



Species and Ecosystems at Risk in the Resort Municipality of Whistler 2019 Update

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Notes about this report

The data and conclusions presented here are the culmination of more than 15 years of work with the Whistler Biodiversity Project (WBP) which has now inventoried over 4,300 species. The assessment and inclusion of species at risk are based on data compiled by the WBP, data from the BC Conservation Data Centre (CDC), other online and printed sources, and the experts mentioned below and referenced in the report. I chose to be as definitive as possible about the likelihood and, perhaps as importantly, non-likelihood of species at risk in the RMOW. This intention means that some species labelled, for example, “Likely” may never be found in the RMOW and some labelled “Unlikely” may eventually be found (the Dun Skipper shown on the cover is one such example).

The uncertainty surrounding the distribution of species, whether at risk or not, is always an interesting challenge for biologists, and species often occur in unexpected locations. These facts highlight the need for qualified surveyors who conduct surveys for the species groups of interest at appropriate times and with appropriate protocols. Species at risk surveys require biologists with expertise in each targetted group and all such people I’ve been lucky enough to work with are delighted to prove a list incomplete by finding new species or correcting past data. Future versions of the lists presented here will undoubtedly decrease any errors and omissions as well as hone the accuracy of which species at risk and habitats should be considered for protection during conservation planning and the RMOW development process.

Acknowledgements

When I started the Whistler Biodiversity Project in late 2004, a comprehensive list as presented here was one of my major goals. These results would not have been possible without the contributions of the many scientists and volunteers listed in Appendix 3 who performed targetted surveys for the Whistler Biodiversity Project or participated in Whistler BioBlitz and Fungus Among Us. All three of those efforts would not have been possible without support from the Community Foundation of Whistler (CFOW), Resort Municipality of Whistler (RMOW), Whistler Naturalists, Association of Whistler-Area Residents for the Environment (AWARE), Whistler Blackcomb EFund, and others.

I would especially like to thank the following scientists for improving the accuracy of the original 2016 report as well as annual updates since: Curtis Björk (vascular plants and lichens); Adolf Ceska and Andy MacKinnon (vascular plants); Steve Joya and Olivia Lee (mosses and liverworts); Trevor Goward and Daryl Thompson (lichens); Paul Kroeger (fungi), Karen Needham, Chris Ratzlaff, Sean McCann, Tyler Kelly, and Claudia Copley (insects); Robb Bennett (spiders); Scott Gilmore (beetles); Libby and Rick Avis (moths), Crispin Guppy and Derrick Marven (butterflies); Denis Knopp (dragonflies); Robert Forsyth (snails and slugs); Christopher Stinson and Steve Rochetta (mammals); Eric Crowe and Veronica Woodruff (fish); Karl Ricker, Heather Baines, and George Clulow (birds); Elke Wind (amphibians); Brent Matsuda (small mammals, birds, amphibians); Leslie Anthony (reptiles); and Pamela Zevit (legislation).

BioBlitz and Fungus Among Us would not have been possible without my co-organizer Kristina Swerhun. I also appreciate all the work done for these events by Julie Burrows and other volunteers from the Whistler Naturalists. Tina Symko and Heather Beresford (RMOW) were instrumental in ensuring this information was originally published in 2016. Carol Coffey (CFOW) helped in many ways to support the Whistler Biodiversity Project from its early days. Bob Green and Pamela Zevit provided helpful comments to improve the original report that I have followed since. I’d also like to acknowledge the vast efforts of Brian and Rose Klinkenberg whose EFlora and EFauna websites are incredible resources for identification and information about species in BC.

Cover Photo: Whistler’s first record of the Red-listed Dun Skipper butterfly (*Euphyes vestris*) was seen feeding on western yarrow flowers on June 30, 2019 near Cheakamus Crossing (Bob Brett photo). This record represents a range extension for the species since the nearest previous records were from the Pemberton Valley.

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Executive Summary

This report presents the third annual update for the Resort Municipality of Whistler's (RMOW) list of species and ecosystems at risk first published in 2016. It combines and updates local data collated by the Whistler Biodiversity Project (including important contributions from the Whistler Naturalists' BioBlitz), the knowledge of many experts, RMOW records, and museum and government data.

Before these reports, the BC Conservation Data Centre (CDC) was the primary and sometimes sole source for information about local species at risk in the Whistler area. In spite of the important work the CDC does, it is not yet able to provide comprehensive local-scale data on which species do and do not occur within the RMOW. The CDC has limited resources for species surveys throughout BC and limited resources to assess and enter existing information. As a result, online searches at the CDC website can yield false positives (species which are unlikely or impossible in the RMOW) and, as importantly, false negatives (species which are in Whistler or could occur).

The intention of this updated report is to provide the best available information about species and ecosystems at risk within the RMOW. It is meant to be the authoritative reference for listing which species should be considered during conservation planning within the RMOW. Conservation planners, environmental consultants, and other interested parties should refer to updated lists presented here rather than lists generated by CDC searches.

This report includes the following updates since 2018:

- Updated species rankings by the BC Conservation Data Centre (CDC) including the downlisting of nine species (now ranked Yellow, or Secure) and delisting of one species.
- Updated species rankings under Federal Species At Risk (SARA) legislation.
- The addition of one (possibly two) new species previously unknown and unexpected in the RMOW.
- Reassessment of all species included in the 2018 report based on new records.

A total of 162 species at risk are considered in this report. This total includes the 10 removed in 2019 through downlisting and delisting. (New information, especially from surveys in northern BC has revealed that many species, especially lichens, are more common in BC than previously thought.) The 2018 reassessment removed 23 species from the RMOW list (mostly lichens) due to downlisting or delistings, and the 10 in 2019 continue that trend. Such work to continually reassess rankings is important because it helps planners and conservationists concentrate scarce resources on species that are truly at-risk.

As of December 31, 2019 the total number of species at risk by local status is as follows (2018 totals in parentheses):

- 50 (58) Confirmed;
- 13 (12) Likely;
- 11 (11) Migratory (bird species that have enough presence to be considered during conservation planning);
- 6 (2) Data Deficient;
- 1 (1) Extirpated;
- 22 (23) Possible;
- 31 (34) Unlikely to Not possible species;
- 18 (16) Casual and Accidental bird species (without significant or and/or annual presence); and
- 10 (23) Downlisted and Delisted.

There has been no change to the rankings of ecosystems at risk which remain at seven Red-listed and 12 Blue-listed. Almost all of these ecosystems are old forests found at lower elevations in Whistler Valley, in areas with the highest risk of development and within the scope of the Cheakamus Community Forest.

The following tables list species at risk that are Confirmed, Likely, and Migratory, that is, those that should be the highest priorities for conservation planning. (Species at risk in other categories are listed in full in Section 4 of this report.)

Species at risk in the RMOW, updated to December 31, 2019. Key: E (Endangered), T (Threatened), SC (Special Concern).

	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
CONFIRMED	Butterfly	<i>Callophrys eryphon</i> ssp. <i>sheltonensis</i>	Western Pine Elfin, <i>sheltonensis</i> ssp.		Blue		
		<i>Euphyes vestris</i>	Dun Skipper	Yes	Red	T/T	
		<i>Parnassius clodius</i> ssp. <i>pseudogallatinus</i>	Clodius Parnassian, <i>pseudogallatinus</i> ssp.		Blue		
	Amphibian	<i>Anaxyrus boreas</i>	Western Toad		Yellow	SC/SC	
		<i>Ascaphus truei</i>	Coastal Tailed Frog		Yellow	SC/SC	Yes
		<i>Rana aurora</i>	Northern Red-legged Frog		Blue	SC/SC	Yes
	Bird	<i>Accipiter gentilis</i> ssp. <i>laingi</i>	Northern Goshawk, <i>laingi</i> ssp.		Red	T/T	Yes
		<i>Ardea herodias</i> ssp. <i>fannini</i>	Great Blue Heron, <i>fannini</i> ssp.		Blue	SC/SC	Yes
		<i>Butorides virescens</i>	Green Heron		Blue		
		<i>Chordeiles minor</i>	Common Nighthawk		Yellow	SC/T	
		<i>Coccothraustes vespertinus</i>	Evening Grosbeak		Yellow	SC/SC	
		<i>Contopus cooperi</i>	Olive-sided Flycatcher		Blue	SC/T	
		<i>Cypseloides niger</i>	Black Swift		Blue	E/E	
		<i>Hirundo rustica</i>	Barn Swallow		Blue	T/T	
		<i>Megascops kennicottii</i> ssp. <i>kennicottii</i>	Western Screech-Owl, <i>kennicottii</i> ssp.		Blue	T/T	
		<i>Patagioenas fasciata</i>	Band-tailed Pigeon		Blue	SC/SC	
	Fish	<i>Salvelinus confluentus</i> pop. 28	Bull Trout - South Coast Population		Blue	SC/SC	Yes
	Mammal	<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> ssp.		Blue	SC/SC	Yes
		<i>Myotis lucifugus</i>	Little Brown Myotis		Yellow	E/E	
		<i>Oreamnos americanus</i>	Mountain Goat		Blue		
		<i>Ursus arctos</i>	Grizzly Bear		Blue	SC/SC	Yes
	Lichen	<i>Alectoria imshaugii</i>	spiny witch's hair		Blue		
		<i>Nodobryoria subdivergens</i>	alpine redhead		Blue		
		<i>Umbilicaria decussata</i>	electric rocktripe		Blue		
		<i>Umbilicaria krascheninnikovii</i>	lesser salted rocktripe		Blue		
	Liverwort	<i>Haplomitrium hookeri</i>	liverwort		Blue		
		<i>Jungermannia atrovirens</i>	liverwort		Blue		
		<i>Nardia breidleri</i>	liverwort		Blue		
		<i>Nardia compressa</i>	liverwort		Blue		
		<i>Nardia geoscyphus</i>	liverwort		Blue		
		<i>Scapania curta</i>	liverwort		Blue		
		<i>Scapania obscura</i>	liverwort		Blue		
		<i>Scapania scandica</i> var. <i>scandica</i>	liverwort		Blue		
		<i>Solenostoma confertissimum</i>	liverwort		Red		
	Moss	<i>Brachydontium olympicum</i>	Olympic brachydontium moss		Red		
		<i>Brachythecium holzingeri</i>	Holzinger's brachythecium moss		Blue		
		<i>Bryum pallescens</i>	tall-clustered thread-moss		Blue		
		<i>Grimmia caespiticia</i>	grimmia moss		Blue		
		<i>Grimmia donniana</i>	Donn's grimmia		Blue		
		<i>Grimmia incurva</i>	black grimmia		Red		
		<i>Homalothecium nevadense</i>	Nevada homalothecium moss		Blue		
		<i>Hygrohypnum alpinum</i>	alpine hygrohypnum moss		Blue		
		<i>Orthotrichum pylaisii</i>	Pylais' orthotrichum moss		Blue		
		<i>Pohlia cardotii</i>	Cardot's pohlia moss		Blue		
		<i>Pseudoleskea radicata</i> var. <i>pallida</i>	pseudoleskea moss		Blue		
		<i>Racomitrium pygmaeum</i>	pygmy racomitrium moss		Blue		
		<i>Schistidium crassipilum</i>	thickpoint grimmia		Blue		
		<i>Tripterocladium leucocladulum</i>	tripterocladium moss		Blue		
	Aquatic	<i>Utricularia ochroleuca</i>	ochroleucous bladderwort		Blue		
	Tree	<i>Pinus albicaulis</i>	whitebark pine		Blue	E/E	

Species at risk in the RMOW, updated to December 31, 2019 (cont.). Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient).

	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
LIKELY	Bee	<i>Bombus flavidus</i> (=B. fernaldae)	Fernald's Cuckoo Bumblebee	Yes?	Blue		
	Snail	<i>Pristiloma arcticum</i> ?	Northern Tightcoil		Blue		
	Mammal	<i>Cervus elaphus roosevelti</i>	Roosevelt Elk		Blue		
	Lichen	<i>Leptogium californicum</i>	midlife vinyl		Blue		
		<i>Peltigera gowardii</i>	northwest waterfan		Red	SC/SC	
	Liverwort	<i>Marchantia alpestris</i>	liverwort		Blue		
	Moss	<i>Bryum alpinum</i> ?	alpine thread-moss		Red		
		<i>Bryum schleicheri</i> ?	Schleicher's thread-moss		Blue		
		<i>Grimmia anomala</i>	grimmia dry rock moss		Blue		
		<i>Polytrichastrum sexangulare</i> var. <i>vulcanicum</i>	Polytrichum moss		Red		
		<i>Pseudoleskea incurvata</i> var. <i>tenuetis</i>	brown leskea moss		Red		
		<i>Racomitrium affine</i> ?	lesser fringe-moss		Blue		
		<i>Tortula leucostoma</i>	desmatodon moss		Blue		
POSSIBLE	Bee	<i>Bombus occidentalis</i> ssp. <i>occidentalis</i>	Western Bumble Bee		Blue	T/	
	Butterfly	<i>Collophrys johnsoni</i>	Johnson's Hairstreak		Red		Yes
		<i>Parnassius clodius</i> ssp. <i>claudianus</i>	Clodius Parnassian, claudianus ssp.		Blue		
	Dragonfly	<i>Tanypteryx hageni</i>	Black Petaltail		Blue		
	Mollusc	<i>Physella propinqua</i>	Rocky Mountain Physa		Blue		
		<i>Physella virginea</i>	Sunset Physa		Blue		
		<i>Sphaerium striatinum</i>	Striated Fingernailclam		Blue		
	Mammal	<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat		Blue		
		<i>Pekania pennanti</i>	Fisher		Blue		Yes
	Reptile	<i>Charina bottae</i>	Northern Rubber Boa		Yellow	SC/SC	
	Lichen	<i>Leptogium polycarpum</i>	peacock vinyl		Yellow	SC/SC	
		<i>Pannaria rubiginosa</i>	considerable gingerbread		Red		
		<i>Pseudocyphellaria rainierensis</i>	old growth specklebelly		Blue	SC/SC	
	Liverwort	<i>Frullania hattoriana</i>	liverwort		Blue		
	Moss	<i>Andreaea heinemannii</i>	Heinemann's andreaea moss		Red		
		<i>Atrichum tenellum</i>	slender smoothcap moss		Red		
		<i>Bryum calobryoides</i>	bryum moss		Red		
		<i>Pohlia andalusica</i>	Roth's thread-moss		Red		
		<i>Pohlia tundrae</i>	tundra pohlia moss		Red		
		<i>Trematodon asanoi</i>	Boas' long-necked moss		Blue		
	Fern Ally	<i>Botrychium spathulatum</i>	spoon-shaped moonwort		Blue		
	Shrub	<i>Arceuthobium tsugense</i> ssp. <i>mertensianae</i>	mountain hemlock dwarf mistletoe		Blue		
DATA. DEFICIENT	Bird	<i>Riparia riparia</i>	Bank Swallow		Yellow	T/T	
	Fish	<i>Oncorhynchus clarkii</i> ssp. <i>clarkii</i>	Coastal Cutthroat Trout		Blue		
	Mammal	<i>Myotis keenii</i>	Keen's Myotis		Yellow	DD/SC	Yes?
	Lichen	<i>Stereocaulon pileatum</i>	pixie foam		Unknown		
	Liverwort	<i>Tritomaria polita</i> ssp. <i>polita</i>	liverwort		Unknown		
	Grass	<i>Muhlenbergia racemosa</i>	satin grass		Unknown		
MIGRATORY	Bird	<i>Aechmophorus occidentalis</i>	Western Grebe		Red	SC/SC	
		<i>Clangula hyemalis</i>	Long-tailed Duck		Blue		
		<i>Cygnus columbianus</i>	Tundra Swan		Blue		
		<i>Gavia adamsii</i>	Yellow-billed Loon		Blue	NAR	
		<i>Hydroprogne caspia</i>	Caspian Tern		Blue	NAR	
		<i>Larus californicus</i>	California Gull		Blue		
		<i>Melanitta americana</i>	Black Scoter		Blue		
		<i>Melanitta perspicillata</i>	Surf Scoter		Blue		
		<i>Numenius americanus</i>	Long-billed Curlew		Blue	SC/SC	Yes
		<i>Podiceps auritus</i>	Horned Grebe		Yellow	SC/SC	
		<i>Podiceps nigricollis</i>	Eared Grebe		Blue		

Ecosystems at Risk in the RMOW (updated to December 31, 2019).

Site Series	Common Name	Scientific Name	BC List	BC ID Wildlife
CWHds1/01	Western Hemlock - Douglas-fir / Electrified Cat's-tail Moss ds1	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Rhytidiadelphus triquetrus</i> ds1	Blue	Yes
CWHms1/01	Western Hemlock - Amabilis Fir / Step Moss	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Hylocomium splendens</i>	Blue	
CWHds1/02	Douglas-fir - Lodgepole Pine / Kinnikinnick Dry Submaritime	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Arctostaphylos uva-ursi</i> Dry Submaritime	Red	
CWHms1/02	Douglas-fir - Lodgepole Pine / Kinnikinnick Moist Submaritime	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Arctostaphylos uva-ursi</i> Moist Submaritime	Blue	
CWHds1/03; CWHms1/03	Douglas-fir - Western Hemlock / Falsebox	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Paxistima myrsinites</i>	Blue	
CWHds1/04	Douglas-fir / Douglas maple / Hooker's Fairybells	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> / <i>Prosartes hookeri</i>	Red	
CWHms1/04	Amabilis Fir - Western Redcedar / Oak Fern	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Gymnocarpium dryopteris</i>	Blue	
CWHds1/05	Western Redcedar - Douglas-fir / Vine Maple	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Acer circinatum</i>	Blue	Yes
CWHds1/06	Western Hemlock / Queen's Cup	<i>Tsuga heterophylla</i> / <i>Clintonia uniflora</i>	Red	
CWHms1/06	Amabilis Fir - Western Redcedar / Devil's Club Moist Submaritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Oplopanax horridus</i> Moist Submaritime	Blue	
CWHds1/07	Western Redcedar / Devil's Club	<i>Thuja plicata</i> / <i>Oplopanax horridus</i>	Blue	Yes
CWHms1/07	Sitka Spruce / Salmonberry Moist Submaritime	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Moist Submaritime	Red	
CWHds1/08	Sitka Spruce / Salmonberry Dry	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Dry	Red	
CWHms1/08, CWHds1/09	Black Cottonwood - Red Alder / Salmonberry	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	Blue	
CWHms1/09	Black Cottonwood / Sitka Willow – Thimbleberry	<i>Populus trichocarpa</i> / <i>Salix sitchensis</i> - <i>Rubus parviflorus</i>	Red	
CWHds1/10	Black Cottonwood / Willows Dry Submaritime	<i>Populus trichocarpa</i> / <i>Salix</i> spp. Dry Submaritime	Blue	
CWHms1/11, CWHds1/12	Western Redcedar - Sitka Spruce / Skunk Cabbage	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Blue	
CWH/Ws51	Sitka Willow - Pacific Willow / Skunk Cabbage	<i>Salix sitchensis</i> - <i>Salix lasiandra</i> var. <i>lasiandra</i> / <i>Lysichiton americanus</i>	Red	
CWH/Wm04	Common Spike-Rush Herbaceous Vegetation	<i>Eleocharis palustris</i> Herbaceous Vegetation	Blue	

Glossary of Terms

Term	Definition
Accidental (Birds)	"Only one on record for season noted" (Ricker et al. 2014). These species are generally far out of range and therefore not a conservation concern within the RMOW.
Breeds in RMOW	This category applies only to wide-ranging species including birds, large mammals, and bats. For birds, local breeding is the main determinant of the importance of Whistler habitat.
Casual (Birds)	"1 to 10 birds per year. Not seen every year" (Ricker et al. 2014). These species do not have enough of a presence in Whistler to be a local conservation concern (that is, for long-term planning).
Confirmed	Species at risk with at least one confirmed record in the RMOW. For large-ranging species such as birds and large mammals, this category is somewhat less straightforward and inclusion requires significant use of habitat in the RMOW for at least part of the year even if not nesting or denning within the RMOW.
Data Deficient (DD)	There is not enough information about some species at risk to ascertain their current status within the RMOW. For example, the local status of Coastal Cutthroat Trout (<i>Oncorhynchus clarkii ssp. clarkii</i>) and Bank Swallow (<i>Riparia riparia</i>) is still uncertain. COSEWIC also lists some species as Data Deficient.
Downlisting	When a species is reassessed from a higher to lower threat ranking (e.g. BC Blue to Yellow list). Species can also be uplisted.
Delisting	When a species is removed from the BC list since past records within the Province are found to be in error (misidentification).
Extirpated	A species that has been recorded within the RMOW in the past but which: (a) no longer occurs; and (b) is unlikely to re-establish in the future.
Important Habitat	This category records an estimate of whether one or more specific habitat types within the RMOW are necessary for a species to continue to inhabit the area. More information about habitat requirements for each species at risk is needed to improve the accuracy of this determination.
Likely	Species at risk not yet confirmed in the RMOW with >75% (approximately) likelihood to be found in targetted surveys. That is, at least three out of four of these species should eventually be found in the RMOW and the others will be (or have been) documented in nearby or in similar habitats.
Migratory (Birds)	A bird species that migrates through Whistler in spring and/or fall, and in all or most years. Since these species use Whistler habitats, they should ideally be included in conservation planning.
Not Possible	Species that, given current data, have no chance of occurring in the RMOW due to habitat types that are not in Whistler.
Possible	Species at risk not yet confirmed in the RMOW with a low probability of occurring in the RMOW. Although there is no particular reason they couldn't occur, there is also no data that strongly suggests they would. Only a small portion of the species in this category is likely to be documented in the RMOW regardless of search effort.
Resident?	Does the species have a year-round or annual, seasonal presence in the RMOW?
Seasonal	This term includes birds that have a significant local presence during non-winter months but have not been confirmed to breed locally (e.g., Great Blue Heron). It mainly includes migratory birds.
Seasonal (Birds)	Three types of birds use Whistler habitat seasonally. Migratory birds that breed in Whistler are generally present from late April/early May through early fall. Migratory birds that do not breed in Whistler pass through during spring and fall migrations. Non-breeding birds are a third type of seasonal species. The Great Blue Herons seen during the summer, for example, appear to be non-breeding individuals (breeding in the RMOW is possible but hasn't been confirmed).
Unlikely	Species at risk that have a very low probability of occurring in the RMOW but are not impossible. If species in this category are eventually found in the RMOW, they would represent large range extensions (e.g., Pacific Water Shrew). This term also includes species that are Highly Unlikely to occur (due to habitat requirements and current range) but are not impossible.

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1.0 Introduction

1.1 Background and Report Goals

Whistler's first comprehensive list of species and ecosystems at risk in the Resort Municipality of Whistler (RMOW) was published in 2016 (Brett 2016a). It analyzed 178 species and grouped them into five classes based on their likelihood of being resident in the RMOW: Confirmed, Likely, Probable, Unlikely, and Not Possible. The intention of that classification was to improve species-level conservation efforts by targeting species most likely to be in Whistler (either already documented or with a high probability of occurring).

The 2016 report documented some of the challenges in determining which species at risk occur or are likely to occur in the Whistler area. In particular, it described strengths and weaknesses of the CDC's Species and Ecosystem Explorer for planners, developers, and scientists working to conserve species and their habitats. The biggest challenge that still remains in 2019 is that the Species and Ecosystem Explorer does not have complete and accurate species locations and often produces search results for the RMOW area that include both false positives and false negatives (see Brett 2016a for an extended discussion of challenges in using the CDC's online resources).

The 2016 report also described how new data compiled by the Whistler Biodiversity Project (WBP) was an essential precursor to the first comprehensive list of species at risk in the RMOW (Section 1.3 and 1.4). Updates since are compiled by the WBP and included in this report.

This report updates species and ecosystems at risk in the RMOW to the end of 2019. Its goals were to:

1. Update species and ecosystem listings (changes, additions, and deletions) that occurred in the last year;
2. Add any species documented in 2019 by Whistler BioBlitz, the Whistler Biodiversity Project, and other sources.
3. Reassess the likelihood to occur for species not yet documented in the RMOW.
4. Provide suggestions and content to allow better species at risk resources on the RMOW website.

Section 2 describes methods. Section 3 details changes since 2018, including internal, Provincial, and Federal alterations to rankings and current status. Section 4 presents the updated 2019 list of species at risk in the RMOW. Section 5 provides a brief comparison of 2019 results with past years.

Section 6 presents the 2019 list of ecosystems at risk in the RMOW. Section 7 includes a list of relevant publications about conservation plans published by the BC and Canadian Governments.

A Glossary is included in before the Table of Contents. Definitions for species and ecosystems at risk are included as Appendix 1. A detailed description of how these were made is included as Appendix 2. A list of the many scientists and volunteers who have helped provide data to the Whistler Biodiversity Project are included as Appendix 3.

1.2 Legislation and Terminology for Species at Risk

Municipalities have struggled with an increasing maze of legislation, strategies, plans, and guidelines introduced at Federal and Provincial levels, including the Species at Risk Act (SARA 2019), the Migratory Birds Convention Act (MBCA 2019), conservation threat assessments by the BC Conservation Data Centre (Red and Blue listings in particular; CDC 2019), the Identified Wildlife Management Strategy (BC MOE 2019a), as well as species-specific Management Plans, Recovery Strategies, and Implementation Plans (see Section 7.0). These initiatives don't provide municipalities clear guidance about their legal obligations nor tools to implement conservation goals (SAR LGWG 2011, 2012, 2013; Bedore 2014).

Leigh-Spencer (2004; Table 1.1) discussed a number of different ways a species can be determined to be "at risk." At the Provincial level, risks to a species are identified three ways: (i) by Red and Blue lists; (ii) as Identified Wildlife under the Forest and Range Practices Act; and (iii) under the Provincial Wildlife Act. At the Federal level, species at risk are identified by: (i) the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); (ii) the Species at Risk Act (SARA); and/or (iii) the Migratory Bird Conventions Act (MBCA).

TABLE 1.1: Summary of Federal and Provincial species at risk jurisdictions, legislative frameworks, and means of protections (Leigh-Spencer 2004, p. 2 and Green et al. 2005, pp. 2-3, with minor updates to 2019).

Jurisdiction	Responsible Agency	Legislative Framework	Form of Protection	Ranking System (risk of extinction)
Federal	COSEWIC (Committee on the Status of Endangered Wildlife in Canada; 2019)	Species at Risk Act (SARA 2019)	Recovery Strategies are required for extirpated, endangered and threatened species and Management Plans for species of concern. Protecting species from being killed and protecting "residences" is paramount.	<p>Endangered: species facing imminent extirpation or extinction¹;</p> <p>Threatened: species likely to become endangered if nothing is done to reverse factors leading to its extirpation or extinction.</p> <p>Special Concern: species that may become threatened or endangered because of a combination of biological characteristics and identified threats.²</p>
British Columbia	NatureServe and CDC (Conservation Data Centre)		Provide an objective ranking system based on all sources of credible information regarding distribution, abundance, trends and threats.	S = Provincial; N = National; G = Global; X = Extirpated or extinct; H = Historical 1=critically imperiled; 2=imperiled; 3=vulnerable; 4=apparently secure; 5=secure; ?=unranked; U=unrankable
	Province of BC, Ministry of Water, Land and Air Protection	Wildlife Act; BC Species at Risk Strategy (Endangered Species and Ecosystems in BC)	Red- listed (sometimes Blue-listed) species require special management attention by protecting critical habitat in the form of special management guidelines.	Red: Any species or ecosystem that is at risk of being lost (Extirpated, Endangered or Threatened)
	Ministry of Water, Land and Air Protection	Forest and Range Practices Act Identified Wildlife Management Strategy (IWMS)	Wildlife Habitat Areas (WHA), General Wildlife Measures (GWM), and Higher Level Plans	Blue: Any species or ecosystem that is of special concern (formerly Vulnerable). Yellow: Any species or ecosystem that is secure. ³
	Ministry of Water, Land and Air Protection	Forest and Range Practices Act	Wildlife Habitat Areas (WHA), General Wildlife Measures, and Higher Level Plans	Schedule 1 species list (section 11 (1)) (May 6th, 2004): Red and Blue- listed species negatively affected by forest or range management on Crown Lands.

¹ Endangered and Threatened rankings are now based on quantitative thresholds defined in http://www.cosewic.gc.ca/htmlDocuments/Assessment_process_and_criteria_e.pdf (p. 11). Additional definitions are included in http://www.cosewic.gc.ca/eng/sct2/sct2_6_e.cfm.

² <https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife/wildlife-species-assessment-process-categories-guidelines/status-categories.html>

³ https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/faq#red_blue_and_yellow

A similar summary was prepared by the South Coast Conservation Program (Bedore 2014; SCCP 2016). It adds helpful interpretations of the various processes, terms, and legislation that impact the management of species at risk in BC and is included with the kind permission of the SCCP⁴ as an appendix to this report (Appendix 1).

Terminology for Species at Risk

The number of terms used to describe species at risk can cause confusion, and that confusion is sometimes compounded when some of these terms have both legal and casual uses. Even the term “species at risk” may cause confusion to people who may be more familiar with the related terms “rare species” and “endangered species.”

For the purposes of this report, all species listed under any of BC or Canadian Government processes (Table 1.1; Appendix 1) are considered species at risk. The situation for ecosystems at risk is much easier since it is simply a BC process that assesses them in a similar manner to the Red and Blue (or Yellow) listings for species.

“Wildlife” is another term that can cause confusion. In the past, the only species groups to be assessed and listed were animals (primarily game mammals and fish) so the legal and public uses of the term were the same. Now that a much wider range of species groups and ecosystems have been assessed, the meaning of the term has been wildly stretched so that butterflies, plants, and even ecological communities (ecosystems) can be labelled “Identified Wildlife.” With the exception of that legally designated term, “wildlife” will not be used in this report.

To help reduce confusion, this report capitalizes terms when they refer to legal or other distinct categories, for example: Endangered, Threatened, Special Concern, Red-listed, and Blue-listed. It also extends that capitalization to the likelihood that a species is resident in the RMOW (as defined in Table 4.1), for example, Confirmed, Likely or Possible.

1.3 Sources of Species Data

The process to rank species in BC and Canada includes a vast dataset and many experts. These efforts are published on BC’s very helpful Species and Ecosystem Explorer and on the Federal Species at Risk Public Registry.⁵ These data are nonetheless incomplete due to the scale of effort needed to document species at risk which poses a challenge for municipalities when assessing conservation risks. The RMOW is fortunately ahead of many municipalities in Canada due to new sources of data including:

1. The Whistler Biodiversity Project (WBP) surveys and data collation since 2004 (Brett 2007; 2015; 2019).
2. Data generated by Fungus Among Us (since 2003) and Whistler BioBlitz (since 2007) which are collated by the Whistler Biodiversity Project into its master list.
3. Greatly expanded access to data online, including museum collections such as UBC Beaty Museum databases (2019), citizen science initiatives such as eBird (www.ebird.org) and EFauna and EFlora (Klinkenberg 2019a, b), and the Flora of North America (www.efloras.org). Whistler data from these sources has been compiled and edited by the Whistler Biodiversity Project.

Scientific knowledge of species diversity has expanded greatly since E.O. Wilson (1988) promulgated the prospect that there were probably five to as many as 30 million species on the planet. Since then, scientists have continued to expand what is known about the diversity of species in various habitats, including the RMOW. Combined with this increase in scientific knowledge has been an increase in the belief that all species deserve to be protected from extirpation or extinction, especially by human causes. For these two reasons, the CDC continues to add species groups to its database, most recently expanded its listings of invertebrates and fungi. Many species and species groups nonetheless remain unranked (that is, to determine which are at-risk) and threats to them will presumably be assessed as resources allow.

⁴ Pamela Zevit, pers. comm.

⁵ <http://a100.gov.bc.ca/pub/eswp/> (CDC 2019); https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm (COSEWIC 2019).

1.4 The Whistler Biodiversity Project

When Green et al. (2005) compiled their list of confirmed and possible species at risk in the RMOW, the total number of species that were publicly documented in Whistler was approximately 335, or less than 10% of the 2019 total (Section 1.4). The majority of those species were mammals, birds, and fish. There was, meanwhile, very little publically information available about other groups.

Whistler's situation in 2005 was similar to that of many communities in BC. Most of the mammal and fish data was originally compiled by the BC Government, often with contributions from universities (especially UBC) and the Royal BC Museum. In Whistler, there is a wealth of vertebrate data starting in the 1920s from Ken Racey and, later, his son-in-law and namesake of the UBC Cowan Tetrapod Collection (UBC Beaty 2019), Ian McTaggart-Cowan (e.g., Racey and McTaggart Cowan 1935). The Whistler Naturalists and its predecessors (before 1999) are the main source of information about birds (Gotz et al. 1996, Ricker and Baines 2005; Ricker et al. 2009, 2014). The RMOW itself has also added to the amount known about species, especially in its partnerships with the Whistler Fish Stewardship Group and the BC Government.

The vast majority of species groups therefore remained mostly unknown in 2005, including fungi, lichens, mosses and liverworts, amphibians, reptiles, butterflies and moths, dragonflies, snails and slugs, spiders, other insects, etc. Even when past surveys had targetted some of these groups, the results of those surveys were not compiled or easily accessible. Due to three main sources of new data (Section 1.3), Whistler has access to more information about local species than almost any other community in BC or Canada.

The Whistler Biodiversity Project began in late 2004 and has been the primary source of new data, both through surveys and data compilation (Brett 2007; 2015; 2019). One of its primary goals was to improve the inventory of species in Whistler and thereby aid conservation planning. It engaged specialists in many species groups to conduct the first targetted surveys in a number of species groups, especially between 2005 and 2011. It also conducted the first comprehensive data searches from museums and universities in BC and across Canada.⁶ These surveys and data searches helped establish for the first time species lists in the species groups mentioned above. As of 2019, the total number of species known in Whistler is over 4,300 (Figures 1.1 and 1.2; Brett 2019).

The annual Whistler BioBlitz began in 2007 and has established itself as an essential source of new knowledge about local species.⁷ BioBlitz is organized by the Whistler Naturalists to increase public interest in biodiversity and also provide real data from all the volunteer scientists who participate. The data from BioBlitz, compiled by the Whistler Biodiversity Project, has added over 1,400 species to the total list in just 13 years (its emerging Pemberton list now totals over 1,500 species). The Whistler event is Canada's longest-running BioBlitz and has helped spawn similar events across BC.

Fungus Among Us,⁸ a Whistler Naturalists event that started in 2003, is another important source of information. Almost 900 species of fungi have been documented to date, mostly from this event (Figure 1.2; Brett 2019). Although fungi have not yet been ranked by the CDC and COSEWIC, it is certain some are rare and threatened by human activities and therefore in need of protection. One example is agarikon (*Fomitopsis officinalis*), a bracket fungus closely associated with old Douglas-fir forests in Whistler and elsewhere. If and when the BC and Canadian Governments do assess fungi, the Whistler list will become even more important. In addition, scientists at the Fungus Among Us event record other species that add to the overall list. In previous years, many vascular plants, mosses, lichens, and even moths have been added.

One key takeaway from the breakdown of the WBP by major species group (Figure 1.2) is that vertebrates are relatively uncommon (8%) of the total. Since the vertebrate inventory is unlikely to grow by more than a few species (because it is very comprehensive), numbers of other groups are likely to continue growing. Vertebrates are nonetheless important for conservation planning since protecting them often protects the habitats required by many other species groups.

⁶ The most productive searches have been from UBC (the Beaty Museum and online predecessors; UBC Beaty 2019) and Royal BC Museum (RBCM 2019). Other museums across Canada were also searched (E. Wind in Brett 2007).

⁷ www.whistlerbioblitz.ca.

⁸ www.whistlernaturalists.ca

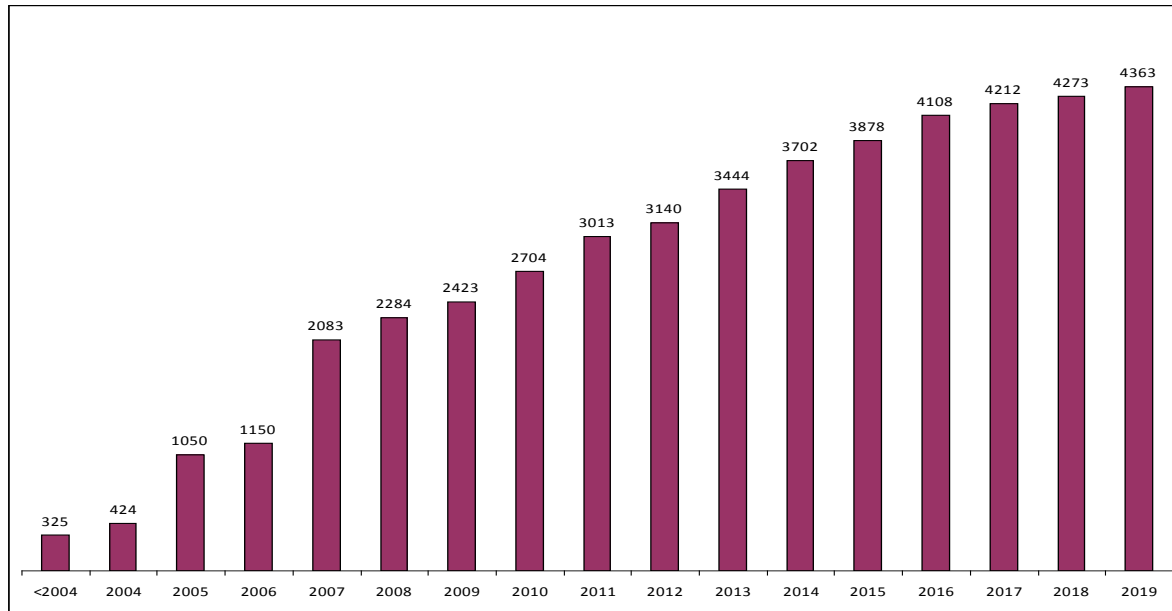


FIGURE 1.1: Number of species documented in the RMOW by year to date (Brett 2019). The WBP began in fall 2004; the majority of its targetted surveys and data collation began in 2005. Data from Fungus Among Us was first entered in 2004; data from Whistler BioBlitz starting with the first event in 2007.

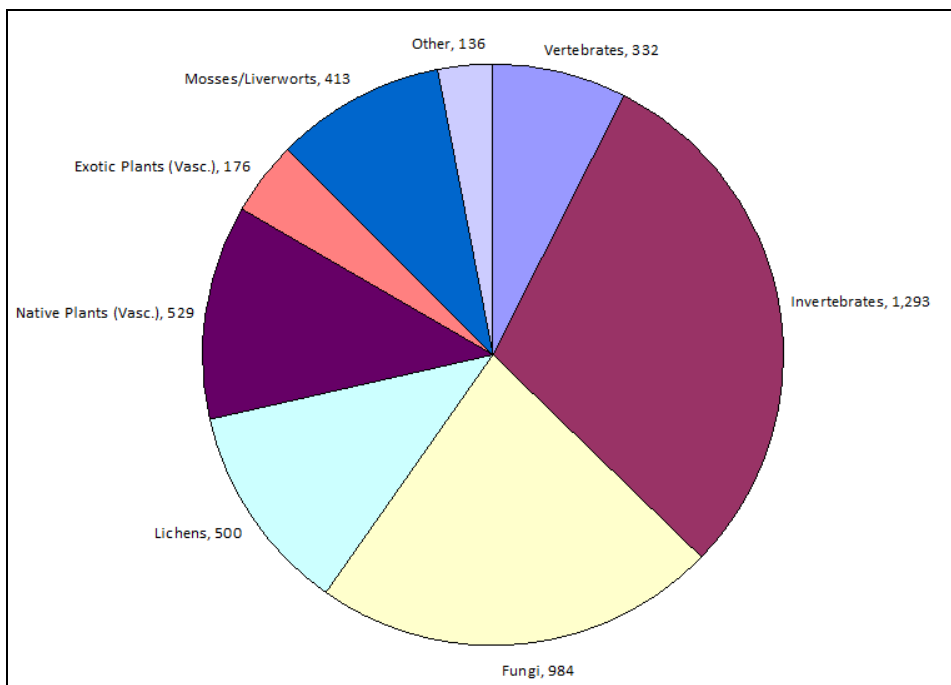


FIGURE 1.2: Number of species in Figure 1.1 by group. Vertebrates represented virtually all documented species prior to the WBP but that proportion has continued to decrease – vertebrates now represent approximately 8% of the total.

The RMOW is in an enviable position compared to many municipalities: it knows a great deal about the species that inhabit the area. As a result of new data since 2005, it can also determine with a high degree of certainty what other species are likely and, often as importantly, what is not likely or not possible in Whistler. The data presented here is more comprehensive and accurate than available through the BC Conservation Data Centre (CDC). That gap will lessen as WBP data is eventually added to CDC records. This report demonstrates the essential role that municipal-level surveys and data compilation can play.

2.0 Species at Risk – Search Methods and Terminology

This report builds on previous versions starting with the 178 species at risk included for consideration in the 2016 version (Brett 2016) because they:

- a) Were classified as at-risk by the BC (Red or Blue Listed by the CDC) and/or Canadian Government Endangered, Threatened, or Special Concern under COSEWIC and SARA);
- b) Had been documented at least once within or near the RMOW (Brett 2019);
- c) Were considered by specialists to be Likely or Possible within the RMOW (Appendix 2); and/or,
- d) Were returned by a search on the CDC Species and Ecosystems Explorer for species at risk in the Whistler area.⁹

The latter source is not very precise, both because the finest-scale search includes a much larger area than Whistler, and because it includes marine and other species that are Highly Unlikely or Not Possible in the RMOW.

Subsequent versions (Brett 2017, 2018, this report) updated the 2016 results based on:

- (a) revisions in species rankings by the CDC, COSEWIC, and SARA (Sections 3.2 and 3.3);
- (b) new species documented in the Whistler area (Section 3.1); and
- (c) changes in understanding about presence and habitat use of species within the area (Section 3.1).

A Glossary of Terms is included on page viii of this report (just before the Table of Contents). The definitions in the Glossary were used to classify species by their current status within the RMOW (e.g., Confirmed, Likely, etc.), and also more detailed information about habitat use (that is, whether they are resident, seasonal, breed in the RMOW, etc.). Refer to Appendix 2 for more detailed information about each species and rationales for their classification. Species classified as Unlikely to Not Possible are not included in Appendix 2 because they have such a low probability of occurring within the RMOW (this information is included as Section 3 in Brett 2016a).

Changes from the 2018 to 2019 lists are presented in Section 3. The updated 2019 list is presented in Section 4, and a comparison with past lists is presented in Section 5.

⁹ <http://a100.gov.bc.ca/pub/eswp/>. The finest scale search for Whistler species then and in 2019 includes: Red and Blue List + Squamish Forest District (DSQ) + Coastal Western Hemlock (CWH) + Mountain Hemlock (MH) + Coastal Mountain Alpine (CMA). See Brett (2016) for more details.

3.0 Species at Risk – 2019 Changes

3.1 New Species and RMOW Status Updates

Any new information relevant to species at risk considered in this report was assessed to determine if their RMOW status (e.g., Confirmed, Likely, etc.) had changed. This process included a search of CDC and COSEWIC websites for any changes since 2018 (Sections 3.2 and 3.3, respectively). For this section, it mainly involved reviewing new data from Whistler BioBlitz, Fungus Among Us, other local observations, and consultation with other scientists.

One new species was added to the 2019. The closest records for Dun Skipper (*Euphyes vestris*) prior to 2019 were from Pemberton Valley in habitats and at elevations not found in Whistler (which is why in previous reports it was considered Unlikely). Several Dun Skippers were nonetheless seen near Cheakamus Crossing on June 30, 2019 (Figure 3.1a), a record which represents a large range extension. Dun Skipper is a small, relatively non-descript butterfly which favours open habitats (Appendix 2) and is Red-listed in BC.

For the first time, observations recorded on iNaturalist (www.inaturalist.org) were also reviewed and a potential new species at risk for Whistler was found: Fernald's Cuckoo Bumblebee (*Bombus flavidus* = *B. fernaldae*¹⁰; Figure 3.1b). This is the first new species at risk that resulted from a search of iNaturalist which demonstrates the huge potential of this new source of data. At present it nonetheless an arduous process to sift through all the observations, especially since many of them are not identified or, maybe worse, incorrectly identified. As the information on this website continues to improve, its value will increase.

A user named “adorantes” photographed and uploaded the unidentified record to iNaturalist; a second user suggested it was a *Bombus* sp., and a third user named John Ascher identified it as *Bombus fernaldae* – a Blue-listed species in BC (which lists it by a synonym *B. flavidus*). Dr. Ascher is a world-renowned bee expert who, when contacted by email (Dec. 2019), wrote he was fairly confident about the identification but suggested getting a second opinion from a BC bee expert. UBC Beaty Museum associate Riley Waytes reviewed the photos and concluded a positive identification would require physical examination but that it is quite possibly that species.¹¹ Cuckoo bees are parasitic on other *Bombus* (bumble bee) species and have been recorded at a wide range of locations and elevations in BC, but none nearer to Whistler than Parksville on Vancouver Island (Klinkenberg 2019a).

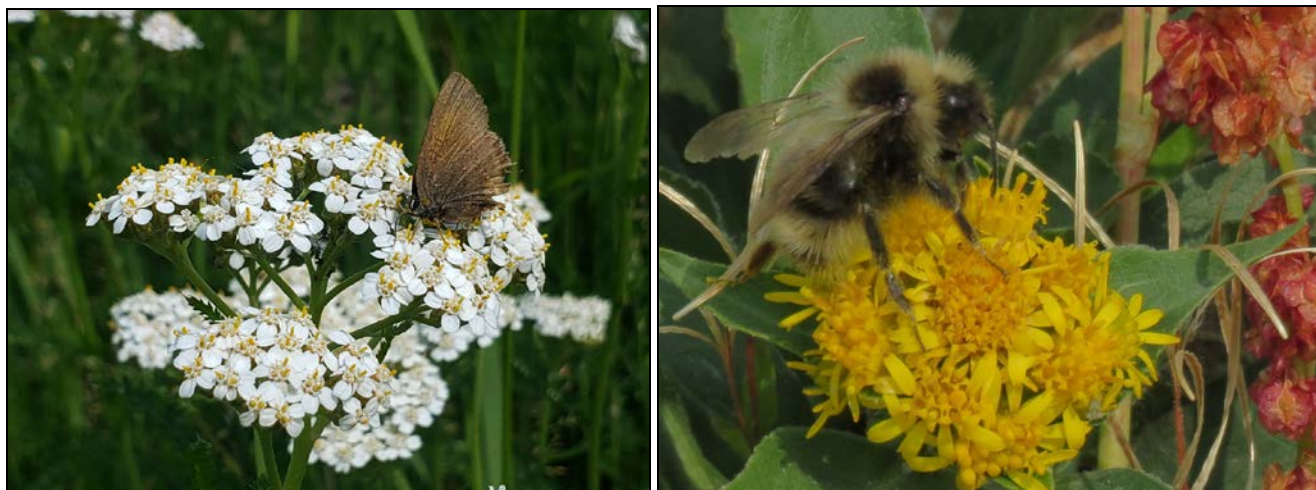


Figure 3.1. (a) Dun Skipper (*Euphyes vestris*) feeding on western yarrow flowers near Cheakamus Crossing on June 30, 2019 (Bob Brett photo). (b) One of two bumblebees tentatively identified as the Blue-listed Fernald's Cuckoo Bumblebee (*Bombus flavidus*; = *B. fernaldae*; photo by “adorantes” on iNaturalist).

¹⁰ The main link on the CDC names this species as *Bombus flavidus* with *B. fernaldae* as a synonym. Both are considered valid names by ITIS (www.itis.gov/) which suggests the taxonomy of the BC species may be in flux, though Riley Waite agrees with the former name.

¹¹ “Given that it would be a new record, I don't think the photos are strong enough evidence. With that said, I would not be surprised if there were *B. fernaldae* in the Whistler area. That seems relatively consistent with its range” (Riley Waite by email, Jan. 2, 2020).

Migratory Birds

The 2018 report (Brett 2018) included the first attempt, mainly through consultation with Karl Ricker, to assess the use of habitat in the RMOW by species at risk that are non-resident birds. A total of 27 bird species documented in Whistler (Ricker et al. 2014) were deemed annual migrators likely to require specific habitats while passing through. The treatment of non-resident, non-breeding birds in Whistler's conservation planning remains a work in progress due to the lack of habitat-specific data.

A total of 11 migratory birds are included in this report (Table 4.8) as having a significant enough seasonal presence to warrant consideration during conservation planning. Further work is needed to understand their habitat requirements as well as to review which migratory birds are a local conservation concern.

3.2 Changes in Provincial (CDC) Species at Risk Lists

The most significant change in last year's update was the downlisting of 20 species (primarily lichens) from at-risk designation to Secure (Yellow list) and the delisting of an additional three species from the BC flora (Table 3.1). The CDC has continued to reassess risks to species as more Province-wide data becomes available and in 2019 has downlisted an additional nine species (all lichens or vascular plants; Table 3.1). The CDC has also delisted two species: Flett's Quillwort (*Isoetes flettii*) and a liverwort, *Tritomaria polita* spp. *polita*. Quillworts are a difficult group to identify and have been a source of dispute among botanists surveying for the WBP and BioBlitz. The CDC's determination that Flett's Quillwort does not occur in BC helps solve that debate. The delisting of the *Tritomaria* liverwort is meanwhile puzzling since the CDC provides no rationale. It is possible that, like past delistings (e.g., satin-grass, *Muhlenbergia racemosa*¹²), it is reinstated and ranked as Unknown until its status is confirmed.

3.3 Changes in Federal Species at Risk Lists

Three species confirmed in Whistler were newly listed under Schedule 1 of the Species at Risk Act: Evening Grosbeak (SC = Special Concern), Black Swift (E = Endangered), and Bull Trout (SC; Table 3.2).¹³ These designations provide legal protection under Canada's Species at Risk Act.

¹² This grass has been identified by Hans Roemer in the Whistler Wildlife Refuge in 2007. I collected a specimen from there in 2018 and am awaiting confirmation of its identity.

¹³ COSEWIC/SARA: 2019. Species at risk public registry – A to Z species index https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm accessed throughout 2019.

Table 3.1. Changes by the CDC since 2018 to listings of species at risk considered in previous reports (Brett 2017, 2018).

Year of Change	Change	Group	Scientific Name	Common Name	Former Rank	2018 RMOW Status
018	Downlisted	Lichens	<i>Allantoparmelia almqvistii</i>	lesser rock grub	Blue	Confirmed
			<i>Arctoparmelia incurva</i>	finger ring	Blue	Confirmed
			<i>Cladonia singularis</i>	wax candle pixie	Blue	Confirmed
			<i>Hypogymnia recurva</i>	recoiling bone	Red	Confirmed
			<i>Leptogium intermedium</i>	forty-five vinyl	Blue	Confirmed
			<i>Leptogium polycarpum</i>	peacock vinyl	Red	Possible
			<i>Letharia columbiana</i>	brown-eyed wolf	Blue	Confirmed
			<i>Lobaria oregana</i>	lettuce lung	Blue	Confirmed
			<i>Physcia dubia</i>	grinning rosette	Blue	Confirmed
			<i>Pseudocyphellaria anthraxis</i>	reticulate specklebelly	Blue	Confirmed
			<i>Psoroma tenue</i> var. <i>boreale</i>	tundra tarts	Red	Likely
			<i>Stereocaulon symphycheilum</i>	two-toned foam	Red	Possible
			<i>Umbilicaria lambii</i>	windward rocktripe	Blue	Confirmed
			<i>Vahliella californica</i>	sun snaps	Red	Confirmed
		Plants - Vascular	<i>Allium geyeri</i> var. <i>tenerum</i>	Geyer's onion	Blue	Unlikely
			<i>Botrychium crenulatum</i>	dainty moonwort	Blue	Possible
			<i>Botrychium simplex</i> var. <i>compositum</i>	least moonwort	Blue	Possible
			<i>Draba lactea</i>	milky draba	Blue	Unlikely
			<i>Erythranthe breweri</i>	Brewer's monkey-flower	Blue	Possible
			<i>Stellaria obtusa</i>	blunt-sepaled starwort	Blue	Possible
	Delisted	Plants - Vascular	<i>Draba stenopetala</i>	star-flowered draba	Red	Confirmed
			<i>Muhlenbergia racemosa</i>	satin grass	Red	Confirmed
			<i>Schoenoplectus americanus</i>	American bulrush	Red	Unlikely
2019	Downlisted	Lichens	<i>Ahtiana sphaerosporella</i>	mountain candlewax	Blue	Confirmed
			<i>Fuscopannaria leucostictoides</i>	frosted crackers	Blue	Confirmed
			<i>Hypogymnia canadensis</i>	canuckle bone	Blue	Confirmed
			<i>Sphaerophorus globosus</i>	arctic coral	Blue	Confirmed
			<i>Stereocaulon glareosum</i>	alpine soil foam	Blue	Confirmed
		Plants - Vascular	<i>Botrychium ascendens</i>	upswept moonwort	Blue	Confirmed
			<i>Carex praeceptorum</i>	teacher's sedge	Blue	Possible
			<i>Cryptogramma cascadenis</i>	Cascade parsley fern	Blue	Confirmed
			<i>Pyrola elliptica</i>	shinleaf wintergreen	Blue	Confirmed
	Delisted	Plant - Non-vascular	<i>Tritomaria polita</i> ssp. <i>polita</i> ¹⁴	liverwort	Blue	Confirmed
		Plant - Vascular	<i>Isoetes flettii</i>	Flett's Quillwort	Red	Possible*

TABLE 3.2. Changes in Federal listings of species at risk that are considered in this report.

Change in 2019	RMOW Status	Group	Scientific Name	Common Name	2018	2019	Note
Listed under SARA	Confirmed	Bird	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	SC/pend.	SC/SC	1
			<i>Cypseloides niger</i>	Black Swift	E/pend.	E/E	1
		Fish	<i>Salvelinus confluentus</i> pop. 28	Bull Trout - South Coast Pop.	SC/pend.	SC/ SC	2

Notes:

- <http://www.gazette.gc.ca/rp-pr/p2/2019/2019-05-29/html/sor-dors145-eng.html>
- <http://gazette.gc.ca/rp-pr/p2/2019/2019-08-21/html/sor-dors287-eng.html>

¹⁴ This species still appears in the 2019 list, but changed from Confirmed (2018) to Uncertain Status (2019).

4.0 Species at Risk - 2019 Updated Lists

The following tables represent the status of species at risk in the RMOW at year-end 2019. They are numbered as follows:

- Table 4.1: Confirmed species.
- Table 4.2: Likely species.
- Table 4.3: Possible species.
- Table 4.4: Data Deficient species (including those whose current presence within the RMOW is unclear).
- Table 4.5: Extirpated species.
- Table 4.6: Unlikely species.
- Table 4.7: Not Possible species.
- Table 4.8: Birds that migrate through the RMOW most years which should be considered in conservation planning.
- Table 4.9: Birds that are infrequently seen in the RMOW that do not have a significant presence of use of habitat.

I recommend that Confirmed (50 species), Likely (13 species), and the Migratory Birds (11 species; Table 4.8) should be considered in conservation planning at this time. These 74 species represent all habitat types within the RMOW and providing habitat for them will also protect other species (see also Section 5.1).

TABLE 4.1(Page 1 of 2). Confirmed species at risk in the RMOW. Key: E (Endangered), T (Threatened), SC (Special Concern).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Invert.	Butterfly	<i>Callophrys eryphon</i> ssp. <i>sheltonensis</i>	Western Pine Elfin, sheltonensis ssp.		Blue		
Animal - Invert.	Butterfly	<i>Euphyes vestris</i>	Dun Skipper	Yes	Red	T/T	
Animal - Invert.	Butterfly	<i>Parnassius clodius</i> ssp. <i>pseudogallatinus</i>	Clodius Parnassian, pseudogallatinus ssp.		Blue		
Animal - Vert.	Amphibian	<i>Anaxyrus boreas</i>	Western Toad		Yellow	SC/SC	
Animal - Vert.	Amphibian	<i>Ascaphus truei</i>	Coastal Tailed Frog		Yellow	SC/SC	Yes
Animal - Vert.	Amphibian	<i>Rana aurora</i>	Northern Red-legged Frog		Blue	SC/SC	Yes
Animal - Vert.	Bird	<i>Accipiter gentilis</i> ssp. <i>laingi</i>	Northern Goshawk, laingi ssp.		Red	T/T	Yes
Animal - Vert.	Bird	<i>Ardea herodias</i> ssp. <i>fannini</i>	Great Blue Heron, fannini ssp.		Blue	SC/SC	Yes
Animal - Vert.	Bird	<i>Butorides virescens</i>	Green Heron		Blue		
Animal - Vert.	Bird	<i>Chordeiles minor</i>	Common Nighthawk		Yellow	SC/T	
Animal - Vert.	Bird	<i>Coccothraustes vespertinus</i>	Evening Grosbeak		Yellow	SC/SC	
Animal - Vert.	Bird	<i>Contopus cooperi</i>	Olive-sided Flycatcher		Blue	SC/T	
Animal - Vert.	Bird	<i>Cypseloides niger</i>	Black Swift		Blue	E/E	
Animal - Vert.	Bird	<i>Hirundo rustica</i>	Barn Swallow		Blue	T/T	
Animal - Vert.	Bird	<i>Megascops kennicottii</i> ssp. <i>kennicottii</i>	Western Screech-Owl, kennicottii ssp.		Blue	T/T	
Animal - Vert.	Bird	<i>Patagioenas fasciata</i>	Band-tailed Pigeon		Blue	SC/SC	
Animal - Vert.	Fish	<i>Salvelinus confluentus</i> pop. 28	Bull Trout - South Coast Population		Blue	SC/SC	Yes
Animal - Vert.	Mammal	<i>Gulo gulo luscus</i>	Wolverine, luscus ssp.		Blue	SC/SC	Yes
Animal - Vert.	Mammal	<i>Myotis lucifugus</i>	Little Brown Myotis		Yellow	E/E	
Animal - Vert.	Mammal	<i>Oreamnos americanus</i>	Mountain Goat		Blue		
Animal - Vert.	Mammal	<i>Ursus arctos</i>	Grizzly Bear		Blue	SC/SC	Yes
Fungus	Lichen	<i>Alectoria imshaugii</i>	spiny witch's hair		Blue		
Fungus	Lichen	<i>Nodobryoria subdivergens</i>	alpine redhead		Blue		
Fungus	Lichen	<i>Umbilicaria decussata</i>	electric rocktripe		Blue		
Fungus	Lichen	<i>Umbilicaria krascheninnikovii</i>	lesser salted rocktripe		Blue		
Plant - Non-Vasc.	Liverwort	<i>Haplomitrium hookeri</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Jungermannia atrovirens</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Nardia breidlerii</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Nardia compressa</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Nardia geoscyphus</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Scapania curta</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Scapania obscura</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Scapania scandica</i> var. <i>scandica</i>	liverwort		Blue		
Plant - Non-Vasc.	Liverwort	<i>Solenostoma confertissimum</i>	liverwort		Red		
Plant - Non-Vasc.	Moss	<i>Brachydontium olympicum</i>	Olympic brachydontium moss		Red		
Plant - Non-Vasc.	Moss	<i>Brachythecium holzingeri</i>	Holzinger's brachythecium moss		Blue		
Plant - Non-Vasc.	Moss	<i>Bryum pallescens</i>	tall-clustered thread-moss		Blue		

TABLE 4.1 (Page 2 of 2). Confirmed species at risk in the RMOW. Key: E (Endangered), T (Threatened), SC (Special Concern).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Plant - Non-Vasc.	Moss	<i>Grimmia caespiticia</i>	grimmia moss		Blue		
Plant - Non-Vasc.	Moss	<i>Grimmia donniana</i>	Donn's grimmia		Blue		
Plant - Non-Vasc.	Moss	<i>Grimmia incurva</i>	black grimmia		Red		
Plant - Non-Vasc.	Moss	<i>Homalothecium nevadense</i>	Nevada homalothecium moss		Blue		
Plant - Non-Vasc.	Moss	<i>Hygrohypnum alpinum</i>	alpine hygrohypnum moss		Blue		
Plant - Non-Vasc.	Moss	<i>Orthotrichum pylaisii</i>	Pylais' orthotrichum moss		Blue		
Plant - Non-Vasc.	Moss	<i>Pohlia cardotii</i>	Cardot's pohlia moss		Blue		
Plant - Non-Vasc.	Moss	<i>Pseudoleskea radicata</i> var. <i>pallida</i>	pseudoleskea moss		Blue		
Plant - Non-Vasc.	Moss	<i>Racomitrium pygmaeum</i>	pygmy racomitrium moss		Blue		
Plant - Non-Vasc.	Moss	<i>Schistidium crassipilum</i>	thickpoint grimmia		Blue		
Plant - Non-Vasc.	Moss	<i>Tripterocladium leucocladulum</i>	tripterocladium moss		Blue		
Plant - Vascular	Aquatic	<i>Utricularia ochroleuca</i>	ochroleucous bladderwort		Blue		
Plant - Vascular	Tree	<i>Pinus albicaulis</i>	whitebark pine		Blue	E/E	

TABLE 4.2. Species at risk that are **Likely** in the RMOW. Key: SC (Special Concern).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Invert.	Bee	<i>Bombus flavidus</i> (=B. <i>fernaldae</i>)	Fernald's Cuckoo Bumblebee	Yes**	Blue		
Animal - Invert.	Snail	<i>Pristiloma arcticum</i> ?	Northern Tightcoil		Blue		
Animal - Vert.	Mammal	<i>Cervus elaphus roosevelti</i>	Roosevelt Elk		Blue		
Fungus	Lichen	<i>Leptogium californicum</i>	midlife vinyl		Blue		
Fungus	Lichen	<i>Peltigera gowardii</i>	northwest waterfan		Red	SC/SC	
Plant - Non-Vasc.	Liverwort	<i>Marchantia alpestris</i>	liverwort		Blue		
Plant - Non-Vasc.	Moss	<i>Bryum alpinum</i> ?	alpine thread-moss		Red		
Plant - Non-Vasc.	Moss	<i>Bryum schleicheri</i> ?	Schleicher's thread-moss		Blue		
Plant - Non-Vasc.	Moss	<i>Grimmia anomala</i>	grimmia dry rock moss		Blue		
Plant - Non-Vasc.	Moss	<i>Polytrichastrum sexangulare</i> var. <i>vulcanicum</i>	Polytrichum moss		Red		
Plant - Non-Vasc.	Moss	<i>Pseudoleskea incurvata</i> var. <i>tenuetis</i>	brown leskea moss		Red		
Plant - Non-Vasc.	Moss	<i>Racomitrium affine</i> ?	lesser fringe-moss		Blue		
Plant - Non-Vasc.	Moss	<i>Tortula leucostoma</i>	desmatodon moss		Blue		

** This species has been tentatively confirmed and is awaiting a second confirmation as of December 2019 (Section 3.1).

TABLE 4.3. Species at risk that are **Possible** in the RMOW but not yet documented. Key: T (Threatened), SC (Special Concern).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Invert.	Bee	<i>Bombus occidentalis</i> ssp. <i>occidentalis</i>	Western Bumble Bee		Blue	T/	
Animal - Invert.	Butterfly	<i>Callophrys johnsoni</i>	Johnson's Hairstreak		Red		Yes
Animal - Invert.	Butterfly	<i>Parnassius clodius</i> ssp. <i>claudianus</i>	Clodius Parnassian, claudianus ssp.		Blue		
Animal - Invert.	Dragonfly	<i>Tanypteryx hageni</i>	Black Petaltail		Blue		
Animal - Invert.	Mollusc	<i>Physella propinqua</i>	Rocky Mountain Physa		Blue		
Animal - Invert.	Mollusc	<i>Physella virginea</i>	Sunset Physa		Blue		
Animal - Invert.	Mollusc	<i>Sphaerium striatinum</i>	Striated Fingernailclam		Blue		
Animal - Vert.	Mammal	<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat		Blue		
Animal - Vert.	Mammal	<i>Pekania pennanti</i>	Fisher		Blue		Yes
Animal - Vert.	Reptile	<i>Charina bottae</i>	Northern Rubber Boa		Yellow	SC/SC	
Fungus	Lichen	<i>Leptogium polycarpum</i>	peacock vinyl		Yellow	SC/SC	
Fungus	Lichen	<i>Pannaria rubiginosa</i>	considerable gingerbread		Red		
Fungus	Lichen	<i>Pseudocyphellaria rainierensis</i>	old growth specklebelly		Blue	SC/SC	
Plant - Non-Vasc.	Liverwort	<i>Frullania hattoriana</i>	liverwort		Blue		
Plant - Non-Vasc.	Moss	<i>Andreaea heinemannii</i>	Heinemann's andreaea moss		Red		
Plant - Non-Vasc.	Moss	<i>Atrichum tenellum</i>	slender smoothcap moss		Red		
Plant - Non-Vasc.	Moss	<i>Bryum calobryoides</i>	bryum moss		Red		
Plant - Non-Vasc.	Moss	<i>Pohlia andalusica</i>	Roth's thread-moss		Red		
Plant - Non-Vasc.	Moss	<i>Pohlia tundrae</i>	tundra pohlia moss		Red		
Plant - Non-Vasc.	Moss	<i>Trematodon asanoi</i>	Boas' long-necked moss		Blue		
Plant - Vascular	Fern Ally	<i>Botrychium spathulatum</i>	spoon-shaped moonwort		Blue		
Plant - Vascular	Shrub	<i>Arceuthobium tsugense</i> ssp. <i>mertensianae</i>	mountain hemlock dwarf mistletoe		Blue		

TABLE 4.4. Species at risk in the RMOW that are **Data Deficient**. Based on recent genetic research (Lausen et al. 2019), the CDC has re-identified past records of Keen's Myotis as Long-eared Myotis (*Myotis evotis*), that is, the former is no longer included as a BC species. COSEWIC meanwhile has not yet adopted this approach (though it is likely to in the near future). See Appendix 3 for additional notes on the species below.

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Vert.	Bird	<i>Riparia riparia</i>	Bank Swallow		Yellow	T/T	
Animal - Vert.	Fish	<i>Oncorhynchus clarkii</i> ssp. <i>clarkii</i>	Coastal Cutthroat Trout		Blue		
Animal - Vert.	Mammal	<i>Myotis keenii</i>	Keen's Myotis		Yellow	DD/SC	Yes?
Fungus	Lichen	<i>Stereocaulon pileatum</i>	pixie foam		Unknown		
Plant - Non-Vasc.	Liverwort	<i>Tritomaria polita</i> ssp. <i>polita</i>	liverwort		Unknown		
Plant - Vascular	Grass	<i>Muhlenbergia racemosa</i>	satin grass		Unknown		

TABLE 4.5. Species at risk that are **Extirpated** in the RMOW. Key: E (Endangered), T (Threatened).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Vert.	Bird	<i>Strix occidentalis</i>	Spotted Owl		Red	E/E	Yes

TABLE 4.6. Species at risk that are **Unlikely** to **Highly Unlikely** in the RMOW, even though they may appear in CDC search results for the Whistler area. Key: E (Endangered), T (Threatened), SC (Special Concern).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Invert.	Beetle	<i>Cicindela hirticollis</i>	Hairy-necked Tiger Beetle		Blue		
Animal - Invert.	Butterfly	<i>Argia vivida</i>	Vivid Dancer		Blue	SC/SC	
Animal - Invert.	Butterfly	<i>Epargyreus clarus ssp. californicus</i>	Silver-spotted Skipper, californicus ssp.		Red		
Animal - Invert.	Butterfly	<i>Erynnis propertius</i>	Propertius Duskywing		Red		
Animal - Invert.	Dragonfly	<i>Ophiogomphus occidentis</i>	Sinuous Snaketail		Blue		
Animal - Invert.	Mollusc	<i>Galba bulimoides</i>	Prairie Fossaria		Blue		
Animal - Invert.	Mollusc	<i>Galba dalli</i>	Dusky Fossaria		Blue		
Animal - Invert.	Mollusc	<i>Gyraulus crista</i>	Star Gyro		Blue		
Animal - Vert.	Bird	<i>Brachyramphus marmoratus</i>	Marbled Murrelet		Blue	T/T	Yes
Animal - Vert.	Mammal	<i>Sorex bendirii</i>	Pacific Water Shrew		Red	E/E	Yes
Animal - Vert.	Reptile	<i>Coluber constrictor (ssp. mormon)</i>	North American Racer		Blue	T/SC	Yes
Animal - Vert.	Reptile	<i>Contia tenuis</i>	Sharp-tailed Snake		Red	E/E	
Plant - Non-Vasc.	Moss	<i>Andreaea sinuosa</i>	small-spored rock-moss		Red		
Plant - Non-Vasc.	Moss	<i>Atrichum flavisetum</i>	moss		Blue		
Plant - Non-Vasc.	Moss	<i>Brotherella roellii</i>	Roell's brotherella		Red	E/E	
Plant - Non-Vasc.	Moss	<i>Callicladium haldanianum</i>	callicladium moss		Blue		
Plant - Non-Vasc.	Peat Moss	<i>Sphagnum contortum</i>	twisted peat-moss		Blue		
Plant - Vascular	Herb	<i>Allium amplexans</i>	slimleaf onion		Blue		
Plant - Vascular	Herb	<i>Bidens amplissima</i>	Vancouver Island beggarticks		Blue	SC/SC	
Plant - Vascular	Herb	<i>Boechera paupercula</i>	tiny suncrest		Red		
Plant - Vascular	Herb	<i>Castilleja rupicola</i>	cliff paintbrush		Blue	T/T	
Plant - Vascular	Herb	<i>Claytonia washingtoniana</i>	Washington springbeauty		Red		
Plant - Vascular	Herb	<i>Comastoma tenellum</i>	slender gentian		Red		
Plant - Vascular	Herb	<i>Draba stenopetala</i>	star-flowered draba		Unknown		
Plant - Vascular	Herb	<i>Oenothera pallida ssp. pallida</i>	pale evening-primrose		Red		
Plant - Vascular	Herb	<i>Sidalcea hendersonii</i>	Henderson's checker-mallow		Blue		
Plant - Vascular	Sedge	<i>Schoenoplectus americanus</i>	American bulrush		Unknown		

TABLE 4.7. Species at risk that are **Not Possible** in the RMOW, even though they may appear in CDC search results for the Whistler area. Key: E (Endangered), T (Threatened), SC (Special Concern).

Group 1	Group 2	Species	Common Name	New 2019?	BC List	COSEWIC / SARA	BC ID Wildlife
Animal - Vert.	Fish	<i>Acipenser medirostris</i>	Green Sturgeon		Red	SC/SC	
Animal - Vert.	Fish	<i>Thaleichthys pacificus</i>	Eulachon		Blue	E/T	
Animal - Vert.	Mollusc	<i>Haliotis kamtschatkana</i>	Northern Abalone		Red	E/E	
Animal - Vert.	Mollusc	<i>Ostrea lurida (=O. conchaphila?)</i>	Olympia Oyster		Blue	SC/SC	

TABLE 4.8. Listed birds that migrate through the RMOW most years (K. Ricker, pers. comm., Dec. 2018). Although specific habitats are generally not mapped (or at least unavailable on the RMOW GIS system), these species should be considered in conservation planning.

Group 1	Group 2	Species	Common Name	BC List	COSEWIC / SARA	BC ID Wildlife	RMOW Record?	Resident?	Breeds in RMOW?	Impt. Habitat?
Birds - Non-Resident/ Non-Breeding	Migratory	<i>Aechmophorus occidentalis</i>	Western Grebe	Red	SC/SC		Yes	Seasonal	No	Uncertain
		<i>Clangula hyemalis</i>	Long-tailed Duck	Blue						Unlikely
		<i>Cygnus columbianus</i>	Tundra Swan	Blue						Unlikely
		<i>Gavia adamsii</i>	Yellow-billed Loon	Blue	NAR					Unlikely
		<i>Hydroprogne caspia</i>	Caspian Tern	Blue	NAR					Unlikely
		<i>Larus californicus</i>	California Gull	Blue						Unlikely
		<i>Melanitta americana</i>	Black Scoter	Blue						Unlikely
		<i>Melanitta perspicillata</i>	Surf Scoter	Blue						Uncertain
		<i>Numenius americanus</i>	Long-billed Curlew	Blue	SC/SC	Yes				Unlikely
		<i>Podiceps auritus</i>	Horned Grebe	Yellow	SC/SC					Uncertain
		<i>Podiceps nigricollis</i>	Eared Grebe	Blue						Unlikely

TABLE 4.9. Listed birds that have been recorded infrequently in the RMOW and are not a local, long-term conservation concern at this time. **Casual** = “1 to 10 birds per year. Not seen every year” (Ricker et al. 2014). **Accidental** = “Only one on record for season noted” (Ricker et al. 2014) and generally well outside of their usual range.

Group 1	Group 2	Species	Common Name	BC List	COSEWIC / SARA	BC ID Wildlife	RMOW Record?	Resident?	Breeds in RMOW?	Impt. Habitat?
Birds - Non-Resident	Casual	<i>Buteo lagopus</i>	Rough-legged Hawk	Blue	NAR		Yes	No	No	No
		<i>Falco mexicanus</i>	Prairie Falcon	Red	NAR	Yes				
		<i>Falco peregrinus</i>	Peregrine Falcon	Red	SC/SC					
		<i>Podiceps nigricollis</i>	Eared Grebe	Blue						
	Accidental	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Red		Yes				
		<i>Asio flammeus</i>	Short-eared Owl	Blue	SC/SC	Yes				
		<i>Botaurus lentiginosus</i>	American Bittern	Blue						
		<i>Euphagus carolinus</i>	Rusty Blackbird	Blue	SC/SC					
		<i>Limnodromus griseus</i>	Short-billed Dowitcher	Blue						
		<i>Melanerpes lewis</i>	Lewis’s Woodpecker	Blue	T/T	Yes				
		<i>Phalacrocorax auritus</i>	Double-crested Cormorant	Blue						
		<i>Phalaropus lobatus</i>	Red-necked Phalarope	Blue	SC/					
		<i>Pluvialis dominica</i>	American Golden-Plover	Blue						
		<i>Progne subis</i>	Purple Martin	Blue						
		<i>Sterna forsteri</i>	Forster’s Tern	Red	DD/					
		<i>Tringa incana</i>	Wandering Tattler	Blue						
		<i>Tyto alba</i>	Barn Owl	Red	T/T					
		<i>Zonotrichia querula</i>	Harris’ Sparrow	Unknown	SC/					

5.0 Species at Risk – Priorities and Comparisons with Past Years

5.1 Comparison with Previous Years

The updated total of 50 Confirmed species at risk is eight fewer than in 2018 and 20 fewer than in 2017 (Table 5.1). The main cause of that decrease has been the downlisting (to Yellow, or Secure) and delisting of 33 species by the CDC since 2017.¹⁵ One new, Red-listed, species was added in 2019 (Dun Skipper, *Euphyes vestris*) which was previously considered out of range and classified as Unlikely (Brett 2018).

TABLE 5.1. Species at risk considered within this report by RMOW status and conservation priority. Migratory birds of conservation interest were not included in 2016 and 2017 reports.

<u>RMOW Residency</u>	<u>Priority?</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>
Confirmed	Yes	69	70	58	50
Likely	Yes?	9	10	12	13
Migratory Birds	Yes?	n/a	n/a	11	11
Possible		23	23	23	22
Data Deficient		3	3	2	6
Extirpated		0	0	2	1
Unlikely to Highly Unlikely		33	33	29	27
Not Possible		12	13	5	4
Casual and Accidental Birds		n/a	n/a	16	18
Excluded		n/a	n/a	22	10
		149	152	177	162

Many of the Confirmed and Likely species (Tables 4.1 and 4.2) will not be returned in a CDC search that combines conservation status, Forest District, BGC Zones, Regional Districts, etc.¹⁶ That means anyone trying to determine which species at risk are in Whistler using the CDC Species and Ecosystems Explorer alone would significantly underestimate the number of species at risk to be considered in conservation planning. In addition, there are many species at risk returned in a CDC search that are Unlikely to Not Possible in Whistler (e.g., Green Sturgeon and Northern Abalone). The lists presented in Section 4 are therefore more accurate and complete for the Whistler area than data available online from the CDC.

5.2 Species-Level Conservation Priorities

Just under half (46%) of the species at risk described in this report are potential conservation priorities (Confirmed, Likely, or Migratory; Table 5.1), a total that is the same as 2018. A further 17% are Possible and would be worthy targets (second in priority to Likely species) for targetted surveys, especially if of particular interest to the RMOW. Scarce resources should not be directed to any of the 37% of species with less likelihood of occurring.¹⁷

TABLE 5.2: Proportion of species at risk by likelihood of occurring in the RMOW.

<u>RMOW Residency</u>	<u>2019 Total</u>	<u>2018 Total</u>
Confirmed, Likely, or Migratory	74 (46%)	81 (46%)
Possible (including Data Deficient)	28 (17%)	23 (13%)
Unlikely, Possible, Extirpated, Casual, Accidental, Excluded	60 (37%)	73 (41%)

There are risks in considering only Confirmed species as conservation priorities for at least three reasons:

- (i) new species at risk continue to be discovered in the RMOW;
- (ii) species listed by the CDC and COSEWIC continue to change with new information; and
- (iii) the local habitat use of migratory species (primarily birds) is often unclear.

For these reasons, it seems prudent to extend local conservation planning at least to Likely (Table 4.2) and Migratory birds (Table 4.8). These 74 species represent all habitat types within the RMOW and providing habitat for them will also protect other species.

¹⁵ Thirteen of the 33 species were not Confirmed which explains the discrepancy in totals.

¹⁶ A 2016 CDC search returned fewer than half the Confirmed and Likely species at that time (Brett 2016a).

¹⁷ Excluding Unlikely species from targetted searches does not mean they could not occur here but rather that future surveying effort would be better directed towards other species. The discovery of Dun Skippers during an unrelated 2019 survey is an example.

6.0 Ecosystems At Risk

6.1 Search Methods

The CDC assesses and ranks possible threats to ecological communities, synonymous in this usage with “ecosystems.”¹⁸ The term refers to distinctive plant communities which can occur in a variety of Biogeoclimatic (BGC) Zones and similar growing conditions (represented by the most specific class in the BGC system, Site Series; Green and Klinka 1994).

Search Criteria

The narrowest search for ecosystems at risk on the BC Species and Ecosystems Explorer¹⁹ includes the following search terms (Table 6.1; Figure 6.1):

- Ecosystem Realm-Groups: Flood Group (F) OR Forest OR Grassland Group (G) OR Hydrogenic Group (H) OR Rock Group (R) OR Subalpine Shrub Group (S) OR Mineral Wetland Group OR Peatland Group OR Alpine Group (A) OR Beach Group (B)
- AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
- AND Forest Districts: Squamish Forest District (DSQ) (Restricted to Red, Blue, and Legally designated species)
- AND BGC Zone:
- AND BGC Zone, Subzone, Variant, Phase: CMAun, CMAunp, CWHds1, CWHms1, MHunp, MHmm2

The BGC units included in the search for ecosystems at risk in the RMOW were: low elevation ecosystems in the Coastal Western Hemlock (CWH) Zone, subalpine forested and parkland ecosystems in the Mountain Hemlock (MH) Zone, and alpine ecosystems in the Coastal Mountain-heather Alpine (CMA) Zone (Table 6.1). Within each of these units, the most restrictive (lowest level) unit was chosen from CDC search options. For the CWH Zone and MHmm Subzone it was possible to specify Variant which restricted search results to ecosystems that are most likely to occur in Whistler. The most restrictive search term for MH parkland was at the next higher (more general) Subzone level (MHmmp) which also includes parkland ecosystems with a more maritime influence west of Whistler. Two search terms were necessary to return all results for alpine ecosystems: CMAun and CMAunp (the latter includes some parkland ecosystems). Estuarine ecosystems were excluded since that habitat does not occur in the RMOW.

TABLE 6.1. Full Biogeoclimatic (BGC) unit names that occur in the RMOW. Small patches of the Engelmann Spruce – Subalpine Fir (ESSF) Zone mapped in the RMOW that are not included here (Section 6.2).

<u>BGC Unit</u>	<u>BGC Class</u>	<u>Full Description</u>
CMAun	Zone	Coastal Mountain-heather Alpine – undifferentiated
CMAunp	Zone + Subzone	Coastal Mountain-heather Alpine - undifferentiated and parkland
CWHds1	Variant	Coastal Western Hemlock Southern Dry Submaritime
CWHms1	Variant	Coastal Western Hemlock Southern Moist Submaritime
MHmm2	Variant	Mountain Hemlock Leeward Moist Maritime
MHmmp	Subzone	Mountain Hemlock Moist Maritime Parkland

¹⁸ <http://a100.gov.bc.ca/pub/eswp/search.do>

¹⁹ Accessed January 7, 2019.

Basic Search

Name ? ☒ Scientific ☒ English ☐ Species Code

Groups ?

- ☐ Animals
- ☐ Plants
- ☐ Fungi (Lichens and Macrofungi)
- ☒ Ecological Communities
 - ☒ Estuarine Realm
 - ☐ Estuarine Marsh Class (Em)
 - ☐ Estuarine Meadow Class (Ed)
 - ☐ Estuarine Tidal Flat Class (Et)
 - ☒ Terrestrial Realm
 - ☒ Wetland Realm
 - ☒ Mineral Wetland Group
 - ☒ Peatland Group

Advanced Search Expand All Collapse All


Note: when selecting multiple criteria in an Advanced Search, the Search Results will show taxa that meet all chosen conditions. E.g. Blue-listed lichens in the CDF zone, within the Capital Regional District.

☒ Native / Endemic ?

☒ Conservation Status ? ✓

☒ BC List (Red, Blue, Yellow, Extinct)

- ☒ Red (Extirpated, Endangered, or Threatened)
- ☒ Blue (Special Concern)
- ☐ Yellow (Not at Risk)
- ☐ Extinct (Species only)



Regional Districts

Biogeoclimatic Units

Zone	Zone, Subzone (Variant, Phase) (Ecosystems only)
BWBS - Boreal White and Black Spruce	CWHds - Dry Submaritime
CDF - Coastal Douglas-fir	CWHds1 - Southern Dry Submaritime
CMA - Coastal Mountain-heather Alpine	CWHds2 - Central Dry Submaritime
CWH - Coastal Western Hemlock	CWHmm - Moist Maritime
ESSF - Engelmann Spruce - Subalpine Fir	CWHmm1 - Submontane Moist Maritime
ICH - Interior Cedar - Hemlock	CWHmm2 - Montane Moist Maritime
IDF - Interior Douglas-fir	CWHms - Moist Submaritime
IMA - Interior Mountain-heather Alpine	CWHms1 - Southern Moist Submaritime
MH - Mountain Hemlock	CWHms2 - Central Moist Submaritime
MS - Montane Spruce	CWHun - Undifferentiated

FIGURE 6.1. Screenshot from the CDC Species and Ecosystem Explorer showing some of the search terms used to narrow results for ecological communities that occur in the Squamish Forest District.

6.2 Notes on the inclusion of CWHds1 and exclusion of ESSFmwp Variants

CWHds1:

Two reports (MOT 2003; Timberline 2007) mapped the forests at the south end of the RMOW (near Brandywine Provincial Park) and further south as CWHds1 (Coastal Western Hemlock Southern Dry Submaritime). The CDC recorded a Species Occurrence of CWHds1 at the north end of that park, but has not verified it with a field visit.²⁰ Green (2010) mapped all low-elevation ecosystems in the RMOW as Moist Submaritime (CWHms1), but he acknowledged that the southern boundary between the Moist and Dry Submaritime Subzones (CWHms and CWHds, respectively) was difficult to establish (p. 8). Ecological communities from the CWHds1 Variant were included within Section 6 for three reasons:

- (i) There are sites at the south end of the RMOW that have similar plant communities to CWHds1 site series (references above and personal observations);
- (ii) 10% of the Whistler Landscape Unit for the Cheakamus Community Forest (in which the RMOW is a partner) is classified as CWHds1 (Green 2010); and
- (iii) The CWHds1 Variant has a higher percentage of Red-listed ecosystems than the CWHms1 Variant and a prudent approach would be to assume higher risk to them.

ESSFmwp:

Although previous mapping has sometimes included polygons of the Engelmann Spruce – Subalpine Fir Parkland Moist Warm Parkland (ESSFmwp) Variant on the west aspect slopes of Blackcomb and Whistler Mountains, it was excluded as a search term here. Green (2010) did not map any Engelmann Spruce – Subalpine Fir (ESSF) Zone ecosystems in the Whistler Landscape Unit of the Cheakamus Community Forest and there is some contention whether such small, discontinuous occurrences from another BGC Zone fit within the overall BGC system (Karel Klinka, pers. comm.). Either way, many of the ecological communities that would be found in the ESSFmwp would also be found in the MHmwp2. Finally, the listings for high-elevation plant communities for the BC Coast have not yet been completed so will need to be reassessed when they are (Will MacKenzie, pers. comm.). Two sources for this future work include plots and ecosystem classification in the Whistler area (Brett et al. 2001; Brett and Bjork 2016b).

²⁰ B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 118616, western hemlock - Douglas-fir / electrified cat's-tail moss Dry Submaritime 1. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed May 5, 2019).

6.3 Ecosystems at Risk within the RMOW (2019)

The CDC did not make any changes in 2019 to ecosystems at risk that occur with the RMOW which include seven Red-listed and 12 Blue-listed ecosystems (Table 6.2). This result means that the CDC considers all but three terrestrial ecosystems (Site Series) within the RMOW to be at-risk; CWHds1/11 and CWHms1/10 (Lodgepole pine – Sphagnum), plus CWHms1/01 (Western hemlock – amabilis fir – step moss). The first two are boggy ecosystems typically not included in logging or other development plans. The third is the most common forested ecosystem at lower elevations in Whistler Valley (“01” sites are mesic sites, also called zonal). Much of Whistler’s past logging and ski area development has been in this ecosystem.

TABLE 6.2. Ecosystems at risk in the RMOW. The “BC ID Wildlife” column lists three plant communities designated as Identified Wildlife (BC MOE 2019a).

Present?	Site Series	Common Name	Scientific Name	BC List	BC ID Wildlife
Yes	CWHds1/01	Western Hemlock - Douglas-fir / Electrified Cat's-tail Moss ds1	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Rhytidiadelphus triquetrus</i> ds1	Blue	Yes
Yes	CWHms1/01	Western Hemlock - Amabilis Fir / Step Moss	<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Hylocomium splendens</i>	Blue	
Yes	CWHds1/02	Douglas-fir - Lodgepole Pine / Kinnikinnick Dry Submaritime	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Arctostaphylos uva-ursi</i> Dry Submaritime	Red	
Yes	CWHms1/02	Douglas-fir - Lodgepole Pine / Kinnikinnick Moist Submaritime	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Arctostaphylos uva-ursi</i> Moist Submaritime	Blue	
Yes	CWHds1/03; CWHms1/03	Douglas-fir - Western Hemlock / Falsebox	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Paxistima myrsinites</i>	Blue	
Yes	CWHds1/04	Douglas-fir / Douglas maple / Hooker's Fairybells	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> / <i>Prosartes hookeri</i>	Red	
Yes	CWHms1/04	Amabilis Fir - Western Redcedar / Oak Fern	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Gymnocarpium dryopteris</i>	Blue	
Yes	CWHds1/05	Western Redcedar - Douglas-fir / Vine Maple	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Acer circinatum</i>	Blue	Yes
Yes	CWHds1/06	Western Hemlock / Queen's Cup	<i>Tsuga heterophylla</i> / <i>Clintonia uniflora</i>	Red	
Yes	CWHms1/06	Amabilis Fir - Western Redcedar / Devil's Club Moist Submaritime	<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Oplopanax horridus</i> Moist Submaritime	Blue	
Yes	CWHds1/07	Western Redcedar / Devil's Club	<i>Thuja plicata</i> / <i>Oplopanax horridus</i>	Blue	Yes
Yes	CWHms1/07	Sitka Spruce / Salmonberry Moist Submaritime	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Moist Submaritime	Red	
Yes	CWHds1/08	Sitka Spruce / Salmonberry Dry	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Dry	Red	
Yes	CWHms1/08, CWHds1/09	Black Cottonwood - Red Alder / Salmonberry	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	Blue	
Yes	CWHms1/09	Black Cottonwood / Sitka Willow – Thimbleberry	<i>Populus trichocarpa</i> / <i>Salix sitchensis</i> - <i>Rubus parviflorus</i>	Red	
Yes	CWHds1/10	Black Cottonwood / Willows Dry Submaritime	<i>Populus trichocarpa</i> / <i>Salix</i> spp. Dry Submaritime	Blue	
Yes	CWHms1/11, CWHds1/12	Western Redcedar - Sitka Spruce / Skunk Cabbage	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Blue	
Yes	CWH/Ws51	Sitka Willow - Pacific Willow / Skunk Cabbage	<i>Salix sitchensis</i> - <i>Salix lasiandra</i> var. <i>lasiandra</i> / <i>Lysichiton americanus</i>	Red	
No	CWH/Wm04	Common Spike-Rush Herbaceous Vegetation	<i>Eleocharis palustris</i> Herbaceous Vegetation	Blue	

Excluded:

No	CWHds1/00	Garry oak - bigleaf maple - cherries	<i>Quercus garryana</i> - <i>Acer macrophyllum</i> - <i>Prunus</i> spp.*	Red	
Yes**	CWHds1	Dune Wildrye - Beach Pea	<i>Leymus mollis</i> ssp. <i>mollis</i> - <i>Lathyrus japonicus</i> **	Red	

* Garry Oak and this plant community is not possible near the RMOW. The only occurrence mapped by the CDC is in the Fraser Valley.

**The *Lathyrus mollis* plant community is not possible in the RMOW since they are seaside communities.

Two wetland ecosystems are included as occurring or possible within the RMOW: Common Spike-Rush Herbaceous Vegetation and Sitka willow - Pacific willow / skunk cabbage (Mackenzie and Moran 2004). I have seen similar ecosystems to the first in shallow parts of the Alta Lake shoreline and at the Brandywine basalt flats (among other locations). Analogues to the second occur in shallow water in floodplain forests and wetlands (Mackenzie and Moran 2004). I have seen similar ecosystems in the Emerald Forest and at the south end of the Chateau Golf Course (among other locations). The RMOW's Terrestrial Ecosystem Mapping (Green 2010) did not map non-forested ecosystems as described by Mackenzie and Moran.²¹ They did, however, describe and map their own plant communities. Green's "Nuphar" site unit²² appears to be the closest match to the MacKenzie and Moran's Common Spike-Rush community. Green's Alder/Willow – Skunk Cabbage site unit²³ appears to be a very close match to the CDC's Sitka willow - Pacific willow / skunk cabbage community. Field work would be necessary to confirm locations of these two wetland ecosystems within the RMOW.

Two ecosystems were excluded because they are not possible in the RMOW (bottom of Table 6.2). Garry oak only occurs in warm and dry, typically coastal sites in southern BC, particularly the Gulf Islands and southern Vancouver Island. The dune wildrye ecosystem is strictly found on the coast.

No ecosystems are listed for the Mountain Hemlock (MH) Zone. The reason there are no listed ecosystems in the forested, lower portion of the MH (MHmm2) may be because past logging and other developments have typically focussed on lower elevations. Now that higher elevations are being targeted for logging in Whistler and elsewhere in BC, some ecosystems are certainly at risk. As mentioned above, high elevation (non-forested) ecological communities on the BC Coast have yet to be thoroughly assessed so there are few listings. Will Mackenzie expects to finish that job within the next two years (pers. comm. in Brett and Björk 2016).

²¹ As noted above, non-forested ecosystems have only recently been classified and recognized in BC.

²² Which is based on Klinka et al.'s (1997) *Nuphar polysepalum*: *Eleocharis palustris* subassociation.

²³ Coded as "DrWi-Skunk Cabbage."

7.0 Recovery Planning and Best Management Practices

While outside the immediate scope of this report, BC and Canadian Governments have published many plans and other documents to assess species at risk and propose management and recovery planning for them.²⁴ To date, most of these documents are non-binding but nonetheless provide useful information. The BC Government maintains a list of current recovery and management plans published for species at risk at BC and/or Federal levels.²⁵ All plans, if published, are included under the species accounts below (Table 7.1). Recovery and/or management plans for many species at risk have yet to be conducted. Based on the Provincial and Federal ranking, plans listed below may be at either or both the Provincial and Federal level.

Definitions provided by the BC Government²⁶ for the different types of plans are as follows:

Recovery plan: A document developed for a species or ecosystem in B.C. that has been designated as extirpated, endangered or threatened. This approach is used for B.C.-led recovery documents– it includes information to guide implementation as well as an outline of the survival and recovery habitat needed to meet the goal and objectives. In some cases, information is summarized in a more strategic recovery strategy followed by one or more action plans used to guide implementation measures.

Management plan: A document developed for "special concern" species or ecosystems in B.C. It outlines the coordinated conservation activities and land use measures needed to ensure, at a minimum, that a species or ecosystem does not become threatened or endangered.

Implementation plan: In addition to a recovery planning document, some species may also have an implementation plan that outlines the provincial government's response to managing species at risk – especially in cases where there could be significant socio-economic implications.

BC publishes non-binding guidelines on a variety of local species (titled as Best Management Practices or Develop With Care).²⁷ These guidelines and the documents listed in Table 7.1 should be references for future conservation efforts in the RMOW. BC has not yet enacted endangered species laws similar to the Canadian Species at Risk Act, in spite of a 2017 directive to the incoming Minister of Environment and Climate Change Policy.²⁸ As of April 2019, the BC backtracked on its commitment to endangered species legislation which is now not likely to be enacted before 2021.²⁹

The only new addition to Table 7.1 since 2019 is the Federal Management Plan for Band-tailed Pigeon (*Patagioenas fasciata*).

²⁴ The BC recovery planning process is best summarized in BC MOE (2016b).

²⁵ <http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/recovery-planning/recovery-planning-documents/recovery-planning-documents>

²⁶ Ibid.

²⁷ <http://www.env.gov.bc.ca/wld/BMP/bmpintro.html#second>

²⁸ <https://www2.gov.bc.ca/assets/gov/government/ministries-organizations/premier-cabinet-mlas/minister-letter/heyman-mandate.pdf>

²⁹ <http://thenarwhal.ca/b-c-stalls-on-promise-to-enact-endangered-species-law/>

TABLE 7.1: Planning documents available from the BC or Canadian Government for species at risk in the RMOW.

Common (Scientific Name)	Most recent approved planning document(s); online links
Band-tailed Pigeon (<i>Patagioenas fasciata</i>)	Federal Management Plan (ECCC2019): https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/mp_band_tailed_pigeon_e_final.pdf
Coastal Tailed Frog (<i>Ascaphus truei</i>)	Federal Management Plan (ECCC 2018a): https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/Mp-CoastalTailedFrog-v00-2018Oct-Eng.pdf
Common Nighthawk (<i>Chordeiles minor</i>)	Federal Recovery Strategy (Env. Canada 2016a): Recovery Strategy for the Common Nighthawk (Chordeiles minor) in Canada (PDF) 2018 Assessment: https://sararegistry.gc.ca/virtual_sara/files/cosewic/srCommonNighthawk2018e.pdf
Evening Grosbeak (<i>Coccothraustes vespertinus</i>)	Federal assessment and status report (COSEWIC 2016): https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/cosewic/sr_Evening%20Grosbeak_2016_e.pdf .
Great Blue Heron (<i>Ardea herodias</i> ssp. <i>fannini</i>)	Proposed Federal Management Plan (Environment Canada 2016b): https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/mp_great_blue_heron_fannini_e_proposed.pdf
Grizzly Bear (<i>Ursus arctos</i>):	Federal assessment and status report (COSEWIC 2013c): http://www.registrelep-sararegistry.gc.ca/document/default_e.cfm?documentID=2459 North Cascades Grizzly Bear Recovery Team (2004): http://www.env.gov.bc.ca/wld/documents/recovery/ncgbrt_final.pdf
Little Brown Myotis (<i>Myotis lucifugus</i>)	Federal Recovery Strategy (ECCC 2018b): file:///C:/Users/Snowline/Documents/2018%20SEAR/regulation%20-%20Recovery%20Plans%20BC%20and%20Canada/Little%20Brown%20Bat%20Recovery%20Strategy%20Env.%20Canada%20Final%202018.pdf .
Marbled Murrelet (<i>Brachyramphus marmoratus</i>)	Federal Recovery Strategy (Env. Canada 2014a): Recovery Strategy for the Marbled Murrelet (Brachyramphus marmoratus) in Canada Developing a BC Implementation Plan (MFLNRO 2015b): https://www.for.gov.bc.ca/ftp/rco/external/!publish/FMLT%20Publish/North%20Island%20Central%20Coast/February%2025%202016%20Meeting/MAMU%20Info%20Package_Dec%2017%202015.pdf
Mountain Goat (<i>Oreamnos americanus</i>)	BC Management Plan (Mountain Goat Management Team 2010): Management Plan for the Mountain Goat (Oreamnos americanus) in British Columbia(PDF)
Northern Goshawk, <i>laingi</i> ssp. (<i>Accipiter gentilis</i> ssp. <i>laingi</i>)	Developing a BC Implementation Plan (MFLNRO 2015a): https://www.for.gov.bc.ca/ftp/rco/external/!publish/FMLT%20Publish/North%20Island%20Central%20Coast/February%2025%202016%20Meeting/NOGO%20Info%20Package_Dec%2017%202015.pdf BC Management Plan (BC MFLNRO 2013): Management Plan for the Northern Goshawk, laingi subspecies (Accipiter gentilis laingi) in British Columbia(PDF) BC Recovery Strategy (Northern Goshawk Recovery Team 2008): Recovery Strategy for the Northern Goshawk, laingisubspecies (Accipiter gentilis laingi) in British Columbia(PDF)
Northern Red-legged Frog (<i>Rana aurora</i>)	BC Recovery Plan (BC MOE 2015). URL: http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10251 . BC
Northern Spotted Owl (<i>Strix occidentalis</i> ssp. <i>caurina</i>)	Federal Recovery Strategy (2006; In: Chutter et al. 2004): http://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_spotted_owl_caurina_1006_e.pdf
Northwest (Western) Waterfan (<i>Peltigera gowardii</i>)	BC Management Plan (BC MOE 2015a): http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10291 Federal Status Assessment (COSEWIC 2013a): https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Western%20Waterfan_2013_e.pdf

TABLE 7.1 (cont.): Planning documents available from the BC or Canadian Government for species at risk in the RMOW.

Common (Scientific Name)	Most recent approved planning document(s); online links
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	Proposed Federal Management Plan (Environment Canada 2016c): http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_olive-sided%20flycatcher_e_final.pdf 2018 Assessment: https://sararegistry.gc.ca/virtual_sara/files/cosewic/srOlive-sidedFlycatcher2018e.pdf
Old-growth Specklebelly (<i>Pseudocyphellaria rainierensis</i>)	Federal management plan (COSEWIC 2017): http://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=1440C3BA-1 Management plan for oldgrowth specklebelly (<i>Pseudocyphellaria rainierensis</i>) in British Columbia (BC MOE 2015c). http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10231 .
Pacific Water Shrew (<i>Sorex bendirii</i>)	Federal Recovery Strategy (Environment Canada 2014b): http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_pacific_water_shrew_e_final.pdf BC Recovery Strategy (Pacific Water Shrew Recovery Team 2009): http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=6612
Peregrine Falcon (<i>Falco peregrinus</i> ssp. <i>anatum</i>)	Federal assessment and status report: https://sararegistry.gc.ca/virtual_sara/files/cosewic/srPeregrineFalcon2017e.pdf
Western Screech-Owl (<i>Megascops kennicottii</i> ssp. <i>kennicottii</i>)	Federal assessment and status report (COSEWIC 2012): http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech-owl_1012_e.pdf
Western Bumblebee (<i>Bombus occidentalis</i>)	Federal assessment and status report (COSEWIC 2014a): http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Western%20Bumble%20Bee_2014_e.pdf
Western Toad (<i>Anaxyrus boreas</i>)	Federal Management Plan (ECCC 2016): http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/mp-western-toad-e-proposed.pdf .
Whitebark Pine (<i>Pinus albicaulis</i>)	SARA recovery strategy (ECCC 2017): http://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=C6EB6568-1
Wolverine (<i>Gulo gulo</i> ssp. <i>luscus</i>)	Federal assessment and status report (COSEWIC 2014b): http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=206

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Appendix 1: Species and Ecosystems at Risk Definitions

Term	Definition
Federal Definitions ⁸ (COSEWIC and the Species At Risk Act [SARA] use same rankings. COSEWIC is not a legal listing; the legal list is under SARA)	
Extinct	A species that no longer exists.
Extirpated	A species that no longer exists in its native habitat, but may occur elsewhere.
Endangered	A species facing imminent extinction or extirpation. *
Threatened	A species that is likely to become endangered if limiting factors such as diminishing population sizes, isolated geographic distribution, and habitat threats are not reversed. *
Special Concern	A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.
Not at Risk	A species that has been evaluated and found to be not at risk.
Data Deficient	A species for which there is insufficient scientific information to support status designation.
Provincial Definitions ⁹	
Endangered Species (legal list under BC Wildlife Act)	A species of wildlife that is threatened with imminent extinction throughout all or a significant portion of its range in British Columbia because of the action of humans, not including controlled alien species. Only 3 species are legally listed as endangered under the BC Wildlife Act: Vancouver Island Marmot, American White Pelican and Burrowing Owl.
Threatened Species (legal list under BC Wildlife Act)	A species of wildlife that is likely to become endangered in British Columbia if the factors affecting its vulnerability are not reversed, not including controlled alien species. Only 1 species is legally listed as threatened under the BC Wildlife Act: Sea Otter.
Forest and Range Practices Act (Identified Wildlife Management Strategy)	B.C. designates both species and ecological communities under FRPA. There are 62 animal species, 2 plant species and 17 ecological communities provincially designated.
BC Ministry of Environment Conservation Data Centre Red list (not a legal list)	The list of ecological communities and indigenous species and subspecies that are extirpated, endangered or threatened in BC. They may or may not be considered candidates for provincial legal designations under the Wildlife Act or under FRPA. There are 98 species and 54 ecological communities on the CDC's red list in the South Coast. Although no species are actually listed as endangered or threatened under the Wildlife Act, individual vertebrates receive protection under the Wildlife Act (see above).
BC Ministry of Environment Conservation Data Centre Blue list (not a legal list)	The list of ecological communities and indigenous species and subspecies of special concern in BC. There are 177 species and 50 ecological communities blue-listed in the South Coast.

⁸ Government of Canada Environment Canada. 2014. <http://www.sararegistry.gc.ca/about/glossary/default_e.cfm>

⁹ Government of British Columbia Ministry of Environment. Ecosystems Branch. 2014. <<http://www.env.gov.bc.ca/atrisk/index.html>>

Source: Bedore 2014, p. 8 and SCCP 2016, used with permission of the SCCP (P. Zevit, pers. comm.).

Appendix 2: Assessment Rationale for Species at Risk in the RMOW

TABLE A2.1. Confirmed species.

<u>Group</u>	<u>Scientific (Common) Name</u>	<u>Biogeoclimatic Zone (CDC)</u>	<u>Whistler status and habitat notes</u>	<u>Habitat elsewhere, esp. if not documented in RMOW</u>
Amphibian	<i>Anaxyrus boreas</i> (Western Toad)	BG; BWBS; CDF; CWH; ESSF; ICH; IDF; PP; SBS; SWB	Only known continuous breeding site in RMOW is Lost Lake (W. Horan 2007) but also detected in the past at Cheakamus Crossing and Brandywine (Brett 2007). Toads have been observed in summer far from Lost Lake, including alpine (Brett 2019).	
Amphibian	<i>Ascaphus truei</i> (Coastal Tailed Frog)	CWH; ESSF; ICH; IDF; MH; MS	Mountainside creeks >6 deg. C water temperature, mainly between 700 and 1200 metres, especially with rounded cobbles; confirmed presence in ~19 RMOW creeks with others likely (Brett 2019; Palmer and Snowline 2017, 2018, 2019).	
Amphibian	<i>Rana aurora</i> (Northern Red-legged Frog)	CDF; CWH; MH	Lakes and small ponds in warm sites at the south end of the RMOW, especially Brandywine; also confirmed on n. side of Callaghan R. on CalCheak FSR by Jory Mullen (Brett 2007, 2019).	
Bird	<i>Accipiter gentilis</i> ssp. <i>laingi</i> (Northern Goshawk)	CDF; CWH	Alpine, CWH & MH forest, wetlands (Ricker et al. 2014); current and past nesting activity near Comfortably Numb Trail (MFLNRO and Madrone 2014, 2015; Brett, in prep.), recent nest at Millar's Pond (Brent Matsuda in Palmer and Snowline 2017), past activity near Brew Creek ((MFLNRO and Madrone 2014, 2015) though not recently (Brett, in prep.). Seen annually by Whistler Naturalists and recorded on eBird (Brett in prep.).	
Bird	<i>Ardea herodias</i> ssp. <i>fannini</i> (Great Blue Heron)	CDF; CWH	Foraging mainly in valleybottom lakes, wetlands, and riparian areas (Campbell et al. 1990a; Ricker et al. 2014); no known breeding sites nearby; local herons may return to coast for breeding (K. Ricker, pers. comm.)	
Bird	<i>Butorides virescens</i> (Green Heron)	BG; CDF; CWH; ICH; IDF; PP; SBS	Rivers & streams, wetlands, riparian adjacent to shrub or small tree cover (Ricker et al. 2014; Campbell et al 1990a); Campbell et al. report breeding on Alta and Green Lakes but not recorded since 2013 on Green Lake by Karl Ricker (pers. comm., Dec. 2019).	
Bird	<i>Chordeiles minor</i> (Common Nighthawk)	BG; BWBS; CDF; CWH; ESSF; ICH; IDF; MH; MS; PP; SBPS; SBS; SWB	Lakes & ponds, CWH forest, riparian (Ricker et al. 2014); recorded most years in Breeding Bird Survey (D. Marven unpubl. data) and at Brandywine basalt flats (BioBlitz 2012).	Ground nester on open sites (Campbell et al. 1990b).
Bird	<i>Coccythraustes vespertinus</i> (Evening Grosbeak)	All non-alpine throughout BC.	Breeding in Whistler according to Ricker et al. (2014) but Karl Ricker (pers. comm., Dec. 2018) notes this species is not recorded each year.	

TABLE A2.1. **Confirmed** species (cont.)

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Bird	<i>Contopus cooperi</i> (Olive-sided Flycatcher)	BWBS; CDF; CWH; ESSF; ICH; IDF; MH; MS; PP; SBPS; SBS; SWB	CWH & MH forest, riparian habitats, breeding (Ricker et al. 2014); requires snags adjacent to openings (Campbell et al. 1997); breeds most commonly at mid-elevations, +/-1100 m (Campbell et al. 1997); sightings decreasing (K. Ricker, pers. comm.)	
Bird	<i>Cypseloides niger</i> (Black Swift)	BAFA; BG; CDF; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; PP; SBPS; SBS; SWB	Alpine, CWH & MH forest (Ricker et al. 2014); nests in cliffs/steep bluffs (Campbell et al. 1990b); known nests in Brandywine Canyon and maybe Soo Bluffs (K. Ricker, pers. comm., Dec. 2018). Seen flying over Shadow Lake in 2019 (K. Ricker, pers. comm., Dec. 2019). Presumed habitat use within RMOW.	
Bird	<i>Hirundo rustica</i> (Barn Swallow)	BAFA; BG; BWBS; CDF; CWH; ESSF; ICH; IDF; IMA; MH; MS; PP; SBPS; SBS; SWB	Wetlands, grassy areas, riparian, urban areas, breeding (Ricker et al. 2014); nest at float plane wharf last year, not this year (K. Ricker, pers. comm.); 92% of documented nests were on structures (Campbell et al. 1997)	
Bird	<i>Megascops kennicottii</i> ssp. <i>kennicottii</i> (Western Screech-Owl)	BG; CDF; CWH; ICH; IDF; PP	Deemed a non-resident (Ricker et al. 2014) and "essentially non-migratory" by Campbell et al. (1990b). Recent records from Greg Ferguson (2017), Mark Beaven (2018 video), and Karl Ricker (pers. comm., Dec. 2018) suggest resident (breeding?) birds are likely.	Screech-owls are known to breed in Pemberton (Ferguson 2017) and are often associated with cottonwood and similar habitats where tree cavities are available for nesting.
Bird	<i>Patagioenas fasciata</i> (Band-tailed Pigeon)	CDF; CWH; ICH; IDF; MS; SBS	Seen in CWH & MH forest, riparian, urban areas (Ricker et al. 2014); can breed in urban edges and forests; historic (Campbell et al. 1990b). Ricker et al. (2014) lists as possible breeder but numerous spring/summer records suggest they do breed in the RMOW.	
Butterfly	<i>Callophrys eryphon</i> ssp. <i>sheltonensis</i> (Western Pine Elf)	CWH	Low-elevation conifer forests (Brett 2019; their larval food plants are lodgepole and western white pine (Guppy and Shepard 2001); photo ID confirmed by C. Guppy.	
Butterfly	<i>Euphyes vestris</i> (Dun Skipper)	CDF; CMA; CWH; ESSF; IDF; IMA; MH; PP	Single record from late June 2019, feeding on western yarrow (Brett 2019). Unclear distribution and abundance elsewhere in the RMOW.	Generally open, grassy and/or wet areas with availability of sedge (<i>Carex</i> spp.). Previously known only from drier habitats, including Pemberton Valley.
Butterfly	<i>Parnassius clodius</i> ssp. <i>pseudogallatinus</i> (Clodius Parnassian)	CMA; CWH; ESSF; IDF; IMA; MH; MS	Based on range and photos, this is likely the ssp. in Whistler, otherwise the Blue-listed ssp. <i>claudianus</i> (C. Guppy, pers. comm.). It has been found in various low-elevation sites in Whistler (Brett 2019) and could extend to subalpine elevations (Guppy and Shepard 2001)	Ssp. <i>pseudoallatinus</i> is the likely identity of three specimens to date according to Crispin Guppy (pers. comm.). The alternative is ssp. <i>claudianus</i> which is also Blue-listed.

TABLE A2.1 (cont.). **Confirmed** species.

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Fish	<i>Salvelinus confluentus</i> - coastal lineage (Bull Trout)	CDF; CWH; MH	Green Lake, Fitzsimmons Creek, occasionally Alta Lake and historic records from Lost Lake and 21-Mile Creek (Rebellato 2005)	
Herb	<i>Utricularia ochroleuca</i> (ochroleucous bladderwort)	BWBSdk; CDFmm; ESSFmv; ICHmw	One record from Wildlife Refuge wetland (Brett 2019)	
Lichen	<i>Alectoria imshaugii</i> (spiny witch's hair)	CWHwh	One record from Brandywine Provincial Park (Brett 2019)	Infrequent on low elevation conifers (Goward 1994, McCune and Geiser 2009).
Lichen	<i>Nodobryoria subdivergens</i> (alpine redhead)	no data	One 1994 record from Whistler alpine (T. Goward in Brett 2019),	On rocks and trees at treeline (Goward et al. 1994).
Lichen	<i>Umbilicaria decussata</i> (electric rocktripe)	BAFA; MS	On granitic rock in exposed alpine sites (Brett 2019); only other BC record from J. Pojar, 1975, Spatsizi Plateau (C. Björk, pers. comm.).	
Lichen	<i>Umbilicaria krascheninnikovii</i> (lesser salted rocktripe)	no data	On acidic rock in exposed alpine sites (Brett 2019; Goward 1994)	
Liverwort	<i>Haplomitrium hookeri</i> (liverwort)	no data	Humus and soil in the alpine (Brett 2019; Schofield 2002)	
Liverwort	<i>Jungermannia atrovirens</i> (liverwort)	no data	Wrongly labelled "Likely" in 2016 and 2017 reports. Two 1980 records from Brandywine Creek via the UBC database were added to the WBP list in 2014 (Brett 2019).	On emergent rock, upper edge of Brandywine Falls (Brett 2019). Found on damp calcareous rocks. ³⁰
Liverwort	<i>Nardia breidlerii</i> (liverwort)	no data	Wet soil at high elevations (Brett 2019; FNA 2019)	
Liverwort	<i>Nardia compressa</i> (liverwort)	no data	Over wet rocks along streams and peaty bogs, alpine and Brandywine PP (Brett 2019; FNA 2019)	
Liverwort	<i>Nardia geoscyphus</i> (liverwort)	no data	On dry rocks or damp rocks in streams, alpine (Brett 2019)	
Liverwort	<i>Scapania curta</i> (liverwort)	no data	On rock in the alpine (Brett 2019) no other data found	
Liverwort	<i>Scapania obscura</i> (liverwort)	no data	Peaty soil on late snowmelt sites in the alpine (Brett 2019; Wagner 2008)	
Liverwort	<i>Scapania scandica</i> var. <i>scandica</i> (liverwort)	no data	Four RMOW records, none of which identify to variety. Both var. <i>scandica</i> and var. <i>dimorpha</i> are Blue-listed on EFlora (Klinkenberg 2019b) but only the former is included at all by CDC (2019). The four specimens are from diverse habitats from low to subalpine elevations (Brett 2019).	No other habitat or range information yet located.
Liverwort	<i>Solenostoma confertissimum</i> (liverwort)	no data	Added in 2018 based on two 1980 UBC records from Whistler Mt. (presumably alpine; Brett 2019).	At high elevations and latitudes (CDC 2019).

³⁰ <https://rbg-web2.rbge.org.uk/bbs/Activities/liverworts/Jungermannia%20atrovirens.pdf>

TABLE A2.1 (cont.) **Confirmed** species.

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Mammal	<i>Gulo gulo</i> ssp. <i>luscus</i> (Wolverine, <i>luscus</i> ssp.)	BAFA; BWBS; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; SBPS; SBS; SWB	"Potentially breeding and habitat use specifically Brandywine, Callaghan, Fitzsimmons and Cheakamus River (Steve Rochetta, pers. comm.); plus Whistler and Blackcomb Mts. alpine (Laird Brown photo and E. Crowe, pers. comm.)	Large home ranges (Steve Rochetta by email, Feb. 2, 2019) make confirmation of habitat use difficult.
Mammal	<i>Myotis lucifugus</i> (Little Brown Myotis)	BG; BWBS; CDF; CWH; ESSF; ICH; IDF; MH; MS; PP; SBPS; SBS; SWB	Common over wetlands, lake edges, trails; roosts in houses (Brett 2007; Lausen and Isaac 2010; Isaac and Lausen 2012) and likely loose bark of large trees and other sites (Nagorsen and Brigham 1993). Over-wintering survival threatened by white-nose fungus.	
Mammal	<i>Oreamnos americanus</i> (Mountain Goat)	BAFA; BG; BWBS; CDF; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; PP; SBPS; SBS; SWB	"Historically breeding and habitat use, however people, helicopters and snowmobiles have significantly impacted former range. Possibly there is still some use of Sproatt winter range?" (S. Rochetta, pers. comm., Feb 2019 email); also Overlord/Fitzsimmons (K. Ricker, pers. comm.), Brandywine Mt. (B. Brett, pers. obs.); maybe Phalanx through Singing Pass?	Overwinter habitat elsewhere is typically <1200m, in older forest and, crucially, close to escape terrain (cliffs; Wilson 2005).
Mammal	<i>Ursus arctos</i> (Grizzly Bear)	BAFA; BWBS; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; SBPS; SBS; SWB	"Some breeding and habitat use specifically Brandywine, Callaghan, Sproatt" (S. Rochetta, pers. comm., Nov. 2016). Occupancy by sow and cubs on Sproatt Mt in 2018 and 2019.	
Moss	<i>Brachydontium olympicum</i> (Olympic brachydontium moss)	MH	First and only record from Blackcomb Lake in 2014 (Brett 2019); only 4 records in BC (Klinkenberg 2019b; S. Joya, pers. comm.) makes this a significant record	Moist, acidic boulders mainly in the alpine (FNA 2019).
Moss	<i>Brachythecium holzingeri</i> (Holzinger's brachythecium moss)	CDF; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; SBS	On soil and boulders in alpine sites (Brett 2019; FNA 2019)	
Moss	<i>Bryum pallescens</i> (tall-clustered thread-moss)	no data	One record from thin soil over boulder in stream at 1219m (Brett 2019)	
Moss	<i>Grimmia caespiticia</i> (grimmia moss)	no data	On exposed, dry acidic rock at high elevations (Brett 2019; FNA 2019)	
Moss	<i>Grimmia donniana</i> (Donn's grimmia)	no data	On exposed, dry acidic rock at high elevations (Brett 2019; FNA 2019)	
Moss	<i>Grimmia incurva</i> (black grimmia)	CMA	Damp acidic rock at high elevations (Brett 2019; FNA 2019)	
Moss	<i>Homalothecium nevadense</i> (Nevada homalothecium moss)	no data	On rock in the valley bottom (Brett 2019) various substrates at low to high elevations (FNA 2019)	
Moss	<i>Hygrohypnum alpinum</i> (alpine hygrohypnum moss)	BAFA; CWH; ESSF; ICH; IDF; SWB	On emergent rocks in subalpine to alpine creeks (Brett 2019; FNA 2019)	

TABLE A2.1 (cont.). **Confirmed** species.

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Moss	<i>Orthotrichum pylaisii</i> (Pylais' orthotrichum moss)	BWBS [sic: mistake or omission?]	"McGuire area," dry basalt cliff walls (Brett 2019) granitic rock to alpine elevations (FNA 2019)	
Moss	<i>Pohlia cardotii</i> (Cardot's pohlia moss)	CMA; CWH; IMA; MH	Moist, seepy sites, predominantly alpine (Brett 2019)	
Moss	<i>Pseudoleskea radicata</i> var. <i>pallida</i> (pseudoleskea moss)	no data	One specimen from Vladimir Krajina identified to this variety; the other six records ID'd only to species level (Brett 2019). Rock and mineral soil in the alpine (also FNA 2019).	FNA (2019) includes three varieties, but not var. <i>pallida</i> . It is unclear whether the CDC will also remove that variety. Steve Joya notes identification below species level is very difficult (email, Dec. 2019).
Moss	<i>Racomitrium pygmaeum</i> (pygmy racomitrium moss)	BAFA; ESSF; MH	Dry, acidic soil near treeline (Brett 2019; FNA 2019)	
Moss	<i>Schistidium crassipilum</i> (thickpoint grimmia)	no data	One record from Whistler Village, substrate not specified (Brett 2019)	On low elevation, often limestone substrates including sidewalks FNA (2019).
Moss	<i>Tripterocladium leucocladulum</i> (tripterocladium moss)	CWH; IDF; MH	On dry rocks at lower elevations, e.g., Brandywine Park (north?; Brett 2019)	
Tree	<i>Pinus albicaulis</i> (whitebark pine)	CMAunp; CWHds; CWHms; CWHun; MHmm; MHmp + >40 other BGC units	Common on warm aspect sites near treeline (Brett 2019).	

TABLE A2.2. **Likely** species.

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Bee	<i>Bombus flavidus</i> (=B. <i>fernaldae</i> ; Fernald's Cuckoo Bumblebee)	no data	From one 2018 iNaturalist record from Whistler Mt. alpine entered in 2019. Initial ID by John Ascher in 2019 (confirmed by email, Dec. 2019). Riley Waite (UBC Beaty) agrees with tentative ID but photo not enough for confirmation (email, Jan. 2, 2010)	Subalpine and low alpine habitats (CDC 2019).
Gastropod	<i>Pristiloma arcticum</i> (Northern Tightcoil)	ESSF; ICH	Tentatively confirmed by Kristiina Ovaska at Harmony Lake (Brett 2019); could occur in RMOW (R. Forsyth, pers. comm.) but see notes re taxonomy.	Under woody debris/litter (Burke 2013); wet subalpine sites under rocks/vegetation, should occur in Whistler but Coast Mt. spp. might be <i>P. crateris</i> instead (R. Forsyth, pers. comm.)
Lichen	<i>Leptogium californicum</i> (midlife vinyl)	CDF; CWH; IDF	Brandywine PP area on <i>Acer macrophyllum</i> (just outside RMOW? Brett 2019)	On mossy rock (Goward 1994).
Lichen	<i>Peltigera gowardii</i> (northwest waterfan)	no data	Not yet documented in RMOW (Brett 2019)	2 records s. of Whistler (Black Tusk and Brew Lake) in streams <1m wide near treeline (COSEWIC 2013; BC MOE 2015a)
Liverwort	<i>Marchantia alpestris</i> (liverwort)	no data	Not yet documented in RMOW (Brett 2019) but almost certain based on nearby records, e.g. Russet Lake (Brett and Bjork 2016b). Tentative ID from the 2019 BioBlitz site at WOP (B. Brett photo).	Russet Lake; margins of snowmelt streams and high elevation ponds/lakes (Brett and Björk 2016). Often misidentified as <i>M. polymorpha</i> (C. Björk, pers. comm.).
Mammal	<i>Cervus elaphus</i> ssp. <i>roosevelti</i> (Roosevelt Elk)	CWH; MH	Recently introduced to upper Squamish Valley; occasional sightings (K. Ricker, pers. comm.; Brett 2019). Only bull elk have been reported locally but elk could expand their range (S. Rochetta, pers. comm.).	Elk are wide-ranging animals that use a wide range of habitats at all elevations (CDC 2019). The relocation of elk into the Squamish Valley was part of an effort to re-establish them in their former range.
Moss	<i>Bryum alpinum</i> (= <i>Imbybryum alpinum</i> ; alpine thread-moss)	no data	One tentative record from Whistler alpine (O. Lee in Brett 2019); but may be <i>B. (Imbybryum) muehlenbeckii</i> (S. Joya, pers. comm.).	Rock and soil over rock at all elevations (FNA 2019).
Moss	<i>Bryum schleicheri</i> (Schleicher's thread-moss)	CMA; CWH; IMA; MH	Tent. ID by Olivia Lee from Blackcomb Lake (Brett 2019)	Other BC records from wet subalpine sites (UBC Herbarium 2017).
Moss	<i>Grimmia anomala</i> (grimmia dry rock moss)	CWH; MH	Not yet documented in RMOW (Brett 2019); possible in RMOW (O. Lee, pers. comm.).	Exposed, damp soils at mid and high elevations (FNA 2019); closest record is from 1974 on Brew Lk. trail from Brandywine (Brett 2019).
Moss	<i>Polytrichastrum sexangulare</i> var. <i>vulcanicum</i> (Polytrichum moss)	MHmm (Squamish Forest District)	Seven records to species level in the Whistler Mt. and vicinity at alpine elevations (Brett 2019).	Specimens in the UBC Herbarium should be re-examined for identifications below species level, if possible.
Moss	<i>Pseudoleskea incurvata</i> var. <i>tenuetis</i> (brown leskea moss)	no data	Records (not ID'd to ssp.) from wet soil at Russet Lk., Brandywine lower MHmm1 moist subalpine forest, and Blackcomb alpine. Very difficult to identify to ssp. even for Wilf Schofield (S. Joya, pers. comm.).	Exposed mineral soil, boulders, and outcrops at mid to high elevations (FNA 2019).
Moss	<i>Racomitrium affine</i> ? (lesser fringe-moss)	no data	Tentative ID by Olivia Lee and Steve Joya from Rainbow Trail (Brett 2019).	Acidic, moist to dry sites to high elevations (FNA 2019).

TABLE A2.2 (cont.). Likely species.

<u>Group</u>	<u>Scientific (Common) Name</u>	<u>Biogeoclimatic Zone (CDC)</u>	<u>Whistler status and habitat notes</u>	<u>Habitat elsewhere, esp. if not documented in RMOW</u>
Moss	<i>Tortula leucostoma</i> (desmatodon moss)	BAFA; MH; SWB	Not yet documented in RMOW (Brett 2019) though likely.	Dry soil in alpine heath at Russet Lake (UBC Herbarium in Brett 2019)
Bee	<i>Bombus occidentalis</i> ssp. <i>occidentalis</i> (Western Bumble Bee)	no data	Possible in the RMOW but rare and difficult to find (K. Needham, pers. comm.).	Mainly open areas and edges to subalpine elevations (COSEWIC 2014). Closest locations: Mt. Garibaldi and Blackwater Lake near Mt. Currie (Klinkenberg 2019b).

TABLE A2.3. Possible species (including Data Deficient).

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Bee	<i>Bombus occidentalis</i> ssp. <i>occidentalis</i> (Western Bumble Bee)	no data	Possible in the RMOW but rare and difficult to find (K. Needham, pers. comm.).	Mainly open areas and edges to subalpine elevations (COSEWIC 2014). Closest locations: Mt. Garibaldi and Blackwater Lake near Mt. Currie (Klinkenberg 2019b).
Bird	<i>Falco peregrinus</i> ssp. <i>anatum</i> (Peregrine Falcon)	BG; BWBS; CDF; CWH; IDF; MS; PP; SBS	CWH forest, wetlands, urban areas (Ricker et al. 2014); nests in cliffs/steep bluffs. May nest at Soo Bluffs (K. Ricker, pers. comm., Dec. 2018). While similar, suitable nest habitat is likely not present within the RMOW, foraging within the RMOW is possible.	"Low population size still in recovery stage. Few breeding sites known. Significant contraction from historical range" (CDC 2019).
Bivalve	<i>Sphaerium striatinum</i> (Striated Fingernailclam)	BAFA; BG; BWBS; CDF; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; PP; SBPS; SBS; SWB	Not yet documented; uncertain likelihood in Whistler due to lack of data Province-wide	Permanent bodies of water including lakes, ponds, and streams; only 3 BC records, none near Whistler (CDC 2019).
Butterfly	<i>Callophrys johnsoni</i> (Johnson's Hairstreak)	CDF; CMA; CWH	"The habitat requirements, especially elevation, of Johnson's, are even less well known than for Cedar, so it simply cannot be predicted whether it may occur at Whistler. All one can do is look." (C. Guppy email, June 13, 2019.)	Recorded on southeastern Vancouver Island and in the Fraser Valley below 625m. Larvae feed on mistletoe (<i>Arceuthobium</i> spp.) growing on western hemlock (Klinkenberg 2019a).
Butterfly	<i>Parnassius clodius</i> ssp. <i>claudianus</i> (Clodius Parnassian)	CDF; CMA; CWH; MH	The one record (Brett 2019) is likely ssp. <i>pseudogallatinus</i> (tentative photo ID by C. Guppy) but this ssp. is possible in Whistler (C. Guppy, pers. comm.).	Riparian and moist meadows at low to subalpine elevations (Guppy and Shepard 2001).
Dragonfly	<i>Tanypteryx hageni</i> (Black Petaltail)	CWH	Possible (even Likely) in Whistler (D. Marven and D. Knopp, pers. comm.).	"Found in seepage areas and bogs, flat or on hillsides, often associated with streams and usually not under forest canopy in wet mountain ranges" (CDC 2019).
Gastropods	<i>Physella propinqua</i> (Rocky Mountain Physa)	BAFA; CDF; CMA; CWH; ESSF; IDF; IMA; MH; MS; SBPS; SBS	Not documented in Whistler (Brett 2019) unknown likelihood in Whistler due to taxonomic/ID difficulties (R. Forsyth, pers. comm.).	Wet areas; the few records are not close to Whistler (CDC 2019); Physa spp. are an "outright taxonomic evil" (R. Forsyth, pers. comm.); i.e., it will be difficult to survey for and/or confirm the presence of these species.
Gastropods	<i>Physella virginea</i> (Sunset Physa)	BAFA; BG; CDF; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; SBPS; SBS	Not documented in Whistler (Brett 2019) unknown likelihood in Whistler due to taxonomic/ID difficulties (R. Forsyth, pers. comm.).	Wet areas; the few records are not close to Whistler (CDC 2019); Physa spp. are an "outright taxonomic evil" (R. Forsyth, pers. comm.); i.e., it will be difficult to survey for and/or confirm the presence of these species.
Lichen	<i>Leptogium polycarpum</i> (peacock vinyl)	no data	Not yet documented in RMOW (Brett 2019) but C. Björk (pers. comm.) suggests it's worth looking for.	
Lichen	<i>Pannaria rubiginosa</i> (considerable gingerbread)	CWHd; CWHvh; CWHwh; CWHxm	Not yet documented in RMOW (Brett 2019). Unknown likelihood to occur.	

TABLE A2.3 (cont.) Possible species (including Data Deficient).

Group	Scientific (Common) Name	Biogeoclimatic Zone (CDC)	Whistler status and habitat notes	Habitat elsewhere, esp. if not documented in RMOW
Lichen	<i>Pseudocyphellaria rainierensis</i> (old growth specklebelly)	CWHvh; CWHvm; CWHwh	Not recorded to date and may prove not to be present in Whistler (if found, it would be a large range extension). Many surveys in subalpine yellow cedar forests for the WBP, BioBlitz, and Fungus Among Us in the past 15 years have not yet encountered the species.	Currently known only from the five wettest CWH Subzones, i.e., nearer the coast than Whistler (COSEWIC 2017). Associated with yellow cedar-amabilis fir forests and Trevor Goward therefore thought it possible within Whistler (pers. comm., 2007).
Lichen	<i>Stereocaulon pileatum</i> (pixie foam)	CMAunp (inc. Squamish Forest District)	No habitat information other than Confident or Certain in the CMAunp (alpine ecosystems that occur within the RMOW; CDC 2019). Current BC status = Unknown.	
Liverwort	<i>Frullania hattoriana</i> (liverwort)	no data	Not yet documented in RMOW (Brett 2019). possible in RMOW (O. Lee, pers. comm.). One 1974 record from "Brandywine Falls" may be inside RMOW (Brett 2019).	
Mammal	<i>Corynorhinus townsendii</i> (Townsend's Big-eared Bat)	BG; CDF; CWH; ICH; IDF; PP	Karl Ricker (pers. comm.) included this species on an early list of Mammal compiled with help from the RBCM but I have not been able to locate any records from there.	Buildings, caves, and mines; known only from locations far from Whistler (Nagorsen and Brigham 1993); may be possible in Whistler (C. Lausen, pers. comm.).
Mammal	<i>Pekania pennanti</i> (Fisher)	BAFA; BWBS; CDF; CMA; CWH; ESSF; ICH; IDF; IMA; MH; MS; PP; SBPS; SBS; SWB	Unknown current status (S. Rochetta, pers. comm.); historic presence with last two records from Green Lake in 1956 (Brett 2019); UBC Tetrapod Museum specimens)	Associated with old growth forests with large trees (CDC 2019).
Mistletoe	<i>Arceuthobium tsugense</i> ssp. <i>mertensianae</i> (mountain hemlock dwarf mistletoe)	MH	Possible (even Likely?) in Whistler due to its (parasitic) association with mountain hemlock, amabilis fir, and subalpine fir (CDC 2019).	
Moonwort	<i>Botrychium spathulatum</i> (spoon-shaped moonwort)	BWBSmw; ESSFwm; ESSFwmp; MSdk	Not yet documented in RMOW (Brett 2019); "pops up" in unexpected places (C. Björk, pers. comm.), i.e., possible in Whistler.	
Moss	<i>Andreaea heinemannii</i> (Heinemann's andreaea moss)	MH	Not yet documented in RMOW (Brett 2019); possible in Whistler (S. Joya and O. Lee, pers. comm.).	
Moss	<i>Atrichum tenellum</i> (slender smoothcap moss)	BAFA; ESSF	Not yet documented in RMOW (Brett 2019), but possible (O. Lee, pers. comm.).	
Moss	<i>Bryum calobryoides</i> (bryum moss)	ESSF; MH	Not yet documented in RMOW (Brett 2019); possible in RMOW (O. Lee, pers. comm.).	
Moss	<i>Pohlia andalusica</i> (Roth's thread-moss)	CMA	Not yet documented in RMOW (Brett 2019).	
Moss	<i>Pohlia tundrae</i> (tundra pohlia moss)	MH	Not yet documented in RMOW (Brett 2019); possible in RMOW (O. Lee, pers. comm.).	
Moss	<i>Trematodon asanoi</i> (Boas' long-necked moss)	MHmm	Not yet documented in RMOW (Brett 2019); possible in RMOW (O. Lee, pers. comm.).	

TABLE A2.4: Data Deficient species.

<u>Group</u>	<u>Scientific (Common) Name</u>	<u>Biogeoclimatic Zone (CDC)</u>	<u>Whistler status and habitat notes</u>	<u>Habitat elsewhere, esp. if not documented in RMOW</u>
Reptile	<i>Charina bottae</i> (Northern Rubber Boa)	BG; CWH; ICH; IDF; PP	Non-resident, though there have been unconfirmed anecdotal records (Johnny Mikes from Lost Lake; Cathy Ivany from Emerald Estates, pers. comm.).	Dry, warm sites with rock habitat; the closest record is from Rutherford Creek (Leslie Anthony, pers. comm.).
Bird	<i>Riparia riparia</i> (Bank Swallow)	no data	Karl Ricker (pers. comm., Dec. 2019) noted former presence in sand banks before development of Rainbow subdivision. Ebird (online) lists one record from June 2, 2019 at Fitzsimmons Fan, but there is no way to confirm its accuracy.	Main range is east of the Coast Mountains (CDC 2019).
Fish	<i>Oncorhynchus clarkii</i> ssp. <i>clarkii</i> (Coastal Cutthroat Trout)	BWBS; CDF; CWH; ICH; SBS	Historic presence in local lakes and streams before introduction of Rainbow Trout (Eric Crowe, pers. comm.) but unlikely now, based on DNA evidence, within RMOW (E. Crowe and V. Woodruff, pers. comm.). Sterile cutthroat have been introduced to Alta Lake.	Still potentially viable in isolated water bodies north into Pemberton, e.g., Keyhole Falls (E. Crowe, pers. comm.).
Grass	<i>Muhlenbergia racemosa</i> (satin grass)	BGxh; IDFxh	One <i>Muhlenbergia</i> sp. site confirmed in the Wildlife Refuge wetland (Brett 2019), originally identified by Adolf Ceska as <i>A. glomerata</i> and Hans Roemer re-identified as <i>M. racemosa</i> . A UBC specimen and one retrieved in 2018 need to be re-examined to determine if they are <i>M. racemosa</i> or the not-at-risk <i>M. glomerata</i> .	The CDC removed <i>Muhlenbergia racemosa</i> in error in 2018 (CDC 2018; Curtis Björk, by email, June 7, 2018) and reinstated it as "Unknown" in 2019. Given how far Whistler is from other CDC records of this species, it is possible the Whistler population is <i>M. glomerata</i> .
Liverwort	<i>Tritomaria polita</i> ssp. <i>polita</i> (liverwort)	no data	Various substrates in the alpine (Brett 2019).	Delisted (from Blue) without explanation by the CDC in 2019, but is included in FNA descriptions (2019). Presumably will be reassessed by the CDC.
Mammal	<i>Myotis keenii</i> (Keen's Myotis)	See Notes	Although Keen's Myotis was recorded near 19-Mile Creek in 2011 (Brett 2019) its genetics have been in question for many years. In 2019, the CDC removed it as a species since it is genetically too similar to Long-eared Myotis (<i>Myotis evotis</i> ; Lausen et al. 2019). It is likely to be downlisted by SARA as a result.	

TABLE A2.5: Extirpated species.

<u>Group</u>	<u>Scientific (Common) Name</u>	<u>Biogeoclimatic Zone (CDC)</u>	<u>Whistler status and habitat notes</u>	<u>Habitat elsewhere, esp. if not documented in RMOW</u>
Bird	<i>Strix occidentalis</i> (Spotted Owl)	CWH; ESSF; IDF; MH	Extirpated. Historic in CWH & MH forest; extirpated (Ricker et al. 2014); last record from Ken Racey in 1946 (Campbell et al. 1990a).	Past records from near Lillooet Lake may be the closest occurrences. Likely to be extirpated in BC due to loss of habitat (old-growth forest) and competition with Barred Owls.

Appendix 3: Scientists Who Contributed to the Whistler Biodiversity Project

Data in this report is from the 298 contributors to the WBP, Fungus Among Us, Whistler BioBlitz, and Whistler Naturalists' birding events (as well as others inadvertently not included on the list below). Most have volunteered their valuable time and expertise and only a few have been recompensed in any way. In short, these people have contributed to the project because of their love for nature and desire to protect it. I apologize for any omissions and thank everyone for their efforts.

Adolf Ceska	Cori Lausen	Harriet Jarvis	Kathleen Stormont	Melanie Tardif	Sara Jennings
Adriana Suarez-Gonzalez	Curtis Björk	Heather Baines	Kathy Jenkins	Mendel Shulski	Sarah Yontez
Adrien Baudouin	Dan Luoma	Heather Beresford	Kathy McGillion	Michael Thompson	Saskia Wolsak
Agnes Lynn	Dan McDonald	Hillary Williamson	Keenan Peddie	Michele Thomas	Scott Gilmore
Alex Burns	Dan Peach	Hitomi Kimura	Keith Browning	Michelle Crowe	Sean Aldcroft
Alexandra Gilliss	Daniel Mosquin	Hugh Daubeney	Kelly Ng	Mike Boyd	Sean McCann
Alicia Fontaine	Danny Miller	Irmgard Carter	Kem Luther	Mike Gravnic	Seth Rudman
Amy Burns	Daren Romano	Jaclyn Dee	Kent Anders	Mike Toochin	Shannon Berch
Andree Janyk	Darren Copley	Jacqueline Shaben	Kent Brothers	Mitchel Martin Downie	Shannon Didier
Andy MacKinnon	Daryl Thompson	Jagoda Kozikowska	Kevin Bell	Morgan Black	Shari Willmott
Angela Manweiler	Dave Cunningham.	James Holkko	Kevin Rosé	Murray Lashmar	Sharmin Gamiet
Angus MacKinnon	Dave Williamson	James Miskelly	Kevin Trim	Nancy Lee	Sharon Toochin
Anita Wheatley	David Aldcroft	Jamie Fenneman	Kiran Pal-Ross	Naomi Sands	Shawn Caulfield
Anna Bazzicalupo	David Bell	Jamie Michel	Kris Shoup	Nicola Brabyn	Sorcha Masterson
Anne Leathem	David Blades	Jasper George	Kristen Harrison	Nicole Basaraba	Stephanie Hurst
Ariane Comeau	David Cunningham	Jeff Joy	Kristen Jones	Nicole Harrison	Steve Joya
Asher Price	David Langor	Jeff Shatford	Kristina Ovaska	Noah Haave	Sue Maxwell
Asta Kovanen	David Snair	Jen Sibbald	Kristina Swerhun	Nora Ciurysek	Susan Hamersley
Aynsley Thielmann	David Walde	Jenn Barrett	Larissa Taylor	Olivia Lee	Susan Leech
Bardia Khaledi	Davina Dube	Jennifer Chia	Larry Evans	Oluna Ceska	Suzie Lavallee
Barry Janyk	Dawn Hanna	Jennifer Heron	Laura Dilley	Pablo Jost	Tanya Luszc
Ben Hircock	Dawn Johnson	Jeremy Gatten	Leanne Elliott	Pamela Zevit	Tara Schaufele
Betty Rebellato	Denis Knopp	Jeremy Nilson	Leanne Gallon	Patricia Thomson	Terry McIntosh
Bill Caulfield	Derrick Marven	Jeremy Winkler	Leanne Williams	Patrick Lilly	Theresa Oswald
Bob Brett	Don Brett	Jess Wagstaffe	Lee Larkin	Patrick Mulligan	Thom O'Dell
Breanne Johnson	Don MacLaurin	Jill Cooper	Leigh Anne Isaac	Paul Higginson	Thor Henrich
Brent Matsuda	Doug Sinclair	Jim Cuthbert	Lennart Sopuck	Paul Kroeger	Tiia Haapalainen
Brian Didier	Doug Skilton	Jim Ginns	Leslie Anthony	Pauline Ng	Tim Goater
Brian Klinkenberg	Dylan Rawlyk	Jodie Krakowski	Lex Joseph	Peter Gaffney	Tim Howay
Brook Moyers	Elke Wind	Joe Kiegel	Libby Avis	Purnima Govindarajulu	Tim Joy
Brooke Fochuk	Emma Harrower	John Swann	Lindsay Coulter	Rebecca MacKay	Tina Symko
Bryce Kendrick	Emma Tayless	Johnny Mikes	Lisa Neame	Regina Chan	Todd Bush
Candace Rose-Taylor	Eric Crowe	Jonathan Goff	Lisa Rockwell	Rex Kenner	Tom Pietrzak
Cara Richard	Erin Campbell	Jordan Rosenfeld	Liz Barrett	Rich Mably	Tom Plath
Catherine Soper	Erin Edal	Jory Mullen	Liz Snair	Rick Avis	Tracy Fleming
Cathy Ivany	Erin Edwards	Joyce Eberhart	Lois Joseph	Riley Fleet	Trevor Goward
Chris Byrd	Erin Feldman	Joyce Lee	Luana Kodato	Rob Lyske	Tristan Galbraith
Chris Dale	Erin Rutherford	Judith Harpel	Ludovic Le Renard	Robb Bennett	Trystan Willmott
Chris Ratzlaff	Ethan Askey	Judith Holm	Luke Harrison	Robert Forsyth	Tyrel Pinnegar
Chrispin Guppy	Felix Martinez	Julian Gan	Luke Mikler	Roger Bean	Valena Bradbury
Christine Olsen	Fleur Sweetman	Julian Heavyside	Lynne Henderson	Roland Treu	Vanessa Logie
Christopher Di Corrado	Fraser Willmott	Julie Burrows	Makie Matsumo-Hervol	Rose Klinkenberg	Veronica Woodruff
Christopher Stinson	Genevieve Rowe	Julie Sims	Mallory Clarke	Roxy Tripp	Vesna Young
Claire Johnson	Geoff Playfair	Julie Wray	Marcia Danielson	Ruby Pennel	Virginia Skilton
Claire Ruddy	George Clulow	Juliet Pendray	Marian Daubeney	Ruth Joy	Wendy Horan
Clare O'Brien	Greg Ferguson	Karen Needham	Mary Lightle	Sabrina Hinitz	Will Gibson
Claudia Copley	Greg Lee	Karina Valeretto	Mathew Bayly	Sam Cousins	Zoey Slater
Cody Labossiere	Greg Michalenko	Karl Ricker	Max Gotz	Sam Evans	Zuleika Pevac
Colin Sanders	Hamzeh Karim-Ramezani	Kate Brandon	Meg Fellowes	Sam Reeve	
Connor McGillion	Hans Roemer	Kate Entwistle	Meg Loop	Samantha Woods	