

Hunterston Farm Stewardship Report:
A Review of the 2010 BioBlitz
and an Update on Initiatives Since August 2010

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What We Did

A survey of Hunterston Farm (HF) members suggested that members would like to achieve the following two goals:

1. To continue to support HF members' diverse stewardship of HF, which include farming and growing food, gathering wood for fire wood, using water for domestic and agricultural use, and nurturing/supporting the existing bio-eco-systems of land/water/coast.
2. To recommend strategic processes, based on available evidence, which will enable HF members to collectively make the best stewardship decisions.

We formed a stewardship committee of interested members, including both community members and interested scientific experts. The committee decided that a BioBlitz might be a suitable initial step in the process of HF achieving the above goals. A BioBlitz is a special type of field study, where a group of scientists and volunteers conduct an intensive 24-hour (or 48-hour) biological inventory, attempting to identify and record all species of living organisms in a given area. The success of a BioBlitz is dependent on having many volunteers, specific scientific experts to assist, and an overall coordinated plan. The committee held seven teleconference meetings in the Fall of 2009 and Spring of 2010 to plan the BioBlitz, which was held for 24 hours, from Saturday May 22nd AM to Sunday May 23rd AM, 2010.

The following experts volunteered to advise the HF BioBlitz process: Keith Erikson, Markku Kostamo, Mike Hoebel, Sherry Kirkvold, Ken Marr, Ken Summers, Rene Zick, Burl Jantzen, Bob Duncan, Allison Gratz, Sophie-Anne Blanchette, Stan Olson, Laura Parkinson and Jennifer Heron

We developed the following BioBlitz materials:

- a) *Invitational Flyer*
HF members distributed the invitation (Appendix A) to friends, family and community members of Hunterston Farm. We intended the BioBlitz to be a collaborative venue with experts working alongside volunteers, in order to facilitate skill building and community engagement .
- b) *Zone map of Hunterston Farm*
Daniel Martin, Keith Erikson and Markku Kostamo created a map of Hunterston Farm, which divided the property into nine distinct eco-systems (Appendix B). Every BioBlitz participant received a black and white copy (Appendix C) of the map.
- c) *Volunteer Orientation Material*
This orientation manual was a Microsoft Word document that provided volunteers with logistical information such as accommodation, travel, and meals. In addition, it provided community guidelines for respecting the property (walking on trails, leaving plants alone, etc). We hoped that every volunteer would gain increased knowledge, appreciation, and enthusiasm for the diversity of life on HF, and on the Gulf Islands.

We also hoped that every volunteer would enjoy learning from the scientists during the BioBlitz.

d) Checklist of Common Species

We provided this list to all participants, to assist them with the identification of the most common species suspected to be found on the farm (Appendix D).

e) Species Identification Form

BioBlitz participants used this form (Appendix E) to write down the species category of their sighting, the species name and the zone location of the item identified.

f) Seven Steps to Species Identification

We developed a 'how to' guide (Appendix F) for all participants that outlined the process of identifying and cataloguing species in seven easy steps. We created our own guide based on various Internet sources.

g) BioBlitz Schedule

The weekend of the BioBlitz was laid out in the following manner:

Saturday, May 22nd

9:00 Volunteer registration at the BioBlitz basecamp (Wilkinsons' deck)

10:00 BioBlitz begins

Opening remarks, introductions, and information including sign-up for
10:00 guided field walks

Beginning of guided field walks and independent observation (ran through
10:30 all of day)

12:30 Community BioBlitz lunch - hosted by the Kusters

18:00 Community BioBlitz supper - hosted by the Martins

21:00 Scheduled owl and moth observation

Sunday, May 23rd

5:30 Bird walk

7:00 Community BioBlitz breakfast - hosted by individual houses

10:00 BioBlitz ends

10:00 Closing remarks, data review, and thank you's

11:30 Community BioBlitz lunch - hosted by the Wilkinsons's

h) BioBlitz Organization

We decided to organize the BioBlitz around 4 teams of experts, with guided walks/events for participants, who could select according to their interest:

1. *Large and moving*
 - ❖ Mammals/Birds /Amphibians/Fish/Reptiles
2. *Small and moving*
 - ❖ Butterflies /Dragon/Damsel-flies/Gastropods /Other- invertebrates
3. *Not moving*
 - ❖ Plants-native/Plants-invasive/Bryophytes/Fungi/ Lichens
4. *Intertidal and seashore*
 - ❖ Algae & seaweed/Sea-shore/Inter-tidal/other

What We Found

1) Primary Outcomes

During the BioBlitz, the following higher category names were observed in the identified number. In total 396 different species were observed over 24 hrs, May 22rd - 23rd, 2010.

# Observed	Higher Category Name	# Observed	Higher Category Name
116	Wildflowers	4	Echinoderm
48	Bird	4	Fish
25	Mushroom	4	Unidentified Higher Category
24	Grass	3	Butterfly
14	Shrubs & Ground Cover	3	Hemiptera
12	Crustacean	3	Lichen
10	Algae	3	Reptile
10	Shrub	2	Fly
10	Tree	2	Homoptera
9	Beetle	2	Plant (Ocean)
9	Bivalve	2	Rush
9	Mollusk	2	Worm
8	Fern	1	Ant
8	Mammal	1	Arthropod
8	Mosses & Liverworts	1	Clubmoss
7	Hymenoptera	1	Ctenophora
7	Sedge	1	Dermaptera
6	Cnidarian	1	Gastropod
6	Moth	1	Mite
5	Crust Lichen		
4	Amphibian		

For a complete list, please see Appendix G. Of special note, the species observed during our BioBlitz include three species identified as blue listed species by the British Columbia (BC) Ministry of Environment. Blue listed species “include any ecological community, and indigenous species and subspecies considered to be of special concern (formerly vulnerable) in BC. Elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not Extirpated, Endangered or Threatened” (Ministry of Environment, 2011)¹. The northern red-legged frog, band-tailed pigeon, and double-crested cormorant are blue listed species and were each identified during our event.

2) Secondary Outcomes

In addition to the species observed, identified, and catalogued, the findings of this event also included the learning gained from group process and community engagement. Based on feedback from both scientific experts and community volunteers, the process of scientific expert coming along side novice learners was beneficial and rewarding for both parties. First, HF community members and friends of HF were able to gain increased knowledge related to observed species and an increased sense of connection with the creation around us as we live, work, and play in this natural environment. Second, engaged friends of HF, local community members of Galiano Island, and individuals with no previous connection to HF were able to witness and take part in the relational community life of HF. The 2010 BioBlitz offered an opportunity for us, as an intentional faith community, to demonstrate to friends, family, local Galiano-ites, and out-of-town scientific experts, what living in community looks like for HF. Finally, this initiative gave community members of HF an opportunity to build deeper relationships with members of the Galiano Island Conservancy and A Rocha Canada. Further, our BioBlitz event spurred curiosity of environmental land surveys in A Rocha Canada groups and an unknown group from New Zealand

¹ BC Ministry of Environment. (2011). *Endangered species and ecosystems: Provincial red and blue lists*. Retrieved from <http://www.env.gov.bc.ca/atrisk/red-blue.htm>

What We Recommend

- 1) The bluff ecosystem, along the edge of the cliff, with Garry Oak and other associated plant species is a high priority ecosystem and should have a *conservation plan*;
- 2) The riparian stream corridor, running through the property, is a high priority ecosystem, with associated plant species and amphibian species, and should have a *conservation plan*;
- 3) The forest ecosystem, because of its interface with humans, should have a *forest stewardship* plan in place, which addresses hazards (human usage) and enhancing biodiversity;
- 4) *Invasive species* should be managed at an ecosystem level:
 - a. Grasses (non-native)
 - b. English Ivy (*Hedera helix*)
 - c. Himalayan Blackberry
 - d. Vinca minor (Periwinkle)
 - e. Scotch Broom
 - f. Spurge laurel (*Daphne laureola*).

In developing of the above recommended conservation, stewardship, and management plans we recommend the following be included.

1. Learning to identify the non-native invaders and develop a removal plan including using recommended removal timing/practices to minimize disturbance and maximize effectiveness.
2. In terms of riparian stream management, consider planting conifers to prevent soil erosion, removing invasive species and restoring native vegetation, and giving high priority to least disturbed areas for protection and restoration.
3. Removing mud or soil from shoes before entering the forest and/or bluff areas, especially if previously walking through weeds or pastures. Prevention is easier than removal of invasive species, such as grass seeds.
4. Ongoing sentinel monitoring for sharp-tailed snakes, rare butterflies and other rare species along the bluff.
5. Developing a management plan for trails and trail locations. For example, consider that new trails increase ecosystem 'fragmentation' as well as invasive grass seeds attach to

clothing/fur as well as are embedded in soil stuck in treads of shoes/tires and then travel to bluff and forest areas.

6. Balancing hazards (eg. fire and falling trees involving forest, roads and houses) with enhancing biodiversity (eg. protecting 'wild life trees')
 - a. Attaching signs to designated 'wildlife trees' so they are not inadvertently removed for fire wood.
7. Consider fencing off several smaller areas to protect biodiversity from the sheep. For example,
 - a. areas with arbutus trees, where the soil is shallow and ground is rocky, such as up the hill towards Porlier Pass Road;
 - b. along the stream above Koster's house.

What We Have Done Since

1. We developed a *How to Tackle Invasive Species Guide*, which was given to every household on HF. The following species are included in this guide:
 - a. Swamp Grass (*Juncus Effusus*)
 - b. Laurel Spurge
 - c. English Ivy
 - d. Himalayan Blackberry
 - e. Periwinkle (*Vinca minor*)
 - f. Scotch Broom
2. We designated the April 2012 Easter weekend as forestry stewardship weekend. We walked through the HF property with Markku Kostamo and discussed forest stewardship principles and activities. Markku created a table (below) entitled, "*Top Ten Forest Stewardship Activities for Hunterston Farm*". As part of our work day, we then began to gather brush that has piled up over the last few years that make some parts of the forest at higher risk for forest fires.
3. We developed a *BioBlitz Database* (see Appendix G) of species that were identified in May 2010.
 - a. We are interested in members' suggestions and/or thoughts about creating a future web-based 'living database' that might become an evolving record of all species sighted at HF.
4. We developed a BioBlitz video, to be shown at the Annual General Meeting on October 20th, 2012.
5. When we were planning the BioBlitz, we found few available resources to guide our planning; therefore, we would like to share the materials and methods that we developed with others. We would like to develop a BioBlitz report, containing no HF identifiers, to share with the World Wide Web as a resource for other communities. Prior to dissemination, we would like to bring this report to the Spring HF shareholders' meeting for approval.

Top Ten Forest Stewardship Activities for Hunterston Farm			
Priority	Location	Activity	Description
1	All buildings	Fire Management	Develop a fire management plan and protocol. Acquire fire suppression tools. (We are in pretty good shape with fire hydrants and local volunteer fire department.)
2	All buildings	Fire Hazard Abatement	Prune and thin trees in and around buildings to mitigate wildfire risk.
3	Dense forest stands	Fire Hazard Abatement	Prune and thin high-risk stands. Clean up associated ground fuels/brush piles. Remove windfall to avoid the buildup of brush piles.
4	Close to buildings and roads	Danger Tree Removal	Assess and remove danger trees.
5	Sheep Access	Erosion Control	Fence and plant native shrubs and trees on eroding areas.
6	All of the property	Invasive Species Removal	On-going removal of invasive species in forested and other areas.
7	Dense forest stands	Gap Creation	Creating some openings in the forest for variety in habitat and decrease fire risk.
8	All forests	Wildlife Tree Designation	Designate trees as wildlife trees so that they don't get removed.
9	All accessible forests	Fire Wood	Mark trees that can be harvested for firewood. Prioritize diseased and deformed trees.
10	Beaver Felled Areas	Replant trees in beaver cut areas	Replant native trees in areas that have had trees felled by beavers.

Markku will develop a HF map with red/yellow/green zones identified for high, medium and low priority areas. Markku is writing 5-page HF *conservation & forest stewardship plan* with goals for Year 1, Year 2, Years 3-5, Years 5-10. Markku will provide a draft in early 2013 for discussion

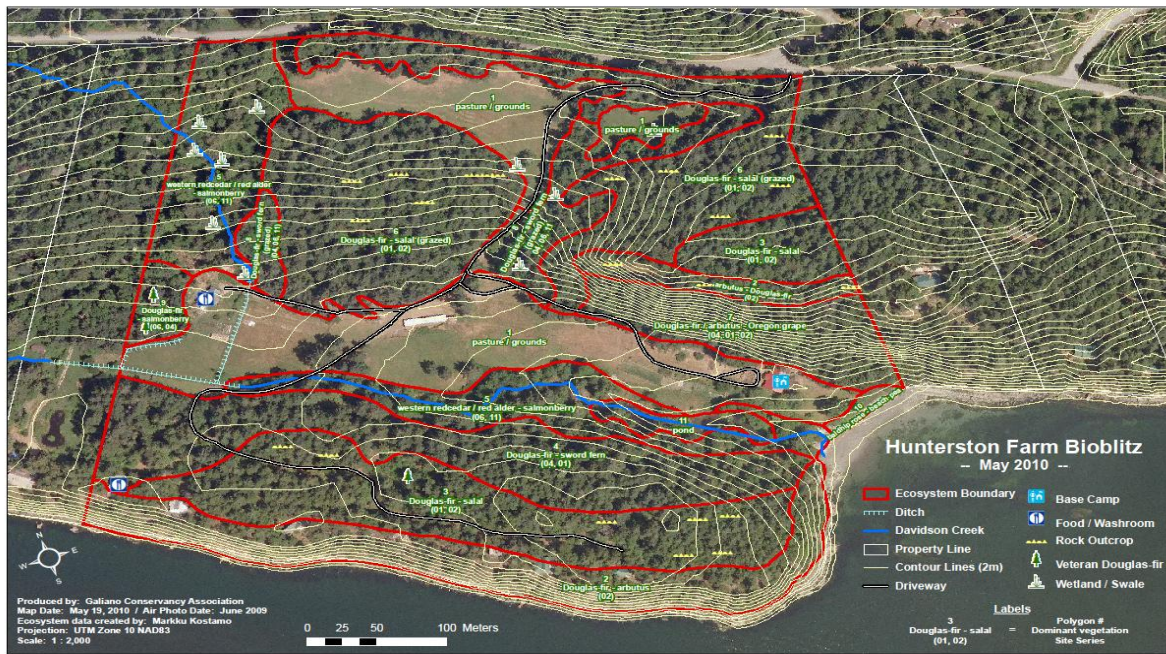
Appendices

Appendix A: Invitational Flyer²



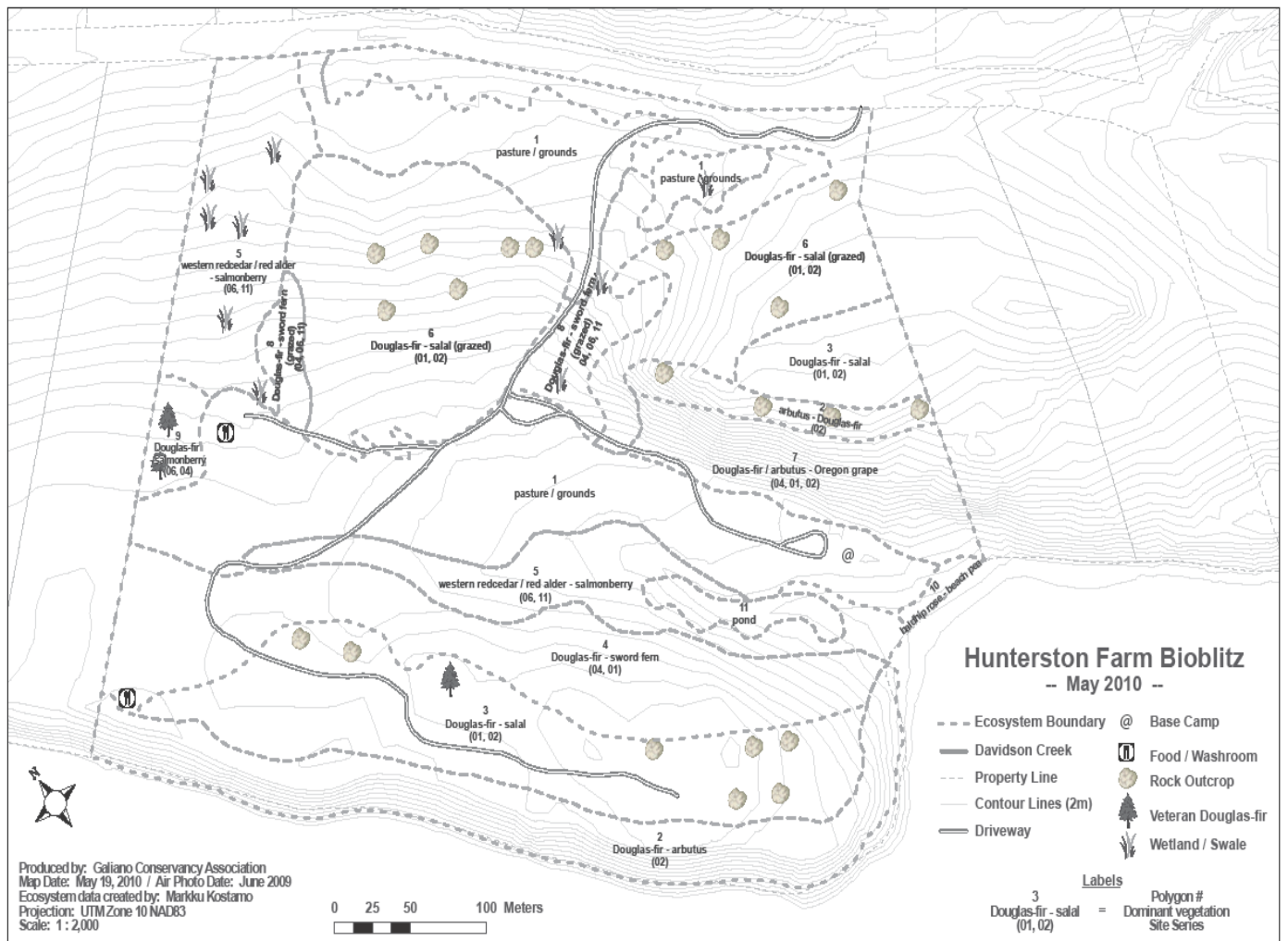
² Created by Sarah Marriott

Appendix B: Colour Map of HF³



³ Created by Keith Erikson and Markku Kostamo

Appendix C: Black and White Map of HF⁴



⁴ Created by Keith Erikson, Markku Kostamo and Daniel Martin

Appendix D: Checklist of Common Species (page 1)⁵

HUNTERSTON FARM BIOBLITZ MAY 2010

CHECKLIST OF COMMON SPECIES

Note: this is a work in progress. We will be refining and correcting the categories and species and will be adding descriptions and photos.

Because this list will be the basis for a guide to the Farm, it will include species that will not be seen in May. At this stage, these species will be marked with an asterisk.

The list is organized provisionally into animals (amphibians, birds, mammals, reptiles), plants (trees, shrubs, flowers, ferns, mosses, other), fungi and lichen, insects (butterflies and moths, dragonflies and damselflies, beetles, hymenoptera (bees, wasps and ants), flies, millipedes and centipedes, other), other bugs and critters (spiders, mites, ticks, other), other invertebrates (gastropods, other), and intertidal life forms.

We will add notes about useful reference books or web sites.

ANIMALS

AMPHIBIANS

<i>Common name</i>	<i>Scientific name</i> [*]	<i>Description</i>	<i>Photo</i>
Pacific chorus frog	<i>Hyla regilla</i>		
Red-legged frog	<i>Rana aurora</i>		

BIRDS

<i>Common name</i>	<i>Scientific name</i>	<i>Description</i>	<i>Photo</i>
Canada goose	<i>Branta canadensis</i>		
Mallard	<i>Anas platyrhynchos</i>		
Pelagic cormorant	<i>Phalacrocorax pelagicus</i>		
Double-crested cormorant	<i>Phalacrocorax auritus</i>		
Great blue heron	<i>Ardea herodias</i>		
Turkey vulture	<i>Cathartes aura</i>		
Glaucous-winged gull	<i>Larus glaucescens</i>		
Pigeon guillemot	<i>Cephus columba</i>		
Barred owl	<i>Strix varia</i>		
Rufous hummingbird	<i>Selasphorus rufus</i>		

⁵ Created by the HF stewardship committee in consultation with the expert advisory committee.

Appendix E: Species Identification Form ⁶

2010 Hunterston Farm BioBlitz												
Team Data Entry Sheet												
1) Team Expert Leader:												
2) Date/Time Observed:												
3) Observations recorded by:												
4) Species Group/Team Name:												
Higher Cat'y	Common Name	Scientific Name	Evidence			Eco # (map)	(Discretionary) GPS Coordinates		(Discretionary) Qty Observed (enter actual # or relative abundance - ie. <25, <100, etc)			
			Expert?	Other?	Photo Y/N, #		UTM (NAD83 datum)					
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
General Comments:						Data Entered into HF BioBlitz Excel Spreadsheet By:						

⁶ Created by the HF stewardship committee in consultation with the expert advisory committee.

Appendix F: Seven Steps to Species Identification Guide⁷

An important goal of the BioBlitz is *volunteer engagement: experts mentor volunteers & volunteers engage experts* (in a collaborative and participatory manner) *to facilitate volunteers to identify species.*

Steps to identify species – information for BioBlitz volunteers

In your volunteer package you will find:

- Your species check list
- A Hunterston Farm map
- An orientation information package

The following steps should occur for identification of every species for HF BioBlitz data entry:

1. Please leave the species alone – do not pick up or disturb – watch it in its own environment. When in doubt, *leave it alone*:
 - a. Do not disturb – for *Large and Moving* (mammals, birds, amphibians, fish and reptiles)
 - b. Consult with an expert – for *Small and Moving* (butterflies, dragon-flies, damselflies, gastropods, other invertebrates). It may be possible to catch in a container or net. If so, please ask expert about where to release after identification.
 - c. Do not disturb - for *Small and Not Moving* : (plants, bryophytes, fungi, lichens, algae and seaweed, seashore and inter—tidal zone, other) – unless advised otherwise by an expert
2. Record *date and time* of day
3. If you have a digital camera, take *photo* for identification: Record the photo number
4. Optional:
 - a. Record *location*:
 - i. Which zone you are in? – see your HF map
 - ii. If you have GPS – What coordinates?
 - b. *Estimate number* of specimens that you have seen
5. *Consult with an expert* to verify identification (and numbers)
6. Mark all the above on your own *species check list*
7. Ask your team leader expert to record all above (from your species check list) onto *team data entry sheets*. Your team leader expert will want to ensure accuracy and will want to avoid data duplication.

⁷ Created by the HF stewardship committee in consultation with the expert advisory committee.

Appendix G: 2010 BioBlitz Catalogued Species⁸

Higher Cat'y		Common Name	Scintific Name	# of species obsrved per zone												Additional Comments:
				0	1	2	3	4	5	6	7	8	9	10	11	
1	Algae	Bull kelp	Nereocystis luetkeana												X	
2	Algae	Green String Lettuce	Ulva intestinalus												X	
3	Algae	Irridescent Seaweed	Mazzaella splendens												X	
4	Algae	Little Rockweed	Pelvetiopsis limitata												X	
5	Algae	Rockweed	Fucus distichus												X	
6	Algae	Sea cauliflower	Leathesia difformis												X	scattered through Zone 12
7	Algae	Sea lettuce	Ulva spp												X	
8	Algae	Sea Tar	Mastocarpus												X	several noted in Zone 12
9	Algae	Turkish towel	Chondracanthus exasperatus												X	
10	Algae	Wireweed (Sargassum)	Sargassum muticum												X	

⁸ Created by Sarah Anne Koster with original information provided by scientific experts and community volunteers and edited information by Ken Summers, Stan Olson, Allison Gratz, Sherry Kirkvold, and Ken Marr.

11	Amphibian	Long-Toed Salamander	Ambystoma macrodactylum			1										
12	Amphibian	Northern Red-Legged Frog	Rana aurora	1			2						2			BC blue list (species of special concern)
13	Amphibian	Pacific Tree Frog	Pseudacris regilla	1												Also referred to by some taxonomists as the pacific chorus frog (Hyla regilla)
14	Amphibian	Roughskin Newt	Taricha granulosa										1			species recalled by Keith Ericson
15	Ant		Formica sp.										X			
16	Arthropod	Spring Tail	Collembola										X			
17	Beetle	Bark Beetle	Pseudohylesinus sp.										X			
18	Beetle	Click Beetle	Ctenicera callida							X			X			
19	Beetle	False Powder Post Beetle	Vrilletta decorata										X			
20	Beetle	Ladybird Beetle	Mulsantina Picta Minor										X+			
21	Beetle	Leather Winged Beetle	Podabrus sp.										X			
22	Beetle	Leather Winged Beetle	Cantharis sp.										X			
23	Beetle	Whirligig beetle	Gyrinidal										X			
24	Beetle		Plectrura										X			

			spinicanda													
25	Beetle		Psyllobora borealis											X		
26	Bird	American goldfinch	Carduelis tristis		X											Feeler
27	Bird	American robin	Turdus migratorius		X	2		1	1, 2	6			X	X		Zone 5, 11 = singing
28	Bird	Bald Eagle	Haliaeetus leucocephalus	X	1											re: zone 0 - BC Wildlife Act (nests protected)
29	Bird	Band-Tailed Pigeon	Columba fasciata					4,3	3							BC blue list (species of special concern)
30	Bird	Barred owl	Strix varia											X		
31	Bird	Bewick's Wren	Thryomanes bewickii							1						
32	Bird	Black-Throated Gray Warbler	Dendroica nigrescens				1									
33	Bird	Brown-headed cowbird	Molothrus ater		8+											Zone 1 = 6 male, 2 female
34	Bird	Brown creeper	Certhia americana			1			1.1				X			
35	Bird	Canada goose	Branta canadensis	2	2									X		
36	Bird	Cassin's Vireo	Vireo cassinii					X	5							Zone 5,6 = singing
37	Bird	Chestnut-backed chickadee	Poecile rufescens			4		X	X	X				X		Zone 5 = calls heard; Zone 6 = calls heard on two occasions

38	Bird	Chipping sparrow	Spizella passerina		2				X							
39	Bird	Common raven	Corvus corax		X				X			X				Zone 6 = GPS (HF CORA) pair at nest observed
40	Bird	Dark-eyed junco	Junco hyemalis			X			6	X	X					Zone 2, 6, 7 = singing
41	Bird	Double-crested cormorant	Phalacrocorax auritus												1	BC blue list (species of special concern)
42	Bird	Glaucous-winged gull	Larus glaucescens												2	
43	Bird	Golden-Crowned Kinglet	Regulus satrapa						1							
44	Bird	Hairy Woodpecker	Picoides villosus					1								female
45	Bird	Hooded Merganser	Lophodytes cuculatus												2	females
46	Bird	House Finch	Carpodacus mexicanus		2				2			X				Zone 1, 6 = pair; Zone 9 = singing
47	Bird	House Wren	Troglodytes aedon			X			X							Zone 2, 6 = singing
48	Bird	Hutton's vireo	Vireo huttoni		1											
49	Bird	Merganser	Mergus sp.											X		
50	Bird	Northern flicker	Colaptes auratus						1							
51	Bird	Northwestern Crow	Corvus caurinus												2	
52	Bird	Olive-Sided Flycatcher	Contopus cooperi					1								

53	Bird	Orange-crowned warbler	Vermivora celata			1			X								Zone 5 = singing
54	Bird	Pacific-slope flycatcher	Empidonax difficilis						1	1+	X+	X					
55	Bird	Pigeon guillemot	Cepphus columba													2	
56	Bird	Pileated woodpecker	Dryocopus pileatus		X							X					
57	Bird	Pine siskin	Carduelis pinus		X					X					X		Zone 1 = Feeler at W
58	Bird	Red-breasted nuthatch	Sitta canadensis			1		X		1.1					X		Zone 6 = singing
59	Bird	Red-breasted sapsucker	Sphyrapicus ruber		1			X									
60	Bird	Red Crossbill	Loxia curvirostra						X			X					Zone 6 = calls heard
61	Bird	Rock Pigeon	Columba livia												X		sighting doubtful in edit review
62	Bird	Rufous hummingbird	Selasphorus rufus		1	2				X				X	X		Zone 6 = singing, Zone 2 = 1 female
63	Bird	Song sparrow	Melospiza melodus		X				X					X	X		
64	Bird	Spotted towhee	Pipilo maculatus		X	1	X			1							Zone 3 = observed species near Zone 6 (from outside of property)
65	Bird	Swainson's thrush	Catharus ustulatus				X	X	1	1					X		Zone 3,4 = singing

66	Bird	Townsend's warbler	Dendroica townsendi						X							singing
67	Bird	Turkey vulture	Cathartes aura	4												
68	Bird	Violet-green swallow	Tachycineta thalassina		10	X										
69	Bird	Warbling Vireo	Vireo gilvus				X		X	X						Zone 3, 6 = out of farm; Zone 5 = singing
70	Bird	Western tanager	Piranga ludoviciana							X						
71	Bird	White-crowned sparrow	Zonotrichia leucophrys		5									X		
72	Bird	Wilson's Warbler	Wilsonia pusilla						1+			X				Zone 5(x), 9 = singing, Zone 5(1) = female
73	Bird	Yellow-rumped warbler	Dendroica coronata							X						singing
74	Bivalve	Bent-nosed macoma	Macoma nasuta												X	
75	Bivalve	Butter clam	Saxidomus gigantea												X	
76	Bivalve	Common Pacific littleneck	Protothaca staminea												X	
77	Bivalve	Green False-Jingle	Pododesmus macrochisma												X	
78	Bivalve	Japanese littleneck	Venerupis philippinarum												X	

79	Bivalve	Mussel	Mytilus [complex]													X	
80	Bivalve	Nuttall's cockle	Clinocardium nuttalli													X	
81	Bivalve	Pacific gaper	Tresus nuttallii													X	
82	Bivalve	Varnish clam	Nutallia obscurata													X	
83	Butterfly	Propertius Duskywing	Erynnis propertius			1											
84	Butterfly	Sara's Orange Tip	Anthocharis sara flora			2											
85	Butterfly	Western Spring Azure	Celastrina echo		2												
86	Clubmoss	Oregon Selaginella	Selaginella oregana			X											
87	Cnidarian	Aggregating anemone	Anthopleura elegantissima													X	
88	Cnidarian	Cross Jelly	Mitrocoma cellularia													X	
89	Cnidarian	Dahlia Anemone	Urticina crassicornis													X	
90	Cnidarian	Moon Jelly	Aurelia labiata													X	
91	Cnidarian	Rose Anemone	Urticina piscivora													1	
92	Cnidarian	Short Plumose Anemone	Metridium senile													X	

93	Crustacean	Acorn barnacle	Balanus glandula													X	
94	Crustacean	Beach hopper	Amphipod (order)													X	
95	Crustacean	Graceful Decorator Crab	Oregonia gracilis													X	
96	Crustacean	Dungeness Crab	Cancer magister													X	
97	Crustacean	Helmet Crab	Telmessus cheiragonus													X	
98	Crustacean	Hermit crab	Pagurus sp.													X	
99	Crustacean	Northern Kelp Crab	Pugettia producta													X	
100	Crustacean	Purple shore crab	Hemigrapsus nudus													X	
101	Crustacean	Red rock crab	Cancer productus													X	
102	Crustacean	Shrimp	Crangon sp.													X	
103	Crustacean	Shrimp	Heptacarpus sp.													X	
104	Crustacean	Thatched barnacle	Semibalanus cariosus													X	
105	Crust Lichen	Pencil Script	Graphis scripta												X		
106	Crust Lichen		Caloplaca													X	
107	Crust Lichen		Ochrolechie laevigate												X		
108	Crust Lichen		Verucarria sp.													X	

109	Crust Lichen		Xanthoria candelaria												X	
110	Ctenophora	Sea Gooseberry	Pleurobrachia bachei												X	
111	Dermaptera	Earwig	Forficula auricularia										X			
112	Echinoderm	Leather Star	Dermasterias imbricata												X	
113	Echinoderm	Ochre sea star	Pisaster ochraceous												X	
114	Echinoderm	Orange Burrowing Seacucumber	Cucomaria miniata												X	
115	Echinoderm	Pink Star	Pisaster brevispinus												X	
116	Fern	Bracken fern	Pteridium aquilinum					X			X			X		
117	Fern	Deer fern	Blechnum spicant		1											
118	Fern	Goldenback Fern	Pityrogramma triangularis			X										
119	Fern	Lady fern	Athyrium filix-femina											X		
120	Fern	Licorice fern	Polypodium glycyrrhiza			X		X								
121	Fern	Maidenhair Spleenwort	Asplenium trichomanes							X						

122	Fern	Spiny Wood-fern	Dryopteris expansa					X								
123	Fern	Sword fern	Polystichum munitum					X	X		X			X		
124	Fish	Buffalo sculpin	Enophrys bison												X	
125	Fish	Penpoint Gunnel	Apodichthys flavidus												X	
126	Fish	Speckled Saudab	Citharichthys stigmaeus												X	
127	Fish	Tidepool sculpin	Oligocottus maculosus												X	
128	Fly	Crane Fly	Tipulidas											X		
129	Fly	Hover Fly	Syrphidae (family)		1											
130	Gastropod	Pacific sideband	Monadenia fidelis				X									(very large snail) found in D. Fir and Arbutus above Wilkinsons: ID uncertain and presumed because of memory of large size
131	Grass	Alaska Brome	Bromus sitchensis					X								
132	Grass	Alaska Oniongrass	Melica subulata				X									
133	Grass	Annual Bluegrass	Poa annua		X		X+									
134	Grass	Barren Brom	Bromus sterilis				X									
135	Grass	Barren Fescue	Vulpia bromoides			X										

136	Grass	Blue Wildrye	Elymus glaucus			X											
137	Grass	California Brome	Bromus carinatus			X											
138	Grass	Cheatgrass	Bromus tectorum		X												
139	Grass	Common velvet-grass	Holcus lanatus		X												
140	Grass	Early Hairgrass	Aira praecox			X											
141	Grass	Fescue sp	Festuca sp.			X											
142	Grass	Harford's melic	Melica harfordii				X										
143	Grass	Hedgehog Dogtail	Cynosurus echinatus			X											
144	Grass	Kentucky Bluegrass	Poa pratensis		X	X	X+										
145	Grass	Orchard Grass	Dactylis glomerata		X									X			
146	Grass	Perennial Ryegrass	Lolium perenne														zone unknown
147	Grass	Reed Canary Grass	Phalaris arundinacea				X										
148	Grass	Roemer's Fescue	Festuca roemerensis			X											
149	Grass	Roughstalk Bluegrass	Poa trivialis					X									
150	Grass	Soft Brome	Bromus hordaceus			X+											

151	Grass	Spike Trisetum	Trisetum spicatum			X											
152	Grass	Sweet Vernal Grass	Anthoxanthum odoratum			X											
153	Grass	Timber Oat-grass	Danthonia intermedia			X											
154	Grass		Poa sp.											X			
155	Hemiptera	Bark Lice	Psocidae											X			
156	Hemiptera	Giant Comferaphid	Cinara											X			
158	Hemiptera	Stink Bug	Elasmostethus cruciata											X			
157	Homoptera	Leaf Hopper	Cicadellidae											X			
159	Homoptera	Treehopper	Platycotis vittatus											X			
160	Hymenoptera	Bumblebee	Bombus spp (? Bombidae)				X										
161	Hymenoptera	Bumble Bee	Bombus bifarius														Zone unknown - nectaring, flying
162	Hymenoptera	Bumble Bee	Bombus melanopygus														Zone unknown - nectaring, flying
163	Hymenoptera	Bumble Bee	Bombus mixtus														Zone unknown - nectaring, flying
164	Hymenoptera	Honey Bee	Apis mellifera														Zone unknown - nectaring, flying
165	Hymenoptera	Sweat Bee	Lasioglossum sp.														Zone unknown

166	Hymenoptera	Western Spring Azure	Celastrina echo													Zone unknown - flying
167	Lichen	Forking bone	Hypogymnia inactiva									X	X			
168	Lichen	Frog pelt	Peltigera neopolydactyla				X									
169	Lichen		Usnec sp.				X									
170	Mammal	American mink	Mustela vison						X						X	
171	Mammal	American beaver	Castor canadensis										X			
172	Mammal	Black-Tailed Deer	Odocoileus hemionus				X		1							Zone 3 = pellet groups
173	Mammal	Common raccoon	Procyon lotor		X											
174	Mammal	Harbour seal	Phoca vitulivia												X+	
175	Mammal	Northern river otter	Lontra canadensis										1			
176	Mammal	Red squirrel	Tamiasciurus hudsonicus				X+				X					
177	Mammal	Shrew	Sorex sp.										X			
178	Mite	Red Mite	Neomolgus littoralis												X	
179	Mollusk	Checkered periwinkle	Littorina scutulata												X	
180	Mollusk	Dogwinkle	Nucella sp.												X	

181	Mollusk	Lewis's moonsnail	Polinices lewisii													X	
182	Mollusk	Mask limpet	Tectura persona													X	
183	Mollusk	Mossy Chiton	Mopalia muscosa													1	
184	Mollusk	Ribbed limpet	Lottia digitalis													X	
185	Mollusk	Rough Keyhole Limpet	Diodora aspera													1	
186	Mollusk	Shield limpet	Lottia pelta													X	
187	Mollusk	Striped Dogwinkle	Nucella ostrina													1	
188	Mosses & Liverworts	Badge Moss	Plagiomnium insigne					X									
189	Mosses & Liverworts	Broom Moss	Dicranum fuscescens					X									
190	Mosses & Liverworts	Electrified Cat Tail	Rhytidiadelphus triquetris					X		X		X					
191	Mosses & Liverworts	Fan Moss	Rhizomnium glabrescens					X									
192	Mosses & Liverworts	Juniper Haircap Moss	Polytrichum juniperinum					X									
193	Mosses & Liverworts	Oregon Beaked Moss	Kindbergia oregana					X									
194	Mosses & Liverworts	Palm Tree Moss	Leucolopis sp. (Climacium dendroides)					X		X							

195	Mosses & Liverworts	Step moss	Hylocomium splendens				X		X		X					
196	Moth	Arbutus Leaf Miner	Marmara arbutiella										X			
197	Moth	Cutworm	Orthosia pacifica										X			
198	Moth	Silver Spotted Tiger Moth	Lophocampa										X			
199	Moth	Silver Spotted Tiger Moth Larvae	Lophocampa argentata			1										identified by Bob Duncan (confirmation needed from Stanley Martin)
200	Moth	Underwing	Catacala aholibah										X			
201	Moth		Ypsolopha subsylvella										X			
202	Mushroom	Artist's Conk	Ganoderma applanatum						X							
203	Mushroom	Black Leg	Polyporus badius					X								
204	Mushroom	Bracket Fungus	Trichaptum abietinus						X							
205	Mushroom	Common Laccaria	Laccania lacata						X							
206	Mushroom	Compressed Elfin Saddle	Helvella compressa					X								
207	Mushroom	Cryptic Globe Fungus	Cryptoporus volvatus					X								
208	Mushroom	Deer Mushroom	Pluteus cerninus						X							

209	Mushroom	? Earthstar	Geastrum quadrifidum							X							
210	Mushroom	Fairy-Ring Mushroom	Marasmius oreades		X												
211	Mushroom	Hairy Turkey Tail	Trametes hirsuta				X										
212	Mushroom	Hoof-Shaped Fungus	Fomes fomentarius							X							
213	Mushroom	Oyster Mushroom	Pleurotus ostreatus						X	X							
214	Mushroom	Panther Amarrita	Amarrita pantherina			X				X							
215	Mushroom	Poison Pie	Hebeloma crustuliniforme						X								
216	Mushroom	Red-Belted Conk	Fomitopsis piwicola				X										
217	Mushroom	Rosy Conk	Fomitopsis cajanderi							X							
218	Mushroom	Silby Nolanea	Nolanea Serives							X							
219	Mushroom	Spring Agrocybe	Agrocybe praecox							X							
220	Mushroom	Tumbling Puffball	Bavista plumbea		X												
221	Mushroom	Turkey Tail	Trametes versicolor						X								
222	Mushroom		Inocybe sp.							X							

223	Mushroom		Omphalina chrysophylla						X							
224	Mushroom		Omphalina ericetorum						X							
225	Mushroom		Perermiporia subacida						X							
226	Mushroom		Tricholoma sp.						X							
227	Plant	Dwarf eelgrass	Zostera japonica												X	
228	Plant	Eelgrass	Zostera marina												X	
229	Reptile	Common Garter Snake	Thamnophis sirtalis					X								identified by Dan and Stan Olson
230	Reptile	Northern Alligator Lizard	Elgaria coerulea				X									identified by Dan
231	Reptile	Western terrestrial garter snake	Thamnophis elegans		X											
232	Rush	Common rush	Juncus effusus											X		
233	Rush	Many-flowered Wood-rush	Luzula multiflora			X										
234	Sedge	Creeping Spike- Rush	Eleocharis palustris		25+											F
235	Sedge	Dewey's Sedge	Carex deweyana					X								
236	Sedge	Henderson's Sedge	Carex hendersonii		X											

237	Sedge	Kellog's Sedge	Carex lenticularis var. lipocarpa		X												
238	Sedge	Sedge	Carex aperta		X												
239	Sedge	Sedge	Carex sp.											X			
240	Sedge	Water Sedge	Carex aquatilis					X									
241	Shrub	Hazlenut	Corylus cornuta											X			
242	Shrub	Holly	Ilex aquifolium					X									
243	Shrub	Red Elderberry	Sambucus racemosa			X								X			
244	Shrub	Saskatoon	Amelanchier alnifolia				X										
245	Shrub	Scouler's Willow	Salix scouleriana				X										
246	Shrub	Snowberry	Symphoricarpos albus							X				X			
247	Shrub	Spurge Laurel	Daphne laureola					X									
248	Shrub	Thimbleberry	Rubus parviflorus			X											
249	Shrub	Tall Oregon-grape	Mahonia aquifolium					X									
250	Shrub	Wild gooseberry	Ribes divaricatum					X									
251	Shrubs & Ground Cover	Baldhip rose	Rosa gymnocarpa			X		X			X						

252	Shrubs & Ground Cover	Dull Oregon-grape	Mahonia nervosa			X			X			X					
253	Shrubs & Ground Cover	Himalayan blackberry	Rubus discolor			X						X			X		
254	Shrubs & Ground Cover	Nootka rose	Rosa nutkana			X								X			
255	Shrubs & Ground Cover	Oceanspray	Holodiscus discolor						X			X			X+		
256	Shrubs & Ground Cover	Oval-leafed Blueberry	Vaccinium ovalifolium						X								
257	Shrubs & Ground Cover	Pacific willow?	Salix lucida				X										
258	Shrubs & Ground Cover	Red flowering-currant	Ribes sanguinum				X										
259	Shrubs & Ground Cover	Red huckleberry	Vaccinium parvifolium				X								X		
260	Shrubs & Ground Cover	Salal	Gaultheria shallon						X	X		X					

261	Shrubs & Ground Cover	Salmonberry	Rubus spectabilis						X			X			X+		
262	Shrubs & Ground Cover	Scotch broom	Cytisus scoparius			X								X			
263	Shrubs & Ground Cover	Trailing blackberry	Rubus ursinus				X		X			X					
264	Shrubs & Ground Cover	Western trumpet honeysuckle	Lonicera ciliosa			X			X			X					
265	Tree	Arbutus	Arbutus menziesii						X			X		X			
266	Tree	Bigleaf maple	Acer macrophyllum						X			X			X		
267	Tree	Douglas-fir	Pseudotsuga menziesii						X	X		X		X	X		
268	Tree	Garry oak	Quercus garryana											X			
269	Tree	Grand fir	Abies grandis									X					
270	Tree	Pacific Yew	Taxus brevifolia								X						
271	Tree	Red alder	Alnus rubra				X		X			X			X		
272	Tree	Sitka Willow	Salix sitchensis						X								
273	Tree	Walnut Tree												X			
274	Tree	Western Redcedar	Thuja plicata						X			X			X		

275	Wildflowers	American Brooklime	Veronica beccabunga		X												
276	Wildflowers	American Glasswort	Salicornia virginica			X											
277	Wildflowers	American Vetch	Vicia americana			X											
278	Wildflowers	Asparagus	Asparagus officinalis			X											
279	Wildflowers	Beach Pea	Lathyrus japonicus										X				
280	Wildflowers	Big-leaved Sandwort	Moerhingia macrophylla				X										
281	Wildflowers	Broad-leaved Stonecrop	Sedum spathulifolium			X											
282	Wildflowers	Bull Thistle	Cirsium vulgare		X												
283	Wildflowers	Camas	Camassia sp.			X											
284	Wildflowers	Canada Thistle	Cirsium arvense								X						
285	Wildflowers	Chickweed Monkey-flower	Mimulus alsinoides			X											
286	Wildflowers	Chickweed	Cerastium sp.			X											
287	Wildflowers	Chickweed	Stellaria media			X		X	X								
288	Wildflowers	Chilean Tarweed	Madia sativa			X											
289	Wildflowers	Chocolate Lily	Fritillaria lanceolata			X											

290	Wildflowers	Cleavers	Galium aparine						X	X		X			X		
291	Wildflowers	Clover	Trifolium repens		X					X							
292	Wildflowers	Coastal Strawberry	Fragaria chiloensis						X								
293	Wildflowers	Common Daisy	Bellis perennis		X				X	X							
294	Wildflowers	Common Dandelion	Taraxarum officinale									X					
295	Wildflowers	Common Horsetail	Equisetum arvense											X	X		
296	Wildflowers	Common Red Paintbrush	Castilleja miniata			X											
297	Wildflowers	Common Sow-thistle	Sonchus oleraceus		X												
298	Wildflowers	Common Stork's bill	Erodium cicutarium			X											
299	Wildflowers	Common Vetch	Vicia sativa			X											
300	Wildflowers	Coralroot	Corallorhiza sp.				X										
301	Wildflowers	Crisp Sandwort	Stellaria crispa						X								
302	Wildflowers	Cut-leaved Geranium	Geranium dissectum		X												
303	Wildflowers	Deer Foot (ie. Vanilla Leaf)	Achlys triphylla				X								X		
304	Wildflowers	Dock	Rumex sp.												X		

305	Wildflowers	Dovefoot Geranium	Geranium molle		X				X	X		X					
306	Wildflowers	Early Blue Violet	Viola adunca		X												
307	Wildflowers	Edible Cherry	Prunus aujum									X					
308	Wildflowers	Enchanter's-Nightshade	Circaea alpina				X										
309	Wildflowers	English Plantain	Plantago lanceolata			X						X					
310	Wildflowers	Entire-leaved Gumweed	Grindelia integrifolia			X											
311	Wildflowers	Evergreen Blackberry	Rubus laciniatus									X					
312	Wildflowers	Falsebox	Pachistima myrsinites			X											
313	Wildflowers	Few-Seeded Bittercress	Cardamine oligosperma			X						X					
314	Wildflowers	Field Chickweed	Cerastium arvense			X											
315	Wildflowers	Field Mint	Mentha arvensis											X			
316	Wildflowers	Floating-Leaved-Pondweed	Potamogeton sp.											X			
317	Wildflowers	Fool's Onion	Triteleia hyacinthina			X											
318	Wildflowers	Forget-me-not	Myosotis arvensis			X			X								

319	Wildflowers	Giant Vetch	<i>Vicia gigantea</i>			X											
320	Wildflowers	Hairy Cat's Ear	<i>Hypochaeris radicata</i>		X			X									
321	Wildflowers	Hairy honeysuckle	<i>Lonicera hispidula</i>			X											
322	Wildflowers	Harsh paintbrush	<i>Castilleja</i> (?) <i>hispida</i>			X											
323	Wildflowers	Hedge Mustard	<i>Sisymbrium officinale</i>			X											
324	Wildflowers	Hedge Nettle	<i>Stachys</i> sp.											X			
325	Wildflowers	Horse-Tail	<i>Equisetum</i> sp.											X			
326	Wildflowers	Hairy Vetch	<i>Vicia hirsuta</i>			X											
327	Wildflowers	Ladyslipper	<i>Calypso bulbosa</i>						X								
328	Wildflowers	Large-leaved Avens	<i>Geum macrophyllum</i>											X			
329	Wildflowers	Little Buttercup	<i>Ranunculus uncinatus</i>					X									
330	Wildflowers	Lungwort												X			
331	Wildflowers	Meadow Death- camas	<i>Zygadenus venenosus</i>			X											
332	Wildflowers	Menzies' Larkspur	<i>Delphinium menziesii</i>			X											
333	Wildflowers	Miner's-lettuce	<i>Claytonia perfoliata</i>			X		X	X		X						

334	Wildflowers	Mountain Sweet Cicely	Osmorhiza chilensis						X	X							
335	Wildflowers	Naked Broomrape	Orobanche uniflora			X											
336	Wildflowers	Nodding Onion	Allium cernuum			X											
337	Wildflowers	Northern bedstraw	Galium boreale						X								
338	Wildflowers	Pacific Sanicle	Sanicula crassicaulis												X		
339	Wildflowers	Pacific Water-parsley	Oenanthe sarmentosa												X		
340	Wildflowers	Pathfinder	Adenocaulon bicolor						X			X					
341	Wildflowers	Pennycress	Thlaspi arvense		X												
342	Wildflowers	Pineapple Weed	Matricaria sp.							X							
343	Wildflowers	Purple peavine	Lathyrus (?Nevadensis)			X											
344	Wildflowers	Purselane Speedwell	Veronica peregrina			X	X										
345	Wildflowers	Rattlesnake-plantain	Goodyera oblongifolia			X											
346	Wildflowers	Rein Orchid	Piperia sp.			X											
347	Wildflowers	Robert Geranium	Geranium robertianum		X												

348	Wildflowers	Scarlet Pimpernel	Anagallis arvensis		X												
349	Wildflowers	Sea Blush	Plectritis congesta							X							
350	Wildflowers	Self-heal	Prunella vulgaris					X									
351	Wildflowers	Shepherd's Purse	Capsella bursa-pastoris		X												
352	Wildflowers	Siberian Miner's-Lettuce	Claytonia sibirica					X									
353	Wildflowers	Skunk Cabbage	Lysichiton americanum					X+			X			X			
354	Wildflowers	Small-flowered Alumroot	Heuchera micrantha				X										
355	Wildflowers	Small-flowered Catchfly	Silene gallica			X+	X										
356	Wildflowers	Small-flowered Forget Me Not	Myosotis laxa		X			X									
357	Wildflowers	Small-flowered Lotus	Lotus micranthus				X										
358	Wildflowers	Small-flowered Nemophila	Nemophila parviflora								X			X			
359	Wildflowers	Small-flowered Fiddleneck	Amsenkia menziesii			X											
360	Wildflowers	Small-flowered Willoherb	Epilobium minutum			X											
361	Wildflowers	Small-headed	Trifolium			X											

		Clover	microcephalum													
362	Wildflowers	Small-hop Clover	Trifolium dubium			X			X							
363	Wildflowers	Small-leaved Montia	Montia parvifolia			X										
364	Wildflowers	Sorrel sp	Rumex acetosella		25+	X										greater than 25 noted in Zone 1
365	Wildflowers	Speedwell	Veronica sp.					X			X					
366	Wildflowers	Spotted Coral Root	Corallorhiza maculata					X								
367	Wildflowers	Springbank Clover	Trifolium wormskejoldii			X										
368	Wildflowers	Stinging Nettle	Urtica dioica					X	X		X			X+		
369	Wildflowers	Sweet Pea	Lathyrus latifolius			X										
370	Wildflowers	Sweet-Scented Bedstraw	Galium triflorum					X	X		X			X		
371	Wildflowers	Tansy Ragwort	Senecio jacobea			X										
372	Wildflowers	Thistle	Cirsium sp.											X		
373	Wildflowers	Thyme-leaved Speedwell	Veronica serpyllifolia		X											
374	Wildflowers	Towermustard	Arabis glabra			X										
375	Wildflowers	Twinflower	Linnaea borealis				X									
376	Wildflowers	Vetan	Ajuga sativa						X							

377	Wildflowers	Wall Lettuce	<i>Lactuca muralis</i>		X				X	X		X				
378	Wildflowers	Western Bitter-cress	<i>Cardamine occidentalis</i>						X+							
379	Wildflowers	Western Buttercup	<i>Ranunculus repens</i>							X		X		X		
380	Wildflowers	Western Starflower	<i>Trientalis latifolia</i>						X	X						
381	Wildflowers	White-flowered Hawkweed	<i>Hieracium albiflorum</i>			X										
382	Wildflowers	Willowherb	<i>Epilobium</i> sp.											X		
383	Wildflowers	Woodland Strawberry	<i>Fragaria vesca</i>				X									
384	Wildflowers	Yarrow	<i>Achillea millefolium</i>			X										
385	Wildflowers	Yellow-cress	<i>Rorripa</i> sp.		X											
386	Wildflowers	Yerba Buena	<i>Satureja douglasii</i>			X										
387	Wildflowers		<i>Agoseris</i> sp.			X										
388	Wildflowers		<i>Aphanes</i> sp.							X						
389	Wildflowers		<i>Cerastium glomeratum</i>		X	X										
390	Wildflowers		<i>Malva neglecta</i>		X											
391	Worm	Dwarf Calcareous Tubeworm	<i>Spirorbidae</i> (family)												X	

392	Worm	Polychaete Worm	Serpulidae (family)													2	
393		Leaf Roller	Batodes angusteararia												X		
394		Long Horned Wood Borer	Carambycidas												X		
395		Swamp Grass													X		
396		Thistle													X		

Legend

Numerical 1, 2, 3...	indicates the number of species seen
X	indicates that this species was seen, but in unknown quantity
1+	indicates that at least 1 of these species was seen and the remainder in unknown number
X+	indicates that this species was seen more than once, but both times in unknown quantity
1.1	this label was used by the identifying expert
1,2	this label was used by the identifying expert