Wetlands Institute

Final Report

Sea-to-Sky, BC

July 8- 15, 2012

B.C. Wildlife Federation
Wetlands Education Program

THE 2012 WETLANDS INSTITUTE WOULD NOT BE POSSIBLE WITHOUT THE FINANCIAL SUPPORT OF THE FOLLOWING PARTNERS:

Wetlands Institute, Sea-to-Sky 2012

Acknowledgements:

BCWF- Wetlands Education Program would like to thank all the instructors, participants, volunteers, and funders for helping to successfully deliver the 2012 Wetlands Institute.

Prepared by:

Neil Fletcher - Wetlands Education Program Coordinator

Jason Jobin - Wetlands Education Program Assistant

Owni Toma - Wetlands Education Program Intern

For information regarding this document, the *Wetlands Institute* or the Wetlands Education Program of the BC Wildlife Federation please contact Neil Fletcher, Wetlands Education Program Coordinator.

Wetlands Education Program
BC Wildlife Federation
Tel: 604-291-9990 or 1-888-881-2293 ext 232
wetlands@bcwf.bc.ca
www.bcwf.bc.ca/wetlands

Contents

i. EXECUTIVE SUMMARY

Since 1998, the BC Wildlife Federation (BCWF) has hosted a Wetlands Institute every other year in a new community of British Columbia. The Wetlands Institute provides the greatest depth of training offered by the BCWF's Wetlands Education program. All Wetlands Education Programs are designed to increase awareness about the values of wetlands and to empower individuals and communities to become stewards of wetlands within BC and across North America. The Wetlands Institute targets individuals currently working on a wetland project and provides them with many of the necessary skills to successfully accomplish their conservation goals. The other two pillar programs are the Wetlandkeepers course and the Map our Marshes. BCWF's Wetland Education Program hosted the 2012 Wetland Institute along the Sea-to-Sky corridor from July 8th to 15th.

Two WI alumni are leaders in their communities in terms of wetland stewardship in their communities (i.e. Edith Tobe (director of Squamish River Watershed Society) and Veronica Woodruff (founder of Stewardship Pemberton Society)). They both requested support for building capacity of stewardship in their host communities. In the last few decades, the Sea-to-Sky corridor has witnessed an influx of development activity and is the fastest growing regional district of the province (BC Stats 2010). The construction of large networks of dykes and ditches has already removed a large portion of wetlands. More environmental awareness and stewards at a local level are needed to help this region grow in an environmentally sustainable manner. By training community members to appreciate, identify, map and steward ecologically important habitats, individuals and groups can actively participate in protecting and restoring wetlands in their community.

The Wetlands Institute would not be possible without the generous financial support provided by Habitat Conservation Trust Fund, The Government of British Columbia, Government of Canada, Wildlife Habitat Canada, Canadian Wildlife Federation, Environment Canada, and Shell Canada.

ii. ABOUT THE BC WILDLIFE FEDERATION

The BC Wildlife Federation (BCWF) is a province-wide voluntary conservation organization of hunters, anglers and outdoor recreationalists, representing all British Columbians whose aims are to protect, enhance and promote the wise use of the environment for the benefit of present and future generations. As such, two strategic goals have been adopted:

> *1. To ensure the sound, long-term management of British Columbia's fish, wildlife, park and outdoor recreational resources in the best interests of all British Columbians, and to coordinate all the voluntary agencies, societies, clubs and individuals interested in that objective, and*
>
> *2. To develop and support a comprehensive educational program to make all British Columbians aware of the value of British Columbia's fish, wildlife, park and outdoor recreational resources, and to arouse in the public conscience a recognition of, and a respect for, the place of fish, wildlife and outdoor recreation in the wise integrated use of the nation's natural resources.*

BCWF delivers educational programs including, but not limited to Conservation Outdoor Recreation Education, Wilderness Watch, Becoming an Outdoors Woman, all which act to fulfill the needs of its members, community and that of the strategic goals. The Wetlands Education Program (WEP), established in 1996, is one of the prominent conservation educational programs of BCWF.

iii. INTRODUCTION TO THE WETLANDS EDUCATION PROGRAM

The BC Wildlife Federation recognizes wetlands as important ecosystems to conserve with enormous social, economic and environmental benefits. The longest standing WEP programs, including Wetlandkeepers and the Wetlands Institute, were designed at a provincial level from government and non-government stakeholders who recognized the need for public stewardship of wetlands in BC. Despite the ups and downs of financial support from the government, the BC Wildlife Federation recognized the value and potential of the program, and has been a champion in delivering province-wide wetland educational programs since its inception. The Wetland Education Program has become a valuable asset and has played an increasingly significant role in meeting the stated mission of the B.C. Wildlife Federation:

"To protect, enhance and promote the wise use of the environment for the benefit of present and future generations"

Through the various Wetland Education Programs, BCWF is able to demonstrate to the broader public the contribution that hunters, anglers and outdoor recreationalists make to fish and wildlife conservation efforts across British Columbia. To date, the WEP has contributed to the conservation of hundreds of wetlands in not only British Columbia but throughout North America. The WEP accomplishes wetland conservation through facilitating community education projects, facilitating land securement, and conducting wetland inventory, monitoring, construction and restoration.

WEP is delivered by a full-time Program Coordinator who receives support from one to three interns throughout the year (pending external funding). Direction for the program is a collaborative effort between the Program Coordinator, an Advisor on the BCWF Board, and the BCWF Director of Operations.

THE ROLE OF WETLANDS

Wetlands play an essential role in the wellbeing of our natural environment through carbon sequestration, providing fish and wildlife habitat, enhancing water quality, mitigating floods, and recharging of groundwater and streams. For these reasons, wetlands impact our individual and community health. In comparison to many other ecosystems, the benefits from wetlands are exceptionally large relative to their size (MacKenzie and Shaw 1999). Within BC, wetlands are valued at approximately $100billion/year (MOE 2010). When total economic values are considered, wetlands often provide greater economic returns than when the land is converted for other uses (Millennium Ecosystem Assessment 2005).

However, wetlands are disappearing from our landscape. Over the last century many wetlands across Canada, including British Columbia, have been disturbed or entirely destroyed, especially in populated areas due to development pressures and lack of awareness to their inherent values. Without increased public awareness, the trend of wetland loss and degradation will likely continue to occur. BCWF's Wetlands Education Program provides participants with the knowledge and skills to address wetland loss and degradation, monitor, rehabilitate and steward wetland habitat and encourages citizens to play a key role in conservation initiatives as advocates and volunteers.

THE WETLANDS INSTITUTE

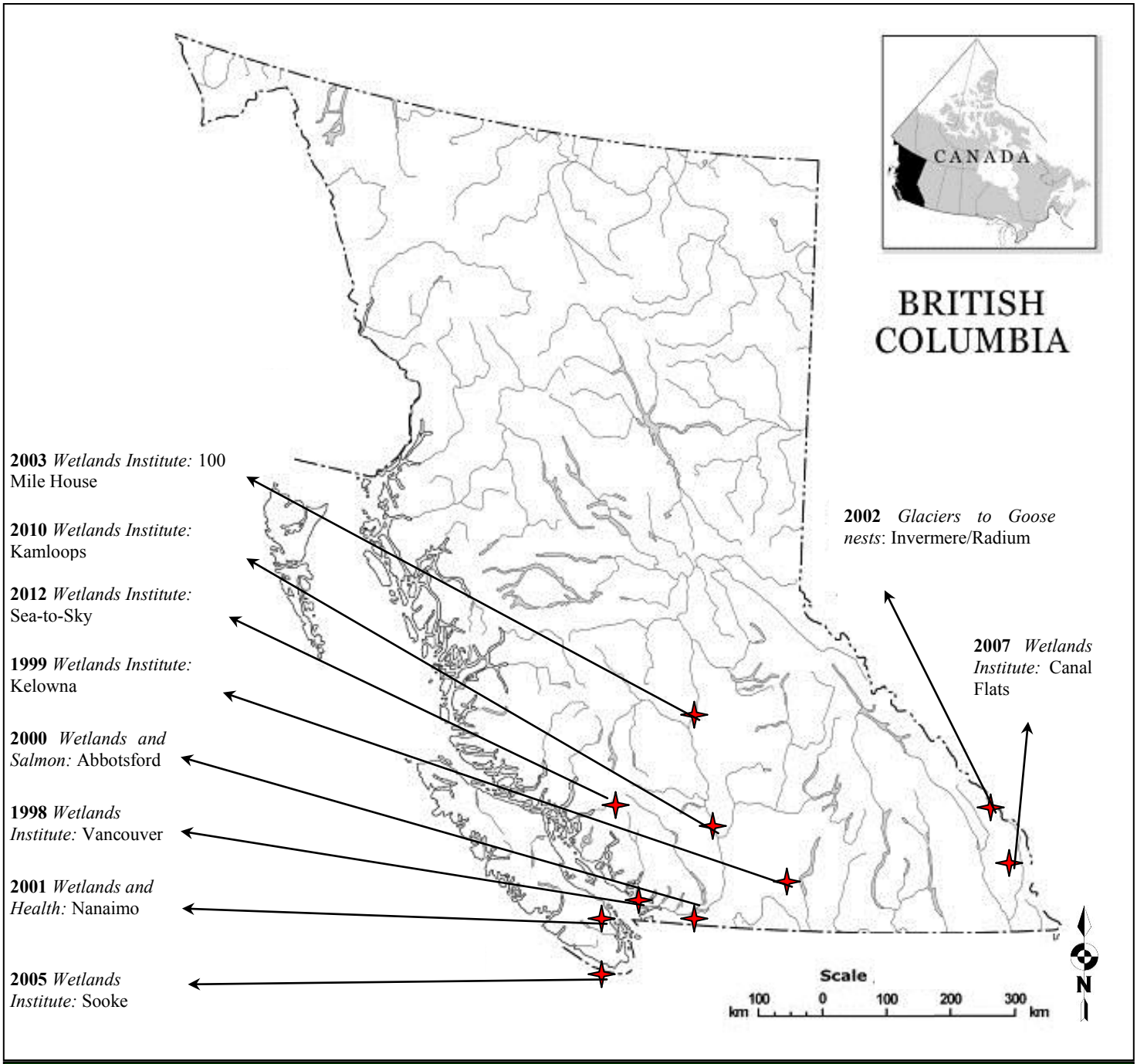
"I believe that the Wetlands Institute represents the highest standard in wetland education"

Tom Biebighauser, Wildlife Biologist USDA Forest Service, Kentucky

The Wetlands Institute is one of the three pillar projects of the BCWF Wetlands Education Program. It is a week-long course attended by landowners, land-managers, government and non-government staff, community volunteers, educators and First Nations. The objective of this course is to provide theoretical and practical training to value, identify, monitor, map, construct, and restore wetlands. As a result of participating in the Institute, individuals can implement wetland stewardship activities in their own communities.

Institute participants submit a wetland conservation project as part of their application and receive specific training and resources in order to successfully complete their project. Participants receive training from numerous specialists, some including wetland construction/restoration professionals, amphibian specialists, hydrology specialists, fish and wildlife specialists, and vegetation specialists. Participants also receive resources from environmental consultants, universities and scientific publications.

Wetland Institute programming is initiated by existing partnerships with BCWF regional presidents, BCWF clubs and local communities or from community champions to identify suitable project sites. Once a WI location has been identified and restoration projects have been identified, funding opportunities, and sponsorship opportunities are pursued. The Wetlands Institute has been successfully implemented in 1998, 1999, 2000, 2001, 2002, 2003, 2005, 2007, 2010 and 2012 (Map 1). The next Wetlands Institute is scheduled for the West Kootenays in 2013.



Map 1. Location of Wetlands Institute Courses.

HISTORY OF WETLANDS INSTITUTE IN BC

1998 Vancouver Wetlands Institute:
The first institute was modeled after its American counterpart, and included a partnership with the Faculty of Education at Simon Fraser University (SFU). There were 18 full-time participants and 15 part-time participants. Staff from the Greater Vancouver Regional District helped deliver the course. Among the conservation activities, participants were involved in the GVRD model project at Camosun Bog.

1999 Kelowna Wetlands Institute:
This institute was based at the Okanagan University College (OUC), with the attendance of 16 full-time and 9 part-time participants, and involvement from the City of Kelowna to deliver and plan the course. A key outcome of the institute included the mapping of significant privately owned wetlands and their subsequent inclusion in the City of Kelowna's municipal inventory.

2000 Abbotsford Wetlands Institute:
This institute had 15 full-time, 2 part-time participants, 1 volunteer, 4 instructors, 3 facilitators, and 3 guest speakers. The focus was to connect wetlands to salmon health and habitat. A number of wetlands were surveyed.

2001 Nanaimo Wetlands Institute:
This institute had 15 full-time, 1 volunteer, 4 instructors, 2 facilitators, and 7 guest speakers. The focus was to demonstrate the link between healthy functioning wetlands and the health of human communities. Nine different wetland areas around Nanaimo were investigated.

2002 Invermere/Radium Wetlands Institute:
This institute had 15 full-time participants, 3 part-time participants, 5 instructors, 1 facilitator, 33 guest speakers, and a 25 member Steering Committee. The focus was to address rural wetland issues such as tourism, livestock grazing and railroads.

2003 100 Mile House Wetlands Institute:
This institute had 12 full-time, 36 part-time participants, 8 instructors, and a 36 member Steering Committee. This institute focused on multiple wetlands with different challenges regarding wetland conservation in the Cariboo region, where ranching and tourism are predominant activities.

2005 Sooke Wetlands Institute:
This institute had 15 full-time participants, 33 part-time participants, 6 instructors, and a 35 member steering committee. The focus was to identify water supply issues and pressures to wetlands from growing urban areas on Vancouver Island.

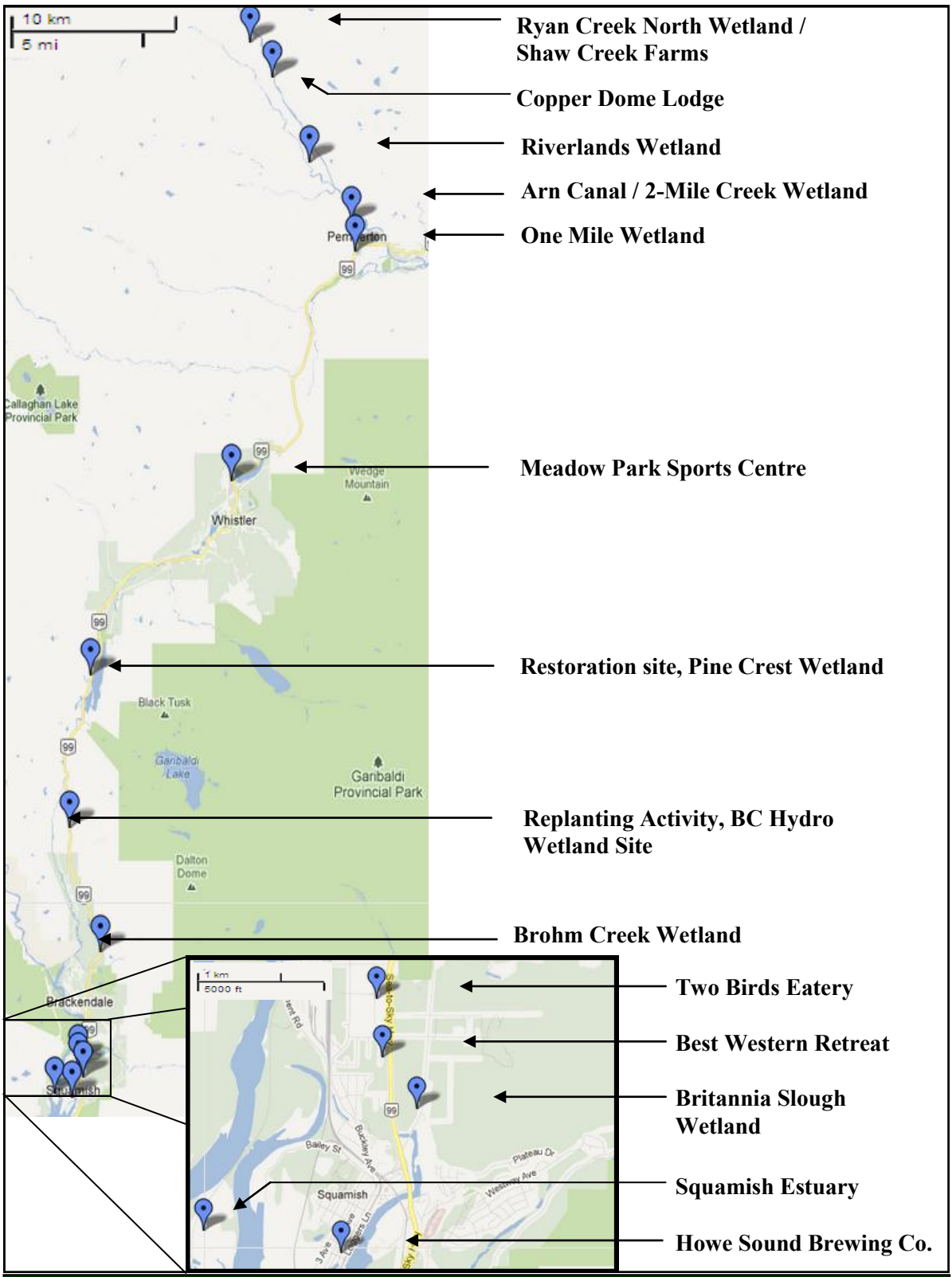
2007 Canal Flats Wetlands Institute:
This institute had 10 full-time participants, 9 instructors, 5 guest speakers and a 4 member steering committee. A major outcome was the construction of a wetland that could provide school children with a place to explore a small-scale outdoor natural habitat. This region is located at the headwaters to the Columbia River, a critical waterway for fish, wildlife and recreational use.

2010 Kamloops Wetlands Institute:
This institute had 13 full-time 18 part-time participants, 13 instructors, and 2 facilitators. A main theme for the institute was to highlight the impacts of recreational and agricultural use and the effects of climate change on wetlands.

2012 Sea-to-Sky Wetlands Institute:
The most recent institute took place in Squamish, Pemberton, and Whistler. It had 18 full-time participants, 17 part-time participants, 10 trainers, 3 guest speakers, and 3 facilitators. Participants helped create/enhance 2 groundwater and 3 liner wetlands. 19 planners from the Lower Mainland and the surrounding areas also attended the Planner's workshop, which focused on incorporating wetland stewardship into existing policies. The following section provides details on the various activities that occurred throughout the week-long institute.

From 1998 to 2012, the Wetlands Institute has connected with and trained 284 full-time and part-time participants!

1.0 WETLANDS INSTITUTE 2012



MAP: WETLANDS INSTITUTE: SEA-TO-SKY 2012, LOCATIONS

SUNDAY JULY 8

In Class Session #1: Refresher Course (CopperDome Lodge, Pemberton)

The first day began in the afternoon and was held indoors at the CopperDome Lodge in Pemberton. For those with little wetland knowledge, Sunday provided a wealth of information. For those with advanced wetland experience, it was primarily a refresher course. Michele Jones of Mimulus Biological Consultants, a long-time instructor for the Wetlands Institute and Wetlandkeeper courses, provided an overview of the material covered in the Wetlandkeeper courses. Wetland importance, functions, identification, and classification were all covered to ensure participants were prepared for the week ahead.

Outdoor Session #1: Wetland Identification and Classification Practice (One Mile Wetland, Pemberton).

Michelle Jones solidified the in-class learning with an outdoor session at One Mile Wetland. This lacustrine wetland adjacent to One Mile Lake provided the stage for participants to try their hand at wetland identification and classification.

MONDAY JULY 9

In Class Session #1: Wetlands Institute Overview (CopperDome Lodge, Pemberton)

Monday began with Wetlands Coordinator Neil Fletcher introducing the learning outcomes and goals of the week. The Institute is designed for participants to receive guidance and support for their own wetland projects through technical training, planning theory, field experience and first-rate, renowned trainers who can fill in knowledge gaps, in order for participants to return to their communities and use their newly acquired skillsets to improve upon their own projects in wetland restoration and creation.

For the next two hours, each participant presented in front of the class on their background, affiliation, current wetland project plans, and desired outcomes and goals of attending the Institute.

For a complete list of participants, see Appendix 2

In Class Session #2: Wetland Drainage in North America (CopperDome Lodge, Pemberton)

Internationally renowned author and wetland restoration expert, Tom Biebighauser of the USDA Forest Service gave a historical overview of wetland loss in North America in a presentation called “Why We Pulled the Plug on North America.” Biebighauser has restored over 1400 wetlands in his career and has accumulated a wealth of knowledge and lessons learned to share with those who are interested in wetland restoration and construction. Participants learned about historical drainage practices and their impacts on the land, which provided context for the importance of restoring these lands back to their original state.

Afterwards, Veronica Woodruff and Hugh Nayler, board members of the Pemberton Stewardship Society, built on Tom Biebighauser’s presentation on wetland drainage by introducing a case study of the Pemberton Valley. After participants learned about the local case study and the recent establishment of a Wildlife Management Area, the group set out to visit the Ryan Creek North Wetland.

Outdoor Session #1: Site Evaluation (Ryan Creek North Wetland, Pemberton)

Photo: Ryan Creek North Wetland

Ryan Creek North Wetland is located on Shawcreek Farms. The wetland has seen significant agricultural impacts over the years, namely, from cattle and historical drainage practices.

Once the participants arrived at the wetland, they were joined by John Beks, the owner of the property. Beks provided insight into the historical drainage practices which shaped the land to its current state. Afterwards, trainer Michelle Jones provided an overview of wetland classification techniques. She guided participants on analysing soil samples, identifying plants, determining the boundary of a wetland, checking an amphibian trap, testing for water with a tile probe, and performing ribbon tests of soil. Participants practiced completing a site evaluation of and impacted section of Ryan Creek North Wetland using the Lentic Wetland Survey Field Score Sheet. The survey is designed to assess the functional health status of lentic (still water) wetlands and is routinely used in Alberta and parts of BC. The participants were split into groups of 4-6 to carry out the survey. The results from the survey showed moderate variation between each group's findings. Participants scored the Functional Rating between 17% and 33% *(Note: less than 60% is classified as non-functional).*

Photo 1. Sara Barker provides input on a fellow participants project. Photo 2. Paul Berlinguette and others listen intently. Photo 3. Michelle Hamilton explains her wetland vision. Photo 4. Mike Botic does a ribbon test. Photo 5. Kyle Rasmussen uses a wire probe. Photo 6. Landowner John Beks talks of the area's history.

TUESDAY JULY 10

Outdoor Session #1: Birding Activity - Identification (Shaw Creek Farms, Pemberton)

Tuesday began with an optional birding activity at Shaw Creek Farm, which fifteen people attended. John Tschopp led the group in visual and audio identification of many species including those listed below. John is a local birder that has been bird watching and listening for many years. In addition, he is an active participant in the Christmas Bird Count and the Breeding Bird Survey.

Bird Species Identified	
Common Name	**Scientific Name**
European Collared Dove	*Streptopelia decaocto*
Brewer's Blackbird	*Euphagus cyanocephalus*
White-crowned Sparrow	*Zonotrichia leucophrys*
Tree Swallow	*Tachycineta bicolor*
Barn Swallow	*Hirundo rustica*
Brown-headed Cowbird	*Molothrus ater*
Violet-green Swallow	*Tachycineta thalassina*
Yellow Warbler	*Setophaga petechia*
American Robin	*Turdus migratorius*
Willow Flycatcher	*Empidonax traillii*
Red-winged Blackbird	*Agelaius phoeniceus*
Savannah Sparrow	*Passerculus sandwichensis*
Common Raven	*Corvus corax*
Rufous Hummingbird	*Selasphorus rufus*
Gray Catbird	*Dumetella carolinensis*
Killdeer	*Charadrius vociferus*
Pine Siskin	*Carduelis pinus*
Mallard	*Anas platyrhynchos*
Hooded Merganser	*Lophodytes cucullatus*

In Class Session #1: Protection Options (CopperDome Lodge, Pemberton)

Owni Toma, a BC Wildlife Federation Wetlands Education Intern, provided insight on what options and tools exist to protect wetlands. The topic is immense, covering laws, incentives, and regulations. An overview chart of multiple options for private citizens, property owners, and municipal planners categorized into partnership building, public education, enforcement, and legal categories was provided to participants. They also received a visual overview of the protection tools in the Green Bylaws Toolkit, complete with strengths, weaknesses, and examples of each tool available to BC communities. During the presentation, participants shared their experiences and knowledge pertaining to wetland protection.

Kyle Hawes (senior biologist with Ecoscape Ltd) and Greg Sauer (municipal planner with the City of Kelowna) discussed the process involved in "Bridging the Science-Policy Gap" with respect to environmental protection of wetlands and other sensitive ecosystems in the face of

development. Kyle and Greg also presented some of the wetland conservation and protection successes within the municipality of Kelowna.

Michele Jones then led the group through a watershed awareness activity. Each participant was given a large plot of waterfront property and was told to develop it in whatever manner they see fit by drawing their designs on a sheet of paper. Some constructed subdivisions while others left it relatively untouched. Afterwards, all the plots of land were revealed to be connected to one another. As the group connected their properties, it quickly became evident that upstream development was impacting other properties downstream and those unfortunate to be furthest downstream were being highly altered by waste, sediments, high levels of salts and nutrients, and more. The activity was greatly enjoyed by all and demonstrated that people must think from a watershed perspective to tackle environmental issues, particularly those related to wetlands.

Outdoor Session #2: GPS Training and Plant ID (Riverlands Wetland, Pemberton Wildlife Management Area)

Photo: Riverlands Wetland

Institute participants headed into the field at Riverlands Wetland just North of Pemberton. This wetland is approximately 6 ha in size and is a registered under the Pemberton Wildlife Management Area (total of 753 ha). Here, participants went through the Wetlandkeepers Short Form Survey and learned how to complete a more extensive survey process than the survey completed on Monday. As a group, participants discussed and determined the Riverlands Wetland's classification, adjacent land use, hydrology, and its potential health concerns. Elements that should be included in a field sketch were covered. One of the main learning outcomes was GPS training. Participants were trained on how to how to track a wetland's perimeter, and how to determine GPS coordinates. Michele also taught the group how to use a dichotomous key to identify plant species (in this case, a local Vetch).

In Class Session #2: Importance of Citizen-Science (CopperDome Lodge, Pemberton)

Upon returning to the classroom, Neil showed participants the step-by-step process of uploading their newly collected GPS data onto the BCWF's Wetland Atlas on the BC Community Mapping Network (CMN). All other information collected on the Short Form Survey was added to the CMN. The CMN is designed to map wetlands across the province and provide detailed information on each one. The Wetlands Atlas was originally created to map smaller, underappreciated wetlands that would otherwise go unnoticed. The CMN can be accessed at http://cmnmaps.ca/WETLANDS

The Executive Director of The Tsolum River Restoration Society and The Comox Valley Land Trust, Jack Minard, led the final presentation of the day. Jack shared the story of how citizens of the Comox Valley designed a proactive land-use framework to help deal with increasing ecosystem losses. Their science-based strategy is based on a network of protected areas within a watershed including many wetlands. Participants were highly inspired after hearing the success story of how the plan received endorsement from all local governments in the Comox Valley.

Photo 1. John Tschopp leads a birding activity. 2. Michelle Jones goes through the Wetland Short Form Survey. Photo 3. Participants observing bird species common to wetlands. Photo 4. Neil Fletcher balances the "garbage" he received on his property. Photo 5. Michelle Hamilton and Trystan Willmont refer to a guide. Photo 6. Michelle Jones analyzes soil composition.

WEDNESDAY JULY 11

Indoor Session #1: Wetland Restoration Successes and Planning Principles (CopperDome Lodge, Pemberton)

Tom Biebighauser gave a presentation on examples of past work, how to identify natural and man-made wetlands, and wetland creation requirements and techniques. The importance of soil type and slope for wetland creation was also discussed. The lesson was cemented with an activity where Biebighauser asked participants how they would proceed to make a wetland in two separate kinds of soil.

Outdoor Session #1: Wetland Restoration Planning Exercise (Arn Canal, Pemberton)

Photo: Arn Canal / 2-mile Creek

Participants traveled to the Arn Canal / 2-Mile Creek Wetland, located North of Pemberton. Landowner Bob Menzel explained the history of the area and how it had previously been a lake with surrounding wetlands. The water was drained for farming. Participants examined the diversion of water flow and the creation of beaver deceivers, and remnant wetlands.

Based on geographical clues, plant species, slope, etc. Biebighauser was able to extrapolate possible past uses for several areas on the property. For example, parts of an old drainage ditch was discovered and suggested that a now-wooded area was previously used for farming. Determining historical land use is key in wetland creation and restoration and can determine the success or failure of a new wetland. For example, historically drained land often retains its

original drainage systems and can keep water tables low enough as to not permit groundwater infiltration.

Participants also practiced soil identification and slope determination as Biebighauser led them through a mock-wetland design for the area. The group was separated into two teams and each was sent into a different direction to test their newly found skills with some valuable hands on experience designing their own wetland. Groups selected an area based on slope and groundwater availability. They designed the outer edges and drew maps of the proposed wetlands. The best of the two designs was determined and its projected border was mapped using a GPS receiver.

Image: Michelle Jones' GPS track of a plot of land where Institute participants designed a groundwater wetland for landowner Bob Menzel.

Outdoor Session #2: Invasive Species and Wetlands (Whistler)

Institute participants voyaged to Whistler to join Kristina Swehurn, executive director of the Sea-to-Sky Invasive Species Council. There, Kristina provided information on some common local invasive plants including yellow flag iris (*Iris pseudacorus*), giant hogweed (*Heracleum mantegazzianum*), and Japanese knotweed (*Polygonum cuspidatum*). Using props, she also demonstrated how to identify yellow flag iris and differentiate it from the common cattail (*Typha latifolia*), which looks very similar. Removal techniques and proper disposal methods for yellow flag were also explained. So as to not spread the plant, the flowers and root masses cannot be composted. Instead they must be bagged and placed with regular waste. The leaves, however, are safe to compost.

Participants aided in yellow flag control by physically removing them from a small creek behind the Meadow Park Sports Centre that was overrun with yellow flag iris. Using shovels, spades, pitchforks, or bare hands the group removed so many plants from the creek that several truckloads were needed to transport the biomass. Afterwards, a significant portion of the creek was yellow flag iris free.

Outdoor Session #3: Tour of Squamish Estuary

Photo: Squamish Estuary

Executive Director with the Squamish River Watershed Society Edith Tobe provided a tour of Squamish Estuary and explained its history and amazing restoration.

In the 1970s BC rail attempted to build a coal port and dredged and diked the estuary giving it the appearance of a “lifeless moonscape”. Massive piles of fill material were left where once highly productive wetland existed. Since in late 1990’s restoration led by Squamish River Watershed Society and other partners has taken place and it is now as it was before the dredging took place. It is now classified as a wildlife management area and is a place for schools, universities and for the public to visit and learn about estuaries, wetlands, and restoration

Photo 1. Tom Biebighauser on soil requirements for wetland construction. Photo 2. Celia Serrano tests for water. 3. Kristina Swerhun of the Sea-to-Sky Invasive Species Council. Photo 4. Filling the truck with the invasive Yellow Flag. Photo 5. Ian Wright holds a large Yellow Flag root. Photo 6. The group stands on an old drainage ditch.

PLANNERS WORKSHOP

On Wednesday July 11, 2012, The BC Wildlife Federation's Wetlands Education Program hosted a 1 day workshop in Squamish targeting municipal planners of B.C. The workshop's main objective was informing planners on ways they can incorporate wetland stewardship into their policies, while also presenting an overview of the value of wetlands and their basic functions. Water is a vital resource and regional and municipal plans must manage and regulate it in a sustainable way. As a society, we are recognizing the growing importance and benefits of wetlands such as flood control, water filtration and the provision of habitat for thousands of species – services which are provided for free.

The workshop featured four speakers from different organizations and 19 planners from the Lower Mainland and the surrounding areas. The speakers were chosen because each had made significant contributions in protecting wetlands and were enthusiastic for providing tools and information for other communities to follow in their footsteps.

The first speakers were Kyle Hawes (Ecoscape Environmental Consultants ltd.) and Greg Sauer (Municipal Planner) from the City of Kelowna. Hawes and Sauer's presentation highlighted the importance of bringing municipal planners in the same room – learning from other's decision-making successes and challenges. The City recently developed a comprehensive wetland protection plan through public consultation, wetland inventory, assessment, and mapping, which is shaping up to be one of the best in the province. The Wetland Inventory, Classification, Evaluation and Mapping (WIM) was completed in 2009 with funding from the Okanagan Basin Water Board and Ducks Unlimited. Among the most important accomplishments is the establishment of a minimum of 15 metre setbacks that apply to non-fish-bearing water bodies (fish bearing = 30 metres). These areas serve as buffers from development to mitigate and reduce potential impacts on streams, and in this case, to preserve the functionality, biodiversity and connectivity of a watershed.

Kelowna's use of the WIM to inform their Natural Environment Development Permit Areas (NEDPAs) sets an example of a city sustaining the ecological needs of the environment while recognizing the social needs of the community. Recently, the City carried out extensive natural resource inventory work to create maps that establish environmentally sensitive ecosystems (including wetlands) and hazardous areas. The maps delineate which properties may require a Development Permit (DP) prior to construction or alteration of the land. This tool encourages development on non-sensitive areas with those developments which pose little or no risk to sensitive areas exempted from a DP. Since the WIM and other ecological mapping are all publicly available, developers and their consultants benefit from this baseline data collected by the City and create plans for sites which avoid these features which is a strong incentive in most cases. The common alternative is for municipalities to adopt the Riparian Areas Regulation which automatically protects a stream, but only if it is associated with fish, leaving much to be concerned for wetlands.

The next presentation was given by Jack Minard, Executive Director of the Tsolum River Restoration Society and the Comox Valley Land Trust. Minard represents the Comox Valley Conservation Strategy, a group of 20+ organizations dedicated to environmental protection. All local governments in the Comox Valley region have endorsed their publication: Nature without Borders, a science-based framework for land use specific to the Valley. The Strategy has achieved a 30 metre buffer on sensitive ecosystems– lacing a thread of wetland protection

around the valley and maintaining connectivity, which is key for biodiversity resilience on the landscape.

The last speaker, Deborah Carlson, from West Coast Environmental Law, brought to the table an insider perspective on the legislative and political workings that apply to wetlands in B.C. Basing her presentation on the Green Bylaws Toolkit, Carlson outlined bylaws and tools that local governments in BC are using to protect sensitive ecosystems with a discussion including benefits and drawbacks. This informative presentation provided context on the status of environmental legislation in Canada.

After having lunch, the participants were split into two groups to discuss and flesh out the main points raised by the speakers. Both groups discussed wetland protection – one, politics and legislation, the other, biophysical and resource inventory techniques. The breakout sessions lasted for more than two hours and produced substantial dialogue and engagement among the planners. The groups had a great dynamic – a planner would introduce an idea or tool, another would expand and build on it to a point where it was fully drawn out and this helped to effectively "fill in" knowledge gaps. One municipal planner noted: "It was probably the best and most informative one day session I have ever attended. If you have another session, I will send others (and myself)."

Three main points surfaced as identifiable needs during the breakout session on politics and legislation. First, the importance of spatial data – if you don't know about a wetland (i.e., if it's not mapped), then how can you protect it? Completing an inventory of natural resources in a region is critical in order for communities and governments to make informed decisions about future developments. Protecting a wetland is much more difficult when one is discovered on site during the development process, or after the development has occurred (i.e., the developer has already acquired permission to build the land). On the contrary, when spatial data of wetlands is available before development occurs, it can be used to inform zoning and EDPAs. Inventory work and mapping can be completed at a number of scales. For example, a partnership between a city and a consultancy such as Kelowna and Ecoscape Consultants, Ltd produced one of B.C.'s best comprehensive wetland protection plans. In addition, mapping can be completed by private citizens with a handheld GPS by tracking and uploading data to the BC Wetlands Atlas on the Community Mapping Network (a publically available tool). This basic and highly valuable citizen-science tool offers a platform for community stewards to contribute reliable data that is increasingly in demand when staff experience budget shortfalls.

Second, the importance of finding and supporting champions who can mobilize communities at opportune times. They can be MPs, planning staff, or even concerned citizens operating at different levels to make an impact. Participants agreed that there was often key people who had the drive to take initiative to make change. Community champions act as catalysts for stewardship by forging relationships, educating politicians, engaging the community, overcoming political inertia, and delivering a strong message and selling it. Their work needs to be encouraged by local and regional groups and also by each other.

Lastly, there is a need for a tool-kit that can not only help identify available protocols to monitor for compliance, but also measure the effectiveness of policies and regulations on watershed integrity, which is arguably the largest hurdle in conserving wetlands (and other sensitive ecosystems) in areas where they are protected in principle. There are municipalities with protection bylaws around wetlands but how do we know if those measures are enough? Could we be suffering from "death by 1000 cuts"? For instance, are pre-established guidelines around setbacks sufficiently protecting stream health and ecological integrity? What about unprotected or underprotected waterways, headwaters etc.? One way a tool-kit could improve this fashion

of decision-making is establishing the watershed as the principal management unit, not a political jurisdiction (as discussed as a concept in “Nature without Borders”.

The three main points that were raised during the discussion on the biophysical and resource inventory techniques in wetland protection centered around the importance of municipalities being able to identify and map small wetlands, how to prioritize what data to collect to map a wetland using GPS/GIS equipment due to limited funding, and the challenge of ground truthing the location of wetlands on private land.

During the discussion the planners stated that clear objectives were needed to guide municipalities on what data to collect , such as: where the wetland is located, what is the extent of the wetlands, and what was the rationale used to classify the wetland, for example, being able to classifying the soils or plants present. There is also a need to be able to explain the data collected by consultants and technicians to non-scientist employees within the municipalities in order to have a common understanding on the need to protect wetlands.

Limited funding appeared to be the number one barrier associated with wetland mapping due to the fact that smaller wetlands are difficult to map using orthophotos as they either do not appear on the orthophoto or they are obstructed from view due to forest canopy cover. Therefore, mapping has to occur on the ground which is labour intensive and often expensive. Another important barrier to mapping of wetlands appears to be the lack of trust between private landowners and the government, and the difficulty in accessing private land for mapping, as most landowners believe that mapping the location of a wetland on their property might decrease their property value.

Suggestions for future solutions of these barriers were discussed in great detail, and focused on how municipalities could receive more funding for mapping wetlands if they began using wetland protection as a justification for improving water quality, providing better stormwater management or improving the effects of climate change. Additionally, GPS/GIS mapping of wetlands could be an excellent base system mapping that eventually could be included with future municipal mapping of drainage or stormwater plans. Kyle Hawes discussed the approach that the city of Kelowna took in the challenge of receiving access to wetlands on private land and suggested that in order to increase landowner acceptance of mapping on their property, municipalities hold open houses to inform the public of what they are doing and the reasons why, as well as sending out letters to private landowners stating that wetlands can increase land value for those that might have wetlands on their property.

The workshop was part of a larger 8 day Institute on the Sea-to-Sky Corridor. This workshop would not have been possible without the financial support of: Habitat Conservation Trust Foundation, Government of British Columbia, Shell, and the Canadian Wildlife Federation.

THURSDAY JULY 12

Indoor Session #1: Importance of Small Mammals and Amphibians (Conference Room, Best Western, Squamish)

Pontus Lindgren (Madrone Environmental Services ltd.) gave a presentation on techniques for small mammal surveys. Common methods and equipment used to trap small mammals were discussed. Participants also learned about the connection between wetland restoration and small mammals, how to measure the success of restoration efforts and about the design and procedures for small mammal trapping.

Afterwards, amphibian biologist Elke Wind (Ewind Consulting) gave a presentation on identifying amphibian species. Wind provided an overview of amphibian populations and the current threats they face.

Outdoor Session #1: Small Mammal Trapping and Amphibian Monitoring (Britannia Slough, Squamish)

Britannia Slough

In the afternoon participants travelled to Britannia Slough, Squamish and learned the basics of small mammal trapping and how to check amphibian traps. The Britannia Slough Sub-Basin is

located on either side of the Sea to Sky Highway, directly north of Squamish's Adventure Center. This is just one of many areas Edith Tobe and local stewards have created habitat for the endangered red-legged frog by constructing 3 wetland complexes which contain 16 pools.

There were 3 pond complexes which had been set with traps left to soak overnight. The participants split into 3 groups. 1 group stayed with Pontus Lindgren to learn about small mammal trapping – which included lessons in assembling a Longworth trap, choosing an optimal location for setting the trap, and overall survey design. The remaining two groups travelled learned about amphibian and invertebrate survey techniques, which included: conducting an inventory of the species captured in gee-nets, management practices, and learning about the threats to amphibians. The groups rotated every 10-15 minutes in order for everyone to see the variety of species captured. Species were returned back to the wetlands after they were recorded. Below is a record of species discovered:

Captured Species at Britannia Slough				
pond	trap	spp	count	stage
1	1	amma	6	larvae
		caddfly	8	larvae
		dive.beetl	3	adult
2	1	raau	1	adult
		caddfly	11	larvae
		dive.beetl	3	adult
		beetl.larvae	1	larvae
1	2	amma	1	larvae
		caddfly	3	larvae
		dive.beetl	1	adult
		pred.dive.btl	1	larvae
2	2	caddfly	3	larvae
		pred.dive.btl	3	larvae
		dive.beetl	1	adult
2	3	caddfly	3	larvae
		dive.beetl	1	adult
		worm	2	
		exoskel	1	
2	4	dive.beetl	3	adult
		caddfly	2	larvae

2	5	tagr	2	larvae
		amma	6	larvae
		caddfly	2	larvae
		dive.beetl	2	adult
		pred.dive.btl	1	larvae
		raau	1	adult
1	3	amma	3	larvae
2	6	amma	6	larvae
		caddfly	3	larvae
		pred.dive.btl	1	larvae
		dive.beetl	1	adult
2	7	amma	6	larvae
		caddfly	4	larvae
		pred.dive.btl	1	larvae
		water.strider	1	adult
3	1	amma	1	larvae
		amby.spp	4	larvae
		dive.beetl	2	adult
		water.strider	1	adult
3	2	amma	13	larvae
		pred.dive.btl	1	larvae
3	3	dive.beetl	4	adult
		bck.swmmr	1	adult
		tagr	3	larvae
		amma	12	larvae
3	4	amma	9	larvae
		dive.beetl	1	adult
3	5	amma	16	larvae
		psre	2	larvae
		dive.beetl	2	larvae

Outdoor Session #2: Wetland Planning and Design (Britannia Slough, Squamish)

After the hands-on monitoring session, Tom Biebighauser trained the participants on wetland design and planning. Participants worked on the site of old Highway 99 to map and plan a groundwater wetland. Participants split into two groups and were directed to two different areas of Britannia Slough. The groups were tasked with finding and marking ideal locations for future wetlands. Participants used what they had learned about water-tolerant vegetation and soil types during previous sessions to guide them through the task of finding an ideal location. Once locations were chosen, participants used a rod and level (laser) to practice survey skills and acquire a sense of elevation requirements in constructing a wetland (<6% slope). Test pits were created to assess the depth of the water table. Participants then discussed the desired size of their wetland and the primary function it would serve (habitat creation, stormwater retention, etc.). Flagging tape was used to mark the perimeter of the desired area and handheld GPS units to create a track of the wetland's perimeter.

Indoor Session #2: Bats of BC (Two Birds Eatery, Squamish)

In the evening, Erin Rutherford (*South Coast Bat Action Team*) gave a presentation on bat species of BC. Participants learned about the importance of bats and the connection between bats and wetlands, current threats to bats, ways to provide habitat for bats, and an overview of monitoring techniques –which was then followed by a live monitoring session at Brohm Creek.

Outdoor Session #3: Bat Monitoring (Brohm Creek)

Participants travelled to Brohm Creek Wetland complex where Doug Sinclair and Jen Barrett from the South Coast Bat Action Team came to help administer the acoustic monitoring and mist-net trapping sessions, as well as answer any questions the group had about using monitoring equipment for listening to echolocation. The South Coast Bat Action Team caught a number of bats. Participants observed the Team conduct a hands-on inventory of the bat species caught.

Photo 1. Pontus Lindgren discusses small mammal trapping. Photo 2. Elke Wind with an amphibian trap. Photo 3. Checking amphibian traps. Photo 4. Owni and Laurie use clinometers to determine slope. Photo 5. Erin Rutherford measures the wingspan of a bat.

Outdoor Session #1: Groundwater Wetland Planning and Construction (Pinecrest Wetland, Whistler)

The group travelled to Pinecrest Wetland in Whistler to begin planning the restoration of two groundwater wetlands onsite. The group used plans to design and construct a groundwater wetland with the use of an excavator. This was a full day activity outdoors where participants gained valuable hands-on experience. Joined by an excavator, participants were led by Tom Biebighauser, Edith Tobe and Michelle Jones to put together the project.

To determine subsurface conditions, soil sampling and groundwater level measurements were conducted. Two test pits were excavated until groundwater was exposed. The soil and water layers were identified and measured. In addition to the test pits, hand tools were used to take soil samples at various other locations around the site to compare the groundwater levels in test pits. Participants learned that the proposed location should ideally have a percent slope less than 6% and an elevation change no larger than 1m from wetland edge to wetland edge.

Pinecrest Wetland

The group coordinated on several levels to successfully construct the wetlands. Once the excavator finished creating a depression into the ground, the group conducted a number of essential tasks in small teams. Tom Biebighauser supervised the whole creation process, from marking the excavation edges with pin flags to overseeing the participants using the rod and level to produce an elevation profile for the site and communicating the measurements to the excavator operator. Some participants engaged in salvaging amphibians so they were not harmed during the wetland construction. Some engaged in transplanting trees, replanting

vegetation and seeding to speed up regeneration of the site. After completing the planting activity the participants spread straw on the exposed soils surrounding the wetland to retain moisture (reduce wind erosion) and reduce soil runoff. Throughout the day participants had the opportunity to observe and also take part in collecting nearby large woody debris to create additional wetland habitat. For a list of the native plants brought in as recommended by Ms. Jones, refer to Appendix 1.

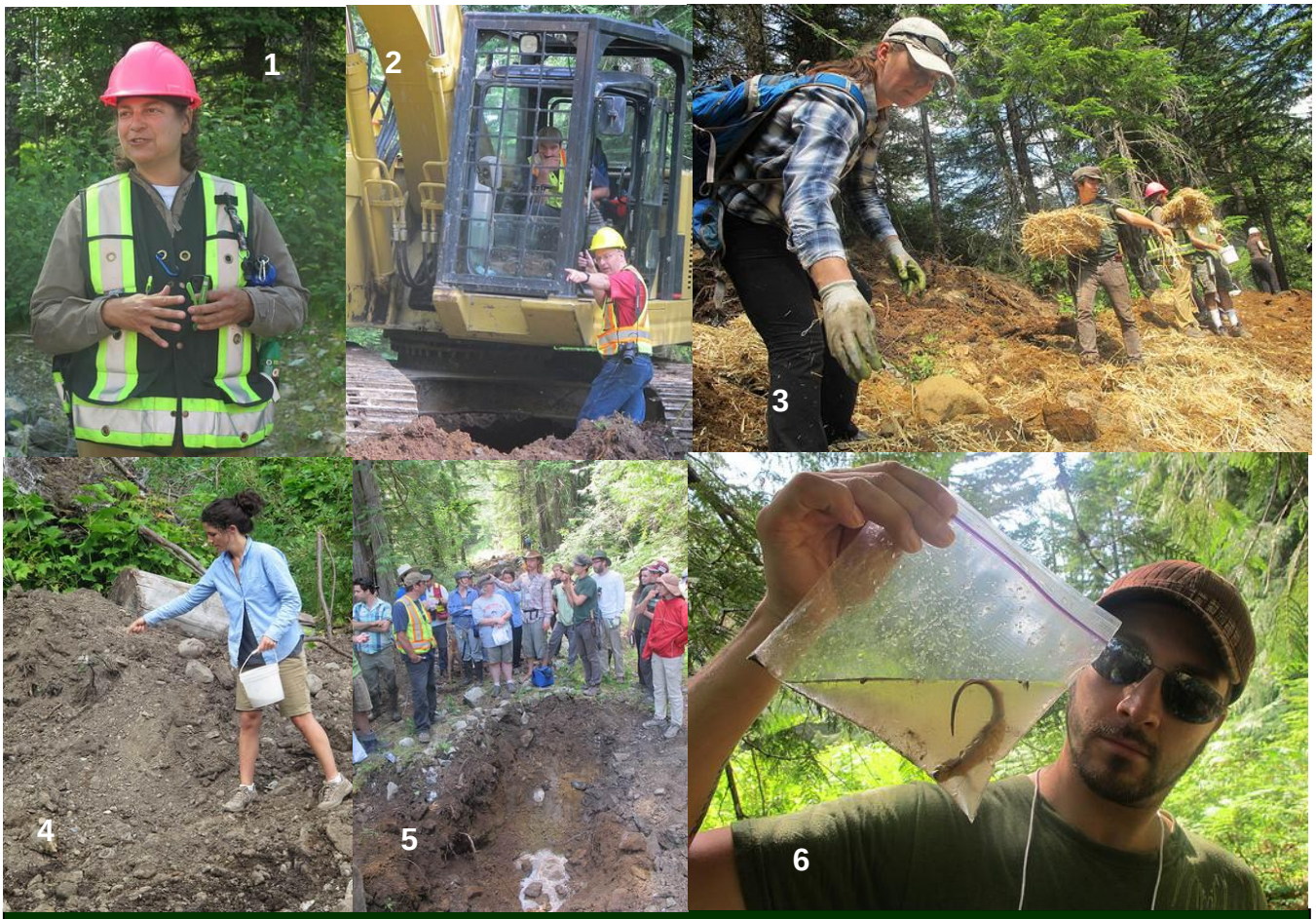


Photo 1. Edith lays the plans for restoring a groundwater wetland. Photo. 2. Tom explains the plans to the contractor. Photo 3. Rachel and others spread stray to prevent erosion. Photo 4. Kate spreading local seeds to encourage vegetation. Photo 5. A test hole yields water. Photo 6. Mike holding a Roughskin Newt.

Outdoor Session #1: Construction of Liner Wetlands (West Brohm Creek Wetland Complex, Squamish)

Saturday was an exciting day for many of the participants. Most Wetland Institutes in the past have created either liner *or* groundwater wetlands but this year participants had the privilege of creating both. Two liner wetlands were constructed on an old section of highway and added to a string of small liner wetlands that were created in previous years by Edith Tobe and local stewards.

Participants learned how to make the calculations, measurements, and cuts to create a liner of proper dimensions. Furthermore, Tom Biebighauser discussed the proper type of liner and geotextile fabric to use when constructing wetlands. Many liners contain elements like fungicides that would inhibit normal wetland health and development so should be avoided. Participants were taught how to determine the proper location and size of a liner wetland. During excavation through the old road bed Biebighauser ensured that many had hands on experience determining the proper depths and slopes of a liner wetland using surveying equipment. Participants smoothed the newly created hole and removed any large rocks and roots that may have otherwise pierced the new liners. A liner buttressed by layers of geotextile was placed in the depression and then hammered into place with long pegs. After trimming the excess liner, the excavator placed sand and soil over top, which participants again smoothed out. Coarse woody debris was strategically added to provide habitat and prevent bike and ATV access through the wetland itself. Upon seeding the surrounding area and placing straw around to prevent erosion, the group's first liner wetland was completed.

Old roadbed at West Brohm Creek

The group proceeded to repeat the process to create another liner wetland further down the old road bed. The second liner was twice the depth of the first and was oval in shape opposed to the first wetland, which was circular. This shape of a liner wetland is much more difficult to create as it requires more difficult calculations. However, this gave participants more hands on experience, including how to mark a perfect oval for excavation.

During the wetland creation, several mini educational activities took place including a discussion on snail biology by South Coast Conservation Program's Pamela Zevit, plant identification exercises by Michele Jones, and a tour of previously created liner wetlands by Edith Tobe.

Groups of participants were also provided bins with 5 different soil types and asked to explain how to construct wetlands in each one. For example, one bin contained clay soil with no water, while another contained sandy loam with a low water table. It was clear that participants had learned a great deal as each participant knew what to do with each soil type.

Since the second liner wetland was twice the depth of the first, it took much longer, pushing the creation of the third wetland to the following morning.

Photo 1. Tom explains the importance of soil types for the construction of wetlands. Photo. 2. Participants creating a path to guide visitors. Photo 3. Trimming the excess liner. Photo 4. Marking the exact place for pegs. Photo 5. Where there was road, there are wetlands. Photo 6. The group after completing construction.

2.0 FINAL COMMENTS AND RECOMMENDATIONS

The legacy left behind by the 2012 Wetlands Institute goes beyond the restored wetlands at West Brohm Creek and Pinecrest sites. Individuals who participated in the course have the capacity to restore and steward wetlands in BC and beyond. Some of the most immediate conservation outcomes include 2012-13 restoration activities by participants, including:

- Celia Serrano, of Balance Ecological, who is restoring habitat in the Fraser Valley for Oregon Spotted Frog
- Luke Warrenton and Peter de Koning, of A Rocha Canada, who are restoring a wetland complex in Campbell River watershed for coho salmon and Salish sucker.
- Kai Rietzel, of Cowichan Land Trust & Quamichan Watershed Stewardship Society, who is restoring wetlands in the Quamichan Valley for wildlife habitat.

Aside from restoration activities, partnerships developed among WI participants and BCWF staff, have enhanced projects and programs for wetland conservation. For example, in the Winter of 2013, the BCWF partnered with Anne and Bryan Green, to co-host a Map our Marshes workshop at Burnaby Lake.

The WEP will continue to follow the progress of WI 2012 participants and provide support wherever possible to help them successfully achieve their conservation projects.

3.0 FUTURE WETLANDS INSTITUTE PROGRAMMING

The next Wetlands Institute is scheduled for 2013 in the West Kootenays. The extent of wetlands in the Columbia Basin is severely compromised due to dam impacts (Utzig and Schmidt 2011). In addition to the Fish and Wildlife Compensations Program's stated commitment to wetland conservation and restoration of wetland sites, other action plans in the Columbia Basin identify wetlands as a priority habitat for conservation/restoration (e.g., see Green et al. 2006)

The BC Wildlife Federation will build the capacity of West Kootenay residents to protect, enhance and construct wetlands through the delivery of several workshops: a Working Group Session, Wetlands Institute workshop, and Map our Marshes Workshop in 2013.

APPENDIX 1: PLANT LISTS

Table 1. Existing Plants in the Channel near work site. Survey completed July 11, 2012. This is not a comprehensive list. Not all species were recorded.

Common Name	Latin Name
Shrub species	
hardhack	*Spiraea douglasii ssp. douglasii*
Herb species	
grasses	
reed canarygrass	*Phalaris arundinacea*
sedges	*Carex spp.*
spike-rush	*Eleocharis sp.*
yellow pond-lily	*Nuphar polysepala*

Table 2. Existing Plants in the old wetland. Survey completed July 11, 2012. This is not a comprehensive list. Not all species were recorded.

Common Name	Latin Name
Tree species	
black cottonwood	*Populus trichocarpa*
Pacific willow	*Salix lasiandra var. lasiandra*
trembling aspen	*Populus tremuloides*
Shrub species	
black hawthorn	*Crataegus douglasii*
black twinberry	*Lonicera involucrata*
hardhack	*Spiraea douglasii ssp. douglasii*
mountain-ash	*Sorbus sp.*
shrubby cinquefoil	*Dasiphora fruticosa*
Herb species	
American speedwell	*Veronica beccabunga ssp. americana*
bull thistle	*Cirsium vulgare*
common dandelion	*Taraxacum officinale*
common plantain	*Plantago major*
creeping buttercup	*Ranunculus repens*
dagger-leaf rush	*Juncus ensifolius*
dock	*Rumex spp.*
forget-me-not	*Myosotis sp.*
great mullein	*Verbascum thapsus*
greater bladderwort	*Utricularia macrorhiza*
hedge-nettle	*Stachys sp.*
lady's-thumb	*Persicaria maculosa*
large-leaved avens	*Geum macrophyllum*
marsh cinquefoil	*Comarum palustre*
orange-red king devil	*Hieracium aurantiacum*
oxeye daisy	*Leucanthemum vulgare*
pineapple weed	*Matricaria discoidea*
red clover	*Trifolium pratense*
reed canarygrass	*Phalaris arundinacea*
rushes	*Juncus spp.*
sedges	*Carex spp.*
self-heal	*Prunella vulgaris*
western St. John's-wort	*Hypericum scouleri*
white clover	*Trifolium repens*

Table 3. Plant list from the Loggers Lane Trail Wetland. Survey completed July 2012. This is not a comprehensive list. Not all species were recorded.	
Common Name	**Latin Name**
Tree species	
bigleaf maple	*Acer macrophyllum*
black cottonwood	*Populus trichocarpa*
red alder	*Alnus rubra*
vine maple	*Acer circinatum*
Shrub species	
black gooseberry	*Ribes lacustre*
coastal red elderberry	*Sambucus racemosa var. arborescens*
red-osier dogwood	*Cornus stolonifera*
salmonberry	*Rubus spectabilis*
thimbleberry	*Rubus parviflorus*
Herb species	
creeping buttercup	*Ranunculus repens*
false lily-of-the-valley	*Maianthemum dilatatum*
lady fern	*Athyrium filix-femina*
piggy-back plant	*Tolmiea menziesii*
sedges	*Carex spp.*
skunk cabbage	*Lysichiton americanus*
spiny wood fern	*Dryopteris expansa*
sword fern	*Polystichum munitum*
Moss, Liverwort, and Non-vascular species	
	Rhytidiadelphus sp.
haircap moss	*Polytrichum sp.*
heron's-bill moss	*Dicranum sp.*
lanky moss	*Rhytidiadelphus loreus*

(*All lists were compiled by Michele Jones*, Mimulus Biological Consulting)

Table 4. Plant list from the enlarged Pinecrest Wetland. Survey completed July 13, 2012. This is not a comprehensive list. Not all species were recorded.	
Common Name	**Latin Name**
Tree species	
red alder	*Alnus rubra*
western hemlock	*Tsuga heterophylla*
western redcedar	*Thuja plicata*
Shrub species	
Alaskan blueberry	*Vaccinium alaskaense*
false azalea	*Menziesia ferruginea*
hardhack	*Spiraea douglasii ssp. douglasii*
highbush-cranberry	*Viburnum edule*
red huckleberry	*Vaccinium parvifolium*
salal	*Gaultheria shallon*
saskatoon	*Amelanchier alnifolia*
thimbleberry	*Rubus parviflorus*
trailing blackberry	*Rubus ursinus*
Herb species	
American speedwell	*Veronica beccabunga ssp. americana*
bracken fern	*Pteridium aquilinum*
buckbean	*Menyanthes trifoliata*
bunchberry	*Cornus canadensis*
pink wintergreen	*Pyrola asarifolia*
sedges	*Carex spp.*
skunk cabbage	*Lysichiton americanus*
spiny wood fern	*Dryopteris expansa*
twinflower	*Linnaea borealis*
	Rhytidiadelphus spp.
step moss	*Hylocomium splendens*

Table 5. Plant list from the roadbed Pinecrest Wetland. Survey completed July 13, 2012. This is not a comprehensive list. Not all species were recorded.	
Common Name	**Latin Name**
Tree species	
coastal Douglas-fir	*Pseudotsuga menziesii var. menziesii*
red alder	*Alnus rubra*
shore pine	*Pinus contorta var. contorta*
western hemlock	*Tsuga heterophylla*
western redcedar	*Thuja plicata*
willows	*Salix spp.*
Shrub species	
false azalea	*Menziesia ferruginea*
falsebox	*Paxistima myrsinites*
hardhack	*Spiraea douglasii ssp. douglasii*
oval-leaved blueberry	*Vaccinium ovalifolium*
red huckleberry	*Vaccinium parvifolium*
red-osier dogwood	*Cornus stolonifera*
salal	*Gaultheria shallon*
saskatoon	*Amelanchier alnifolia*
trailing blackberry	*Rubus ursinus*
Herb species	
bracken fern	*Pteridium aquilinum*
bunchberry	*Cornus canadensis*
cleavers	*Galium aparine*
dagger-leaf rush	*Juncus ensifolius*
lady fern	*Athyrium filix-femina*
large-leaved avens	*Geum macrophyllum*
Menzies' pipsissewa	*Chimaphila menziesii*
one-sided wintergreen	*Orthilia secunda*
orange-red king devil	*Hieracium aurantiacum*
pink wintergreen	*Pyrola asarifolia*
queen's cup	*Clintonia uniflora*
sedges	*Carex spp.*
self-heal	*Prunella vulgaris*
twinflower	*Linnaea borealis*
willowherb	*Epilobium sp.*
Moss, Liverwort, and Non-vascular species	
	Rhytidiadelphus spp.
step moss	*Hylocomium splendens*

Table 6. Plant list from the West Brome Creek roadbed wetlands. Survey completed July 14, 2012. This is not a comprehensive list. Not all species were recorded.	
Common Name	**Latin Name**
Tree species	
bigleaf maple	*Acer macrophyllum*
black cottonwood	*Populus trichocarpa*
cascara	*Rhamnus purshiana*
paper birch	*Betula papyrifera*
red alder	*Alnus rubra*
vine maple	*Acer circinatum*
western hemlock	*Tsuga heterophylla*
western redcedar	*Thuja plicata*
Shrub species	
black gooseberry	*Ribes lacustre*
coastal red elderberry	*Sambucus racemosa var. arborescens*
devil's club	*Oplopanax horridus*
oceanspray	*Holodiscus discolor*
red-osier dogwood	*Cornus stolonifera*
salmonberry	*Rubus spectabilis*
thimbleberry	*Rubus parviflorus*
trailing blackberry	*Rubus ursinus*
Herb species	
grasses	
lady fern	*Athyrium filix-femina*
large-leaved avens	*Geum macrophyllum*
Pacific bleeding heart	*Dicentra formosa*
spiny wood fern	*Dryopteris expansa*
sword fern	*Polystichum munitum*
wall lettuce	*Mycelis muralis*
Moss, Liverwort, and Non-vascular species	
lanky moss	*Rhytidiadelphus loreus*
step moss	*Hylocomium splendens*

APPENDIX 2: – 2012 WETLANDS INSTITUTE BIOGRAPHIES

Instructor Biographies

Elke Wind:
Ewind Consulting

Elke Wind has been a self-employed contract biologist living and working on Vancouver Island since 2000. In 1996, she received her M.Sc from the University of British Columbia. Her thesis research investigated effects of forest fragmentation on Wood Frogs in north-central Alberta. Since that time, her main area of research and monitoring has been habitat management for amphibian populations. Ms. Wind has written numerous reports for government, species recovery teams, and non-profit organizations, including the COSEWIC status report for the Western Toad, *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia* for the Ministry of Environment, and *Habitat Management Guidelines for Amphibians and Reptiles of the Northwestern United States and Western Canada* for Partners in Amphibian and Reptile Conservation (PARC). More recently, Ms. Wind's work has expanded into road issues for amphibians and wetland construction and restoration. She has extensive experience as a Board member for the Society for Northwestern Vertebrate Biology, and as Co-chair of the Northwest chapter of PARC.

Erin Rutherford:
South Coast Bat Action Team

Erin Rutherford is passionate about wetlands and the flora and fauna they sustain, especially bats. As Project Manager for the South Coast Bat Action Team Erin conducts bat monitoring across the south coast of BC, monitoring bats using acoustic bat detectors, mist-net trapping and bat roost surveys. Erin also conducts community education and bat call acoustic analysis with her team members at SCBAT and is the volunteer conservation monitoring team leader at the Stanley Park Ecology Society, where she runs a long-term bat monitoring survey. A graduate of the Fish, Wildlife and Recreation program and Ecological Restoration program at BCIT, Erin has participated in several wetland restoration projects, including the 2011 BCWF Wetland Institute and the Logan Lake inlet wetland restoration project. For more information about Erin's work with the South Coast Bat Action Team please check out www.scbat.org or like SCBAT on Facebook at www.facebook.com/SouthCoastBAT.

Greg Sauer:

City of Kelowna

Greg Sauer has been in the role of Environment and Land Use Planner with the City of Kelowna since 2009. Prior to joining the City, Greg worked for a small environmental consulting firm in Calgary following completion of graduate studies at the University of Calgary (Environmental Design – Planning). Greg is a generalist planner with involvement in all aspects of the City's land use and has had the good fortune to be involved with environmental land use planning at site, city and regional scales. Greg is actively involved with regional initiatives including a stream restoration project (Mission Creek Restoration Initiative) and has served on the Steering Committee for the Okanagan Collaborative Conservation Partnership which recently completed the Foreshore Inventory & Mapping and an Aquatic Habitat Index for Okanagan Lake.

Jack Minard:

Tsolum River Restoration Society and Comox Valley Land Trust

Jack is the executive director of both the Tsolum River Restoration Society and the Comox Valley Land Trust, and is a long time resident of the Comox Valley, having moved from Vancouver to Black Creek in 1964. He works closely with local government staff and politicians in his role as Local Government Chair of the Comox Valley Conservation Strategy's Community Partnership.

Jack also sits as Chair of the Salmon Enhancement and Habitat Advisory Board – a provincial organization sponsored by DFO that represents the 30,000 volunteers doing salmon enhancement and stewardship work in every corner of the Province. He has a long background of environmental activism and continues to bridge people and organizations to discover win-win solutions and effective partnerships.

John Tchopp:

John is a retired business person that has lived in the Pemberton Valley for the last 34 years. Since his home is in the Meadows, birds are facing him daily. It came naturally to learn the names of all those birds around him. Digital photography has made it easier for John to "shoot" and identify the birds. John is also involved in the Breeding Bird Survey and the Christmas Bird Count

Kyle Hawes:
Ecoscape Ltd.

Kyle Hawes has over 14 years of experience conducting numerous field studies within aquatic and terrestrial habitats throughout British Columbia, Ontario, the Northwest Territories, and Alberta. Mr. Hawes has provided services to a broad sector base from mining, to forestry, natural resource projects, transportation, urban land development, and various research and conservation initiatives. Mr. Hawes has a breadth of skills in aquatic habitat studies, fisheries, benthic invertebrate taxonomy, amphibian and reptile inventory and life history studies, bird inventories/counts, terrestrial ecosystem mapping and vegetation surveys, wetland evaluations/classifications, Sensitive Habitat Inventory and Mapping, small mammal surveys, and stream and wetland restoration.

Kyle has worked closely with regional, provincial, and federal inventory specialists to develop and refine inventory protocols and data collection requirements and standards. He has been a leader in the development of spatial inventory programs. Specifically, he has developed wetland inventory methods that have provided the City of Kelowna with an invaluable landuse planning tool for wetland conservation. More recently, he has developed a new assessment protocol for spatial mapping of large rivers and associated riparian and floodplain ecosystems in BC (Lower Shuswap River) and subsequently developed a comprehensive habitat index for these systems.

Michelle Jones:
Mimulus Biological Consultants

Michele, a returning instructor for the Wetlands Institute, has been working as a field biologist for over 25 years as well as teaching technical courses at two colleges. Her specialty is assessing ecological systems, particularly in wet habitats. She is well versed at plant identification, soil analysis, ecosystem classification, navigation, and mapping. She operates her own consulting firm (Mimulus Biological Consultants) and works throughout the province, focusing primarily on ecological assessments and restoration.

Michele has taught vegetation and forest assessment methods as well as impact assessment. She is one of the four provincial ecology instructors for the Vegetation Resources Inventory, a provincial Resource Inventory Standards Committee (RISC) program, and has worked on both the Sensitive Ecosystem Inventory (SEI) and the National Forest Inventory (NFI). Finally, she instructs the Riparian Areas Regulation Field Methodology and the Environmental Technician Certificate Program through Vancouver Island University. Michele is very involved in community stewardship and is a certified Streamkeepers (DFO) and Wetlandkeepers (BCWF) instructor.

Tom Biebighauser:

Center for Wetlands and Stream Restoration

Tom is a Forest Service Wildlife Biologist who has restored over 1,400 wetlands in 20-States and 2-Canadian Provinces, assisting thousands of private landowners and agency personnel with the design and construction of wetlands for improving wildlife habitat. He teaches practical, hands-on workshops across North America where participants learn about restoration and drainage by becoming involved in the design and construction of naturally appearing and functioning wetlands. Tom has developed highly successful and inexpensive techniques for restoring and repairing wetlands on mined lands, steep slopes, mountain ridges, large valleys, timber sale areas, and at schools. He's written three books about restoring wetlands *A Guide to Creating Vernal Ponds* in 2003, *Wetland Drainage, Restoration, and Repair* in 2007, and *Wetland Restoration and Construction - A Technical Guide*, in 2011. Photos showing some of the wetlands he has built are available for viewing at: www.wetlandsandstreamrestoration.org. Tom lives on Twisted Arm Farm in Morehead, Kentucky.

Kristina Swerhun:

Sea to Sky Invasive Species Council

Kristina has been with the Sea to Sky Invasive Species Council since May 2009, before the non-profit society was formed. Her background is native plant biology and during her Masters she established long-term monitoring stations on the south coast of BC to study the effects of climate change on high elevation plant communities, which she continues to coordinate. Kristina's field experience as a plant biologist extends from Northern California to Southern BC. Whistler has been her home since 1996 and she is currently President of the Whistler Naturalists Society and a contributor to the Whistler Biodiversity Projects**.**

Pontus Lindgren:

Madrone Environmental Sevices

Pontus is a small mammals and species at risk specialist with Madrone Environmental Services.

Guest Speaker Biographies

Edith B. Tobe

Squamish River Watershed Society

Edith is a professional biologist who moved to Squamish in 1992. Her passion for biology, wetlands, and nature began at a very early age and it was not unusual to find frogs, caterpillars, or other critters on or around her (in fact, it still isn't all that unusual). Edith went to the University of Waterloo where she earned a degree in Biology followed by an Engineering Technologist diploma from Seneca College of Applied Arts and Science. She manages her own environmental consulting firm in Squamish, EB Tobe Enterprises. In 1993, Edith helped form the group that would later become the Squamish River Watershed Society (www.squamishwatershed.org) where she has been working as project manager and executive director since 1998.

Her main focus these days is working on watershed restoration related projects within the Sea to Sky Corridor, implementing education outreach programs for K-7 grades, and organizing events, workshops, and conferences for the Sea to Sky Corridor on watershed management related issues, including policy, operations, and protection of our greenways. From 2005 to 2009 Edith was able to assist The Land Conservancy in partnering with the District of Squamish to purchase a 16 hectare parcel of land that abuts onto wetlands and provides an east/west greenways connector across Highway 99. It is her hope that in the future they will be able to create amphibian habitat on these lands as well as continue to improve water quality and habitat for fisheries and wildlife. Edith enjoys living in Squamish where we have access to the mountains, the ocean, and an abundance of amazing streams, trails, and natural areas. On pretty much any day you can find her out hiking somewhere with her two red heelers.

Veronica Woodruff

Stewardship Pemberton Society

Veronica is a previous Wetlands Institute Participant and a board member with Stewardship Pemberton. Founded officially in 2007, it is a community group dedicated to education and the protection and restoration of the natural environment. She is a key player in conservation issues around Pemberton.

Facilitator Biographies

Neil Fletcher

BCWF Wetlands Education Program

Neil affirmed his decision to pursue a career in wetlands after preparing a management plan for a provincially significant wetland in Ottawa, Ontario. This wetland suffered multiple threats, including: invasive species, poor consultation, toxic nutrient loading, and ongoing development pressures. From this experience he found that wetlands provide a rich social and natural framework for practicing resource management which is both complex and endlessly fascinating.

He has an undergraduate degree in Environmental Science (specializing in Conservation Biology) from Ottawa University, where his thesis explores impacts to waterways from agricultural nutrient loading. His graduate degree is from Simon Fraser University's School of Resource and Environmental Management, where he pursued certificates in both Planning and Development. Previously he has worked for the Canadian Forest Service, Health Canada, BC Hydro, and the South Nation Conservation Authority. He has worked with BC Wildlife Federation since 2010 to plan and deliver wetland related workshops across the province.

Jason Jobin

BCWF Wetlands Education Program

Passionate about the environment from a young age, Jason took the responsibility of expanding his knowledge and joining the Environmental Sciences program at Trent University. Four years later, Jason graduated with an Honours Joint Bachelor of Science in Environmental Sciences and Biology with a specialization in Ecological Conservation. Trent allowed Jason to strengthen his interest in wetland conservation, and under the teachings of Professor Tom Whillans he became inspired to get involved with Wetland conservation movements. Upon moving to BC, Jason immediately recognized the value of volunteering with the BC Wildlife Federation and was eventually hired as an intern.

Mike Botic

BCWF Wetlands Education Program

Mike Botic is one of the BCWF 2012 Wetlands education programming assistant interns. He loves any experience that he can have outdoors; camping, hiking, snowboarding, fishing, and kayaking. Mike's passion for the environment really started after his first trip to Tofino where he really got the first chance to witness the awesome power of mother nature, huge waves, massive trees, wind, and wildlife everywhere. Mike's interest in wetlands begin when he started learning more about their processes at B.C.I.T., and found out how important they are in creating habitat for birds, and many amphibians. Currently Mike is completing his sustainable

resource manager technician diploma at B.C.I.T., with a primary focus on environmental community planning. Last year Mike and his colleague developed, implemented, and successfully completed their 100% GPS tree inventory technician project for the Marine Drive Golf Course. Mike is very proud of this project because they designed it from the ground up, and are currently testing it to see if it can be applied for other applications in the urban environment. Mike wanted to be involved in the BCWF, because he wanted to learn from an organization that demonstrated as much passion for the outdoors and the natural environment as he does, and share that knowledge with others. Mike plans to continue his education with B.C.I.T. and obtain a degree in sustainable business management, and eventually be the head of a sustainable energy company based out of Vancouver.

Owni Toma

BCWF Wetlands Education Program

Owni grew up enjoying BC's outdoor recreation and nature through Scouts and day trips with the family to beautiful areas like Stanley Park, Cultus, Garibaldi, Seymour, Harrison and everything in-between. He constantly craves outdoor adventure whether its kayaking, biking, hiking, bushwhacking, snowcaving or just plain getting muddy. He loves B.C. and believes he can make it stay the beautiful landscape that it is today. He studied Environmental Sustainability at UBC Geography which taught him the environmental, economic and social workings that underpin urban planning practices ranging from new development to conservation/rehabilitation. His dream career consists of being immersed in nature while also having an influence on sustainable designs in the City. He stays inspired through new experiences, adventures, meeting strangers, and developing ideas.

Participant Biographies – 2012 Wetlands Institute

Adam Huggins

Purple Thistle, Urban Wetland

Adam is an herbalist and urban farmer. He is a great lover of the wilds and of nature's wisdom in performing functions that we all too often overlook in our efforts to create more work for ourselves - hence, wetlands are of great importance to him.

He currently coordinates a collective of gardeners in Vancouver based out of the Purple Thistle Centre where they grow food, keep bees, practice permaculture, and help to heal the damaged industrial ecology of their neighborhood. They are currently working to restore a polluted dumpsite on the edge of a newly-planted food forest into a wetland for habitat, filtration, and educational purposes

Adrien Baudouin

Whistler Resident, Wetland Restoration

Hailing from Couvin, Belgium, Adrien graduated from the University of Louvain in September 2010 with a Master Degree in Ecology and Organism Biology. Shortly after, he moved to Whistler. BC. Since being here, he has held various service industry jobs and completed volunteer work within the local ecology community. Kyle hopes that attending the wetland workshop will allow him to improve his knowledge of the beautiful environment that is the Sea to Sky corridor.

Ann and Bryan Green

Burnaby Lake Park Association, Invasive Species Management

Ann and Bryan Green are the Volunteer Co-coordinator and Chair (respectively) with Burnaby Lake Park Association. The BLPA has been operating around the lake for over 30years. It was responsible for creating the original 12km of walking trails circumnavigating the lake, and more recently, spearheading the development, design and construction of the wheelchair accessible viewing platform. The BLPA continues to be active through the variety of programs it runs, which include Weedbusters (Invasive Plant Removal), nest boxes (Wood Duck, swallow and flying squirrel), Western Painted Turtle monitoring, a butterfly garden, nature walks and educational outreach.

Brent Matsuda

Biodiversity West Environmental Consulting, Constructing Wetlands in Burnaby Schoolyards

Brent is a Senior Ecologist/Principal with Biodiversity West Environmental Consulting. He would like to develop a program in Burnaby where kids create wetlands in their own school yards, similar to what Tom Biebighauser has already been conducting in the USA. It is hoped that this would set a precedent and other cities and municipalities would follow suit. Discussions with environmental coordinators in various cities & municipalities has already generated interest (e.g., Richmond, Port Moody) and they would like to know more about how this has been conducted elsewhere, so it's a matter of getting the ball rolling.

Celia Serrano

Balance Ecological, Wetland Restoration

Originally from Spain, Celia arrived in B.C. by a youth professional program, which has given her the opportunity to work with local Biologists in the Agassiz area (Fraser Valley). A Biologist with experience in community conservation projects, habitat assessment and education she's been involved in monitoring projects for species at risk such as the Oregon Spotted Frog, Red Legged Frog, and Salish Sucker in the Fraser Valley. Soon she will be working with this enthusiastic team on restoration projects in the area, which will represent new opportunities for the native wildlife.

Dan Borslein

UBC Grad Student, Squamish Waterfront Enhancement

Dan is currently completing his Masters in Landscape Architecture at the University of British Columbia. Having taken multiple landscape planning & management courses, with William Marsh and Patrick Mooney, he has become quite familiar with the benefits of wetlands. He believes landscape architecture provides an opportunity to enhance wetlands. Dan's goal is to create ideas and designs of park spaces which can showcase the beauty, recreational possibilities, and other ecological services of a wetland.

Daniel Dejong

BCIT Student, Logan Lake and Deer Lake Park wetland enhancement

Daniel Dejong is currently a student at the British Columbia Institute of Technology and is nearing completion of his bachelor's degree in ecological restoration. Once completed, he hopes to find employment working on restoration projects in Canada and abound. He love the outdoors, and is am very passionate about preserving our natural eco systems so future generations can enjoy the way we are able to. I am really looking forward to the wetland institute in sea to sky country!

Dawn Green

Freelance Writer

Growing up in the back woods of Nova Scotia, Dawn have always had an active imagination leading her, at the tender age of 9, to put pen to paper to start writing her first story. Her first magazine article was published in 2002, on the mighty giants of the sea, the leatherback sea turtles.

This has led me on a journey to make writing her career. Her time in journalist shoes has revolved around working as a columnist, an advertising features writer and a relief journalist while living in Australia for six years. Nowadays Sara calls Squamish, B.C. home, and is a regular contributor to The Pique newsmagazine in Whistler and The Chief newspaper in Squamish. She has also had articles published in The Province, The Vancouver Sun, Mountain Life Magazine and Whistler the Magazine.

Deanna MacTavish

Coastal Painted Turtle Project, Wetland Restoration

Deanna MacTavish is originally from the great province of Manitoba and moved to beautiful BC three years ago. She is a graduate of BCIT's Fish and Wildlife program and is enrolled in the final year of the Ecological Restoration bachelors program there. Currently, she is employed as a Wildlife Field Technician/ Restoration Specialist for the Coastal Painted Turtle Project (CPTP). The CPTP restores turtle nesting and basking habitat and is involved in the restoration of 14 wetland sites in the Alouette Watershed. Through her studies and work, she plans to make wetland restoration her career.

Edward Rothschild

Purple Thistle, Urban Wetland Restoration

Eddie is a gardener with the Purple Thistle group.

Erin Van de Water

BCIT Student, Rithet's Bog Enhancement

Erin is currently working towards a degree in Ecological Restoration at BCIT. A plant enthusiast, Erin is particularly interested in the terrestrial component of wetland restoration and is keen to learn more about bog habitat restoration. Her proposed project for the Wetlands Institute course involves looking at vegetation regrowth at Rithet's Bog on Vancouver Island.

Pictured: Erin (left) and participate in bog restoration at Beaver Lake in Stanley Park

Fiona Wright

North Shore Wetland Partners Society, Wetland Stewardship/Enhancement

Fiona has been volunteering for conservation works in North & West Vancouver for 20 years. Her passion for watersheds on the north shore was instrumental in assisting to coordinate the Wetlandkeepers, Cypress Bowl 2010.

Ian Wright

Wetland Technician, Shawnigan Lake Enhancement

Ian is a Wetland Restoration Technician at Shawnigan Lake School. The school hopes to develop an educational program focused on wetland restoration. It is the hope that this program with foster ecological literacy and a sense of environmental stewardship among students by providing students with hands on learning experiences in the field.

Ilana Fonarioy

Purple Thistle, Urban Wetland Restoration

Focusing on soil, remediation, culture and society, Ilana is completing her bachelors of science at the University of British Columbia. Eventually she hopes to find her way into the world of mycology and their instrumental healing elements. She also hopes to learn to use her hands to build the things she needs instead of buying them. Ilana is interested in wetlands because of their unique mix of land and water.

Jakob Karpik

BCIT Grad, Killarney Park Enhancement

Jakob is a Wetland Restoration Project Leader at Killarney Park. They hope to encourage use of a flooded field in Killarney Park. It is located in an urban area, adjacent to a high school and community centre so has great potential for community involvement and education.

Jasmine Dobson

Jasmine has a broad background in environment science with a current focus in the coordination of environmental assessments (EA). She has over five years environmental experience in both the private and non-profit environmental sector, and is familiar with EA regulatory requirements at a provincial, territorial, and federal level. In addition to EA experience, Jasmine has participated in a wide variety terrestrial biology and applied snow avalanche studies throughout BC.

Julia Alards-Tomalin

BCIT Student, Deer Lake Park Wetland Restoration

Growing up on a farm in rural Manitoba, Julia Alards-Tomalin was surrounded by 80 acres of mixed forest. There were two wetlands on that land; one natural and one she watched my parents build when she was just a child. Julia had the opportunity to observe this barren clay hole change over the years as it

naturalized and became the haven for frogs, dragonflies and marsh birds that it is today.

Her upbringing has created strong ties to the natural world. This led her to seek an education that involved the outdoors, so she enrolled in the forestry program at BCIT. After that she went on to work with trees and shrubs in a nursery and took a course in ecological landscape design. She is currently enrolled in the Ecological Restoration program at BCIT, where she is focusing on wetland restoration. Over the next year she will be involved in developing a wetland restoration project with the city of Burnaby in Deer Lake Park, and she also volunteers with the Stanley Park Ecological Society working to restore the Beaver Lake Bog. Someday she would like to restore wetlands in Manitoba in an effort to help clean up Lake Winnipeg, where she used to swim as a child.

Kai Rietzel

Cowichan Land Trust and Quamichan Stewards, Wetland Restoration

Kai has been a Project Coordinator for the Cowichan Land Trust and the Quamichan Stewards for two years. She was introduced to wetland restoration through my project work and is really excited to be working to restore wetland areas in the Quamichan watershed.

She has a degree in Geography from VIU and have worked and volunteered for many environmental non-profit groups. Kai love taking her kids out to enjoy nature and teaching them all that she knows.

Kate Ballegooyen

BCIT Student

Kate grew up in Saskatchewan surrounded by prairie potholes. She moved to Vancouver and obtained a Bachelor of Arts in Geography and Political Science in 2010. While at UBC, she worked at the horticultural research greenhouse under David Kaplan and learned a great deal about plant management, identification and bio-controls. Kate also worked at the UBC Botanical Gardens as the education and outreach assistant. After travelling and WWOOFing throughout the Middle East and Europe, she decided to pursue a B.Sc. in Ecological Restoration at BCIT. She is interested in restoring wetlands lost to agricultural or urban development.

Karenn Bailey

BCIT Student

Karenn is enrolled in the Fish, Wildlife and Recreation program at BCIT. In addition, she has been monitoring wetlands in Squamish.

Kyle Rasmussen

Somenos Marsh Wildlife Society, Wetland Research

This summer, Kyle is working for the Somenos Marsh Wildlife Society (SMWS) as a geographic consultant. His work is to research the ongoing habitat degradation caused by polluted stormwater and to write a report to the Nature Trust of B.C for the proposal of the altering from agricultural production to installing a filtration/ retention pond. It is the aspiration that this proposed change will have reverberating effects throughout the Somenos wetland area, producing a region wide rainwater management initiative. Kyle is a senior geography student at Vancouver Island University

Laurie Carr

Nelson Resident, Urban Wetland Construction

By attending the Institute, Laurie hopes to explore the potential for wetland creation in urban areas. She plans on building a small wetland on a suburban plot of land. It will be interesting to see what creatures show up naturally as well as people's reaction! She has conducted amphibian surveys as part of her masters on the effects of road mortality on green and leopard frogs in the Ottawa region. Laurie is looking forward to getting her feet wet again.

Luke Warkentin

A Rocha Canada, Wetland Enhancement

This summer Luke interning with the A Rocha Canada conservation science team. Their work focuses on the Little Campbell Watershed, and includes riparian restoration, species at risk surveys, and SHIM mapping, among other things. He's been able to work with biologists with much experience, and is learning a lot. He would like to learn more about practical restoration methods to enhance degraded sites, and designing projects so that many different species benefit from the enhancements. In the fall he will be continuing his biology studies at Simon Fraser University's ecology, evolution, and conservation stream.

The area of their upcoming on-site restoration project is approximately 4000 m2, with 3000 m2 of that being riparian planting, with the remainder being existing river/off-channel or proposed off-channel.

Michelle Hamilton

School teacher, Schoolyard Wetland Restoration

Michelle Hamilton teaches environmental education and science at KLO Middle School in Kelowna. She is a recipient of the Prime Minister Award for teaching excellence and is currently working on a Masters degree in environmental education focused on engaging students in school through nature. Michelle has developed a course in environmental education to inspire future environmental leaders by giving students hands on experience on local environmental issues. Her classes are currently working on greening their school ground with native plants and they have just received approvals to naturalize Fascieux creek that runs through the school property.

Last summer, she built a small liner wetland in her backyard. The wetland has attracted many species so far: raccoons, white tailed deer, squirrels, many species of birds including a pair of Mallard ducks and many insects.

Nicole Schneider:

UBC Grad Student

A Student at UBC's Masters of Landscape Architecture program, Nicole would like to learn as much as possible about wetland restoration. After graduation, she would like to work on ecological restoration projects that are incorporated in local communities. As a landscape architect she will also have the opportunity of educating people about wetlands, and

specifying how they should be constructed when implemented in a design. Currently, she is working with Eckford + Tyacke and Associates, a Vancouver landscape architecture firm. They are working with riparian areas within local communities such as Richmond, Surrey, North and West Vancouver.

Pamela Zevit

South Coast Conservation Program, Partnership Development

As coordinator for the SCCP, Pamela acts as a liaison and facilitates networking with a number of partners and their projects and activities surrounding species and ecological communities at risk. In addition, Pamela has been principal of Adamah Consultants, a specialty company focusing on urban ecological issues on the South Coast of BC since 1999. Her practice as a biology professional uses an approach that integrates ecological literacy, technology, and integrated systems thinking. She work to bridge and resolve conflicts and develop conservation-based solutions between human and non-human species across the private, public and government sectors. Outreach, research and strategic planning for species at risk, invasive species and ecosystem restoration are her expertise. She prefers to focus on areas impacted by intense human settlement - landscapes which provide unique challenges for conservation. Some of her major projects include the Biodiversity Conservation Strategy for Metro Vancouver, The Georgia Basin Ecosystem Initiative/Action Plan, and The Greater Vancouver Invasive Plant Council and for the last several years the South Coast Conservation Program. Julia has been involved with local watershed stewardship organizations in Coquitlam since 1996. Her chief goal is to re-establish the intrinsic connections between nature and human communities to foster positive, sustainable relationships beneficial to both

Paul Berlinguette

North Shore Wetland Partners Society, Wetland Stewardship/Enhancement

Paul is the President at the North Shore Wetland Partners Society. He is currently involved in three wetland areas on the Vancouver's North Shore and monitors several other areas: the Seymour Estuary, Cypress Provincial Park, and Swaywey.

Sarah Kennedy

Ecofish Research

Sarah is an Environmental Technician with Ecofish Research.

Peter De Koning

A Rocha Canada, Wetland Enhancement

Peter is an ecologist with A Rocha Canada, a Christian environmental stewardship and conservation organization. Currently, A Rocha Canada is focusing projects on monitoring species at risk, and a number of restoration projects in the Little Campbell River watershed in South Surrey, Langley and White Rock. These include amphibian monitoring (with a focus on red-legged frog), small mammal trapping for Pacific water shrew, and Salish sucker population assessments and critical habitat mapping. Peter joined A Rocha after completing his M.Sc. in plant ecology at UBC in 2011.

Rachel Drennan

Fraser Valley Watershed Coalition, Wetland Restoration

Rachel is the Outreach coordinator with Fraser Valley Watershed Coordinator and is currently involved in Silverdale Wetlands. She assists in monitoring and maintenance of restored areas. Her hopes are to improve amphibian and bird habitat and create some habitat (isolated from fish if possible). Rachel is also interested in creating yearly programs at wetland to encourage stewardship in the area; possibly wood duck box clean outs and amphibian surveys.

Sara Barker

Klohn Crippen Berger, Wetland Restoration

An Environmental Scientist with Klohn Crippen Berger, Sara would like to implement effective wetland restoration techniques in numerous projects that she us currently working on. She is typically involved in writing Environmental Management Plans which often involve restoration of wetland areas disturbed by development or else compensation measures which could include the creation of new wetland areas. Sara would like to help volunteer in local initiatives in Squamish and the sea to sky corridor.

Thilaka Krishnaraj

PhytoInformatix

Thilaka Krishnaraj is an Entomologist and works as an independent consultant with PhytoInformatix. She earned her Master's Degree from the University of Calgary in Insect Ecology and the University of Toronto in Zoology (Forest Pest Biological Control) in the 90's. In addition, she has a strong back ground in Agricultural Entomology (IPM). For the past 10 years, she has been involved in various research projects such as Chemical and Biological control of insect pests, evaluating Phytotoxicity of heavy metals to insects in agricultural and forest ecosystems, and pesticide efficacy evaluations in agricultural and horticultural crops. Before moving to BC, Thilaka had worked as an Aquatic Biologist for the Toronto and Region Conservation Authority, Toronto, ON for 5 ½ years coordinating benthic sampling and West Nile Virus Surveillance and Monitoring for the Regional Watershed Monitoring Program.

Thilaka's experience with wetland protection comes from monitoring the wetlands for the West Nile Virus vector mosquito larvae and risk assessments. This includes wetlands mosquito larval surveillance, assessing invertebrate community composition and wetland plants identification.

Trystan Willmott

Madrone Environmental Services Ltd, Amphibian Habitat Enhancement

Originally from Cornwall, England, Trystan graduated from Aberystwyth University (Wales) in 1995. He moved to Canada in 2000 and has been a Fish and Wildlife biologist with Madrone Environmental Services Ltd. since 2007. He works with fish, wildlife, and vegetation.

The ultimate goals of his wetland project would be to implement permanent crossing structures under the nearby road for amphibian migration, continue with the education of local landowners, raise awareness of the value of wetlands, and encourage the enhancement of people's property surrounding the lake to improve amphibian habitat.

A total of 36 participants attended the 2012 Wetlands Institute Course.

APPENDIX 3: MEDIA, ADVERTISING AND CORRESPONDENCE

Question
SERVING WHISTLER AND PEMBERTON
Read our latest edition online!

LOCAL NEWS

Watershed restoration work focuses on at-risk species

Conservationists restore two areas in Pinecrest CONSERVATION

JULY 19, 2012

TANYA FOUBERT
TANYA@WHISTLERQUESTION.COM

The red-legged frogs in the Pinecrest area have a bit more habitat to thrive in after a local conservation group spent a day doing watershed restoration along the Sea to Sky Highway.

The Squamish River Watershed Society hosted the workshop by the B.C. Wildlife Federation last week, which saw participants in the area near Whistler on Friday (July 13) to restore two wetlands.

Society executive director and wildlife biologist Edith Tobe said the areas were identified last year with the purpose to expand the wetland to provide more diverse habitat for the red-legged frogs.

Photo by Tanya Foubert / The Question

B.C. Wildlife Federation wetlands education coordinator Neil Fletcher holds a red-legged tree fog in the Pinecrest area last Friday (July 13). The group was part of a project to restore two wetlands adjacent to Highway 99.

"The project... is to try to provide habitat for red legged frogs that may have been impacted from the highway upgrades," Tobe said. "This is all part of a pot of funds that came for compensation for damages done by the Sea to Sky highway through the Pinecrest area.

When Highway 99 was constructed leading up to the 2010 Olympics its location went through a known wetland where the provincially blue-listed species is located. The wetland the group worked on is on an old right of way for an access road adjacent to the roadway.

The frogs favour cool temperatures of the coastal forests breeding in shallow ponds or slow streams that are shaded by trees.

The work last week involved 30 participants in the B.C. Wildlife Federation workshop on restoring wetlands that takes place every other year.

Wetlands education program coordinator Neil Fletcher said the seven-day workshop is held in a different location each time and this year the Sea to Sky region was chosen.

Participants, he said, are developing their own wetland project and the workshop is meant to be hands on experience to help them complete that work.

In addition the two Pinecrest groundwater wetlands that were improved in size, area and quality work was done at the west Brohm Creek wetland near Squamish.

The Pinecrest work, said Fletcher is important because red-legged frogs are at risk in the province as their populations have declined due to habitat degradation.

"Within developed areas of the province we are looking at losses of 50 to 80 per cent of wetlands," he said adding in certain areas that loss is more rapid. "Wetlands are magnets for wildlife because of the water they provide."

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) have listed the red-legged frog as a species of concern while provincially they are blue listed as they have characteristics that make them sensitive to human activities. The status means they are at risk but not extirpated, endangered or threatened yet.

Funding for the workshop and project came from the Habitat Conservation Trust Foundation, Canadian Wildlife Federation and the Government of B.C.

The CHIEF

Saving wetlands

B.C. Wildlife Federation workshop focuses on the Sea to Sky corridor

JULY 19, 2012

REBECCA ALDOUS
RALDOUS@SQUAMISHCHIEF.COM

Sections of the old Highway 99 near Squamish are being transformed into wetlands.

The initiative is part of an eight-day workshop on wetland stewardship run by the B.C. Wildlife Federation. Last weekend, participants rehabilitated one and created two wetlands throughout the Sea to Sky Corridor. The two new habitats were placed on an old piece of highway near West Brohm Creek, said Neil Fletcher, the federation's wetlands education coordinator.

The Squamish River Watershed Society pitched in on the effort. The society has already created a successful wetland habitat in that area, Fletcher noted, which is attracting red-legged frogs and bass.

"For their size they have disproportionately more species using them than any other eco-system," Fletcher said of wetlands.

In B.C., 144 bird species rely on wetlands and 44 different mammals, he noted, a lot of which are either on the blue or red list of animals at risk. Fifty to 85 per cent of wetlands have been developed throughout the province, Fletcher noted.

"We are just part of a movement trying to reverse that trend," he said.

Last week in Squamish, the federation held a municipal planner workshop on bylaws and policies that can help protect wetlands. Municipal employees from the Lower Mainland and Sunshine Coast attended the meeting, including three District of Squamish officials.

People are starting to recognize the importance of these areas, Fletcher said. The Squamish River Watershed Society has been creating habitat in the community's flood control lands, he noted. The organization has placed 11 interpretive signs in the Britannia Slough area and two at West Brohm Creek. The notices aim to make residents aware of the value of wetlands.

The federation's wetlands education program started in 1996. It's funded by the Habitat Conservation Trust Foundation. For more information on workshops and how to get involved visit www.bcwf.net.

Dawn Green – Nature and Travel Writer

Weaving words in Sea to Sky Country

Home About Blog Zone Feature articles Portfolio Contact

Building a wetland 101

Posted on July 24, 2012

Sea-to-Sky Wetlands Institute – July 2012

A few weeks ago I had the immense privilege to witness an incredible sight… the building of a wetland. As you can imagine, this was no easy feat, but not even the heat nor the incessant mozzies (mosquitoes for North Americans) could put a damper on the enthusiasm. Here we had a diverse group of 30 people from all over B.C. convening in the Sea to Sky Corridor to participate in the BC Wildlife Federation's (BCWF) week-long Wetlands Institute. It is a crash course designed to help educate citizens on how to successfully tackle restoration/conservation projects in their own communities.

On July 14, I joined the lively crew as they worked with Edith Tobe, executive director of the Squamish River Watershed Society to create small wetlands near West Brohm Creek, just outside Squamish.

The society has already created a successful wetland habitat in that area, which is attracting red-legged frogs and bass, said Neil Fletcher, BCWF wetlands education coordinator.

"For their size they have disproportionately more species using them than any other ecosystem," Fletcher said of wetlands.

In B.C., 144 bird species rely on wetlands and 44 different mammals – a lot of which are either on the blue or red list of animals at risk. Fifty to 85 per cent of wetlands have been developed throughout the province, Fletcher said.

"We are just part of a movement trying to reverse that trend."

So, how do you go about making a wetlands?

Step 1:

Roll out the enormous sheet of liner, measure the dimensions and cut… sorry, I didn't record the actual measurements, I was too memorized by the flurry of activity to make that all happen!

Step 2:

As a team, roll up the liner and then carry it to the designated wetland location, which had already been dug up, thanks to the excavator.

Step 3:

Remove oversize rocks, roll out the liner, walk as a group in a circle to pat it down. Then add water and voila!

Hmmm…. hey kids, just a heads up – don't try this at home without first checking out and taking part in the Wetlands Institute.

To find out more, click to www.bcwf.net and the amazing and informative Bog Blog www.bcwfbogblog.com.

MIMULUS
Biological Consultants

Wetlands Institute in the Sea to Sky

Posted July 30, 2012

The Wetlands Institute was a huge success this year. A total of seven new wetlands were constructed in Squamish and Whistler. Participants were instructed on how to build ground-water, surface, and lined wetlands. Additional wetland construction was planned in Squamish and Pemberton. Thanks to all who contributed to the week's work!

Groundwater wetland construction in Whistler

Measuring the level of the bottom of the wetland ensures correct water levels during the dry season. We were constructing vernal wetlands, which were to designed to have little to no standing water in the summer.

Liner wetland construction in Squamish

A series of pocket wetlands were constructed in an old roadbed. These wetlands collect surface water in an area that is near a watercourse, but the water table is too low to sustain a groundwater wetland.

Posted in Wetlandkeepers / Streamkeepers Tagged as #courtenay, 0 comments courtenay, #comoxvalley, comox valley, #cumberland, cumberland, mimulus, #mimulus, mimulusbc, #mimulusbc, bioconsultants, biological consultants, environmental services, ecological services, #environmental services, #ecological services, wetlands, #wetlands, wetlands institute, and #wetlands institute

VIEW OUR

PROJECTS

PROFILE

Recommend us on

or +1 0

BCWF Bog Blog
www.bcwfbogblog.com

HOME | WETLAND STEWARDS | THE BOG BLOG | OTHER RESOURCES | 2012 WETLAND WORKSHOPS

STEWARDS OF THE SEA-TO-SKY: WETLANDS INSTITUTE 2012

Posted by *owni toma* on July 31, 2012 · *Leave a Comment (Edit)*

Can you solve the following riddle?

> *What do the these ingredients create: 3 communities + 36 participants + 12 trainers + 4 coordinators + 4 restoration sites, when allowed to age for 8 days?*

If you guessed a journey of stewards gathering lessons and inspiration towards wetland conservation in BC, then you are correct! The 2012 *Wetlands Institute* along the Sea to Sky was an incredible experience.

Tom Biebighauser presents "Why We Pulled the Plug on North America," a history of wetland loss.

The first day of the Institute started at the *Copperdome Lodge* in Pemberton, a quaint venue surrounded by majestic snow-capped Coastal Mountains and charming farm fields. To start things off Wetlands Coordinator, Neil Fletcher, presented on the purpose of the Wetlands Institute – which is designed for participants to receive guidance and support for their own wetland projects through technical training, planning theory, and field experience by renowned trainers in order to return home and use their newly acquired wisdom and skillsets to improve upon their own projects in wetland restoration and creation.

The group examines a soil sample

Throughout the week, the 36 participants had the pleasure of learning under the wing of 12 passionate and skilled trainers and facilitators, including *Tom Biebighouser*, a U.S. Forest Service Wildlife Biologist who has restored over 1400 wetlands; plant biologist Michelle Jones (*Mimulus Biological Consulting*) who has worked as a field biologist for over 25 years; amphibian expert Elke Wind (*E. Wind Consulting*) who has extensive experience in amphibian biology and habitat enhancement; and Edith Tobe, Project Manager and Executive Director of the *Squamish River Watershed Society*, who secured funding and organized wetland construction and restoration projects for the Institute participants.

The Institute featured an extensive range of activities from getting up close and personal with bats in a mist-net trapping session in Squamish led by Erin Rutherford (*South Coast Bat Action Team*); to waking up at the crack of dawn to listen to the songs of local birds that inhabit nearby wetlands in Pemberton led by John Tchopp. Other ventures included learning the basics of small mammal trapping with Pontus Lindgren (*Madrone Environmental Services ltd.*) at Brittania Sleugh in Squamish; learning about invasive species in a labour-intensive but rewarding Yellow Flag Iris weed pulling session in Whistler led by Kristina Swerhun (executive director of *Sea-to-Sky Invasive Plant Council*); and visiting and gaining insight into the success of the establishment of the Pemberton Wildlife Management Area led by Veronica Woodruff (executive director of the Stewardship Pemberton Society) and Hugh Naylor (*Pemberton Wildlife Association*).

The highlight for many was the hands on field experience that the Institute offered. The group worked arduously during the last three days to restore two ground water wetlands and construct three liner wetlands along a decommissioned stretch of highway 99. This invaluable field work offered lessons in identifying soil types for wetland restoration, applying erosion control techniques, and selecting riparian vegetation for re-planting. Participants also learned how to install geotextile liners, handle construction tools such as a survey rod and level, and work with contractors (such as an excavator).

Participants carry a geotextile liner to the construction site

WI Participant Deanna presents her wetland project

The Institute also included a 1 day workshop for 19 municipal and regional planners on enhancing and protecting urban wetlands which was held at the Howe Sound Brewery in Squamish on July 11th. The workshop's main objective was informing planners on ways they can incorporate wetland protection into their policies. The featured speakers included: Kyle Hawes (Ecoscape Environmental Consultants ltd.) and Greg Sauer (Municipal Planner) from the City of Kelowna, Jack Minard from the Comox Valley Land Trust, and Deborah Carlson from West Coast Environmental Law. The main points raised in each of their presentations were later fleshed out during a 2 hour focus group session in the afternoon where the planners came up with identifiable needs, barriers and solutions for achieving successful wetland protection at the municipal and regional level. For more information on the workshop for planners, *click here!*

To see all the great photos taken during our Sea-to-Sky Wetlands Institute, *click here*!

This Institute would not have been possible without the financial support of: *Habitat Conservation Trust Foundation*, *Government of British Columbia*, *Shell*, and the *Canadian Wildlife Federation*.

B.C. PLANNERS UNITE FOR WETLANDS!

Posted by *owni toma* on July 31, 2012 · *Leave a Comment (Edit)*

On Wednesday July 11, 2012, The BC Wildlife Federation's Wetlands Education Program hosted a 1 day workshop in Squamish targeting municipal planners of B.C. The workshop's main objective was informing planners on ways they can incorporate wetland stewardship into their policies, while also presenting an overview of the value of wetlands and their basic functions. Water is a vital resource and regional and municipal plans must manage and regulate it in a sustainable way. As a society, we are recognizing the growing importance and benefits of wetlands such as flood control, water filtration and the provision of habitat for thousands of species – services which are provided for free.

The workshop featured four speakers from different organizations and 19 planners from the Lower Mainland and the surrounding areas. The speakers were chosen because each had made significant contributions in protecting wetlands and were enthusiastic for providing tools and information for other communities to follow in their footsteps.

Howe Sound Brewery, Squamish where the Planners Workshop was held.

The first speakers were Kyle Hawes (*Ecoscape Environmental Consultants ltd.*) and Greg Sauer (Municipal Planner) from the City of Kelowna. Hawes and Sauer's presentation highlighted the importance of bringing municipal planners in the same room – learning from other's decision-making successes and challenges. The City recently developed a comprehensive wetland protection plan through public consultation, wetland inventory, assessment, and mapping, which are shaping up to be one of the best in the province. The Wetland Inventory, Classification, Evaluation and Mapping (WIM) was completed in 2009 with funding from the *Okanagan Basin Water Board* and *Ducks Unlimited*. Among the most important accomplishments is the establishment of a minimum of 15 metre setbacks that apply to non-fish-bearing water bodies (fish bearing = 30 metres). These areas serve as buffers from development to mitigate and reduce potential impacts on streams, and in this case, to preserve the functionality, biodiversity and connectivity of a watershed.

For more information on Nature without Borders visit: http://www.cvconservationstrategy.org/

The next presentation was given by Jack Minard, Executive Director of the *Tsolum River Restoration Society* and the *Comox Valley Land Trust*. Minard represents the Comox Valley Conservation Strategy, a group of 20+ organizations dedicated to environmental protection. All local governments in the Comox Valley region have endorsed their publication: Nature without Borders, a science-based framework for land use specific to the Valley. The Strategy has achieved a 30 metre buffer on sensitive ecosystems– lacing a thread of wetland protection around the valley and maintaining connectivity, which is key for biodiversity resilience on the landscape.

For more information on the Green Bylaws Toolkit visit: http://www.greenbylaws.ca/

The last speaker, Deborah Carlson, from *West Coast Environmental Law*, brought to the table an insider perspective on the legislative and political workings that apply to wetlands in B.C. Basing her presentation on the Green Bylaws Toolkit, Carlson outlined bylaws and tools that local governments in BC are using to protect sensitive ecosystems with a discussion including benefits and drawbacks. This informative presentation provided context on the status of environmental legislation in Canada.

Greg Sauer (left) and Kyle Hawes (right) presenting on Kelowna's recent advances in wetland protection

After having lunch, the participants were split into two groups to discuss and flesh out the main points raised by the speakers. Both groups discussed wetland protection – one, politics and legislation, the other, biophysical and resource inventory techniques. The breakout session lasted for more than two hours and produced substantial dialogue and engagement among the planners. The groups had a great dynamic – a planner would introduce an idea or tool, another would expand and build on it to a point where it was fully drawn out and this helped to effectively "fill in" knowledge gaps. One municipal planner noted:

> *"It was probably the best and most informative one day session I have ever attended. If you have another session, I will send others (and myself)."*

There were a number of key points that surfaced during the two breakout groups. In the politics and legislation group, planners discussed the need for a tool-kit that can not only help identify available protocols to monitor for compliance, but also measure the effectiveness of policies and regulations on watershed integrity, which is arguably the largest hurdle in conserving wetlands (and other sensitive ecosystems) in areas where they are protected in principle. There are municipalities with protection bylaws around wetlands but how do we know if those measures are enough? Could we be suffering from "death by 1000 cuts"? For instance, are pre-established guidelines around setbacks sufficiently protecting stream health and ecological integrity? What about unprotected or underprotected waterways, headwaters etc.? One way a tool-kit could improve this fashion of decision-making is establishing the watershed as the principal management unit, not a political jurisdiction (as discussed as a concept in "Nature without Borders".

In the biophysical and resource inventory techniques group, planners discussed the importance of municipalities being able to identify and map small wetlands. Limited funding appeared to be the number one barrier associated with wetland mapping due to the fact that smaller wetlands are difficult to map using orthophotos as they either do not appear on the orthophoto or they are obstructed from view due to forest canopy cover. Therefore, mapping has to occur on the ground which is labour intensive and often expensive. Suggestions for future solutions of these barriers were discussed in great detail, and focused on how municipalities could receive more funding for mapping wetlands if they began using wetland protection as a justification for improving water quality, providing better stormwater management or improving the effects of climate change. Additionally, GPS/GIS mapping of wetlands could be an excellent base system mapping that eventually could be included with future municipal mapping of drainage or stormwater plans.

The workshop was part of a larger 8 day Institute on the Sea-to-Sky Corridor. It would not have been possible without the financial support of: *Habitat Conservation Trust Foundation, Government of British Columbia, Shell*, and the *Canadian Wildlife Federation*. Stay tuned for the full report on the *BCWF's website*! (including more on the presentations and discussion groups)

BC Wildlife Federation proudly presents

The 2012 Wetlands Institute Workshop

along the Sea-to-Sky Corridor July 8 to 15

The Wetland Institute is an intensive eight-day field experience where stewardship coordinators, city planners, K-12 teachers, First Nations, ministry and municipality staff, NGO staff, business leaders, university students, and passionate community members come together to learn wetland conservation skills.

Participants spend time during the Institute developing action plans for their own community-based projects with the help of coordinators, resource specialist, and educators.

As a participant you will:

Learn about the importance and diversity of wetlands;

Practice current field techniques to inventory/evaluate wetland vegetation, water quality, soils, small mammals, and amphibians;

Gain hands-on experience on how to construct and restore wetlands using groundwater and liner techniques;

Learn how to raise public awareness and influence conservation policies;

Gain access to a network of individuals who will help you successfully complete your local conservation project(s);

Receive a BCWF Wetlands Institute certificate after successfully completing the workshop.

This course is FREE! (not incl. meals/accommodations)

Affordable catering & accommodations available through BCWF on a cost recovery basis

For more information on the Wetlands Institute or to apply contact:

The Wetland Education Program Coordinator

1-888-881-2293 ext. 232
wetlands@bcwf.bc.ca
www.bcwf.bc.ca

The BCWF Wetlands Education Program would like to acknowledge its financial supporters:

HABITAT CONSERVATION TRUST FOUNDATION
FÉDÉRATION CANADIENNE DE LA FAUNE CANADIAN WILDLIFE FEDERATION
WILDLIFE HABITAT CANADA HABITAT FAUNIQUE
BRITISH COLUMBIA The Best Place on Earth
Canada

APPENDIX 4: WETLANDS INSTITUTE PARTICIPANT FEEDBACK

In this section:

1. Participant Feedback Highlights
2. Wetlands Institute Evaluations – Participants from July 8 – 15, 2012
3. Wetlands Planners Workshop Evaluation – Wed. July 11, 2012
4. Preliminary Questionnaire for Planners – Wed. July 11, 2012

Participant Feedback Highlights

- ""It was an invaluable contribution to wetland stewardship, creation and restoration in BC through empowering community organizers, professionals, students and practitioners. Thank you for making it possible!"
- "It was one of the most useful educational experience in which I have participated, and I would highlight the strong field component, the broad experience of the instructors and enthusiasm of the coordinators."
- "It greatly clarifies the history behind the loss of our wetlands and lays down simple, effective, accessible techniques for restoration and habitat creation."
- "I would definitely recommend this to others and might even recommend it be held every year rather than every other year. Very informational and I loved the hands on learning."
- "It was uplifting being with others who share a common passion…. I know we will hire folks we met and will partner with as many as we can to share resources and continue to learn."
- "For those that are new to wetland stewardship/creation/restoration, developing a successful project is a complicated process that requires the support of wide ranging expertise. You provided an excellent training program and consultation with highly skilled experts. With this support, you provide access for not-yet-experts to the information and support needed to successfully implement wetland projects of their own."
- "Great balance between the disciplines. I really valued how much effort and care each instructor put into the program. They each took time to speak with students directly"
- "The course was the perfect balance between a variety of aspects; political science and community partnerships. It will be most useful for me professionally.
- "Seeing the ease with which wetlands can be constructs has left me feeling empowered and confident to advocate for and build wetlands in my watershed"
- "Great level of education targeted at both mid-level professionals and newcomers to the field. Meaning this program was beneficial to me and others with less experience. Good coverage of complex and basic issues associated with wetland design and other issues."
- "[It] was very inspiring to see highly successful projects and becoming more familiar with the process of wetland restoration from start to finish. Now I can return to my wetland project with solidified skills and new skills for baseline studies and monitoring. Additionally, I have the knowledge and resources necessary to construct new wetlands."

Wetlands Institute Evaluations – Participants from July 8 – 15, 2012

1. Did concentrating on hands-on wetland field skills help you with your wetland project? Please explain.

- Yes. Realized the amount of work, time and planning that needs to go into designing, creating or enhancing a wetland and the workshop will help me be better prepared to do it.
- At the Thistle, our work is dirty, hands on, and cooperative. The focus on education and environmental activism with a hands on, applied practice directly informs our work in East Vancouver.
- Yes (×2)
- It helped to refresh some of my skillsets for working with partners on these types of projects.
- Yes, it made me understand the complexity of building wetlands.
- Yes, gave me a chance to see and learn techniques about construction and monitoring of wetlands
- Yes. You learn better by doing hands on.
- Yes, that's the best way to learn in my opinion. It was a good balance between theory and practice.
- My project is generally involved with amphibian road-mortality mitigation, but the contacts I made will help me. I now have experience in wetland construction/restoration, which I hope to incorporate into the general project objectives (e.g. wetland construction on adjoining property).]
- Yes! Hands on field experience cannot be emulated in a classroom!
- Yes. Before the workshop I was unsure how to begin my restoration project. The workshop leaders provided me direction and valuable insight.
- Yes. Other than practical skills, it helps me look at and evaluation what I am looking at (training of eyes). I had no idea how to look at Burnaby Lake before this, in order to get perspectives on what needs to happen when the invasives came out (restoration).
- Yes. I got a better understanding of how to plant, how wetland hydrology works, and how to supervise excavator contractors.
- Yes! It was very good to be in the field with experts and begin to develop the eye for what to look for, and what actually to do in different situations.
- Yes, the tactile element brings a reality to wetland restoration which can't be understood from a classroom lecture or reading from a text book. It helped me determine what sizes and forms of wetlands are possible, while also enhancing habitat for different species. Furthermore, it helped me determine the route of the most cost efficient ways to restore wetlands by digging test holes on site. Overall, this workshop very helpful for my project.
- Yes, because that experience let me know how is a real project building and gave me an better idea of how can my project be built.
- Yes, this workshop helped a lot. I now feel that I am able to build a wetland with all the information given to me.
- Yes! While in-class lectures are informative, it's the hands-on experience that really solidifies my understanding. Seeing the ease with which wetlands can be constructs has left me feeling empowered and confident to advocate for and build wetlands in my watershed.
- Great level of education targeted at both mid level professionals and newcomers to the field. Meaning this program was beneficial to me and others with less experience. Good coverage of complex and basic issues associated with wetland design and other issues.
- Indeed reading can only go so far doing brings education & planning to completion very helpful.
- Yes: (1) It further solidified my understanding of how to conduct amphibian monitoring (2) I was introduced to the methods and merits of small mammals and bat surveys (3) It was empowering

to work through the process of assessing potential sites for wetland construction based on soils and hydrology (4) Especially valuable was watching the construction process unfold – Tom explaining his decision making and communication with the excavator operator (5) Touring past, current and future restoration sites was very inspiring to see highly successful projects and becoming more familiar with the process of wetland restoration from start to finish. Now I can return to my wetland project with solidified skills and new skills for baseline studies and monitoring. Additionally, I have the knowledge and resources necessary to construct new wetlands.

- Yes. When you learn outside the classroom you become familiarized with elements that are unimagined in the textbook and are better prepared to deal with your own outdoor project. Field study is more dynamic and easier to absorb.
- Definitely. Field skills are hard to conceptualize when described through words or through demonstration alone. Having the experience of actually performing the skills helped tremendously.
- My project did not work out as planned but in any case, it was great to apply knowledge learned through lectures by participating in the creation wetlands.
- I did not participate in the hands on field skills portion building wetlands.
- Yes. It helped me become more aware of the different options that exist in wetland creation and how different situations suit different types of wetlands.

2. What were the most valuable aspects of the Wetlands Institute that will help you with your wetlands project/program? Check all that apply to your project/program.

Choice	Results
Wetland Monitoring/ Baseline Mapping	8
Wetland Restoration (enhancing existing/degraded wetlands)	19
Wetland Creation (constructing new wetlands)	19
Invasive Species removal	12
Wildlife Survey Techniques (Bat, Small Mammal, Amphibian)	13
Protection of locally/regionally significant wetland sites	10
Grant writing or identifying new funding sources	4
Create partnerships	15
Develop a plan for your wetlands project/program	15
Other:	3
Other: -"Seeing participants' project presentations and discussing their challenges and successes throughout the week. Evening brainstorming sessions with instructors and participants for project planning support" -"I ended up not having a specific project for this workshop. However, I look forward to applying the skills learned to benefit future projects" -"Inspiration"	

3. You believe the Wetlands Institute has adequately prepared you to successfully complete your project/program. Do you:

Choice	Results
Strongly Disagree	0
Disagree	0
Neutral	4
Agree	7
Strongly Agree	16

4. What could be added or deleted from the course? Why?

- More details on the different types of wetlands (e.g. wetland classification). Grant writing for funding proposals.
- Added → bioremediation of disturbed brownfield sites. Working with fungi.
- Grant writing could be added if specific to wetlands.
- Nothing, it's great (×2)
- Nothing (×11)
- I would like to see more monitoring techniques especially aquatic invertebrate monitoring
- Section on Grant Writing – where to apply, how to write grant application
- Generally a good mix of fieldwork/classwork, but perhaps the first few days had a little too much class time (e.g. the Pemberton portion).
- I only attended 3 days of the course, and I don't believe any of it should be deleted. I can't comment on what could be added for the days I missed.
- I am totally happy with content. The course was the perfect balance between a variet of aspects; political science and community partnerships. It will be most useful for me professionally.
- It would be great to have more 1st Nations involvement
- It was action-packed, so it is tough to consider any additions. Perhaps if your program expands and you have lots of funding you could offer two week-long Institutes that explore each area in greater depth and breadth – one focused on project planning, design and implementation, and the other on field techniques for baseline studies, monitoring and construction.
- I think group work should have been smaller. Have more groups with less people in each. It gets distracting otherwise.
- More lectures/activities while the excavator is digging? (×3)

5. How would you rate the coordinators overall?

Choice	Results
Below Average	0
Average	1
Good	3
Excellent	23

Specific comments:

"Some confusion over learning and day to day event coordination for the portion I participated in"
"Fantastic job"
"Extremely well prepared and a pleasure to work with"
"Would have been excellent; however, I found it a bit disorganized in the week before the conference"
"Everything ran smoothly and everyone was extremely healthy"
"Answered all my questions and were super helpful"
"Super helpful, adaptive to changes ☺"
"Better than excellent"
"Great job organizing everything"
"They managed to keep a large group of very curious individuals on task and on time"
"Very enthusiastic and knowledgeable. Everything was well timed"

6. How would you rate the trainers overall?

Choice	Results
Below Average	0
Average	0
Good	3
Excellent	24

Specific comments:

- "Very professional and very accessible. Broad range of expertise."
- "Above expectation"
- "Just fabulous!"
- "Not only were they very experienced, they were very good at communicating/teaching this knowledge and telling their stories"
- "Tom was such a great resource. I feel so fortunate to have the opportunity to work with him!")
- "Great balance between the disciplines. Each had a ton of knowledge to share. I really valued how much effort and care each instructor put into the program. They each took time to speak with students directly."
- "Tom and Michelle are amazing teachers who genuinely want to help people learn. They are patient, they are knowledgeable and they are kind"
- "Amazing, complete experts in their fields"

7. How would you rate this workshop overall?

Choice	Results
Below Average	0
Average	0
Good	5
Excellent	22

Specific comments:

- "It would have been nice to have a big jug of water in the truck so people could refill their waterbottles on the long field days"
- "Great instructors that are very valuable to this Institute"

8. Would you recommend the Institute to others? Why or why not?

- Yes. Good hands on training – very practical.
- Absolutely. It greatly clarifies the history behind the loss of our wetlands and lays down simple, effective, accessible techniques for restoration and habitat creation.
- Yes, hands on, excellent teachers, covers lots of areas. Mentorship.
- Yes – especially for those who are new to these types of projects and areas of practices –it's a good primer.
- Yes, great way to learn about wetlands.
- Yes, great change for hands on learning.
- Definitely. This is one of the programs you learn a lot of basics and how to design and construct wetlands so I would recommend it to anyone interested in wetlands.
- Yes because of all the valuable information and the hands on component
- Yes → gives participants hands on and background theoretical knowledge that can be tailored to individual project specifics.
- Yes, because the hands on field work and connections made are, to me, invaluable.
- Yes. The workshop provided vital info for wetland building. I was unaware that farmers drained wetlands using clay tiles. This was very important to learn because I would hate for a wetland to fail because I didn't know about tiles.
- Yes. Wetlands are so important and fascinating. We need to be able to demonstrate how critical they are to a population that is -
- Yes, it gives a great intro into wetland restoration and creation.
- Yes. It was very well=rounded and covered a lot of material to a good level of details.
- Yes, it was very informative and a great opportunity to meet people.
- Yes, because it´s a great opportunity to learn about restoration, wetland creation and other aspects related with the wetlands ecosystems, that can be excellent for professionals for better facing certain projects.
- Yes I would definitely recommend this to others and might even recommend it be held every year rather than every other year. Very informational and I loved the hands on learning.
- Definitely (×2)
- Most definitely. It is such an important aspect of ecological restoration that others must be informed about also.
- Yes. A great learning experience.
- It was up lifting being with others who share a common passion great networking to consider wetlands as a toad , turtle or bat is new for fish, herps , birds, plant , tree groups that we partner with. Great education on the how to's to cut through the %#&$. I know we will hire from folks we met & will partner with as many as we can to share resources to continue to learn .Any time Pamela Edith Michele are doing anything alone we are interested together we are going to be there now Tom falls into that easily after meeting once we look forward to the next time.
- Yes. For those that are new to wetland stewardship/creation/restoration, developing a successful project is a complicated process that requires the support of wide ranging expertise. You provided an excellent training program and consultation with highly skilled experts. With this support, you provide access to not-yet-experts to the information and support needed to successfully implement wetland projects of their own.
- Absolutely. It was a very valuable learning experience. Wetland restoration is so important especially in North America where the landscape used to be characterized by wetlands. I think its also important for people to learn and see the way the land has been manipulated in order to grow food and to farm.

- Yes. This workshop is a tremendous opportunity to learn about the restoration of wetlands.
- Yes I would recommend this workshop. It was well organized and packed with valuable information and hands on training.
- Of course! It was a great learning experience that covered a lot of ground. And it was great to connect with other people of similar interests.

9. Where did you hear about the Wetlands Institute? (please specify)

- Social media – Facebook.
- EKCP (East Kootenay Conservation Program)
- Directly from BCWF (6)
- Email from the Sea to Sky Invasive Plant Council
- WetlandKeepers course (2)
- Linkedin discussion group
- Can't remember. I think through RRU mailing list.
- Via email.
- Kia Ritzel
- SCCP workshop
- Stewardship Coordinator at A Rocha (2)
- Through a schoolmate who showed me the website.
- Not sure…Good Work Canada listserv? CEP listserv?
- Tom Biebighauser
- Neil and Edith
- The Purple Thistle email list serve.
- Elke Wind and the Cowichan Land Trust
- BCIT students, professors, etc (5)

10. Are you interested in partnering with the BC Wildlife Federation to deliver workshops in your community (e.g. Wetlandkeepers, Map our Marsh, Wetlands Institute)? If yes, then which ones?

- Sure. If I had more time. Amphibians, small mammals, birds.
- Yes. We would love to do a GPS mapping workshop.
- Sure, although not really experienced enough to do on own.
- The SCCP can certainly provide some expertise if desired on multi-species and species at risk as part of wetland conservation on the South Coast.
- No (3)
- Yes, Map our Marshes.
- Absolutely. No specifics yet.
- Wetlandkeepers – would love to. Need training before.
- Yes – Buttertub Marsh (Nanaimo), Yes – Somenos Marsh (North Cowichan)
- Yes, Wetlandkeepers and Wetlands Institute.
- Wetlandkeepers and Wetlands Institute – could be interested. Depends on what's involved.
- Possibly → I'd have to think more about it. (2)
- Yes; I will have to look into the different programs and see which would be appropriate.
- I am not familiar with all of these, but I would be interested in hearing more about these workshops.
- I would like but I don´t have much capacity for doing that since I don´t going to remain long in the country.
- Yes. Any/all. Especially ones focused more on hydrology etc. rather than on biology. But equally possible with a competent partner.

- Yes, we really want to have a Wetlandkeepers and Map our Marshes workshop here. An Institute on the island would be great too.
- Any & All Seymour estuary ,Cypress Bowl ,mtn View Park ,sway wey, Larson,Mackay Lynn
- Yes, in the future if a community-based project arises.
- Yes. Map our Marsh would be essential or a lot of UBC students
- Definitely, any of the above.
- I would be, but I'm not sure I'm at that point in my career yet. In the future I would definitely like to partner with BCWF.

11. Do you have any other comments about your experience at this year's Wetlands Institute?

- Great people = great fun and great food!
- I am grateful that it was free and accessible for low-income youth participants from our project.
- Would be handy to introduce new people when they come in/hang out.
- Great experience
- More bugs ☺
- Breaks in morning and afternoon with fruit/snack provided would be great.
- Good experience overall, with a great diversity of people.
- I had a phenomenal time!
- Would be useful to have a short coffee/snack break in the morning and afternoon to allow thoughts to be processed.
- Great work organizing this event!
- It was one of the most useful educational experience in which I have participated, and I would highlight the strong field component, the broad experience of the instructors and enthusiasm of the coordinators.
- Wish I'd made it to first couple days! And could have skipped animal studies…
- I absolutely loved the mix of hands-on and classroom education.
- I really wish I had time to attend the whole thing.
- Happy to contribute & be in a bubble away from the world was relaxing
- It was an invaluable contribution to wetland stewardship, creation and restoration in BC through empowering community organizers, professionals, students and practitioners. Thank you for making it possible!
- I found the group size to be a little large for hands on learning. Switching smaller groups between different activities might improve the learning opportunities.

12. Once initiated or complete your project/program will:

A) benefit # _____ of people per year.

Range	Results
N/A, unsure	7
1-49	2
50-99	1
100-499	6
500-999	1
1000-1999	3
2000+	4

B) enhance/protect/conserve _____ m^2 of wetlands

Range	Results
Na, unsure	6
1-99	1
100-499	3
500-999	1
1000-1999	4
2000-4999	4
5000- 9 999	0
10 000- 99 999	3
100 000+	0.302km 3.11km 15.5km

C) List other benefits of your project/program:

- ground water / flood control (2)
- Awareness of watershed, pollution remediation
- Demonstration project
- Provide connections to wetland dependent species and wetland ecosystems as part of our multi-species approach to conservation and stewardship practices.
- increase habitat for red legged frog
- Community engagement, conservation, environment overall
- Educating future generations about the importance of wetlands. Thanks Neil for this great week. P.s. Michelle and Tom are wonderful and very knowledgeable instructors.
- Public stewardship/education potential/ community involvement
- Cascading benefits: salmon restoration, , increase green space, healthy lifestyle, perpetuate more conservation
- Protection and creation of SAR habitat, increase populations of plants of cultural significant for Katzie First Nation
- Educating a public that's disconnected from natural environment, increasing biodiversity of a stopover point in the Pacific fly way, providing habitat for endangered species
- Creation of habitat for species at risk (especially amphibians), educational tool for environmental education programs
- Increase off-channel habitat for salmonids, Salish suckers, provide a large example of restoration project in our areas, stormwater management.
- Native amphibian species and other wildlife, habitat restoration
- recreational space (2)
- I am hoping to initiate a wetland project at my school, UBC. It would be in conjunction with the new UBC farm facility. There are no definite numbers yet, only ideas.
- Increase awareness of infilled False Creek, Increase public receptivity to creating more urban wetlands.

- The wetlands will trap sediment and nutrients before they reach Quamichan Lake. They will also provide wildlife habitat. They are diversifying the ecology of what used to be a field.
- As many species as possible to maintain diversity of wildlife in watersheds; Northwest and BC; Meeting new friends building better communities based on watershed logic for health for all
- High school students learn about: history of wetland loss, opportunities for stewardship, creation and restoration, importance of wetlands for ecosystems and society, importance of riparian vegetation (2) High school students hands on experience with: plant identification and surveys, studies in hydrology, surveying amphibians fish and aquatic invertebrates, riparian vegetation restoration, valuation of ecosystem services, mapping (3) Long term restoration effort will achieve: greater native plant species composition, greater diversity and quality of habitat to benefit all fauna, improved riparian buffer for gains in habitat, water quality and hydrologic function
- Appreciation
- Close proximity to school and recreation centre, high potential for educational opportunities, high community involvement.
- My project did not end up working out as planned but I am grateful for the knowledge gained and hands-on skills learned through this workshop to benefit future projects.
- Increasing public awareness about wetlands and amphibians that are species at risk in the Cowichan Valley. Working with local government planners to develop Development Permit Application Areas to help protect wetlands.
- Education (6)

Wetlands Planners Workshop Evaluation – Wed. July 11, 2012

(1) Did you gain insight into barriers and opportunities for wetland protection/conservation in your region/region jurisdiction? Please explain.

A. Yes- many common issues and barriers, but different starting positions in each jurisdiction – existing regulations, relationships internally and externally, current will and attitudes.

B. Yes – Comforting to know that we are not alone in our struggle and that others have had some successes they could share.

C. Yes, to a degree – Vancouver has a more unique context.

D. Yes, we could use some wetland loss mapping to see how we are doing.

E. Yes – it was good to hear what has worked (and not) in other jurisdictions.

F. Yes, better understanding of the components planners need/use to protect wetlands.

G. Yes, wetland mapping opportunities and integrating into policy reference for environmental assessment

H. Yes, some very useful tools primarily for conservation.

I. Confirmation re: jurisdictional barriers; power of ESA mapping; engaged community organizations.

J. Yes, I have gained insight in how to use various tools for protection and conservation.

K. Yes- barrier: Lack of understanding on the part of public and politicians (and others) about the importance of wetlands – opportunity: conservation zoning density bonus, etc.

L. Yes. New ideas and thoughts gained on how to integrate/expand our existing regulations. Insight on barriers I had not previously considered, and ideas on how to deal with them.

M. The cost of work and getting support from council and public to fund such initiatives is largest hurdle.

N. Yes – thought about process/procedure to begin, carry out, implement wetland protection. Heard range of tools/strategies available or others using.

O. Similar barriers exist in all municipalities e.g. lack of will to actually implement regulation and giving a real, tangible value to wetlands is a food start to selling conservation.

P. Definitely. It was very beneficial to learn about how the regional government policy/by-laws/governance applies to wetland protection/conservation.

Q. It was beneficial to hear of the tools/guides that the presenters mentioned (e.g. wild salmon, report on national capital valuation, value of green infrastructure, green infrastructure guide, water balance model, etc.)

R. Yes. It is tough all over and easy to be/feel defeated. I feel that the City of Kelowna is doing good things and am encouraged.

S. Yes.

T. Yes. Barriers = 1) political will 2) funds available for baseline studies. Opportunities: 1) The will of the people 2) The power of one planner can be great 3) DPAs 4) Get the independent groups to unite their voice.

(2) What do you see being the next step in protecting wetlands in your region/jurisdiction?

A. Building relationships within the organization, with member municipalities, with stewardship groups, politicians.

B. More baseline information/inventory education/ public and elected officials and staff.

C. Getting the value of doing it recognized ($ and intrinsic)

D. Appropriate development planning with existing policy

E. Better engagement with decision makers and local government staff (multi-departmental) as well as regional districts.

F. Need to ID weaknesses in project, if a tool, political will, data, etc and what are opportunities in different municipalities.

G. Baseline mapping, SHIN update, wetland mapping, DP area definition.

H. More detailed mapping. (2)

I. Bill C-38, but also future work on collaborative watershed government – focusing on science with decision-making and triggers for community engagement in governance.

J. Identifying them, community awareness and sharing info with public and engaging local government and sharing info with them.

K. Regulatory (bylaw) protection and a commitment to restoring lost wetlands and connectivity.

M. Looking beyond wetland boundaries to catchments. Further improve protection and enforcement.

N. Assemble spatial data, develop strategy/approach after goals and objectives identified. Identifying how to ongoing fund programs.

O. To identify the value and function that the wetland provides to the local environment.

P. Getting money, community buy in/support to inventory wetlands, riparian areas, SEI to document what is there. Do DPAs exist for CVRD?

Q. Supporting the DMR Streamside Protection Regulations and if possible instigating a monitoring program for urban and urban/rural interface wetlands.

R. Additional monitoring/update WIM report, EGGS assessment.

S. Getting a complete inventory of existing wetlands.

T. 1) Coordinate the different stewardship groups to create a united voice to Council. 2) Embark upon baseline studies throughout sensitive areas within the community.

(3) How has this session helped in your watershed/wetland conservation planning? Do you plan to take action on what you learned today? If yes, please explain.

A. Good to see ambitious (And relatively successful) projects occurring

B. Not sure yet – need to digest

C. Yes, I will reach out to NGOs.

D. Maybe

E. Yes- as part of my work plan I will be making efforts to do more engagement.

F. Much better insight into planners' world. Yes, will be further discussing with BCWF on possible joint partnership/protests (DU).

G. Yes, more with mapping initiatives

H. Wasn't particularly specific to a highly urbanized situation. My mapping needs are more around opportunities for connections, new wetlands and taxing with corridor designations.

I. Yes – will take lots of ideas back to the drawing board, e.g. Bill C-38 implications for local government – how to fill the gaps.

J. Yes, I plan to create a wetland stewardship project for our area over the next year/two.

K. Yes, I believe the lack of land use based watershed plans leads to a disconnect.

L. Yes – will initiate steps to establish mapping (e.g. internal support, budget, partnerships, etc.)

N. Heard what others doing. Also realized Gibsons is fairly evolved and progressive, but inspiration came from how to make better (as leader community) and share info and inspire other communities.

O. I think it is necessary to expand conservation efforts from "fish bearing" water to a broader scope of environmental importance to fuel conservation.

P. Yes. I am planning on meeting with the CVRD planners to find out more about the regions DPA process. Do they (CVRD) work with North Cowichan and city of Duncan planners. Can this relatively be encouraged?

Q. My action will be reading the policies and guides available to provide support for SPR and our development guides.

R. I hope to follow up with DU to encourage their continued support and using us as a model for others.

S. Much of what was discussed was geared towards planning. As I am in Parks, I will encourage our planning staff to attend future workshops.

T. Yes. Take the large amount of great ideas gained today and take those ideas to my fellow planners. Maybe even get going on some of the great ideas.

(4) Did you network with others whom you expect to collaborate with in the future? If yes, please explain.

B. Possibly

C. Yes – WCEL, DVC

D. No

E. Yes- a number of regional districts and local government staff.

F. Yes – Vernon, WCEL

G. Yes, collaborating with staff. Identified external sources and info.

H. Not a lot due to scale issues.

I. Yes

J. Yes. There is a wealth of knowledge here and I can possibly use the contacts in the future.

K. Yes, many. Everyone who spoke brought a unique and informed perspective.

L. Yes – wonderful to have this session focused for planners, and great that participants are from various municipalities/RDs.

N. Yes. Kelowna and Comox Valley examples and tools. Refreshed memory about WCBC and these tools. Partnership opportunities BCWF and WCEL.

O. Yes, insight into the importance of forming relationships between municipality members and local conservation groups.

Q. Not yet, but knowing names and having contact info I intend on following up with individuals.

R.Yes, see above and Comox Valley and WCEL.

T. Yes. Please send out the email of everyone that attended. Although I did directly speak to everyone, I would like to contact a number of people that gave me valuable insight into wetland protection.

(6) Are you willing to provide updates on your progress to BC Wildlife Federation?

E. The SCCP plans to continue to look for opportunities to work with the BCWF.

G. Yes (17)

H. Sure, we do have some projects of interest, mainly in Stanley Park

N. Yes, don't mind occasional reminder email to provide update.

O. Possibly, assuming it is relevant.

P. Always. Gathering information is the 1st step. Sharing the knowledge is the goal.

Q. If BC Wildlife Federation contacts us, I would be more than willing to respond with updates. (2)

R. Yes, would be happy to keep in touch.

(7) What could be added or deleted from this workshop? If you were to attend another workshop for conserving wetlands, what training/speakers/resources would you like?

A. Future workshops could delve into greater detail on specific issues, challenges, and projects

B. Smaller breakout session(s) for better dialogue (2)

D. Breakout tables – targeted discussion on key issue that is already identified

F. Combo of speakers, discussion groups good approach

G. Yes, wetland mapping workshop. Data management for GIS professionals

H. I would be more interested in very urban situations.

I. I found the morning presentations from Kelwona and Comox Valley excellent, and the afternoon session was also useful and well facilitated.

K. Invite some politicians and administrators.

M. Recognizing the challenges to procuring funding while at the same time acknowledging the critical role of wetlands in drainage management. Invite municipal drainage to speak who has dealt with wetlands and understands cost of infrastructure and benefits of wetland conservation, restoring and construction. This may also promote greater attendance from municipal engineers.

N. HADD issues and RAR replacement strategies (more of this in future when happen). How to finance a program of wetland conservation or if no money then how to invest goals/opps in other work.

O. Other examples /case studies would be useful, a start to finish story similar to, for example, the Bowker Creek story which shows a specific application of tools to an end. (4)

P. A good balance for the day. It would be great to have a similar workshop on the island or maybe a webinar.

Q. Info on development related impacts to wetlands. Effective enforcement mechanisms based in regulation and municipal bylaw options.

T. Speaker which understands the basics of gathering political will and how to mobilize local community groups.

(8) Is there anything else about the workshop you would like us to know?

B. Loved the new venue!

F. Perhaps info from today could do preliminary work e.g. survey prior to meet to find more themes. Presentations good mix: planner, ENGO, legal.

H. It was useful.

I. Would be useful to have a contact list and maybe more formal objects re: outcomes/reporting out

K. Fabulous experience – thank you!

L. Thank you! Thank you! Very useful and informative.

N. Important issues about sustainability for planning for future and also relating "Green" Development as a financial benefit (i.e. Green infra=long terms savings).

P. No, it was a great day and learning opportunity. Thank you for letting me attend ☺

Q. Well done, thanks.

R. Nice work!

T. It was probably the best and most informative one day session I have ever attended. If you have another session, I will send others (and myself).

PRELIMINARY QUESTIONNAIRE FOR PLANNERS

(1) Are you currently, or have you recently been, involved in a wetland project? Please explain (e.g., location, description of project, and goals)

A. No
B. Yes- Habitat Atlas Update and restoration of Silverdale Wetland
C. Not currently, directly, but as a participant in technical planning committee work for larger rezoning, e.g. Easter Fraser Lands, South East False Creek, False Creek Flats
D. OCP Development (policy to address RAR), Rezonings.
E. Not directly. I/we work on enhancing information and knowledge around wetland dependent species (and wetlands) to facilitate conservation.
F. Multiple projects (100+) along BC coast. Goals are protection and restoration of wetlands/waterfowl habitat.
G. Whistler. Protected area network. Zoning protection for sensitive habitats.
H. Yes, various initiatives in Vancouver. Major project in Stanley Park soon to be undertaken.
I. Yes. We have been planning a wetland restoration in the Quawichan Watershed
J. Restoring drained wetlands
K. Yes. District of Squamish partnered with Squamish River Watershed Society on wetland restoration/creation project.
L. Prior to 2006 was an Environmental Consultant and did numerous wetland assessments and community projects. Current development concerns for wetlands – only riparian protection,

M. Yes. Culvert replacements, channel and pond maintenance, detention pond construction.
N. Working on a road mitigation project at Wake Lake for amphibians – specifically western toads. Also working on a water levels project with the Cowichan Watershed Board.

(2) What were your main goals in attending today's workshop?

A. Learn more about updated tools and approaches
B. No specific goals – general learning (2)
C. Stay up to date on wetland issues and management tools (2)
D. Find out more about local government activities / methodologies around wetland conservation (2)
E. Meet other planners/stakeholders interested in determining potential mapping specifications of wetlands that can lead to higher awareness of wetlands at local government/public level.
F. Determine mapping tools for wetlands and riparian areas.
G. Better sense of tools to mitigate in urban situation for wildlife and biodiversity enhancement
H. Learn more about working with planners to protect and enhance wetlands through the planning process
I. To share the Comox Valley Experience in developing a conservation strategy
J. Learning tools to integrate wetland protection in local government planning
K. Develop wetland assessment, evaluation, monitoring and preservation strategy
L. Recognizing aspect of design that may be left out when planning infrastructure upgrades. Methods of wetland protection and restoration.
M. Learn more about the process for mapping/inventory of wetlands. How regional government can work towards implementing protection for wetlands.
N. Professional contacts/connections (2)

(3) Please check two focal topics of interest to you for the afternoon group session:

Choice	Results
Technical aspects of the use of GIS- and GPS-based applications for wetland mapping in the urban context (data collection, processing, and analysis)	4
Integration of spatial data into land-use planning, maps, and documents (i.e., OCP's)	4
Development of compliance guidelines and incentives for protection, management, and restoration of wetland ecosystems	9
Policy and regulatory development - use of baseline information in policy.	3
Role of local government versus provincial government; abilities and capacity to manage wetland protection and enhancement decision making.	7
Public awareness, education, and support for wetland protection	4
Integrating wildlife-friendly wetland management practices into urban planning (e.g., habitat connectivity, storm water management, non-native species, etc.)	6
Compensation challenges and compromises; and adaptive wetland management	2
Wetland evaluation and assessment - when is it okay to alter a wetland in an urban environment?	3
Other: ____	1: "Other sensitive ecosystems in terms

	of all of the above”
None of these topics is of interest or help with my project. Please explain:	1:“How to get political will for environmental initiatives”

(4) Comments or concerns?

- Can we access the PPT slides on the website after the workshop?
- Great so far
- Wetland = swamp = mosquitoes = west nile = bulls**t!
- How to develop enforceable and adequate wetland development/alteration policies/bylaws. How to create/identify funding to enable program.

APPENDIX 5: GENERAL LEARNING OUTCOMES

Day 1

Define/identify wetlands using BC Wetlands: A guide to Classification, and describe key functions and values of wetland.

Day 2

List key components of project plans for wetland stewardship. Present community projects in a brief and engaging manner.

Describe the historical and present causes of wetland loss in North America and the environmental implications of such a loss.

Day 3

Gain hands-on experience monitoring birds by sound and learn different techniques for monitoring birds. Gain understanding of the legal framework (Municipal, Regional, Provincial and Federal), and conservation tools and techniques for wetland protection in BC. Learn how to conduct a basic wetland assessment using the BC Wildlife Federation Short Form Survey. Learn how to integrate wetlands into the Community Mapping Network's BC Wetlands Atlas.

Day 4

Identify and understand principles of wetland restoration and receive hands on training on wetland restoration site survey. Learn about aquatic invasive wetland plants, how to identify them, available resources to deal with them, and how to mitigate their impacts. Gain hands on experience in invasive plant removal. Learn the values of estuaries, and learn about a variety of wetland plants associated with them.

Day 5

Describe techniques for small mammal survey. Identify amphibian species of significance. Demonstrate field techniques for identifying amphibians of significance. Gain hands on experience checking small mammal and amphibian traps. Learn how to plan the construction of a liner wetland. Outline methods used for bat surveys. Gain hands on experience in acoustic monitoring.

Day 6

Gain hands on experience constructing a liner wetland. List methods of soil erosion control. Learn how to plan a ground water wetland construction. Use a survey rod and level to produce an elevation profile for a site, and determine if a wetland restoration project is feasible at a given location. Understand the procedures for establishing wetland boundaries

Day 7

Gain hands on experience constructing a groundwater wetland.

Day 8

Discuss and reflect upon how the Wetlands Institute can be applied to your wetland project.

Prepare a proposal of next steps for your community project. Identify additional training needs, barriers, opportunities for your wetland project/program.

APPENDIX 6: REFERENCES

Delesalle, B. 1998. *Understanding Wetlands. A Wetland Handbook for British Columbia'sInterior*. Ducks Unlimited Canada.

Green, B., G. Nellestijn, and P. Field. 2006. The Salmo River Watershed-based Fish Sustainability Plan Report. Stage Two: Setting Watershed Priorities. Columbia-Kootenay Fisheries Renewal Partnership, Cranbrook, B.C and Salmo Watershed Streamkeepers, Salmo, B.C.Available Online: http://www.dfo-mpo.gc.ca/Library/328913.pdf (Accessed: August 15th, 2012)

Kadloc, R. and S. Wallace. 2008. Treatment Wetlands. 2nd edition. Taylor and Francis Group.Boca Raton, FL USA. P 284.

Kirk, G.J.D. and H.J. Kronzuck. 2005. The Potential for Nitrification and Nitrate Uptake in theRhizosphere of Wetland Plants: A Modelling Study. Annals of Botany 96: 639-646.
Larratt Aquatic Consulting. 2010. Logan Lake Water Quality Report 2009. April 30, 2010.

MacKenzie, W. and J. Shaw. 2000. Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk, Kamloops, B.C. 15-19 February 1999. Ed. Darling, L.M. Volume Two. BC Ministry of Environment, Lands and Parks, Victoria B.C. and University College of the Cariboo, Kamloops, B.C. 520 pp.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Wetlands and Water Synthesis. World Resources Institute, Washington DC. Available Online: http://www.millenniumassessment.org/documents/document.358.aspx.pdf (Accessed: September 17, 2010)

Ministry of the Environment 2010. Wetlands in BC. Webpage Article. Environmental Stewardship Division, MOE, Government of British Columbia. Available Online: http://www.env.gov.bc.ca/wld/wetlands.html (Accessed: September 17, 2010)

Ministry of Environment, Lands and Parks 1999. Great Basin Spadefoot Toad. Information Sheet. Ministry of Environment, Lands and Parks. Available Online: http://www.env.gov.bc.ca/wld/documents/spadefoottoad.pdf (Accessed: September 17, 2010)

Ohno T, 1990. Levels of Total Cyanide and NaCl in surface waters adjacent to road salt storage facilities. Environmental Pollution 67(2): 123-132

Rubec, C. 1991. *The Federal Policy on Wetland Conservation in Canada*. Environment Canada.

Sandborn, C. 1996. Economic Incentives to Protecting Wetlands: Selected Issues. EnvironmentCanada.

Sandborn, C. and Penfold, G. 1996. *Towards a Provincial Wetland Policy*. BC Ministry of Environment, Lands, and Parks and Environment Canada.

Scott, David. 2010. Instructor, University of British Columbia-Okanagan. Personal Communication.

Schmutzer, A.C., Gray, M.J., Burton, E.C., and D.L. Miller 2008. Impacts of cattle on amphibian larvae and the aquatic environment. Freshwater Biology 53(12): 2613-2625

Southam, T. and Curran, A. (eds.). 1996. *The Wetlandkeepers Handbook: A Practical Guide to Wetland Care*. Environment Canada, the BC Ministry of Environment, Lands, and Parks and the BC Wildlife Federation.

Utzig, G., and D. Schmidt. 2011. Dam Footprint Impact Summary BC Hydro Dams in the Columbia Basin. Fish and Wildlife Compensation Program: Columbia Basin. Nelson, BC. Available Online: http://www.fwcpcolumbia.ca/version2/reports/pdfs/FWCP-CB_Impacts_Summary.pdf (Accessed: August 15th, 2012)