StreamTalk

The newsletter for stewards of salmonids and their habitat • Volume 20 • Number 1 • Spring 2013

Throughway or barrier?

Culvert size and placement can make or break a waterway

by Jessica Hutchinson

Most of the roads, highways and logging roads on the west coast of Vancouver Island were built between 1960 and 1980. At that time, they were constructed without much consideration for fish. This aging infrastructure has left thousands of streams and rivers fragmented by collapsed or hung culverts. These corrugated metal pipes are supposed to facilitate drainage under roadways but they can be a barrier to fish passage if they are not properly installed or sized.

Every year, wild salmon return to their natal streams around Clayoquot Sound to spawn and give life to the next generation. Unfortunately, much of their historical habitat is not accessible due to fragmentation. Since 1994 the Central Westcoast Forest Society (CWFS) has been replacing culverts and deactivating logging roads to improve fish passage. Despite these efforts, many important streams in our communities and even within Pacific Rim National Park Reserve remain fragmented by culverts.

The size of a culvert is important for maintaining natural water flow and for providing passage for adult and juvenile fish. It should be chosen to protect natural stream conditions. For instance, a culvert should be large enough to handle peak water flows; to protect streamside vegetation; to transport nutrients, sediment, and woody debris; and to facilitate fish passage.

If a culvert is too small, fish may be unable to pass during peak water flows. Water channelled in a narrow culvert increases in velocity and can restrict fish passage (especially for young trout and salmon). Cylindrical culverts should mimic a natural stream by being countersunk below streambed level so that there is a continuous channel with little deviation in width, height or substrate. Even better, bottomless culverts (or small bridges) should be used so that the stream bed is never impacted.

Just a few inches of excess elevation creates a barrier to fish and fragments a whole stream system.

The transport of leaf litter, small woody debris and insects (allochthonous material) downstream is an important function in a watershed. Leaves, twigs and coniferous needles are food for aquatic bugs or invertebrates, which in turn make a healthy diet for rearing salmon in freshwater streams. The transport of leaf litter downstream is hindered when stream networks are divided by barriers.

Salmon are remarkable swimmers; however, if culverts are placed above the natural stream bed, the outlet height may exceed the ability of fish to migrate upstream. As a rule of thumb, the depth of the pool has to equal or exceed the height of the jump. If the pool at the mouth of a culvert is too shallow or the culvert is too high, the fish will not be able to make the jump.

Fish barriers reduce access to important upstream rearing and spawning habitat. When only the lower portion of a creek or river is accessible, competition for spawning habitat increases. If adequate habitat is not available in the lower reaches, spawning success is threatened. In a fragmented watershed, young rearing salmon also face increased competition and decreased access to resources. These can be significant limiting factors to wild salmonid production.

When a stream system is fragmented, the cycles of forest and stream ecosystems break down. Spawning salmon are important sources of food for black bears in the late summer and fall. Carrying their catch back to the creek bank, the bears adeptly hold

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In this issue:

Can you believe it? SEP is 35!

by Roy Neighbor

It's true: 2013 marks the 35th anniversary of the start of the Salmonid Enhancement Program.

SEP was introduced in 1977 to help rebuild and restore healthy salmon populations across B.C. and the Yukon. That original focus has evolved over time to add highly successful programs of public involvement, stewardship and education. Every year, tens of thousands of volunteers work with Fisheries and Oceans Canada on hundreds of projects in their communities to enhance salmon populations, improve fish habitat, raise public awareness and foster a sense of environmental stewardship.

Here are some interesting facts you may not know:

SEP has three key programs – Enhancement Operations, Community Involvement, and Resource Restoration. Collectively, these programs:

- Raise and release over 300,000,000 fish annually from 23 major salmon enhancement facilities, including hatcheries and spawning channels;
- Provide 10-20 per cent of all salmon fishing opportunities for hundreds of thousands of recreational, commercial, and aboriginal harvesters;
- Contribute approximately $90 million of direct and indirect economic benefits and 1,592 person-years of employment annually to the economy (BCStats, 2012);
- Deliver salmon stock assessment information to support the international and domestic management of salmon;
- Restore and maintain critical salmon habitat;
- Involve First Nations, local communities, and external partners in salmon stewardship activities;
- Engage 30,000 volunteers in a variety of community projects that protect salmon, rebuild their habitat, and educate the public on salmon stewardship.

In 2013, SEP expects to balance a number of key priorities, including conserving weak salmon stocks; sustaining commercial, recreational and First Nations fisheries; and involving communities in protecting salmon and salmon habitat. Always a highly adaptive regional program, SEP is currently supporting emerging priorities such as implementation of Canada's Policy for the Conservation of Wild Pacific Salmon.

Let's all join in congratulating SEP, its community partners and its volunteers for the exceptional contributions they have made to enhancing salmon, protecting habitat and building a broad understanding and sense of public stewardship for salmon in Pacific Region.

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the head down with a foot and bite just behind the gills, tearing off a filet or ripping out the egg pocket of a spawning female. If they bite into a male and taste milt instead of eggs, they drop it (mortally injured, of course) and go for another one.

Scavengers such as ravens, eagles, raccoons, and wolves are on clean-up patrol, making the most of whatever the bears leave behind. What remains of the rotting carcasses becomes an important source of marine-derived nutrients or fertilizer for streamside vegetation and trees. Stream barriers such as culverts inhibit this process. If a stream system is fragmented, salmon are restricted to the lower segments and the salmon-bear cycle is altered.

Maintaining the connectivity of a watershed has important implications for salmonid productivity and for the health of the entire watershed. Central Westcoast Forest Society has been working to restore and reconnect damaged or fragmented salmon habitat in Barkley Sound and Clayoquot Sound for over 16 years. In that time the Society has rehabilitated 81 km of fish-bearing streams. The Society has also deactivated 247 km of logging roads to improve fish passage. In 2013 we will be working with Parks Canada and the Ministry of Transportation and Infrastructure to reconnect isolated salmon habitat and increase wild salmon populations in Clayoquot Sound. If you would like more information on our current projects, please visit our website at clayoquot.org or find us on Facebook.

Investing in fish and wildlife

FWCP commits $1.6 million to projects in Coastal region in 2013

by Jennifer Vasarhely

Since the Fish and Wildlife Compensation Program (FWCP) launched in 1988, more than $110 million has been invested and over 1,500 projects have been completed across three regions of B.C. (Coastal, Columbia and Peace). The program has improved fishing and boosted economic benefits associated with enhanced tourism and recreation areas.

In the Coastal area, projects have included improvements to the Gates Creek sockeye spawning channel; genetic assessments of outgoing smolts from Alouette Lake to determine if they are from sea-run sockeye adults; habitat restoration projects on the Puntledge River; wetland restoration on the Jordan Diversion Reservoir; and land purchases to conserve important habitat for fish and wildlife.

A partnership between BC Hydro, the Province of British Columbia and Fisheries and Oceans Canada, the program provides strategic funding that supports restoration to address species and their habitats affected by the creation of BC Hydro generation facilities.

Each year the FWCP receives proposals for research studies and projects. This year $1.6 million was granted toward 19 fish and 13 wildlife projects in Coastal region watersheds of Vancouver Island, the Southern Interior (including Shuswap) and the Coast. Some of the projects granted funding for 2013-14 include:

- Alouette Watershed – the Alouette River Management Society will test the feasibility of restoring the anadromous sockeye run with a grant of $20,977.
- Campbell River Watershed – the B.C. Conservation Foundation was granted $18,475 to conduct performance monitoring of the Salmon River/Bigtree Creek Side Channel.
- Puntledge River Watershed – the Comox Valley Project Watershed Society was granted $33,464 for a Courtenay Airpark Lagoon Dike Breach Planning project.
- Bridge River Restoration Area – the Cayoose Creek Indian Band will continue the second phase of the Seton River Corridor Conservation and Restoration project with a grant of $143,070.

Fish habitat improvements – and fish! – in the Coquitlam River.

Community Involvement

In the Coastal region, Fisheries and Oceans Canada, as one of the FWCP partners, provides strategic and technical advice to fish-related project proposals. Through the Community Involvement and Resource Restoration unit, staff support communities in submitting proposals, reviewing projects and working with FWCP partners to meet program objectives of conserving, enhancing and protecting habitat, fish and wildlife.

There are three regional FWCP programs that share a vision of thriving fish and wildlife populations. An opportunity exists for communities to collaborate with government, industry, private sector and/or academia through the FWCP.

Questions related to the Community Involvement and Resource Restoration role in this process can be directed to Karl Wilson at karl.wilson@dfo-mpo.gc.ca

The Application Process

Each region has an independent board, technical committee and program manager who work with community and First Nations partners.

Applications are reviewed annually in the Coastal region by committees that include representation from the three FWCP partners, First Nations and the public.

"It's important to have all groups involved in reviewing the proposals and allocating the funds," says FWCP Coastal program manager, Allister McLean. "Projects are chosen based on technical merit, cost vs. benefit, level of partnership, linkages to watershed-specific priorities and overall benefit to the FWCP's mandate and vision. We encourage any group or organization that has a project that meets our criteria to look at applying."

For more information visit www.fwcp.ca or contact Allister McLean at 250-850-5906 or al.mclean@bchydro.com.

Streamkeepers Update

Stream monitoring is its own reward

by Zo Ann Morten

I hope all fared well during our fall rains and are ready to explore the subtle changes in the creeks that occur in spring. It is exciting to go down to the local stream pool to see the offspring of last fall's salmon. One shares in the hope, continuity and peace that comes from watching juveniles hit the surface to feed and then dart back to their hiding spots in the fingers of the large woody debris that your group put in the stream.

Pacific Streamkeeper Federation (PSkF) board member Gord Tooker with streamkeeper instructor Dave Clough review mapping data in beautiful Qualicum Beach. Photo: Zo Ann Morten.

You have made a difference for these creatures. You know they are here. You know the gravels where their food is growing and where one day they will return to dig their redds. You know the water quality and quantity. You know some of the dangers these little ones face. And you know the partners with whom you have nurtured a relationship in order to assist our salmon.

We carefully assess, map, and monitor the stream. Sometimes the data solidifies what we already knew, sometimes it leads us to further studies, and sometimes it reveals new insights. We get out in the fresh air, and share our salmon stories with passersby. These forays with our streamkeeper friends have become a part of who we are.

And it is all to the good: more people understand the need for salmon and that people are tied to other species (perhaps they do not know the full extent of our interconnections, but they do grasp our interdependence). Fish are no longer just cold slimy creatures that we smell more often than we see. The bugs flying over the ponds are no longer just pesky mosquitos but recognized as food for fish and birds – creatures of worth.

There are now a couple of new ways to share what we know about streams and the life within them. The World Wildlife Fund will soon be showcasing community salmon stories. Meanwhile, the PSkF has been working on a new easy-to-use data-entry tool designed specifically for DFO streamkeepers monitoring protocols. We will be able to enter data from Streamkeepers Modules 1, 2, 3, 4, 7, 11 and 12 into our computers and then upload it to a map-based site to show where on the stream you gathered your information.

I will be available from June to September to come to your community to assist in mapping your stream and uploading the information gathered. We'll also work together to determine where your spawner surveys or benchmarks are, and how to transfer them from piles of paper on your desk into a shareable format. From councillors to judges to government agencies to communities, all can learn about the life in your stream. No longer do we have to recruit one person at a time; we can use the internet to our advantage, sharing our stories and our message that animals must be protected.

Heads up! Here comes the Workshop!

The Salmonid Enhancement Program Community Workshop will take place on May 17-19, 2013, hosted by the Bowen Island Fish and Wildlife Club.

This biennial workshop is a time of giving thanks to SEP volunteers who dedicate countless hours to protect and preserve our salmon and salmon habitat. They learn new skills, share ideas and meet other volunteers from across the province. It is a time of rejuvenation.

Sessions will cover new DFO best management practices, hatchery practices, streamkeeper protocols, policies in practice, working with students, and more.

The first workshop was in Port Hardy in 1991. Subsequent events have taken place in Port Moody, Williams Lake, Victoria, Comox, Surrey, Terrace, Squamish, Maple Ridge and Campbell River. Each event reflects the community where it is being held, so this year Bowen Island's hatchery, streams, beaches and Howe Sound will be highlighted. Be sure to book your accommodation soon as Bowen Island is a popular long-weekend destination!

For information, please go to http://workshop.pskf.ca and http://workshop.pskf.ca/2013/index.html. Find out about Bowen Island Fish and Wildlife Club at http://www.bowenhatchery.org/

PSkF members welcome everyone at the registration table. Photo: Pat Morten.

What is SEHAB doing for you?

by Paul Cipywnyk

Greetings to fellow stewards from SEHAB – the Salmon Enhancement and Habitat Advisory Board. SEHAB presents the voice of the volunteer community to Fisheries and Oceans Canada. SEHAB CARES: Communicating, Advocating, Representing, Educating and Supporting community endeavours.

Here's a quick introduction to our role. Community advisors from across B.C. nominate a volunteer representative and an alternate from their geographical area. Once voted onto the board, members poll their stewardship groups for input on issues of concern, and gather news about local and regional projects and successes.

SEHAB has three meetings each year, of which one is held outside the Lower Mainland. During an intense final weekend conference, everything brought forth by the volunteer community is distilled into items that are taken directly to senior staff at DFO Regional Headquarters in Vancouver. Based on this input, SEHAB focuses on a few topics each year. The current working groups are Pacific Aquaculture Regulations, Funding and Capacity Building, and Wild Salmon Policy (WSP).

Chair Jack Minard addresses volunteers at the Toboggan Creek Hatchery near Smithers in June 2012. Photo: Zo Ann Morten.

The Aquaculture group has made huge progress in collaboration with DFO staff to clarify changing policies and rules affecting hatchery work. They continue to work on issues such as the licensing of SEP facilities. The Funding group has listed potential funders for stewardship projects. The WSP people have been working to represent the voice of the stewardship community in moving this key policy forward and in supporting related recommendations arising from the Cohen Commission report.

SEHAB thanks the board members who have completed their terms recently, and welcomes their replacements. Tracy Bond (Central Interior North of 100 Mile House) is replaced by Wayne Salewski; Don Lowen (Lower Vancouver Island) has replaced Ian Bruce; Dianne Ramage (North Side Fraser River, Burnaby to Mission) exchanged roles with alternate Paul Cipywnyk; Dianne Sanford now represents Sunshine Coast/Powell River; Jim Armstrong will represent Fraser South, and Elizabeth Hardy will represent Howe Sound/Squamish.

The present SEHAB executive is made up of Chair Jack Minard (Central East Coast Vancouver Island), Vice-Chair Jim Shinkewski (Pacific Salmon Foundation), Treasurer Zo Ann Morten (Pacific Streamkeepers Federation), Secretary Paul Cipywnyk (North Side Fraser River, Burnaby to Mission), and Membership Chair Greig Houlden (Smithers, Northwestern B.C.).

Feel free to contact these folks. You can find more information about them and all the other SEHAB geographical representatives on the SEHAB website at www.sehab.org.

New home for coho

by John Barker

West Vancouver Streamkeepers are pleased to announce that the yellow construction fencing has been removed and the path around their new coho rearing pond is now accessible to the public. It is in Memorial Park, north of Marine Drive between 19th and 20th Streets.

The pond is fed by McDonald Creek. It features plenty of large woody debris providing protective cover for juvenile salmon and cutthroat trout. Native plants, shrubs and trees are planted nearby.

The next phase will add a kiosk, interpretive signage, viewing benches and signage recognizing donors. This project would not have been possible without strong support. The District of West Vancouver provided staff time to help manage the construction phase. Organizations such as Pacific Salmon Foundation, the Coho Society of the North Shore, West Vancouver Community Foundation and TD Friends of the Environment Fund, to name a few, were significant contributors. In addition to the $95,000 raised, $35,000 of in-kind contributions benefitted this exciting project.

Connecting with land and water – in the middle of the city

by Celia Brauer

As recently as 1850 the False Creek watershed was home to old-growth forests criss-crossed by salmon streams. In the forests were large and small mammals, birds and reptiles. Sea life lined the shoreline and the indigenous people lived in harmony with this bountiful natural area.

The Statlew mural is composed of seven mandalas representing stages of the salmon life cycle, as well as watery waves, original plants and animals, and words for water in different languages.

Today the land is covered with buildings and paved streets, with some re-created green space in between. Once-abundant natural resources have given way to a multitude of human resources. The main mandate of the False Creek Watershed Society (FCWS) is to educate citizens about the city's natural history and build environmental awareness. People's understanding of these issues influences the choices they make – whether in voting, shopping, business or recreation.

In 2013 we undertook three major projects. The first was to support the St. George Street Rainway group in its successful bid to create the first mural to be painted on a Vancouver roadway. St. George Creek flows through a sewer nowadays, like almost all other creeks in the city. The group is working with the city and community to eventually "daylight" the stream and bring the water back to life.

The mural honours the historical creek and is named Statlew, meaning "little creek" in the Henqeminem language of the local indigenous people. See it on St. George Street between 7th and 8th Avenues.

In May, the FCWS created a major event called Water is Life – What Healthy Water Means To Us All. Local experts offered fascinating discussions on beach health, sewer runoff, daylighting, bringing back herring, sewage treatment, the health of the Fraser River, and tankers in the harbour. Vancouver councillor Andrea Reimer talked about the possibility of creating a Water Advisory Board. Many water groups hosted community tables.

During the summer we held a series of "Earth Walks" with knowledgeable local guides who offered a city-view of how the earth is a part of everything in our lives. We viewed the Eco Art and beehives of Kitsilano, did a "Nature Walk in a Shopping Mall," heard some stories of the Fraser River, and toured Cottonwood Community Gardens and a "lost creek". We learned about fish off-the-boat and in markets, saw False Creek through the eyes of an ecological economist, and talked about how to connect with the land in the middle of a city. The walks were very successful and we would encourage any group to organize their own.

For information about these events, see our website at www.falsecreek watershed.org. For our newsletter, contact info@falsecreekwatershed.org.

Barry Cordocedo, shown here with Joanne Day, was honoured by DFO staff and volunteers at a retirement luncheon on February 27 to commemorate his long and distinguished career as a community advisor. Barry enjoyed his work over the past 30 years very much, and we may well see him volunteering in the future around the Nanaimo area. Over the years he saw the SEP program grow and evolve, and he was instrumental in assisting projects on Vancouver Island with hatchery work, education, watershed planning and habitat improvement. His knowledge and friendship will be missed by the Department and we all wish him well as he starts on this new adventure.

Project Highlight

Juvenile salmon and habitat restoration in Howe Sound

by Douglas Swanston

For the past two years I have worked with the Squamish River Watershed Society to identify the stocks of juvenile chinook salmon using the nearshore beaches of Howe Sound. We use a beach seine and DNA fingerprinting. In October 2012, I was invited to volunteer aboard the DFO research vessel *W.E.Ricker*, which was conducting a mid-water trawl-net investigation of juvenile salmonids in Howe Sound, Bute Inlet, and Jervis Inlet. It was interesting to compare notes.

Beach seining captures fish close to shore and can only sample to a depth of 2.3 m. By comparison, the mid-water trawl net from the *W.E.Ricker* can sample fish from depths of more than 400 m. It is not easy to directly compare the sampling results from a beach seine to a mid-water trawl net. However, the trawl certainly caught a larger size of fish. The largest juvenile chinook salmon we have caught using beach seines was less than 12 cm long.

On the *W.E. Ricker*, adult chum approaching 1 m long were caught and then released to continue toward their spawning grounds in all three inlets. Unfortunately, many of them suffered scale loss and decompression problems when brought up from depth. This trawl methodology was adapted from an international study. To minimize mortalities, the length of time the net is towed was shortened to a maximum of 30 minutes and the size of the net was reduced. A saltwater revival tank is also used to assist in the recovery of fish before returning them to the ocean.

In both studies, a small portion of the tail fin is collected from juvenile salmon for DNA fingerprinting. Researchers analyse the DNA to determine which stream the salmon came from. In the beach seine study, more than 96 per cent of the chinook were then released. In the trawl study, juvenile salmon were also dissected to determine their sex. The skull was dissected and two otoliths (ear bones) were removed, which helps determine when the fish left freshwater for the marine environment.

On some trips, the gut content of juvenile salmon are also dissected to learn what these fish eat. The largest juvenile chinook trawled had both fish and invertebrates in their stomachs. The fish prey were digested beyond recognition except for two Pacific herring and possibly a sandlance. The invertebrates included squid, a polychaete worm, euphausiids, mysiids, hyperiid and gammarid amphipods, crustaceans and insects.

On the October trip, the year's young herring were commonly observed in shallow net trawls above 30-m depth. Herring possibly two years old or older were observed in both the shallow trawls and below 30 m. Juvenile hake were also caught in these deeper trawls. Dr. Jeff Marlieve from the Vancouver Aquarium had noted a similar abundance of herring and hake in Howe Sound on a similar fishing trip in July of 2012.

A first for me was an observation of sea lice on a juvenile salmon caught in the southern Strait of Georgia. Returning spawners often have sea lice. However, I have never seen sea lice on juvenile salmonids in the southern Strait. I can only imagine that these sea lice moved from some adult chum onto the juvenile chinook when all the fish were packed together in the "cod" end of the net, either while being towed or when recovered by the *W.E. Ricker.*

I came away from the trawl survey struck by the similarities in catch between Howe Sound, Bute Inlet and Jervis Inlet. Howe Sound has been impacted by metals and acid drainage contamination from Britannia Mines; contamination from two of B.C.'s oldest pulp mills; filling and diking for logging and deep-sea port construction; mercury from a caustic soda plant; wood-preservative operations on land adjacent to the Mamquam Channel; and ongoing log sorting and logging. By comparison, Bute and Jervis Inlets are relatively unimpacted fjords, despite ongoing logging, log sorting, log booming, and, in Jervis Inlet, gravel extraction. Yet the trawl results appeared to be very similar in the species caught in each waterway (except for the diversity of juvenile salmonid species caught near the entrance to Jervis Inlet: pinks, sockeye, and chinook). The samples make me feel positive about the many efforts to fix the problems in Howe Sound.

Chinook captured by the *W.E. Ricker* in October 2012. The ruler in the image is 30 cm long.

I would like to thank Dr. Ruston Sweeting, Chrys Neville, Lana Fitzpatrick, and the captain and crew of the *W.E.Ricker* for allowing me to join them on their research project. I would also like to acknowledge the Pacific Salmon Foundation, Edith Tobe of the Squamish River Watershed Society, and Matt Foy of DFO for supporting the juvenile chinook beach seine study in Howe Sound.

Salmon Site-ings

http://www.pac.dfo-mpo.gc.ca/sep-pmvs/chum2012-keta2012-eng.htm
Read about the encouraging chum returns of 2012 in the Lower Mainland.

http://www.seymoursalmon.com/newsletter.php
The Seymour Salmonid Society posts their newsletter here. Catch up on their activities and see some great photos.

http://www.readinga-z.com/book.php?id=806
A children's book, *Leap! A Salmon's Story* can be viewed on this website, or downloaded if you join up. The story is delightfully illustrated, and makes the salmon life cycle clear and memorable.

http://pnwsalmoncenter.org/
See how things are done south of the border at the website of the Pacific Northwest Salmon Center. The not-for-profit centre links people and salmon through educational programming, dissemination of research results, and demonstration of sustainable agricultural practices at the edges of salmon habitat. It has relationships with local First Nations, has links to free teaching aids, runs art camps and cleanups... just like many of us!

http://stanleyparkecology.ca
Stanley Park Ecology Society promotes the stewardship of Stanley Park through collaborative initiatives in education, research and conservation. Among their many programs for students are two that highlight salmon education. Visit their website for more information and prices.

Salmon Forest (Grades 2-3) teaches how salmon contribute to healthy food webs.

The **Salmon Release Program** (Grades 2-7) complements DFO's Salmonids in the Classroom program. They do a stream survey and meet fry prey up close and personal in an exploratory pond dip.

http://www.eurekalert.org/pub_releases/2013-02/osu-smu020413.php
This news release will direct you to results of an Oregon State University study about the ability of spawning salmon to find their stream of origin. The study postulates that juvenile salmon imprint the magnetic field – logging it in as a waypoint for their return as adults.

http://www.pacname.org/conf.shtml
The conference of Northwest Aquatic and Marine Educators will take place July 14-18 at Camp Alexandra in Crescent Beach. The call is out for posters and presentations (deadline April 15). Themes this year are Transforming Knowledge into Action, Exploring the Watershed to the Deep-Sea, and New Waves in Aquatic Education. Visit the website for details, and save the date!

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