

## Species and Ecosystems at Risk in the Resort Municipality of Whistler

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December 23, 2016



### Notes about this report

The data and conclusions presented here concerning species at risk in the Resort Municipality of Whistler (RMOW) are the culmination of more than a decade of work with the Whistler Biodiversity Project. The classification for each species is based on data compiled by the Whistler Biodiversity Project, from the BC Conservation Data Centre (CDC), other on-line and printed sources, and the experts mentioned below. 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. Even more probable is that many additional species, including some at-risk, will be documented in the coming years even though they are not currently listed in the RMOW by the CDC.

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. The results presented here would not have been possible without the contributions of the many scientists and volunteers listed in Appendix 2, notably the expert surveyors for the Whistler Biodiversity Project and the volunteer scientists with Whistler BioBlitz and Fungus Among Us. I am also grateful for support from the Community Foundation of Whistler (CFOW), Resort Municipality of Whistler (RMOW), 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 this report: Curtis Bjork (lichens and vascular plants), Steve Joya and Olivia Lee (mosses and liverworts), Adolf Ceska (vascular plants), Karen Needham (insects), Crispin Guppy and Derrick Marven (butterflies), Denis Knopp (dragonflies), Robert Forsyth (gastropods), Christopher Stinson and Steve Rochetta (mammals), Eric Crowe and Veronica Woodruff (fish), Karl Ricker and Heather Baines (birds), Elke Wind (amphibians), Leslie Anthony (reptiles), and Pamela Zevit (legislation).

The data in this report benefitted from the efforts of Kristina Swerhun, Julie Burrows, and Kathy Jenkins (Whistler Naturalists Society and their events, Whistler BioBlitz and Fungus Among Us) and Clare Ruddy (AWARE). Tina Symko and Heather Beresford (RMOW) were instrumental in ensuring this information was published. Carol Coffey (CFOW) helped in many ways to move this project forward. Bob Green and Pamela Zevit provided helpful comments on an earlier draft. Brian and Rose Klinkenberg's EFlora and EFauna websites are incredibly resources that greatly helped evaluate the likelihood of species in Whistler.

### **Cover Photos**

| <u>Photo</u> | Common Name      | Scientific Name           | BC List | <u>Canada List</u> |
|--------------|------------------|---------------------------|---------|--------------------|
| Upper left   | Lettuce Lung     | Lobaria oregana           | Blue    | Not Listed         |
| Upper right  | Whitebark Pine   | Pinus albicaulis          | Blue    | Endangered         |
| Lower left   | Keen's Myotis    | Myotis keenii             | Blue    | Data Deficient     |
| Lower right  | Northern Goshawk | Accipiter gentilis laingi | Red     | Threatened         |
|              |                  |                           |         |                    |

### **Suggested Citation**

Brett, Bob. 2016. Species and ecosystems at risk in the Resort Municipality of Whistler. Whistler Biodiversity Project, Whistler, BC. Contract report prepared for the Resort Municipality of Whistler. 54 pp.

## **Executive Summary**

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

Part of the need for this report and the lists it presents is that the main source of information for species at risk in BC, the BC Conservation Data Centre (CDC), has less information about local species than has been compiled by the Whistler Biodiversity Project from targetted surveys, 10 years of Whistler BioBlitz, museum searches, and other sources. This statement is not meant to be controversial. It is just a fact that the CDC is far too underfunded and understaffed to be able to collate all known data in BC, let alone conduct extensive surveys to significantly expand what is already known.

Since the CDC assesses and ranks threats to species in BC, and is also the main source of that information, it would be ideal to have access to an accurate and comprehensive list of species at risk for the RMOW, Unfortunately, the CDC's Species and Ecosystem Explorer currently lacks that capability for a number of reasons including: lack of geographic specificity, inaccuracies, and general lack of locational data about the thousands of species it tracks. As a result, it is not currently possible to download a definitive, accurate list of the species at risk that occur in the RMOW. Regardless of search terms, there are far too many false positives (species which are unlikely or impossible in the RMOW) and false negatives (species which have been confirmed, likely, or possible but are not included in CDC searches).

At present, we therefore know much more about species at risk in Whistler yet lack: (a) ways to access that information, and (b) strategies to implement habitat protection for many of those species. This report's goals are to address the first part of that deficit and:

- 1. Provide an accurate list of species at risk known or likely to be in Whistler;
- 2. Compile a summary updating what is currently known about each of these specie's habitat requirements;
- 3. Submit all Whistler Biodiversity Project records of species at risk to the CDC; and also
- 4. Suggest a roadmap for future work, including local species accounts, Best Management Practices, and habitat protection tailored to the species at risk in the RMOW.

The extensive data compiled in this report provide the first definitive compilation of species at risk in the RMOW. A total of 150 species at risk were evaluated. The original list was based on CDC data for this area and additional data compiled by the Whistler Biodiversity Project. The breakdown for the status of these species in Whistler is:

- 69 Confirmed;
- 9 Likely;
- 26 Possible or Uncertain; and
- 46 Unlikely or Not possible.

The CDC currently lists 35 species as "certain" or "confident" in the RMOW. The number of Confirmed and Likely species documented in this report more than double that number to 78 species. Another 46 species that can result from various CDC searches for the RMOW have so little chance of occurring in the RMOW (Unlikely or Not Possible) that they can be excluded from consideration by municipal staff and others involved in environmental assessments or conservation efforts. Future conservation efforts should instead focus on Confirmed species at risk and the habitats they require, as well as clarifying the status of Likely species.

This new, comprehensive list of species at risk will help focus limited resources on species and their habitats that are most likely to be threatened by human actions and development within the RMOW. Future surveys targetted to a range of understudied species groups would certainly document additional species, some at-risk, and should therefore also be a priority. The following three pages list species at risk that are Confirmed, Likely, or Possible in the RMOW as of December 2016.

## Species at risk **<u>Confirmed</u>** in the RMOW:

|                    | Scientific Name                          | <u>Common Name</u>                        | <u>Notes</u>            |
|--------------------|--|---|-------------------------|
| <b>Butterflies</b> | Callophrys eryphon ssp. sheltonensis     | Western Pine Elfin, sheltonensis ssp.     |                         |
|                    | Parnassius clodius ssp. pseudogallatinus | Clodius Parnassian, pseudogallatinus ssp. | Conf Tentative $ID^1$   |
| <u>Amphibians</u>  | Anaxyrus boreas                          | Western Toad                              |                         |
|                    | Ascaphus truei                           | Coastal Tailed Frog                       |                         |
|                    | Rana aurora                              | Northern Red-legged Frog                  |                         |
| <u>Birds</u>       | Accipiter gentilis ssp. laingi           | Northern Goshawk, laingi ssp.             |                         |
|                    | Ardea herodias ssp. fannini              | Great Blue Heron, fannini ssp.            | Seasonal only           |
|                    | Butorides virescens                      | Green Heron                               | Not in RMOW every year. |
|                    | Chordeiles minor                         | Common Nighthawk                          |                         |
|                    | Contopus cooperi                         | Olive-sided Flycatcher                    |                         |
|                    | Cypseloides niger                        | Black Swift                               | Foraging only           |
|                    | Hirundo rustica                          | Barn Swallow                              |                         |
|                    | Melanitta perspicillata                  | Surf Scoter                               | Migration only          |
|                    | Patagioenas fasciata                     | Band-tailed Pigeon                        |                         |
| <u>Fish</u>        | Salvelinus confluentus - coastal lineage | Bull Trout - Coastal Lineage              |                         |
| <u>Mammals</u>     | Gulo gulo luscus                         | Wolverine, luscus ssp.                    |                         |
|                    | Myotis keenii                            | Keen's Myotis                             |                         |
|                    | Myotis lucifugus                         | Little Brown Myotis                       |                         |
|                    | Oreamnos americanus                      | Mountain Goat                             |                         |
|                    | Ursus arctos                             | Grizzly Bear                              |                         |
| Vascular Plants    | Cryptogramma cascadensis                 | Cascade parsley fern                      |                         |
|                    | Muhlenbergia racemosa                    | satin grass                               |                         |
|                    | Draba stenopetala                        | star-flowered draba                       |                         |
|                    | Pyrola elliptica                         | shinleaf wintergreen                      |                         |
|                    | Utricularia ochroleuca                   | ochroleucous bladderwort                  |                         |
|                    | Botrychium ascendens                     | upswept moonwort                          |                         |
|                    | Pinus albicaulis                         | whitebark pine                            |                         |
| Mosses             | Brachydontium olympicum                  | Olympic brachydontium moss                |                         |
|                    | Brachythecium holzingeri                 | Holzinger's brachythecium moss            |                         |
|                    | Bryum alpinum [=Imbybryum alpinum]       | alpine thread-moss                        |                         |
|                    | Bryum pallescens                         | tall-clustered thread-moss                |                         |
|                    | Grimmia caespiticia                      | grimmia moss                              |                         |
|                    | Grimmia donniana                         | Donn's grimmia                            |                         |
|                    | Grimmia incurva                          | black grimmia                             |                         |
|                    | Homalothecium nevadense                  | Nevada homalothecium moss                 |                         |
|                    | Hygrohypnum alpinum                      | alpine hygrohypnum moss                   |                         |
|                    | Orthotrichum pylaisii                    | Pylais' orthotrichum moss                 |                         |
|                    | Pohlia cardotii                          | Cardot's pohlia moss                      |                         |
|                    | Pseudoleskea radicosa var. pallida       | pseudoleskea moss                         |                         |
|                    | Racomitrium pygmaeum                     | pygmy racomitrium moss                    |                         |
|                    | Schistidium crassipilum                  | thickpoint grimmia                        |                         |
|                    | Tripterocladium leucocladulum            | tripterocladium moss                      |                         |

<sup>1</sup> The alternative is also a species at risk: *Parnassius clodius* ssp. *claudianus*.

## Species at risk **<u>Confirmed</u>** to occur in the RMOW: (cont.):

|                   | Scientific Name                             | Common Name             | <u>Notes</u> |
|-------------------|---|-------------------------|--------------|
| <b>Liverworts</b> | Haplomitrium hookeri                        | liverwort               |              |
|                   | Nardia breidleri                            | liverwort               |              |
|                   | Nardia compressa                            | liverwort               |              |
|                   | Nardia geoscyphus                           | liverwort               |              |
|                   | Scapania curta                              | liverwort               |              |
|                   | Scapania obscura                            | liverwort               |              |
|                   | Scapania scandica var. scandica or dimorpha | liverwort               |              |
|                   | Tritomaria polita ssp. polita               | liverwort               |              |
|                   |   |                         |              |
| <u>Lichens</u>    | Ahtiana sphaerosporella                     | mountain candlewax      |              |
|                   | Alectoria imshaugii                         | spiny witch's hair      |              |
|                   | Allantoparmelia almquistii                  | lesser rock grub        |              |
|                   | Arctoparmelia incurva                       | finger ring             |              |
|                   | Cladonia singularis                         | wax candle pixie        |              |
|                   | Fuscopannaria leucostictoides               | frosted crackers        |              |
|                   | Hypogymnia canadensis                       | canuckle bone           |              |
|                   | Hypogymnia recurva                          | recoiling bone          |              |
|                   | Leptogium intermedium                       | forty-five vinyl        |              |
|                   | Letharia columbiana                         | brown-eyed wolf         |              |
|                   | Lobaria oregana                             | lettuce lung            |              |
|                   | Nodobryoria subdivergens                    | alpine redhead          |              |
|                   | Physcia dubia                               | grinning rosette        |              |
|                   | Pseudocyphellaria anthraspis                | reticulate specklebelly |              |
|                   | Stereocaulon glareosum                      | alpine soil foam        |              |
|                   | Umbilicaria decussata                       | electric rocktripe      |              |
|                   | Umbilicaria krascheninnikovii               | lesser salted rocktripe |              |
|                   | Umbilicaria lambii                          | windward rocktripe      |              |
|                   | Vahliella californica                       | sun snaps               |              |

### Species at risk Likely to occur in the RMOW but not yet documented:

|               | Scientific Name            | Common Name              | <u>Notes</u>              |
|---------------|----------------------------|--------------------------|---------------------------|
| <u>Snails</u> | Pristiloma arcticum        | Northern Tightcoil       | Tentative ID, needs conf. |
|               |                            |                          |                           |
| Liverworts    | Jungermannia atrovirens    | liverwort                |                           |
|               | Marchantia alpestris       | liverwort                | Conf. at Russet Lake      |
| Massas        | Pruum coblaichari          | Schlaishar's throad mass |                           |
| INIUSSES      | Bryuni schielchen          | Schleicher Stilleau-moss |                           |
|               | Racomitrium affine?        | lesser fringe-moss       |                           |
|               | Tortula leucostoma         | desmatodon moss          |                           |
| Liebone       | Lantagium galifornigum     | midlife viewd            |                           |
| Lichens       | Leptogium cuijornicum      | maine vinyi              |                           |
|               | Peltigera gowardii         | northwest waterfan       |                           |
|               | Psoroma tenue var. boreale | tundra tarts             |                           |

## Species at risk that are **<u>Possible</u>** in the RMOW but not yet documented (including **<u>Data Deficient</u>**):

| Bees        | <u>Scientific Name</u><br>Bombus occidentalis ssp. occidentalis  | Common Name<br>Western Bumble Bee   | <u>Notes</u>                     |
|-------------|--|---|----------------------------------|
| Bivalves    | Sphaerium striatinum   | Striated Fingernailclam   | Data Deficient                   |
| Butterflies | Parnassius clodius ssp. claudianus   | Clodius Parnassian, claudianus ssp.   |                                  |
| Gastropods  | Physella propinqua<br>Physella virginea  | Rocky Mountain Physa<br>Sunset Physa  | Data Deficient<br>Data Deficient |
| Mammal      | Cervus elaphus roosevelti<br>Corynorhinus townsendii<br>Pekania pennanti   | Roosevelt Elk<br>Townsend's Big-eared Bat<br>Fisher   |                                  |
| Lichen      | Leptogium polycarpum<br>Stereocaulon symphycheilum   | peacock vinyl<br>two-toned foam   |                                  |
| Liverworts  | Frullania hattoriana   | liverwort   |                                  |
| Mosses      | Andreaea heinemannii<br>Atrichum tenellum<br>Bryum calobryoides<br>Grimmia anomala<br>Pseudoleskea incurvata var. tenuetis<br>Pohlia andalusica<br>Pohlia tundrae<br>Trematodon asanoi | Heinemann's andreaea moss<br>slender smoothcap moss<br>bryum moss<br>grimmia dry rock moss<br>brown leskea moss<br>Roth's thread-moss<br>tundra pohlia moss<br>Boas' long-necked moss |                                  |
| Herbs       | Cicuta maculata var. maculata<br>Erythranthe [=Mimulus] breweri<br>Stellaria obtusa  | spotted cowbane<br>Brewer's monkey-flower<br>blunt-sepaled starwort   |                                  |
| Moonworts   | Botrychium crenulatum<br>Botrychium simplex var. compositum<br>Botrychium spathulatum  | dainty moonwort<br>least moonwort<br>spoon-shaped moonwort  |                                  |
| Sedges      | Carex praeceptorum   | teacher's sedge   |                                  |

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## 1.0 Introduction

## 1.1 Background and Report Goals

Since its incorporation in 1976, the Resort Municipality of Whistler (RMOW) has shown its strong interest in protecting the environment. The first concerted effort towards biodiversity conservation began with the Whistler Environmental Strategy which explored strategies to protect habitats required by local species (Waldron 2002). Two years later, the RMOW commissioned its first reports on local species at risk (Leigh-Spencer 2004; Green et al. 2005<sup>2</sup>). As described to me by the lead author, Bob Green (pers. comm.), that project:

"... was intended as a landscape-level planning tool to "flag" potential areas which may represent habitat for selected plant and animal species at risk. The scope of the project defined species at risk as those species assigned red or blue status by the CDC in 2005. Several wildlife species were included that were not red or blue listed but considered regionally significant by the Ministry of Sustainable Resource Management. The list of candidate species was subsequently reduced to key species based on the following criteria:

- are believed to have critical habitat in the Whistler area;
- are susceptible to development impacts;
- have habitat requirements that correlate reasonably well with available GIS data;
- are not wide-ranging, opportunistic carnivores that do not relate well to available spatial data (e.g. wolverine);
- are not managed under higher level plans (e.g. spotted owl).

The project was not intended to be an exhaustive assessment of species at risk in the Whistler area, but rather to provide a general overview of areas of potential habitat for selected species to help guide development planning. It was based largely on available information from the CDC and landscape-level topography, terrestrial ecosystems, and forest cover spatial data. The results were not supplemented with field data and were intended to be verified and refined by on site assessments by trained biologists. Because of the dynamic nature on conservation ranking in B.C. and the significant improvement in local data on species at risk, the information in the 2005 project was designed to be replaced by more current information as it became available."

The Green report was an important step towards biodiversity conservation in Whistler with data available at that time. Unlike this report, the authors' goal was not to provide a comprehensive list of species at risk in the RMOW. Many changes have occurred since 2005 and three sections in this report summarize the context 11 years later. Section 1.3 details new data that has become available since 2005 and is included in this report. Section 2.0 documents ongoing challenges with data accessible through the CDC. Section 4.2 details changes since 2005 in what is known about species at risk in the RMOW.

A number of developments since 2005 have created both challenges and opportunities for biodiversity conservation, specifically:

- It has become increasingly apparent that data compiled for the Whistler area by the BC Conservation Data Centre (CDC 2016) is incomplete, sometimes erroneous, and very difficult to compile and interpret correctly (Section 2.0). There is currently no way on the CDC's on-line BC Species and Ecosystem Explorer<sup>3</sup> to create an accurate and complete list of confirmed and likely species at risk within the RMOW. The difficulty of access to the data hampers municipal staff and potential developers charged with protecting species and habitats.
- 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 2016), the Migratory Birds Convention Act (MBCA 2016), conservation threat assessments by the BC Conservation Data Centre (Red and Blue listings in

 <sup>&</sup>lt;sup>2</sup> Sally Leigh-Spencer's report provided background information for Green et al. (2005) and was incorporated into it. The rest of this report will primarily reference Green et al. (2005) since the two reports were part of the same project.
 <sup>3</sup> BC Species and Ecosystem Explorer (CDC 2016). URL: <u>http://a100.gov.bc.ca/pub/eswp/</u>.

particular; CDC 2016), the Identified Wildlife Management Strategy (BC MOE 2016a), as well as species-specific Management Plans, Recovery Strategies, and Implementation Plans. 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).

- New species groups have been added to BC conservation rankings (Red and Blue lists), often without any geographic information to assess their presence or likelihood in the RMOW. For example, many lichens, mosses, and liverworts have been added since 2005, and there is often a paucity of information about their distribution. As other groups are added, especially insects and spiders, this challenge will be compounded. While it is a positive development that the CDC is adding more species groups, the lack of accompanying data and tools to protect them poses a challenge to municipal staff and other groups attempting to conserve species and their habitats.
- Many species have been uplisted or downlisted since 2005 due to new assessments that have reevaluated conservation risks to those species. Two notable additions are common local species: whitebark pine (*Pinus albicaulis*) and Little Brown Myotis (*Myotis lucifugus*), both of which are threatened by introduced Eurasian fungi.
- A greatly expanded knowledge of the species that currently inhabit the Whistler area due to the efforts of the Whistler Biodiversity Project, the Whistler Naturalists, Whistler BioBlitz, Fungus Among Us, the Resort Municipality of Whistler, and others.
- And finally, there is a greatly increased capacity to compile historic data from on-line databases, especially at the University of British Columbia and the Royal BC Museum. The expanded access to this data has coincided with data compilation efforts by the Whistler Biodiversity Project (Brett 2007, 2015, 2016).

At present, we therefore know much more about species at risk in Whistler since 2005 yet lack: (a) ways to access that information, and (b) strategies to implement habitat protection for most of those species. This report is the first phase of an effort to update and improve biodiversity conservation in the RMOW. The goals of this report are to:

- 1. Provide an comprehensive list of species at risk known or likely to be in Whistler;
- 2. Compile a summary updating what is known about each of these species' habitat requirements;
- 3. Submit all new records of species at risk to the CDC; and
- 4. Suggest a roadmap for future work, including Best Management Plans and habitat protection tailored to the species at risk in the RMOW.

The rest of Section 1 provides further background for the report including terminology and new sources of data, especially the data compiled by the Whistler Biodiversity Project. Section 2 explains why it is necessary for Whistler to create its own list of species at risk given the current constraints of the CDC. Section 3 expands on habitat requirements of the species which provides: (a) the rationale for the classification in Section 4; and (b) information that will help direct future conservation efforts and surveys. Section 4 presents the first comprehensive list of species at risk for the RMOW. Section 5 discusses ecosystems at risk in the RMOW. Section 6 briefly summarizes the recovery planning process currently in place as well as Best Management Practices (BMPs). Recommendations are included in Section 7.

### 1.2 Legislation and Terminology for Species at Risk

Leigh-Spencer (2004) 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). Leigh-Spencer helpfully summarized these processes in tabular form (Table 1.1).

| 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 2016).  |

| Jurisdiction        | Responsible Agency  | Legislative Framework  | Form of Protection  | Ranking System (risk of extinction)  |
|---------------------|---|--|---|--|
| Federal             | COSEWIC (Committee<br>on the Status of<br>Endangered Wildlife in<br>Canada) | Species at Risk Act<br>(SARA, 2002)  | Recovery Strategies are required<br>for extirpated, endangered and<br>threatened species and<br>Management Plans for species of   | Endangered: facing imminent<br>extirpation or extinction [definition<br>prior to May 2003] <sup>4</sup> ;  |
|                     |   |  | "residences" is paramount.  | <b>Threatened</b> : species likely to become<br>endangered if nothing is done to<br>reverse factors leading to its<br>extirpation or extinction [definition<br>accepted December 2008];                            |
|                     |   |  |   | <b>Species of Concern</b> : species that may become threatened or endangered because of a combination of biological characteristics and identified threats.  |
| British<br>Columbia | NatureServe and CDC<br>(Conservation Data<br>Centre)                        |  | Provide an objective ranking<br>system based on all sources of<br>credible information regarding<br>distribution, abundance, trends<br>and threats.   | S = Provincial; N = National; G = Global;<br>X = Extirpated or extinct; H = Historical<br>1=critically imperiled; 2=imperiled;<br>3=vulnerable; 4=apparently secure;<br>5=secure; ?=unranked; U=unrankable         |
|                     | Province of BC,<br>Ministry of Water,<br>Land and Air<br>Protection         | Wildlife Act; BC Species<br>at Risk Strategy<br>(Endangered Species<br>and Ecosystems in BC) | Red-listed (sometimes Blue-<br>listed) species require special<br>management attention by<br>protecting critical habitat in the<br>form of special management<br>guidelines.<br>Wildlife Habitat Areas (WHA), | Red: Any species or ecosystem that is<br>at risk of being lost (extirpated,<br>endangered or threatened)<br>Blue: Any species or ecosystem that is<br>of special concern.<br>Yellow: Any species or ecosystem that |
|                     |   |  | General Wildlife Measures<br>(GWM), and Higher Level Plans  | is at risk of being lost.  |
|                     | Ministry of Water,<br>Land and Air<br>Protection                            | Forest and Range<br>Practices Act<br>Identified Wildlife<br>Management Strategy<br>(IWMS)    | Wildlife Habitat Areas (WHA),<br>General Wildlife Measures, and<br>Higher Level Plans   | Schedule 1 species list (section 11 (1))<br>(May 6th, 2004): Red and Blue- listed<br>species negatively affected by forest or<br>range management on Crown Lands.  |

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 SCCP<sup>5</sup> as an appendix to this report (Appendix 1).

<sup>&</sup>lt;sup>4</sup> Endangered and Threatened rankings are now based on quantitative thresholds defined in <u>http://www.cosewic.gc.ca/htmlDocuments/Assessment\_process\_and\_criteria\_e.pdf</u> (p. 11). Additional definitions are included in <u>http://www.cosewic.gc.ca/eng/sct2/sct2\_6\_e.cfm</u>.

<sup>&</sup>lt;sup>5</sup> P. Zevit, pers. comm.

### 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 more 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.<sup>6</sup> The situation for ecosystems at risk is much easier since it is simply a BC process that assesses them similarly to the Red and Blue (or Yellow) listings for species:

In B.C., species and ecological communities are assigned to one of three lists, based on their provincial Conservation Status Rank. Red-listed species and ecological communities are Extirpated, Endangered, or Threatened in British Columbia. Blue-listed species and ecological communities are of Special Concern (formerly Vulnerable) and Yellow-listed species and ecological communities are secure.<sup>7</sup>

"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 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." Excepting 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 New Sources of Species Data since 2005

Basic inventory data for most species groups is lacking throughout much of BC and Canada. Municipalities nonetheless must evaluate risks and generally rely on what government data is available, sometimes with additional information provided by local naturalist groups. The RMOW is now ahead of many municipalities in Canada due to surveys conducted since Green et al.'s report in 2005. The main things that have changed in the interim include:

- 1. The Whistler Biodiversity Project (WBP) surveys and data collation since 2004 (Brett 2007; 2015; 2016).
- 2. Data generated by Fungus Among Us (since 2003) and Whistler BioBlitz (since 2007) which are incorporated into Whistler Biodiversity Project lists.
- 3. Greatly expanded access to data on-line, including museum collections and citizen science initiatives such as EBird (C. Dale, pers. comm.), and EFIora and EFauna (Klinkenberg 2016a, b). Whistler data from these sources has been compiled and edited by the Whistler Biodiversity Project.
- 4. Changes in threat rankings, either up or down, as determined by COSEWIC and the CDC.

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 has been adding species groups to its database, for example, mosses, liverworts, lichens, and some beetles. Many of the species in these groups are currently unranked but threats to them will presumably be assessed as resources allow (threat assessments are necessary to determine which species are at risk).

<sup>&</sup>lt;sup>6</sup> These criteria differ from Green et al. (2005) who included only those species Blue- or Red-listed by the BC CDC or which were deemed "regionally significant" (see Section 1.1).

<sup>&</sup>lt;sup>7</sup> http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/species-and-ecosystems-explorer/faq#red\_blue\_and\_yellow.

### **1.4 The Whistler Biodiversity Project**

When Green et al. (2005) compiled their list of confirmed and possible species at risk in the RMOW, fewer than 500 species were publicly documented in Whistler (Brett 2016a). The majority of those species were vertebrates, mainly mammals, birds, and fish. Limited information about such other groups such as vascular plants and amphibians were also available, but were not accessible and/or comprehensive.

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 with Ken Racey and, later, his son-in-law and namesake of the UBC Cowan Tetrapod Collection, Ian McTaggart-Cowan (e.g., Racey and McTaggart Cowan 1935). The Whistler Naturalists and its predecessors (before 1998) are the main source of recent 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.

In 2005, the vast majority of species groups remained mostly unknown, for example, 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; 2016). 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. These surveys and data searches helped establish for the first time species lists in the species groups mentioned above. As of 2016, the total number of species known in Whistler is approximately 4,000 (Figures 1.1 and 1.2; Brett 2016a, b).

Starting in 2007, Whistler BioBlitz established itself as an essential source of new knowledge about local species.<sup>8</sup> 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 1,200 species to the total list in just 10 years. The Whistler BioBlitz is Canada's longest-running BioBlitz and has helped spawn similar events across BC. Its impact on local knowledge is apparent in the proportion of species documented in Whistler by source (Figure 1.1).

Fungus Among Us,<sup>9</sup> a Whistler Naturalists event that started in 2003 is another important source of information. Over 800 species of fungi have been documented to date, primarily by Fungus Among Us (Figure 1.2; Brett 2016b). Although fungi have not yet been assessed by the CDC, it is likely some are rare and threatened by human activities and therefore in need of protection. If and when they are assessed, this source of local information will be invaluable, as it was for mosses and lichens when they were assessed.

<sup>&</sup>lt;sup>8</sup> <u>www.whistlerbioblitz.ca</u>.

<sup>&</sup>lt;sup>9</sup> <u>www.whistlernaturalists.ca</u>



**FIGURE 1.1**: Number of species documented in the RMOW by year and source through 2015 (Brett 2016a). The breakdown by source is estimated.



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The other important source of additional species data has been databases from various collections, notably, the UBC Herbarium<sup>10</sup> (lichens, vascular plants, bryophytes, algae, and fungi), the UBC Cowan Tetrapod Collection,<sup>11</sup> and the Royal BC Museum.<sup>12</sup> These and some other collections (e.g., Canadian Museum of Nature) were painstakingly searched early in the Whistler Biodiversity Project (Brett 2007). Since then, data from many collections been increasingly posted on-line and locating and downloading data has become increasingly easy, especially since about 2012. It is likely that even more historic records will become available in the future from these and similar collections.

The RMOW is therefore 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 data gap will lessen when Whistler Biodiversity Project data is delivered to the CDC in the next phase of this project. This report shows the essential role that municipal-level surveys and data compilation can play in BC.

 <sup>&</sup>lt;sup>10</sup> <u>http://www.biodiversity.ubc.ca/museum/herbarium/database.html.</u>
 <sup>11</sup> <u>http://www.biodiversity.ubc.ca/museum/herbarium/database.html.</u>

<sup>&</sup>lt;sup>12</sup> http://search-collections.royalbcmuseum.bc.ca/.

## 2.0 Why a Made-in-Whistler List is Necessary

It is not currently possible to produce an accurate and comprehensive list of species at risk in Whistler using on-line or other government (BC or Canada) sources. The CDC's (2016) Species and Ecosystems Explorer is the primary source of data for species at risk available to BC municipalities, biologists, environmental consultants, and others. Although it is an excellent and welcome resource, it is a mistake to assume it can produce a comprehensive list of species at risk for the RMOW. Searches produce false positives (species that are Unlikely or Not Possible) and also false negatives (species that are Confirmed or Likely).

Another challenge posed by the CDC site is that there is no way to produce a single report that includes all species that have either a Provincial or Federal designation, that is, an "AND/OR" search. For example, if the search specifies COSEWIC rankings and BC List ranking, only those that appear on both will be included in the search results. There are a number of other reasons why the Species and Ecosystem Explorer is currently not able to provide a comprehensive list of species at risk in the RMOW. A test of searches narrowed by varying terms (but all including "Squamish Forest District"), revealed a number of conclusions:

- 1. The narrowest search by geographic region for the RMOW is by Forest District (Figure 2.1). Since the RMOW is within the Squamish Forest District, that search term returns data from a huge range of habitat types: from coastal and marine in or near Howe Sound to semi-arid near D'Arcy. As a result, many species that are neither resident nor possible in Whistler appear in the search results, for example, Northern Abalone and Green Sturgeon. Only six species include "Whistler" and "Squamish Forest District" in their data fields, and one of these (Pacific Water Shrew) has not been documented yet in the RMOW. Still others such as Western Thorn and Threaded Vertigo inaccurately list "Whistler" but accurately (but inconsistently) do not include "Squamish Forest District."
- 2. Even though searches can be further refined by Biogeoclimatic (BGC) Zone (Figure 2.1), this does not solve the problem mentioned above. The three BEC Zones in Whistler are: Coastal Western Hemlock (CWH) from valley bottom to mid-elevations; Mountain Hemlock (MH) between the CWH zone and treeline; and Coastal Mountainheather Alpine (CMA) from treeline to mountain tops.<sup>13</sup> Limiting search results to these three zones eliminates only some species that could not occur in Whistler. It retains others, for example marine species that occur beside the CWH Zone on Howe Sound, and Coho Salmon whose habitat abuts the CWH Zone both in Squamish and Pemberton areas. It also excludes any species (notably lichens and mosses) for which there is no BGC data.
- 3. Even for species that include data at finer levels, these data are only available: (a) on the Species Summary linked individually to each species; or (b) when full data is downloaded as a spreadsheet from the CDC site. As a result, even if there is distributional information about which municipalities, BGC Subzones, and BGC Variants in which a species is resident, it is currently not possible to narrow the search to those more restrictive and preferable boundaries.
- 4. There is no way to produce a single list that includes all species with at least one species at risk designation (Figure 2.2). Narrowing the search by conservation status options (BC Red and Blue and COSEWIC lists) and legal designation (SARA, Identified Wildlife, Wildlife Act, Migratory Bird Conventions Act, and Convention on Trade in Endangered Species) results in only those species that are multiply-listed. Species that are just listed by BC but not Canada or vice versa therefore do not appear in the search results.
- Species that are Data Deficient (uncertain) can be shown as Confident or Certain in virtually all of BC. For example, two Physa snails and one clam (Striated Fingernailclam) are listed as Confident or Certain in almost all Biogeoclimatic Zones and Forest Districts even though very little is known about them (R. Forsyth, pers. comm.).
- 6. Even if the search function is changed to display only those species that are present or possible within the RMOW, the search results will be incomplete until data compiled by the Whistler Biodiversity Project and possibly other sources are added.

<sup>&</sup>lt;sup>13</sup> The rationale for excluding the Engelmann Spruce – Subalpine Fir (ESSF) Zone is included with Figure 2.1 and in Section 5.



**FIGURE 2.1**: Screen shot of advanced search terms on the BC Species and Ecosystem Explorer that narrow the geographic range as closely to Whistler as possible. This search returns species found in the Squamish Forest District (DSQ) and CMA, CWH, and MH Biogeoclimatic Zones. Note that the Engelmann Spruce – Subalpine Fir (ESSF) Zone was not included since a test of results returned no additional species (also see the rationale for excluding the ESSF Zone in Section 5 on ecosystems at risk).

| Conservation Status <sup>1</sup>     |  |
|--------------------------------------|--|
| BC List (Red, Blue, Yellow, Extinct) | <ul> <li>Red (Extirpated, Endangered, or Threatened)</li> <li>Blue (Special Concern)</li> <li>Yellow (Not at Risk)</li> <li>Extinct</li> </ul>   |
| 🖩 Provincial Status (SRank)          |  |
| 🗉 Global Status (GRank)              |  |
| ■ COSEWIC Status                     | <ul> <li>Extinct</li> <li>Extirpated</li> <li>Endangered</li> <li>Threatened</li> <li>Special Concern</li> <li>Not at Risk</li> <li>Data Deficient</li> </ul>  |
| 🗉 Legal Designation 🛛                |  |
|                                      | <ul> <li>Federal Species at Risk Act (SARA)</li> <li>Provincial Identified Wildlife (under FRPA)</li> <li>Provincial Wildlife Act</li> <li>Migratory Bird Conventions Act (MBCA)</li> <li>Convention on International Trade in Endangered Species (CITES)</li> </ul> |

**FIGURE 2.2**: Screenshot of advanced search categories on the CDC website narrowing the search to all species at risk, that is, any species assessed as BC Red or Blue list, COSEWIC Special Concern through Extirpated, and/or legally designated by Canada or BC Governments.

The result of the conclusions above is that the CDC's Species and Ecosystem Explorer is not currently able to deliver a list of all the species that are confirmed to be in the RMOW or likely to be here. Regardless of search term combinations, it returns far too many false positive – close to half the species returned by five combinations of search terms are Unlikely or Not Possible in the RMOW (Table 2.1). Maybe more importantly, these searches also return false negatives, that is, they don't include all the species Confirmed in Whistler but not yet on the CDC database. The absence of this data is of course not the fault of the CDC and the problem will be rectified when it is submitted and uploaded to the CDC.

**TABLE 2.1:** Number of species returned by different combinations of search terms (Figures 1 and 2) that the CDC Species and Ecosystem Explorer classes as Confident or Certain in the Squamish Forest District.

| Search Terms (Figures 1 and 2)                    | <b>Species</b> | Unlikely or Not Possible in the RMOW |
|---|----------------|--------------------------------------|
| Squamish FD + Red + Blue                          | 84             | 38 (45%)                             |
| CDC Search: Squamish FD + Red + Blue + CWH,MH,CMA | 72             | 32 (44%)                             |
| COSEWIC listed & Squamish FD, + CWH,MH,CMA        | 32             | 16 (50%)                             |
| All Legal Designations & Squamish FD,CWH,MH,CMA   | 31             | 13 (42%)                             |
| All the above                                     | 24             | 12 (50%)                             |

Because of these reasons, results of current searches for species at risk in the Whistler area vary based on the search terms and process used. At present there are approximately 35 species at risk listed by the CDC for Whistler "Confident or Certain" that have either been confirmed in the RMOW or likely to occur. Many others are incorrectly listed as "Confident or Certain" occurrences in Whistler (Table 2-1). The CDC lists even more as not present in the RMOW (usually due to no data) that have been documented by the Whistler Biodiversity Project since 2005 (Section 4).

## 3.0 Habitat Requirements of Species at Risk in Whistler

The status of species at risk as of December 2016 and resulting lists (Section 4) are based on a very detailed compilation of records in Whistler and beyond, as well as consultations with a wide range of experts. The first of these sources helped confirm species that have been recorded at least once in the RMOW ("Confirmed"). Defining this group is the most important step towards delineating habitat types and perhaps specific locations that require conservation.<sup>14</sup>

Ranking the remaining, unconfirmed species by their likelihood of occurrence is also important since it: (a) helps define which unconfirmed but likely species at risk to target for future surveys; and (b) helps exclude species that are unlikely or not possible in the RMOW and therefore frees resources for higher priorities. As mentioned earlier, the species at risk included for consideration were either listed by the CDC as possible in the RMOW or known to occur nearby or in similar habitats (mainly based on consultation with specialists). Unconfirmed species were classed as Likely, Possible, Uncertain, Unlikely, or Not Possible based on local occurrence data, range maps, known habitat affinities, my experience, and consultation with other biologists cited in Tables 3.1 to 3.4.

Confirmed species at risk for the RMOW are included as Table 3.1. Species that will probably be found in future surveys are listed in Table 3.2 as Likely. Species that could possibly occur in the RMOW (Possible) or whose likelihood could not yet be determined (Possible – Data Deficient) are included as Table 3.3. Species that are improbable (Unlikely) or whose range excludes habitats available in Whistler (Not Possible) are included as Table 3.4.

<sup>&</sup>lt;sup>14</sup> Note that this group includes two bird species that use habitat but do not breed in Whistler. Great Blue Herons are relatively common in Whistler during the summer and therefore rely on local habitat even if they only breed elsewhere. Surf Scoters pass through Whistler during migration and may, briefly, require specific habitat.

| TABLE 3.1: Habitat notes used to class | fy likelihood of species at | risk in the RMOW – <b>Confirmed</b> species. |
|--|-----------------------------|--|
|--|-----------------------------|--|

|           | Common (Scientific)   | Biogeoclimatic (BGC)  |   | Habitat elsewhere (esp. if not documented in         |
|-----------|---|---|---|--|
| Group     | Name  | Zone from CDC   | Whistler status and habitat notes   | RMOW)  |
| Butterfly | Clodius Parnassian<br>(Parnassius clodius ssp.<br>pseudogallatinus) | CMA;CWH;ESSF;IDF;IMA;<br>MH;MS                                      | Based on range and photos, this is likely the ssp. in Whistler,<br>otherwise the Blue-listed ssp. <i>claudianus</i> (C. Guppy, pers.<br>comm.). It has been found in various low-elevation sites in<br>Whistler (Brett 2015) and could extend to subalpine<br>elevations (Guppy and Shepard 2001) |  |
| Butterfly | Western Pine Elfin<br>(Callophrys eryphon ssp.<br>sheltonensis)     | СШН   | Low-elevation conifer forests (Brett 2015; their larval food<br>plants are lodgepole and western white pine (Guppy and<br>Shepard 2001); photo ID confirmed by C. Guppy.  |  |
| Amphibian | Coastal Tailed Frog<br>(Ascaphus truei)                             | CWH;ESSF;ICH;IDF;MH;<br>MS  | Mountainside creeks >6 deg. C water temperature, mainly<br>between 700 and 1200 metres, especially with rounded<br>cobbles; confirmed presence in 15 RMOW creeks with<br>others likely (Brett 2007; 2015; unpubl. 2016 data).   |  |
| Amphibian | Northern Red-legged<br>Frog ( <i>Rana aurora</i> )                  | 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 (Brett 2007).  |  |
| Amphibian | Western Toad (Anaxyrus<br>boreas)                                   | BG;BWBS;CDF;CWH;ESSF<br>;ICH;IDF;PP;SBS;SWB                         | Only known continuous breeding site in RMOW is Lost Lake<br>(W. Horan 2007) but possible in any small or large pond<br>including Cheakamus Crossing, Brandywine and almost<br>certainly other sites (Brett 2007). Toads have been<br>observed in summer in the alpine and far from Lost Lake.     |  |
| Bird      | Band-tailed Pigeon<br>(Patagioenas fasciata)                        | CDF;CWH;ICH;IDF;MS;SB<br>S  | Seen in CWH & MH forest, riparian, urban areas (Ricker et<br>al. 2014); can breed in urban edges and forests; historic<br>(Campbell et al 1990b) and likely current breeding in<br>Whistler (Ricker et al. 2014)  |  |
| Bird      | Barn Swallow (Hirundo<br>rustica)                                   | BAFA;BG;BWBS;CDF;CW<br>H;ESSF;ICH;IDF;IMA;MH;<br>MS;PP;SBPS;SBS;SWB | Wetlands, grassy areas, riparian, urban areas, breeding<br>(Ricker et al. 2014); nest at float plane wharf last year, not<br>this year (K. Ricker, pers. comm.); 92% of documented nests<br>were on structures (Campbell et al.1997)  |  |
| Bird      | Black Swift (Cypseloides<br>niger)                                  | BAFA;BG;CDF;CMA;CWH<br>;ESSF;ICH;IDF;IMA;MH;M<br>S;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.)  |  |
| Bird      | Common Nighthawk<br>(Chordeiles minor)                              | BG;BWBS;CDF;CWH;ESSF<br>;ICH;IDF;MH;MS;PP;SBPS<br>;SBS;SWB          | Lakes & ponds, CWH forest, riparian (Ricker et al. 2014);<br>recorded most years in Breeding Bird Survey (Marven et al.<br>2015) and at Brandywine basalt flats (BioBlitz 2012).  | Ground nester on open sites (Campbell et al. 1990b). |
| Bird      | Great Blue Heron (Ardea<br>herodias ssp. fannini)                   | CDF;CWH   | Foraging mainly in valleybottom lakes, wetlands, and<br>riparian areas (Campbell et al. 1990a; Ricker et al. 2014); no<br>known breeding sites nearby; local herons may return to<br>coast for breeding (K. Ricker, pers. comm.)  |  |
| Bird      | Green Heron ( <i>Butorides</i><br>virescens)                        | BG;CDF;CWH;ICH;IDF;PP;<br>SBS                                       | Rivers & streams, wetlands, riparian adjacent to shrub or<br>small tree cover (Ricker et al. 2014; Campbell et al 1990a);<br>Campbell et al. report breeding on Alta and Green Lakes but<br>there are no recent records (K. Ricker, pers. comm.)  |  |

| Group  | Common (Scientific)<br>Name                                  | Biogeoclimatic (BGC)<br>Zone from CDC                                       | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)  |
|--------|--|---|--|---|
| Bird   | Northern Goshawk<br>(Accipiter gentilis ssp.<br>laingi)      | CDF;CWH   | Alpine, CWH & MH forest, wetlands (Ricker et al. 2014);<br>nest sites in old-growth montane forests at Wedge Creek<br>(2014?) and Whistler (Brent Matsuda in Mason et al, in<br>prep.), many aerial sightings (Ricker et al. 2014; Whistler<br>BioBlitz)   |   |
| Bird   | Olive-sided Flycatcher<br>(Contopus cooperi)                 | BWBS;CDF;CWH;ESSF;IC<br>H;IDF;MH;MS;PP;SBPS;S<br>BS;SWB                     | CWH & MH forest, riparian habitats, breeding (Ricker et al.<br>2014); requires snags adjacent to openings (Campbell et al.<br>1997); breeds most commonly at mid-elevations, +/-1100 m<br>(Campbell et al.1997); sightings decreasing (K. Ricker, pers.<br>comm.)  |   |
| Bird   | Surf Scoter (Melanitta<br>perspicillata)                     | BG;BWBS;CDF;CWH;ICH;I<br>DF;MS;PP;SBPS;SBS;SWB                              | Seen on lakes & ponds during migration (Ricker et al 2014;<br>K. Ricker pers. comm.); no chance of breeding here<br>(Campbell et al. 1990a).   | Winters on coast and breeds in NE BC (Campbell et<br>al. 1990a); Listed as year-round resident, non-<br>breeding species in the Squamish Forest District CDC<br>(CDC 2016). |
| Fish   | Bull Trout (Salvelinus<br>confluentus - coastal<br>lineage)  | CDF;CWH;MH  | Green Lake, Fitzsimmons Creek, occasionally Alta Lake and<br>historic records from Lost Lake and 21-Mile Creek (Betty<br>Rebellato 2005)   |   |
| Mammal | Grizzly Bear (Ursus<br>arctos)                               | BAFA;BWBS;CMA;CWH;E<br>SSF;ICH;IDF;IMA;MH;MS;<br>SBPS;SBS;SWB               | "Some breeding and habitat use specifically Brandywine,<br>Callaghan, Sproatt" (S. Rochetta, pers. comm.).   |   |
| Mammal | Keen's Myotis (Myotis<br>keenii)                             | BWBS;CDF;CWH;MH   | Confirmed in Edgewater old riparian forest and roosting in<br>nearby old forest (Lost Lake Park); unknown<br>hibernacula/migration patterns (C. Lausen and LA. Isaac in<br>B. Brett 2015)  | Data deficient; likely to be delisted and included with<br>M. evotis (C. Lausen, pers. comm.).  |
| Mammal | Little Brown Myotis<br>(Myotis lucifugus)                    | BG;BWBS;CDF;CWH;ESSF<br>;ICH;IDF;MH;MS;PP;SBPS<br>;SBS;SWB                  | Common over wetlands, lake edges, trails; roosts in houses<br>(Brett 2007; Lausen and Isaac 2010; Isaac and Lausen 2012;<br>Brett 2015) and likely loose bark of large trees and other<br>sites (Nagorsen and Brigham 1993). Over-wintering survival<br>threatened by white-nose fungus.   |   |
| Mammal | Mountain Goat<br>(Oreamnos americanus)                       | BAFA;BG;BWBS;CDF;CM<br>A;CWH;ESSF;ICH;IDF;IMA<br>;MH;MS;PP;SBPS;SBS;SW<br>B | "Historically breeding and habitat use, however people,<br>helicopters and snowmobiles have significantly impacted<br>former range. Possibly there is still some use of Sproatt<br>winter range?"(S. Rochetta, pers. comm.); also<br>Overlord/Fitzsimmons (K. Ricker, pers. comm.), Brandywine<br>Mt. (B. Brett, pers. obs.); maybe Phalanx through Singing<br>Pass? |   |
| Mammal | Wolverine, <i>luscus</i> ssp.<br>( <i>Gulo gulo luscus</i> ) | BAFA;BWBS;CMA;CWH;E<br>SSF;ICH;IDF;IMA;MH;MS;<br>SBPS;SBS;SWB               | "Potentially breeding and habitat use specifically<br>Brandywine, Callaghan, Fitzsimmons and Cheakamus River<br>(Steve Rochetta, pers. comm.); plus Whistler and Blackcomb<br>Mts. alpine (Laird Brown photo and E. Crowe, pers. comm.)  |   |
| Lichen | alpine redhead<br>(Nodobryoria<br>subdivergens)              | no data   | One 1994 record from Whistler alpine (T. Goward in Brett 2015),  | On rocks and trees at treeline (Goward et al. 1994).  |
| Lichen | alpine soil foam<br>(Stereocaulon glareosum)                 | no data   | Blackcomb alpine in wet soil (Brett 2007)  | Sandy, gravelly soil at all elevations (Goward et al. 1994).  |

| ٦ | TABLE 3.1: | (cont.): Habitat notes | used to classify likeliho | od of species at risk in the RMOW – | Confirmed species. |
|---|------------|------------------------|---------------------------|-------------------------------------|--------------------|
|   |            |                        |                           |                                     |                    |

| <b>TABLE 3.1</b> : | (cont.): Habitat notes | used to classify | y likelihood of s | pecies at risk in | the RMOW - | Confirmed species |
|--------------------|------------------------|------------------|-------------------|-------------------|------------|-------------------|
|--------------------|------------------------|------------------|-------------------|-------------------|------------|-------------------|

| Group     | Common (Scientific)   | Biogeoclimatic (BGC) | Whistler status and babitat notos  | Habitat elsewhere (esp. if not documented in   |
|-----------|---|----------------------|--|--|
| Lichen    | brown-eved wolf   | no data              | Whistler Mt. alpine on conifer bark (Brett 2007).  | On conifer bark and wood at mid to high elevations   |
|           | (Letharia columbiana)   |                      |  | (Goward et al. 1994).  |
| Lichen    | canuckle bone<br>(Hypogymnia canadensis)                      | no data              | Rainbow Trail at 1050m in ancient forest (Brett 2015).   | On conifers in cool, moist forests to mid elevation (McCune and Geiser 2009).  |
| Lichen    | electric rocktripe<br>(Umbilicaria decussata)                 | no data              | On granitic rock in exposed alpine sites (Brett 2015); only<br>other BC record from J. Pojar, 1975, Spatsizi Plateau (C.<br>Bjork, pers. comm.). |  |
| Lichen    | finger ring (Arctoparmelia incurva)                           | no data              | Blackcomb Mt. Xhiggy's Meadow 2007 record is possibly the first in the Coast Mts. (Brett 2007).  | "Infrequent over acid rock in open inland sites"<br>(Goward 1994).   |
| Lichen    | forty-five vinyl<br>( <i>Leptogium intermedium</i> )          | no data              | On large cottonwoods (Brett 2007); this epiphytic form is rarer, old-growth dependent; possibly new to science (C. Bjork, pers. comm.).          |  |
| Lichen    | frosted crackers<br>(Fuscopannaria<br>leucostictoides)        | no data              | On large black cottonwood (Brett 2007) on barks and twigs<br>in open, old forests (Goward 1994; C. Bjork, pers. comm.).                          |  |
| Lichen    | grinning rosette ( <i>Physcia</i><br>dubia)                   | no data              | Blueberry Hill schist cliff (Brett 2007).  | On base rich rock in open sites (Goward 1994).   |
| Lichen    | lesser rock grub<br>(Allantoparmelia<br>almquistii)           | no data              | On acid rock at subalpine and alpine elevations (Brett 2007;<br>Goward 1994)   |  |
| Lichen    | lesser salted rocktripe<br>(Umbilicaria<br>krascheninnikovii) | no data              | On acidic rock in exposed alpine sites (Brett 2015; Goward 1994)   |  |
| Lichen    | lettuce lung (Lobaria oregana)                                | no data              | On conifers in old forests (Brett 2007); old-growth dependent (Goward 1994; C. Bjork, pers. comm.)   |  |
| Lichen    | mountain candlewax<br>(Ahtiana sphaerosporella)               | no data              | Frequent on whitebark pine; may decline significantly as that species declines (C. Bjork, pers. comm.)   |  |
| Lichen    | recoiling bone<br>(Hypogymnia recurva)                        | no data              | Brandywine PP area on branches of lodgepole pine (Brett 2015); newly described in 2010 (Goward et al. 2010)                                      |  |
| Lichen    | reticulate specklebelly<br>(Pseudocyphellaria<br>anthraspis)  | no data              | On large cottonwoods in the valley bottom (Brett 2007; 2015)   | On trees, especially conifers at lower elevations<br>(Goward 1994); old-growth dependent (C. Bjork,<br>pers. comm.). |
| Lichen    | spiny witch's hair<br>(Alectoria imshaugii)                   | no data              | One record from Brandywine PP (Brett 2007)   | Infrequent on low elevation conifers (Brett 2007;<br>Goward 1994, McCune and Geiser 2009).                           |
| Lichen    | sun snaps (Vahliella californica)                             | no data              | On chloritic schist, Blueberry Hill cliffs (Brett 2015)  |  |
| Lichen    | wax candle pixie<br>(Cladonia singularis)                     | no data              | Brandywine Park area and Russet Lake records shows a wide habitat amplitude (Brett 2015; 2016)   | Not as rare as previously thought so could be downlisted (C. Bjork, pers. comm.).                                    |
| Lichen    | windward rocktripe<br>(Umbilicaria lambii)                    | no data              | On acidic rock in exposed alpine sites (Brett 2015; Goward 1994)   |  |
| Liverwort | liverwort (Haplomitrium hookeri)                              | no data              | Humus and soil in the alpine (Brett 2015; Schofield 2002)  |  |
| Liverwort | liverwort (Nardia<br>breidleri)                               | no data              | Wet soil at high elevations (Brett 2015; FNA 2016)   |  |

| Group     | Common (Scientific)<br>Name  | Biogeoclimatic (BGC)<br>Zone from CDC      | Whistler status and habitat notes   | Habitat elsewhere (esp. if not documented in RMOW)      |
|-----------|--|--|---|---|
| Liverwort | liverwort (Nardia<br>compressa)  | no data                                    | Over wet rocks along streams and peaty bogs, alpine and Brandywine PP (Brett 2016b; FNA 2016)   |   |
| Liverwort | liverwort (Nardia<br>geoscyphus)   | no data                                    | On dry rocks or damp rocks in streams, alpine (Brett 2015)  |   |
| Liverwort | liverwort (Scapania<br>curta)  | no data                                    | On rock in the alpine (Brett 2015) no other data found  |   |
| Liverwort | liverwort (Scapania<br>obscura)  | no data                                    | Peaty soil on late snowmelt sites in the alpine (Brett 2015;<br>Wagner 2008)  |   |
| Liverwort | liverwort (Scapania<br>scandica vər. scandica or<br>dimorpha)                | no data                                    | Four RMOW records, none of which identify to variety. Both<br>var. <i>scandica</i> and var. <i>dimorpha</i> are Blue-listed on EFlora<br>(Klinkenberg 2016b) but only the former is included at all by<br>CDC (2016). The four specimens are from diverse habitats<br>from low to subalpine elevations (Brett 2016b). | No other habitat or range information yet located.      |
| Liverwort | liverwort ( <i>Tritomaria</i><br>polita ssp. polita)                         | no data                                    | Various substrates in the alpine (Brett 2016b)  |   |
| Moss      | alpine hygrohypnum<br>moss (Hygrohypnum<br>alpinum)                          | BAFA;CWH;ESSF;ICH;IDF;<br>SWB              | On emergent rocks in subalpine to alpine creeks (Brett 2015; FNA 2016)  |   |
| Moss      | alpine thread-moss<br>(Bryum alpinum<br>[=Imbybryum alpinum])                | no data                                    | One tentative record from Whistler alpine (O. Lee in Brett 2015); but may be B. ( <i>Imbybryum</i> ) <i>muehlenbeckii</i> (S. Joya, pers. comm.).   | Rock and soil over rock at all elevations (FNA 2016).   |
| Moss      | black grimmia (Grimmia<br>incurva)   | СМА  | Damp acidic rock at high elevations (Brett 2015; FNA 2016)  |   |
| Moss      | Cardot's pohlia moss<br>( <i>Pohlia cardotii</i> )                           | CMA;CWH;IMA;MH                             | Moist, seepy sites, predominantly alpine (Brett 2015)   |   |
| Moss      | Donn's grimmia ( <i>Grimmia donniana</i> )                                   | no data                                    | On exposed, dry acidic rock at high elevations (Brett 2015; FNA 2016)   |   |
| Moss      | grimmia moss (Grimmia<br>caespiticia)  | no data                                    | On exposed, dry acidic rock at high elevations (Brett 2015; FNA 2016)   |   |
| Moss      | Holzinger's<br>brachythecium moss<br>(Brachythecium<br>holzingeri)           | CDF;CMA;CWH;ESSF;ICH;<br>IDF;IMA;MH;MS;SBS | On soil and boulders in alpine sites (Brett 2015; FNA 2016)   |   |
| Moss      | Nevada homalothecium<br>moss (Homalothecium<br>nevadense)                    | no data                                    | On rock in the valley bottom (Brett 2015) various substrates<br>at low to high elevations (FNA 2016)  |   |
| Moss      | Olympic brachydontium<br>moss (Brachydontium<br>olympicum)                   | МН   | First and only record from Blackcomb Lake in 2014 (Brett<br>2015); only 4 records in BC (Klinkenberg 2016b; S. Joya,<br>pers. comm.) makes this a significant record  | Moist, acidic boulders mainly in the alpine (FNA 2016). |
| Moss      | pseudoleskea moss<br>( <i>Pseudoleskea radicosa</i><br>var. <i>pallida</i> ) | no data                                    | On rock and mineral soil in the alpine (Brett 2015; FNA 2016)   |   |
| Moss      | pygmy racomitrium moss<br>(Racomitrium<br>pygmaeum)                          | BAFA;ESSF;MH                               | Dry, acidic soil near treeline (Brett 2015; FNA 2016)   |   |

| <b>TABLE 3.1</b> : | (cont.): Habitat ( | notes used to classif | v likelihood of s | pecies at risk in the | e RMOW – Confirme | d species. |
|--------------------|--------------------|-----------------------|-------------------|-----------------------|-------------------|------------|
|--------------------|--------------------|-----------------------|-------------------|-----------------------|-------------------|------------|

| Group    | Common (Scientific)<br>Name                                | Biogeoclimatic (BGC)<br>Zone from CDC  | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)                           |
|----------|--|--|--|--|
| Moss     | Pylais' orthotrichum<br>moss (Orthotrichum<br>pylaisii)    | BWBS [sic: mistake or omission?]   | "McGuire area," dry basalt cliff walls (Brett 2015) granitic rock to alpine elevations (FNA 2016)                                    |  |
| Moss     | tall-clustered thread-<br>moss ( <i>Bryum pallescens</i> ) | no data  | One record from thin soil over boulder in stream at 1219m (Brett 2015)   |  |
| Moss     | thickpoint grimmia<br>(Schistidium crassipilum)            | no data  | One record from Whistler Village, substrate not specified (Brett 2007)   | On low elevation, often limestone substrates including sidewalks FNA (2016). |
| Moss     | tripterocladium moss<br>(Tripterocladium<br>Ieucocladulum) | CWH;IDF;MH   | On dry rocks at lower elevations, e.g., Brandywine Park<br>(north?; Brett 2015)  |  |
| Fern     | Cascade parsley fern<br>(Cryptogramma<br>cascadensis)      | CMA, ESSFvc; ESSFvcp;<br>IMA   | One 2016 record from Whistler Mt., and likely in other rocky sites above treeline (Brett 2016b)                                      |  |
| Grass    | satin grass (Muhlenbergia racemosa)                        | BGxh; IDFxh  | One site confirmed in from Wildlife Refuge wetland (Brett 2007)  |  |
| Herb     | ochroleucous<br>bladderwort (Utricularia<br>ochroleuca)    | BWBSdk;CDFmm;ESSFmv<br>ICHmw   | One record from Wildlife Refuge wetland (Brett 2007)   |  |
| Herb     | shinleaf wintergreen<br>(Pyrola elliptica)                 | BWBSmw; CWHvm;<br>ESSFmw; ICHmw;<br>IDFww; IDFxm; MHmm;<br>MSxk; SBSdw; 0SBSmh | Dry forest; two records from Brandywine Park area (Brett<br>2015)  |  |
| Herb     | star-flowered draba<br>( <i>Draba stenopetala</i> )        | BAFA;CMA   | One 1917 record from "Mt. Whistler" (UBC Herbarium in Brett 2015); could be present though ID for any <i>Draba</i> sp. is difficult. | Mainly alpine, Mt. Edziza + Cascades (Klinkenberg 2016b).                    |
| Moonwort | upswept moonwort<br>(Botrychium ascendens)                 | СМА  | One 2005 record from Whistler Peak (in Brett 2007) that hasn't been re-located in many visits (B. Brett, unpubl. data)               | Low to montane elevation grassy meadows (Klinkenberg 2016b).                 |
| Tree     | whitebark pine (Pinus<br>albicaulis)                       | CMAunp; CWHds;<br>CWHms; CWHun;<br>MHmm; MHmmp + >40<br>other BGC units        | Common on warm aspect sites near treeline (Brett 2007).  |  |

TABLE 3.1: (cont.): Habitat notes used to classify likelihood of species at risk in the RMOW – <u>Confirmed</u> species.

| Group     | Common (Scientific)<br>Name                         | Biogeoclimatic (BGC)<br>Zone from CDC | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)  |
|-----------|---|---------------------------------------|--|---|
| Gastropod | Northern Tightcoil<br>(Pristiloma<br>arcticum)      | ESSF;ICH                              | Tentatively confirmed by Kristiina<br>Ovaska at Harmony Lake (Brett<br>2015); could occur in RMOW (R.<br>Forsyth, pers. comm.) but see notes<br>re taxonomy. | Under woody debris/litter (Burke 2013); wet subalpine sites under<br>rocks/vegetation, should occur in Whistler but Coast Mt. sp. might be P.<br>crateris instead (R. Forsyth, pers. comm.) |
| Lichen    | midlife vinyl<br>(Leptogium<br>californicum)        | no data                               | Brandywine PP area on Acer<br>macrophyllum (just outside RMOW?<br>Brett 2015)  | On mossy rock (Goward 1994).  |
| Lichen    | northwest waterfan<br>(Peltigera gowardii)          | no data                               | Not yet documented in RMOW (Brett 2016b)   | 2 records s. of Whistler (Black Tusk and Brew Lake) in streams <1m wide near treeline (COSEWIC 2013; BC MOE 2015a)  |
| Lichen    | tundra tarts<br>(Psoroma tenue var.<br>boreale)     | no data                               | Not yet documented in RMOW (Brett 2016b)   | One 2011 record from Brew Lake (UBC via Brett 2015); common in wet<br>snowbeds at high elevations and prob. should be downlisted (C. Bjork, pers.<br>comm.)                                 |
| Liverwort | liverwort<br>(Jungermannia<br>atrovirens)           | no data                               | Not yet documented in RMOW (Brett 2016b)   | On emergent rock, upper edge of Brandywine Falls (Brett 2015) on damp calcareous rocks (http://rbg-<br>web2.rbge.org.uk/bbs/Activities/liverworts/Jungermannia%20atrovirens.pdf).           |
| Liverwort | liverwort<br>(Marchantia<br>alpestris)              | no data                               | Not yet documented in RMOW (Brett<br>2016b) but almost certain.  | Russet Lake; margins of snowmelt streams and high elevation ponds/lakes<br>(Brett and Bjork 2016). Often misidentified as M. polymporpha (C. Bjork, pers.<br>comm.).                        |
| Moss      | desmatodon moss<br>(Tortula<br>leucostoma)          | BAFA;MH;SWB                           | Not yet documented in RMOW (Brett 2016b) though likely.  | Dry soil in alpine heath at Russet Lake (UBC Herbarium in Brett 2015)   |
| Moss      | lesser fringe-moss<br>(Racomitrium<br>affine?)      | no data                               | Tent. ID from Rainbow Trail (Brett<br>2015)  | Acidic, moist to dry sites to high elevations (FNA 2016).   |
| Moss      | Schleicher's thread-<br>moss (Bryum<br>schleicheri) | CMA;CWH;IMA;MH                        | Tent. ID by Olivia Lee from<br>Blackcomb Lake (Brett 2015)   | Other BC records from wet subalpine sites (UBC Herbarium 2016).   |

### **TABLE 3.2:** Habitat notes used to classify likelihood of species at risk in the RMOW – <u>Likely</u> species.

|           | Common (Scientific)  | Biogeoclimatic (BGC)  |  |  |
|-----------|--|---|--|--|
| Group     | Name   | Zone from CDC   | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)   |
| Bee       | Western Bumble Bee<br>(Bombus occidentalis<br>ssp. occidentalis) | 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).<br>Closest locations: Mt. Garibaldi and Blackwater Lake near Mt. Currie<br>(Klinkenberg 2016b).  |
| Bivalve   | Striated<br>Fingernailclam<br>(Sphaerium<br>striatinum)          | BAFA;BG;BWBS;CDF;C<br>MA;CWH;ESSF;ICH;IDF<br>;IMA;MH;MS;PP;SBPS;<br>SBS;SWB | Not yet documented; uncertain<br>likelihood in Whistler due to lack of data<br>Province-wide   | Permanent bodies of water including lakes, ponds, and streams; only 3 BC records, none near Whistler CDC 2016).  |
| Butterfly | Clodius Parnassian<br>(Parnassius clodius<br>ssp. claudianus)    | CDF;CMA;CWH;MH  | The one record (Brett 2015) is likely ssp.<br>pseudogallatinus (tentative photo ID by<br>C. Guppy) but this ssp. is possible in<br>Whistler (C. Guppy, pers. comm.)  | Riparian and moist meadows at low to subalpine elevations (Guppy and Shepard 2001).  |
| Gastropod | Rocky Mountain<br>Physa ( <i>Physella</i><br>propinqua)          | BAFA;CDF;CMA;CWH;<br>ESSF;IDF;IMA;MH;MS;<br>SBPS;SBS                        | Not documented in Whistler (Brett<br>2016b) unknown likelihood in Whistler<br>due to taxonomic/ID difficulties (R.<br>Forsyth, pers. comm.)  | Wet areas; the few records are not close to Whistler (CDC 2016); 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. |
| Gastropod | Sunset Physa<br>(Physella virginea)                              | BAFA;BG;CDF;CMA;C<br>WH;ESSF;ICH;IDF;IMA;<br>MH;MS;SBPS;SBS                 | Not documented in Whistler (Brett<br>2016b) unknown likelihood in Whistler<br>due to taxonomic/ID difficulties (R.<br>Forsyth, pers. comm.)  | Wet areas; the few records are not close to Whistler (CDC 2016); 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. |
| Mammal    | Fisher (Pekania<br>pennanti)                                     | BAFA;BWBS;CDF;CMA;<br>CWH;ESSF;ICH;IDF;IM<br>A;MH;MS;PP;SBPS;SBS<br>;SWB    | Unknown current status (S. Rochetta,<br>pers. comm.); historic presence with last<br>two records from Green Lake in 1956<br>(Brett 2007); Tetrapod Museum<br>specimens)  | Associated with old growth forests with large trees (CDC 2016).  |
| Mammal    | Roosevelt Elk (Cervus<br>elaphus roosevelti)                     | СWH; МН   | Recently introduced to upper Squamish<br>Valley; occasional sightings (K. Ricker,<br>pers. comm.; Brett 2015). Only bull elk<br>have been reported locally but elk could<br>expand their range (S. Rochetta, pers.<br>comm.) | Elk are wide-ranging animals that use a wide range of habitats at all<br>elevations (CDC 2017). The relocation of elk into the Squamish Valley was<br>part of an effort to re-establish them in their former range.            |
| Mammal    | Townsend's Big-<br>eared Bat<br>(Corynorhinus<br>townsendii)     | BG;CDF;CWH;ICH;IDF;<br>PP   | Karl Ricker (pers. comm.) included this<br>species on an early list of mammals<br>compiled with help from the RBCM but I<br>have not been able to locate any records<br>from there.  | Buildings, caves, and mines; known only from locations far from Whistler<br>(Nagorsen and Brigham 1993); may be possible in Whistler (C. Lausen, pers.<br>comm.).  |
| Lichen    | peacock vinyl<br>(Leptogium<br>polycarpum)                       | no data   | Not yet documented in RMOW (Brett<br>2016b) but C. Bjork (pers. comm.)<br>suggests it's worth looking for.   | One record from Acer macrophyllum in talus just south of Brandywine Falls; also on Alnus rubra and in spray zones (COSEWIC 2011).  |
| Lichen    | two-toned foam<br>( <i>Stereocaulon</i><br>symphycheilum)        | no data   | Not yet documented in RMOW (Brett<br>2016b) but very possible in RMOW (C.<br>Bjork, pers. comm.)   | One record from basalt cliffs at outlet of Garibaldi Lk. (C. Bjork in Brett 2015).   |
| Liverwort | liverwort (Frullania<br>hattoriana)                              | no data   | Not yet documented in RMOW (Brett<br>2016b). possible in RMOW (O. Lee, pers.<br>comm.)   | Epiphytic on bark, esp. yellow cedar and rocks; type specimen from Mt.<br>Seymour (S. Joya, pers. comm.) otherwise little data (Schofield 2002).   |

**TABLE 3.3:** Habitat notes used to classify likelihood of species at risk in the RMOW – <u>Possible</u> species (including Data Deficient).

|          | Common  | Biogeoclimatic (BGC)  |  |  |
|----------|---|---|--|--|
| Group    | (Scientific) Name   | Zone from CDC   | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)   |
| Moss     | Boas' long-necked<br>moss ( <i>Trematodon</i><br>asanoi)              | MHmm  | Not yet documented in RMOW (Brett 2016b);<br>possible in RMOW (O. Lee, pers. comm.)  | Closest record at Table Mt. (UBC Herbarium 2016); moist, exposed soil on late snowmelt sites (Christy 2007).   |
| Moss     | brown leskea moss<br>(Pseudoleskea<br>incurvata var.<br>tenuetis)     | no data   | Records not identified to subspecies from wet<br>soil at Russet Lake, Brandywine lower MHmm1<br>moist subalpine forest, Blackcomb alpine. Very<br>difficult to identify to subspecies even for Wilf<br>Schofield (S. Joya, pers. comm.). | Exposed mineral soil, boulders, and outcrops at mid to high elevations (FNA 2016).   |
| Moss     | bryum moss (Bryum calobryoides)                                       | ESSF;MH   | Not yet documented in RMOW (Brett 2016b);<br>possible in RMOW (O. Lee, pers. comm.).   | On humus/rock at Little Diamond Head (UBC Herbarium 2016); calcareous damp soil to high elevations (FNA 2016).   |
| Moss     | grimmia dry rock<br>moss ( <i>Grimmia</i><br>anomala)                 | СWН;МН  | Not yet documented in RMOW (Brett 2016b);<br>possible in RMOW (O. Lee, pers. comm.).   | Exposed, damp soils at mid and high elevations (FNA 2016); closest record is from 1974 on Brew Lk. trail from Brandywine (Brett 2015).   |
| Moss     | Heinemann's<br>andreaea moss<br>(Andreaea<br>heinemannii)             | МН  | Not yet documented in RMOW (Brett 2016b);<br>possible in Whistler (S. Joya and O. Lee, pers.<br>comm.).  | On rock in alpine sites (CDC 2016); on acidic rock at low to moderate elevations (FNA 2016); one 1983 record from Alice Ridge Trail to Diamond Head is closest (Klinkenberg 2016b).  |
| Moss     | Roth's thread-moss<br>(Pohlia andalusica)                             | СМА   | Not yet documented in RMOW (Brett 2016b).  | Acidic, disturbed soil to high elevations (FNA 2016); closest record from Garibaldi Neve (UBC Herbarium 2016).   |
| Moss     | slender smoothcap<br>moss ( <i>Atrichum</i><br><i>tenellum</i> )      | BAFA;ESSF   | Not yet documented in RMOW (Brett 2016b).<br>possible in RMOW (O. Lee, pers. comm.).   | Mainly an interior species; the lowland Squamish record could be a mis-ID (S. Joya, pers. comm.).  |
| Moss     | tundra pohlia moss<br>(Pohlia tundrae)                                | МН  | Not yet documented in RMOW (Brett 2016b);<br>possible in RMOW (O. Lee, pers. comm.).   | On humus and alpine tundra (FNA 2016); closest record from Sentinel Glacier foreland (UBC Herbarium 2016).   |
| Herb     | blunt-sepaled<br>starwort ( <i>Stellaria</i><br><i>obtusa</i> )       | CWHms;ESSFdk;ESSFw<br>c;ESSFwcp;ESSFwk;ICH<br>dw;ICHwk;IDFdm;IDFw<br>w;IDFxh    | Not yet documented in RMOW (Brett 2016b);<br>often overlooked and may be here (C. Bjork,<br>pers. comm.).  | Moist to wet, open sites mainly east of Coast Mts.; closest record at Meagher Cr. (Klinkenberg 2016b).   |
| Herb     | Brewer's monkey-<br>flower (Erythranthe<br>[=Mimulus]<br>breweri)     | ESSFdcp;ESSFwc;ESSFx<br>v;ICHdw;ICHmk;ICHm<br>w;ICHxw;IDFdm;IDFw<br>w           | Not yet documented in RMOW (Brett 2016b);<br>possible in Whistler (C. Bjork, pers. comm.).   | Moist sites at various elevations; closest record at Meagher Cr.<br>(Klinkenberg 2016a); more common than previously though (C. Bjork, pers.<br>comm.).  |
| Herb     | spotted cowbane<br>( <i>Cicuta maculata</i><br>var. <i>maculata</i> ) | no data   | Not yet documented in RMOW (Brett 2016b);<br>possible in Whistler on moist sites (C. Bjork,<br>pers. comm.; Klinkenberg 2016b) though check<br>additional notes re taxonomy.   | <i>Cicuta</i> taxonomy is a mess (C. Bjork, pers. comm.). NB: this ssp. seems to have been delisted with only <i>C. m.</i> var. <i>angustifolia</i> now listed (CDC 2016); EFlora lists as Red with the closest occurrence in the Upper Lillooet Valley (Klinkenberg 2016b). |
| Moonwort | dainty moonwort<br>( <i>Botrychium</i><br><i>crenulatum</i> )         | BWBSmw;ESSFdk;ICH<br>wk   | Not yet documented in RMOW (Brett 2016b);<br>"pops up" in unexpected places (C. Bjork, pers.<br>comm.), i.e., possible in Whistler.  | Mainly montane in SE and NE BC, one 1917 record from Empetrum Ridge (Klinkenberg 2016b).   |
| Moonwort | least moonwort<br>(Botrychium<br>simplex var.<br>compositum)          | BWBSmw;CDFmm;CW<br>Hds;CWHxm;ESSFvc;IC<br>Hmw;ICHvk;ICHwk;IDF<br>xh;MSdk;SBPSxc | Not yet documented in RMOW (Brett 2016b);<br>"pops up" in unexpected places (C. Bjork, pers.<br>comm.), i.e., possible in Whistler.  | Coastal lowland, 1 record from Pemberton (Klinkenberg 2016b).  |

| TABLE 3.3 | (cont.). H  | labitat not | es used to | classify | likelihood of | species at | risk in the | RMOW – | Possible s | necies ( | including | Data Defic  | ient)   |
|-----------|-------------|-------------|------------|----------|---------------|------------|-------------|--------|------------|----------|-----------|-------------|---------|
|           | (00110.7.1) |             |            | ciussiiy | Incolution of | species at |             |        |            |          | menuume   | , Dutu Dene | iciicj. |

Species and Ecosystems at Risk in the Resort Municipality of Whistler

| Group    | Common<br>(Scientific) Name                             | Biogeoclimatic (BGC)<br>Zone from CDC | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)                          |
|----------|---|---------------------------------------|--|---|
| Moonwort | spoon-shaped<br>moonwort<br>(Botrychium<br>spathulatum) | BWBSmw;ESSFwm;ESS<br>Fwmp;MSdk        | Not yet documented in RMOW (Brett 2016b);<br>"pops up" in unexpected places (C. Bjork, pers.<br>comm.), i.e., possible in Whistler.  | Mainly eastern BC, one 1941 record from Empetrum Ridge (Klinkenberg 2016b). |
| Sedge    | teacher's sedge<br>(Carex<br>praeceptorum)              | no data                               | One record from a bog at Callaghan Lake (Brett<br>2016b). Many sedge experts with the WBP<br>have been in similar habitats since (e.g., H.<br>Roemer, A. Ceska, and C. Bjork). Possible here<br>but if abundant would likely have already been<br>found. | Margins of lakes, ponds, and seeps at mid- to high elevations.              |

| TABLE 3.3 | (cont. | ): Habitat notes used to classify | / likelihood of s | pecies at risk in the RMOW | – Possible species | (including Data Deficient). |
|-----------|--------|-----------------------------------|-------------------|----------------------------|--------------------|-----------------------------|
|-----------|--------|-----------------------------------|-------------------|----------------------------|--------------------|-----------------------------|

| Group     | Common<br>(Scientific) Name   | Biogeoclimatic (BGC)<br>Zone from CDC                      | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)   |
|-----------|---|--|--|--|
| Beetle    | Hairy-necked Tiger<br>Beetle ( <i>Cicindela</i><br><i>hirticollis</i> ) | BAFA;BG;CMA;CWH;E<br>SSF;ICH;IDF;IMA;MH;<br>MS;PP;SBPS;SBS | Non-resident.  | Associated with sand beaches; none of 10 N. Am. ssp. near Whistler<br>(Pearson et al. 2006; K. Needham pers. comm.).   |
| Dragonfly | Sinuous Snaketail<br>(Ophiogomphus<br>occidentis)                       | BAFA;BG;CDF;CMA;C<br>WH;ESSF;ICH;IDF;IMA;<br>MH;MS;PP;SBPS | Not documented in Whistler (Brett 2016b) and not likely (D. Knopp, pers. comm.).   | Open streambanks and sandy lakeshores at low elevations (Cannings 2002).   |
| Dragonfly | Vivid Dancer ( <i>Argia</i><br>vivida)                                  | BG;CWH;ICH;IDF;PP  | Non-resident.  | Mainly associated with hot springs; closest site is Meagher and Keyhole Hot Springs (Cannings 2002; COSEWIC 2015).   |
| Gastropod | Dusky Fossaria<br>( <i>Galba dalli</i> )                                | BG;CDF;CMA;CWH;ESS<br>F;ICH;IDF;IMA;MH;MS;<br>PP           | Not documented in Whistler (Brett 2016b) and probably not in Whistler (R. Forsyth, pers. comm.).   | Data deficient; potentially in wet areas across southern BC; the few BC records are not close (CDC 2016).  |
| Gastropod | Prairie Fossaria<br>(Galba bulimoides)                                  | CDF;CMA;CWH;ESSF;I<br>CH;IDF;IMA;MH;MS;PP                  | Not documented in Whistler (Brett 2016b) and probably not in Whistler (R. Forsyth, pers. comm.).   | Data deficient; wet areas with unknown range there are only a few records from Vancouver Island, Fraser Valley, and Kamloops (CDC 2016).   |
| Gastropod | Star Gyro ( <i>Gyraulus</i><br><i>crista</i> )                          | BAFA;BG;CWH;ESSF;IC<br>H;IDF;IMA;MH;MS;PP                  | Not documented in Whistler (Brett 2016b)<br>doubtful in Whistler (R. Forsyth, pers. comm.).  | Data deficient; eutrophic wet areas in central and northern BC (CDC 2016).   |
| Bird      | Marbled Murrelet<br>(Brachyramphus<br>marmoratus)                       | CDF;CWH;MH   | Not yet documented and not likely in RMOW<br>due to distance from ocean (Env. Canada<br>2014a) even though it is the only species for<br>which SARA has designated Critical Habitat<br>(Env. Canada 2014a and T. Symko, pers. comm.)   | Most likely in old forests below 900m and <30km from seawater (Env.<br>Canada 2014a), i.e., south of RMOW.   |
| Bird      | Peregrine Falcon<br>(Falco peregrinus<br>anatum)                        | BG;BWBS;CDF;CWH;ID<br>F;MS;PP;SBS                          | CWH forest, wetlands, urban areas (Ricker et al.<br>2014); nests in cliffs/steep bluffs, closest<br>location at Soo Bluffs (K. Ricker, pers. comm.)  |  |
| Bird      | Rusty Blackbird<br>(Euphagus<br>carolinus)                              | BG;BWBS;CDF;CWH;ES<br>SF;MS;PP;SBPS;SBS;S<br>WB            | Can be found in urban areas (Ricker et al. 2014)<br>but is not resident in RMOW.   | Breeds primarily in Interior BC (Campbell et al. 2001).  |
| Bird      | Spotted Owl (Strix<br>occidentalis<br>[COSEWIC = ssp.<br>caurina])      | CWH;ESSF;IDF;MH  | Historic in CWH & MH forest; extirpated (Ricker<br>et al. 2014); last record from Ken Racey in 1946<br>(Campbell et al. 1990a).  | Past records from near Lillooet Lake may be the closest occurrences. Likely to be extirpated in BC due partly to loss of habitat (old-growth forest) and competition with Barred Owls. |
| Bird      | Western Screech-<br>Owl (Megascops<br>kennicottii<br>kennicottii)       | BG;CDF;CWH;ICH;IDF;<br>PP                                  | Non-resident (Ricker et al. 2014) and<br>"essentially non-migratory" (Campbell et al.<br>1990b) so accidental sightings almost certainly<br>not of local breeding birds.   | Documented in Pemberton (Mathews 2016), presumably <i>kennicottii</i> spp.   |
| Fish      | Coastal Cutthroat<br>Trout<br>(Oncorhynchus<br>clarkii clarkii)         | BWBS;CDF;CWH;ICH;S<br>BS                                   | Almost certain historic presence in local lakes<br>and streams before introduction of Rainbow<br>Trout (Eric Crowe, pers. comm.) but unlikely<br>now, based on DNA evidence, within RMOW (E.<br>Crowe and V. Woodruff, pers. comm.). Sterile<br>cutthroat have been introduced to Alta Lake.<br>Awaiting DNA results from two possible<br>specimens from 21-Mile Creek (Mason et al. in<br>prep.). | Still potentially viable in isolated water bodies north into Pemberton, e.g.,<br>Keyhole Falls (E. Crowe, pers. comm.).  |

### **TABLE 3.4**: Habitat notes used to classify likelihood of species at risk in the RMOW – <u>Unlikely</u> or <u>Not Possible</u> species.

\_\_\_\_\_

| Group     | Common<br>(Scientific) Name  | Biogeoclimatic (BGC)<br>Zone from CDC | Whistler status and habitat notes  | Habitat elsewhere (esp. if not documented in RMOW)  |
|-----------|--|---------------------------------------|--|---|
| Mammal    | Pacific Water Shrew<br>(Sorex bendirii)  | СШН                                   | Not recorded in mammal trapping to date<br>(Cowan 2016; RBCM 2016; Cascade 2013, 2014,<br>2015; Brett 2016b; Mason et al., in [rep.; S.<br>Rochetta, pers. comm.).                   | Low elevation riparian and wetland habitat, mainly south of Fraser River;<br>2008 Squamish record was large range extension (COSEWIC 2009).   |
| Reptile   | North American<br>Racer (Coluber<br>constrictor<br>[COSEWIC = ssp.<br>mormon]) | BG;IDF;PP                             | Non-resident   | Warm, dry biogeoclimatic zones east of Whistler; the closest record is from<br>Anderson Lake ((Klinkenberg 2016a).  |
| Reptile   | Northern Rubber<br>Boa ( <i>Charina</i><br><i>bottae</i> )                     | BG;CWH;ICH;IDF;PP                     | Non-resident, though there have been<br>unconfirmed anecdotal records (Johnny Mikes<br>from Lost Lake; Cathy Ivany from Emerald<br>Estates, pers. comm.)                             | Dry, warm sites with rock habitat; the closest record is from Rutherford Cr;<br>(L. Anthony, pers. comm.).  |
| Reptile   | Sharp-tailed Snake<br>(Contia tenuis)  | CDF;CWH                               | Non-resident   | Open canopy woodlands in the CDF (COSEWIC 2009) and warm aspect,<br>low-elevation slopes in Pemberton (L. Anthony, pers. comm.).  |
| Lichen    | old growth<br>specklebelly<br>( <i>Pseudocyphellaria</i><br>rainierensis)      | CMAunp; CWHvh;<br>CHWwh; MHwh         | Old-growth dependent and not impossible in<br>Whistler's ancient, subalpine yellow-cedar<br>forests (C. Bjork, pers. comm.).   | So far only found on bark of yellow-cedar and amabilis in hypermaritime environments on Vancouver Island and the Mid Coast (BC MOE 2015c)   |
| Moss      | callicladium moss<br>(Callicladium<br>haldanianum)                             | СШН                                   | Not documented in RMOW (Brett 2016b);<br>lowland floodplain species that is likely not<br>present (cf. S. Joya, pers. comm.) or is possible<br>in Whistler (cf. O. Lee, pers. comm.) | Lowland floodplain species with questionable likelihood in RMOW (S. Joya, pers. comm.); the two closest records are from Squamish floodplain sites (UBC Herbarium 2016).  |
| Moss      | moss (Atrichum<br>flavisetum)  | no data                               | Not documented in RMOW (Brett 2016b); not likely in RMOW (O. Lee, pers. comm.)   | "Banks or stumps in woods, roots of fallen trees, ravines in crevices of rock<br>outcrops; low to moderate elevation" (FNA 2016); Steve Joya (pers. comm.)<br>reports this species is not well-understood and may be more common than<br>currently thought. |
| Moss      | moss<br>(Polytrichastrum<br>sexangulare vər.<br>vulcanicum)                    | MHmm                                  | Not yet documented in RMOW (Brett 2016b);<br>species status in question though otherwise<br>possible (S. Joya, pers. comm.) or not likely in<br>Whistler (O. Lee. pers. comm.)       | Steve Joya (pers. comm.) reports that the species status is in question and is data deficient. Although recognized by the FNA (2016), intermediates between var. vulcanicum and the nominate variety have been found in B.C. so the taxonomy may change.    |
| Moss      | Roell's brotherella<br>( <i>Brotherella roellii</i> )                          | СШН                                   | Not documented in RMOW (Brett 2016b); likely<br>not in Whistler (S. Joya and O. Lee, pers.<br>comm.)   | Lowland forest edges and floodplains (FNA 2016; S. Joya, pers. comm.);<br>closest records from low elevations near Squamish and Fraser Valley (UBC<br>Herbarium 2016); Steve Joya (pers. comm.) says it likely don't make it into<br>Whistler.              |
| Moss      | small-spored rock-<br>moss (Andreaea<br>sinuosa)                               | CMA;CWHvm;MHmm;<br>MHwh               | Not documented in RMOW (Brett 2016b); not likely in Whistler (O. Lee, pers. comm.)   | Late snow sites on acidic rock (CDC 2016; FNA 2016); closest record is from Cypress Mt. (UBC Herbarium 2016).   |
| Peat Moss | twisted peat-moss<br>(Sphagnum<br>contortum)                                   | CWH;SBS                               | Non-resident not in Whistler area; species may<br>not even occur in BC (S. Joya, pers. comm.;<br>unlikely in Whistler (O. Lee, pers. comm.)  | Coastal and northern Interior (UBC Herbarium 2016); Steve Joya (pers. comm.) reports there is now some doubt whether S. contortum even occurs in B.C. at all. The <i>Sphagnum subsecundum</i> group in B.C. is in need of revision.                         |
| Fern      | marginal wood fern<br>(Dryopteris<br>marginalis)                               | CWHds                                 | Not documented in RMOW (Brett 2016b); not possible in RMOW (C. Bjork, pers. comm.)   | Only known from Meagher Hot Springs (CDC 2016); may be removed from BC list since that occurrence have been planted (C. Bjork, pers. comm.).  |

| TABLE 3.4 | cont.): Habitat not | es used to classify l | ikelihood of | species at risk in | the RMOW – | Unlikely or Not Possible species. |
|-----------|---------------------|-----------------------|--------------|--------------------|------------|-----------------------------------|
|           |                     |                       |              |                    |            |                                   |

|           | Common   | Biogeoclimatic (BGC)  |   |   |
|-----------|--|---|---|---|
| Group     | (Scientific) Name  | Zone from CDC   | Whistler status and habitat notes   | Habitat elsewhere (esp. if not documented in RMOW)  |
| Herb      | cliff paintbrush<br>(Castilleja rupicola)                                | CMA;IMA;MSdm  | Not yet documented in RMOW (Brett 2016b);<br>very unlikely in Whistler based on current<br>range (Env. Canada 2016a)  | The only current records are from south of Fraser and Skagit Rivers (Env.<br>Canada 2016a); the closest record was from 1912 on Brunswick Mt. (Lions<br>Bay) but has not been recorded since.   |
| Herb      | Geyer's onion<br>(Allium geyeri var.<br>tenerum)                         | BGxw;CDFmm;CWHx<br>m;ESSFxc;IDFdk;IDFm<br>w;IDFww;IDFxm;MSd<br>m                            | Not documented in RMOW (Brett 2016b); not<br>impossible in Whistler especially since its range<br>might have expanded due to First Nations trade<br>(C. Bjork, pers. comm.) | Dry warm habitats on Vcr. Island and in Fraser/Thompson Valleys<br>(Klinkenberg 2016b); may have expanded with First Nations trade (C. Bjork,<br>pers. comm.); closest record from Owl Creek near Mt. Currie (Klinkenberg<br>2016b).      |
| Herb      | milky draba (Draba<br>lactea)  | BAFA;BWBS;CMA;ESSF<br>mv;ESSFvcp;ESSFwm;E<br>SSFwmp;ESSFwv;ESSFx<br>v;IMAun;SWBmk;SWB<br>un | The one tentative record tentatively identified<br>by Jamie Fennemen (BioBlitz 2011 in Brett<br>2015) is likely a different <i>Draba</i> .                                  | Dry high elevation sites mainly in n. BC (Klinkenberg 2016b).   |
| Herb      | slender gentian<br>( <i>Gentianella tenella</i><br>ssp. <i>tenella</i> ) | BWBSdk;ESSFmw;ESSF<br>wv;IMAunp;MHmm;SB<br>Sun;SWBun  | Not yet documented in RMOW (Brett 2016b);<br>unlikely in Whistler (C. Bjork, pers. comm.)   | Higher elevation moist meadows Klinkenberg 2016a); closest record from<br>Tenquille Lake (UBC Herbarium 2016) by be incorrect due to taxonomic<br>problems with sp. (C. Bjork, pers. comm.).  |
| Herb      | slimleaf onion<br>(Allium amplectens)                                    | CDFmm;CWHxm   | Not yet documented in RMOW (Brett 2016b);<br>unlikely in Whistler (C. Bjork, pers. comm.)   | Coastal low elevation (Klinkenberg 2016b).  |
| Herb      | tiny suncress<br>(Boechera<br>paupercula)                                | PPxh  | Not documented in RMOW (Brett 2016b)  | Data deficient (CDC 2016); closest habitat is near Tenquille Lk. (UBC Herbarium 2016); habitat and range not well described in BC (C. Bjork, pers. comm.).  |
| Herb      | Vancouver Island<br>beggarticks ( <i>Bidens</i><br>amplissima)           | CDFmm;CWHdm;CWH<br>ms;CWHxm   | Not yet documented in RMOW (Brett 2016b);<br>unlikely in Whistler (C. Bjork, pers. comm.)   | Coastal lowland only (Klinkenberg 2016b). NB: "CWHms" locations in CDC (2016) appear to be a mistake.   |
| Herb      | Washington<br>springbeauty<br>(Claytonia<br>washingtoniana)              | CDFmm;CWHdm;CWH<br>xm;IDFww   | Not yet documented in RMOW (Brett 2016b);<br>unlikely in Whistler (C. Bjork, pers. comm.)   | Moist to mesic outcrops in drier coastal subzones (Klinkenberg 2016b);<br>closest record is from Port Douglas (UBC Herbarium 2016).   |
| Sedge     | American bulrush<br>(Schoenoplectus<br>americanus)                       | CWHds   | Not documented in RMOW (Brett 2016b);<br>unlikely in Whistler (C. Bjork, pers. comm.)   | Only known from Meagher and Interior (CDC 2016).  |
| Sedge     | porcupine sedge<br>(Carex hystericina)                                   | BGxh;BGxw;IDFww;ID<br>Fxh;MSxk;PPxh;SBPSxc  | Not yet documented in RMOW (Brett 2016b);<br>unlikely in RMOW since would have been<br>recorded by now if here (C. Bjork, pers. comm.)                                      | Wet sites mainly e. of Coast-Cascade Mts. (Klinkenberg 2016b).  |
| Bivalve   | Olympia Oyster<br>(Ostrea<br>conchaphila)                                | no data   | Non-resident  | Tidal areas only (Klinkenberg 2016a).   |
| Butterfly | Dun Skipper<br>( <i>Euphyes vestris</i><br>(ssp. <i>vestris</i> ))       | CDF;CMA;CWH;ESSF;I<br>DF;IMA;MH;PP  | Non-resident; zero chance of occurring in<br>Whistler due to high elevation (C. Guppy, pers.<br>comm.)  | Southern Vancouver Island, Fraser Valley to Lillooet; also three records from Mt. Currie and Pemberton Valley (Guppy and Shepard 2001).   |
| Butterfly | Propertius<br>Duskywing (Erynnis<br>propertius)                          | CDF;CMA;CWH;MH  | Non-resident; zero chance of occurring in<br>Whistler due to high elevation (C. Guppy, pers.<br>comm.)  | Associated Garry oak; records outside of that range are likely strays, e.g.,<br>the one record from 40km north of Mt. Currie (Guppy and Shepard 2001;<br>C. Guppy, pers. comm.); recorded by Pemberton BioBlitz (Brett, unpubl.<br>data). |

### TABLE 3.4 (cont.): Habitat notes used to classify likelihood of species at risk in the RMOW – Unlikely or Not Possible species.

| TABLE 3.4 | (cont.) | : Habitat | notes use | ed to classif | v likelihood of s | pecies at risk in | the RMOW – | Unlikely or | Not Possible st | pecies. |
|-----------|---------|-----------|-----------|---------------|-------------------|-------------------|------------|-------------|-----------------|---------|
|           |         |           |           |               |                   |                   |            | -           |                 |         |

| Group     | Common<br>(Scientific) Name  | Biogeoclimatic (BGC)<br>Zone from CDC                                   | Whistler status and habitat notes   | Habitat elsewhere (esp. if not documented in RMOW)  |
|-----------|--|---|---|---|
| Butterfly | Silver-spotted<br>Skipper (Epargyreus<br>clarus ssp.<br>californicus)      | CDF;CWH   | Non-resident  | The coastal population formerly in Gulf Islands and the Lower Mainland<br>(Guppy and Shepard 2001) is now extinct (C. Guppy, pers. comm.).  |
| Gastropod | Northern Abalone<br>(Haliotis<br>kamtschatkana)                            | CDF;CWH   | Non-resident  | Intertidal and subtidal zones (Klinkenberg 2016a).  |
| Bird      | American bittern<br>(Botaurus<br>lentiginosus)                             |   | Recorded as accidental by the Whistler Bird List (Ricker et al. 2014).  | Breeding range in BC mainly in the Interior (not near Whistler). Year-round population in Lower Mainland (Klinkenberg 2016b).   |
| Bird      | Lewis's<br>Woodpecker<br>( <i>Melanerpes lewis</i><br>pop. 1)              |   | Rarely recorded in spring ("Casual," Ricker et al. 2014).   | Breeding range in BC mainly in the Interior (not near Whistler). Some overwintering on s. Vancouver Island and Lower Mainland (Klinkenberg 2016b).  |
| Bird      | Short-eared Owl<br>(Asio flammeus)   |   | Not resident in Whistler.   | Not included in this report since it does not occur here. It does not appear<br>in CDC searches, in spite of being listed as a "seasonal resident, non-<br>breeder" in the Squamish Forest District (CDC 2016). One record from<br>Whistler BBS from Pemberton in 2000 (Marven, unpub. data); recorded as<br>Pemberton spring/fall migrant in Mathews (2016). |
| Fish      | Coho Salmon<br>(Oncorhynchus<br>kisutch)                                   | BAFA;BG;BWBS;CDF;C<br>MA;CWH;ESSF;ICH;IDF<br>;MH;MS;PP;SBPS;SBS;S<br>WB | Non-resident; the CDC (2016) shows it in the<br>Squamish Forest District and CWH/IDF<br>Biogeoclimatic Zones but it didn't show up in a<br>search with those terms. | Closest populations are in Pemberton and Squamish (V. Woodruff, pers. comm.).   |
| Fish      | Eulachon<br>(Thaleichthys<br>pacificus)                                    |   |   |   |
| Fish      | Green Sturgeon<br>(Acipenser<br>medirostris)                               | CDF;CWH   | Non-resident  | Marine and estuaries only.  |
| Herb      | Henderson's<br>checker-mallow<br>( <i>Sidalcea</i><br><i>hendersonii</i> ) | CDFmm; CWHxm  | One 1941 record by K. Racey from Alta Lake (in<br>Brett 2016b) is likely a mis-ID or planted (C.<br>Bjork, pers. comm.)   | Squamish (Judith Holm pers. comm.) and other coastal estuaries<br>(Klinkenberg 2016b); not possible in RMOW (C. Bjork, pers. comm.).  |
| Herb      | pale evening-<br>primrose<br>(Oenothera pallida<br>ssp. pallida)           | BGxh; CWHds   | Non-resident; not possible in RMOW (C. Bjork, pers. comm.)  | Dry sites and sand dunes, mainly southern Interior BC (Klinkenberg 2016b).  |

## 4.0 Comprehensive List of Species at Risk in the RMOW

### 4.1 Species at Risk in the RMOW

The first comprehensive list of species at risk in the RMOW was compiled from the following sources:

- Search results from the CDC.
- Occurrence and habitat data (in Whistler and beyond) compiled by the Whistler Biodiversity Project.
- Additional local data from other sources, especially for mammals, birds, and fish.

The data from these sources was summarized into tabular format (Tables 3.1 to 3.4) to aid grouping by their presence or likelihood presented in this section.

A total of 150 species at risk were considered (Tables 4.5a to 4.5e). Nine others included in Green et al. (2005) have since been downlisted to Yellow (Secure; Table 4.5f) and were therefore excluded. The process I used to rank the likelihood of each species was based on my own local experience, other data, and aided by consultations with experts when unsure (Section 3). I first ranked each species by these criteria:

- Confirmed presence in the RMOW;
- Important habitat in the RMOW; and
- (For wide-ranging species, i.e., large mammals, bats, and birds only) its potential to den or nest (breed) in the RMOW. This classification needs to be expanded and confirmed in the future to clarify use of overwintering habitat and significant summer habitat. It should also extend to defining, where possible, exact locations that provide important habitat for these and potentially other species groups such as fish and other small mammals.

The resulting fourth determination, "Resident in the RMOW," (Tables 4.1 and 4.4) synthesizes the other criteria into classes that will hopefully highlight which species at risk need to be considered in local decision making. This determination will change for some species as new data become available.

### **TABLE 4.1:** Definition of classes used.

| Resident in RMOW   | Definition   |
|--------------------|--|
| Yes (Confirmed,    | Species at risk with at least one confirmed record in the RMOW. For large-ranging species such as birds and large  |
| Resident)          | mammals, this category is somewhat less straightforward and inclusion requires significant use of habitat in the   |
|                    | in the RMOW (especially birds but also some large mammals) do not have a significant need for babitat within   |
|                    | RMOW houndaries and have been excluded from this category  |
| Yes - Foraging     | Forages in the RMOW (Black Swifts, which nest outside the RMOW but forage inside). Reliance on RMOW habitat  |
|                    | unknown.   |
| Yes – Intermittent | May breed in the RMOW but not every year (Green Heron).  |
| Yes – Migratory    | Passes through the RMOW during migration. Reliance on RMOW habitat unknown (Surf Scoter).  |
| Yes – Seasonal     | Significant local presence during non-winter months but not yet confirmed to breed locally (Great Blue Heron).   |
| 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.   |
| 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.  |
| Possible (DD)      | Data Deficient: There is not enough information about the nabitat requirements of some species at risk to  |
|                    | ascertain whether they are possible in the RiviOw. This group includes three invertebrate species, two Physa spails and Stripted Eingerpailelam. For the purposes of this report, species in this class are considered Bessible. |
|                    | "Incertain" is another term used synonymously with Data Deficient  |
| Unlikely           | Species at risk that have a very low probability of occurring in the RMOW but are not impossible. If species in this   |
| onincery           | category are eventually found in the RMOW, they would represent large range extensions (e.g., Pacific Water  |
|                    | Shrew).  |
| No/Not Present     | Species that, given current data, have no chance of occurring in the RMOW. If species in this category are   |
|                    | eventually found in the RMOW they would represent very large range extensions and/or evidence that past  |
|                    | habitat data was incorrect. This group also includes species that are impossible in the RMOW, for example,   |
|                    | marine, estuarine, and seaside species.  |

The 150 species at risk considered in this report include almost twice as many species as any individual CDC search (Table 4.2). Almost all the species not returned by CDC searches have been documented by the Whistler Biodiversity Project or Whistler BioBlitz. The species not yet documented by the CDC represent false negatives. Until the new data is uploaded to the CDC, it is therefore important to rely on the lists presented in this report.

**TABLE 4.2**: Total number of species-at-risk addressed in this report categorized by likelihood of being resident in the RMOW.

| Posident in PMOW (2016)             | No. of  |
|-------------------------------------|---------|
| Resident III KIVIOW (2010)          | species |
| Confirmed                           | 69      |
| Likely                              | 9       |
| Possible (including Data Deficient) | 23      |
| Data Deficient                      | 3       |
| Unlikely                            | 33      |
| No/Not Possible                     | 13      |
|                                     | 150     |

In summary, just over half (52%) of the species at risk described in this report are Confirmed or Likely in the RMOW (Table 4.3). A further 23% are Possible and therefore potentially worth searching for in future surveys, especially if of particular interest to the RMOW. Almost one-third (31%), however, should be eliminated from future consideration as species at risk in the RMOW because they are Unlikely or Not Possible in the area.<sup>15</sup>

**TABLE 4.3:** Summary of Table 4.2.

|                                     | No.(%) of      |
|-------------------------------------|----------------|
| Resident in RMOW?                   | <b>Species</b> |
| Confirmed or Likely                 | 78 (52%)       |
| Possible (including Data Deficient) | 24 (17%)       |
| Unlikely or Not Possible            | 46 (31%)       |

Only 18 or the 69 species confirmed to date in the RMOW are vertebrates (Table 4.4). This result is a reminder that vertebrates represent a small fraction of total biodiversity. Vertebrates represent less than 10% of all species documented to date in the RMOW (Figure 1.2) and this figure will decrease in the future as more invertebrates, fungi, lichens, etc. are documented.

TABLE 4.4: Summary of species at risk that are Confirmed residents, Likely, or Possible in the RMOW, by species group.

|                |                | Resid | dent in Whi | stler?     |              |
|----------------|----------------|-------|-------------|------------|--------------|
| <u>Group 1</u> | Group 2        | Yes   | Likely      | Poss./Unc. | <u>Total</u> |
| Vertebrates    | Amphibians     | 3     | 0           | 0          | 3            |
|                | Birds          | 9     | 0           | 0          | 9            |
|                | Fishes         | 1     | 0           | 0          | 1            |
|                | Mammals        | 5     | 0           | 3          | 8            |
| Invertebrates  | Insects        | 2     | 0           | 2          | 4            |
|                | Snails & Clams | 0     | 1           | 3          | 4            |
| Plants         | Vascular       | 7     | 0           | 7          | 14           |
|                | Mosses         | 15    | 3           | 8          | 26           |
|                | Liverworts     | 8     | 2           | 1          | 11           |
| Lichens        | Lichens        | 19    | 3           | 2          | 24           |
|                | Total          | 69    | 9           | 26         |              |

<sup>15</sup> 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.

 TABLE 4.5a:
 Confirmed
 species at risk in the RMOW. Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient), Int. (Intermittent, i.e., not every year), Forage (confirmed foraging but not breeding), Seas. (resident only part of the year); Mig. (migrates through). The denning/nesting data applies only to wide-ranging species (large mammals, bats, and birds).

|              |           |  |   | BC     | BCID     | COSEWIC | Conf in         | Impt.<br>Habitat in | Den /     | Posidont in    |
|--------------|-----------|--|---|--------|----------|---------|-----------------|---------------------|-----------|----------------|
| Group 1      | Group 2   | Species                                  | Common Name                               | List   | Wildlife | / SARA  | RMOW?           | RMOW?               | RMOW?     | RMOW?          |
| Invertebrate | Butterfly | Callophrys eryphon ssp. sheltonensis     | Western Pine Elfin, sheltonensis ssp.     | Blue   |          | ,       | Yes             | Yes                 |           | Yes            |
| Invertebrate | Butterfly | Parnassius clodius ssp. pseudogallatinus | Clodius Parnassian, pseudogallatinus ssp. | Blue   |          |         | Yes? (Tent. ID) | Yes?                |           | Yes (Tent. ID) |
| Vertebrate   | Amphibian | Anaxyrus boreas                          | Western Toad                              | Blue   |          | SC/SC   | Yes             | Yes                 |           | Yes            |
| Vertebrate   | Amphibian | Ascaphus truei                           | Coastal Tailed Frog                       | Blue   | Yes      | SC/SC   | Yes             | Yes                 |           | Yes            |
| Vertebrate   | Amphibian | Rana aurora                              | Northern Red-legged Frog                  | Blue   | Yes      | SC/SC   | Yes             | Yes                 |           | Yes            |
| Vertebrate   | Bird      | Accipiter gentilis ssp. laingi           | Northern Goshawk, laingi ssp.             | Red    | Yes      | T/T     | Yes             | Yes                 |           | Yes            |
| Vertebrate   | Bird      | Ardea herodias ssp. fannini              | Great Blue Heron, fannini ssp.            | Blue   | Yes      | SC/SC   | Yes             | Yes?                | Unlikely  | Yes (Seas.)    |
| Vertebrate   | Bird      | Butorides virescens                      | Green Heron                               | Blue   |          |         | Yes             | Yes - Int.          | Int.      | Yes (Int.)     |
| Vertebrate   | Bird      | Chordeiles minor                         | Common Nighthawk                          | Yellow |          | T/T     | Yes             | Yes                 | Likely    | Yes            |
| Vertebrate   | Bird      | Contopus cooperi                         | Olive-sided Flycatcher                    | Blue   |          | T/T     | Yes             | Yes                 | Yes       | Yes            |
| Vertebrate   | Bird      | Cypseloides niger                        | Black Swift                               | Blue   |          | Е       | Yes             | Yes - Forage        | Possible  | Yes (Forage)   |
| Vertebrate   | Bird      | Hirundo rustica                          | Barn Swallow                              | Blue   |          | Т/      | Yes             | Yes                 | Yes       | Yes            |
| Vertebrate   | Bird      | Melanitta perspicillata                  | Surf Scoter                               | Blue   |          |         | Yes             | Yes                 | No        | Yes (Mig.)     |
| Vertebrate   | Bird      | Patagioenas fasciata                     | Band-tailed Pigeon                        | Blue   |          | SC/SC   | Yes             | Yes                 | Yes?      | Yes            |
| Vertebrate   | Fish      | Salvelinus confluentus - coastal         | Bull Trout - Coastal Lineage              | Blue   | Yes      | SC/     | Yes             | Yes                 |           | Yes            |
| Vertebrate   | Mammal    | Gulo gulo luscus                         | Wolverine, luscus ssp.                    | Blue   | Yes      | SC/     | Yes             | Yes                 | Likely    | Yes            |
| Vertebrate   | Mammal    | Myotis keenii                            | Keen's Myotis                             | Blue   | Yes      | DD/SC   | Yes             | Yes                 | V. Likely | Yes            |
| Vertebrate   | Mammal    | Myotis lucifugus                         | Little Brown Myotis                       | Yellow |          | E/E     | Yes             | Yes                 | Yes       | Yes            |
| Vertebrate   | Mammal    | Oreamnos americanus                      | Mountain Goat                             | Blue   |          |         | Yes             | Yes                 | Likely    | Yes            |
| Vertebrate   | Mammal    | Ursus arctos                             | Grizzly Bear                              | Blue   | Yes      | SC/     | Yes             | Yes                 | Yes       | Yes            |
| Lichen       | Lichen    | Ahtiana sphaerosporella                  | mountain candlewax                        | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Alectoria imshaugii                      | spiny witch's hair                        | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Allantoparmelia almquistii               | lesser rock grub                          | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Arctoparmelia incurva                    | finger ring                               | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Cladonia singularis                      | wax candle pixie                          | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Fuscopannaria leucostictoides            | frosted crackers                          | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Hypogymnia canadensis                    | canuckle bone                             | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Hypogymnia recurva                       | recoiling bone                            | Red    |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Leptogium intermedium                    | forty-five vinyl                          | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Letharia columbiana                      | brown-eyed wolf                           | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Lobaria oregana                          | lettuce lung                              | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Nodobryoria subdivergens                 | alpine redhead                            | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Physcia dubia                            | grinning rosette                          | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Pseudocyphellaria anthraspis             | reticulate specklebelly                   | Blue   |          |         | Yes             | Yes                 |           | Yes            |
| Lichen       | Lichen    | Stereocaulon glareosum                   | alpine soil foam                          | Blue   |          |         | Yes             | Yes                 |           | Yes            |

 TABLE 4.5a (cont.): Confirmed species at risk in the RMOW. Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient), Int. (Intermittent, i.e., not every year), Forage (confirmed foraging but not breeding), Seas. (resident only part of the year); Mig. (migrates through). The denning/nesting data applies only to wide-ranging species (large mammals, bats, and birds).

|                |           |   |                                | вс   | BC ID    | COSEWIC | Conf. in | Impt.<br>Habitat in | Den /<br>nest in | Resident<br>in |
|----------------|-----------|---|--------------------------------|------|----------|---------|----------|---------------------|------------------|----------------|
| Group 1        | Group 2   | Species                                     | Common Name                    | List | Wildlife | / SARA  | RMOW?    | RMOW?               | RMOW?            | RMOW?          |
| Lichon         | Lichen    | Umbilicaria krasshaninnikovij               | losser calted resktring        | Blue |          |         | Voc      | Voc                 |                  | Voc            |
| Lichen         | Lichen    |   | lesser sailed focktripe        | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Lichen         | Lichen    | Umbilicaria lambil<br>Mahlialla anlifamian  | windward rocktripe             | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Lichen         | Lichen    | Vanileila californica                       | sun snaps                      | Rea  |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Haplomitrium nookeri                        | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Nardia breidleri                            | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Nardia compressa                            | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Nardia geoscyphus                           | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Scapania curta                              | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Scapania obscura                            | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Scapania scandica var. scandica or dimorpha | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Liverwort | Tritomaria polita ssp. polita               | liverwort                      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Brachydontium olympicum                     | Olympic brachydontium moss     | Red  |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Brachythecium holzingeri                    | Holzinger's brachythecium moss | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Bryum alpinum                               | alpine thread-moss             | Red  |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Bryum pallescens                            | tall-clustered thread-moss     | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Grimmia caespiticia                         | grimmia moss                   | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Grimmia donniana                            | Donn's grimmia                 | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Grimmia incurva                             | black grimmia                  | Red  |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Homalothecium nevadense                     | Nevada homalothecium moss      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Hygrohypnum alpinum                         | alpine hygrohypnum moss        | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Orthotrichum pylaisii                       | Pylais' orthotrichum moss      | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Pohlia cardotii                             | Cardot's pohlia moss           | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Pseudoleskea radicosa var. pallida          | pseudoleskea moss              | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Racomitrium pygmaeum                        | pygmy racomitrium moss         | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Schistidium crassipilum                     | thickpoint grimmia             | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Nonvasc. Plant | Moss      | Tripterocladium leucocladulum               | tripterocladium moss           | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Fern      | Cryptogramma cascadensis                    | Cascade parsley fern           | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Grass     | Muhlenbergia racemosa                       | satin grass                    | Red  |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Herb      | Draba stenopetala                           | star-flowered draba            | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Herb      | Pyrola elliptica                            | shinleaf wintergreen           | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Herb      | Utricularia ochroleuca                      | ochroleucous bladderwort       | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Moonwort  | Botrychium ascendens                        | upswept moonwort               | Blue |          |         | Yes      | Yes                 |                  | Yes            |
| Vascular Plant | Tree      | Pinus albicaulis                            | whitebark pine                 | Blue |          | E/E     | Yes      | Yes                 |                  | Yes            |
|                |           |   |                                |      |          |         |          |                     |                  |                |

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# TABLE 4.5b Species at risk that are Likely to be in the RMOW but not yet confirmed. Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient). The denning/nesting data applies only to wide-ranging species (large mammals, bats, and birds).

|                |           |                            |                          |         | BC ID    | COSEWIC | Conf. in    | Impt.<br>Habitat in | Den /<br>nest in | Resident in |
|----------------|-----------|----------------------------|--------------------------|---------|----------|---------|-------------|---------------------|------------------|-------------|
| Group 1        | Group 2   | Species                    | Common Name              | BC List | Wildlife | / SARA  | RMOW?       | RMOW?               | RMOW?            | RMOW?       |
| Invertebrate   | Gastropod | Pristiloma arcticum        | Northern Tightcoil       | Blue    |          |         | Likely/Yes? | Likely/Yes?         |                  | Likely      |
| Lichen         | Lichen    | Leptogium californicum     | midlife vinyl            | Blue    |          |         | No          | Likely              |                  | Likely      |
| Lichen         | Lichen    | Peltigera gowardii         | northwest waterfan       | Red     |          | SC/     | No          | Likely              |                  | Likely      |
| Lichen         | Lichen    | Psoroma tenue var. boreale | tundra tarts             | Red     |          |         | No          | Likely              |                  | Likely      |
| Nonvasc. Plant | Liverwort | Jungermannia atrovirens    | liverwort                | Blue    |          |         | No          | Likely              |                  | Likely      |
| Nonvasc. Plant | Liverwort | Marchantia alpestris       | liverwort                | Blue    |          |         | No          | Likely              |                  | Likely      |
| Nonvasc. Plant | Moss      | Bryum schleicheri          | Schleicher's thread-moss | Blue    |          |         | Tent. ID    | Likely              |                  | Likely      |
| Nonvasc. Plant | Moss      | Racomitrium affine?        | lesser fringe-moss       | Blue    |          |         | Tent. ID    | Likely              |                  | Likely      |
| Nonvasc. Plant | Moss      | Tortula leucostoma         | desmatodon moss          | Blue    |          |         | No          | Likely              |                  | Likely      |

# TABLE 4.5c: Species at risk that are Possible in the RMOW but not yet documented. Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient). The denning/nesting data applies only to wide-ranging species (large mammals, bats, and birds).

|                |           |                                       |                                     |         | BC ID    | COSEWIC | Conf. in    | Habitat in | nest in  | Resident in   |
|----------------|-----------|---------------------------------------|-------------------------------------|---------|----------|---------|-------------|------------|----------|---------------|
| Group 1        | Group 2   | Species                               | Common Name                         | BC List | Wildlife | / SARA  | RMOW?       | RMOW?      | RMOW?    | RMOW?         |
| Invertebrate   | Bee       | Bombus occidentalis ssp. occidentalis | Western Bumble Bee                  | Blue    |          | т/      | No          | Possible   |          | Possible      |
| Invertebrate   | Bivalve   | Sphaerium striatinum                  | Striated Fingernailclam             | Blue    |          |         | No          | Possible   |          | Possible (DD) |
| Invertebrate   | Butterfly | Parnassius clodius ssp. claudianus    | Clodius Parnassian, claudianus ssp. | Blue    |          |         | Possible ID | Possible   |          | Possible      |
| Invertebrate   | Gastropod | Physella propinqua                    | Rocky Mountain Physa                | Blue    |          |         | No          | Possible   |          | Possible (DD) |
| Invertebrate   | Gastropod | Physella virginea                     | Sunset Physa                        | Blue    |          |         | No          | Possible   |          | Possible (DD) |
| Vertebrate     | Mammal    | Cervus elaphus roosevelti             | Roosevelt Elk                       | Blue    |          |         | Yes         | Possible   | Possible | Possible      |
| Vertebrate     | Mammal    | Corynorhinus townsendii               | Townsend's Big-eared Bat            | Blue    |          |         | No          | Possible   | Possible | Possible      |
| Vertebrate     | Mammal    | Pekania pennanti                      | Fisher                              | Blue    | Yes      |         | Historic    | Possible   | Possible | Possible      |
| Lichen         | Lichen    | Leptogium polycarpum                  | peacock vinyl                       | Red     |          | SC/     | No          | Possible   |          | Possible      |
| Lichen         | Lichen    | Stereocaulon symphycheilum            | two-toned foam                      | Red     |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Liverwort | Frullania hattoriana                  | liverwort                           | Blue    |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Andreaea heinemannii                  | Heinemann's andreaea moss           | Red     |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Atrichum tenellum                     | slender smoothcap moss              | Red     |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Bryum calobryoides                    | bryum moss                          | Red     |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Grimmia anomala                       | grimmia dry rock moss               | Blue    |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Pseudoleskea incurvata var. tenuetis  | brown leskea moss                   | Red     |          |         | Possible ID | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Pohlia andalusica                     | Roth's thread-moss                  | Red     |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Pohlia tundrae                        | tundra pohlia moss                  | Red     |          |         | No          | Possible   |          | Possible      |
| Nonvasc. Plant | Moss      | Trematodon asanoi                     | Boas' long-necked moss              | Blue    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Herb      | Cicuta maculata var. maculata         | spotted cowbane                     | Red?    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Herb      | Erythranthe [=Mimulus] breweri        | Brewer's monkey-flower              | Blue    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Herb      | Stellaria obtusa                      | blunt-sepaled starwort              | Blue    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Moonwort  | Botrychium crenulatum                 | dainty moonwort                     | Blue    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Moonwort  | Botrychium simplex var. compositum    | least moonwort                      | Blue    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Moonwort  | Botrychium spathulatum                | spoon-shaped moonwort               | Blue    |          |         | No          | Possible   |          | Possible      |
| Vascular Plant | Sedge     | Carex praeceptorum                    | teacher's sedge                     | Red     |          |         | No          | Possible   |          | Possible      |
|                |           |                                       |                                     |         |          |         |             |            |          |               |

\*The status of spotted cowbane is unclear in December 2016 since it does not appear on the CDC website yet is still a valid name (C. Bjork, pers. comm.). Variety *angustifolium* appears on the CDC as Yellow-listed (CDC 2016). The *maculata* variety was previously listed as Red and still appears as such on EFIora (Klinkenberg 2016b).

# TABLE 4.5d: Species at risk that are Unlikely in the RMOW. Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient). The denning/nesting data applies only to wide-ranging species (large mammals, bats, and birds).

|                 |                   |   |  |         |          |              |          | Habitat   | Den / nest  | Resident  |
|-----------------|-------------------|---|--|---------|----------|--------------|----------|-----------|-------------|-----------|
| C               | C                 | Canadian .                                  | Common Name                              | DC List | BCID     | COSEWIC      | Conf. in | in        | in          | in        |
| Invertebrate    | Group Z<br>Beetle | Species<br>Cicindela hirticollis            | Common Name<br>Hairy-necked Tiger Beetle | BULIST  | wiidlife | / SAKA       | No       | Linlikely | RIVIOW?     | Unlikely  |
| Invertebrate    | Dragonfly         |   | Vivid Dancer                             | Blue    |          | sc/          | No       | Unlikely  |             | Unlikely  |
| Invertebrate    | Dragonfly         | Argia viviau<br>Onhiogomnhus occidentis     | Sinuous Snaketail                        | Blue    |          | 507          | No       | Unlikely  |             | Unlikely  |
| Invertebrate    | Gastronod         | Galba bulimoides                            | Prairie Fossaria                         | Blue    |          |              | No       | Unlikely  |             | Unlikely  |
| Invertebrate    | Gastropod         | Galba dalli                                 | Dushy Fossaria                           | Blue    |          |              | No       | Unlikely  |             | Unlikely  |
| Invertebrate    | Gastropod         |   | Star Gyro                                | Blue    |          |              | No       | Unlikoly  |             | Unlikoly  |
| Vertebrate      | Bird              | Brachyramphus marmoratus                    | Marhled Murrelet                         | Blue    | Voc      | т/т          | No       | Unlikely  | Unlikely    | Unlikely  |
| Vertebrate      | Bird              | Europagus carolinus                         | Pusty Blackbird                          | Blue    | 163      | sc/sc        | No       | No        | V Unlikoly  | Unlikoly  |
| Vertebrate      | Bird              | Euphagus caronnas                           | Porogrino Falcon, anatum sen             | Pod     |          | sc/sc        | Voc      | Int       | V. Offikely | Unlikoly  |
| Vertebrate      | Bird              | Magascons konnisottii konnisottii           | Wastern Screech Owl kennisettii sch      | Blue    |          | JC/JC        | No       | No.       | Unlikely    | Unlikoly  |
| Vertebrate      | Bird              | Striv occidentalis (ssp. cauring)           | Spotted Owl                              | Pod     | Voc      | 1/3C<br>E/E  | Historic | Historic  | Unlikely    | Unlikely  |
| Vertebrate      | Eich              | Oncorbunchus clarkii clarkii                | Coastal Cutthroat Trout                  | Rluo    | 163      | L/L          | Historic | Uncortain | Officery    | Unlikely2 |
| Vertebrate      | Mammal            | Sorey bendirii                              | Dacific Water Shrow                      | Pod     | Voc      | E/E          | No       | Unlikoly  | Unlikoly    |           |
| Vertebrate      | Roptilo           | Charing bottop                              | Northern Bubber Boo                      | Vollow  | 163      | L/L<br>SC/SC | No       | Unlikoly  | Officery    | Unlikoly  |
| Vertebrate      | Reptile           | Coluber constrictor(con mormon)             | North American Pacer                     | Plue    | Voc      | 3C/3C        | NO       | Unlikely  |             | Unlikely  |
| Vertebrate      | Reptile           | Contig tonuic                               | Sharp tailed Spake                       | Bod     | 163      | Г/3C<br>E/E  | No       | No        |             | Unlikoly  |
| Lichon          | Lichon            | Regudosunhallaria rainiaransis              | ald growth spacklabally                  | Blue    |          | L/L<br>SC/SC | No       | Unlikoly  |             | Unlikoly  |
| Nonvoca Diant   | LICHEN            | Androace cinucca                            |  | Diue    |          | 30/30        | No       | Unlikely  |             | Unlikely  |
| Nonvasc. Plant  | Noss              | Anareaeu sinuosa                            | small-spored rock-moss                   | Reu     |          |              | NO       | Unlikely  |             | Unlikely  |
| Nonvasc. Plant  | Noss              | Atrichum juvisetum                          | nuoss<br>Reall's brotheralla             | Blue    |          | F/           | NO       | Unlikely  |             | Unlikely  |
| Norivasc. Plant | NIOSS             |   |  | Reu     |          | E/           | NO       | Unlikely  |             | Unlikely  |
| Nonvasc. Plant  | NIOSS             | Calificatium nationianum                    | calliciadium moss                        | Biue    |          |              | NO       | Unlikely  |             | Unlikely  |
| Nonvasc. Plant  | NOSS              | Polytrichastrum sexangulare var. vuicanicum | moss                                     | Rea     |          |              | NO       | Unlikely  |             | Unlikely  |
| Nonvasc. Plant  | Peat Moss         | Spnagnum contortum                          | twisted peat-moss                        | Biue    |          |              | NO       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Fern              | Dryopteris marginalis                       | marginal wood fern                       | кеа     |          |              | NO       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Allium amplectens                           | slimleat onion                           | Blue    |          |              | NO       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Allium geyeri var. tenerum                  | Geyer's onion                            | Blue    |          | 60/60        | No       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Bidens amplissima                           | Vancouver Island beggarticks             | Blue    |          | SC/SC        | NO       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Boechera paupercula                         | tiny suncress                            | Red     |          |              | No       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Castilleja rupicola                         | cliff paintbrush                         | Blue    |          | T/T          | No       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Claytonia washingtoniana                    | Washington springbeauty                  | Red     |          |              | No       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Herb              | Draba lactea                                | milky draba                              | Blue    |          |              | Tent. ID | Tent. ID  |             | Unlikely  |
| Vascular Plant  | Herb              | Gentianella tenella ssp. tenella            | slender gentian                          | Red     |          |              | No       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Sedge             | Carex hystericina                           | porcupine sedge                          | Blue    |          |              | No       | Unlikely  |             | Unlikely  |
| Vascular Plant  | Sedge             | Schoenoplectus americanus                   | American bulrush                         | Red     |          |              | No       | Unlikely  |             | Unlikely  |

## **TABLE 4.5e:** Species at risk that are Not Possible in the RMOW even though they may appear in CDC search results. Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient). The denning/nesting data applies only to wide-ranging species (large mammals, bats, and birds).

|                |           |                                     |   |         |          |         |          | Impt.      | Den / nest  | Resident |
|----------------|-----------|-------------------------------------|---|---------|----------|---------|----------|------------|-------------|----------|
|                |           |                                     |   |         | BC ID    | COSEWIC | Conf. in | Habitat in | in          | in       |
| Group 1        | Group 2   | Species                             | Common Name                               | BC List | Wildlife | / SARA  | RMOW?    | RMOW?      | RMOW?       | RMOW?    |
| Invertebrate   | Bivalve   | Ostrea conchaphila                  | Olympia Oyster                            | Blue    |          | SC/SC   | No       | No         |             | No       |
| Invertebrate   | Butterfly | Epargyreus clarus ssp. californicus | Silver-spotted Skipper, californicus ssp. | Red     |          |         | No       | No         |             | No       |
| Invertebrate   | Butterfly | Erynnis propertius                  | Propertius Duskywing                      | Red     |          |         | No       | No         |             | No       |
| Invertebrate   | Butterfly | Euphyes vestris (ssp. vestris)      | Dun Skipper                               | Red     |          | T/T     | No       | No         |             | No       |
| Invertebrate   | Gastropod | Haliotis kamtschatkana              | Northern Abalone                          | Red     |          | E/E     | No       | No         |             | No       |
| Vertebrate     | Bird      | Asio flammeus                       | Short-eared Owl                           | Blue    | Yes      | SC/SC   | No       | No         | V. Unlikely | No       |
| Vertebrate     | Bird      | Botaurus lentiginosus               | American bittern                          | Blue    |          |         | No       | No         | No          | No       |
| Vertebrate     | Bird      | Melanerpes lewis pop. 1             | Lewis's Woodpecker                        | Red     | Yes      | T/T     | No       | No         | No          | No       |
| Vertebrate     | Fish      | Acipenser medirostris               | Green Sturgeon                            | Red     |          | SC/SC   | No       | No         |             | No       |
| Vertebrate     | Fish      | Oncorhynchus kisutch                | Coho Salmon                               | Yellow  |          | т/      | No       | No         |             | No       |
| Vertebrate     | Fish      | Thaleichthys pacificus              | Eulachon                                  | Blue    |          | E/      | No       | No         |             | No       |
| Vascular Plant | Herb      | Oenothera pallida ssp. pallida      | pale evening-primrose                     | Red     |          |         | No       | No         |             | No       |
| Vascular Plant | Herb      | Sidalcea hendersonii                | Henderson's checker-mallow                | Blue    |          |         | No       | No         |             | No       |
|                |           |                                     |   |         |          |         |          |            |             |          |

**TABLE 4.5f:**Species that were included in Green et al. (2005) which are no longer considered at risk (that is, have been downlisted since 2005). This list also<br/>includes two others (Western Sulphur and nodding semaphore grass) that were species at risk when first documented by the Whistler Biodiversity<br/>Project (Brett 2015) but have since also been downlisted.

| <b>Group 1</b><br>Invertebrate | <b>Group 2</b><br>Butterfly | <b>Species</b><br>Colias occidentalis  | Common Name<br>Western Sulphur | BC List<br>Yellow | BC ID<br>Wildlife | COSEWIC<br>/ SARA | Conf. in<br>RMOW?<br>2012 | Impt.<br>Habitat in<br>RMOW? | Den /<br>nest in<br>RMOW? | Resident in<br>RMOW? |
|--------------------------------|-----------------------------|--|--------------------------------|-------------------|-------------------|-------------------|---------------------------|------------------------------|---------------------------|----------------------|
| Vertebrate                     | Fish                        | Salvelinus malma                       | Dolly Varden                   | Yellow            |                   |                   | Yes                       | Yes                          |                           | Yes                  |
| Vascular Plant                 | Sedge                       | Carex enanderi                         | Enander's sedge                | Yellow            |                   |                   | Likely                    | Likely                       |                           | Likely               |
| Vascular Plant                 | Hornwort                    | Ceratophyllum echinatum                | spring hornwort                | Yellow            |                   |                   | No                        | Possible                     |                           | Possible             |
| Vascular Plant                 | Fern                        | Cheilanthes gracillima                 | lace fern                      | Yellow            |                   |                   | No                        | Possible                     |                           | Possible             |
| Vascular Plant                 | Herb                        | Epilobium glaberrimum ssp. fastigiatum | smooth willowherb              | Yellow            |                   |                   | No                        | Possible                     |                           | Possible             |
| Vascular Plant                 | Rush                        | Juncus regelii                         | Regel's rush                   | Yellow            |                   |                   | No                        | Unlikely                     |                           | Unlikely             |
| Vascular Plant                 | Herb                        | Nothochelone nemorosa                  | woodland penstemon             | Yellow            |                   |                   | No                        | Possible                     |                           | Possible             |
| Vascular Plant                 | Grass                       | Pleuropogon refractus                  | nodding semaphore grass        | Yellow            |                   |                   | 2009                      | Yes                          |                           | Yes                  |

### 4.2 Comparison of Species at Risk in 2016 to Green et al. (2005)

The Green et al. (2005) report<sup>16</sup> provided the first step towards identifying which species at risk and which habitats are candidates for conservation consideration within the RMOW. The Green report selected 45 species for consideration and classed their potential for occurring in the RMOW as Unlikely, Low, Moderate, or High (Green et al. p. 11) and each plant species as Uncertain, Possible, or Probable (p. 7). The reports used different classifications for assessing the status of each species at risk, which are again different from terms used in this report (Table 4.6).

| TABLE 4.6: Comparison of classes used to assess the potential presence or presence in the RMOW in Leigh-Spencer (2004), |
|---|
| Green et al. (2005), and this report. If there is no equivalent class, "n/a" is entered below.                          |

|           |                             | Leigh-Spencer, Table 2;     |   |                         |
|-----------|-----------------------------|-----------------------------|---|-------------------------|
| Source    | Leigh-Spencer, p. 6         | Green et al. Table 5        | Green et al. p. 6                           | This Report (Table 4.1) |
| Focus     | Vertebrates                 | Vertebrates                 | Vascular Plants                             | All Species             |
| Criterion | Potential for species<br>RM | occurrence within the<br>OW | Probability of occurrence<br>in zonal units | Resident in RMOW?       |
|           | n/a                         | n/a                         | n/a   | Yes                     |
| Classes   | High Potential              | High                        | Probable                                    | Likely                  |
|           |                             | Moderate                    | Possiblo                                    | Possible                |
|           | Moderate Potential          | Low                         | POSSIBLE                                    | FOSSIBLE                |
|           |                             | Unlikely                    | n/a   | Unlikely                |
|           | No Potential                | n/a                         | n/a   | No/Not Possible         |
|           | n/a                         | n/a                         | Uncertain                                   | Uncertain               |

The 2004 and 2005 reports were often not able to confidently assess whether a species was present or likely in the RMOW: (a) mainly because accurate local data was not available; and also (b) because other sources of local data were not included within the scope of the report.<sup>17</sup> The 2005 report therefore relied on CDC data which included false positives (species which are highly unlikely or impossible to occur in the RMOW) and false negatives (species that occur in the RMOW but were not shown as such in the CDC database). Much more is known in 2016 and the rest of this section describes changes in the intervening years that are a result of greatly expanded local data as well as changes in Provincial (CDC) and Federal (COSEWIC) threat rankings.

### Changes in BC and Canadian Risk Assessments:

There have been many changes in threat assessments by both BC and Canadian Governments since 2005 as more data becomes available and/or the status (threat ranking) of individual species has changed. Almost half of the species in the 2005 report (22 of 45) have been re-assessed, 14 downlisted 6 uplisted, one downlisted in BC while uplisted by COSEWIC, and one no longer appears on the CDC website (Table 4.7). Nine species are no longer considered to be species at risk – they are now ranked as Yellow (Not At Risk). Six others have been downlisted from Red to Blue and three of these are very unlikely in Whistler (cliff paintbrush, Geyer's onion, and Vivid Dancer). Fisher has been downlisted to Blue and uplisted to Provincially Identified Wildlife. Its local status is uncertain since the last confirmed record was from 1956 (Brett 2007). Keen's Myotis has been downlisted to Blue and is likely to lose its full species status and instead become either a subspecies of Western Long-eared Myotis (*Myotis evotis*) or even be subsumed entirely within that species (C. Lausen, pers. comm.).

<sup>&</sup>lt;sup>16</sup> Leigh-Spencer's (2004) report on vertebrates provided background information that was incorporated into Green et al. (2005).

<sup>&</sup>lt;sup>17</sup> For example: Whistler Naturalists' bird checklists (Gotz 1996 and later publications); bird data included in Campbell et al. (1990a/b; 1997, 2001); and historic data from Ken Racey and Ian McTaggart plus specimens they contributed to the Cowan Tetrapod Collection at UBC and the Royal BC Museum.

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Marbled Murrelet has been downlisted to Blue and, though it is the only local species to have Critical Habitat designated under SARA (Env. Canada 2014a), is unlikely in the RMOW (based on the criteria in that Recovery Strategy).

The uplistings are more important for conservation purposes except for the two species that are either non-resident (Lewis's Woodpecker) or very unlikely within Whistler (slender gentian). The other four are important local species. Band-tailed Pigeon is now listed under SARA as Special Concern. Bull Trout have been uplisted to Identified Wildlife (IDW) and COSEWIC Special Concern (SC). Mountain Goat was uplisted to Blue. Northern Goshawk is now Red-listed by the CDC and designated as Threatened under SARA.

**TABLE 4.7:** Status changes since 2005 for species listed in Green et al. (2005). Abbreviations: IDW = Provincially Identified Wildlife; SC = COSEWIC Special Concern. Also see Table 4-4f.

| Group       | Species                                  | Common Name                   | Resident in RMOW | Status change since Green et al. 2005   |
|-------------|--|-------------------------------|------------------|---|
| Butterfly   | Argia vivida                             | Vivid Dancer                  | Unlikely         | Downlisted to Blue; uplisted to SC      |
| Butterfly   | Colias occidentalis                      | Western Sulphur               | Likely           | Downlisted to Yellow                    |
| Bird        | Accipiter gentilis ssp. laingi           | Northern Goshawk, laingi ssp. | Yes              | Uplisted to Red, Threatened (ssp.)      |
| Bird        | Brachyramphus marmoratus                 | Marbled Murrelet              | Unlikely         | Downlisted to Blue                      |
| Bird        | Melanerpes lewis pop. 1                  | Lewis's Woodpecker            | No               | Uplisted to Red                         |
| Bird        | Patagioenas fasciata                     | Band-tailed Pigeon            | Yes              | Upliisted to SC (2008)                  |
| Fish        | Salvelinus confluentus - coastal lineage | Bull Trout - Coastal Lineage  | Yes              | Uplisted to ID wildlife                 |
| Fish        | Salvelinus malma                         | Dolly Varden                  | Yes              | Downlisted to Yellow                    |
| Mammal      | Myotis keenii                            | Keen's Myotis                 | Yes              | Downlisted to Blue                      |
| Mammal      | Oreamnos americanus                      | Mountain Goat                 | Yes              | Uplisted to Blue                        |
| Mammal      | Pekania pennanti                         | Fisher                        | Possible         | Downlisted to Blue, uplisted to IDW     |
| Vasc. Plant | Allium geyeri var. tenerum               | Geyer's onion                 | Unlikely         | Downlisted to Blue                      |
| Vasc. Plant | Carex enanderi                           | Enander's sedge               | Likely           | Downlisted to Yellow; taxonomic change  |
| Vasc. Plant | Castilleja rupicola                      | cliff paintbrush              | Unlikely         | Downlisted to Blue                      |
| Vasc. Plant | Ceratophyllum echinatum                  | spring hornwort               | Possible         | Downlisted to Yellow                    |
| Vasc. Plant | Cheilanthes gracillima                   | lace fern                     | Possible         | Downlisted to Yellow                    |
| Vasc. Plant | Cicuta maculata var. maculata            | spotted cowbane               | Possible         | No longer in CDC database <sup>18</sup> |
| Vasc. Plant | Epilobium glaberrimum ssp. fastigiatum   | smooth willowherb             | Possible         | Downlisted to Yellow                    |
| Vasc. Plant | Gentianella tenella ssp. tenella         | slender gentian               | Unlikely         | Uplisted to Red                         |
| Vasc. Plant | Juncus regelii                           | Regel's rush                  | Unlikely         | Downlisted to Yellow                    |
| Vasc. Plant | Nothochelone nemorosa                    | woodland penstemon            | Possible         | Downlisted to Yellow                    |
| Vasc. Plant | Pleuropogon refractus                    | nodding semaphore grass       | Yes              | Downlisted to Yellow                    |

### Species Added Since 2005:

An additional 75 species are considered in this report that the CDC and/or COSEWIC have designated at-risk since 2005. The majority of these are taxa that have been assessed since 2005 and are mainly comprised of mosses (32 species), liverworts (11 species), and lichens (24 species). Twenty-five of these species appear in this report because they are listed as Confident or Certain in the Squamish Forest District by the CDC but have yet to be confirmed in the RMOW. The other 40 appear because they have been confirmed in the RMOW by the Whistler Biodiversity Project (and may or may not be listed by the CDC in the Squamish Forest District).

Two species common in the RMOW have been newly listed since 2005 because of mortality caused by exotic fungi. The future of whitebark pine (*Pinus albicaulis*) is threatened by white pine blister rust (*Cronartium ribicola*) which is why COSEWIC (in 2010) and SARA (in 2012) designated it as Endangered. The CDC followed with a Blue listing in 2013. Although Little Brown Myotis (*Myotis lucifugus*) is Canada's most common bat, its future is highly uncertain due to overwintering deaths caused by White nose Syndrome (*Pseudogymnoascus destructans*). The situation is so severe in eastern North America that COSEWIC (in 2013) and SARA (in 2014) designated the species Endangered. The fungus is expected to expand westward but, to date, the closest occurrence to BC was a single infected bat found in Seattle in 2016.<sup>19</sup> The CDC does not currently list Little Brown Myotis but that will almost certainly change if and when infected bats are found in BC.

 <sup>&</sup>lt;sup>18</sup> Cicuta maculata var. angustifolium is the only variety currently on the CDC site. It is Yellow-listed (Not At Risk).
 <sup>19</sup> <u>http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-health/wildlife-diseases/white-nose-syndrome; and http://www.cbc.ca/news/canada/british-columbia/white-nose-bats-b-c-1.3569289
</u>

### Species and Ecosystems at Risk in the Resort Municipality of Whistler

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Ten animals including Little Brown Myotis were uplisted to species at risk status since 2005 (Table 4.8). Roosevelt Elk were introduced to the Upper Squamish Valley and so far is not resident in the RMOW – only bull elks have been sighted to date (S. Rochetta, pers. comm.). Western Toads were not included in Green et al. (2005) because at that time they were not yet Blue-listed by the CDC and were just emerging as a species of local concern (Horan 2007).

| ABLE 4.8: Animal species included in this report that were not included by Green et al. (2005). Abbreviations: IDW | = |
|--|---|
| rovincially Identified Wildlife; SC = COSEWIC Special Concern. Also see Table 4-4f.                                |   |

| <u>Group</u> | <u>Species</u>                        | Common Name                           | Resident? | Status change since 2005      |
|--------------|---------------------------------------|---------------------------------------|-----------|-------------------------------|
| Bee          | Bombus occidentalis ssp. occidentalis | Western Bumble Bee                    | Likely    | Uplisted to Blue, Threatened. |
| Butterfly    | Parnassius clodius ssp. claudianus    | Clodius Parnassian, claudianus ssp.   | Possible  | Uplisted to Blue              |
| Butterfly    | Callophrys eryphon ssp. sheltonensis  | Western Pine Elfin, sheltonensis ssp. | Yes       | Uplisted to Blue, Threatened  |
| Amphibian    | Anaxyrus boreas                       | Western Toad                          | Yes       | Uplisted to Blue              |
| Bird         | Hirundo rustica                       | Barn Swallow                          | Yes       | Uplisted to Blue, Threatened  |
| Bird         | Cypseloides niger                     | Black Swift                           | Foraging  | Uplisted to Blue, Endangered  |
| Bird         | Chordeiles minor                      | Common Nighthawk                      | Yes       | Uplisted to Threatened        |
| Bird         | Contopus cooperi                      | Olive-sided Flycatcher                | Yes       | Uplisted to Blue, Threatened  |
| Mammal       | Myotis lucifugus                      | Little Brown Myotis                   | Yes       | Uplisted to Endangered        |
| Mammal       | Cervus elaphus roosevelti             | Roosevelt Elk                         | Possible  | Uplisted to Blue, Endangered  |

All four birds uplisted since 2005 in Table 4.8 had been confirmed as local residents before that date (Gotz et al. 1996). The two new butterflies were confirmed in the RMOW after 2005 (Brett 2015). One of them, Clodius Parnassian, is listed by the CDC as possible in the Squamish Forest District while Western Pine Elfin is not (CDC 2016). One final species whose status changed since 2005 is upswept moonwort (*Botrychium ascendens*). This vascular plant was Red-listed when first documented by the WBP in 2005 (A. and O. Ceska in Brett 2007) but has since been downlisted to Blue. It has not been found again since that single occurrence on Whistler Peak (Brett, unpubl. data)

### 4.3 Comparison of 2016 and 2005 Lists by Presence and Likelihood

There are 38 species that were included by Green et al. (2005) and/or whose status changed since that report (Table 4.9). The status and likelihood of only five of these species remained unchanged, four birds and one fish, all of which are currently ranked as Unlikely to be residents in the RMOW: Peregrine Falcon, Western Screech Owl, Short-eared Owl, Spotted Owl, and Cutthroat Trout. The likelihood of Cutthroat Trout may change however if two 2016 specimens caught in 21-Mile Creek turn out to be this species (Mason et al. in prep.)

The other 33 species either had status changes or a change in likelihood of being resident in the RMOW. The CDC downlisted six species and uplisted five others; the COSEWIC uplisted three species, and two species were newly listed as Identified Wildlife.

Due to data added since 2005, this report is able to confidently add two categories not included in Green et al.: (a) species Confirmed in the RMOW; and (b) species that are Not Possible in the RMOW (Figure 4.1). This information should help narrow and direct any future efforts to conserve species and their habitats.

### Confirmed Mammals

Grizzly Bears and Wolverines were not included in the 2005 report. Grizzly Bears are included as Likely in this report since they have been confirmed to use significant habitat in the RMOW (and probable breeding and/or denning). Wolverines are included due to anecdotal reports that suggest they use high elevation (and possibly low elevation) habitats in the Whistler area more than previously thought. The status of wolverines in the RMOW is still uncertain.

Keen's Myotis were assessed in the 2005 report as a species with a moderate probability of occurring in the RMOW. Since then, the Whistler Biodiversity Project discovered records of two specimens of Keen's Myotis in the Cowan Tetrapod Collection that were collected in the 1940s (Brett 2007) but with limited geographical detail. Ken Racey's specimen is recorded as from Alpha Lake. Ian McTaggart-Cowan's specimen is recorded as from "Alta Lake" which was Whistler's previous name. The Whistler Biodiversity Project reconfirmed this species in the RMOW in 2010 (Isaac and Lausen).

### Confirmed Birds

There as pre-2005 documentation of local breeding for Band-tailed Pigeons and Green Herons (Campbell et al. 1990b; Gotz 1996). While there are no recent records of Green Herons breeding, this species is at least an intermittent summer resident and is likely to be found breeding in the area again (K. Ricker, pers. comm.). Northern Goshawk was listed in Green et al. (2005) as a "species of regional significance" in 2005. Since then, two subspecies of goshawk have been recognized and the local subspecies, *laingi*, has been Red-listed. An active nest was documented within the RMOW for the first time in 2016 (Brent Matsuda in Mason et al. in prep.).

### **Confirmed Amphibians**

Coastal Tailed Frogs and Northern Red-legged Frogs were listed as having a high probability in the RMOW but hadn't been confirmed in the RMOW in 2005. Green et al. notes records of Coastal Tailed Frogs from Brandywine Creek, outside of the RMOW and probably from studies predating the Independent Power Project there. The Whistler Biodiversity project first documented tailed frogs in the RMOW in late 2004 (in Alpha Creek; Brett 2007); and also confirmed presence in 12 other local creeks. Since then electrofishing by the RMOW has confirmed them in three other creeks. Green et al. (2005) note a historic record of Red-legged Frog from the River of Golden Dreams which is likely a misidentification by the original recorder. The Whistler Biodiversity Project first publicly documented Northern Red-legged Frogs in the RMOW in 2006 (Brett 2007) from the Brandywine area. Soon after we discovered that the BC Government had found but not published records of this species from as early as 2002 when surveys were conducted in advance of the expansion of Highway 99 (D. Knopp, pers. comm.). Other records since include the lower Callaghan Valley (L. Anthony, pers. comm.) and the north side of Callaghan Creek (J. Mullen; pers. comm.). The latter record is significant since it shows these frogs have crossed the largest natural east-west barrier south of Whistler Village.

### Confirmed Fish

The taxonomic status of Dolly Varden versus Bull Trout was unclear in 2005 so only the former (now downlisted to Yellow) was included in Green et al. (2005). Bull Trout has since been confirmed in the RMOW while the presence of Dolly Varden is disputed. As mentioned above, there is a chance that Coastal Cutthroat Trout (ranked as Unlikely both here and in Green et al.) may be present in 21-Mile Creek (Mason et al., in prep.). While the historic (and even present) status of Cutthroat Trout is disputed, it seems certain they were present at least through the early decades of Rainbow Trout stocking (e.g., E. Crowe pers. comm; Cascade 2015).

### Confirmed Non-residents

Another 12 species included in Green et al. (2005) can now be listed as Not Possible or Unlikely (Table 4.9). In the absence of conflicting evidence, these species need not be included in future conservation planning in the RMOW.

### **Changes in Likelihood Ratings**

Additional data since 2005 gives this list much more certainty in various ways, one of which is that seven vascular plants labelled as Uncertain by Green et al. have been assigned likelihood ratings from Unlikely to Possible. That is, there is enough local and regional information in 2016 to confidently rank their likelihood of occurring in the RMOW.

The likelihood ratings for many species remained the same (e.g., from equivalent ratings of Low to Unlikely). The ones that changed the most were for three mammals and three birds considered to have a Low or Moderate likelihood by Green et al. (2005) but which had already been documented in the RMOW before 2005 or which were documented since.

**TABLE 4.9**: Status changes since 2005 of species at risk included in Green et al. (2005). Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient), Int. (Intermittent, i.e., not every year), Seas. (resident part of the year). "Resident in RMOW" reflects current knowledge as of 2016.

| Common<br>Name   | Species      | BC List<br>2016 | BC ID<br>Wildlife | COSEWIC<br>/ SARA | Resident<br>in RMOW? | Green et<br>al. listing | Green et<br>al. prob. | Status change notes<br>since Green et al. 2005          | Notes on changes since Green et al. (2005;<br>which includes findings of Leigh-Spencer<br>2004).         |
|------------------|--------------|-----------------|-------------------|-------------------|----------------------|-------------------------|-----------------------|---|--|
| <b>Dragonfly</b> |              |                 |                   |                   |                      |                         |                       |   |  |
| Vivid Dancer     | Argia vivida | Blue            |                   | SC/               | V. Unlikely          | Red                     | Unlikely              | Downlisted to Blue<br>(2015); Uplisted to SC<br>(2015?) | This species is found at hot springs and is<br>therefore highly unlikely (or impossible) in the<br>RMOW. |

#### Amphibians

| Coastal Tailed | Ascaphus truei  | Blue | Yes | SC/SC | Yes | Blue, SC, | High      |                          | The Whistler Biodiversity Project confirmed     |
|----------------|-----------------|------|-----|-------|-----|-----------|-----------|--------------------------|---|
| Frog           |                 |      |     |       |     | IDW       |           |                          | Tailed Frogs sites in 12 creeks in the Whistler |
|                |                 |      |     |       |     |           |           |                          | area since late 2004. Electrofishing for the    |
|                |                 |      |     |       |     |           |           |                          | RMOW found tailed frogs in three creeks         |
|                |                 |      |     |       |     |           |           |                          | since.  |
| Northern Red-  | Rana aurora     | Blue | Yes | SC/SC | Yes | Blue, SC, | High      |                          | The first publicly documented site in the       |
| legged Frog    |                 |      |     |       |     | IDW       |           |                          | RMOW was confirmed by the WBP was in            |
|                |                 |      |     |       |     |           |           |                          | 2006 (Brett 2007). Green et al. report historic |
|                |                 |      |     |       |     |           |           |                          | sightings in the "River of Golden Dreams        |
|                |                 |      |     |       |     |           |           |                          | wetland" which are almost certainly             |
|                |                 |      |     |       |     |           |           |                          | erroneous.                                      |
| Western Toad   | Anaxyrus boreas | Blue |     | SC/SC | Yes | Not       | Not incl. | Uplisted to Blue (2010); | Although listed by COSEWIC as Special           |
|                |                 |      |     |       |     | included  |           | SARA SC (2005)           | Concern in 2002, this species was not Blue-     |
|                |                 |      |     |       |     |           |           |                          | listed in BC until 2010 (and therefore not      |
|                |                 |      |     |       |     |           |           |                          | included by Green et al.).                      |

#### <u>Birds</u>

| American<br>bittern   | Botaurus<br>Ientiginosus       | Blue |     |       | No          | Blue             | Low             |                              | This species is not listed as occurring in the<br>Squamish Forest District (CDC 2016) and is not<br>otherwise included in this report.  |
|-----------------------|--------------------------------|------|-----|-------|-------------|------------------|-----------------|------------------------------|---|
| Band-tailed<br>Pigeon | Patagioenas<br>fasciata        | Blue |     | SC/SC | Yes         | Blue             | Moderat<br>e    | Upliisted to SC (2008)       | Confirmation of this species in Whistler<br>occurred before 2005 (Campbell et al. 1990b;<br>Gotz 1996)  |
| Great Blue<br>Heron   | Ardea herodias ssp.<br>fannini | Blue | Yes | SC/SC | Yes (Seas.) | Blue, SC,<br>IDW | Moderat<br>e    |                              | Green et al. confirmed non-breeding presence<br>and moderate potential for occurrence<br>(presumably meaning breeding).   |
| Green Heron           | Butorides virescens            | Blue |     |       | Yes (Int.)  | Blue             | Low             |                              | Intermittent presence and breeding was<br>confirmed before 2005 (Campbell et al. 1990a;<br>Gotz et al. 1996).   |
| Lewis's<br>Woodpecker | Melanerpes lewis<br>pop. 1     | Red  | Yes | T/T   | No          | Blue             | Unlikely/<br>No | Uplisted to Red              | Leigh-Spencer (2004, p.6): "very low potential for occurrence."   |
| Marbled<br>Murrelet   | Brachyramphus<br>marmoratus    | Blue | Yes | т/т   | Unlikely    | Red, T, IWD      | Low             | Downlisted to Blue<br>(2010) | This is the only species in the RMOW with<br>SARA designated Critical Habitat, yet (a) none<br>have been documented in the RMOW; and (b)<br>the distance to seawater suggests a low<br>probability (Env. Canada 2014a). |

**TABLE 4.9** (cont.): Status changes since 2005 of species at risk included in Green et al. (2005). Key: E (Endangered), T (Threatened), SC (Special Concern), DD (Data Deficient), Mig. (migrates through).

| Common                        |  | PC List | PCID            | COSEWIC | Posidont   | Groop of              | Groop of        | Status change notes                          | Notes on changes since Green et al. (2005;   |
|-------------------------------|--|---------|-----------------|---------|------------|-----------------------|-----------------|--|--|
| Name                          | Species  | 2016    | Wildlife        | / SARA  | in RMOW?   | al listing            | al prob         | since Green et al 2005                       | 2004)  |
| Birds (cont.)                 | opecies  | 2010    | <b>Windline</b> | 70/10/  |            | un noting             | un probr        |  | 2004).   |
| Northern<br>Goshawk           | Accipiter gentilis ssp.<br>laingi              | Red     | Yes             | Т/Т     | Yes        | Reg'l<br>Significance | Moderat<br>e    | Uplisted to Red (ssp.;<br>2010?)             | Breeding confirmed by the Wedgemount<br>Creek IPP project in 2014 (?) and within<br>RMOW in 2016 (B. Matsuda in Mason et al. in<br>prep.). This is a very significant find given the<br>low number of active breeding sites in BC. |
| Peregrine<br>Falcon           | Falco peregrinus<br>anatum                     | Red     |                 | SC/SC   | Unlikely   | Red, SC               | Low             |  | No change.   |
| Short-eared<br>Owl            | Asio flammeus                                  | Blue    | Yes             | SC/SC   | No         | Blue                  | Unlikely/<br>No |  | No change.   |
| Spotted Owl                   | Strix occidentalis<br>[ssp. caurina]           | Red     | Yes             | E/E     | Unlikely   | Red, E, IWD           | Low             |  | No change.   |
| Surf Scoter                   | Melanitta<br>perspicillata                     | Blue    |                 |         | Yes (Mig.) | Blue                  | Low             |  | This species only breeds only in NE BC.  |
| Western<br>Screech-Owl        | Megascops<br>kennicottii kennicottii           | Blue    |                 | Т/Т     | Unlikely   | Blue, T/SC            | Low             |  | No change.   |
|                               |  |         |                 |         |            |                       |                 |  |  |
| <u>Fishes</u>                 |  |         |                 |         |            |                       |                 |  |  |
| Bull Trout                    | Salvelinus<br>confluentus - coastal<br>lineage | Blue    | Yes             | SC/     | Yes        | Blue                  | High            | Uplisted to ID wildlife<br>(2006); SC (2012) | DNA tests were ongoing to determine status of<br>Bull Trout and Dolly Varden and Bull Trout was<br>not yet confirmed in 2005.  |
| Coastal<br>Cutthroat<br>Trout | Oncorhynchus clarkii<br>clarkii                | Blue    |                 |         | Unlikely   | Blue                  | Low             |  | No change, though two fishes caught in 21-<br>Mile Creek (Mason et al., in prep.) were<br>tentatively identified as this species.  |
| Eulachon                      | Thaleichthys<br>pacificus                      | Blue    |                 | E/      | No         | Blue                  | Unlikely/<br>No |  | Maritime habitats only.  |

| TABLE 4.9 (cont.):  | Status changes sinc    | ce 2005 of s | pecies at ris | k included i | in Green et a | al. (2005 | 5). Key: E ( | Endangered)  | , T (Threa | atened), | SC (Spe | ecial ( | Conce | rn), DD |
|---------------------|------------------------|--------------|---------------|--------------|---------------|-----------|--------------|--------------|------------|----------|---------|---------|-------|---------|
| (Data Deficient), I | nt. (Intermittent, i.e | ., not every | year), Seas.  | (resident p  | part of the y | ear); Mi  | g. (migrat   | es through). |            |          |         |         |       |         |
|                     |                        |              |               |              |               | 1         |              |              |            |          |         |         | -     |         |

|                              |                            | <b>BC</b> List | BCID     | COSENNIC | Desident | Croon of         | Croop of     | Status shanga natas   | Notes on changes since Green et al. (2005;  |
|------------------------------|----------------------------|----------------|----------|----------|----------|------------------|--------------|---|---|
| Common Name                  | Species                    | 2016           | Wildlife | / SARA   | in RMOW? | al, listing      | al. prob.    | since Green et al. 2005   | 2004).  |
| Mammals                      | openeo                     |                |          | ,        |          |                  |              |   |   |
| Fisher                       | Pekania pennanti           | Blue           | Yes      |          | Possible | Red              | Low          | Downlisted to Blue<br>(2015); uplisted to ID<br>Wildlife (2006) | Fishers haven't been documented in the<br>RMOW since 1956 (two UBC specimens<br>reported in Brett 2015) and its current status<br>is unknown (S. Rochetta, pers. comm.).  |
| Grizzly Bear                 | Ursus arctos               | Blue           | Yes      | SC/      | Yes      | Blue, SC,<br>IDW | Low          |   | Deemed by Green et al. to have low potential<br>for occurrence and not recommended for<br>habitat management. Recent reports of<br>activity show habitat use in the RMOW<br>including breeding (S. Rochetta, pers. comm.).  |
| Keen's Myotis                | Myotis keenii              | Blue           | Yes      | DD/SC    | Yes      | Red, DD,<br>IWD  | Moderat<br>e | Downlisted to Blue<br>(2015)                                    | Two specimens of this bat from Whistler in the<br>early 1940s are housed at UBC (Brett 2007). It<br>was reconfirmed by the WBP in 2010. This bat<br>is likely to be demoted to a subspecies of the<br>unlisted <i>Myotis evotis</i> (C. Lausen, pers.<br>comm.).      |
| Mountain Goat                | Oreamnos<br>americanus     | Blue           |          |          | Yes      | None             | High         | Uplisted to Blue (2015)   | Not Blue-listed in 2005. Green et al. confirmed presence.   |
| Townsend's Big-<br>eared Bat | Corynorhinus<br>townsendii | Blue           |          |          | Possible | Blue             | Low          |   | While possible in Whistler (C. Lausen, unpubl.<br>data), the closest records are not near<br>Whistler.  |
| Wolverine, luscus<br>ssp.    | Gulo gulo luscus           | Blue           | Yes      | sc/      | Yes      | Blue, SC,<br>IDW | Low          |   | Deemed by Green et al. to have low potential<br>for occurrence and not recommended for<br>habitat management. Anectodotal reports<br>since suggest wolverines may use habitat in<br>the RMOW more than previously thought (S.<br>Rochetta and E. Crowe, pers. comm.). |

| TABLE 4.9 (cont.): Status changes since 2005 of species at risk included in Green et al. (2005). Key: E (Endangered), T (Threatened), SC (Special Concern | 'n). |
|---|------|
|---|------|

| Common Name                   | Species                               | BC List<br>2016 | BC ID<br>Wildlife | COSEWIC<br>/ SARA | Resident<br>in RMOW? | Green et<br>al. listing | Green et<br>al. prob. | Status change notes<br>since Green et al. 2005           | Notes on changes since Green et al. (2005;<br>which includes findings of Leigh-Spencer<br>2004).   |
|-------------------------------|---------------------------------------|-----------------|-------------------|-------------------|----------------------|-------------------------|-----------------------|--|--|
| Vascular Plants               |                                       |                 |                   |                   |                      |                         |                       |  |  |
| marginal wood<br>fern         | Dryopteris<br>marginalis              | Red             |                   |                   | Unlikely             | Red                     | Uncertai<br>n         |  | Not possible in the RMOW and may be<br>removed entirely from BC flora since previous<br>records may be of planted individuals (C. Bjork,<br>pers. comm.).                                      |
| blunt-sepaled<br>starwort     | Stellaria obtusa                      | Blue            |                   |                   | Possible             | Blue                    | Uncertai<br>n         |  | Curtis Bjork (pers. comm.) has encountered<br>this plant in BC surveys and considers it<br>possible in the RMOW.   |
| Brewer's<br>monkey-flower     | Erythranthe<br>[=Mimulus] breweri     | Blue            |                   |                   | Possible             | Blue                    | Uncertai<br>n         |  | Curtis Bjork (pers. comm.) has encountered<br>this plant in BC surveys and considers it<br>possible in the RMOW.   |
| cliff paintbrush              | Castilleja rupicola                   | Blue            |                   | т/т               | V. Unlikely          | Red                     | Probable              | Downlisted to Blue<br>(2008)                             | Very unlikely in Whistler based on current range (Env. Canada 2016a).  |
| Geyer's onion                 | Allium geyeri var.<br>tenerum         | Blue            |                   |                   | Unlikely             | Red                     | Possible              | Downlisted to Blue<br>(2015)                             | Though very unlikely in the RMOW due to its<br>affinity for warmer habitats, it is not<br>impossible since its range may have expanded<br>due to First Nations trade C. Bjork, pers.<br>comm.) |
| Henderson's<br>checker-mallow | Sidalcea<br>hendersonii               | Blue            |                   |                   | No                   | Blue                    | Possible              |  | The closest record of this species is from<br>Squamish, in estuarine habitat consistent with<br>other BC records. It is not possible here (C.<br>Bjork, pers. comm.).                          |
| pale evening-<br>primrose     | Oenothera pallida<br>ssp. pallida     | Red             |                   |                   | No                   | Blue                    | Uncertai<br>n         |  | Not possible in the RMOW (C. Bjork, pers. comm.).  |
| slender gentian               | Gentianella tenella<br>ssp. tenella   | Red             |                   |                   | Unlikely             | Blue                    | Uncertai<br>n         | Uplisted to Red (2015)                                   | Not likely in the RMOW (C. Bjork, pers. comm.).  |
| spotted cowbane               | Cicuta maculata<br>var. maculata      | Red/<br>Yellow? |                   |                   | Possible             | Red                     | Possible              | Delisted or missing -<br>doesn't appear on CDC<br>(2016) | Only <i>C. maculata</i> var. <i>angustifolia</i> (Yellow)<br>appears on CDC (2016). Klinkenberg still<br>includes var. <i>maculata</i> as Red.   |
| Washington springbeauty       | Claytonia<br>washingtoniana           | Red             |                   |                   | Unlikely             | Red                     | Uncertai<br>n         |  | Not likely in the RMOW (C. Bjork, pers. comm.).  |
| least moonwort                | Botrychium simplex<br>var. compositum | Blue            |                   |                   | Possible             | Blue                    | Possible              |  | No change.   |
| American<br>bulrush           | Schoenoplectus<br>americanus          | Red             |                   |                   | Unlikely             | Red                     | Possible              |  | Curtis Bjork (pers. comm.) thinks this species is very unlikely in the RMOW.   |
| porcupine sedge               | Carex hystericina                     | Blue            |                   |                   | Unlikely             | Blue                    | Uncertai<br>n         |  | Unlikely in the RMOW since it would have<br>already been recorded if here (C. Bjork, pers.<br>comm.)   |

## 5.0 Ecosystems At Risk

The CDC (2016) also assesses and ranks possible threats to "ecological communities," synonymous in this usage with "ecosystems." The term refers to distinctive plant communities (that is, with more or less the same species) that can occur in a variety of Biogeoclimatic (BGC) Zones and, based on regional climate, Site Series.

### Search Criteria

The narrowest search for ecosystems at risk on the BC Species and Ecosystems Explorer (CDC 2016) includes the following search terms (Table 5.1; Figure 5.1):

- 1. Search Type: Ecological Communities, and;
- 2. Squamish Forest District (DSQ), and;
- 3. BGC Unit (CMAun, CMAunp, CWHds1, CWHms1, MHmm2, and MHmmp).

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 5.1). 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 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).

TABLE 5.1: Full Biogeoclimatic (BGC) unit names that occur in the RMOW. Small patches of the Engelmann Spruce – Subalpine Fir (ESSF) Zone occur in the RMOW that are not included here.

| BGC Unit | BGC Class      | Full Description  |
|----------|----------------|---|
| 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                        |

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

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 are included here for three reasons:

- (i) There are arguably sites within the southern end of the RMOW that could be classed as CWHds1 (pers. obs.);
- (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 high percentage of Red-listed ecosystems.

Although some previous mapping 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, discontiguous 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 MHmmp2. 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.). One of the main sources for this future work includes a number of plots in the Whistler area (Brett et al. 2001).

| Advanced Search                 |  |     | Expand All   ⊟Collapse Al   | 1            |
|---------------------------------|--|-----|---|--------------|
| ∃ Area Based <sup>1</sup>       |  |     |   | $\checkmark$ |
| Biogeoclimatic Units            | Zone<br>BWBS - Boreal White and Black Spruce<br>CDF - Coastal Douglas-fir<br>CMA - Coastal Mountain-heather Alpine<br>CWH - Coastal Western Hemlock<br>ESSF - Engelmann Spruce - Subalpine Fir<br>ICH - Interior Cedar - Hemlock<br>IDF - Interior Douglas-fir<br>IIMA - Interior Mountain-heather Alpine<br>MH - Mountain Hemlock<br>MS - Montane Spruce                                  | •   | Zone, Subzone (Variant, Phase)<br>CWHws1 - Submontane Wet Submaritime<br>CWHws2 - Montane Wet Submaritime<br>CWHxm - Very Dry Maritime<br>CWHxm1 - Eastern Very Dry Maritime<br>CWHxm2 - Western Very Dry Maritime<br>MHmm1 - Moist Maritime<br>MHmm1 - Windward Moist Maritime<br>MHmm2 - Leeward Moist Maritime<br>MHmmp - Moist Maritime Parkland<br>MHun - Undifferentiated | •            |
| # Ecoregion<br>Classification   |  |     |   |              |
| Ministry of Environment Regions |  |     |   |              |
| ∃ Forest Districts              | North Coast Forest District (DNC)<br>North Island - Central Coast Forest District<br>Okanagan Shuswap Forest District (DOS)<br>Peace Forest District (DPC)<br>Prince George Forest District (DPG)<br>Quesnel Forest District (DQU)<br>Rocky Mountain Forest District (DRM)<br>Skeena Stikine Forest District (DSS)<br>South Island Forest District (DSI)<br>Squamish Forest District (DSQ) | (DI |   |              |
|                                 | DSS DIA<br>DMK<br>DSS DJA<br>DKM<br>DND<br>DVA<br>DND<br>DVA<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC<br>DC   |     | DPC<br>DPG<br>DCC<br>DMH<br>DCC<br>DMH<br>DCA<br>DCS<br>DOS<br>DAB<br>DKL<br>DRM  |              |
|                                 | DSI  | 3   |   |              |

**FIGURE 5.1**: Screenshot from the Species and Ecosystem Explorer (CDC 2016) showing some of the search terms used to narrow results for ecological communities that occur in the Squamish Forest District.

The results show eight Red-listed and 10 Blue-listed ecosystems (Table 5.2). Five of the Red-listed ecosystems are within the CWHds1 and therefore of more concern for parts of the Cheakamus Community Forest south of the RMOW (though closer examination may find some near the RMOW's southern boundary). These ecosystems include most of the forested ecosystems in the CWHds1.

| BGC Unit   | Common Name   | Scientific Name   | BC List |
|------------|---|---|---------|
| CWH/Ws51   | Sitka willow - Pacific willow / skunk cabbage                       | Salix sitchensis - Salix lasiandra var. lasiandra / Lysichiton americanus             | Red     |
| CWHds1/01  | western hemlock - Douglas-fir / electrified                         | Tsuga heterophylla - Pseudotsuga menziesii / Rhytidiadelphus                          | Red     |
|            | cat's-tail moss ds1   | triquetrus ds1  |         |
| CWHds1/02  | Douglas-fir - lodgepole pine / kinnikinnick Dry                     | Pseudotsuga menziesii - Pinus contorta / Arctostaphylos uva-ursi Dry                  | Red     |
|            | Submaritime   | Submaritime   |         |
| CWHds1/04  | Douglas-fir / Douglas maple / Hooker's<br>fairybells                | Pseudotsuga menziesii / Acer glabrum / Prosartes hookeri                              | Red     |
| CWHds1/06  | western hemlock / queen's cup                                       | Tsuga heterophylla / Clintonia uniflora   | Red     |
| CWHds1/08  | Sitka spruce / salmonberry Dry                                      | Picea sitchensis / Rubus spectabilis Dry  | Red     |
| CWHms1/07  | Sitka spruce / salmonberry Moist Submaritime                        | Picea sitchensis / Rubus spectabilis Moist Submaritime                                | Red     |
| CWHms1/09  | black cottonwood / Sitka willow -<br>thimbleberry                   | Populus trichocarpa / Salix sitchensis - Rubus parviflorus                            | Red     |
| CWHds1/03; | Douglas-fir - western hemlock / falsebox                            | Pseudotsuga menziesii - Tsuga heterophylla / Paxistima myrsinites                     | Blue    |
| CWHms1/03  |   |   |         |
| CWHds1/05  | western redcedar - Douglas-fir / vine maple                         | Thuja plicata - Pseudotsuga menziesii / Acer circinatum                               | Blue    |
| CWHds1/07  | western redcedar / devil's club                                     | Thuja plicata / Oplopanax horridus  | Blue    |
| CWHds1/09; | black cottonwood - red alder / salmonberry                          | Populus trichocarpa - Alnus rubra / Rubus spectabilis                                 | Blue    |
| CWHms1/08  |   |   |         |
| CWHds1/10  | black cottonwood / willows Dry Submaritime                          | Populus trichocarpa / Salix spp. Dry Submaritime                                      | Blue    |
| CWHds1/12; | western redcedar - Sitka spruce / skunk                             | Thuja plicata - Picea sitchensis / Lysichiton americanus                              | Blue    |
| CWHms1/11  | cabbage   | To a believe built a blieve and the full because and a deve                           | DI.     |
| CWHms1/01  | western nemiock - amabilis fir / step moss                          | i suga neterophylla - Ables amabilis / Hylocomium spiendens                           | Blue    |
| CWHms1/02  | Douglas-fir - lodgepole pine / kinnikinnick<br>Moist Submaritime    | Pseudotsuga menziesii - Pinus contorta / Arctostaphylos uva-ursi Moist<br>Submaritime | Blue    |
| CWHms1/04  | amabilis fir - western redcedar / oak fern                          | Abies amabilis - Thuja plicata / Gymnocarpium dryopteris                              | Blue    |
| CWHms1/06  | amabilis fir - western redcedar / devil's club<br>Moist Submaritime | Abies amabilis - Thuja plicata / Oplopanax horridus Moist Submaritime                 | Blue    |
| Excluded   |   |   |         |
| CWHds1     | dune wildrye - beach pea  | Levmus mollis ssp. mollis - Lathyrus japonicus*                                       | Red     |

| TABLE 5 2. Ecos | ustems at risk in the Whistl    | er area (CDC 2016 | · downloaded December      | 1 2016)   |
|-----------------|---------------------------------|-------------------|----------------------------|-----------|
| TADLE J.Z. LUUS | ysteins at hisk in the vvilisti | EI AIEA (CDC 2010 | , uuwilluaueu Decellibei ( | +, 2010). |

| CWHds1   | dune wildrye - beach pea               | Leymus mollis ssp. mollis - Lathyrus japonicus*    | Red |  |  |  |  |  |
|--|--|--|-----|--|--|--|--|--|
| CMA; MHmmp   | purple reedgrass Herbaceous Vegetation | Calamagrostis purpurascens Herbaceous Vegetation** | Red |  |  |  |  |  |
| The Lathyrus mollis community is not possible in RMOW these are seaside communities. |  |  |     |  |  |  |  |  |

\*\* The Calamagrostis purpurascens community is not possible in Whistler (Brett and Bjork 2016, and also based on the species composition described in Douglas and Bliss 1977).

All three of the Red-listed ecological communities at lower elevations in the RMOW (CWH Zone) are on wetter sites. The <u>Sitka willow - Pacific willow / skunk cabbage</u> (CWH/Ws51) are swamp communities that occur in shallow water in floodplain forests and wetlands (Mackenzie and Moran 2004). Although I could find no map references, it almost certainly occurs in Whistler based on the species composition described by MacKenzie and Moran (2004), species occurrences recorded by the WBP, and personal observations.

<u>Sitka spruce / salmonberry Moist Submaritime</u> ecosystems are found on high bench floodplains and <u>black cottonwood /</u> <u>Sitka willow – thimbleberry</u> ecosystems are found on low bench floodplains (Green and Klinka 1994). Both ecosystems are present in the Whistler valley bottom.

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 there has, historically, been less logging and other developments at these higher elevations. Now that higher elevations are being targetted more for logging, some ecosystems may become at risk. As mentioned above, high elevation 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 Bjork 2016).

## 6.0 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.<sup>20</sup> 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.<sup>21</sup> All plans, if published, are included under the species accounts below (Table 6.1). 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 Government (ibid.) 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 also publishes non-binding guidelines on a variety of local species (titled as Best Management Practices or Develop With Care.<sup>22</sup> These guidelines and the documents listed in Table 6.1 should be references for future conservation efforts in the RMOW.

<sup>&</sup>lt;sup>20</sup> The BC recovery planning process is best summarized in BC MOE (2016b).

<sup>&</sup>lt;sup>21</sup> <u>http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/recovery-planning/recovery-planning-documents/recovery-planning-documents</u>

<sup>&</sup>lt;sup>22</sup> <u>http://www.env.gov.bc.ca/wld/BMP/bmpintro.html#second</u>

| Common Name<br>(Scientific Name)                                  | Most recent approved planning document(s); on-line links   |
|---|--|
| Coastal Tailed Frog (Ascaphus<br>truei)                           | BC Management Plan (BC MOE 2015b): <u>Management plan for the Coastal Tailed Frog (Ascaphus truei)</u><br>in British Columbia (PDF, 1.4MB)   |
| Common Nighthawk<br>(Chordeiles minor)                            | Federal Recovery Strategy (Env. Canada 2016): <u>Recovery Stratagy for the Common Nighthawk</u><br>(Chordeiles minor) in Canada (PDF)  |
| Great Blue Heron (Ardea<br>herodias ssp. fannini)                 | Proposed Federal Management Plan (Environment Canada 2016c): <u>https://www.registrelep-</u><br>sararegistry.gc.ca/virtual_sara/files/plans/mp_great_blue_heron_fannini_e_proposed.pdf   |
| Grizzly Bear (Ursus arctos);<br>North Cascades pop. only          | North Cascades Grizzly Bear Recovery Team (2004):<br><a href="http://www.env.gov.bc.ca/wld/documents/recovery/ncgbrt_final.pdf">http://www.env.gov.bc.ca/wld/documents/recovery/ncgbrt_final.pdf</a>   |
| Little Brown Bat ( <i>Myotis</i><br><i>lucifugus</i> )            | Proposed Federal Recovery Strategy (Env. Canada 2015): <u>https://www.registrelep-</u><br><u>sararegistry.gc.ca/virtual_sara/files/plans/rs_LittleBrownMyotisNorthernMyotisTricoloredBat_e_prop</u><br><u>osed.pdf</u>   |
| Marbled Murrelet<br>(Brachyramphus marmoratus)                    | Federal Recovery Strategy (Env. Canada 2014a): <u>Recovery Strategy for the Marbled Murrelet</u><br>(Brachyramphus marmoratus) in Canada   |
|   | Developing a BC Implementation Plan (MFLNRO 2015b):<br>https://www.for.gov.bc.ca/ftp/rco/external/!publish/FMLT%20Publish/North%20Island%20Central%2<br>0Coast/February%2025%202016%20Meeting/MAMU%20Info%20Package_Dec%2017%202015.pdf  |
| Mountain Goat ( <i>Oreamnos</i><br><i>americanus</i> )            | BC Management Plan (Mountain Goat Management Team 2010): <u>Management Plan for the Mountain</u><br><u>Goat (Oreamnos americanus) in British Columbia (PDF)</u>  |
| Northern Goshawk, laingi ssp.<br>(Accipiter gentilis ssp. laingi) | Developing a BC Implementation Plan (MFLNRO 2015a):<br>https://www.for.gov.bc.ca/ftp/rco/external/!publish/FMLT%20Publish/North%20Island%20Central%2<br>0Coast/February%2025%202016%20Meeting/NOGO%20Info%20Package Dec%2017%202015.pdf  |
|   | BC Management Plan (BC MFLNRO 2013): <u>Management Plan for the Northern Goshawk, laingi</u><br><u>subspecies (Accipiter gentilis laingi) in British Columbia (PDF)</u>  |
|   | BC Recovery Strategy (BC MOE 2008): <u>Recovery Strategy for the Northern Goshawk, laingi subspecies</u><br>(Accipiter gentilis laingi) in British Columbia (PDF)  |
| Northern Red-legged Frog<br>( <i>Rana aurora</i> )                | BC Management Plan (BC MOE 2014b): <u>Management Plan for the Northern Red-legged Frog (Rana</u><br>aurora) in British Columbia (PDF, 1.3MB)   |
| Northern Spotted Owl (Strix occidentalis ssp. caurina)            | Federal Recovery Strategy (2006; In: Chutter et al. 2004):<br>http://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_spotted_owl_caurina_1006_e.pdf   |
| Northwest (Western)<br>Waterfan ( <i>Peltigera gowardii</i> )     | BC Management Plan (BC MOE 2015a):<br>http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10291   |
|   | Federal Status Assessment (COSEWIC 2013): <u>https://www.registrelep-</u><br>sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Western%20Waterfan_2013_e.pdf  |
| Olive-sided Flycatcher<br>(Contopus cooperi)                      | Proposed Federal Management Plan (Environment Canada 2016c): <u>http://www.registrelep-</u><br><u>sararegistry.gc.ca/virtual_sara/files/plans/rs_olive-sided%20flycatcher_e_final.pdf</u>  |
| Old-growth Specklebelly<br>(Pseudocyphellaria<br>rainierensis)    | Management plan for oldgrowth specklebelly ( <i>Pseudocyphellaria rainierensis</i> ) in British Columbia (BC MOE 2015c). <u>http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10231</u> .   |
| Pacific Water Shrew (Sorex<br>bendirii)                           | Federal Recovery Strategy (Environment Canada 2014): <u>http://www.registrelep-</u><br>sararegistry.gc.ca/virtual_sara/files/plans/rs_pacific_water_shrew_e_final.pdf  |
|   | BC Recovery Strategy (Pacific Water Shrew Recovery Team, 2009):<br>http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=6612   |
| Western Toad ( <i>Anaxyrus boreas</i> )                           | BC Management Plan (PWTWG 2014): <u>Management Plan for the Western Toad (Anaxyrus boreas) in</u><br><u>British Columbia (PDF, 1.3MB)</u><br>Proposed Federal Management Plant (Environment and Climate Change Canada 2016):<br><u>http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/mp-western-toad-e-proposed.pdf</u> . |

TABLE 6.1: Planning documents available from the BC or Canadian Government for species at risk in the RMOW.

## 7.0 Recommendations

Recommended next steps include the following:

- 1. Surveys to determine which habitats are important to local species at risk. These should include the use of seasonal, migratory, breeding (denning and nesting), overwintering, and critical summer habitats (for animals).
- 2. Targetted surveys for species ranked as Confirmed or Likely. These surveys would help clarify habitats (per above) but also provide better information about presence (or not) and abundance.
- 3. Species should be ranked by conservation priority (i.e., by threat, local significance, role as a keystone species, etc.), and local conservation strategies should be pursued.
- 4. Conservation guidelines such as Best Management Practices should be adopted or modified for local use.
- 5. Conservation options through municipal bylaws should be pursued.
- 6. Further work on ecosystems at risk is needed to: (a) map their locations, if not already available; and (b) prepare strategies to protect and, if necessary, restore them (i.e., a recovery plan).
- 7. This report and lists should be updated on a regular basis to incorporate new data and changes in Provincial and Federal threat rankings.

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Baines, Heather. Bird expert and co-author of the Whistler bird checklist, Whistler Naturalists, Whistler, BC. Personal communications by telephone and email.

Bjork, Curtis. Botanist and Lichenologist, Enlichened Consulting, Clearwater, BC. Personal communications in person. by phone, and by email.

Ceska, Adolf. Botanist and mycologist, Ceska Geobotanical Consulting, Victoria, BC and former botanist with the CDC. Personal communications by email and telephone.

Crowe, Eric. Angler, fish historian, and naturalist, Whistler, BC. Personal communications by email and telephone.

Forsyth, Robert. Malacologist (expert in snails, slugs, and other mollluscs) and author of Land snails of British Columbia (Forsyth 2004), Smithers, BC. Personal communications by email.

Green, Bob. Ecologist and Terrestrial Ecosystem Mapping specialist, BA Blackwell & Assoc., Vancouver, BC. Personal communication by email and telephone.

Guppy, Crispin. Lepidopterist (butterfly expert) and lead author of Butterflies of British Columbia (Guppy and Shepard 2001). Senior Biologist, Ecofor Consulting BC Ltd., Whitehorse, Yukon. Personal communications by email.

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Klinka, Karel. Emeritus Professor in Forest Ecology at the University of BC and co-author of many publications on Biogeoclimatic (BGC) Ecosystem Classification in BC (e.g., Green and Klinka 1994; Brett et al. 2001), Vancouver, BC. Personal communications between 1992 and 2002.

Knopp, Denis. Field biologist with numerous specialties including species at risk, Wild Heritage Environmental Consultants and Chilliwack Field Naturalists, Chilliwack, BC. Personal communications by email.

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Lee, Olivia. Bryologist (expert in mosses and liverworts), UBC Herbarium, Beatty Biodiversity Museum, Vancouver, BC. Many communications via email.

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Woodruff, Veronica. Fish specialist, naturalist, Project Manager, Ecofish Research Ltd., Pemberton, B.C. Personal communication by email.

## Appendix 1: Species and Ecosystems at Risk Definitions<sup>23</sup>

| Term   | Definition  |  |
|--|---|--|
| Federal Definitions <sup>8</sup> (COSEWIC and the Species At Risk Act [SARA] use same rankings.<br>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<br>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 <sup>9</sup>  |   |  |
| Endangered Species (legal list<br>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.<br>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<br>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.<br>Only 1 species is legally listed as threatened under the BC Wildlife Act: Sea Otter.  |  |
| Forest and Range Practices<br>Act (Identified Wildlife<br>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<br>Conservation Data Centre Red<br>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<br>Conservation Data Centre<br>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.  |  |

<sup>8</sup> Government of Canada Environment Canada. 2014. <a href="http://www.sararegistry.gc.ca/about/glossary/default\_e.cfm">http://www.sararegistry.gc.ca/about/glossary/default\_e.cfm</a>>

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

<sup>&</sup>lt;sup>23</sup> Bedore 2014, p. 8 and SCCP 2016, used with permission of the SCCP (P. Zevit, pers. comm.).

## Appendix 2: Scientists Who Contributed to the Whistler Biodiversity Project

The Whistler Biodiversity Project (WBP) could not have compiled the data in this report without the more than 270 local and non-local scientists and naturalists named below (as well as others inadvertently not included in the list). Most have volunteered their valuable time and expertise to the WBP and the Whistler Naturalists' events BioBlitz, and Fungus Among Us, 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.

Adam Brett Adolf Ceska Adriana Suarez-Gonzalez Adrien Baudouin Agnes Lynn Alex Burns Alexandra Gilliss Alicia Fontaine Amy Burns Andree Janyk Andy MacKinnon Angela Manweiler Angus MacKinnon Anita Wheatley Anna Bazzicalupo Anne Leathem Ariane Comeau Aynsley Thielmann Bardia Khaledi Barry Janyk Ben Hircock Betty Rebellato Bob Brett Breanne Johnson Brent Matsuda Brian Didier Brian Klinkenberg **Brook Moyers Brooke Fochuk** Brvce Kendrick Candace Rose-Taylor Cara Richard **Catherine Soper** Cathy Ivany Chris Byrd Chris Dale Chris Ratzlaff Christine Olsen Christopher Di Corrado **Christopher Stinson Claire Johnson** Claire Ruddy Clare O'Brien **Claudia Copley Colin Sanders** 

**Connor McGillion** Cori Lausen Curtis Bjork Dan Luoma Dan McDonald **Daniel Mosquin** Danny Miller Daren Romano Darren Copley **Daryl Thompson** Dave Cunnington. Dave Williamson David Aldcroft David Bell David Blades **David Cunnington** David Langor David Snair Davina Dube Dawn Hanna Dawn Johnson Denis Knopp Derrick Marven Don MacLaurin Doug Sinclair **Doug Skilton** Dylan Rawlyk Elke Wind Emma Harrower Emma Tavless Eric Crowe Erin Campbell Erin Edal Frin Edwards Frin Feldman Erin Rutherford Ethan Askey Felix Martinez Fleur Sweetman Fraser Willmott Genevieve Rowe Geoff Playfair George Clulow Greg Ferguson Greg Lee

Greg Michalenko Hamzeh Karim-Ramezani Hans Roemer Harriet Jarvis Heather Baines Heather Beresford Hitomi Kimura Hugh Daubeny Irmgard Carter Jaclyn Dee Jacqueline Shaben James Holkko James Miskelly Jamie Fenneman Jamie Michel Jeff Joy Jeff Shatford Jen Sibbald lenn Barrett Jennifer Chia Jeremy Gatten Jeremy Nilson Jeremy Winkler Jess Wagstaffe Jill Cooper Jim Cuthbert Jodie Krakowski Joe Kiegel John Swann Johnny Mikes Jonathan Goff Jordan Rosenfeld Jory Mullen Joyce Eberhart Joyce Lee Judith Harpel Judith Holm Julian Gan Julian Heavyside Julie Burrows Julie Sims Julie Wray Juliet Pendray Karen Needham Karl Ricker

Kate Brandon Kate Entwhistle Kathleen Stormont Kathy Jenkins Kathy McGillion Keith Browning Kem Luther Kent Anders Kent Brothers Kevin Bell Kevin Rosé Kevin Trim Kiran Pal-Ross **Kris Shoup** Kristen Harrison **Kristen Jones** Kristiina Ovaska Kristina Swerhun Larissa Tavlor Larry Evans Laura Dilley Leanne Elliott Leanne Gallon Leanne Williams Lee Larkin Leigh Anne Isaac Lennart Sopuck Leslie Anthony Lex Joseph Libby Avis Lindsav Coulter Lisa Neame Lisa Rockwell Liz Barrett Liz Snair Lois Joseph Ludovic Le Renard Luke Mikler Lynne Henderson Mallory Clarke Marcia Danielson Marian Daubeny Mary Lightle Mathew Bayly Max Gotz

**Meg Fellowes** Meg Loop Melanie Tardif Michael Thompson Michele Thomas Michelle Crowe Mike Boyd Mike Gravnic Mike Toochin Mitchel Martin Downie Morgan Black Murray Lashmar Nancy Lee Naomi Sands Nicola Brabyn Nicole Basaraba Nicole Harrison Olivia Lee Oluna Ceska Pablo Jost Pamela Zevit Patricia Thomson Patrick Lilly Patrick Mulligan Paul Higginson Paul Kroeger Peter Gaffney Purnima Govindarajulu Rebecca MacKay Rex Kenner **Rick Avis Riley Fleet** Rob Lyske Robb Bennett **Robert Forsyth** Roger Bean **Roland Treu** Rose Klinkenberg Roxy Tripp **Ruby Pennel** Ruth Joy Sam Cousins Sam Evans Samantha Woods Sara Jennings

Sarah Yontez Saskia Wolsak Sean Aldcroft Seth Rudman Shannon Berch Shannon Didier Shari Willmott Sharmin Gamiet Sharon Toochin Sorcha Masterson Stephanie Hurst Steve Joya Sue Maxwell Susan Hamersley Susan Leech Suzie Lavallee Tanva Luszcz Tara Schaufele Terry McIntosh Theresa Oswald Thom O'Dell Thor Henrich Tim Goater Tim Howay Timmy Joy Tina Symko Todd Bush Tom Plath Tracy Fleming Trevor Goward Tristan Galbraith **Trystan Willmott** Tyrel Pinnegar Valena Bradbury Vanessa Logie Veronica Woodruff Vesna Young Virginia Skilton Wendy Horan Will Gibson Zoey Slater Zuleika Pevec