Date: **October 1, 2105**
To: **Allison McDonald (SLRD) and Stewardship Pemberton Society**
From: **Bob Brett, M.Sc., Reg. Prof. Biologist**
Re: **Riverside Wetlands BioBlitz, 2014 & 2015**

The Riverside Wetlands Conservation Area was acquired by the Squamish-Lillooet Regional District (SLRD) in 2012. Little was known at that time about which plants, animals, and other species inhabited the site. The SLRD and Stewardship Pemberton Society helped address this knowledge gap through their support of two BioBlitz events in 2014 and 2015. This memo summarizes the results.

The two events were held on August 24, 2014 and June 28, 2015. Each event attracted approximately 70 scientists and naturalists to survey the Riverside Wetlands, Bathtub Trail and, to a lesser extent, the dry slope uphill. The 2014 BioBlitz was late in the growing season during a dry year. As a result, the wetland was mostly dry and most plants were no longer flowering. The earlier date of the 2015 BioBlitz was fortuitous. The original intent of the June date was to document species that appear early in the growing season. Due to the exceptional drought this spring, the growing season was accelerated and we were lucky to still find flowering plants and accompanying insects.

Overall Results
Species totals were similar for the two years, 379 species in 2014 and 353 species in 2015 (Table 1). There was relatively little overlap: 58% of 2015 species were not recorded in 2014.

		Total BioBlitz 2014	Total BioBlitz 2015	New BioBlitz 2015	Grand Total*	Intro-duced	Species at Risk
Vertebrates	Amphibians	3	2	1	7	0	1
77	Birds	38	28	16	55	1	2
	Fishes	0	0	0	0	0	0
	Mammals	8	3	1	9	0	0
	Reptiles	3	2	1	6	0	2
Invertebrates	Beetles	15	29	26	40	3	0
213	Butterflies	6	12	9	15	0	0
	Dragonflies & Damselflies	11	12	8	14	0	0
	Moths	8	25	24	31	0	0
	Snails, Slugs, & Clams	6	7	4	10	0	1
	Spiders	0	1	1	1	0	0
	Other Invertebrates	55	51	42	102	4	0
Plants	Native Vascular Plants	83	92	30	113	0	2
220	Introduced Vascular Plants	31	23	5	38	38	0
	Mosses & Liverworts	68	18	0	68	0	1
	Algae	0	1	1	1	0	0
Fungi and Lichens	Fungi	18	30	25	43	0	0
65	Lichen	25	16	8	20	0	0
	Slime Moulds	1	1	1	2	0	0
	TOTAL	**379**	**353**	**203**	**575**	**46**	**9**
			new (%)	**58%**		**8%**	

Table 1: Species summary list. Note that grand totals are lower than the addition of 2014 records plus new 2015 records due to varying levels of detail. Only the most detailed records of two or more is retained. For example, the 2014 record of "*Usnea* sp." was superseded by the 2015 record of "*Usnea filipendula*" (Herringbone Lichen).

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Species-at-Risk:
A total of 9 species-at-risk are now documented in the Riverside Wetlands area (Table 2). Western Toads, Sharp-tailed Snakes and Rubber Boas were documented prior to BioBlitz through the work of Leslie Anthony, Veronica Woodruff, and Stewardship Pemberton Society. Red-legged Frogs (*Rana aurora*, blue-listed) have also been recorded in the wetland but may have been Columbia Spotted Frog instead (see page 4 for more details). BioBlitz added first records for an additional 6 species-at-risk described below.

Grouping	Scientific Name	Common Name	Listing(s)[1]	Observer	1st Record	Notes
Amphibian	Anaxyrus boreas	Western Toad	Blue, SC	V.Woodruff, L.Anthony	non-BioBlitz	Main wetland
Amphibian	*Rana aurora*	Red-legged Frog	Blue, SC	V.Woodruff	<2014	ID is uncertain; see discussion on page 4.
Bird	Chordeiles minor	Common Nighthawk	Threatened	H.Baines	2014	Previously recorded elsewhere in Pemberton
Bird	Contopus cooperi	Olive-sided Flycatcher	Blue, T	H.Baines	2014	Previously recorded elsewhere in Pemberton
Moss	Tripterocladium leucocladulum	moss	Blue	O.Lee, S.Joya	2014	First Pemberton record
Reptile	Charina bottae	Rubber Boa	SC	B.Hircock, S.Hirst	<2015,2015	Previously recorded by Leslie Anthony
Reptile	Contia tenuis	Sharp-tailed Snake	Red, E	L.Anthony	non-BioBlitz	Dry slopes uphill
Snail	Monadenia fidelis	Pacific Sideband	Blue	B.Brett, R.Pennell	2014 & 2015	Large range extension.
Vascular Plant	Rupertia physodes	California-tea	Blue	R. Avis	2015	Large range extension.
Vascular Plant	Zosterella dubia	Water Star-grass	Blue	B.Moyers	2014	Need to confirm ID

Table 2: Summary of species-at-risk documented within the Riverside Wetlands area. Note: Red-legged Frog is confirmed elsewhere in the Pemberton Valley but its status in the Riverside Wetlands is uncertain (see page 4.)

Birds: Heather Baines documented two species in 2014, **Common Nighthawk** (unlisted in BC; Threatened COSEWIC) and **Olive-sided Flycatcher** (Blue in BC; Threatened COSEWIC). I do not know if anyone has documented nesting within the Riverside Wetlands area though it is likely (or at least possible).

Moss: Olivia Lee and Steve Joya from the Beatty Museum at UBC documented ***Tripterocladium leucocladulum*** (Blue in BC; unlisted by COSEWIC). This moss forms mats on rocks and occurs at low elevations in BC and beyond.

Snail: Pemberton's first record of **Pacific Sideband** was by Bob Brett and Ruby Pennell at BioBlitz 2014, and I recorded it again at BioBlitz 2015. These records represent a range extension northwest from Harrison Lake (it has not been recorded in Whistler). This snail is relatively easy to see and identify due to its unusually large size (Figure 1).

Figure 1: Pacific Sideband (Monadenia fidelis) on western redcedar. This specimen was approximately 30mm in diameter so at 100% viewing of this page the photo will be slightly larger than life-size. (Bob Brett photo.)

[1] BC species-at-risk include those on the Red (highest risk) and Blue (special concern) lists. Canada (COSEWIC) rankings included here, from higher to lower risk, are E (Endangered), T (Threatened), and SC (Special Concern). For more details, refer to: http://www.env.gov.bc.ca/atrisk/help/list.htm (BC) and http://www.cosewic.gc.ca/eng/sct0/assessment_process_e.cfm#sec3 (Canada).

Vascular plants: **Water Star-grass** was recorded in the main wetland by Brooke Moyers. While I don't doubt Brooke's skills, it would be good to reconfirm its presence and growing conditions. **California-tea** was a surprising discovery by Rick Avis who knows it from Vancouver Island (Figure 2). This record represents a large range extension (Figure 3).

Figure 2:. California-tea is a blue-listed herb in the pea family. This is Pemberton's first record. (Rick Avis photo.)

The adjacency of dry slope, wetland, and cottonwood forest ecosystems in the Riverside Wetlands area provides unusual habitat combinations in which additional rare species are likely to be found with future surveys. The discovery of Sharp-tailed Snakes (2011) and California-tea (2015) during BioBlitz events[2] highlights the ecological similarity between dry sites on the Gulf Islands/eastern Vancouver Island, where there are many rare species, and the Riverside Wetland complex. This similarity is reflected in the ecological classification of each: the former is classified in the Coastal Douglas-for Zone (CDF), and the dry slope above Riverside Wetland is within the Interior Douglas-fir Zone (IDF). The only known occurrences of both species previous to the Pemberton records were in or directly adjacent to the CDF, and the Pemberton records are a very large and disjunct range extension (Figure 3).

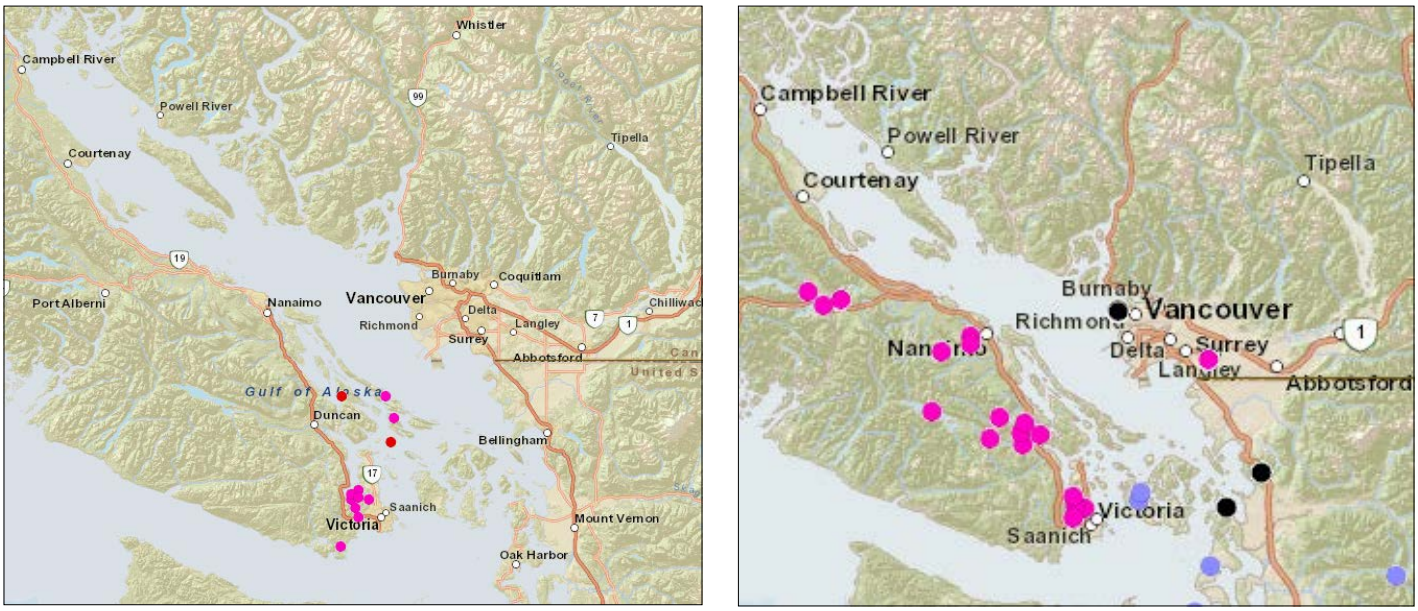

Figure 3: Locations recorded for Sharp-tailed Snakes (left) and California-tea (right) before Pemberton sightings. Pink circles represent sightings. Note there are no sightings recorded near Pemberton for either. Sources: Efauna: (http://ibis.geog.ubc.ca/biodiversity/efauna/) and Eflora (http://ibis.geog.ubc.ca/biodiversity/eflora/), respectively.

[2] The Sharp-tailed Snake was found by Leslie Anthony for the 2011 Whistler BioBlitz.

Introduced Species
The two BioBlitz events documented 46 introduced species (Table 1), most of which are plants associated with disturbed sites (e.g. the railway line) and agriculture. All of these species were already known to occur in the area, even if not documented formally. Of these, two are species that managers should consider removing.

Himalayan blackberry: There is a small (~5m^2) patch near the west end of the gravel road where it meets the riverside trail back to the railway (UTM: 514957 5575712). Blackberry is a priority species for removal by the Sea to Sky Invasive Species Council (SSISC). Manual removal with follow-up should eradicate this occurrence and prevent further spread.

Reed canarygrass: Although not currently a priority species for SSISC, reed canarygrass poses a potential risk to the wetland. BioBlitz scientists documented a patch covering ~50m^2 in the NW corner of the wetland (UTM: 514914 5575721) and there may be other patches. Reed canarygrass can displace native species and control and/or removal is difficult.

New Species of Frog?
Previous surveys by Veronica Woodruff, Leslie Anthony, and Stewardship Pemberton have documented Red-legged Frogs (*Rana aurora*) in the Pemberton Valley, including in the Riverside Wetlands. These records represent a large range extension for this blue-listed species (Figure 4). A frog found during the 2015 BioBlitz, however, spurred a reassessment of which frogs reside in Pemberton and specifically within the Riverside Wetlands area.

This additional species, found by Veronica Woodruff and others in the main wetland, was probably a Columbia Spotted Frog (*Rana luteiventris*). This frog is very similar to Red-legged Frog (*Rana aurora*) and is difficult to distinguish without careful examination of the animal in the hand, and ideally documented with photos. Veronica's sighting led to many emails and the identification is still not certain. (I photographed another likely record of Columbia Spotted Frog in the Pemberton Valley in 2008 which resulted in similar questions about whether it was instead a Red-legged Frog.)

Two conclusions can be drawn from these results: (i) they represent large range extensions for one and likely two species of frogs; and (ii) further surveys are necessary to clarify the situation. To further the confusion, Leslie Anthony (pers. comm.) thinks there may be hybridization between these related species, which may even include a species not currently documented in BC, Cascades Frog (*Rana cascadae*).

On a related note, credible scientists photographed a frog they tentatively identified as a Columbia Spotted Frog during the 2014 Whistler BioBlitz. The first Red-legged Frogs were not recorded in Whistler until 2003. The Whistler and Pemberton experiences are similar in that both show how much is yet to be learned about amphibians in our area. It is therefore no surprise that so little is known about less obvious species groups such as insects and lichens. Revealing some of this unknown diversity is one of the main benefits of BioBlitzes.

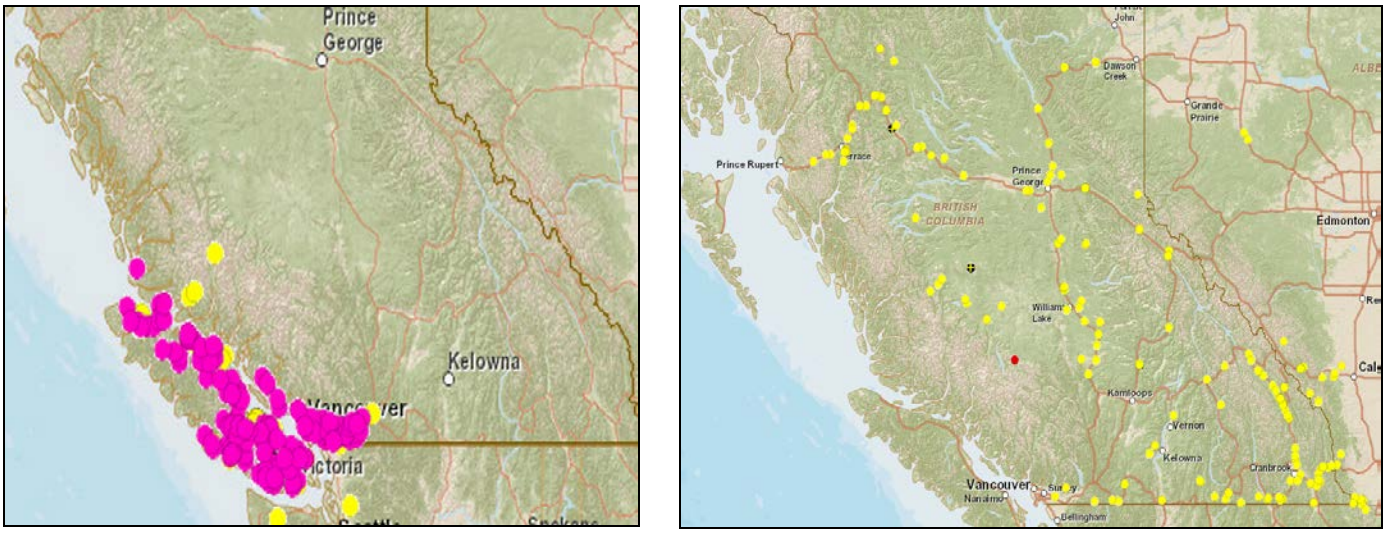

Figure 4: Locations recorded for Red-legged Frogs (left) and Columbia Spotted Frogs (right) before Pemberton sightings. Pink and yellow circles represent sightings. Note there are no sightings recorded near Pemberton for either. Source: Efauna: (http://ibis.geog.ubc.ca/biodiversity/efauna/).

Conclusions and Future Pemberton BioBlitz Opportunities

In only two partial days of BioBlitz, scientists documented 575 species, of which 6 are species-at-risk not previously known to occur in Pemberton. Having events at two different times in the growing season helped increase the diversity of species found, but the dry weather in 2015 limited the number of species found in groups such as fungus, snails, and slugs.

Further diversity could be documented with additional: (a) times of the year; (b) locations; (c) scientists representing different specialities; and (d) survey effort of any kind. We hope to have a large event next year to celebrate the 10th anniversary of the Whistler BioBlitz and scientists are very keen to have an expanded event in Pemberton. One attractive possibility would be an earlier event that included more of the dry, grassy areas uphill of the wetland.

2014 Photos:

Adolph and Oluna Ceska reveal their discoveries to fellow BioBlitz mycologists (fungus specialists). Bob Brett photo.

Lil'wat welcome ceremony before lunch at Hugh and Jan Naylor's property. James Hollko photo.

2015 Photos:

BioBlitz scientists chase a long-tailed salamander. Joern Rohde photo.

BioBlitz scientist wading in the Riverside Wetland. Joern Rohde photo.