

The following is an excerpt from the minutes from the recently held 2013 SSBC AGM. It is an overview of the presentations of the two guest speakers; Mike Wallis of Wallis Environmental Aquatics Ltd and Dan McCubbing of Instream Fisheries Research Inc.

Mike Wallis, spoke on the SSBC funded Spius Creek habitat restoration project and the proposed Bonaparte River habitat restoration project. First, Wallis discussed what works for fish--natal stream values, rearing, spawning, and ecosystem integrity. Enabling natural complexity is required. As for what works for people, Wallis looks for common points of interest. Regarding water and stream control, approaches have changed. We no longer push old cars, tractors, etc. into streams in order to stabilize the banks. The original recipe was use of rock and wood in order to prevent erosion. Today, proven habitat improvement techniques include sealing, brush matting and planting, out planting, revetments, spurs and groynes, instream complexing, bar stabilization and cross channel weirs. Such techniques have a high success rate in Interior streams.

Wallis has to match the design to the site and the species specifics. Hybrid designs match site conditions and species preferences. Wallis showed photographs of the Spius Creek site before a final plan was developed. Features of the area included known use by steelhead, large substrate, steep gradient, groundwater upwelling, and a cooperative landowner. Issues included high peak flows, a mobile bed channel, ice scour, lost stream bank integrity, and riparian vegetation loss.

Following development of the plan, spurs were installed. Then, structure was added between the spurs. This structure included rock, fabric, willow cuttings and fencing. The configuration created roughness, hydraulic variability and biological complexity. The work prevents further migration of the stream channel into surrounding land and encourages deepening and narrowing of the channel. A rock source was donated from the landowner's property. The work was done during winter, and many willow cuttings were planted. A biodegradable fabric matting placed bank side behind the rock facing, prevented fines coming out into the water during the first freshet. Based on experience from past projects this has proven to stabilize the bank substrate. Wallis showed photographs of sites 1, 2 and 3 after the work was done. Site 3 was an off channel site used mainly by salmon. Wallis would like to assess the work one, three, five and 20 years later.

At the Bonaparte River site, Wallis consulted with DFO, the landowners and the Bonaparte stewardship society. Wallis then outlined the preferred steelhead features of the site. The plan includes construction of an instream weir to create riffle-pool habitat, placement of boulder clusters and large woody debris in the pool, placement of boulder clusters downstream from the pool, and riparian planting and fencing.

There are various steelhead and salmon issues found in the Bonaparte watershed. A watershed plan and a water management plan have been completed. So far, past restoration work on the Bonaparte has been done to benefit salmon. The proposed plan should maintain steelhead genetics, improve habitat and allow time for nature to work. Wallis then displayed drawings of the proposed weir and the surrounding areas. The plan showed construction of the weir, placement of boulder clusters and large woody debris in the pool created by the weir and placement of boulder clusters downstream from the pool. Upstream from the weir the pool would be 50.3 meters long, and downstream from the weir the riffle area would be 45 meters long. The permit has just been approved and construction can be done during the winter, before the 2013 spring freshet.

Following Mike Wallis' talk, Braidwood introduced Don McCubbing of Instream Fisheries Research Inc. McCubbing's topic was steelhead research work on Keogh River.

This work started in 1977 with a population dynamic study. Further studies included netpen rearing and release, habitat and smolt capacity models, habitat structures, nutrient addition, watershed restoration, a living gene bank captive brood program, management applications and POST--acoustic smolt tagging. Climate change study is now starting. Coho and pink escapement work has also been done. As a result of all this work, there have been 33 journal papers, 7 student theses, 75 technical papers, many presentations, and 350 citations in the literature.

Originally built in 1976, the fish fence had to be rebuilt in 1977 after a major flood. From April through June, this fence captures all downstream migrating smolts and helps with adult enumeration. Species present include steelhead, Dolly Varden char, cutthroat trout and coho salmon. The fence is operated with HCTF funding with a DFO contribution. Adult steelhead can be marked and outmigrating kelts can be captured. Age class structures of both smolts and adult steelhead are required. Since the

early 1990s, the steelhead population has declined. Once as high as 27%, marine survival averaged 15% but in recent years has declined to 4%. Similar results have been found in Oregon. Coho survival also declined from the 1990s on.

Steelhead are very productive when not many are present. In such situations, the number of smolts per spawner increases. However, in the 1990s the same number of spawners was producing fewer smolts. At 4% average survival, the population eventually will disappear. A coho data set was started in 1998. Coho marine survival matches the decline in steelhead marine survival. In recent years, coho smolt numbers have been better.

A watershed restoration program benefited the Keogh's fish. At first structures were added to the upper river and fertilizer to the lower river, but by year five nutrients were added to the whole stream. During summer low flows, production at various structure sites was determined. Fertilizer addition resulted in a 20-30% increase in growth rates of steelhead and coho fry. The best response came from a combination of structure and nutrients. Prior to fertilization, steelhead smolts were primarily age 3 with some age 2. After fertilization, steelhead smolts were mainly age 2 with some age 3. Nutrient added smolts at age 2 were the same size as non-nutrient added smolts at age 3. There is an on-off signature with pink salmon, whose carcasses add nutrients to the Keogh.

While the Keogh has a good population of resident cutthroat trout it has hardly any resident rainbow trout. Sizes and densities of juvenile fish are highest where the river has been treated with nutrients and habitat structures. The smolt yield was significantly higher after treatment work at the Keogh. Steelhead smolt recruits per spawner improved. Watershed restoration may augment survivals in freshwater to offset declines in survival at sea. Large woody debris is used by over wintering steelhead parr.

The living gene bank program involved captive brood stock grown from wild smolts. The fish were matured in captivity and their genetic representation and relatedness were determined. The captive adults were then spawned and their offspring were stocked as smolts. Then, the performance of these smolts at producing adults was evaluated. LGB steelhead returned from 2003-2008. Having these adult steelhead come back was a success. However, ocean survival was lower than wild--1/2 to

1/3 survival of wild smolts was shown by the LGB smolts. No more smolts were produced in the river with the hatchery spawners, so numerically the program was a failure--it did not produce more spawners.

The POST program involves inserting acoustic tags into smolts, and the Keogh was the first place at which smolts were given these acoustic tags. Each tag has a unique tag code and a four month battery life. In order to detect the acoustic tags, receiver lines were placed in the ocean. In order to compare results, POST work was also done on fish in Waukwass River in Quatsino Sound and receiver arrays were placed along the west side of Vancouver Island. Highest survivals were found at the first array at the mouth of the Keogh and in Quatsino Sound. Lower survivals were found on the east side of Vancouver Island; in fact, over half the Keogh fish were lost in the first 10 kilometres in the ocean. McCubbing said a lot of fish die in the first few weeks in the ocean; after that, the rest survive fairly well.

Later POST work has been done on the Cheakamus, Seymour and Thompson rivers. During a recent spring flood the fence was breached. A temporary structure replaced the breached fence and, fortunately, only the early part of the smolt outmigration, mostly, coho, was lost.

Today the Keogh project has one part time biologist (McCubbing), three-five technicians, and students. Also involved are DFO and universities. Long term monitoring on the Keogh has been effective in defining recruitment limitations for steelhead and coho. There is evidence of positive response to watershed ecosystem rehabilitation. Future work includes nutrient interactions, habitat evaluation (after 10 years), climate change, water augmentation and long term monitoring of cutthroat trout and Dolly Varden char.