ontario's birds are protected for years to come.

Wondering which species the second Ontario Breeding Bird Atlas found to be the most abundant in the province?

a) *Nashville Warbler*
b) *American Robin*
c) *Red-winged Blackbird*
a) *European Starling*

Find out by visiting the StoryMap here.

L'Atlas des oiseaux nicheurs de l'Ontario: une nouvelle carte-récit interactive pour mobiliser les observateurs de la province

Natasha Barlow, biologiste – Programmes de l'Ontario, Oiseaux Canada

Cartographier la répartition et l'abondance relative des quelque 300 espèces d'oiseaux nicheurs en Ontario serait impossible sans l'aide de centaines de citoyens scientifiques bénévoles. Cela est possible grâce au troisième Atlas des oiseaux nicheurs de l'Ontario, un programme collaboratif mené sur cinq ans (2021-2025) qui permettra de recueillir des données pour orienter les politiques environnementales et les stratégies de conservation pour des années à venir.

Pour montrer l'importance des données recueillies par les observateurs d'oiseaux de la province, Oiseaux Canada, en partenariat avec l'équipe de l'Atlas (qui compte des représentants d'Environnement et Changement climatique Canada, des Ontario Field Ornithologists, d'Ontario Nature et du ministère des Richesses naturelles et des Forêts de l'Ontario), a produit une carte-récit immersive. Cette carte présente l'objectif de l'Atlas, comprend des cartes interactives et souligne l'engagement des communautés autochtones, entre autres.

C'est facile de participer à la campagne de terrain de l'Atlas. Si vous observez déjà les oiseaux en Ontario pendant les périodes de reproduction, nous avons besoin de vos données! Vous prendrez part à une aventure agréable et stimulante qui fournit de l'information d'une valeur inestimable pour la protection des oiseaux. Faites partie d'une communauté d'ornithologues passionnés qui mettent leurs

talents et leurs connaissances locales au service de la conservation aviaire. Parcourez la carte-récit (en anglais pour le moment) pour savoir à quel point votre participation est cruciale pour la protection de la faune ailée de l'Ontario au cours des prochaines années.

Savez-vous laquelle de ces espèces était la plus abondante dans la province selon le deuxième Atlas des oiseaux nicheurs de l'Ontario?

b) Paruline à joues grises
c) Merle d'Amérique
d) Carouge à épaulettes
e) Étourneau sansonnet

Vous trouverez la réponse en consultant la carte-récit.

Bird Artwork

Short-billed Dowitcher (*Limnodromus griseus*) by Olivia Maillet.

Avian Conservation and Ecology Articles

Volume 17, Issue 2 (continued)

RESEARCH PAPERS

Volume 18, Issue 1 (in progress)

RESEARCH PAPERS

ESSAYS

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(Non-voting) Past Presidents:

Ross Lein	1983-1986	Tony Diamond	1998-2000	Joe Nocera	2012-2014
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Jon Barlow	1990-1992	Charles Francis	2004-2006	Colleen Barber	2018-2020
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Membership Information

www.sco-soc.ca/membership.html

SCO-SOC membership forms can be found at the link above. Current membership rates are provided below. SCO-SOC provides free membership to members of equity-denied communities. See our website for more information.

Student	$15.00/year
Early Career (<5 y post-grad)	$25.00/year
Retired	$25.00/year
Regular	$35.00/year ($45.00/year international)
Sustained	$75.00/year
Life	$500.00

SCO-SOC Website

www.sco-soc.ca/index.html

The SCO-SOC website includes sections on membership, meetings, news, publications, awards, information for students, an overview of SCO-SOC, and links of interest to members and other visitors.

Please direct any suggested additions or edits to the website to the Society's webmaster, Jennifer Foote, at jennifer.foote@algomau.ca.

Submissions to *Picoides*:

Articles and photos relevant to Canadian ornithology are welcomed by the editors. If submitting photos, please save them in tiff or jpeg format with descriptive file names, and supply captions including common names of species, location, date, photographer, and any other notes of interest. Deadlines for submission are February 15, May 15, and October 15; issues are typically published 4-6 weeks later. Please send all submissions to Rob Warnock at warnockr@myaccess.ca.

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