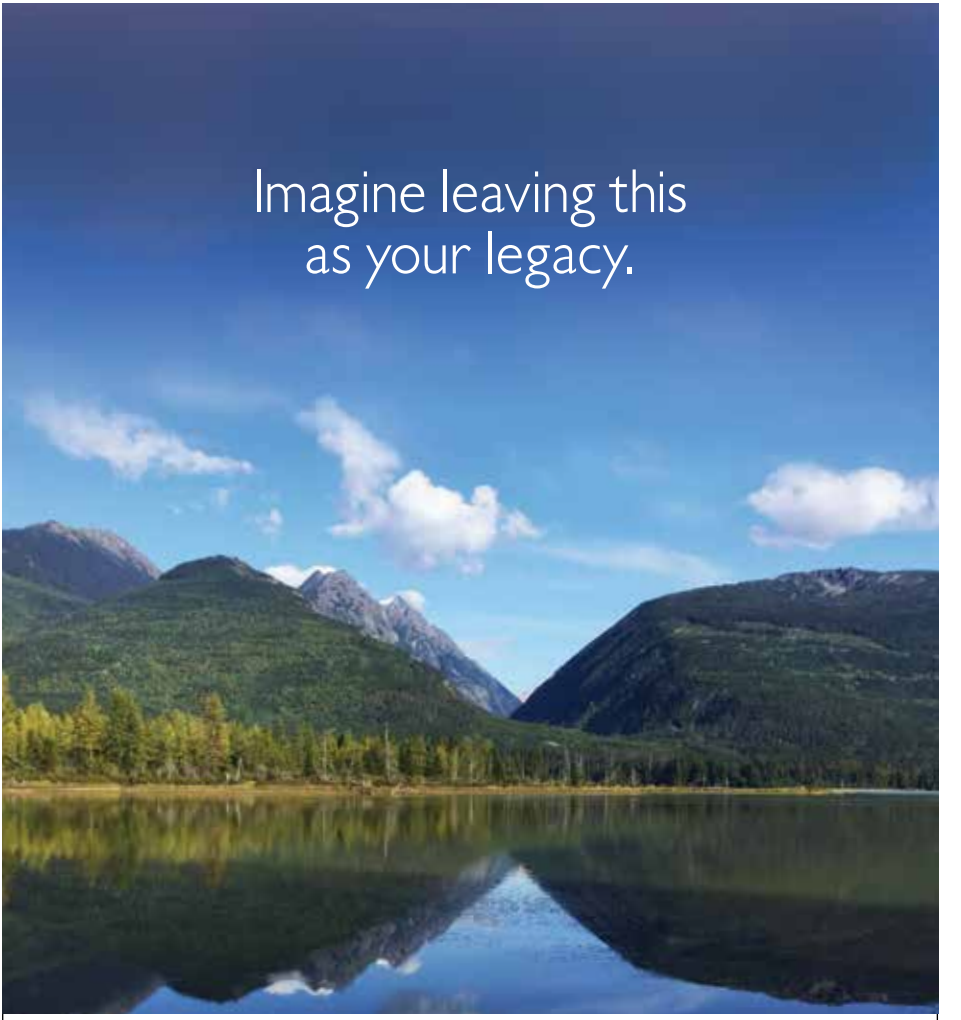
DISCOVERY

VOLUME 50 * 2022 * NATURE VANCOUVER



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Salmonberry Transformation (*Rubus spectabilis*). This ripening fruit with petals still remaining is unusual. Petals of the salmonberry flower typically fall off before the fruit forms, as seen lower in the photo, where the forming fruit has stamens present, but no petals remain. *Photo: Teresa Gagné (entry in NV photo contest)*

President's Report

by Joan Lopez

As the new President of Nature Vancouver, the first priority is to introduce myself to members that are unfamiliar with me. I live in Vancouver on the shores of False Creek and enjoy a view of this waterway and all the natural beauty of this place, despite the high density of urbanization. I hold a BSc from the University of British Columbia, majoring in Marine Biology. I have worked in tourism, as a guide for a local whale watching company, since 2003. I had also previously been employed in the Education Department at the Vancouver Aquarium. This is where the slippery slope of my involvement with Nature Vancouver began. It seemed a simple enough task to be the liaison with the Aquarium for the Marine Biology Section (MBS)—just put up some posters and advertise MBS events to the staff and volunteers. Just a few short years later, I found myself as the Chair of the Marine Biology Committee, a position that I still hold. Still sliding down the slope, the Board of Directors was my next stop. I suppose it was inevitable that the slope would end with me presiding over this incredible organization for the coming year or two.

Looking back on the past several years, I commend the Past-President, Nigel Peck, for holding the society together through some very turbulent times. COVID-19 prevented in-person meetings; with Nigel's encouragement and support from a great technical team, we were able to pivot to virtual presentations that kept the membership connected and continuing to learn about the natural world around us. In small steps, Nature Vancouver has emerged from the isolation, first with small-group field trips and walks outdoors; then recently, with some in-person evening presentations. COVID-19 is far from done with us, but with appropriate precautions, there was a successful Nature Vancouver trip to the Adams River to view salmon spawning. Huge thanks to Cynthia Crampton and Adele Liu for organizing and to Cynthia for leading this three-day tour with 32 participants.

Nature Vancouver will be co-hosting the showing of two movies at the Vancouver Public Library—"Soul of the Fraser" and "Heart of the Fraser". We were in the process of arrangements to show the latter when COVID-19 put all such plans on hold in 2020. Thanks to Adele Liu's persistence, these two important documentaries will finally reach our members and the public. In addition, the summer camp postponed since 2020 will at last be held summer 2023 at Big Bar Ranch, thanks to the dedication of the Camp Committee that never gave up hope. So there is reason for optimism.

Jude and Al Grass at the Appreciation Gathering held in their honour. The gathering was organized by Metro Vancouver Regional Parks at the heritage barn in Campbell Valley Regional Park, 28 April 2022. Al and Jude have had a life-long fellowship with this Park. In this photo, they thanked their guests for their many expressions of appreciation. *Photo: Jeff Rotin*

All the volunteers who keep Nature Vancouver ticking along are the heroes of the society. Everyone who has dedicated their time to organize and manage evening presentations, field trips and outings, written or researched entries for the weekly e-News or blog, or taken part in a variety of committees deserves recognition. Nature Vancouver could not continue without your support. A special thank you goes out to fellow Board members—Nigel Peck, Laura Cottle, Janet Snell, Adele Liu, John Martin, Selina Wong, Colin Clasen, Donna Underhill and Stephen Hui. These individuals contribute so much of their time to Board duties, as well as on several committees. I appreciate working with each and every one of them. Past Board members Angela Bond, Bev Ramey and Caroline Penn—we miss you and your valued input. Our technical team that keeps our website running smoothly and accurately—Harvey Dueck and Kelly Sekhon—might be behind the scenes, but their work is so important to communications. Denis LaPlante and Lyndsey Smith make sure that members are regularly informed of upcoming events and issues with the weekly e-News. Denis has also been instrumental in making our Zoom presentations successful, both virtually and with hybrid Zoom/in-person events. Margaret Bear

has graciously and competently taken on the task of responding to enquiries from outside the organization. Our finance committee is committed to making sure we meet all the mandates of a non-profit while keeping Nature Vancouver on a positive financial heading. And of course, our editors of *Discovery*, Bev Ramey and Sheila Byers, who publish a top-notch journal every year.

Sadly, several members have passed away in the past year. See separate pages in this *Discovery* for brief accounts of their lives.

Congratulations to our 2022 scholarship recipients. These young people have shown dedication to their studies, with the underlying goal of protecting and enhancing natural spaces. Separate pages in this *Discovery* describe the four recipients. The future is in the hands of these promising up and comers. We look forward to hearing more from this select group in the future. Thank you to our scholarship committee, Laura Cottle, Janet Snell, Stephen Partington and Michelle Perry, who sorted through many applications to select the most appropriate recipients.

A heart-warming recognition of long-time volunteers Jude and Al Grass was organized by Metro Vancouver Regional Parks last April, at Campbell Valley Regional Park. The invitation list was limited by the space within the venue of the historical barn, but representatives from Lower Mainland naturalist clubs gave heartfelt recognition to Jude and Al. At the end of the speeches, Jude and Al expressed a huge thanks to all, as seen in their beaming faces.

Daphne Solecki was remembered at a lovely celebration of her life, organized by her family. The event was held at VanDusen Botanical Gardens in August and was attended by her extended family, as well as her naturalists' friends, including NatureKids' leaders.

Another celebration of life was recently held in November for Katharine Steig, with the fitting location at Cypress Provincial Park. Over 50 friends and family remembered Katharine, as snowflakes fell, adjacent to the old growth forest she'd worked to protect.

Looking forward, Nature Vancouver is investigating collaborating with other like-minded local organizations on some environmental projects. The successful and ongoing rehabilitation project at New Brighton Park—spearheaded by Nigel Peck and mentored by Ian Clague, saw the removal of Scotch broom and Himalayan blackberry and the planting of pollinator roses, shrubs and perennials. It has provided hands-on work for many volunteers, has created an east-side restoration community and re-established Nature Vancouver in a dynamic project resulting in community awareness with new volunteers and memberships. (See separate account and photos in this *Discovery*.)

Besides appreciating nature, there is an appetite for making a difference by creating, restoring and enhancing natural places in a meaningful way. John Martin has created a Citizen Science initiative, which will enable members to become more involved in the nature of our own backyards.

Thanks to the support from our many members including time, skills, participation, as well as donations and bequests. All these contributions enable our society to function in many diverse ways including providing a voice for nature and fostering greater appreciation and understanding of nature.

This past year has borne witness to upheavals in the world order. The peace and democracy we value so highly are being challenged in several countries. Locally, we experience the fallout of this as higher costs for almost everything we purchase. On a larger scale, the human and environmental costs of ongoing conflicts are devastating. While there are no silver linings from the war in Ukraine, the urgency to investigate alternate, renewable forms of energy may help curb the climate crisis. However, this conflict reminds us to appreciate the beautiful, peaceful place we live in, with freedom to move around, to gather and to find solace in the nature all around us.

Award Recipients

Awards were presented as part of Nature Vancouver's AGM (online) on 28 April 2022. A full account of the contributions of the award recipients, together with their photos can be found on the NV website (under About Us, Volunteer Awards and Award Presentations). Recipients of the 2022 awards are:

Garibaldi Awards for Service
Lyndsey Smith, Naomi Ross, Bill Ramey, Donna Underhill

Frank Sanford Award for Community Service
Judith Holm

Kay Beamish Award for Nature Education
Susan Fisher

John Davidson Award for Conservation
Ian Clague

Kaye and Charlies Ney Award for Exemplary Service
Nigel Peck

Nature Vancouver Scholarship Recipients 2022

by Laura Cottle, Stephen Partington, Michelle Perry and Janet Snell

Please see the Nature Vancouver website under heading "Scholarships" (top right-hand side) for full descriptions and photos of the scholarship recipients. Four scholarships will once again be awarded in spring 2023: two Nature Vancouver Scholarships of $1000 each and two Hugh Hamilton Memorial Scholarships of $5,000 each. See NV website for details on how to apply. Donations from members are always welcomed to support these scholarships. Herein follow descriptions of the 2022 recipients.

Tara Brown (Nature Vancouver Graduate Scholarship)

Tara L. Brown is a second-year PhD student in the UBC Faculty of Forestry, a certified Forest Therapy Guide, and a certified educator in sustainable development. She's interested in forest-based interventions, human health and well-being. As an advocate for open and participatory science, Tara's dissertation research project examines the effects of forest bathing and environmental factors on individual health responses in Vancouver parks. Volunteers will be forest bathing over four seasons while monitoring the environment, including the forest air.

The results obtained in this study and the broader program of research support Nature Vancouver's objective to encourage individuals to spend time in nature. With a greater understanding of the linkages between nature mechanisms and human health, it will be possible for park and forest managers to adjust their practices (if necessary) to maintain and enhance the factors for forest-based interventions. By expanding the understanding of the connection between forest characteristics and different health-related benefits, health practitioners prescribing nature can be more prescriptive. Overall, individuals can make more informed choices when choosing where to spend their time in forest spaces.

Rachel Foster (Nature Vancouver Undergraduate Scholarship)

Rachel Foster, in six short years, has come from graduating with a Fine Arts degree from the University of Derby (located in the relatively domesticated Peaks District in England), to graduating with a Diploma in Fish, Wildlife and Recreation from BCIT. Along the way Rachel served a stint in the remote wilds of Yukon where in 2021 she assisted with a fire ecology study as an Avian Technician with the Wildlife Conservation Society Canada, a tale about which you can read in *Discovery* 2021, 49: 51–55.

During these six years Rachel also volunteered banding birds at Iona with WildResearch, video-recorded the Great Blue Heronry with the Stanley Park Ecology Society and monitored Purple Martin nest success with Wild Bird Trust. Rachel has also volunteered on WildResearch's Grant-Writing Committee.

Rachel discovered that she has a passionate interest in the ecology of western Canadian wildlife. Thus she is upgrading her education further and has now entered the Bachelor of Ecological Restoration program at BCIT. In Rachel's own words: "As an emerging biologist, I feel it is critical to research sensitive habitats, attune to their adaptations to climate change and to prioritize strategies that protect the needs of impacted species."

Keila Stark (Hugh Hamilton Memorial Graduate Scholarship)

Keila Stark is a PhD Candidate of Zoology at UBC on unceded xʷməθkʷəy̓əm/Musqueam Territory. Her research aims to understand the effect of climate warming on biodiversity, with a focus on coastal ecosystems. Her work takes her to eelgrass (*Zostera marina*) meadows along the BC coast and to coastal areas around Baffin Island, Nunavut. She frequently visits the eelgrass meadow at Roberts Bank near the proposed Terminal 2 expansion site and is a witness to the rich diversity of plants, invertebrates, fishes and birds that could be affected by the port expansion.

Outside her dissertation research, Keila has authored several academic and policy publications on topics including implementing the UN Sustainable Development Goals, achieving social equity in conservation, and environmentally harmful subsidy reform. She has worked as an educator for several nature organizations including the BC Wildlife Federation, Parks Canada and Ocean Wise. She has founded an ecology mentorship program—*BioBuddies*—for elementary school-aged students. She has also coordinated youth delegations to the UN Climate Conference and is an advocate for youth involvement in political decision-making. The overarching theme that motivates Keila's work is a desire to find solutions that simultaneously achieve nature conservation, climate resilience and human well-being.

Ira Sutherland (Hugh Hamilton Memorial Graduate Scholarship)

Ira Sutherland is a PhD student at UBC's Faculty of Forestry. In particular, he is expanding on his earlier research in the ecology and social values of old-growth forests. He has given many talks to local natural history groups on "The Great Vancouver Rainforest" as well as creating the website and big-tree hiking guide: ***VancouversBigTrees.com***. He has extensive volunteer experience since his undergraduate days, leading hikes in old-growth forests

for groups such as the Stanley Park Ecology Society, Ancient Forest Alliance, Western Canada Wilderness Committee and several local First Nations groups.

Ira has expanded that early hands-on volunteering with an organizational approach. As chair of the BC BigTree Committee and in Ira's words, he "is interacting with government during the development of legislation to protect big trees, as well as interfacing with forestry industry groups who are trying to better steward large trees, and with local community groups who are trying to get their own tree registries started." Ira's commitment to sharing his knowledge and passion for the natural world with others is well evident.

NATURE VANCOUVER

The Vancouver Natural History Society, now known by its members and the public as Nature Vancouver, was founded in 1918 by Professor John Davidson, with the following objectives:

- To promote the enjoyment of nature
- To foster public interest and education in the appreciation and study of nature
- To encourage the wise use and conservation of natural resources
- To work for the complete protection of endangered species and ecosystems
- To promote access to and maintenance of natural areas in the vicinity of Vancouver

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How to Join: New members are welcome. See Nature Vancouver website, ***naturevancouver.ca/membership***.

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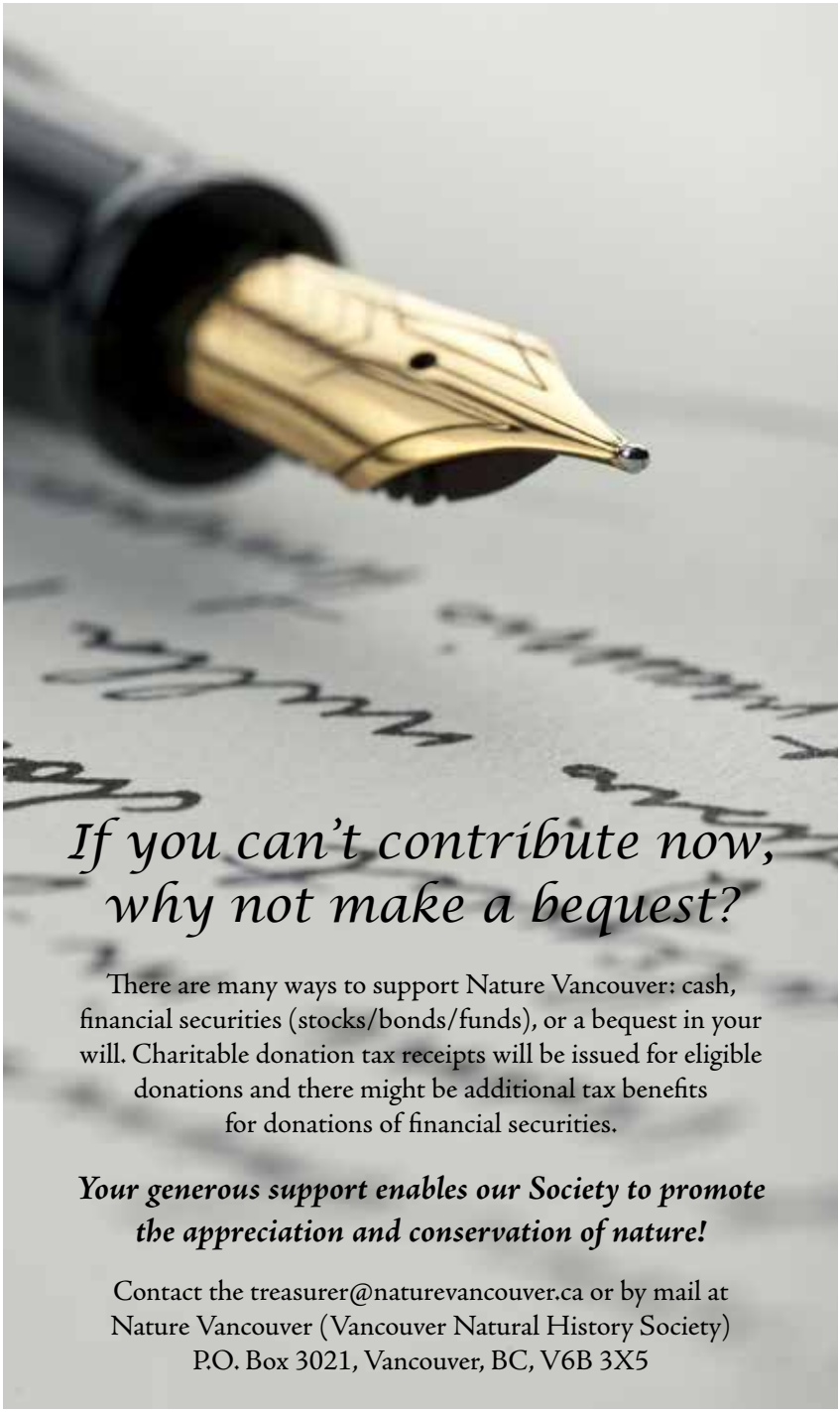

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There are many ways to support Nature Vancouver: cash, financial securities (stocks/bonds/funds), or a bequest in your will. Charitable donation tax receipts will be issued for eligible donations and there might be additional tax benefits for donations of financial securities.

Your generous support enables our Society to promote the appreciation and conservation of nature!

Contact the treasurer@naturevancouver.ca or by mail at
Nature Vancouver (Vancouver Natural History Society)
P.O. Box 3021, Vancouver, BC, V6B 3X5

Editors' Notes

by Sheila Byers and Bev Ramey

This 2022 *Discovery* issue has a great combination of subjects spanning birding, marine biology, botany, history and thought-provoking articles. We very much appreciate the submissions and the authors, whose interests cover this wide subject range. And to you readers too, we hope you enjoy the content. From an historical perspective, the decades of association between the BC Mountaineering Club (BCMC) and Nature Vancouver (NV) are carefully detailed by Michael Feller. He describes the hundred-year relationship between members of our two organizations that reinforces the ideal fit of exploring the outdoors, including scaling peaks, while gaining knowledge and appreciation of nature. He recounts the tremendous, collaborative conservation work accomplished by members of BCMC and NV.

However, regardless of past efforts and achievements, the conservation fight is not over. It is very encouraging that recent investigations by students, including the scholarship recipients, show that the next generation is stepping up to action.

The data review of red-listed vascular plants archived at the Herbarium, Beaty Biodiversity Museum, is described by Christina Gentle and Linda Jennings Lipsen. They explain that while records were being updated, they noted that an increase in species collection trends occurred after the 1970s. This furthers scientific understanding of where protective actions are needed. Another author, Sunny Tseng, describes the history of birdsong recording over the past hundred years to present-day technology that allows birds to be identified by their sounds through an app on your phone. What a bonus to citizen science!

The citizen science efforts of NV, other BC Nature clubs and environmental organizations have been, and continue to be, instrumental in challenging government agencies to focus on biodiversity loss. Read about the example of the incredibly beautiful, fragile and deep cold-water corals inhabiting the sill in Knight Inlet and the many marine species that they support. This article by Neil McDaniel, describes how the corals are threatened by bottom-contact fisheries. Fortunately, given the continued public pressure, DFO has agreed to designate protection for the sill in 2023, two years earlier than expected. Will the same progress occur for the glass sponge reefs of Howe Sound that were protected in 2019, yet continue to be damaged? Time will tell.

It is difficult not to get depressed about biodiversity loss when governments do not take action. But it

is not just up to government to take action. Can we change our attitudes, our too-complacent demands or 'needs' for material wealth, for travel, increased world population, for our own greed and wealth at the risk of destroying our planet; or are we too well-ensconced in treating the world and nature, as Susan Fisher describes in her opinion piece, as our 'Oyster'?

It is possible and there is a small window of opportunity for action, according to the Intergovernmental Panel on Climate Change (2022). BUT we need a collaborative effort to get things done. With increased awareness and continued conservation efforts by naturalists and other concerned citizens, it is possible to see hope in a future for the next generations—a future supporting biodiversity and the pleasure, beauty, peacefulness and resources that nature provides us, to which we have become so accustomed.

Ruth Simons' description of the Átl'ka7tsem UNESCO Biosphere Region in Howe Sound is a great example. The 2021 designation was a major step forward enabling Howe Sound communities to achieve biodiversity conservation, sustainable development and reconciliation where people, culture and humanity can thrive in harmony with nature. Furthermore, continued engagement with young children through the NatureKids programs helps to promote the inherent, but often not seen or appreciated value of nature, while fostering a love and emotional attachment at an early age. Similar benefits can be attained with adult engagement through physical activity such as removing invasive species and replacing with native plants, as described by Nigel Peck in the restoration project at New Brighton Park. The work of the many volunteers provides immediate energy release, plus a sense of accomplishment and comradeship with the restored landscape and enhanced biodiversity.

Further nature learning is provided in other *Discovery* articles, such as the local Pacific Yew (David Cook), Deer Fern (Lee Beavington) and even the invasive new bugs in our backyard (Karen Needham). These encourage us to explore nature and become involved in actions to protect biodiversity. Another perspective on the mental and physical benefits of slowing down and looking closer at nature is described by Vicky Earle in her article on nature sketchbook journaling.

The book reviews cover important take-homes about biodiversity: experiencing first-hand the disappearing glaciers, 'trees on the march' due to climate change, an update on BC's bat species, an insightful look at the science and spirit of seaweeds living off our coast, and a welcomed edition update of the coastal *Whelks to Whales* guidebook. All are a testament to the efforts being made to both educate and engage us to better understand the

importance of biodiversity and the need to remain vigilant with our conservation efforts.

The years of 2019 to 2022 have not been kind in the passing of a number of our members and active volunteers. Their accomplishments and contributions to Nature Vancouver have been much appreciated. To ensure that individuals who have helped to support Nature Vancouver into its 104th year, the Nature Vancouver Profile of members is back, featuring Kelly Sekhon!

Thanks to NV President, Joan Lopez, for describing the many activities of our nature club and, more importantly, for coordinating and leading club activities for our 700 members. Thank-yous are also due to the resourceful photographers whose lovely photos help better convey the written words of the articles herein. We'd also like to extend a huge thanks to Laura Fauth who uses her skills and creativity to produce an impressive design of the text and photos for our readers. In addition, thanks are due to Rick Gee for his exceedingly careful copy-editing, although we still debate the use of 'Oxford Commas'.

NV very much appreciates the support of its sponsors, whose ads you will see dispersed between the covers.

Marsh Wren. Entrant in Nature Vancouver photo contest.
Photo: Malcolm Hayes

In Memoriam

Sadly, several well-known Nature Vancouver members passed away last year. Others passed away in previous years and were recently brought to our attention. More detailed recognition of these members, plus photos, are posted on the Nature Vancouver website. On the Home page right sidebar, choose 'Blog Categories'/'In Memoriam' to see the blog entries. Note: the Nature Vancouver (NV) trade name was adopted in 2006; Vancouver Natural History Society (VNHS) remains the legal name (since 1918).

Katharine Steig, 1936–2022

Katharine's greatest passion was for native plants and wild places. Some of her fondest childhood memories were of summers on Puget Sound beachcombing and playing in the mudflats and estuaries; she grew up in Tacoma, Washington. Katherine studied biology at Reed College before completing her undergraduate degree in early childhood education at the University of Washington. Upon moving to West Vancouver, where she and her husband, Michael Steig, raised two sons, she became entranced by the wilderness on her doorstep. With growing awareness, her concerns with development threats increased and Katharine became active in the West Vancouver community. By immersing herself in educational and municipal affairs for over 50 years, Katharine hoped to ensure that the wild places would be preserved for future generations to respect and enjoy.

In 1990, Katharine played a leading role in the successful effort to protect a stand of old-growth forest in West Vancouver. In 1991, she joined NV and served on its Board of Directors and Conservation Section for many years. She also greatly contributed to the West Vancouver Old Growth Conservancy Society and to Friends of Cypress Provincial Park, including many years as president where she worked diligently to ensure that the wildness of the park continued in the face of development and recreation pressures. Katharine was presented with NV's Garibaldi Award for Club Service in 1996, Davidson Award for Conservation in 2000 and Ney Award for Exemplary Service in 2006.

Catherine (Cathy) Aitchison 1947–2022

Cathy was known for her passion for nature and birds. These interests came later in her life after extensive travel and building her skills in fashion design in Chicago and London, England. She worked as a professional dressmaker and teacher at night school. She was an enthusiastic participant in sewing and knitting circles. Cathy's love of

travel and nature led her to many countries around the world with like-minded people, adding to her extensive list of bird species.

Cathy joined NV in 1984. As her knowledge of birds grew, she led birding trips for NV, participated in bird surveys and contributed to the NV publication, *Vancouver Birds in 1995* (Elliot and Gardner). She edited *The Birders Guide to Vancouver and the Lower Mainland* (First edition, 2001), which involved coordinating the authors for the several chapter descriptions of different geographic locations. In 1996, Cathy received NV's Ney Award for Exemplary Service.

Louise Irwin 1927–2022

Louise grew up in the Barnet area of Burnaby where she developed a great love for the outdoors. She brought home lots of 'pets' from the woods where she enjoyed swimming, including across the Port Moody Arm. Later her family moved to Point Grey where she completed her high school. Louise graduated from UBC with a BSc in Agriculture (1948) and later, after travels, obtained a Bachelor of Library Science (1967). She worked abroad in research labs, taught high school and was a librarian at the Vancouver Public Library.

Her years were spent hiking, skiing, gardening, travelling and enjoying her view of Kits Beach from her apartment. She spent many hours on the local mountains and travelled around the world into her 80s. Louise joined NV in 1969, after hearing stories of summer camps from Dick Stace-Smith. She led many hikes as a long-time member of NV. She received the Garibaldi Award for Club Service in 1998 and the Ney Award for Exemplary Service in 2011. She served on the executive of BC Nature (Federation of British Columbia Naturalists) and was active with North Shore Hikers and Friends of Cypress Provincial Park. Louise describes her principal interest as plant life, although she considered herself a 'generalist'. Louise donated generously to NV, including the support of publications, conservation and protection of Pink Mountain, northern BC.

Nature Vancouver's website posting includes memories of Louise shared by NV members Cynthia Crampton, Ken Dent, Jane Srivastava, Rosemary and Terry Taylor. Louise herself shared her memories of VNHS in an article she wrote for *Discovery*, Spring 2007, 36(1):8–13. In that article, Louise describes her long connection with summer camps from 1970 to 2006, how summer camps helped support campaigns to protect several areas as provincial parks, and how the set-up access modernized from pack horses to helicopters. Her quote summarizes her appreciate of these camps, "… the companionship and humour, expertise, inventiveness and especially the work of hundreds of volunteers—all contributing to a

learning experience and enjoyment of these often-unknown places in British Columbia."

Wayne Weber 1947–2022

Wayne is remembered by many birders as a big-hearted, compassionate and astonishingly knowledgeable mentor and teacher. He worked as a biologist for the Ministries of Agriculture, Forestry and Environment. With his passion for birding, he devoted much time to volunteer organizations. He joined VNHS in 1970 and was a founding member of the BC Field Ornithologists. He also had a lifelong interest in botany and enjoyed photography. Wayne contributed extensively to eBird, to the BC Breeding Bird Atlas, to NV's Birding Section, the Editorial Committee of *Discovery* journal and to the NV Board. Wayne was presented a Club Service Award in 1993.

Dan Overmyer 1935–2021

Dan Overmyer served as president of NV from 2011–2013 and headed the Editorial Committee of *Discovery* for two years, hosting meetings in his cozy Vancouver apartment; or, during COVID-19, in the open-air, ground-level parking area beneath his apartment building.

Born in Columbus, Ohio, Dan grew up in China and the Philippines, spending the majority of his career as a pioneering scholar of Chinese popular religions and philosophy. He published widely and taught for 27 years at UBC Asian Studies and Chinese Research. His autobiography and professional record can be found by searching "UBC, Dan Overmyer".

Dan joined NV in 1996. He was an ardent protector of Mother Earth and very much enjoyed philosophizing on nature. Dan was presented with Garibaldi Service Awards in 2010 and 2021. It is fitting to remember Dan through his favourite nature poem, "The Water Ouzel" by William Matchett. Dan arranged for the printing of this poem in *Discovery* 2020, 48:33–34. You can reread and especially think of Dan in the poem's last lines, which Dan described as giving him "goose bumps."

Joan Ford 1925–2021

Joan's love of the outdoors led her to our coastal mountains, participating in outings as a member of VNHS (joining in 1986) and with hiking groups. She served as our Club Representative to BC Nature (Federation of BC Naturalists) for several years in the early 2000s.

Joan had a praiseworthy career as a doctor. She was the first woman on the medical staff of the Royal Columbian Hospital and provided dedicated service as Dr. Ford to patients in Burnaby and New Westminster for over 40 years. Joan had a long friendship with Sir Edmund Hillary. She was the *locum tenens* six times in his mountain hospital in Kunde, becoming good friends with the people in the clinic within sight of Mount Everest. Her

work in the Himalayas was well depicted in the documentary *She Makes Mountain Calls* by Bev Reid (Coming Home Films). In 1991 she was awarded the Order of Canada in recognition of her contribution to health care locally and among the Sherpa people of the Himalayas. The Dr. Joan Ford lobby in the Wavefront Centre for Communication Accessibility, Vancouver is an example of her philanthropic leadership. She also contributed generously to the purchase of lands for nature.

Noreen Fairweather

Noreen Fairweather passed away in 2020. She joined VNHS in 1968 and served as President from 1976–1978. She edited *Discovery* for many years, and would occasionally include her drawings of birds and animals. During the past two decades, Noreen was active in the South Delta Artists Guild for which accounts can be found in the *Delta Optimist News*. Noreen received NV's Ney Award for Exemplary Service in 1985.

Elizabeth Walker 1921–2019

Elizabeth Walker joined VNHS in 1965 as a Life Member. She is recognized by the BC Naturalists' Foundation president, as "naturalist, adventurer, historian, librarian, archivist, humanitarian and visionary." She joined hikes and travelled with the club for over a half century and donated generously to the VNHS and the BC Naturalists' Foundation. As a member of the VNHS Board in the 1980s, she served as Recording Secretary and was also active on the VNHS Conservation Committee in the 1980s and 1990s.

Her career was a librarian in the Northwest History Department of the Vancouver Public Library. Her passion for history and data organization shone through with her contributions to NV's Board and the Conservation Committee, ensuring that appropriate club records, including minutes, were stored in the Vancouver City Archives. While volunteering with the Conservation Committee, Elizabeth appreciated the value of site visits when pursuing an issue. Her site visits were well known as producing results as she made sure to include government staff and politicians, as well as members of other naturalist clubs and environmental groups in the discussions. Elizabeth was presented the VNHS Ney Award for Exemplary Service in 1989.

New Brighton Park Restoration Project

by Nigel Peck

This year Nature Vancouver (NV) became involved in an exciting new conservation project at New Brighton Park in Vancouver's northeast corner, near the Iron Workers' Second Narrows Bridge. In the area just to the west of the off-leash dog area, landfill dug from the Shoreline Habitat Restoration Project was deposited in 2016 and 2017 to create a hillock. Sadly, planted native coastal shrubs did not survive the initial years, leaving the area to be populated by invasive Scotch broom, Himalayan blackberry, bull thistle and later reed canary grass.

The rapid growth and spread of Scotch broom and Himalayan blackberry was of particular concern. The entire hillock of the park and the vegetated strip of Port of Vancouver land between the park and Port of Vancouver fence would become increasingly infested. NV approached the Vancouver Parks Board in February 2021 to ask if we could assist in any Vancouver Park related restoration projects. We then met with the Environmental Stewardship Coordinator, Krista Voth, at the site in December 2021 and agreed to become a part of the restoration project of the hillock.

Volunteers pause for break from careful planting of native species, late November 2022, before predicted snowfall. Left to right, Sue Garber, Daryl Sturdy, Lorna Homuth, Fred Hornby and Peter Cawsey. *Photo: Nigel Peck*

January 2022 Work Party with broom piles behind. Volunteers from left to right: Heather Bartley, Angela Bond, Sue Garber, Lyndsey Smith, Fred Hornby, Peter Cawsey, Marissa Gilmour and Rachel Singleton-Polster. *Photo: Nigel Peck*

Initially the Vancouver Parks Board envisaged that a contractor would complete the vast majority of the work with NV assisting only in a minor way. The enthusiasm and effectiveness of NV volunteers overturned the plan and NV has ended up completing all the invasive plant removal and subsequently, all the native plantings. The project began on January 24th with three NV volunteers 'extracticating' (pulling out) the first of hundreds of Scotch broom plants from the hillock. Himalayan blackberry was the next invasive needing attention, with major infestations along the Park/Port fence and northward toward the water to be removed.

Nature Vancouver's status as an independent society including experienced botany enthusiasts was particularly beneficial when it was realized that all the park's invasive species could be cleared. However, knowing that the area—just metres away and separated only by a chain link fence—would be immediately reseeded by the same invasive species which were growing densely on Port of Vancouver property.

Recognizing this problem, we contacted the Port and were able to meet with the Port of Vancouver

Nature Vancouver Treasurer Adele Liu, New Brighton organiser Greg Leach and NV technical specialist Adam Wang pulling on broom, February 2022. *Photo: Nigel Peck*

Manager of Infrastructure Habitat Development, Charlotte Olson, at the site in February to survey the amount of invasive broom and blackberry. Charlotte then applied for a special permit to allow Nature Vancouver volunteers to enter Port property to continue our removal efforts on the Port side of the fence.

One unexpected by-product of the collaboration occurred when Charlotte suggested that the Port was benefitting with the removal of the invasive plants on their property and that we should bill them for work. This in turn resulted in the generous payment of $5000 to NV, which has been used to purchase restoration equipment to augment tools loaned by the Vancouver Parks Board and to fund other expenses associated with the project.

By March, nine separate work parties had essentially removed all the broom in the park, as well as the major blackberry infestations on the hillock of the park. Two weeks later volunteers removed the final broom and blackberry infestations which remained on the Port vegetated strip.

The successful invasive species removal allowed us to begin the

Kitty Castle, Anita Ellis and Greg Leach pulling thistle, August 2022.
Photo: Mike Castle

next phase of planting native pollinators. Planting began with a work party on March 26th. Over the course of the next three weeks, we planted about 800 Nootka, prickly wild and Woods' roses, Indian plums, woolly sunflowers, Douglas asters and nodding onions.

Additional invasive pull work parties took place in May, led by Alix Noble and Greg Leach, to remove bull thistle from the 'restoration hillock'. With the initial goals achieved, invasive removal was scaled back over the summer and early fall. Smaller scale work parties in July tried to pull the thistle, but by then it had become almost impossible due to the rock-hard soil resulting from the summer-weather dryness. A temporary solution was to cut the thistle down to prevent seeding and to leave the digging up of the roots until rain softens the soil.

Now, almost in December it is interesting to see the results of our work. With ongoing sprout removal, Scotch broom can be considered a thing of the past at New Brighton Park. Blackberry is coming back with a vengeance as

is the bull thistle. Another concern is the reed canary grass, which will require a major digging effort.

The roses and other shrubs seemed to have survived—to be confirmed next spring. Most of the pollinator perennials planted seem to have succumbed to the heat, the dryness and perhaps, most challenging, the 60 cm high grasses blanketing the hill.

Nigel Peck demonstrates the planting of a ten-centimetre-sized pot of a Canadian goldenrod plant, November 2022. *Photo: Sarah Chester*

Looking forward, there is huge potential for future restoration efforts. As of the end of November, there have been four thistle and blackberry pull work parties. In two late fall planting work parties, we planted 150 native roses, thimbleberry, Indian plum and red flowering currant. Additionally, 150 ten-centimetre-sized pot transplants of Canadian and European golden rod have been planted, as well as 50 four-litre-sized Douglas aster and 30 large-leaved lupine.

We are excited to soon install 10 bird nest boxes in the park for Tree Swallow and chickadee. This is particularly exciting, not only for enhancing nesting opportunities, but as a way to hopefully engage school groups in the annual cleaning and monitoring of nesting success of the boxes.

It is just one year since the New Brighton Park Restoration Project was proposed. We have accomplished an incredible amount and are looking forward to continued efforts and accomplishments. If this is as exciting for you as it is for everyone involved so far, please contact us to join the effort. It is worthwhile and extremely rewarding!

Kelly Sekhon

by Donna Underhill

Kelly is an invaluable member of Nature Vancouver (NV), but as much of his recent support is 'behind the scenes', this profile allows us to share the extent of his contributions over the past decades. The smooth functioning of the Board and communication amongst members is facilitated by Kelly; he updates the content on the Nature Vancouver website (including its events calendar, blogs and other postings), membership, bylaws and much more. Kelly has an amazing memory and this has made him a fine naturalist as well as a knowledge-keeper for NV. He has been a mentor to many members and has organized and led many field trips. Read on to learn more about Kelly, how his appreciation of nature grew and his contributions evolved over four decades with NV.

Kelly grew up in India. His father served in the Indian Air Force and that necessitated the family to move quite often within India. As a result, Kelly attended several schools in different parts of the country. Kelly was 10 years old when his father decided to leave the Air Force to help another member of the family look after a farm in the Terai region of India, located just south of the Nepal border. The farm was in a remote area close to the forest; tigers, swamp deer and wild boars often foraged in its sugarcane fields. Kelly attended high school near the farm and after graduation moved to Delhi, where, in 1972, he completed a master's degree in Economics from Delhi University. He then taught at a college for a couple of years. A major event followed: Kelly's cousin introduced him to Barbara, who was visiting India with her sisters (from her home in New Westminster, BC). Kelly and Barbara married and she sponsored Kelly to come to Canada in 1975 where they settled in New Westminster and still live. They have three daughters and three grandchildren. Family is important to Kelly; he now cares for his father who is living with them.

In 1982 Kelly noticed a photo in the Vancouver Sun with a group of Barn Swallows on a wire. The caption noted that the birds were getting together to fly south for the winter and would return to the north to breed the next summer. Kelly found that intriguing. He realized that it was Barn Swallows that were nesting under his carport roof, but until reading the newspaper article, he had only noticed the droppings on his car!

Kelly's interest in natural history had been sparked, so the next

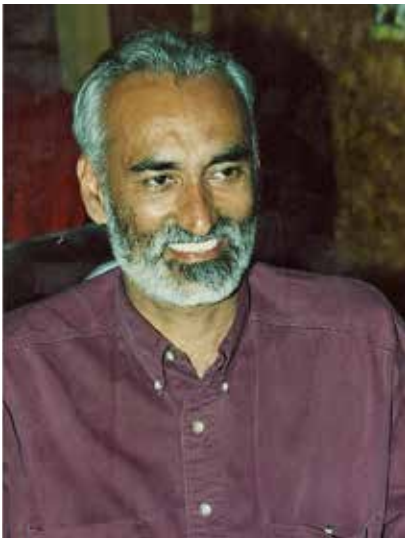
NV Nature Tour to Alberta, 1994, observing the Piping Plover. Margaret Bear is standing beside Kelly, while Bill Merilees looks through the scope. *Photographer unknown*

spring he signed up for a one-day "Introduction to Birdwatching" through Douglas College led by Keith Hobson (a NV member). Kevin Bell, the NV President at the time, came along and brought old copies of *Discovery*. The bird course took them from Burnaby Lake to Iona Island, then to Ladner Harbour Park, ending at Roberts Bank, Tsawwassen. There they saw Caspian Terns and heard them calling as they were diving for food. These terns had only recently been seen in Vancouver as their range was expanding north. Kelly can still recall that day, hearing their distinct call and learning to identify them by sound alone. He also remembers seeing several species of ducks and shorebirds at Iona Island and, at Ladner Harbour Park, a Black-headed Grosbeak and a Bullock's Oriole. It was a memorable day for Kelly—he realized he had never even noticed the common birds of our city.

Kelly recalls that after that memorable day of birding, he sent in his membership and joined NV in 1983; then participated in almost every birding trip that was scheduled. Two or three years after joining, he went on some alpine hikes that piqued his interest in wildflowers and botany. That led him to become Chair of the Botany Section (1989) where he initiated the monthly Botany section evening programs. Soon there were bus tours to various destinations to see birds and wildflowers, and Kelly

took a leadership role with these too. Kelly has been leading hiking, birding and botany field trips since 1987. A well-known annual trip led by Kelly is the New Years' Day walk along Sturgeon Banks, followed by a celebratory lunch at a nearby restaurant. Kelly served as President of Nature Vancouver from 2002 to 2004. Kelly was presented Nature Vancouver's Ney Award in 1993, the Garibaldi Award in 1994 and the Kay Beamish Award in 2021.

Kelly, along with Bill Merilees and Audrey Viken, conceived the idea of a program of educational nature tours which they would lead for NV on a completely volunteer basis. (See 2022 photo of this threesome in Merilees Celebration account, p. 31). They started organizing these tours in 1990. Twelve years later, 54 trips had been undertaken, ranging from as far south as the Grand Canyon to the Alaska Highway in the north, east to grasslands of Alberta and Saskatchewan and west to Haida Gwaii. More than 1100 people participated in the NV-sponsored Nature Tours, and the money raised was staggering, in the order of $115,000. The surplus funds generated by these tours were used for habitat acquisition and preservation. Several thousand dollars were contributed to The Nature Trust of BC, the World Wildlife Fund and to the purchase of Burns Bog and Codd Island Wetlands. A percentage of the profits went to NV's Special Project Fund (includes printing publications) and to the Endowment Fund. The Society has gained greatly, not only from this huge contribution of money, but also from the equally huge amount of time so selflessly volunteered by Kelly, Bill and Audrey, who made all these trips happen. In recognizing the huge dollar contribution towards nature conservation, the immediate benefit of these nature tours must not be forgotten—the joy in sharing knowledge of nature and friendship by the 1100 plus participants who joined in these 54 trips.



NV Nature Tour to Haida Gwaii, 1996. *Photo: Jane Siska*

In 1996, Jaideep Mukerji, who had just moved to Canada, was looking for tour leaders to lead trips to India for his company, Peak Adventure Tours. He contacted one of the people in the Botany Section at Nature Vancouver and was told about Kelly. Leading these tours

Sikkim, India tour, 1999. Group includes NV members on left Terry Taylor, Rosemary Taylor and Janet O'Connor; on far right Dick Stace-Smith; centre-right in yellow blouse, Eva Nagy; Kelly in back centre-left. *Photographer unknown*

became an important part of Kelly's life from 1996 to 2014—notable too, were the many Nature Vancouver members who were lucky enough to be participants in these epic journeys to various parts of India. There were eight tours to India and one to Nepal, where participants enjoyed and learned much about birding, botany, wildlife and culture, and some even joined in trekking.

Countless members fondly remember the many outings they have taken with Kelly. Here are a few recollections.

Wally Kiel notes that with Kelly's organization, "We forged many long-term friendships while out on day trips to the Gulf Islands, Vancouver Island, the Lower Mainland and Mount Baker region. We would often celebrate with meals afterwards and share birthday celebrations and slide shows from trips abroad. The added benefit of this organization was that we came from varied backgrounds. Kelly was always patient showing native plants with the correct botanical terminology."

Janet O'Connor remembers her first outing with NV that was a birding event—Kelly was the leader. She enjoyed the day, but for some reason was unable to attend another outing for about a year. She was shocked at that outing when "Kelly greeted me by my name—my first introduction to his amazing memory! He never forgets anyone, or anything. Oh, except the time he remembered that he had forgotten his hiking boots three quarters of the way to Cathedral Lakes Park! (Luckily the fellow who ran the lodge had several pairs of his

own which fit Kelly.) Along with hundreds of others, I have been lucky enough to have had Kelly as our hike leader, bird and plant identifier, and friend. Along the way he has fostered a respect for nature and a desire to protect it, which is so sorely needed."

Bill Merilees wrote that what he always appreciated about Kelly was "his quiet confidence and that he was steady and down-to-earth." Audrey Viken, who co-led the Nature Tours along with Bill and Kelly recalls that, "in our 12 years of organizing trips together, Kelly was unflappable. His strength was in uniting people and after the trips, bringing them back to eat together again and share the slides and pictures of the trip." Audrey believes this was a really effective way to keep the memories alive and to keep the heart in the programs of NV.

NV hike along Cal-Cheak Trail, Brandywine Falls near Whistler, 1999. People (L to R): Leo Eutsler, Kelly Sekhon, James Chen, Jennifer MacKay, Eileen Pinkerton, George Bangham, Pat Wilson, Gloria Murray, Eva Nagy. *Photo: Ian Lane*

Cynthia Crampton comments, "Over the years, Kelly has offered walks through his neighbourhood of Queensborough, in New Westminster. This walk alongside the Fraser River, where the Fraser forks into its North Arm and its Main Channel, led by someone with deep roots in this community, is a field trip much anticipated and appreciated."

Pat Wilson recalls that "for years, despite all his commitments, Kelly found time to climb the BCMC trail up Grouse Mountain, often joined by me and others. He seemed to know all the regular climbers. I feel grateful to have shared many of Kelly's trips and hikes: India, Columbia River Gorge, Mount Baker and local hikes. Kelly was our 'walking encyclopedia' and patiently repeated the same information again and again to anyone who asked. My knowledge of Vancouver and environs is a direct result of Kelly's passion."

Harmony Meadows, Whistler, 2005. People from left side: Pat Wilson, Eva Nagy and Kelly. Stunning mauve flowers blooming are river beauty willow-herb (*Chamaenerion latifolium*), which was prolific along Harmony Creek. *Photo: Janet O'Conner*

In addition to his natural history knowledge and ability as a field-trip leader, Kelly has used his self-taught computer skills to produce and edit the *Vancouver Naturalist* (1999–2004) and the weekly e-News (2004–2012). He has been the Website Content Editor since 2008. During the past year, he has also been assisting with managing the membership database and the mailing lists for the weekly e-News and *Discovery* journal.

Every organization functions better through teamwork and NV is no exception. Kelly has been recognized with Nature Vancouver awards, but had not yet been profiled. We are happy to do so in *Discovery* at this time in your life, Kelly, while you are still able to contribute so much to Nature Vancouver.

Donna Underhill was born and raised in Vancouver (as Donna Stace-Smith). As a Stace-Smith, she was lucky to always be involved with Nature Vancouver; attending summer camps from the age of 5 or 6, as well as many local field trips. Donna completed her BSc in Zoology at UBC. After working as a Park Naturalist for ten years, Donna completed her MSc in Resource and Environmental Management at SFU. She owned her own consulting business, and worked on many interesting projects and publications throughout the Province. She has now retired, allowing her more time to enjoy nature and to volunteer with Nature Vancouver as a Board member and Membership Secretary, a position she is happy to share with Kelly Sekhon.

A Celebration of the Bill Merilees' Mollusc Donation to Beaty Museum

by Sheila Byers. Photos: Cim McDonald

Bill Merilees' gift of well-documented mollusc specimens (clams, snails, chitons, etc.) to the Marine Invertebrate Collection at Beaty Biodiversity Museum was recognized the evening of 26 October 2022. Invited guests included members of Bill's family; long-time world-travel friends; members of Nature Vancouver; enthusiastic snail-research students of Dr. Chris Harley, Director and Curator of the Marine Invertebrate Collection; and experienced divers who have substantially contributed to marine invertebrate education through publication of BC marine life guidebooks.

The social gathering honoured Bill, his donation and research efforts. All who attended appreciated the value of Bill's mollusc contributions for research; particularly, the value of attaining a better understanding of the poorly known micromolluscs of coastal BC.

See Bill's in-depth, descriptive article on his collection in *Discovery* 2021, 49:61–66.

Marine Snail Champions display case contrasts the giant Australian snail, *Syrinx aruana* with Bill's micromollusc, *Cythnia ?albina*. Bill suggested the idea for the display that was developed by the Beaty Exhibits and Design team of Derek Tan, Manager of Exhibitions and Lesha Koop, Mount Maker.

Left: Bill, Audrey Viken and Kelly Sekhon.

Below: Bill and June Merilees, Brian Herrin and David Main.

Golden Treasure at the Hoeya Head Sill in Knight Inlet

by Neil McDaniel

Co-editor Sheila Byers' Note: *Over the past decade, conversations, consultations and collaborations occurred between the Department of Fisheries and Oceans, Province of British Columbia and sixteen First Nations including stakeholder industries, communities and residents of Haida Gwaii, North Coast, Central Coast and North Vancouver Island. The outcome is a draft Marine Protected Area Network Plan for the Northern Shelf Bioregion (**https://mpanetwork.ca/**). The Northern Shelf Bioregion extends from the northern Vancouver Island (including Quatsino Sound) and Quadra Island/Bute Inlet on the inland waters, north to the Canada-Alaska border. The federal government's Network Action Plan is expected to be approved sometime in early 2023. This Network Plan proposes a series of marine protected areas to conserve key habitats, species and areas of cultural importance to First Nations—the Knight Inlet sill encompasses one such area. The Plan would support economic security in the region, with reduced ecosystem and biodiversity threats and greater resource sustainability.*

*The Hoeya Head Sill in Knight Inlet, the focus of the following article, lies within the southern part of the Northern Shelf Bioregion. McDaniel and fellow professional divers, photographers and biologists have submitted reports to DFO since 2013 to document their concerns and observations about impacts to sensitive benthic corals and sponges growing on the sill. These citizen science reports contributed to the scientific evidence included in the 2020 DFO Canadian Science Advisory Secretariat, Science Response Report #030, that invoked the designation of an Ecologically and Biologically Significant Area (EBSA) for the Hoeya Head Sill (**https://publications.gc.ca/**)*

In the 2020 assessment report, Hoeya Head Sill ranked medium to high in scores for specific criteria required to trigger an EBSA designation. (The EBSA criteria specifically for the nearshore feature of high tidal current that supply nutrients and oxygen, increase ecological and biological uniqueness, aggregations, productivity and biodiversity.) The EBSA designation would then instigate an increased measure of risk aversion through new management measures of human activities. Although there was strong support for EBSA designation, the 2020 report also stated that additional research and assessment was necessary for the Hoeya Head Sill area. That additional research and assessment resulted in the following announcement from Fisheries and Oceans Canada on November 1, 2022:

> Given evidence of damage from fishing gear at the relatively shallow Hoeya Sill site, we are engaging on potential commercial, recreational, and Indigenous fishing closures within the boundary site. The Department is seeking to proceed with potential closures at this site in advance of the 2025 target given the highly sensitive nature of the site as well as the imminent risk of irreversible damage from certain activities.

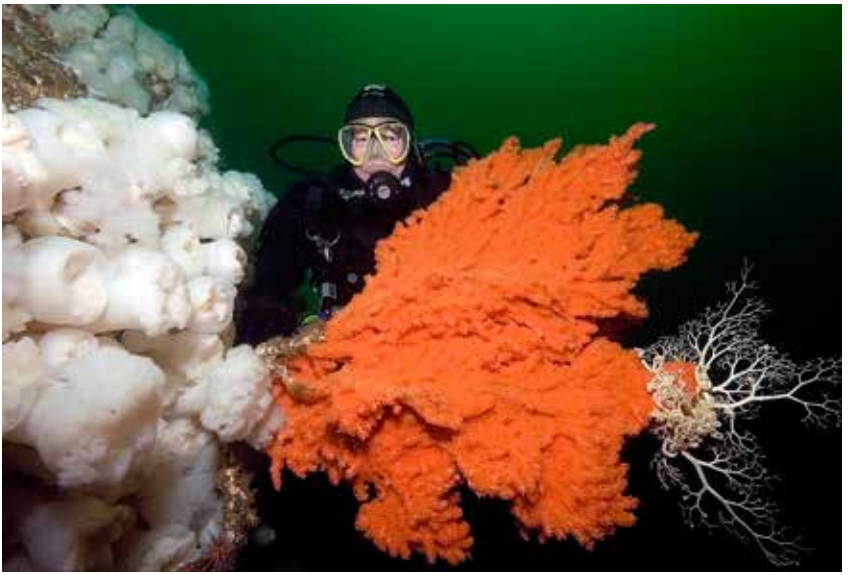
No specific date for implementation of these measures was given.

Read on for McDaniel's decade of dive experiences and observations at Hoeya Head Sill.

Dive buddy Doug DeProy and I were 30 m deep and swimming hard into a slight current flowing eastward over the Hoeya Head Sill in Knight Inlet, a long and narrow fjord on the south mainland coast of British Columbia. Our bulky neoprene drysuits, while providing essential thermal protection from the bone-chilling 8°C water, slowed our progress to a crawl. So far, the bottom before us had been a featureless expanse of sand and small cobbles with a few scattered feather stars and sea cucumbers. Both our scuba tanks and bottom time were running low and it was nearly time to call it quits on a disappointing dive. Just as we were about to head to the surface a massive black shadow appeared at the edge of visibility, what looked to be a van-sized boulder. As we got closer and aimed our powerful underwater flashlights, we saw it was bristling with brilliant orange gorgonian coral fans, the biggest about a metre across. I remember whooping in delight into my regulator, sharing a high-five with Doug, snapping a few photographs of him grinning behind the corals and ascending toward our decompression safety stop five metres beneath the surface.

The date was 24 June 2008, and that first encounter with the gorgonian coral *Primnoa pacifica* was one that I will never forget. Years earlier, in 1982, former Port McNeill teacher and dive instructor Ralph Delisle had visited the sill with Dave Wardell, photographing coral fans 30 m deep, but at the

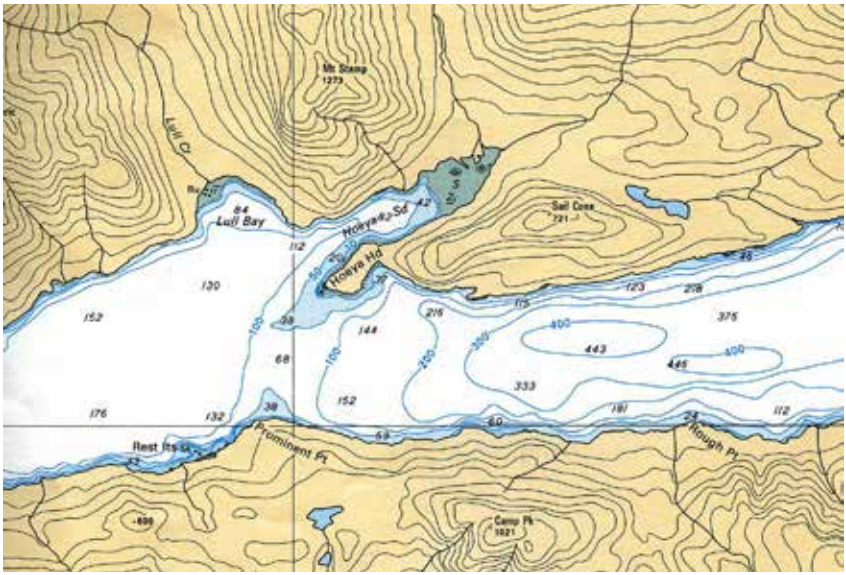
A school of dark rockfish (*Sebastes ciliatus*) hover near a thicket of *Primnoa* coral fans. *Photo: Neil McDaniel*



Gordon Brow poses behind a *Primnoa* gorgonian fan attached to a massive boulder resting on the summit of the Hoeya Head Sill. A basket star (*Gorgonocephalus eucnemis*) is perched on the tip of the fan, in a perfect position to capture passing plankton. *Photo: Neil McDaniel*

time they did not realize the significance of their remarkable find. For years I had mistakenly believed that *Primnoa* was only found far below diving depths. That changed in a second when Ralph e-mailed me his pictures over 26 years later. I immediately recognized it as *Primnoa* gorgonian coral, a marine creature I had never seen before in over 40 years of diving in BC.

The next morning, we once again piled our dive gear and cameras into Steve Lacasse's (SunFun Divers) boat in Port McNeill for the two-hour journey to the sill, winding our way through a maze of islands and passages. Andy Lamb, Phil Edgell, Jackie Hildering and Markus Kronwitter rounded out our dive group. Once at the sill we descended off Hoeya Head and followed the bottom further west, hoping to find a larger boulder field. Andy Lamb and I worked our way against the flooding (incoming) tidal current, eventually encountering scattered boulders with small coral fans attached. We noticed that in some cases the fans were oddly bent, evidence that they had tipped their host boulders over and were now growing vertically to capture the plankton-rich currents. As Andy and I followed the boulder field inshore, both the size of the rocks and the coral fans increased, with some of the biggest fans up to 1.5 m across. We found coral fans all



BC Hydrographic Chart shows the location of the Hoeya Head Sill, traversing the narrow inlet between Hoeya Head and Prominent Point. This is the area where *Primnoa* thickets are most abundant.

the way up to a depth of 12 m, which was extraordinary for what I had once considered a "deep-water" gorgonian. Most of the fans that we observed were uniformly an orange-pink colour with very wiry, tough and dense branches.

In order to confirm its identity, a sample of the coral was sent to the Smithsonian Institution for examination. Dr. Stephen Cairns, an expert in the taxonomy of corals, confirmed that the specimen was *Primnoa pacifica* Kinoshita, 1907. This species had been previously collected in BC from the Strait of Georgia (attached to a cable recovered from a depth of 350 m) by Colin Levings and I in 1974 and deposited as USNM catalogue #57980 (Cairns and Bayer, 2005).

Coral Research in Knight Inlet

Knight Inlet is a twisting, extremely long coastal fjord, extending 120 km inland from its entrance located 240 km northwest of Vancouver, near the north end of Vancouver Island. Despite a maximum depth of 540 m, it features a relatively shallow sill lying between Hoeya Head and Prominent Point, that has a maximum depth of only 65 m. Due to the shallow depth of the sill, tidal currents in its vicinity frequently exceed 1 m/sec. The Hoeya Head Sill has been of particular interest to oceanographers as it creates internal gravity waves and other hydraulic phenomena (Thompson, 1981). As a result, university and federal government scientists have undertaken several surveys of these features.

Back in the early 1980s researchers probing the depths of Knight Inlet on the central BC coast with the mini-submarine *Pisces IV* encountered large fans of gorgonian coral on the deep slopes of the sill. Impressive fans colonized boulders large and small resting on the sand and gravel. The fact that this coral was present was fascinating, but the scientists observed something else extremely curious. They noticed that there were long drag marks behind some of the boulders, suggesting that when the coral fan on a particular boulder became large enough it acted like a sail in the strong tidal currents. This was thought to gradually transport the boulder until it was removed from the influence of the current or until the fan caused the boulder to tip over, thus spilling the "wind" from the sail created by the fan.

Primnoa pacifica has also been found in very shallow water in Glacier Bay and Holkham Bay, Alaska. In 2003 these gorgonians were observed during scuba-diving surveys as shallow as 9 m deep. Researchers suggested that low temperature, stable salinity and low ambient light levels encouraged *Primnoa* to colonize the rocky drop-offs. Since there is an accurate record of the deglaciation of Glacier Bay, they were also able to estimate the growth rates of these corals at 2.4 cm/yr, a significant figure to know when trying to determine the time it might take for damaged corals to recover.

Primnoa Distribution, Size and Age

Primnoa pacifica ranges from the Sea of Japan eastward across the Aleutian archipelago and south to La Jolla, California, generally at depths of 64 to 800 m. Off the BC coast, it appears to be widespread and attains considerable size, with the biggest fans reaching more than 2.4 m tall. The highest densities are found in areas of moderate to high tidal currents. Despite its strong holdfast and wiry, flexible branches, *Primnoa* gardens can be seriously damaged by mechanical fishing gear. *Primnoa* is easily the largest coral found off the Pacific coast—in the Gulf of Alaska a gigantic specimen 7 m tall was reportedly observed during a submersible dive. I've seen some enormous gorgonian fans on tropical Pacific reef drop-offs that would rival this, but not many.

The 2009 *Finding Coral Expedition* by the Living Oceans Society searched for *Primnoa pacifica* off the BC coast utilizing two Nuytco *DeepWorker* submersibles. They discovered extensive deep-water coral thickets near Dundas Island, in Portland Canal and in Juan Perez Sound.

In very large specimens of *Primnoa* the main stem can exceed 6 cm in diameter. Cross-sections reveal that the skeleton is densely calcified and exhibits growth rings much like a tree. These annuli can be counted; age has been verified using radiometric methods in *Primnoa resedaeformis*.

A cluster of large *Primnoa* fans at a depth of 40 m on the flank of the sill. Each of these fans is likely 50 to 100 years old. *Photo: Neil McDaniel*

A dead branch of *Primnoa pacifica* approximately 1 m tall and with a maximum diameter of 6 cm was examined by Allen Andrews who determined that it was 80 years old. He estimated a basal radial growth rate of 0.33 mm/yr.

Some gorgonian corals reach astounding ages and rank among the oldest living creatures on our planet. Using submersible vehicles, researchers from Texas A&M University have discovered beds of *Leiopathes* sp. at 366 m off the coast of Hawaii that were carbon dated at 4,265 years old. Our BC large gorgonians, such as *Paragorgia*, *Primnoa* and *Calcigorgia* are apparently nowhere near as ancient, although 2 m tall specimens of *Primnoa* are estimated to be up to 120 years old.

The gorgonian corals (Order Gorgonacea) are just one group of cold-water corals found off Canada's west coast. This broad category also includes hydrocorals (Order Anthoathecatae), black corals (Order Antipatharia), sea pens (Order Pennatulacea), cup corals (Order Scleractinia) and soft corals (Order Alcyonaria)—a total of 61 species by most recent counts. About a third of these creatures can be observed by divers while the balance are found in deeper water, down to 6,100 m in some cases, although the majority of species are found between 180 and 1,830 m on the continental shelf. In Alaska, which has more than 55,000 km of coastline, 70% of the US continental slope and plenty of deep, cold water, the diversity of corals is much higher—141 species at last count.

Sensitive Coral Habitats

Cold-water corals, especially the gorgonians, often dominate deep-water habitats, forming complex thickets that create important refuges for fishes and mobile invertebrates. Their significant size and vertical orientation provide habitat with three-dimensional complexity, creating shelter for rockfish and other benthic species, protection from strong currents and predators, and feeding and spawning areas. Unfortunately, these fields of corals are threatened by commercial fisheries such as trawling and other bottom-contact fishing methods.

In bottom trawling or "dragging" a pair of massive steel trawl doors connected by heavy chain and fitted to a mesh net are towed over the seabed like a gigantic scoop, crushing corals and sponges and swallowing everything in their path. While the targeted species include flatfishes, hake and pollock, the indiscriminate and devastating nature of this fishing method causes extensive collateral damage. It is estimated that bottom trawling has already destroyed 50% of the continental shelf coral gardens off BC, despite Fisheries closures that ban trawling in specific areas. Between 1996 and 2002 fisheries observers in BC waters reported that more than 41,000 kg of corals and 72,600 kg of sponges were torn from the seafloor and discarded, ironically described as "bycatch". In Alaskan waters the

This *Primnoa* coral branch has been broken off a larger fan. The polyps will soon wither and die as they are no longer subject to the currents that supply plankton. *Photo: Neil McDaniel*

situation is far worse: between 1997 and 1999 the National Marine Fisheries Service estimated that 454,000 kg of corals and sponges were destroyed in the Bering Sea and Aleutian archipelago, 90% due to bottom trawling. Because the devastation caused by this fishery occurs unseen hundreds or thousands of metres below the surface of the sea, few of us know it is happening. Deep-water surveys to map the distribution of these precious coral beds and ban destructive bottom fishing in these locations should be a top priority; but given the huge seabed off Canada's west coast, it's a daunting task.

In BC inshore waters, bottom-contact fisheries such as commercial prawn trapping also cause serious damage to gorgonian corals and delicate glass sponges. The baited steel traps are attached to long lines which are lowered to the bottom and allowed to sit for several hours while the bait attracts spot prawn (*Pandalus platyceros*). Coral and sponge damage occurs when the fishing gear is deployed or raised as the traps and lines snag on the coral fans and sponge structures, wrenching them off the rocky seafloor.

The complexity and significance of the deep-water corals of our oceans are only beginning to be understood. Modern technology, including deep-diving submersibles and remotely operated vehicles, have transported us ever deeper into the vast unexplored reaches. In British

These two fans have been damaged by fishing lines and have been broken free of their attachment to the boulders. The feeding polyps are gradually dying. *Photo: Neil McDaniel*

Columbia and Alaska, scuba divers are lucky enough to be able to catch a glimpse of some of these impressive cold-water corals in shallow water, but we cannot continue to ignore the destruction caused by bottom-contact fishing practices.

Protection for the Hoeya Head Sill is Urgent—But When will it Happen?

Since 2008, I have made nearly a dozen expeditions to Knight Inlet to document the density and distribution of gorgonian corals and sponges within scuba-diving depths. In 2014 biologist Doug Swanston and I summarized our observations and compiled a comprehensive species list of macro-invertebrates, fishes and marine mammals. In addition to the spectacular gorgonian corals, we also documented rare deep-water sponges, nudibranchs, sculpins and sea stars at unusually shallow depths.

This information was shared with Fisheries and Oceans Canada with the goal of creating a protected area at the sill, as part of a proposed Fisheries and Oceans Marine Protected Areas Network for this part of the BC coast. The Mamalilikulla First Nation subsequently proposed the site as part of a larger MPA candidate. Even with that support, any enabling federal regulations would not likely be instituted until 2025, at the earliest. Until then the sill is open to bottom-contact fisheries such as the commercial prawn fishery, which generally occurs during May and June each year in that region. With the prospect of federal formal protection for the Hoeya Head Sill still a few years away, there is an urgent need to establish immediate interim protection.

On 29 November 2021 the Mamalilikulla First Nation declared the Gwa̲xdlala/Nala̲xdlala (Lull Bay/Hoeya Sound) area in Knight Inlet an Indigenous Protected and Conserved Area (IPCA). The intent is to take a co-governance role in the planning, use, management and restoration of their traditional lands and waters, and to expedite interim fisheries protection of the sill. The 10,416 h IPCA contains rare sponges and gorgonian coral thickets of high biodiversity, critical estuaries and salmon-bearing streams. A number of historical Mamalilikulla settlements and associated cultural and archaeological sites are also found within the IPCA. While the Mamalilikulla efforts to negotiate co-governance with Canada and British Columbia may take time, the First Nations continues to lobby Fisheries and Oceans to provide some interim protection for the area.

The Mamalilikulla First Nation held a community dedication ceremony at Hoeya Sound on 5 May 2022. Chief John Powell spoke to the guests, saying,

> *If there is one disappointment we currently share, it is the inability to attract any dialogue with*

Mamalilikulla Chief Councillor Winidi (John Powell) speaks at the community dedication ceremony held 5 May 2022 at the Lull Bay/Hoeya Sound Indigenous Protected and Conserved Area. The yellow cedar headpiece is unique to the Mamalilikulla First Nation; the bone images represent the four Mamalilikulla clans. *Photo: Brodie Guy*

Fisheries and Oceans Canada. One of our challenges to DFO was to provide some immediate protection to the well-documented underwater coral and sponge gardens that are growing at the Hoeya sill in our IPCA. We have had to appeal to the commercial prawn fishery sector for a voluntary avoidance of this area during the commercial prawn fishery, which coincidentally opened today for this area. Our law of Aweenak'ola obliges us to protect these underwater creatures from irreversible destruction and damage, and we will do everything possible to achieve that protection.

In spite of these efforts by the Mamalilikulla First Nation and concerned marine biologists, the fate of the *Primnoa* gorgonian corals and sponges at the Hoeya Head Sill is still in limbo, neither acceptable nor a solution. The sill is home to an extraordinary marine treasure that must be fully protected without further delay. The

Performing the welcome dance at Hoeya Sound, 5 May 2022.
Photo: Brodie Guy

Hoeya Head Sill in Knight Inlet is the only place in Canada where *Primnoa* gorgonian corals and rare sponges are found in such profusion in shallow water. However, it seems that because these magnificent creatures are hidden from view beneath the surface of the ocean, they do not get the respect that they deserve. It is long past time to correct that.

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This rare, soft goblet-shaped sponge (*Amphilectus digitatus infundibulus*) is normally found in deep water. At the Knight Inlet Hoeya Head Sill, it can be found as shallow as 10 m. *Photo: Neil McDaniel*

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Note: Neil has included a total of 21 references for this article of which only seven are listed above. Please contact the *Discovery* Editors through the Nature Vancouver website ***http://naturevancouver.ca/contact/*** to gain access to all 21 references.

Neil McDaniel has been photographing marine life since 1969, when he learned to scuba dive while completing a degree in marine zoology at the University of British Columbia. After graduation, he worked at the Pacific Environment Institute in West Vancouver and later became the editor of DIVER Magazine. Neil has an avid interest in the natural history of BC's coastal marine life and is a freelance photographer and cinematographer, working primarily on nature documentaries.

Glass Sponge Reef Protection Falters—Will Reefs Survive?

by Sheila Byers

With my fifteen years of commitment to the Marine Life Sanctuaries Society (MLSS), whose primary focus is the protection of rockfishes and glass sponge reef habitats in Átl'ka7tsem/Howe Sound, I now better appreciate why it takes so long to make changes. By no means am I providing excuses for lack of action by government agencies on whom the primary responsibility rests, but it takes time to obtain the science-based justification to introduce conservation management measures. As such, time, energy and the will to persevere underlie the major costs required to achieve conservation of our natural habitats by all stakeholders, whether government agencies, research scientists, citizen scientists or the public. Conservation 'wins' do happen, albeit slowly.

McDaniel's article in this *Discovery*, "Golden Treasure at the Hoeya Head Sill", describes 14+ years of citizen science efforts to pressure DFO into action. The good news from the federal government announcement (1 November 2022) is that protection of Hoeya Head Sill is promised for some time in 2023. Hoeya Head Sill area is one of the Ecologically and Biologically Significant Areas proposed as an MPA. Realistically, the time to design and implement the MPA network management plans in the Northern Shelf Bioregion will likely not be in place until 2025. The hope with this DFO announcement is that the Hoeya Head Sill will potentially be closed to commercial and recreational fisheries within the boundary site in 2023—before the prawn season opens, usually in May or June.

The destructive damage to the *Primnoa* corals and glass sponge structures growing on Hoeya Head Sill is not unlike the destructive damage that continues within DFO-protected Marine Refuges for eight Glass Sponge Reefs (GSR) in Átl'ka7tsem/Howe Sound. Damage to both the *Primnoa* coral and GSR benthic habitats are most likely caused by bottom-contact prawn fishing traps and lines by both recreational and commercial fishers. The GSR Marine Refuges and five subsequently designated GSR Fisheries Closures (2019 and 2022, respectively) supposedly provide protection. Why are the GSR protective measures not working?

In last year's *Discovery*, the continuing damage to the sensitive benthic habits of the GSRs in Átl'ka7tsem/Howe Sound by illegal bottom-contact fishing activities was described (issue 49: 83–90). The response from the Honourable

Bernadette Jordan, then Minister of Fisheries, Oceans and the Canadian Coast Guard on 11 August 2021 to the MLSS letter submitted on 6 July 2021 was disappointing, yet predictable.

However, positive news from DFO was received, 15 February 2022; this indicated that there **may be** two additional Fishery Officers hired to enforce and monitor the expansive coastal conservation areas in the Salish Sea Fisheries Management Areas 28 and 29: Howe Sound to Vancouver to Indian Arm; Sechelt to Steveston (including Tsawwassen) to Thrasher Rock (off Gabriola Island) and Galiano Island. These two fishery officer positions, however, will not be in effect until 2023. There is no guarantee that the officers' time commitment will be dedicated strictly to Howe Sound Area 28; nor, to providing coverage for full 24-hour shifts as unfortunately violations and infractions are likely occurring around the clock.

Within just one area of the Sound, MLSS witnessed and reported to DFO 78 infractions and violations within GSR Marine Refuges from 13 February 2022 to 2 May 2022, the period prior to the May prawn season commercial opening. The level of infractions and violations within protected areas continued through the 2022 prawning season and into the Fall with observers reporting infractions to DFO from elsewhere in the Sound. In other words, no one including DFO, has any idea of the true size of the problem, other than that it's BIG. It is unconscionable to think that we are allowing this physical damage to continue at the very real risk of seeing a complete collapse of sensitive GSR ecosystems in Átl'ka7tsem/Howe Sound—world-class treasures unique to BC and Canada.

Persevering, MLSS sent off another email to the new Minister of Fisheries, Oceans and the Canadian Coast Guard, Honourable Joyce Murray on 23 May 2022. A request to meet in-person was not granted. The letter focused on the MLSS recorded bottom-contact fishery infractions within the GSR Marine Refuges in Átl'ka7tsem/Howe Sound. Fifty-eight stakeholders, including government employees, were copied on that letter.

A good-news response was received from Honourable Joyce Murray on the 16 September 2022. Among more rhetoric of accomplishments of which MLSS was already aware, the response stated progress over the summer month. DFO's Conservation and Protection (C&P) Branch is responsible for enforcing the Fisheries Act, the Oceans Act, and other mandated legislation and regulations, including bottom-contact fishing closures. With all the infractions and violations reported by MLSS and other observers, it was satisfying to see that in May 2022, a DFO C&P investigation resulted in a $40,000

A healthy, pristine GSR at Halkett, Átl'ka7tsem/Howe Sound in 2020.
Photo: Adam Taylor

fine issued for illegal prawn fishing in 2019 within a protected area of Howe Sound. Another 2022 conviction, for illegal prawn fishing within a protected area in 2020, resulted in an $18,000 fine. Note that, unfortunately, two to three years is the timeframe required to process these convictions in court. But at least the enforcement actions are ramping up with significant fines to hold those responsible for the damage accountable. It may be that the designation in 2021 of the UNESCO Biosphere Reserve for Átl'ka7tsem/Howe Sound, is helping to focus the federal government's attention on this area.

Increased funding to C&P has enabled utilization of more technology to monitor for regulation compliance, e.g., fisheries aerial surveillance enforcement aircraft and remotely-operated vehicles. A focus on education and outreach has engaged local Indigenous communities and stakeholders. Recently, one large sign, visible from the water, has been installed to notify boaters about the Átl'ka7tsem/Howe Sound GSR protected areas and fishery restrictions. Additional signs are proposed.

These steps forward are encouraging but not sufficient to halt the fishery violations that are likely to continue into 2023. On 5 December 2022, MLSS sent a letter of support to the Honourable Joyce Murray to address the failure of DFO to protect GSR Marine Refuges and GSR Fisheries Closures in Átl'ka7tsem/Howe Sound, BC. This letter was undersigned by 19 stakeholder ENGOs and individuals. MLSS is imploring DFO to invoke increased protection of these GSRs 'as soon as possible'—definitely prior to the opening of the 2023 prawn season.

The same Halkett GSR from a different perspective, sadly showing that by 2021 it had been completely destroyed. *Photo: John Kaay*

Currently, DFO is organizing a Public Engagement Workshop for stakeholders to consider a Glass Sponge Reef and Rockfish Conservation Area (GSR-RCA) Alignment Project. Proposed changes are to amend already established fisheries closures (RCAs, GSR Marine Refuges, GSR Fisheries Closures) in Átl'ka7tsem/Howe Sound specifically to reduce public confusion on the water, improve compliance and enforcement, improve education and awareness for GSRs and RCAs, as well as several other objectives to refine management efficiency of current GSRs and RCAs.

These DFO conservation and protection efforts of the *Primnoa* coral and GSRs are timed to support Canada's Marine Conservation Target to conserve 25% of marine and coastal waters by 2025. Time is of the essence, however, for the GSRs. Without immediate increase in enforcement, there is a **VERY HIGH RISK** of additional damage to the GSRs and a complete economic and ecological collapse of these valuable, healthy and productive GSRs. It is our duty as citizens of Canada to protect these reefs.

Sheila Byers is a Registered Professional Biologist and marine biologist, President and Past President, Vice-President and current Director-at-large of MLSS since 2007. She has been a member of Nature Vancouver and a Planning Committee member of the Marine Biology Section since 2002. Sheila is the Curatorial Assistant of the Marine Invertebrate Collection at the Beaty Biodiversity Museum, UBC.

The Pacific Yew, with Examples from the North Shore

Article and photo by David Cook

The Pacific (or Western) yew, *Taxus brevifolia*, is an evergreen conifer tree. However, it looks rather scrubby, is slow-growing and its appearance is like a large shrub that usually reaches up to 15 m and has a trunk diameter of up to 50 cm. Consequently, it is an understory tree in our forests. Its distribution is throughout western North America from southernmost Alaska south to Northern California, mostly in the Pacific Coast Ranges but with an isolated population in south-east British Columbia to northern Idaho. In rare instances, trees with heights in excess of 20 m occur in parks and other protected areas.

Features that identify *Taxus brevifolia* are its small size, shabby/scrubby appearance, red to purplish thin bark which is scaly to shreddy and a trunk that resembles a series of trees fused together, known as fluting. In addition, its needles are sharply pointed and flat. Small spirally-arranged branchlets, known as epicormic branching or water-shoots, grow from its trunk. A fleshy, red, berry-like female cone with a hole at its top is known as an aril.

The Pacific yew has a fairly short lifespan of 200 to 300 years and a narrow girth, unlike the English or European yew (*Taxus baccata*) which can reach a great age of up to 5000 years and a girth of 4 m. The heartwood of the English yew may rot away with the sapwood splitting, forming what appears to be a ring of multiple trees. The yew is mostly dioecious (i.e., male and female cones are on separate trees), but occasionally individual trees can have both male and female cones (monoecious), or change sex with time.

World-wide, there are other yew species with many cultivars. However, all yews are very closely related to each other, and some botanists treat them all as subspecies or varieties of just one widespread species. Under this treatment, the species name used is *Taxus baccata*. DNA sequencing has attempted to unravel the closely related species.

The Pacific yew is widely, yet sparsely, dispersed throughout the forest and this can give the impression that it is a rare species. Its succulent female cone (aril) is dispersed by birds which eat the fleshy non-toxic outer layer and defecate the single toxic seed. An example of its wide dispersal is in Lighthouse Park, where only one yew tree is known. However, there are a few examples elsewhere in our North Shore mountains where small yew groves have developed around a female tree when the fruit drops to the ground. An accessible example

Pacific yew on the west bank of Mosquito Creek, above the crib dam and above Montroyal Boulevard at the southern end of the Mosquito Creek old-growth area.

is on a skid road diversion up the Mosquito Creek trail at 650 m elevation just before the large area of old-growth western redcedars.

All parts of the tree except the flesh of the female fruit or cone contain taxine, a combination of at least 11 alkaloid poisons which causes neurological damage resulting in convulsions, muscle fasciculations and paralysis. According to one study, a dose of 100 gm of chopped leaves could kill an adult. Even mushroom species growing near a yew, which would be edible under normal conditions, are likely to contain the poisonous alkaloids from the yew. In Europe, *T. baccata* yew poisonings are relatively common in both domestic and wild animals that consume the plant accidentally, resulting in numerous fatalities in livestock. It is not harmful to moose, elk and deer. Yew sawdust is highly toxic to some people, causing breathing difficulties, sneezing fits and dermatitis, especially swelling of the hands.

The English yew has an ancient association with death, but also long life in the Celtic and Pagan cultures of Europe. However, this association has not developed amongst the First Nations of North America. Europeans have transported the long-life concept

to Canada where churches and graveyards often have the English yew or even the native Pacific yew in their landscaping.

Both the English and Pacific yew have a habit where the inner heartwood rots due to fungal infection, creating hollow forms such as the yews in Capilano Regional Park near the fish hatchery. This makes aging the tree by increment boring impossible. The outer sapwood, however, is dense, hard and strong, resistant to fungal attack.

The yew has a remarkable ability to regenerate. Loggers in Canada had no use for the yew and usually swept it aside during their operations. Even though uprooted, many of these trees were able to survive by re-rooting. With roots completely separated from the soil, yew can still regenerate by re-rooting any branches that may be touching the ground. A notable example of the former is an apparently old-growth tree above the steep western bank of Brothers Creek, along the Brothers Creek trail at 568 m elevation on the North Shore.

The yew also has a noteworthy medicinal property. In the 1960s the National Cancer Institute (NCI) funded researchers in Canada who discovered the compound paclitaxel from the yew; this later became the cancer drug Taxol. However, clinical trials were delayed because of how slowly Pacific yew trees grow and the large amount of bark needed to produce a dose of the active ingredient. As well, the ecological cost was too high, as harvesting the bark kills the tree.

In 1991 NCI partnered with Bristol-Myers Squibb for the commercial production of Taxol using a semisynthetic form of the compound. A year later, the Food and Drug Administration approved Taxol for treatment of ovarian cancer and in 1994 for the treatment of breast cancer. A clinical trial found that 30% of patients with advanced ovarian cancer responded positively to Taxol treatment.

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David Cook has served on the Nature Vancouver Board, chaired the Botany Section for 10 years, revived the Geology Section, written articles and given presentations. He has led many field trips in botany and geology, as well as his programs "Reconnecting with Nature". For the last seven years, David has documented the ecology of a large area of old-growth forest in West Vancouver and recently submitted his findings in a report to the West Vancouver Parks Department, recommending protection as a Conservation Area.

Contributions of BC Mountaineers to Nature Vancouver

by Michael Feller

An advertisement for a talk in summer, 2022, about the history of protection of the Stein Valley, contained some misleading information. This led to the suggestion that it would be worthwhile documenting for current Nature Vancouver members, the major contribution BC mountaineers have made not only to Nature Vancouver itself, but also to the protection of BC's biodiversity. Much of this information can be found scattered in several history publications, such as the excellent history of the *Vancouver Natural History Society, 1918–1993* by Jim Peacock, the BC Mountaineering Club's *100 Years of Mountaineering 1907–2007* and Nature Vancouver's *A Hundred Years of Natural History 1918–2018* by Fisher and Solecki. Additional

Photo 1. John Davidson in Black Tusk Meadows, Garibaldi, c.1914. Attached to top of front tent pole is a plant press. *Photo: John Davidson (Davidson fonds, CVA 660-26, City of Vancouver Archives)*

information is provided in guidebooks, such as the early editions of David and Mary Macaree's *103 Hikes in Southwestern British Columbia* or Gordon White's *Stein Valley Wilderness Guidebook* (1991).

John Davidson, who emigrated from Northern Scotland in 1911, was the founder of the Vancouver Natural History Society (VNHS, now known as Nature Vancouver) in 1918 (Photo 1). Appointed the

Photo 2. Fred Perry dressed up in 'tongue-in-cheek' attire, to display his 'hunting' trophies in this 1916 photo, near a cabin on Grouse Mountain. If not readily apparent in the photo, here's the explanation: Fred did not like carrying guns on outings, but he did take seriously the responsibility for trapping mice in the cabin when the mice were eating the food supplies (mice seen hanging from line). *Credit: BC Mountaineering Club*

Provincial Botanist and charged with conducting a nature survey of BC, Davidson went into the Vancouver store of Bishop and Christie seeking maps of BC. There he met Joe Bishop, who was then president of the B.C. Mountaineering Club (BCMC). This lead Davidson to become heavily involved in BCMC trips and affairs. As a result of this involvement, botanical, geological and entomological sections were formed within the BCMC and Davidson was encouraged by BCMC members to teach botany classes.

One of his keenest supporters was Fred Perry, who emigrated from England to BC, arriving via the US in 1905 (Photo 2). Perry had been a botanical enthusiast who, in 1911, became the first person in charge of the BCMC's newly formed Botanical Section. Davidson's botany classes started in 1912. The group studied botany and went on botanical expeditions around the Lower Mainland. The Botanical Section of the BCMC grew and grew—to the point where its membership was larger than the active membership of the club. It also expanded beyond botany to include all organisms and environmental factors that influenced plants. Thus, in 1916, the Botanical Section changed its name to the Natural History Section, with Davidson as its leader.

Meanwhile, word of Davidson's classes spread beyond the BCMC and his audience greatly expanded to include various other groups, one of which was the University Women's Club whose members formed an Arbor Day Committee in response to Davidson's call for greater appreciation of trees. This committee became an Association in 1917 and then merged with the BCMC Natural History Section to form the Vancouver Natural History Society in 1918. Davidson (1957) considered that the VNHS had its inception in 1911 in the BCMC. To a large extent this can be attributed to the enthusiasm of BCMC members—Fred Perry in particular—in building up the Botanical Section of the club.

Perry is one example of the close ties between mountaineers and natural history enthusiasts. After Davidson formed the VNHS, Perry continued with the BCMC in the 1920s and became a major writer of natural history articles which emphasized flora. He continued writing prolifically for three decades, describing the flora of widely scattered parts of the province. Perry joined the Burrard Field Naturalists Club sometime in the 1920s and gave lectures in Vancouver on BC's flora, advocating its protection and opposing destruction by people. Perry's expertise included plant ecology. In this respect, in 1937 he described the zonal distribution of plants in BC (Perry 1937).

Although not new to science, it would be over 30 years before such concepts truly escaped the narrow

confines of academia to be used by politicians and land managers in BC. In the 1930s Perry would have been one of the extremely few non-academics to understand these concepts. In 2012 a modern update to Perry's work titled, *Plant Ecological Zones of B.C. for the Mountaineer* (Feller 2012), was published by the BCMC, using BC's Biogeoclimatic Ecosystem Classification system.

Having effectively created the VNHS, mountaineers were also heavily involved with running it and contributing in many ways. Kate McQueen, the first VNHS librarian, was described as "an avid mountain hiker" and was a member of both the BCMC and the Alpine Club of Canada (ACC). Bert Brink, a very major contributor to VNHS in countless ways, pointed out that one of the people who sparked his interest in the outdoors was his cub scout pack leader who was a member of both the VNHS and the BCMC. Another was Don Munday, a well-known mountaineer and member of both the BCMC and ACC. Brink noted that Don and his wife, Phyl, were both "naturalists and Don, particularly, was interested in so much of the natural world and possessed a deep conservation ethic" (Peacock 1993, p. 44).

The close ties between mountaineers and natural history enthusiasts is further exemplified in Brink's speech at the 50th anniversary banquet of the VNHS in 1968 when he acknowledged the very long-time VNHS members who were present. These included Preston Tait. Tait was trained as a chiropractor, but devoted his life to mountain exploration, studying natural history, photography and presenting illustrated lectures on these topics. He chaired the BCMC's Natural History section in 1932.

Writing about natural history and protecting it dominates VNHS/Nature Vancouver publications. Similarly, it is also prevalent in mountaineering publications of both the ACC and the BCMC where mountain flora, glaciers and climate change feature prominently. Since 2011, for example, the ACC has been producing a *State of the Mountains* report for Canada. The 100 years of ACC and BCMC journals (1908–2007) included 254 and 412 articles, respectively, dealing with natural history (Ricker 2009). A very prominent contributor in recent years to Nature Vancouver has been Terry Taylor who was also a BCMC member.

Hiking guidebooks used by Nature Vancouver members, such as the 103, 105, and 109 Hikes in Southwestern British Columbia books have been authored by BCMC members—the Macarees, Jack Bryceland, Stephen Hui, Alice Purdey and John Halliday; as have been the three books by Randy Stoltmann (*Hiking Guide to the Big Trees of British Columbia*, *Written by the Wind,* and *Hiking the Ancient Forests of British Columbia*

Photo 3. Chutine Lake BCMC summer mountaineering expedition in 1973 to the BC-Alaska border area where the trip focus was first ascents, but some of the group got waylaid by the small flowering plants, possibly tufted saxifrage. *Photo: Michael Feller*

and Washington), and *The Glorious Mountains of Vancouver's North Shore: A Peakbagger's Guide* by D. Crerar, H. Crerar and B. Maurer.

Summer camps (Photo 3) have been a feature of VNHS/Nature Vancouver, beginning in 1918, or even earlier in 1911, when they were run by the BCMC. Camp directors have included Norm Purssell (ACC member and VNHS president), Bob Harris (BCMC, North Shore Hikers, VNHS) and the well-known Mary and David Macaree (BCMC, VNHS and hiking guide-book authors).

Turning to conservation and protection of nature, mountaineers have often taken the lead to protect BC's biodiversity, beginning with the BCMC's efforts to establish Garibaldi Park. These efforts began in 1913 and culminated with strong support from other mountaineers from the ACC and the Seattle Mountaineers and Mazamas of Portland, Oregon, in the passing of the Garibaldi Park Act in 1927 (Ford 1957). During the early days of those organizing to form VNHS, the 1912 BCMC camp held in Garibaldi, inspired several members to work towards its protection. In 1928 following creation of this park, VNHS held its summer camp in Garibaldi.

Mountaineers have had a long association with Cypress Bowl, beginning in the 1920s when BCMC members were advocating for Hollyburn to be protected as a park. After the area was set aside as a Park Reserve in the 1940s, it was a BCMC trip to Cypress Bowl in the late 1960s which uncovered the commercial logging occurring there rather than logging just for ski runs. Bringing this to public attention facilitated the ultimate establishment of Cypress Provincial Park. Initially a "Save Cypress Bowl Committee" helped to stop old-growth logging in Cypress Bowl before Cypress Provincial Park was created. Mountaineers involved with this committee included John Beltz (Photo 4), who then went on in 1990 to found Friends of Cypress Provincial Park, whose first chairperson was fellow BCMC member Peter Goy. John Beltz was also active with VNHS and its summer camps. Friends of Cypress continues its important role advocating on behalf of the natural biodiversity of this park, with VNHS members filling several key board positions. Sadly, long-term president of Friends and VNHS member, Katharine Steig, passed away last year. The BCMC also proposed the creation of the Hollyburn Hikers Access winter trail in 1986, to allow free access to Hollyburn after the 'Ski-In' protest, at which John Beltz was arrested and

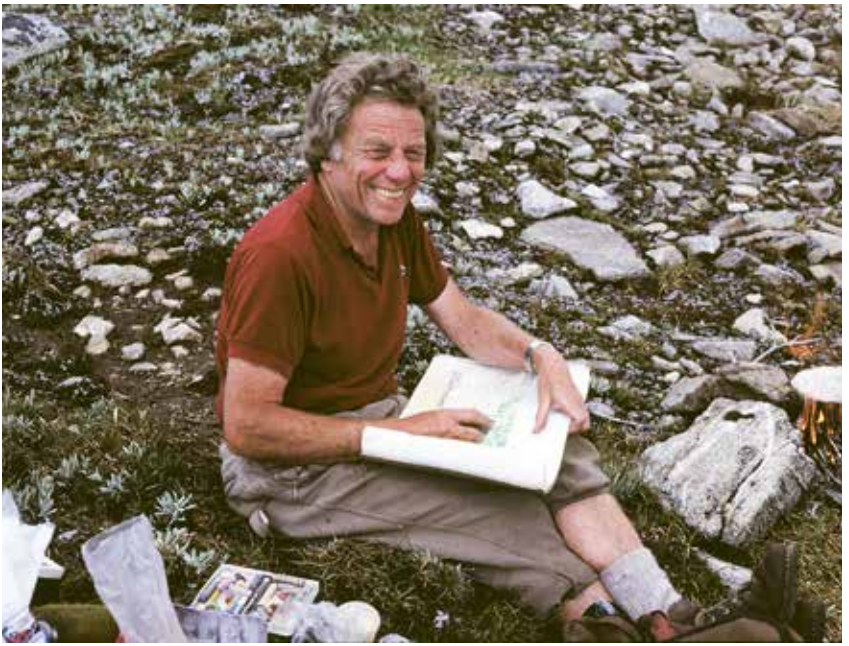

Photo 4. John Beltz at VNHS summer camp, 1981, alpine at Trophy Mountain area of Wells Gray. *Photo: V.C. (Bert) Brink*

driven off in a Snowcat by West Vancouver Police. This "Hikers Access" winter trail still provides free and unencumbered access to Hollyburn Mountain for the general public.

It is interesting to read an anonymous article in a BCMC newsletter published in 1932. It stated "Seven years ago it was possible to visit the peak of Hollyburn or Grouse and be alone; now it is impossible to be alone on Crown Mountain and not probable on any other North Shore peak. How will things be in another seven years?" We can now ponder this, 90-years later.

One of the key people on that BCMC trip that came across the commercial logging in Cypress Bowl was Ken Farquharson. He co-founded the Save Cypress Bowl Committee and was one of the founders of the Sierra Club of BC. He was the Secretary and Spokesperson for the Run Out Skagit Spoilers (ROSS) Committee which worked for 15 years to prevent the flooding of the Skagit Valley. He also worked on the BC government's Wilderness Advisory Committee in the mid-1980s. This committee helped to protect many significant parts of BC, including the Stein Valley.

Again, mountaineers have had a long involvement in protecting the Stein Valley. It was a mountaineer, Roy Mason, who first argued for protection of the Stein. Mason was a pilot who flew fellow mountaineers into the Stein and who was able to observe from the air what was happening in nearby watersheds. In 1973 he wrote to the government seeking protection of the Stein, pointing out that the Stein "is the only major valley in south-western B.C. that has not been logged, flooded, mined or otherwise altered from its natural state." His solitary attempts fell on deaf ears, so he decided to enlist support from fellow BCMC members who believed more widespread support from the Federation of Mountain Clubs of B.C. (FMCBC) would be desirable. The FMCBC took up the cause and helped establish the "Save the Stein Coalition" in 1977 with Roger Freeman of the FMCBC playing a major role; member organizations included the VNHS and Federation of BC Naturalists (FBCN). The Coalition convinced the then BC Forest Service to set up a Stein River Public Liaison Committee which was instrumental in stopping the construction of a mining road right through the middle of the Stein Valley.

The FMCBC's efforts led to publication of the first guide-book to the Stein, *Exploring the Stein River Valley* by Roger Freeman and David Thompson (1979). In addition, the FMCBC supported an economic analysis of potential logging in the Stein titled, "Wilderness or Logging: Case Studies of Two Conflicts in BC" by Trevor Jones. All this activity and publicity assisted the protection

cause, but the BC Forest Service announced logging plans in 1985. It was at this point that First Nations got involved, initially with a mixed response—some wanting employment from logging, others wanting protection of the entire watershed—soon leading the way towards protection. After many battles, political lobbying, and the work of the BC government's "Wilderness Advisory Committee," protection was secured in 1995.

Mountaineers have been very active in fighting for protection of many other areas in BC. Examples in southwestern BC are Tantalus, Pinecone-Burke, Tetrahedron and Chilliwack Lake provincial parks. Efforts by the mountaineers—Randy Stoltmann and John Clarke—have been exceptional. Both passed away far too young, but both were gifted adventurers, nature enthusiasts, environmentalists and communicators.

Stoltmann wrote prolifically about mountaineering expeditions, but also authored three books (titles named above). He became an expert on big trees in BC at a young age. He played a key role in the campaign to prevent the logging of the Carmanah Valley on Vancouver Island, which led to the establishment of the Carmanah Walbran Provincial Park in 1990. In May 1994 he was killed while ski-mountaineering in the Kitlope area (Great Bear Forest). The provincial government honoured Stoltmann after his death by naming the Randy Stoltmann Commemorative Grove in Carmanah Walbran Provincial Park after him. In addition, people working to preserve the Elaho Valley north of Squamish designated this area as the Stoltmann Wilderness.

Clarke (Photo 5) has probably been the greatest explorer of BC's Coast Mountains, having spent at least six months of each of 39 years on extended backcountry trips, making around 600 first ascents of the many mountains along the way. Many of these trips, usually solo, exceeded 30 days in length. Clarke was a good friend of Stoltmann and was profoundly affected by his death which left a hole in the mountaineering conservation community that Clarke stepped in to fill. In memory of Stoltmann, he began his wilderness education efforts, involving countless hours of illustrated talks, educating young people about the wilderness and its natural components. In 1996, Clarke and fellow ACC and BCMC member, Lisa Baile, founded the Wilderness Education Program. In 1997, Clarke, Chief Bill Williams (hereditary chief of the Squamish First Nation) and artist photographer Nancy Bleck founded the Uts'am Witness Project, providing an opportunity for city dwellers to reconnect with nature and to take part in a Coast Salish First Nations witness ceremony. In 1998, Clarke was honored by being adopted into the Squamish First Nation and given

Photo 5. John Clarke admiring old Douglas-fir, 1990s. *Photo: John Clarke Collection from BCMC files*

the Coast Salish name "Xwexwsélkn" which means "mountain goat". In July 2002, he became one of the few mountaineers in Canada to be inducted as a Member of the Order of Canada. He was also an honorary member of the ACC and BCMC. Sadly, he died from a brain tumor in 2003.

The preceding highlights from over a century show that mountaineers have played an important role in helping and shaping VNHS/Nature Vancouver and the close ties between the two groups. In recent years I have encountered a number of mountaineers at Nature Vancouver meetings and on Nature Vancouver trips, reinforcing this connection. It is timely to reflect on this quote from Fred Perry, active with the Botany Section over a century ago. In his article titled, "Mountaineers as Naturalists" (1953), Perry ponders: "The mere climbing of mountain peaks is a passing condition, and is a form of athletics that merely produces muscular stimuli; while an interest in the plants, animals, and insects, or the forces that make up the mountains stays with the traveler long after his climbing days are over."

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Michael Feller is a forest ecologist who is currently an emeritus associate professor in the UBC Department of Forest and Conservation Sciences. He has climbed mountains for over 55 years, mainly with the BC Mountaineering Club, being attracted to mountains primarily for aesthetic reasons and for their wilderness values. He served as the BCMC editor for 30 years, trying to encourage members to get more involved in protecting wilderness, and is currently the BCMC archivist. He is also a member of Nature Vancouver and particularly enjoys the bird walks.

Is the World Our Oyster?

by Susan Fisher

I CAME TO BIRDING late in life. I was already retired when I began to take it up as a serious hobby. And what joy it has brought me. To see American avocets in a prairie slough, a Long-billed Curlew in a tidal lagoon, a silent Great-horned Owl in a forest clearing—these have been moments of undiluted happiness in my life. Even common birds, like the Black-capped Chickadees and White-crowned Sparrows in my backyard, have given me entertainment and delight.

Notice my opening paragraph. It contains seven first-person pronouns. That's the thing about our relationship with nature: we think it's all about us. And that's a conceptual disease we can't seem to shake.

Birds (and other organisms) surely don't exist for human entertainment or to improve our well-being. That's not why they are here. Yet we human beings are driven to ascribe purpose and meaning to not only our own lives but also the other lives around us.

This is an old human habit. Medieval Christians believed the world was itself a Book, the very word of God made visible. In studying the world—with the interpretive aid of that other book from God, the Holy Scriptures—humans could learn how to behave, how to be moral. The ant and the bee taught us industry. The pelican, which supposedly plucked its own breast for blood to feed its young, reinforced the message of Christ's sacrifice. Medieval Christians took quite literally the injunction to "ask the beast and it will teach thee, and the birds of heaven and they will tell thee" (Job 12:7). (This of course is not a uniquely Christian practice. The Jataka Tales of the Buddhist tradition, for example, use animal characters to represent particular virtues. And some schools of Hinduism maintain that each animal was created to embody a particular spiritual message for human beings.)

All creatures embodied some moral lesson: their purpose was to improve us by their example. What a complex book, this book of the world—and how hard human interpreters must have worked to extract from each creature's existence a model for human betterment. Now, in the era of ecology and evolutionary biology, it seems laughable that speciation was once understood as God's way of cataloguing vice and virtue.

But in our thinking about nature, have we really progressed? Are we so different from our world-reading forebears? We now understand how species arose and we understand something of the complex relations among species in an ecosystem. We know intellectually that we are just one among 5,400 mammal species and that the rest of nature

could get along quite well without us. There is no spiritual purpose in their (or our) existence. And yet we persist in making nature serve our moral needs.

Certainly our methods of interpretation and engagement have changed. Instead of attaching a simplistic moral lesson to the supposed character of individual species, we now see the natural world as a balm for our spiritual and physical ills. Books, workshops, and certification programs promote "forest bathing" as a way to diminish stress and anxiety. Nature study for children, which, after its first flourishing in the early years of the twentieth century, was consigned to the experimental fringe, has re-emerged as the enthusiasm *du jour* of educators. It is recognized for its undoubted value in promoting creativity and physical and mental well-being. Urban developers, designers and planners argue for the importance of trees and green spaces which help to mitigate climate change and moderate temperatures and also bring calm and contentment to harried city dwellers. (See, for example, *Planning the Urban Forest: Ecology, Economy, and Community Development* PAS Report 555, by James Schwab.)

Perhaps this new embrace of the natural world is just a variation on a very old human theme: that the world is ours, for our pleasure, spoliation, enlightenment. I'm not disputing the value for conservation of this recent turn towards nature. Please—let us have more parks, more trees, more forests, more clear streams, more bird-friendly habitats. But in our enthusiasm for the healing powers of nature, let's not forget that birds and other beauties of our planet are not ornaments. They exist for themselves. We are incidental observers, graced now and then with a glimpse of their wild and separate lives. If they can be said to serve a purpose at all, it is to hold together the ecosystems where they dwell. Each is essential in some way to the ecosystem services on which we depend. Without wild creatures, we are in trouble.

So yes, let us enjoy them, care for them, study them, protect them. But don't justify their protection on the grounds of human enjoyment. They have their own reasons for being.

The next time I set out on a birding trip—driving at dawn to the edge of the city or flying to a tropical hotspot to see exotic species—I will need to consider the environmental impact of pursuing this nature-loving hobby. Is nature-oriented travel morally better than other kinds of tourism, which we now, to our sadness, must consider a waste of the planet's remaining fossil fuel budget? (Tourism is responsible for as much as 8% of global emissions, according to a study published in *Nature Climate Change* in 2018.) Does the fact that I want to travel to see wildlife get me off the hook for the fossil fuel bill? Is it morally better to fly to the

Gulf Coast of Texas to see spring migrants than to go to Vegas for a bachelorette party?

Our impulse to explore the natural world leads all too often to more growth in the material economy—more roads, more hotels, more resort condos, more films, more books, more outdoor clothing. We know that economic growth is the enemy of biodiversity. As ecologist Brian Czech puts it, "the human economy grows at the competitive exclusion of nonhuman species in the aggregate." That is, when we convert land to the myriad purposes of the human economy, we are destroying habitat and pushing out other species. If in our pursuit of "nature" we are contributing to economic growth in some way, we are harming the other creatures that we value. It is painful to examine how we are all to some degree implicated in biodiversity loss. Changing our ways so that we can appreciate the natural world without usurping the land and food supply of other creatures will require a constant and unrelenting effort to question our purchases, modes of travel, diet, energy use and so forth.

But individual soul-searching will not be enough. We need to pressure governments to move away from an economy that relies on continuous growth toward one that does not require growth—a steady state economy. This transition will require us to re-think all the complex factors driving the economy, such as population increase, money creation and consumption habits.

Somehow, we need to drum into our bones what it means to change, in Aldo Leopold's words, "from conqueror of the land-community to plain member and citizen of it." It's a comedown, but one that is long overdue.

Susan Fisher is the editor of NatureWILD*, the quarterly magazine of NatureKids BC, and the chair of the Jericho Stewardship Group. With Daphne Solecki, she co-authored* A Hundred Years of Natural History: The Vancouver Natural History Society, 1918–2018.

Note: this essay first appeared in the Substack *newsletter as "Pathological Illusions."*

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Above: Spindly reproductive spore-laden frond of deer fern. **Below:** Dual fronds of deer fern: the unfurling fertile fiddlehead frond which produces the spores, surrounded by several sterile leafy fronds.

The Symmetric Wonder of Deer Fern

Article and photos by Lee Beavington

The word 'fern' was deemed insignificant enough to be removed from the Oxford Junior Dictionary in 2007. Am I alone in adoring these relics from the Jurassic? Deer fern, *Struthiopteris* (formerly *Blechnum*) *spicant*, is a humble addition to a forest floor often dwarfed by cloud-reaching conifers.

Found on four continents, this evergreen perennial hugs the BC coast and is typically found in the acidic, nitrogen-poor soils of our temperate rainforest. Despite the name, deer are not fond of deer fern except in winter. I've always been fascinated by the fern's dual fronds: the spindly ones that stretch up to send forth spores (reproductive) and the sterile yet aesthetically pleasing fronds that often lie flat (vegetative) and spread their symmetry across the earth.

Deer fern use reaches well beyond common garden ornamental. When Carl Linnaeus documented this species for science in 1753, he saw a seedless vascular plant. Did he know of its extensive ethnobotany? The Hesquiaht peoples use this fern as skin medicine and have also chewed the leaflets as a hunger and thirst suppressant. The Washington Salish ate the fronds and roots when food was

scarce, while early ethnographers recorded that a root decoction was employed to treat diarrhea. Eighteenth-century midwives used them to stop bleeding during childbirth, and the leaflets were consumed to treat stomach and lung issues as well as cancer.

My family's neighbours on SḴŦAḴ (Mayne Island) had to clear some land to build their modest house. Knowing how rare deer fern are on the island, Jack asked the excavator operator to spare them, to which the incredulous driver said: "They're just ferns. They'll grow back!" "Not these ones," Jack protested and so the excavator gently (as gently as a machine built for destruction can) scooped out the grove of deer fern. We received two ferns as gifts and they now grow in a wet and shaded area of our backyard. Can we pay forward this example of human-made machines and ingenuity being used to rescue other species?

Deer fern, your geometric form mesmerizes. Your fresh growth in spring is a green hard to describe. If photosynthesis had a colour, it would be you. Your fiddleheads unfurl a kind of magic into the world—a magic of wonder and possibility. Deer fern, you seek the wet and quiet places, huddle next to hidden streams and forgotten ditches. You dwell where humans seldom tread, the spaces where silence can still be heard. The dictionary may have forgotten your name but here you are remembered.

Sunlit fronds of deer fern (*Struthiopteris spicant*).

Author bio provided in book review of Wild Pedagogies, *p. 103.*

BC's Red-listed Vascular Plant Specimens in the UBC Herbarium

by Christina Gentle and Linda Jennings Lipsen

Overview

Over the past year, the Herbarium at UBC's Beaty Biodiversity Museum completed an inventory of British Columbia's red-listed species within our vascular plant collection. This project included digitizing over 700 red-listed specimens, thereby broadening the available data for conservation and research. During the inventory we entered each specimen's collection information into our database (including geolocations, relevant federal and provincial conservation status) together with high-resolution images, thereby making the information available to the public. We also physically fixed each specimen sheet and filed them within new protective folders designating their conservation status and ensuring long-term preservation.

After reviewing the new collection data, we were surprised by the number of BC red-listed vascular species that were not previously inventoried and how poorly the specimen collection information was previously captured within our database. We also detected an interesting trend showing that over the past four decades, while overall collecting has decreased, the collection of red-listed species has greatly increased. We are excited to share this new knowledge and see how this new data can help better inform conservation decisions regarding the rarest and most endangered plant species within our province.

Introduction

Herbaria are systematically arranged collections of preserved plant species that have been dried, pressed, and mounted with a collection label to create a specimen (Photo 1). Herbarium collections have been used by botanists since the 16th century to describe and classify plant diversity from around the world. Presently there exist more than 390 million specimens housed in approximately 3,100 herbaria around the globe. These collections are increasingly used by a wider audience as specimens have become more easily accessible through online resources. The UBC Herbarium at the Beaty Biodiversity Museum houses one of the world's largest collections of vascular plants with 250,000 accessioned specimens; of these, about 190,000 are from BC. These specimens can be useful to elucidate information about climate change, habitat fluctuations, pollution, biological invasions, and help designate species at risk. The UBC Herbarium collaborates with the British Columbia Conservation Data Centre (BC CDC) by using specimens to track the fluctuating BC flora and at-risk species.

The BC CDC conducts biological inventories that document rare species and ecological communities, analyzes conservation data, and makes this data widely available for public use. This government agency is also responsible for assigning provincial conservation status ranks of red- and blue-listed species, a scale representing the risk of a species or ecological community becoming extinct. The most at-risk species and communities are designated as red-listed, meaning that they are extirpated, endangered or threatened in BC. Less-threatened species that are still of special concern are designated as blue-listed. Factors taken into account when determining conservation status include total number and condition of occurrences, population size, threats to the species, range extent and area of occupancy, short- and long-term trends in the foregoing factors, intrinsic vulnerability, and environmental specificity. This data can be used to inform conservation management strategies, natural resource management,

Photo 1 (left). Acc # V30334 *Castilleja levisecta*. The oldest BC red-listed specimen in the UBC Herbarium vascular plant collection. Collected in 1895. The 'poisoned' stamp indicates specimen was treated with mercuric chloride, a toxic substance used up until the 1960s as an insecticide and fungicide. The modern preservation technique is to freeze specimens for two weeks. Colour checker bar in top left acts as a reference point to ensure that the colours of specimen are represented in the image. The original specimen sheet has been remounted on a standard-sized herbarium sheet. Note the barcode top-right which links to specimen's digital data.

government agencies, researchers, and citizen scientists.

This project involved searching the UBC Herbarium vascular collection for all specimens of red-listed species to ensure they had been entered in the UBC Herbarium vascular collection database with accurate and up-to-date information, imaged, and properly protected within the physical collection. By pulling every red-listed species and confirming and updating each specimen in the database, a more-complete record of information will be available to help inform and protect the most vulnerable species in BC.

Project Description

Databasing specimen information

We first downloaded a complete list of 172 red-listed vascular species from the BC CDC Species & Ecosystems Explorer website. Next, we searched the UBC Herbarium vascular database for each species and found 80 red-listed species with a corresponding 119 specimen sheets in our inventory. We then pulled the corresponding sheets from the physical collection and discovered many more specimens than were originally accounted for in our databased inventory. We pulled all the new-found specimen sheets and entered them into our database to ensure a complete inventory of all BC red-listed species found within our collection. Additionally, for specimens we had previously databased and inventoried, we checked the accuracy of the specimen label information in the database and updated as needed. This label generally includes the location where the plant was collected including its geolocation (i.e., latitude and longitude), descriptors of the environment in which the plant was growing such as habitat and altitude, field notes, the date the plant was collected, the collector's name, the collector's number, the name of the person who identified the specimen, and the date on which the identification was recorded (Photo 2).

Furthermore, to broaden the available data for the red-listed species, geographic information was also entered or updated. Maps on platforms such as E-Flora BC display information such as species distribution and range; these maps are generated based on information from a variety of collections, including the UBC Herbarium. To generate accurate dots on a map, we georeferenced 439 red-listed specimens, which previously lacked adequate information. Of these, 275 specimens were georeferenced based on the locality descriptions on their labels, as they did not have specific coordinates given by the collector. Additionally, we updated the conservation status for each red-listed specimen in our database as this will allow the public to easily know the extinction risk for a given species when searching our database.
We first consulted the BC CDC

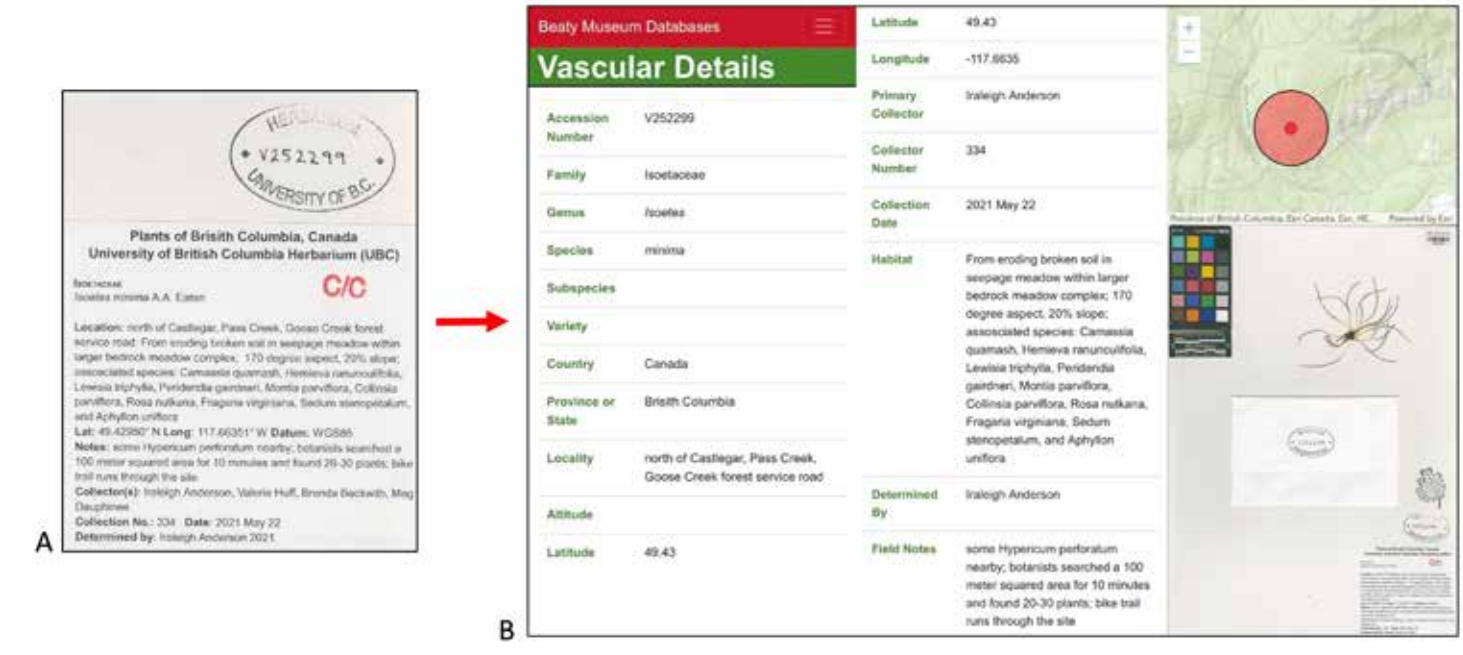

Photo 2. Label conversion. A. Physical specimen; B. Online record available in the UBC Herbarium vascular database.

Species & Ecosystem Explorer, as well as recent (2021) and archived (2019, 2020) lists of data changes available on the CDC website. We then updated conservation status in our database and as a result 49 vascular plant species in our collection had their risk factor ranking shift from red-listed to blue-listed (the lower risk factor ranking).

Our final step was to image and barcode each specimen with a unique accession number. Ensuring that accession numbers are assigned/legible is vital as it allows us to keep track of all of the specimens in the museum's collection. When an accession number is searched in our database, all the information corresponding to that specimen will appear. Images are linked to their corresponding specimen in our database and are made available to the public online. Digitization and imaging allow online visitors to draw an extended wealth of information from the original specimen. (See barcode in top right-hand corner of Photo 1.)

Specimen maintenance and protection

Before returning the specimens to the cabinets, each specimen was examined and repairs were made to ensure long term preservation. First, repairs were made to the specimens by removing physically damaging non-archival materials such as Scotch tape or hardened glue and ensuring all specimens were securely fastened to their Herbarium sheet with archival grade materials. (See white bands fastening specimen to sheet in Photo 1.) Secondly, all red-listed specimens were organized and placed into new species herbarium folders. The new folders are labeled with the most up to date taxon name with a red-listed insignia stamp on each folder, highlighting the importance of these specific physical specimens. The new folders will ensure uniformity in the collection, help to catalog the red-listed specimens, and make them easier to locate within the collection. By taking the time to fix and folder each specimen we can extend their life by hundreds of years.

Surprises

Many BC red-listed vascular species were not previously inventoried in our database

Out of the 172 red-listed vascular species known in BC, we found 131 in the UBC Herbarium collection. This is 51 more species than we previously had inventoried in our database. During this project we have been able to assess the comprehensiveness of red-listed species in our collection and identify areas that can be strengthened to create a greater wealth of information. For example, we found one sheet of *Papaver pygmaeum,* a species we were previously unaware of in our collection, yet it had been collected over 70 years ago. This indicates that our collection could benefit from

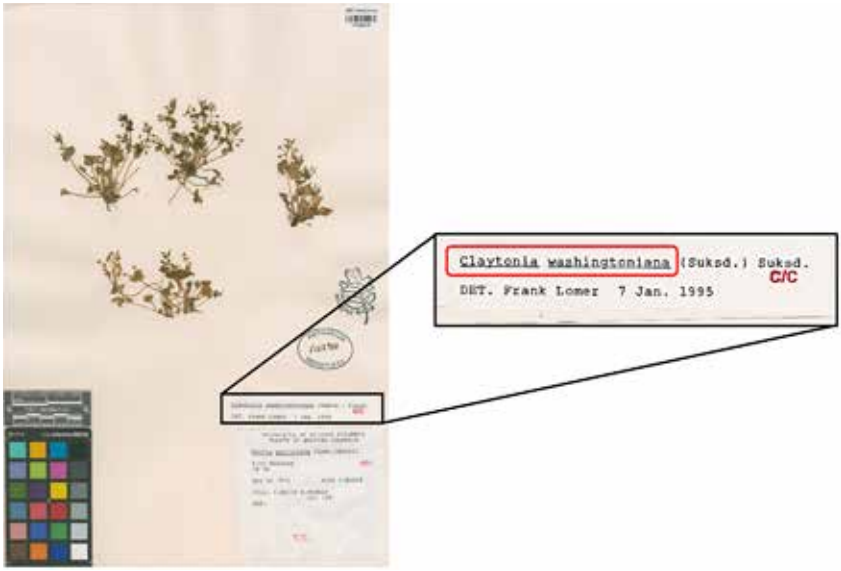

Photo 3. Acc # V182948 *Claytonia washingtoniana*. Originally misidentified as *Montia perfoliata.* Specimen now has an annotation (Frank Lomer 1995) entered into the database to reflect the correct name.

having additional, more recently collected specimens of *P. pygmaeum*, which would allow better tracking of the species over time.

Upon entering data from each specimen sheet into the database we came to the surprising realization that we actually had 708 specimens—609 more than what had been in our database. Of these 609 records, over 10% (70 specimens) were not previously inventoried anywhere in the database and were not available online in any capacity to be used for assessments or research. In some cases, entering data from the new-found specimen sheets greatly increased the number of specimens available for a given species. For example, before updating our database we had two records of *Viola howellii*, but after updating the database, we discovered 21 records for this species. Data from these new records increases the number of occurrences of the species within its range along the east coast of Vancouver Island and expands the range to Bowen Island. Having this additional information on the range and number of occurrences for the species is important for future assessments when determining conservation status. The increase in range and number of occurrences for this species could possibly lead to its downgrading from red-listed.

Much of the specimen information in our database was incomplete or inaccurate

Upon comparing physical specimen labels with the digital data, we found that for 500 of the 708 specimens, the information in the database was incomplete or incorrect. Commonly, annotations had not been recorded in the database and these are important as they are often done by researchers to correct misidentifications and make note of the updated species names. One example of this was seen for a specimen of *Claytonia washingtoniana* (Photo 3). The specimen was originally misidentified and was in our database as *Montia perfoliata*; however, it had an annotation done in 1995 by Frank Lomer correcting the specimen's name and changing it to *C. washingtoniana*. Making sure this specimen had its proper identification recorded in the database was vital as it made the difference between the specimen being non-threatened (*M. perfoliata*) or red-listed (*C. washingtoniana*). Completing taxonomic updates and entering annotations in our database also ensures that collection data is matching the most up-to-date nomenclature used by the BC CDC and eliminates confusion for those using the collection.

A further issue with specimen information was inaccuracy in location data due to misinterpretation of collection information and out-of-date names of geographic features, some of which can no longer be found on modern maps. One example of this occurred with the species, *Thelypteris nevadensis*. Before updating our database, we had one record of *T. nevadensis,* which according to our data was found growing beside a lake near Strathcona Provincial Park. However, after revising the data for this species, we found that we had two additional specimens of *T. nevadensis*, both of which were collected near Sooke River. Upon checking the sheet for the first specimen, we found a note that had not been entered into the database, stating that the specimen was actually collected in a garden at Cobble Hill. This note illustrates how the data previously entered in the database was a misinterpretation of the collector's data. According to the note, the collector was initially saying that the specimen was found in a garden but that the population originated beside the lake near Strathcona Park. However, the note further goes on to say that the plant probably would not have originated from near the lake, as this is an unlikely habitat, and that it most likely originated from near Sooke River. The original place of origin stated in the note aligns with the data we found for the two other specimens of *T. nevadensis*. Thus, our data now represents an accurate range for the species.

A further deficiency in specimen information was that many specimens were lacking specific coordinates. This required georeferencing based on textual locality descriptions. An example of this was *Castilleja levisecta*. Two out of

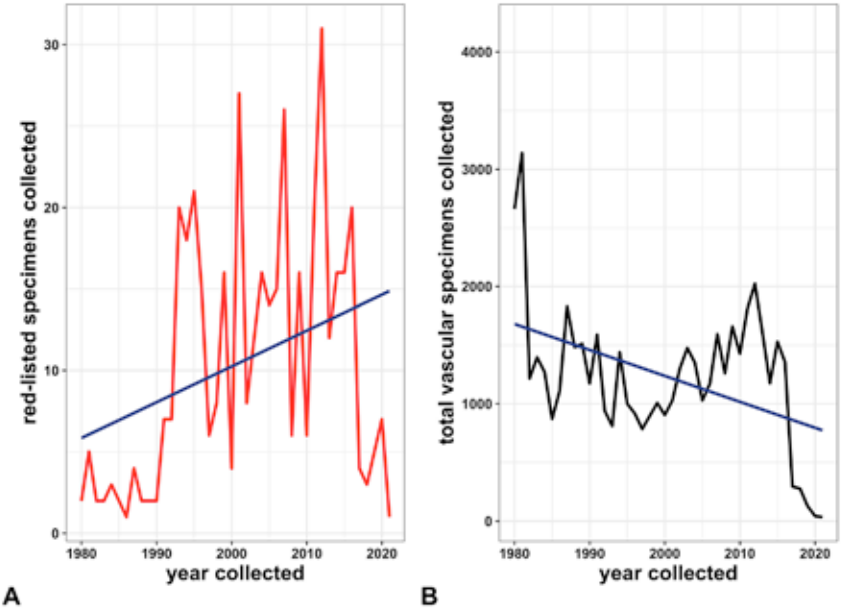

Photo 4. Collection trends since 1980. A. Number of red-listed specimens collected per year. B. Number of all vascular specimens collected per year.

the ten specimens we have for this species had labels saying they were collected "near Rifle Range, Victoria, B.C." However, as these specimens were collected in 1913, there were no coordinates listed on their label. We had to search the City of Victoria Archives to determine that this location was the Clover Point Rifle Range, which is now Clover Point Park. We were then able to update the database with coordinates for the specimens, which will contribute to a more accurate distribution record for the species.

Understanding collection trends tied to conservation

After we ensured that all our red-listed specimens were inventoried with accurate data, we wanted to further investigate the trends in collection. Other studies have found that there has been a general decreasing trend in collection of specimens since the end of the 1970s. We wanted to see if the same trend could be seen for red-listed species and so compared changes in the number of annual specimen donations for the approximately 700 red-listed specimens compared to the non-red-listed vascular specimens in our collection (Photo 4). When looking at collection trends, we discovered that the most drastic increase in collections of red-listed species occurred after the 1970s (Photo 4A). This is contrary to the collection of all vascular

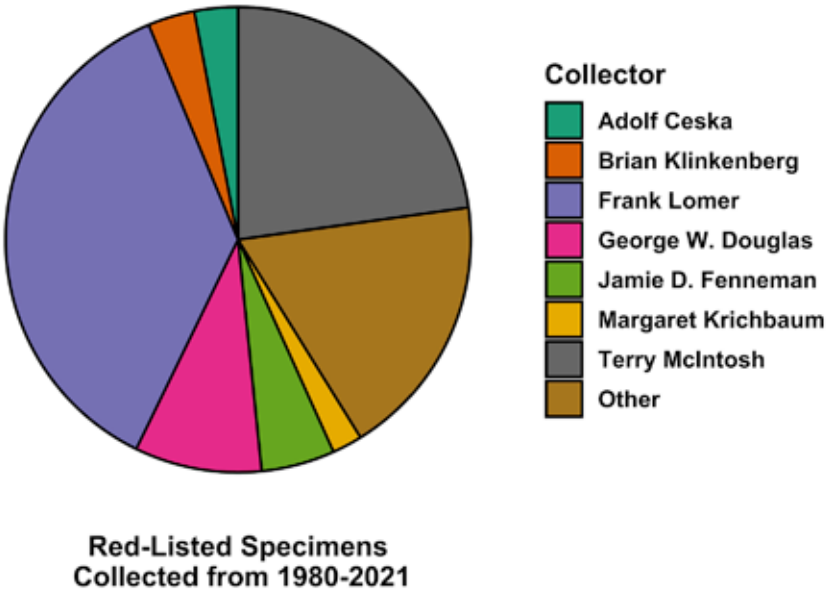

Photo 5. Pie Chart illustrating the seven most prominent collectors of red-listed specimens over the last four decades. (Read colour code counter-clockwise.)

species, which aligned with the pattern previously demonstrated in other studies and was shown to experience a sharp decline starting at the end of the 1970s (Photo 4B).

We then considered the possible causes of increase in collection of red-listed species over the past four decades. This increase was correlated with a growth in the interest of expert researchers, which can be seen in our data with more than 80% of all the red-listed specimens collected between 1980 and 2021, collected by seven out of forty-five people who have collected the red-listed specimens in our collection (Photo 5). We theorize that the increased interest in red-listed species after the 1970s has occurred due to growing government involvement, which has raised awareness of environmental protection and the importance of biodiversity.

In 1971, Canada was among the first countries to create a Department of Environment (now Environment and Climate Change Canada). This brought a focus onto the conservation of species and paved the way for the establishment of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1977 and the Federal Species at Risk Act (SARA) in 2002. COSEWIC is a committee of independent

scientists and wildlife experts that assesses the status of wildlife species in Canada and communicates its findings to government. Species assessed by COSEWIC are candidates for listing under SARA, which is responsible for management and recovery of listed species. It therefore follows that more strategic and comprehensive collection of these species has been taking place in recent decades.

The UBC Herbarium houses specimens that contain information vital to making informed decisions regarding land management and the designation of conservation status. We have now made this information available to professionals and the public by entering accurate data for all the red-listed vascular plant specimens in the UBC Herbarium into our database. Additionally, we have imaged specimens and linked them to their corresponding record in the database, allowing remote access to the collection. Furthermore, we ensured the preservation of the specimens in our collection by physically fixing them and made them easier to find by cataloging them with our designated folder system. UBC Herbarium data may now be utilized effectively for environmental protection, conservation management and research.

Note to Prospective Collectors

Due to the threats that red- and blue-listed species are under, there are limitations to their collection. If you are looking to inventory or monitor these species, it is essential to obtain the required permits. Always check with an expert or institution before collecting a specimen of which you are unsure. If you are interested in learning more about how to collect and press plants for herbaria, there is a new handbook, *Pressed Plants*, to be released in February 2023 by Royal British Columbia Museum.

Acknowledgements

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Christina Gentle is a third-year UBC student majoring in Biology. She completed the work on this project during a Science Co-op placement at the Beaty Biodiversity Museum where she worked as a Bioinformatics Intern and Curatorial Technician.

Linda Jennings Lipsen is the Collections Curator of the University of British Columbia Herbarium, Beaty Biodiversity Museum. Linda holds a BSc and MSc from UBC. She previously worked for the UBC Botanical Garden and taught in UBC's Department of Botany. Now she leads a variety of specimen educational activities where you can have connections

to the collections and research while making a positive impact with real results! Linda has recently finished a book, published by Royal British Columbia Museum, titled Pressed Plants *which she hopes will inspire readers to get outside, learn how to identify and press plants!*

Website Links for Further Information

BC Conservation Data Centre:
https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/species-and-ecosystems-explorer

UBC Beaty Biodiversity Museum's Herbarium Database:
https://beatymuseum.ubc.ca/research-2/collections/herbarium/herbarium-vascular-plants/

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The Path to Becoming Canada's 19th UNESCO Biosphere Region

by Ruth Simons, Lead, Howe Sound Biosphere Region Initiative Society

The Átl'ka7tsem/Howe Sound Biosphere Region received UNESCO designation on 15 September 2021 and we can now report on our experience to date. Since the announcement in the Discovery Journal 2021 issue, it is timely to provide a more in-depth coverage of the UNESCO nomination process, requirements, implications, collaborations and responsibilities for the Howe Sound region.

It is an honour to have a region recognized as a special place—by a very special organization: UNESCO. But a lot of work goes into being nominated, and then designated, which is as it should be. The application process is daunting, but after twenty or more years of successive organizations and individuals in the Átl'ka7tsem/Howe Sound region advocating for a holistic land and marine plan, many motivated and committed volunteers and authorities were willing to participate in the information-gathering process. We tapped into the many qualified knowledge holders to help with missing information. An example of this was the tremendous contribution of Judith Holm, curating the region's species lists from data collected through iNaturalist. The 387-page dossier was a grassroots effort fueled chiefly by volunteers, generous contractors, partners and donors.

Nor is it easy to create a biosphere reserve. Experience shows that, in Canada, it takes an average of eight years for an area to be designated. In our case, the journey was five because we already had an established forum for consensus building in the region.

The Canadian Commission for UNESCO in Ottawa and the Canadian Biosphere Reserve Association provided guidance, resources, and support. We began by downloading and reviewing the specific questions asked in Part I of the UNESCO Biosphere Reserve nomination form. We became more committed to the initiative when we were confident that we could meet the toughest of the questions:

1. Did our area contain biophysical characteristics that make it globally important? *In 2019, Fisheries and Oceans Canada had designated eight internationally and ecologically important glass sponge reefs in Howe Sound as Marine Refuge Conservation Areas.* **But which of these protected or regulated areas might serve as the Core and Buffer areas for the biosphere reserve?** *We had a significant amount of core protected areas in the five terrestrial provincial parks at high-elevation levels. The buffer zones and the location of*

lands between development and core protected areas were more of a challenge there. The term 'buffer' raised concerns, but through good relations and cooperation from the Ministry of Forests, Lands and Natural Resource operations, we found that existing conservation management boundaries served as a sufficient buffer in most areas. In the marine environment, a 150-metre buffer was already included around the footprint of the designated marine refuges.

2. What cultural elements were present?

The region has two national historic sites (Britannia Mine Concentrator, Point Atkinson Lighthouse), the Sea-to-Sky cultural information highway kiosks, well-known Squamish Nation place names, active cultural practices, and the Squamish Nation's sacred land use plan.

These were a few of the initial hurdles. The Canadian Biosphere Reserve Association's published 2018 guide on becoming a biosphere reserve includes more of the initial steps involved and is available by searching "A Guide to being a Biosphere Reserve in Canada by P.G. Kingsmill".

During the application process, I believed that our chances for designation were strong, given the existence of the Howe Sound Community Forums. The twice-annual Forums are informal consensus-building events established around *Principles for Cooperation* structured specifically for sharing information, networking and trust building amongst those authorities that govern the region. The Forums bring together elected officials, First Nations, and other observers from around the region. The Forum members supported the consensus to pursue the designation. All three levels of government and the Squamish Nation were supportive right through to completion.

Biosphere reserves are special places where people and organizations have committed to live and work more in harmony with nature and one another. The people living in these areas are figuring out—and demonstrating—how to achieve a sustainable balance between conserving cultural diversity, natural ecosystems, biodiversity and fostering sound economic development. These shared values were established in the Forum's Principles for Cooperation in 2002 and have been updated to reflect the changing society, while also undergoing a recommitment with each subsequent election cycle.

Biosphere reserves share a commitment to meaningfully engage Indigenous Peoples. We reached out early to the Squamish Nation—the biosphere is wholly within their unceded territory. Biosphere reserves have influence on policy but no legal authority over lands or waters. The framework of the biosphere reserve upholds the intentions of reconciliation as a guiding principle. Our Squamish Nation

Co-Chair, Joyce Williams, represents members in the Squamish Valley and we work collaboratively with the Squamish Nation's staff and council.

Biosphere reserves are mandated to support research, learning, education and capacity-building in their regions. Collaborative relationships with academic partners offer tremendous research opportunities for faculty and youth to experience place-based learning and field trips. We also developed a relationship early-on in the process with Capilano University finding mutual alignment with their Vision 2030 and we have teamed up on numerous projects. With several universities nearby and Quest University located in Squamish, we are tapping into their tremendous research and education capacity.

View from Cypress Provincial Park looking northwest over Howe Sound to Bowen Island and Sunshine Coast. *Photo: Murray Hendren (entry in NV photo contest)*

The Canadian Commission for UNESCO is responsible for overseeing all UNESCO programs in Canada (CCUNESCO), but it does not fund biosphere reserves. From time to time, and according to the priorities of CCUNESCO, funding may be provided to the network of Canadian Biosphere Reserves to support initiatives that match CCUNESCO's strategic priorities. This is not to say that the federal government—and provincial governments—never contribute financially to biosphere reserve activities, but most, if not all, of such funding is project-based, contingent upon senior government

priorities and contract delivery expectations. The good news is that this year, the Canadian Biosphere Reserves Association boosted their capacity through funding from Environment and Climate Change Canada's Enhanced Nature Legacy program. We can now leverage four years of funding for our biodiversity conservation work. Our work plan involves conducting research, filling in data gaps, communications and education on species at risk; as well as ways we can strengthen our conservation contribution to Canada's commitment to conserving 25% of Canada's land and 25% of its oceans by 2025.

To sustain themselves financially, the organizations responsible for managing biosphere reserves usually develop partnerships with local and provincial governments, NGOs, charitable organizations and private-sector donors. Like many NGOs, we depend on multiple sources of funding. During COVID, online communications advanced our connectivity with people and organizations around the region while keeping our overhead low.

There is a misconception that once the designation is complete, that's all there is to it. This could not be further from the truth. The responsibility to sustain a stable and well-funded organization is a criterion of the designation—a UNESCO designation is intended to be indefinite. The governance of biospheres is not all the same: some are run out of universities, some by local governments and not all have charitable status. The flexibility to create a structure suitable for a local context is a benefit, but each structure has its own challenges. Our not-for-profit organization, the Howe Sound Biosphere Region Initiative Society, was formed in 2017. We are a volunteer board of people from around the region.

The governance of the biosphere region is still a work in progress. Our non-profit society's role is to act as a convenor, a communications hub and to provide logistical support. We intend to convene a consensus-building roundtable with representatives from throughout the region to ensure we stay current and relevant to the influences affecting a sustainable future. We are currently working on our Nchu'ú7mut/Unity Plan, a management plan that will guide us toward successful periodic reviews.

Organizations managing the biospheres need to demonstrate financial sustainability, create a regional collaborative management plan, and provide annual tracking and reporting. Every ten years, biospheres undergo a periodic review where they demonstrate their progress on the core functions: biodiversity conservation, sustainable development and reconciliation.

You may well ask then, what is the value or importance of the biosphere designation? The UNESCO designation provides an aspirational, overarching framework

Where Nature and Humanity Thrive. *Photo: Overflight*

to collaboratively move forward towards achieving the objectives for the core functions of biodiversity conservation, sustainable development and reconciliation. While all levels of authority endorsed the UNESCO designation it does not mandate governments or First Nations to increase further conservation designations or improve management for established conservation values. The designation does, however, provide a collaborative basis for open discussions and negotiations amongst First Nations, civil society, stakeholders and all levels of government to strive for holistic land and marine use plans, biodiversity conservation of critical ecological values, and defined regions where people, culture and humanity can thrive in harmony with nature.

We are aware of the challenges ahead; yet we know that our community of communities can pull together toward the vision and aspirations of a sustainable Átl'ka7tsem/Howe Sound. If you would like to donate or learn more, please go to ***www.howesoundbri.org***. Additional information on "The Journey to the UNESCO Designation" is also available on this site.

Ruth Simons has been a dedicated volunteer in Howe Sound for ten years following a term on Village of Lions Bay Council (2008–2011). Prior to 2008, she was in the travel insurance industry as a business owner and CEO. She has been advocating for a holistic, comprehensive land and marine use plan for the region since 2012. Ruth has been the Coordinator of the Howe Sound Community Forums for the past eight years and has lead the Howe Sound Biosphere Region Initiative since its start in 2016. A lifelong resident of the region, she is happiest in nature and is often seen either on the trails or the water.

New Bugs in Your Backyard

by Karen Needham

When is a Brown Marmorated Stink Bug (*Halyomorpha halys*) not a Brown Marmorated Stink Bug? When it is a Rough-Shouldered Bug (*Brochymena spp.*), or a Douglas Fir Seed Cone Bug (*Leptoglossus occidentalis*)[1], or one of several other native bug species in BC that could easily be confused with the non-native BMSB[2].

What they all have in common is a piercing and sucking mouthpart for feeding on plant juices; which plants they prefer differs by bug species. While the BMSB likes tree fruits, soft fruits, and vegetables, the RSB eats various shrubs and trees and the DFSCB prefers conifer seeds. What they also have in common is their survival strategy of overwintering as adults. In the fall when the temperature cools, they will seek out warm, south-facing cracks or crevices (often indoors) to shelter until spring. During this time, they live off stored fat in their bodies and generally no longer feed, except on exceptionally warm winter days when they may head outside for a bit and then return to their hiding places at night.

First discovered here in 2015, the BMSB is not the only non-native bug to make Metro Vancouver its home in the past few years. Both the Elm Seed Bug (*Arocatus melanocephalus*) and the Tuxedo Bug (*Raglius alboacuminatus*) are recent arrivals to our province. They were first detected in Kelowna in 2016 and in Metro Vancouver a few years later. Neither is known to feed on agricultural crops as the BMSB does; the Elm Seed Bug eats elm seeds while the Tuxedo Bug prefers plants in the mint family. However, they can be a nuisance when overwintering in large numbers in and around the home. But like so many who come to Vancouver and fall in love with the area, they are here to stay!

For more information on these new arrivals, the BC Ministry of Agriculture has issued two excellent Pest Alerts:

- Brown Marmorated Stink Bug (BMSB) Pest Alert – Gov.bc.ca
- Elm Seed and "Tuxedo Bugs" – Gov.bc.ca

Karen Needham is the Collections Curator of the Spencer Entomological Collection, Beaty Biodiversity Museum, UBC. She specializes in aquatic insects, primarily Hemiptera (the true bugs). Karen also fields about 500 calls and emails each year from members of the public regarding their bug concerns.

1. The original common names of Rough-Shouldered Bug and Douglas Fir Seed Cone Bug are also known as Rough Stink Bug and Western Conifer Seed Bug, respectively.
2. Consecutive Photos 1–3 include the recognized acronyms (e.g., BMSB) for these insects.

These insect photos and others are accessible from ***https://www.zoology.ubc.ca/entomology/***

A small yellow circle in the centre denotes the pin holding the specimen in place at the Beaty's Spencer Entomological Collection.

Photo 1. BMSB: Brown Marmorated Stink Bug (*Halyomorpha halys*).

Photo 2. RSB: Rough-Shouldered Bug (*Brochymena* spp.)

Photo 3. DFSCB: Douglas Fir Seed Cone Bug (*Leptoglossus occidentalis*).

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Listening to the Whispers of the Wings

by Sunny (Yi-Chin) Tseng

Birds sing—it is one of the reasons people are fascinated by them. Surprisingly, it was not until 1929 that the first recordings of wild birds were made. Since 1929, field audio recording of birds has become important for science, conservation and a fun hobby for enthusiastic birders. Permanent records of bird sounds not only inform new scientific discoveries, but also provide an opportunity for people to learn birds from their sounds. This article will cover the history of avian field recording, the tools that are used in the present to record bird sounds, and the citizen science platforms that are accessible for all to learn and share about worldwide bird sounds.

History of Avian Field Recording

It is impossible to discuss the history of wild bird recording without mentioning Arthur Allen, Peter P. Kellogg and Albert R. Brand from the Cornell Lab of Ornithology. During the first half of the 20th century, the team developed techniques and key technologies for recording birds that are still used today. In 1929, Allen and Kellogg made the very first recordings of wild birds using the new technology of motion-picture film with synchronized sound. The digital version of the first bird sound recording, that of a Song Sparrow (*Melospiza melodia*), can be found in the Cornell Macaulay Library (see p. 89). Within two years, they successfully recorded more than 40 species of birds in North America. In 1931, the team used a World War I parabola mould to design and build a parabolic reflector for field recordings (Image 1). The parabolic design and the concept of directional recording are still being used today.

Image 1. The early parabolic recording equipment (Cornell Lab of Ornithology).

Microphones for Field Recording

The microphone is the key component in a recording system—it senses the vibration of air and transforms it into electrical signals. Microphones for recording birds should be 'directional', that is, microphones that are sensitive to sounds coming from one direction. Two kinds of directional microphones are commonly used for bird sounds: the parabolic microphone and the shotgun microphone.

A parabolic microphone consists of a microphone placed at the focal point of a dish with a

parabolic curve (Image 2). Given the reflective property of a parabola, parabolic microphones can amplify sounds from a far distance, making them suitable to record species from high-canopy or birds with soft vocalizations. The diameter of the parabola influences the dominant frequency it collects. The lower the frequency (longer wavelength), the bigger the parabola needs to be. Common commercial parabolic microphones for field recording (e.g., Telinga Microphones) have a diameter of 55 cm, targeting sounds with frequency 500 Hz to 10 kHz (Wildtronics, 2022)—the frequency range of most songbirds.

A shotgun microphone doesn't amplify sounds like a parabolic microphone; instead, it selectively captures the sounds coming from the same direction. Shotgun microphones have a long interference tube containing a series of slots (Image 3) which make off-axis sounds cancel out each other, and only the on-axis sounds can reach the microphone capsule. The longer the interference tube, the more directional that microphone is. Sennheiser shotgun microphones are most commonly used, e.g., Sennheiser ME 66, ME 67 and MKH series. Recently, Røde shotgun microphones are gaining

Image 2. The dish can be made of various materials. The most advanced disk is made of foldable plastic which is light and easier to carry in the field (the disk on the left held by Ken Hall). An older version of the dish was made of glass fibre (the disk on the right held by Sunny Tseng). *Photo: Peter Ward*

in popularity given their lower price range.

The choice between parabolic microphone or shotgun microphone depends on the species that one is trying to record. Parabolic microphones provide outstanding directionality. It's often recognized that parabolic microphones can produce a cleaner recording than shotgun microphones under the same circumstances. However, as a shotgun microphone is less directional than a parabolic microphone, it is faster to aim. Additionally, a shotgun is easier to carry in the field and can be especially useful for recording a group of birds, birds in flight or birds on the move.

Passive Acoustic Monitoring

Passive acoustic monitoring involves setting up recorders in the field to remotely monitor the bird sound activity. Unlike in an active search that emphasizes the quality of recordings, the system used in passive acoustic monitoring prioritizes compactness, durability and most importantly, programmability. Recording systems that can be programmed to record sounds at a given time and interval are called 'autonomous recording units'. The most commonly used autonomous recording units are Song Meter SM4 from Wildlife Acoustics, Swift from Cornell Lab of Ornithology and AudioMoth from Open Acoustic Devices (Image 4).

Passive acoustic monitoring is mostly used in avian surveys, conventionally done with people conducting point counts. Passive acoustic monitoring with autonomous recording units provides several advantages over conventional point count surveys, such as providing permanent records, reducing observer bias and potentially

Image 3. Shotgun microphones with interference tube. *Photo: Sunny Tseng*

Image 4. Autonomous recording unit AudioMoth. A single autonomous unit includes microphone and data logger that can be left in the field for days or months. Usually, the AudioMoth is deployed with plastic bags to prevent water damage. *Photo: Sunny Tseng*

increasing the spatiotemporal scale of the scientific study (Shonfield & Bayne, 2017). Several studies have used richness as the metric to compare the performance of passive acoustic monitoring and point counts and these studies have suggested that both methods together can be more effective in assessing biodiversity than either method alone (Celis-Murillo et al., 2009).

Citizen Science to Share Bird Sounds

The idea of citizen science was developed in the mid-1990s, fostering the relationship between citizens and science. There are two worldwide citizen science platforms that encourage people to share their bird sound recordings: Xeno-Canto and Macaulay Library. Shared recordings can be accessed for scientific research or for educational purposes.

Xeno-Canto (***www.xeno-canto.org***), which translates to "strange sounds", is a website for sharing bird sounds all around the world. It was initiated in 2005, aiming to improve accessibility of bird sounds, and can be used for enjoyment, education, conservation and science. Xeno-Canto has a collection of around 700,000 recordings representing 10,516 bird species. More than 9,000 recordists participate around the world (numbers

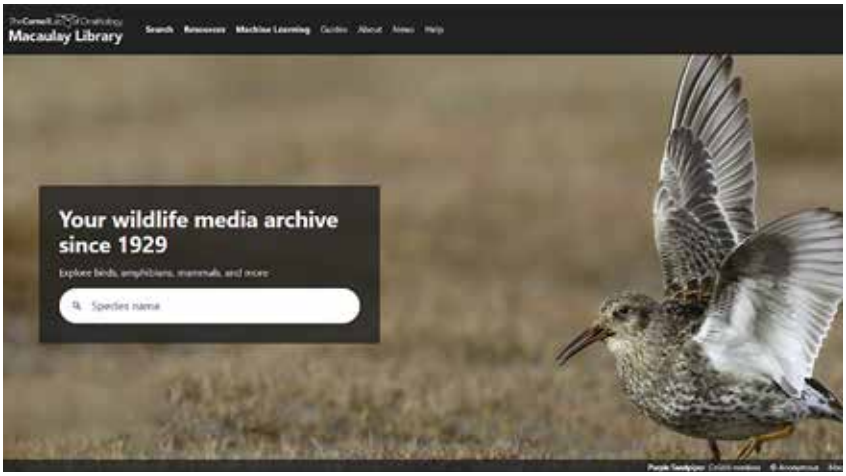

Image 5. Home page of Macaulay Library.

accessed 24 October 2022). Most importantly, Xeno-Canto keeps this dataset as open source. It is free for anyone to share, download and comment on other people's sound collections.

Macaulay Library (***https://www.macaulaylibrary.org/***), hosted by the Cornell Lab of Ornithology, is a scientific archive for research, education and conservation (Image 5). It was initiated in 1929, making it one of the oldest archives for bird sounds. Macaulay Library has a collection of 40 million media files (photo, audio and video) representing 10,056 bird species. There are more than 80,000 contributors (numbers accessed on 24 October 2022). Contributors can upload their recording while submitting an eBird checklist. Birds Canada coordinates oversight of eBird checklists throughout Canada for the Macaulay Library, Cornell Lab of Ornithology.

Learning and Identifying Birds by their Sounds

There are several "free" cell phone apps developed to help people learn birds by ear or enhance field surveys. These apps include Merlin (Image 6) and BirdNET. BirdNET is a sound identification app developed by the Cornell Lab of Ornithology. Soon after, a similar artificial-intelligence algorithm was integrated into Merlin 'Sound ID' feature. BirdNET features more than 3,000 of the most common species worldwide while Merlin supports 685 species of birds in the US, Canada and Europe. Both apps work by recording bird sounds using phone and the sounds are processed by artificial intelligence algorithms. The bird species is named immediately when the app records the bird sound. In addition to the name of the bird species, the app shows a spectrogram of the sound. The app

can even simultaneously detect/identify species singing and will list all species heard. For enhanced recording and identification, you can connect a shotgun microphone to your cell phone. To date, the app sound recording identification is not 100% accurate, but birders estimate it is better than 90% accurate depending on the extent of recordings that are available for that geographic area. The sound apps identify species, but not the number of birds making the sound, so field observers are still essential.

Image 6. Merlin app for sound identification. Merlin also provides a sound library for each of the species so that users can double-check the prediction output.

Conclusions

Technology advancements have made field bird sound recording affordable for the public. Professional microphones such as parabolic microphones and shotgun microphones provide high quality sound recordings. Autonomous recording units enable passive acoustic monitoring. One can further share their bird sounds in citizen science platforms such as Xeno-Canto and Macaulay Library through eBird checklists. Finally, there are apps such as BirdNET and Merlin to help birders identify bird sound in the field. It is a pure pleasure to do bird sound recordings and it is even more delightful to share these beautiful sounds with the world.

"There is a danger when picking up recorders," warns Donald Kroodsma, a well-known field recordist. "You can get hooked for life."

*Sunny Tseng is a field recordist and a PhD candidate studying bird sound at University of Northern British Columbia. Her Xeno-Canto collection (**https://xeno-canto.org/contributor/SPMWIWZKKC**) includes bird sounds from more than 250 species around the world. She can be reached at sunnyyctseng@gmail.com or her website (**https://sunshineland.netlify.app/**).*

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Nature Sketchbook Journaling—A Global Movement

by Vicky Earle

The tradition of keeping field notes has grown into its own genre over the past four centuries. This time-honoured tradition has been practiced by artists traveling with early explorers to naturalists like Darwin, Audubon and Muir. Now more commonly called nature sketchbook journaling, clubs are springing up all over the world—from Canada and the United States to Japan, New Zealand, Saudi Arabia and Africa. Traditionally, the main purpose of a field journal was to keep a record of observations and discoveries while learning about principles governing the natural world. This is still true today and, more recently, many secondary benefits are coming to light.

Starting a nature sketchbook journaling practice:

- Triggers curiosity, which makes your mind active instead of passive. Curious people ask questions and search for answers. Since the mind is like a muscle, it becomes stronger with continual exercise.
- Is a healthy pursuit, combining both mental stimulation and physical activity.
- Allows time for quiet contemplation, meditation and mindfulness of your surroundings, providing a much-needed break from our technology-filled world.
- Deepens observational skills and strengthens hand-eye coordination.
- Creates a record of your experiences and a meaningful connection to a place—more personal and cherished than a smartphone full of photos.
- Is a multi-disciplinary activity that can incorporate such diverse subjects as science, language arts, visual arts and mathematics.
- Can be done as an individual, with a group, or as a family activity—enjoyed by all ages, backgrounds and abilities.
- Can contribute to citizen-science research.
- Gets you out and engaged with nature!

There is increasing concern that urban residents around the world—especially children and youth—are spending less time outdoors and losing our connection with nature and the health benefits it provides. A growing body of research shows that spending time in nature—even as little as twenty minutes a day—benefits our mental and physical health. Being in nature brings a sense of calm and restores balance to our spirit. Some doctors, in partnership with the Parks Prescription Program (PaRx) now prescribe time in greenspace for their

patients. Positive health effects are many—from reducing chronic disease (like asthma, diabetes, heart disease, high blood pressure and stroke) and lowering blood pressure and stress hormones in adults, to improved eyesight and brain power in children—all over and above the benefits of exercise. Even more impressive, adults who take short day trips to the forest boost their levels of immunoproteins and natural killer cells (a type of white blood cell) for at least seven days after the trip. Immunoproteins improve immune functions while natural 'killer' cells fight certain types of cancer. Memory, creativity and task performance also increase more after a walk in a park. Couple this with nature journaling and it's a win/win combination!

Nature is all around us, but even the most observant people often pass by too quickly to take notice. Creating deeper connections to nature through nature sketchbook journaling is a simple way to discover details most people will never see. By documenting outdoor experiences with pen and paper, you celebrate the big and small moments of your experiences while outside. A nature journal is a lens that focuses your attention, enriches your experiences and develops your skills as a naturalist. It enhances your observations, curiosity, memory and joy during field trips and outings.

A journal is a simple, accessible tool available to everyone. Keeping a journal is intimate and engaging—it is a personal exploration of nature around you. Experiences become more memorable than snapping a quick picture on a smart phone and moving on (although that has its place too). The more we engage with nature through a sketchbook, the more nature seemingly engages with us. When we are still and intently observing, things in nature become more comfortable with our presence. Often, a variety of creatures come flooding into view—almost like things *want* to be noticed. When you write and draw in your nature journal, those detailed observations spark a desire to discover more. It improves your recognition of different species and your

Nature Vancouver sketch group pages from September outing at Fraser River Park. *Photo: Bettina Matzkuhn*

Double-crested Cormorant, Hastings Park Sanctuary. Sketchbook page of Vicky Earle.

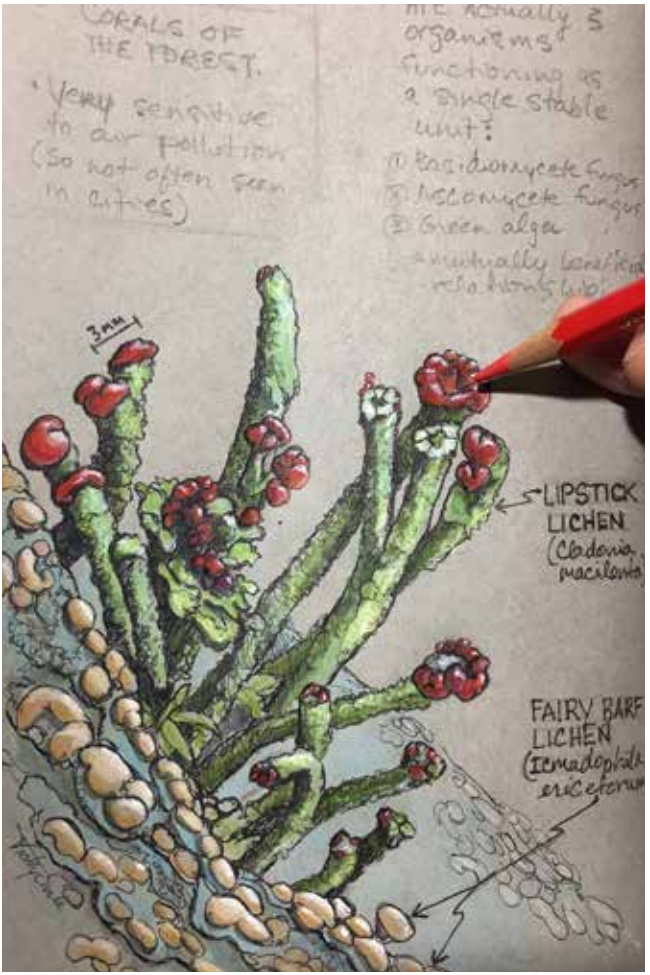
understanding of where and how they live. Each page becomes a tangible record of the natural world you experienced at that specific moment in time, filtered through your own unique lens.

Asking questions and letting curiosity be your guide are at the heart of nature journaling. John Muir Laws, artist, naturalist, author and educator, encourages journalers to keep three guiding principles in mind: "I notice," "I wonder," and "it reminds me of"—followed by recording information on the pages of your sketchbook through drawing, writing notes, taking measurements and asking questions.

Many different parts of our brain are activated during this process. When done regularly, journaling impacts how we think and increases our ability to look with intention, make connections and think visually.

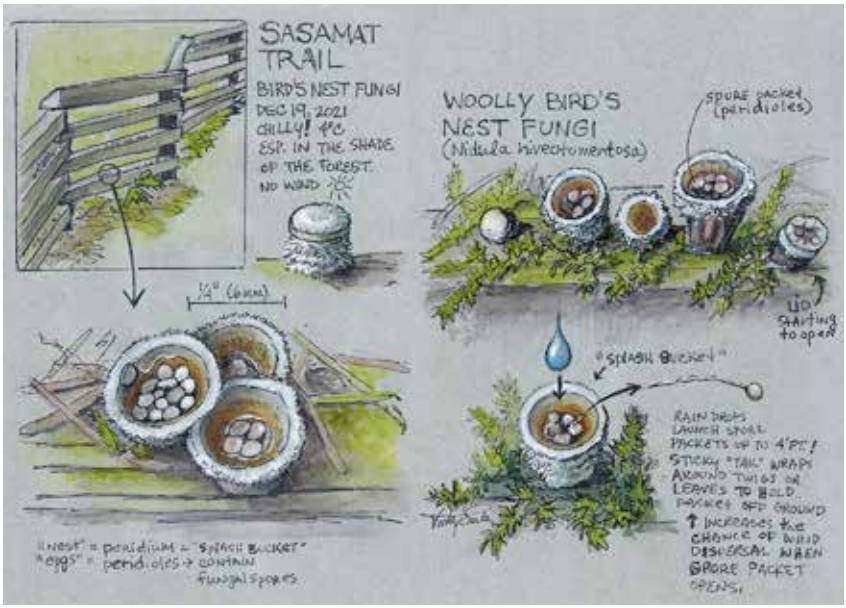
There is no right or wrong way to keep a nature journal and you do not have to be an artist to get started. If you are more comfortable writing, then write observations, notes and/or feelings that an experience may trigger. If you are more comfortable drawing, sketch what you find—an interesting plant, bird, insect and/or the habitat or landscape of where you are. The most interesting pages include both and will become a document of your personal experiences; however, the main goal is to be outside with nature and to engage more deeply when we're there.

To start, all you need is a book and something to write or draw with. Where to go? Anywhere! A park, garden, your backyard, the beach, the forest—even a parking lot! Be prepared for the elements. Ranulph Fiennes, British explorer, writer and poet said, "There's no such thing as bad weather, only inappropriate clothing". Make sure to dress appropriately and protect yourself from the sun. Take a snack and water bottle if you will be out for a while. Not sure what to put on a blank page? Start with adding the date, the location, perhaps the temperature and time of day. Think of your outing like a treasure hunt. What catches your eye? What interests you? Start with something small—an unusual berry or mushroom, an interesting seedpod, leaf, flower, caterpillar. Now really look at and study it.



Lichen at Camosun Bog. Sketchbook page of Vicky Earle.

How would you describe it? Pay attention to all your senses and write it on the page. Next, look at the lines and shapes of your subject. Is it circular? Angular? Make a sketch as simple or detailed as you want. Just remember, it does not have to be perfect or a "work of art", just a descriptive picture. Add labels and ask yourself questions about



Bird's Nest Fungi in Pacific Spirit Park. Sketchbook page of Vicky Earle.

the subject. What makes you go "hmmmm" or say "I wonder"? Add answers to the page.

Congratulations! You have made your first nature sketchbook journal entry!

In May 2022, Nature Vancouver member Vicky Earle led an *Introduction to Nature Journaling* Workshop. Afterward, participants voted to keep meeting on a monthly basis to explore different city parks and to continue nature journaling as a group. Everyone is welcome to join these outings. Watch the Nature Vancouver eNews and calendar for dates and locations. There are also many books and websites available with information on how to start and continue a nature journaling practice. A great place to begin is John Muir Laws' website: Nature Stewardship through Science, Education, and Art ***https://johnmuirlaws.com***. Happy journaling!

Vicky Earle is an award-winning natural science, medical and botanical illustrator who delights in connecting people to nature through art. After working in the healthcare profession for thirty years, she is now dedicated to sharing nature's stories through watercolour paintings and sketchbook journaling. Her main goal is to foster an affinity for nature in others by encouraging people to spend time outdoors and follow their own art practice. Vicky is a member of Nature Vancouver, the Guild of Natural Science Illustrators, the American Society of Botanical Artists, and a Signature Member of the Artists for Conservation.

A Busy Year for NatureKids BC

by Rebecca Clapperton Law, Executive Director, and Deborah Simpson, Vancouver Club Volunteer Co-leader.

Rebounding from the constraints of the COVID-19 pandemic through 2020 and 2021, NatureKids BC has adapted with a deeper appreciation of our role in creating opportunities for children and families to stay healthy and well by accessing their nearby nature on a regular basis. Our Explorer Days are in demand across the province, our *NatureWILD* publication has expanded distribution and our collaborative community partnerships are proving positive impact with new delivery models, particularly with new Canadian families.

In 2022, we have made the important decision to offer membership for free to families while presenting a "pay what you can" sliding scale opportunity to donate to the organization. This way, we believe any interested family can access our program, including a child-centred welcome package and subscription to *NatureWILD*.

Since 2020, our strategic intention to investigate the barriers that many families face when accessing nature has led to several very successful partnerships with community agencies and organizations

Photo 1. Watching chum salmon swim up Stoney Creek to spawn.
Photo: Deborah Simpson

such as the Kamloops Immigrant Settlement Agency, MOSAIC (Settlement and employment services for newcomers) and Colour the Trails (community for BIPoC and allies interested in outdoors). These relationships reflect our commitment to equitable access and building inclusive and welcoming club environments for families, while also demonstrating the trust we build with organizations through our partnerships. And the children are having such fun while they are birding, searching for sea stars with scavenger hunt lists, and testing water quality to assess the stream habitats of salmon!

In the past year, the Vancouver NatureKids Club has been able to offer 14 Explorer Days. With the guidance of Nature Mentors, we made baskets out of invasive English Ivy that we pulled out of Renfrew Ravine; watched salmon spawn in Stoney Creek with our 12-year-old peer mentor (Photo 1); went birding at Jericho Park with a youth mentor (Photo 2); learned what to do (and not to do) with wildlife in our backyards while meeting Cruella the skunk; experimented with "leaves in the sun" on a very rainy day; hiked on the North Shore among giant trees and along rivers; learned all about the amazing fungi that pop up all over Vancouver (Photo 3); pulled weeds (and ate some) at an urban farm and an urban orchard; tried

Photo 2. Young birders at Jericho Park. *Photo: Deborah Simpson*

Photo 3. Learning about the mysteries of mushrooms. *Photo: Sheila Byers*

to find Dungeness megalopae[1] in False Creek, but found four sand lance instead; and got "wowed" in the intertidal area at Stanley Park (Photo 4) with its myriad of fascinating and adaptive creatures—we even listened to barnacles "talking!" We've been busy!! Some of the Explorer Days drew such interest that we offered them twice so all interested families could participate.

1. Megalopae: post larvae (last of a series of larval stage molts) are intermediate between the planktonic (passively floating in water column) and benthic (associated with the sea floor) periods of a crab's life cycle.

Photo 4. Discovering intertidal life at Stanley Park. *Photo: Deborah Simpson*

The Vancouver Club would like to thank all of this year's Nature Mentors for your expertise, generosity, and for sharing your passion about the natural world with our families. Your passion is so wonderfully catchy! We also want to express our gratitude to our 'kids' who energetically pull weeds, gently return shore crabs to their safe hiding places, stand patiently in the rain to watch the super-fast Coho salmon move upstream (one blink and they're gone), and ask—and answer—the most brilliant questions. We look forward to sharing more Explorer Days together.

Note: *In August, several Nature-Kids' leaders and members joined in the Celebration of Life for Daphne Solecki in the big hall at VanDusen Botanical Garden, organized by her family. Daphne chaired the committee that founded Nature-Kids in 2000 and continued to lead the organization through two decades with determination, energy and effectiveness. She lived an incredibly productive life, inspiring many to appreciate nature and to share that appreciation and understanding. Her celebration included her four children and spouses, grandkids, great-grandkids, and countless naturalist colleagues who spoke fondly of Daphne's contributions, many with fond memories of conversations in her backyard nature garden.*

Nature Vancouver Photo Contest

Two photo contest entries, 2022, below; all photos can be viewed on NV's website, under Sections/Photography, together with contest details.

Snow day at Lynn Creek. *Photo: Daphne Hamilton-Nagorsen*

Western Grebe with shiner surfperch, near Crescent Beach. *Photo: Terry Carr*

Wild Pedagogies

Touchstones for Re-Negotiating Education and the Environment in the Anthropocene

Editors: Bob Jickling, Sean Blenkinsop, Nora Timmerman and Michael De Danann Sitka-Sage, 2018
Palgrave Studies in Educational Futures
Series Editor Jan Jagodzinski
Publisher: Palgrave Macmillan Cham, SpringerLink
171 pages; eBook or Hardcover

Pondering Nature as Teacher

Rivers of moss meander up to Midtdalsbreen glacier. Her ice glows blue and deep and whispers the language of the ancients. Huge glacial shards crash into the river, shedding tears of this mountain

that flow into Finse, Norway below. Our guide, Marianne, knows this glacier well. It used to blanket the mountainside. She struggles to keep her voice steady—everyone, including the glacier, is fighting back tears—as she speaks to the dramatic decline of Midtdalsbreen. We stand here as witnesses of the climate crisis.

Nearly thirty academics and outdoor enthusiasts from around the world are in Norway for this Wild Pedagogies Colloquium, which gives the natural world an active role as presenter, facilitator and co-teacher. There are no formalized workshops or presentations. Instead, we walk and listen to the land, and, through this attunement, the wilderness becomes our mentor and guide. This idea is foreign, even antithetical, to western-settler understandings, yet is familiar to Indigenous ways of knowing.

The book *Wild Pedagogies: Touchstones for Re-Negotiating Education and the Environment in the Anthropocene* was inspired by place-based conversations. This book asks us to question our cultural norms and engage with the natural world through immersive experience and intentional reflection. The teachings within are applicable to learners of any age; the prose is accessible, researched and written by leading experts in environmental education.

If you are interested in learning on and with the land and cultivating respect and reciprocity with the more-than-human world, consider this book your touchstone. In fact, Wild Pedagogies outlines six touchstones for doing this work:

- Nature as Co-Teacher
- Complexity, the Unknown, and Spontaneity
- Locating the Wild
- Time and Practice
- Socio-Cultural Change
- Building Alliances and the Human Community

Rivers of moss meander to the glacier. *Photo: Lee Beavington*

Each touchstone section concludes with a list of powerful questions to ponder, such as

- "How did I notice and overcome my own and my students' colonial habits in relating to the natural world?;"
- "Did learners encounter the incomplete nature of knowledge today?;" and
- "Where are my habitual ways of doing things still limiting possibilities?"

Wild Pedagogies asserts that our current relationship with the Earth is not sustainable. If we want to address the climate emergency, ecological collapse, and the myriad environmental crises at hand, we need to get wild with our teaching and learning. Not wild in the sense of being out of control, but wild in terms of being, as this book defines it, "a place where there is freedom to flourish."

The poet-scientist Jacob Bronowski visited Nagasaki after the atomic bomb had turned that city into what he called an "ashy, clinical sea of rubble." He implored the United Nations to hold talks of nuclear disarmament in Nagasaki, where the impacts could be unmistakably felt. Similarly, perhaps standing next to a melting glacier is the right place to discuss climate solutions. A forest is where we talk about species extinction. A river is where we discuss salmon decline.

Wild Pedagogies encourages us to get out of our heads and into our hearts, to let go of constraint and control, and to re-wild education by "attending to the untamed." To recognize that "this multispecies,

Midtdalsbreen, a fading Norwegian glacier. *Photo: Lee Beavington*

multicentric world is a communicator." This book is an educator's guide on how to re-animate the world and help our learners feel the pulse of place. The land informs everything we do. We just need to listen. Wild Pedagogies is a wise, philosophical roadmap for engaging in this work.

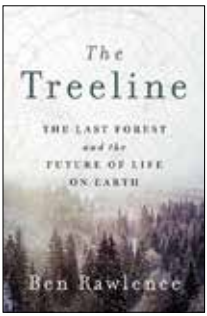
This review is by Lee Beavington. Lee is a settler-scholar of European ancestry. He is an award-winning author, learning strategist, and interdisciplinary instructor at Kwantlen Polytechnic University. At SFU he teaches graduate students in nature-based education. He is currently co-developing (with Liz Toohey-Wiese) a stal'əw' (Fraser River) Field School and leading Wild Spaces, an interdisciplinary project on place-based outdoor learning in higher education. Check out his TEDx talk on ***Teaching Science with Compassion and Wonder****.*

The Treeline

The Last Forest and the Future of Life on Earth

Author: Ben Rawlence, 2022, St. Martin's Press, New York
320 pages, black-and-white renderings of botanical features of eight tree species, one map of the arctic and the subarctic boreal forest; $38.50

When Ben Rawlence became engrossed with the question of how climate change is impacting our fragile planet Earth, he realized that the "trees on the march" at the subarctic treeline—the boreal forest—have been telling us this story for decades.[i] Daunted by the scope of such a huge topic, Rawlence discovered that the growth and habits of a mere handful of tree species—one or two per arctic country—predict and describe what is going on regarding climate change on our planet.



Already a researcher for Human Rights Watch's Africa division, an author of two books (*Radio Congo: Signals of Hope from Africa's Deadliest War*, published in 2012 and *City of Thorns: Nine Lives in the World's Largest Refugee Camp*, 2016) and a writer for *The New York Times*, *The Guardian* and *London Review of Books*, Rawlence knew what to do. He researched and visited the location in the boreal subarctic of each of these species, until COVID-19 stopped his journeying to a few of the locations. Nevertheless, he pursued the topic using every other method available, meeting both Indigenous locals and experts.

He observed these tree species firsthand:

- *Pinus sylvestris*, Scots pine, in Scotland, UK
- *Betula pubescens*, downy birch, in Norway, Scandinavia
- *Larix gmelinii*, Dahurian larch, in Siberia, Russia
- *Picea glauca*, white spruce, and *Picea mariana*, black spruce, in Alaska, USA
- *Populus balsamifera*, balsam poplar, in Canada
- *Sorbus groenlandica*, Greenland mountain ash, also known as rowan, in Greenland, an island that's part of Denmark

In places, these trees shrink from being of a medium height (between 6 and 12 metres), down to a short height (between 3.5 and 6 metres). Then as the harsh soil and wind conditions at the edge of the muskeg (or the steppe or the tundra or the taiga) challenge them further, these trees max out at head height, or shoulder height, or finally at a ground-creeping, stunted krummholz height, their form hugging the ground, away from the wind.

Rawlence also introduces his readers to a particular tree of indeterminate age (because of its capability to propagate from its

low-growing branches) that grows in the grounds of a church near his home: it's an English yew (*Taxus baccata*). In a glossary of trees at the back of the book, he also describes some of the other common tree species of the boreal forest.

I feel a kinship with the author because he lives in Llanelieu, Brecon Beacons, Wales, eighty kilometres north from where I was born and raised in Cardiff, Wales. This principality occupying the western part of the island of Great Britain was protected from the English by a line of now-ruined castles, before being colonized: "The colonization of Wales was the first expression of an economic system founded on overreach: having exceeded the limits of what their own environment could sustain, early [English] mercantilists applied force to acquire tribute and resources elsewhere."[ii]

The author is also able to observe, sometimes harshly, the predicament of the human inhabitants of these treelines in each subarctic country; often they are the challenges of colonialism. From recognizing that my native land of Wales was colonized in the 1500s, I am personally feeling the self-reproach of colonizing yet another land, Canada.

The human inhabitants of the boreal forests are mostly Indigenous:

- the Sámi of Finnmark, Norway (Finnmark was once and is to be once more in 2024 named a county of Norway)
- the Nganasan of Siberia, Russia
- the Koyukon in Alaska, USA
- the Anishinaabe of Canada (including the Ojibwe, a specific Anishinaabe nation), and
- the Inuit of Greenland, Canada, and Alaska

Writing about the trees of the boreal forest in Scotland first and journeying counter-clockwise (as viewed from the North Pole) through Norway, Siberia, and Alaska, Rawlence arrives in Canada. Here he delivers the harshest indictment of what is happening in the boreal forest—here in my own country. He states that our struggle through reconciliation between Canada's Indigenous people and her colonizers—initially from Europe and now from all over the globe—is muddying our response to climate change. Rawlence's finger-pointing makes me focus in this book review on what he has to say about how Canada is contributing to climate change. I have much to learn.

What does *reconciliation* mean? A dictionary definition says it means to settle our differences, to restore our friendship, to create harmony. But, having read *The Treeline* from canopy to root, I believe *reconciliation* in our Canadian context should mean that "both sides can learn to respect the wisdom of the other," while also "living in harmony and moving forward together." And I have to admit that we are struggling with reconciliation. And with climate change.

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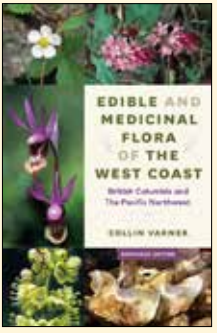

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But that's just one side of this deep study into what is happening in the subarctic boreal zone. What emerges is a story of two opposing views: a small minority continue to deny climate change whereas others are convinced the change is rampant, evident, frightening and has been ongoing since the early 1960s, when Rachel Carson published *Silent Spring*.

Rawlence uses the words of Alexander Tikhomirov, PhD, head of Bios-3 in the Department of Life Support Systems at St. Petersburg State University and of the Siberian Aerospace University, who sees three phrases of awareness: "One, maybe warming will bring benefits. That phase is gone. Two, flora and fauna will shift. That is where we are now. Three, humans will have to adapt to new conditions—soil, agriculture, fight for land, water, resources."[iii]

The shift in flora during the 2020s in Vancouver has been clearly visible. Lawns crisp up into beige-coloured straw. Leafdrop from trees thirsting for rain begins earlier each summer. Native trees, like western redcedar, continue to be challenged by our drier, longer-lasting summers. Big-leaved boulevard trees with insufficient root space tumble across roads in fall rains and winds. Insects such as looper moths and gypsy moths, which benefit from warm conditions, are thriving in outbreak numbers and chomping their way through more tree foliage.

The treeline is responding in different ways in different places, hence another confusion. For instance, "the forest is racing north (three hundred feet per year in Scandinavia)" and in other places it is moving more slowly, at "less than thirty feet a year in central Canada."[iv] Even so, the northward move of trees appears to be relentless.

Whereas the premise of this book might be to convince its readers that climate change is upon us and we are deep into stage two, the solution to this dilemma is unclear. This is because the solution at the treeline itself varies according to the geography, hydrology and ecology of the land. And it varies according to the tree that is the keystone species there, the one that holds together all the flora and fauna that call that forest *home*.

The government ruling the country where the subarctic boreal treeline exists has a huge impact on the response to the treeline's move north. For instance, Alaska is where the most money has been spent on research; after all, it is research that will determine the best next steps. In Russia, the least money has been spent and its boreal forest covers ten time zones and more than five thousand kilometres.

What are we doing here in Canada? Rawlence cites two recent articles on Canada's underreporting of the rate at which we are cutting down our boreal forest.[v] One of these references states

that "Canada has been reporting a deforestation rate of 2,800 ha/year, a fraction of the actual total…. Canada's forests are emitting more carbon into the atmosphere than they are absorbing…. Canada's forests could make the difference we need this decade to avoid worst case climate breakdown. Forests are irreplaceable carbon sinks and our country is basically one of the largest forests on Earth."

We in Canada are at the top of the table of the world's countries speeding up global warming, by cutting down balsam poplar in our far north and exporting it all over the world as pulp and paper simply to supply paper products. Balsam poplar is the best tree species growing in Canada for pulp and paper and we are the largest exporter of pulp and paper in the world. However, this tree is also the "nurse of the woods" to our First Nations peoples, for its medicinal values. Its abundant leaf litter makes it a keystone species in Canada's boreal forest.

Rawlence says Natural Resources Canada states the nation's deforestation rate at 0.4 percent, "but conveniently assumes that all the clear-cutting in the boreal will eventually grow back and therefore does not count. In fact, once disturbed a precious ecosystem … which has evolved over thirty thousand years and is still evolving, can never be replaced."[vi] Here we are, hurtling toward the third stage, the climax point of the three phases of climate change. People don't realize how suddenly this will happen. There will be a moment when too much carbon dioxide will have accumulated in the atmosphere, more than plants can use. At that point, trees and shrubs will start dying. When flora die, they aren't breathing out the by-product of photosynthesis: oxygen. When there is less oxygen in our atmosphere, we fauna who breathe it in to survive…

If you want to acknowledge your responsibility for climate change, read *The Treeline.* Because our ancestors were responsible; we still are. Should we be stewarding the Earth, to live with it in *a sufficient way*? Rawlence learned from the Sámi people that *sufficiency* is the exact opposite of "the modern idea of sustainability, which is based on the maximum surplus that can be extracted without destroying nature's capacity to sustain the resource."[vii] It is an important distinction.

Which are we doing? Stewarding sufficiently? Stewarding sustainably? Or stewarding unsustainably?

Should we be planting trees in the boreal forest? Plant the same species that are already growing there? While some might see this as assisted migration of tree species able to survive the climate, others understand that the more trees are planted into permafrost, the faster the permafrost melts, speeding up global warming.

What can we do to slow climate change? Is it enough to do as the

Indigenous people of many lands say, to recognize the spirit, the divinity, in every rock, tree, river, and landmark, and honour it?

As a Canadian, apart from reading *The Treeline*, what can you do to learn more about Canada's influence on climate change. And then what can you do?

This book reviewed by Nina Shoroplova who is herself the author of Legacy of Trees: Purposeful Wandering in Vancouver's Stanley Park, *a finalist in the 2020 British Columbia Lieutenant Governor's Historical Writing Awards. She is a member of Vancouver Master Gardeners and the Botany Section of Nature Vancouver.*

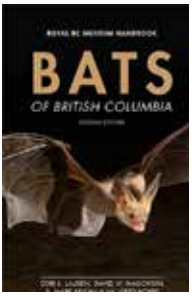
Endnotes

i. *The Treeline*, p. 5. Also, *borealis* is Latin for "north" and "northern"; so "boreal forest" means the forest in the north.
ii. Ibid. p. 3.
iii. Ibid. p. 95.
iv. Ibid. p. 150.
v. Ibid. p. 190 refers to the article by Tracy Glynn, "Canada is under-reporting deforestation, carbon debt from clearcutting: Wildlands League," *NB Media Co-op*, January 15, 2020; Frederick Beaudry, "An update on deforestation in Canada," treehugger.com, January 31, 2019.
vi. *The Treeline*, p. 190.
vii. Ibid., p. 74.

Bats of British Columbia (Second Edition)

Authors: Cori L. Lausen, David W. Nagorsen, R. Mark Brigham, and Jared Hobbs, 2022
Royal British Columbia Museum, Victoria
375 pages; paperback; $34.95; KOBO EBOOK (Indigo); $15.99

Many bat biologists, bat ambassadors and naturalists eagerly awaited publication of the second edition of this book about bats in British Columbia. Its release is appreciated by those involved in the conservation, research, monitoring, habitat management and study of bat species.



When published in 1993, the first edition of this book was considered as the principal reference book regarding bats in our province and elsewhere in Canada. While the first edition contained a great deal of useful information, since its publication substantial new research and field studies have been conducted regarding bats. Moreover, new technology and research tools have greatly increased our knowledge of bat fauna. Consequently, this second edition benefits from the use of new genetic techniques, bat acoustic detectors, mobile devices, data loggers and other scientific devices.

This book stands out as a very comprehensive reference and

information source of bats and their habitat in BC. With the increased importance of bat conservation, particularly in light of the impending advance of white-nose syndrome toward our province, this book will serve as an excellent reference source.

The contents of this book can be summarized as follows:

- **Preface**—an explanation of the changes to this second edition in comparison to the 1993 first edition.
- **Introduction**—a brief overview of bats around the world; the origins and classification of bats with an indication of bat species composition in North America, taxonomy and nomenclature for classification of wildlife and bats in particular, and a checklist of bats and brief description of bats in BC.
- **General Biology of Bats**—bat morphology, reproduction, roost types and selection, hibernation, disease and health, conservation and threats, and ways in which biologists can study bats. The section on conservation and threats presents two new major threats to bats that arose in the early 21st century: fatalities from wind turbines and from white-nose syndrome.
- **Identifying BC's Bats**—parameters for identifying bat species including in-hand differentiation, morphometrics (key body measurements), a list of diagnostic external features, an illustrated morphological key to BC bats (which is very helpful for identification), an overview of acoustics and echolocation, the use of acoustics to differentiate bat species, and a key to BC bats based on acoustic characteristics.
- **Species Accounts**—detailed information regarding 15 bat species presented through 12 categories: acoustic characteristics, distribution and provincial range, roosting habitat, feeding habitat and methods, reproductive cycles, winter biology with migration movements and winter hibernation sites, conservation status and ranking, taxonomy and variation (e.g., recognized subspecies), body measurements and mass, remarks such as interesting facts and areas for future study, and references that support information in this document.
- **Appendices 1 to 5**—common and scientific names of other species referenced in the book, a key to skulls and dental traits of BC bats, a reference table for species morphology, an acoustic species summary table, and a list of fun bat facts.
- **Ending pages**—glossary, extensive list of references, index and profiles of the authors. The inclusion of a thorough glossary is a welcome feature of this document.

The comprehensive accounts of BC's bat species really stand out as a major feature of this book. This

information, combined with the bat species identification parameters, provides the reader with an excellent resource to identify bats, as this can be quite challenging depending on the bat species. The book content sections also help to better understand the biological characteristics of these bats. What also makes this book a really valuable field guide are the detailed close-up photographs of the different bat species taken from a variety of angles and positions. These high-quality bat photos and illustrations allow the reader to see bats in habitats seldom ever seen by most people, such as in caves and mines where bats hibernate.

While this book contains a great deal of scientific information, the manner in which the content is written makes for an interesting read. I found the book to contain a good mixture of reference information and interesting facts, with fascinating insights provided regarding bats and their characteristics. The content is presented in a logical, organized and accessible format as a field guide. This book really benefits from behavioural information that is based on data collected from field work, which makes for a very engaging and interesting read for a wide audience.

My one minor concern regarding this book was that the paper used for printing does not do justice to the superb bat photographs, almost all of which were taken by Jared Hobbs. This may have been done to keep publishing costs reasonable and/or to ensure that the book's paper was obtained from responsible sources. However, the electronic version of the book may show the photographs in greater detail. (The Kobo eBook is available through Indigo.)

This book well serves a variety of audiences; it would be quite welcome in one's home library, a public or school library, or as a reference field guide for biologists and bat enthusiasts.

In summary, this book represents a superb reference document. It is also a first-rate field guide, which serves as a comprehensive compendium as to what the authors as bat specialists know about the world of bats in BC.

This book was reviewed by John Saremba. Since 2016, John has coordinated a comprehensive program for stewardship and community involvement in the conservation of bats and protection of their habitat. Through the Burke Mountain Naturalists, this group of volunteer bat enthusiasts conduct a range of bat-related activities and field work in the Tri-Cities and Fraser Valley region. This conservation and education work is done in association with the BC Community Bat Program. Through his direct involvement with bat monitoring and knowledge of bat colonies in the Tri-Cities area, John has had the pleasure of directly supporting research projects conducted by Dr. Cori Lausen and other bat biologists.

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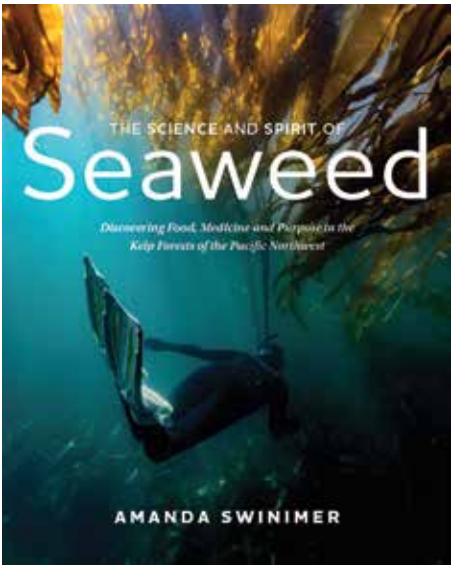

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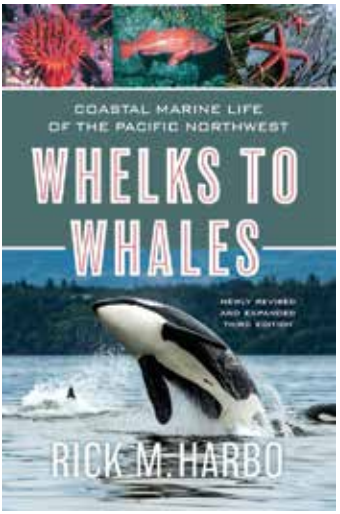

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The Science and Spirit of Seaweed

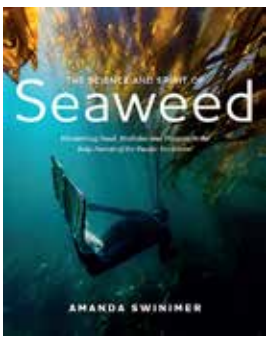
Discovering Food, Medicine and Purpose in the Kelp Forests of the Pacific Northwest

Author: Amanda Swinimer, 2021
Harbour Publishing, Madeira Park, BC
246 pages, paperback; $28.95;
20.5x25.5cm

Amanda Swinimer (Dakini Tidal Wilds) offers a delicious and thought-provoking smorgasbord in *The Science and Spirit of Seaweed*. Part autobiography, part taxonomic algae harvest guide, part seaweed and human health literature review, part ecological alarm bell, part cookbook, part confessional—this tome is a feast from start to finish.

I recommend this astonishing book to anyone who might have an interest in learning about BC's most commonly-harvested seaweeds, their nutritional and potential health benefits, and about some of the commercial and regulatory issues concerning wild harvest and mariculture.

The *Science and Spirit of Seaweed* has the appearance and feel of a learning manual. Readers are immediately immersed in the practice of wild seaweed harvest through the silky, mysterious full-page cover photograph of the author on a dive within a kelp forest.



Swinimer devotes half the book to presenting the most-commonly harvested species of seaweed among the three types of algae: green, red and brown.

Each major genus that is harvested from the wild has its own section. Firstly, the common name is stated, followed by a line drawing of the whole alga, the formal taxonomic identification, and a few pages that describe the geographic/ecological range, utility, nutritional properties, healing aid/spa properties/potential, harvesting techniques and culinary tips.

Readers are treated to copious lavish photographs and I, for one, found an ever-increasing desire to cook with seaweed as I studied Amanda's descriptions.

About a quarter of *The Science and Spirit of Seaweed* covers two sections titled "Seaweed & Health" and "Algae: A Global Perspective". These are difficult to read primarily because of the scientific ambiguity of the former and the sociopolitical enormity of the latter.

From a purely chemical point of view, seaweed offers the potential for direct benefits to human health through homeostatic maintenance and disease intervention. However, to prove that algae truly are "...potent allies for health" is no easy task. Still, against the over-hyped background claims for

various miraculous algal-mediated panaceas, Swinimer bravely takes a wisely cautious dip into the dangerous quagmire of medical literature. With a clearly stated caveat that most of the reports (listed in the 300-plus-entry bibliography) are based on in vitro or animal model investigations, she makes a valiant pitch for more exploration of the deployment of algal products and phycochemical preparations in human health and welfare. Essentially, it appears that seaweeds contain all the ingredients to support human health but it is up to the body to take the benefits from algae, with or without technological assistance. "Seaweed & Health" is a good starting point for serious students interested in this emerging field.

"Algae: A Global Perspective" gives a quick synopsis of the importance of Earth's marine environment for planetary health, highlighting biodiversity, chemical cycling and climatic modulation. Topics include human responsibility, the algal role in marine ecology, sustainable harvest and mariculture, pollution, economics and regulation. Again, I would say that this is a good starting point for those wanting to pursue these matters further.

For the commercial situation of the seaweed industry in BC, I recommend "A precautionary approach to seaweed aquaculture in North America—A position paper by the Seaweed Commons" authored by Swinimer and others (***www.dakinitidalwilds.com*** under Media/Articles). See also, the recommended reading list.

The last section of *The Science and Spirit of Seaweed*, a little more than one-tenth of the script, is a luscious collection of illustrated recipes donated by 17 chefs. Each of the dishes is clearly and precisely written. Most of them left me drooling. I think, though, that my own skills won't take me much beyond the recipe from the Winged Kelp (*Alaria marginata*) write up on page 87 for lingcod, pepper and Grand Fir sprig wrapped together in algal frond and baked.

In addition to the extensive bibliography, the book finishes with a full page of acknowledgements, a three-page glossary (only one incorrect entry under Interferons), five recommended readings, a comprehensive index and a one-pager about-the-author.

The *Science and Spirit of Seaweed* is packed with gobs of factual information directed principally to the lay audience. My only technical quibbles were with the mixed units of measure (200 metres and 25 feet in the same paragraph) and the very minor unnecessary use of acronyms.

But wait—what about the 'Spirit of Seaweed'?

Swinimer's 'Seaweed Spirit' dialogue first revealed in the cover photograph and on the dedication page, is sprinkled throughout the book as a series of more than 36 texts, at least 10 quotes, 17 or

more photographs of Swinimer herself within the kelp forests or in the ocean shallows, at least eight deep-dark-and-mysterious kelp forest photographs with no people, and dozens of other photographs that illustrate seaweed physiognomy, harvest and processing, the people who apprentice, research and lobby in the world of algae, and of course the family, wildlife and dog who inspire Swinimer in her calling. Some of the texts are anecdotal, others testimonial, a few are confessional and all are spiritually philosophical.

Leonard Cohen: "If you don't become the ocean, you'll be seasick every day."

Anaïs Nin: "I must be a mermaid…I have no fear of depths and a great fear of shallow living."

Amanda Swinimer: "Following your passion, your curious longing, your intrinsic love, can lead you to places you would never have dreamed. For example, a childhood love of dolphins could lead one to create a life among mystical kelp forests and seaweeds..."

Amanda Swinimer: "The ocean is sacred to me. Every drop of it is holy water."

This book reviewed by Stephen Partington. He studied botany, agriculture and microbiology. He is a retired health care research technologist in diagnostics, marine drug discovery and development, and sterile supply. Stephen discloses that he loves to eat.

Whelks to Whales

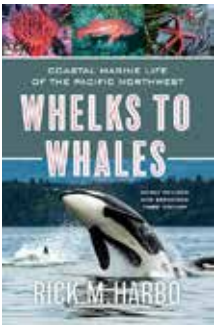
Coastal Marine Life of the Pacific Northwest

(Revised and Expanded Third Edition)

Author: Rick M. Harbo, 2022
Harbour Publishing Co. Ltd.,
Madeira Park, BC
352 pages; paperback; $28.95

A Perspective on Rick Harbo's Wealth of Guidebook Contributions

Whether exploring the coast by boat, intertidal areas by foot, subtidal snorkelling or scuba diving to take a closer look at the spectacular flora and fauna, there is something of interest for everyone in Harbo's books and brochures. He is an experienced biologist, diver, photographer, researcher, a prolific writer and an educator. Although retired from his position as a senior marine biologist with Fisheries and Oceans Canada, Harbo's love and enthusiasm of documenting BC's marine life shines through in his revised *Whelks to Whales* and in his several earlier published guidebooks.



Diving since 1972, Harbo has contributed greatly to our understanding and appreciation of the Pacific Ocean coastline, extending from Alaska through British Columbia and south to California. He essentially 'led the pack' of

divers who focused on photography and species documentation in guidebooks. Here is a brief synopsis of his guidebooks:

- 1980: ***Tidepool & Reef, Marinelife Guide to the Pacific Northwest Coast***—a best seller—covered invertebrates, fishes and representatives of seaweeds and seagrasses (or seed plants).
- 1988: ***The Western Seashore, Introductory Marinelife Guide to the Pacific Coast*** expanded the species of seaweeds and in addition to the fishes, introduced a second group of vertebrates, marine mammals.
- 1988: ***The Edible Seashore, Pacific Shores Cookbook & Guide*** (and second printing 2005) provided comprehensive details from catching to serving edible seafood found on the Pacific coast. (The above titles were published by Hancock House Publishers.)
- 2003: ***Pacific Reef & Shore, A Photo Guide to Northwest Marine Life*** (and second unabridged edition 2017) provided new species, up-to-date scientific information and many brilliant photographs of more than 300 common animals, seagrasses and seaweeds found in the intertidal zone.

Harbo's books were intentionally compact and the perfect size for carrying and travelling. As his repertoire of species expanded, however, so did the size and bulk of his guidebooks. Whether due to an increased interest in seafood, unfurling new research details, or too much information to include in one book, his 1997 book focused entirely on the phylum Mollusca.

- 1997: ***Shells & Shellfish of the Pacific Northwest, A Field Guide*** described 225 of the most familiar mollusc species: clams, oysters, mussels, abalone, snails, whelks, tusks, chitons and other common shellfish inhabiting the beaches, shallow waters and intertidal areas near saltwater. A fascinating new section: "Bivalve Siphons and Shows or 'Eyes Looking Out'" focused on close-ups of the inhalant and exhalent siphons with excellent descriptions and keys connecting the siphons with their bivalve species. Appendices included important Recreational Harvest Information, Licensing Requirements and Regulations; toxin risks associated with Paralytic Shellfish Poisoning (Red Tide); and, a rarely-included and captivating "Glossary of Approximate Meanings of Scientific Names."

Curiously, and in-spite-of the comprehensive book on ***Shells & Shellfish***, the new ***Whelks to Whales*** book included, rather than excluded, molluscs. Perhaps this broader content coverage of marine life within one book, resulted in ***Whelks to Whales*** becoming the book in greatest demand with three editions, as follows:

- 1999: ***Whelks to Whales, Coastal Marine Life of the Pacific Northwest*** incorporated 420 of the most common species of invertebrates (including molluscs), fishes and marine mammals.
- 2011: ***Whelks to Whales, Coastal Marine Life of the Pacific Northwest*** revised and expanded second edition included an additional 60 new species, and an excellent new chapter "Field Guide to Eggs and Egg Cases of Invertebrates and Fishes."
- 2022: ***Coastal Marine Life of the Pacific Northwest Whelks to Whales*** revised, full-colour and expanded third edition includes more than 500 of the most common local species including sponges, jellyfishes, crabs, shrimps, barnacles, clams, snails, octopus and squid, seals, fishes, whales, sea algae to name a few. Of these species, 40 are new. Also new is a chapter on "Non-Native, Introduced and Aquatic Invasive Species" which brings this very relevant topic into focus. (These six books were published by Harbour Publishing.)

Harbo writes and illustrates his books to help us observe and identify animals, seaweeds and flowering plants in their natural surroundings without disturbing them. By doing so, the observer benefits by better understanding the relationship between the organism and its environment. Harbo prefers 'capturing' the organisms by using a camera, sketchbook or notebook so that the beach remains undisturbed for the wildlife and for people to experience. Most chapters or subgroups within a chapter have schematic diagrams to illustrate the anatomy or physical features of a specific group. Most books include a reading list and full index, but a glossary was not introduced until the *Shells & Shellfish* book.

Harbo's books include the range of species observed that inhabit the shorelines of Alaska, British Columbia, Washington and Oregon to northern California. A map that is included highlights the Pacific Northwest coast of North America and species' range distribution specifically to Point Conception, California. This (approximate) landmark identifies the biogeographic zone where northern species of algae and invertebrates dominate. Southward from Point Conception, a mixing of northern and southern invertebrate and algal species occurs, influenced by currents, cold and warm water mixing, upwelling, and other factors.

Over time and with improved technology, the photography and layout of Harbo's guidebooks vastly improved the 'look' of the books. Compared to his first book in 1980, the ***Whelks to Whales*** 2022 book has a cleaner layout and readability, with species details formalized under the titles of Common Name, Scientific Name, Size, Range, Habitat, Description and

Comments. Scientific names have been updated and common names changed to be more consistent with other recent marine-life guides.

Harbo's books and species information are well-researched to include an abundance of natural history details, predator/prey relationships and highlights of commercial and recreational fisheries. He includes historical details about coastal Indigenous peoples. ***Shells & Shellfish*** is especially interesting as it includes species traditionally used for food, decoration, currency in trade, as well as Indigenous harvesting and fishing techniques.

Harbo's books have greatly improved my knowledge and understanding of the incredible diversity of species, especially the intertidal invertebrates. Personally, I carry both the ***Whelks to Whales 2022*** and ***Shells & Shellfish*** books with me wherever I go exploring the inhabitants along BC's coastline.

This book reviewed by Sheila Byers. *See her bio on p. 47.*

Cover Photo Stories

Front Cover Photo by Neil McDaniel

The gorgonian coral, Primnoa pacifica*, inhabiting Hoeya Head Sill, Knight Inlet*

Forty metres beneath the surface of Knight Inlet, just west of the Hoeya Head Sill, underwater photographers Tom Sheldon and Lou Lehmann pose behind a magnificent fan of the gorgonian coral *Primnoa pacifica*. While this coral is relatively common in deep water along the Pacific coast of North America, the Hoeya Head Sill is the only site in Canadian waters where it occurs shallow enough that it can be observed using scuba. These precious coral gardens are currently at great jeopardy of destruction by bottom-contact fisheries. The image was taken using a Nikon D100 digital SLR camera in Subal housing; artificial light was provided by twin Ikelite strobes.

Back Cover Photo by Lee Beavington

A study of curls: deer fern unfurling

Deer fern fiddleheads, both for the fertile and sterile fronds (pictured here), typically unfurl amongst last year's dying fronds in April or early May. The author took this photo of his daughter in a place we call Fern Alley on Mayne Island where hundreds of deer fern flourish together. Read more about deer ferns on p. 64.

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A study of curls. *Photo: Lee Beavington*

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