Simms Park Refocus to Improve Side Channel Connectivity

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Final Report

Prepared for: Fish and Wildlife Compensation Program

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EXECUTIVE SUMMARY:

In April of 2016 the Fish and Wildlife Compensation Program (FWCP) provided seed funding to the Comox Valley Project Watershed Society (CVPWS) to develop a new restoration prescription for a high priority habitat restoration project alongside the Courtenay River. The objective of this project was to use the seed funding to build on previous work done in order to develop a refocused restoration plan and associated budget which would be cost effective and would provide the maximum benefits to fish, wildlife and the community; and therefore have a high likelihood of being implemented. The project area, located in Simms Millennium Park (Simms Park) – Courtenay, B.C., is of high importance as off-channel fish habitat for juvenile salmonids. This area provides one of only three off-channel habitats for juvenile salmonids along a three kilometer stretch of upper ecotone of the Courtenay River estuary. The restoration of this area in order to provide functioning off-channel habitat will address issues to juvenile salmonids from seal predation, displacement during high flows, and the need for ecologically diverse habitats in a dynamic tidally influenced system. Currently, the off-channel fish habitat in Simms Park is marginal and there is a high potential for improvement. At present, the area has a pond and blind channel (the 'finger') that are separated from each other and the Courtenay Slough by high elevation culverts. The aim of the restoration is to increase the habitat quality and tidal exchange in the pond and finger. Both the pond and the finger are utilized by fish, however habitat quality is low, and tidal flushing is restricted due to the elevations of the culverts at either end of the pond. Increased access to the pond and finger will provide salmon with refuge from seals and fish with rearing and foraging opportunities.

The original habitat restoration design, which was previously developed for the project in 2011 by a local biologist, was deemed too complicated, too expensive, and more suitable for an upstream habitat restoration (as it did not take into consideration the

tidal influences at the site). Updated baseline data was collected and survey work undertaken by CVPWS in 2016 in order to inform the new restoration plan. The original restoration plan and budget was then reworked and vetted through the appropriate stakeholders for feedback and buy-in order to develop a new restoration prescription and associated budget. The outcome was the development of a new restoration prescription for the project which is more cost effective and maximizes fish, wildlife and community benefits; thereby increasing the chances of it being successfully funded and implemented.

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1. INTRODUCTION:

The K'ómoks estuary (Courtenay River estuary) is one of only eight estuaries in British Columbia designated as Class 1, these estuaries are considered the most important due to their size, intertidal biodiversity and the variety of species they support[1]. The K'ómoks estuary is located near Courtenay, B.C. (Figure 1) and is a critical area of interest to the Comox Valley Project Watershed Society (CVPWS), partly due to its importance in sustaining healthy salmon runs. Over the past 150 years human activities such as dredging, shoreline hardening, river channelization, diking, log storage, development in intertidal and nearshore subtidal areas, altered flow regimes due to hydroelectric operations and pollution from stormwater and sewage discharges have negatively impacted the ecological integrity of salmonid habitat in the estuary. In particular these changes have compromised river-floodplain connectivity, eroded the habitat base and degraded water quality[2]. Habitat restoration and creation are important activities to conduct in order to compensate for this past harm and to increase the productive capacity of fish habitat resources within the estuary.

Figure 1 - Location of K'ómoks Estuary next to the community of Courtenay, B.C.

Off-channel or side channel habitats are bodies of water adjacent to the main channel that have surface water connections to the main river channel at summer discharge

levels[3]. Young salmonids migrating down the river require this habitat to escape high river flows, predation by seals, and to provide holding areas to allow for forage, growth, and acclimatization to increasing salinities before their marine migration. Off-channel habitat has been shown to benefit juvenile salmon growth and survival, decrease their competition for food and space, help keep larger predators away and provide important refuge[4]. Side channels are excellent nurseries for juvenile fish, providing conditions favorable for growth, such as lower water velocity, moderated water temperature, and enhanced food availability [5 - 8]. In addition, many floodplain restoration projects are specifically directed at reconnecting and/or recreating side channels to increase rearing capacity for juvenile fish [9-10].

In 2000, Fisheries and Oceans Canada (DFO) and the City of Courtenay supported a project to create off-channel habitat for salmonids, alongside the Courtenay River, through a newly created local park (Simms Millennium Park (Figure 2)) as mitigation for past habitat damage on the system[11]. DFO developed the restoration plan and the City of Courtenay undertook the work on the ground. The project resulted in a blind channel (the 'finger') and an inner pond that are separated from each other and the Courtenay Slough by high elevation culverts. This original project was not as successful as it could have been as the culvert (Figure 3) that connects the Courtenay River finger through to the internal pond (Figure 4) is long (32 m in length) and narrow (0.9 m diameter) and was installed at too high an elevation to be accessible for fish at a variety of tidal cycles and river flows. The use of side channels by fish and wildlife hinges on connectivity (access) between the main-stem and side channel as well as the presence of suitable habitat characteristics[12].

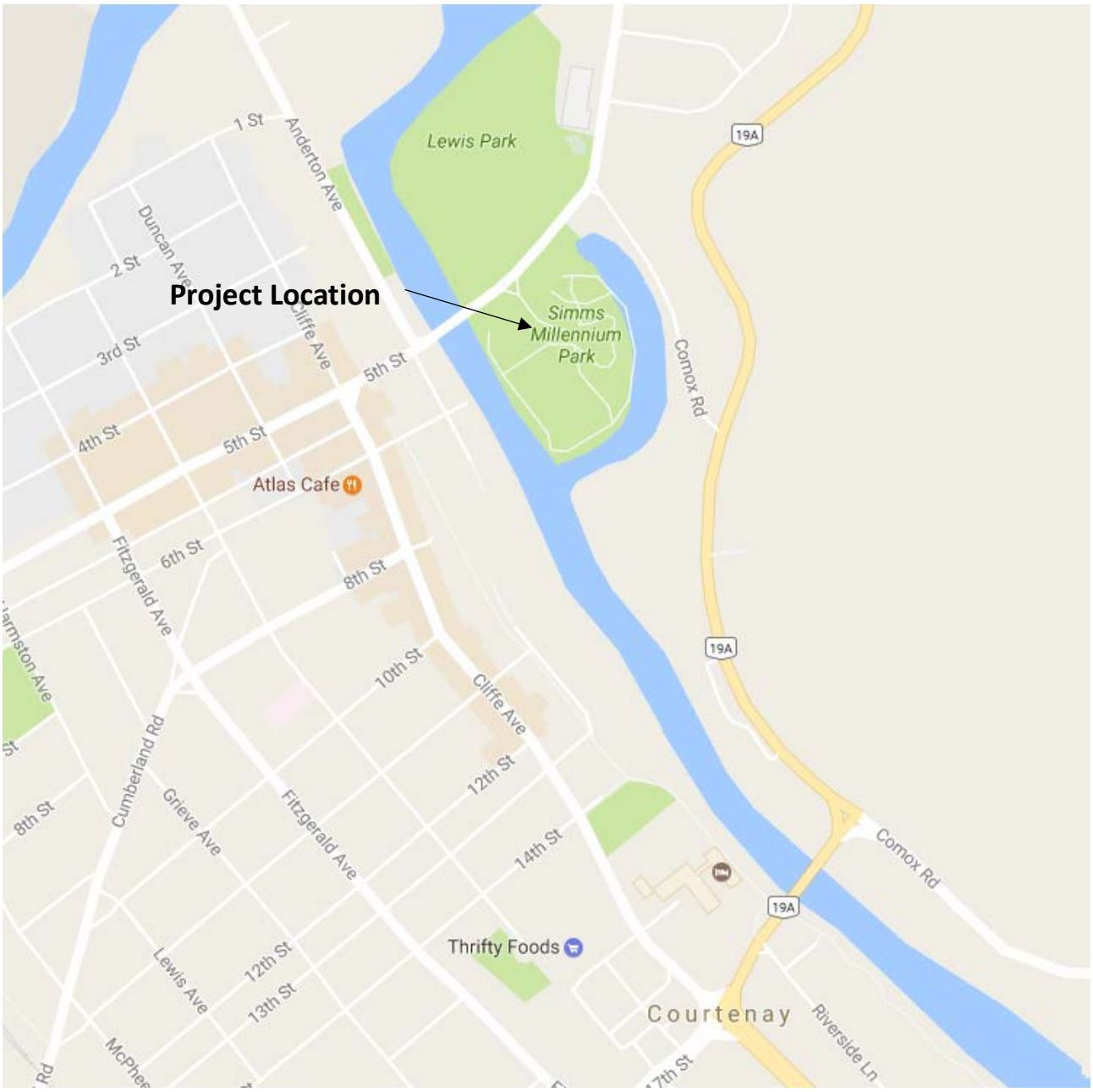


Figure 2 - Project Location - Simms Millennium Park, Courtenay, B.C.

Baseline work conducted in 2016 by CVPWS confirms the culvert only flows at 4.1 m or higher tide levels (with river flows factored in), which do not occur frequently enough to allow for regular fish passage, thus the habitat is not readily available to fish during most tides. Fish sampling has confirmed the presence of some salmonids in the pond,

but they are essentially trapped until the next high tide. The pond has an outlet drainage culvert/pipe to the slough that is only 30 cm in diameter and is perched very high with no potential for fish usage (Figure 5).

Figure 3 - Photo of culvert which connects the Simms Park finger to the inner pond.

Figure 4 - Photo of the Simms Park inner pond.

Figure 5 - Simms pond outlet pipe connecting to the Courtenay Slough.

Simms Park provides one of only three off-channel habitats for juvenile salmonids along a three kilometer stretch of upper ecotone of the Courtenay River (K'ómoks) estuary. In 2010, with support from FWCP, CVPWS carried out a study of juvenile salmonid habitat requirements in the estuary. In this study, the Simms Park location was shown to have had one of the highest concentrations of juvenile trout and salmon over the summer months, demonstrating that it is a key habitat area, and improving the fish habitat quality of this area was identified as a restoration priority at that time[13]. However funding applications in the subsequent year to undertake this project were unsuccessful mainly because, with a price tag of over $380,000.00, the project was cost prohibitive. The project languished for a few years until the fall of 2014 when the Wetlands Institute workshop was held in Courtenay, and the Wetlands Institute team visited the site and critiqued the original restoration plan. The team commented that the original plan, with its many pool and riffle sequences, was more suited for an upstream type of restoration project and did not fully take into consideration the tidal influences at the site. This feedback was presented to the CVPWS Technical Working Group (a committee

consisting of DFO representatives, local biologists and other technical specialists) and resulted in the revitalization of the project. The committee recognized that the current habitat at the site is marginal at best, and not very accessible for fish. However they also identified that, enhancement of the habitat at Simms Park will result in improved quality and quantity of off-channel habitat, and was extremely important to implement. In particular it was noted that increased access to the pond and finger will provide salmon with refuge from seals; as well as rearing and foraging opportunities if designed properly. In addition, as the site is in a highly utilized urban park, it is ideal for allowing the public to engage with the project and to foster stewardship of the site and its natural resources. The feedback from the Wetlands Institute team identified opportunities for reworking and building upon the original design plan in order to create a less complex, more site appropriate and feasible option. Thus seed funding, to develop a refocused restoration plan, was secured from FWCP in the fall of 2015 through the Puntledge River Watershed Salmonid Action Plan[14]. The action that this funding address from the plan is to "restore habitat in the Courtenay River and estuary (e.g., address channelization and naturalize the river banks, instream complexing, and restoration of tributary habitats). These actions may be specifically designed to reduce predation by seals".

2. METHODS:

2.1 WATER QUALITY SAMPLING

Water Quality sampling was conducted in early summer and late summer in three main areas of Simms Park (see Figure 6). These areas were the "finger" between the footbridge at the Courtenay River at the north west end of the channel, the upper pond at the north end of the channel, and the viewing platform pond at the east end of the

channel. In addition, a temperature data logger was installed at a 0.2m tide level under the viewing platform site, which recorded temperature every 15 minutes for a six month period from June to December.

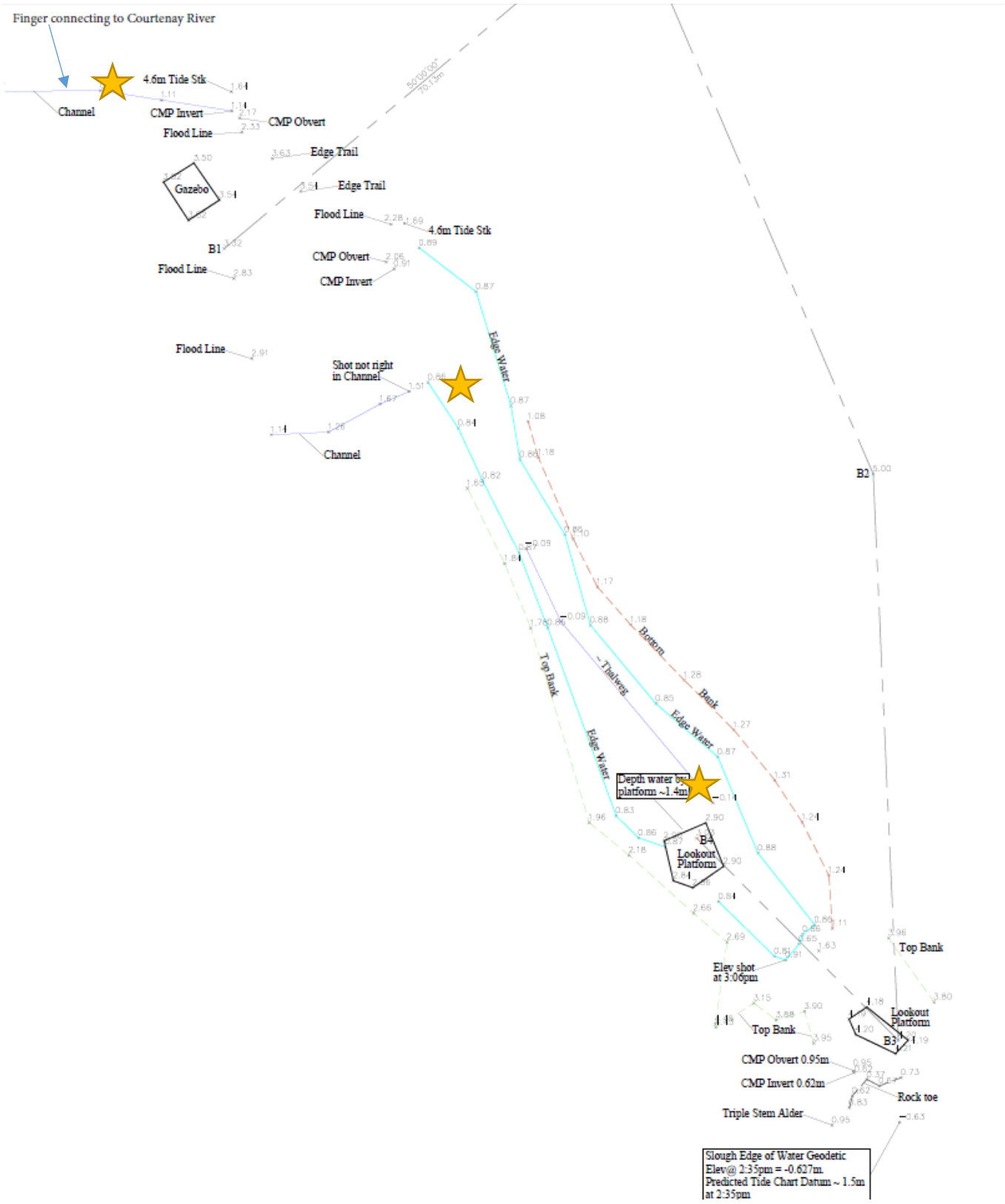


Figure 6 - Locations of water quality sampling station (denoted by yellow stars).

2.2 FISH SAMPLING

Minnow trapping was the methodology used to collect presence/absence fish use information in the Simms Park channel. Data collected provides qualitative information about relative seasonal fish use, but does not provide quantitative fish population estimates. Sets were made in early summer (June 23, 2016), and late summer (August 28, 2016). For each set, fifteen minnow traps baited with salmon roe were set for a minimum of 24 hours at depths ranging from 0.3 to 0.6m. Traps were distributed within three main areas; five in the finger, five in the upper pond, and five in the viewing platform pond.

2.3 SURVEY WORK

Obtaining accurate and up-to-date elevation data was an extremely important piece of baseline work that needed to be completed to inform the development of a new restoration plan for the Simms Park off-channel habitat enhancement project. The existing culvert which connects the finger to the pond is perched at an elevation that is too high, and the new culvert which will replace it needs to be installed at the correct elevation to allow for fish access at a greater range of tide cycles and river flows. In addition, when the culvert between the Courtenay Slough and upper pond is improved to create a true flow through channel, this connection needs to be at the correct elevation so that the inner pond will always maintain a certain level of water and not drain out. The elevation data will also help the engineer determine the amount of excavation and land re-contouring needed at the site. A professional surveyor was hired to re-survey the side channel at Simms Park.

2.4 STAKEHOLDER CONSULTATIONS

An important part of the process to refocus the restoration design for the Simms Park side channel was to get input and buy-in from local stakeholders. The first group approached about the redesign was the CVPWS Technical Working group, a sub-committee of 20 individuals which meets quarterly and consists of representatives from local stewardship groups and Fisheries and Oceans Canada as well as independent scientists. The committee was provided with the germane background information and reports, including the input from the Wetlands Institute, and met on-site in Simms Park to discuss ideas for how the area could be enhanced to improve the benefits for fish and wildlife. Based on this feedback, and baseline survey data collected in April, a newly refocused draft restoration plan and corresponding budget were developed by the project Engineer. The new design was vetted through the committee and then sent to the City of Courtenay for comment.

The City was one of the key stakeholders that had to be consulted as part of this process. As the City is the landowner, how the project is designed and implemented is of concern to them. Furthermore any project works which are to take place in the future cannot proceed without their support. The design was circulated to the Planning, Engineering, Parks and Public Works departments for feedback. Due to internal departmental reorganization and staffing changes with the City of Courtenay; CVPWS was not able to organize a meeting with the relevant department staff until September, 2016. At this meeting the City provided feedback that resulted in significant design changes to the plan that had been presented to the City. Namely the City staff indicated that the open channel that had been proposed (instead of the current culvert which connects the finger to the inner pond) was not acceptable. The original design concept had been to create an open channel in this area and reroute the trails for pedestrian access around this newly opened section of channel. The City staff indicated

that a pedestrian and cyclist bridge, connecting 6th St. across the Courtenay River and through Simms Park, has been proposed as a means to reduce traffic on the 5th St. Bridge. Although this bridge may or may not come into fruition; the City would like any potential traffic from this future bridge to flow through the current park trail system across the area where CVPWS had proposed an open channel. It was also indicated that, since the pedestrian and cyclist traffic is expected to increase through this area if the bridge does proceed, emergency vehicle access into the park across this area of the channel would be preferred by the City. This meant that the existing culvert would have to be replaced with a larger more fish friendly culvert that could accommodate an emergency vehicle. In addition the City's engineering department felt that the culvert we had proposed at the other end of the pond, to connect the inner pond in the park through to the Courtenay Slough, would not be their first choice. Rather they indicated that they would like to see a pedestrian bridge installed; as this would be more 'esthetically pleasing' and mean 'less maintenance' for the City. This resulted in significant design changes to the original plan. These design modifications also impacted the budget which had been developed for the future project and, in order to accommodate these changes, the budget had to be increased by close to $80,000.00.
The restoration design plan was updated to incorporate the input provided by the City staff and the new plan and concept were presented to the Mayor and Council for endorsement. The City officially provided their support of the project and agreed to contribute some in-kind staff time and materials towards its implementation.
The newly refocused project design was also vetted through the Estuary Working Group (EWG) and this group has been kept apprised of the necessary design changes and corresponding amendments to the budget. The EWG is an ad hoc committee which meets monthly and was formed as an outcome of a symposium on the estuary which was held in 2008. The EWG consists of representatives from 12 different organizations including stewardship groups, government organizations, first nations, independent

businesses and others concerned with the long term health of the K'ómoks estuary. The EWG is supportive of the project as a whole.

Another important project stakeholder is the K'ómoks First Nation (KFN). The entire estuary falls within the KFN's traditional territory and their oral histories as well as archaeological evidence demonstrate that the estuary has long been a culturally significant place for fishing, hunting, harvesting and ways of being. The Simms Park side channel concept and design was presented to Chief and Council at a regular Council meeting for buy-in and support. They were supportive of the project and there have also been on-going discussions with the KFN's Guardian Watchman Program to include the guardians in the implementation of the project and to make sure that it dovetails with the work that the Guardians do within their traditional territory.

2.5 ENGINEERING SUPPORT

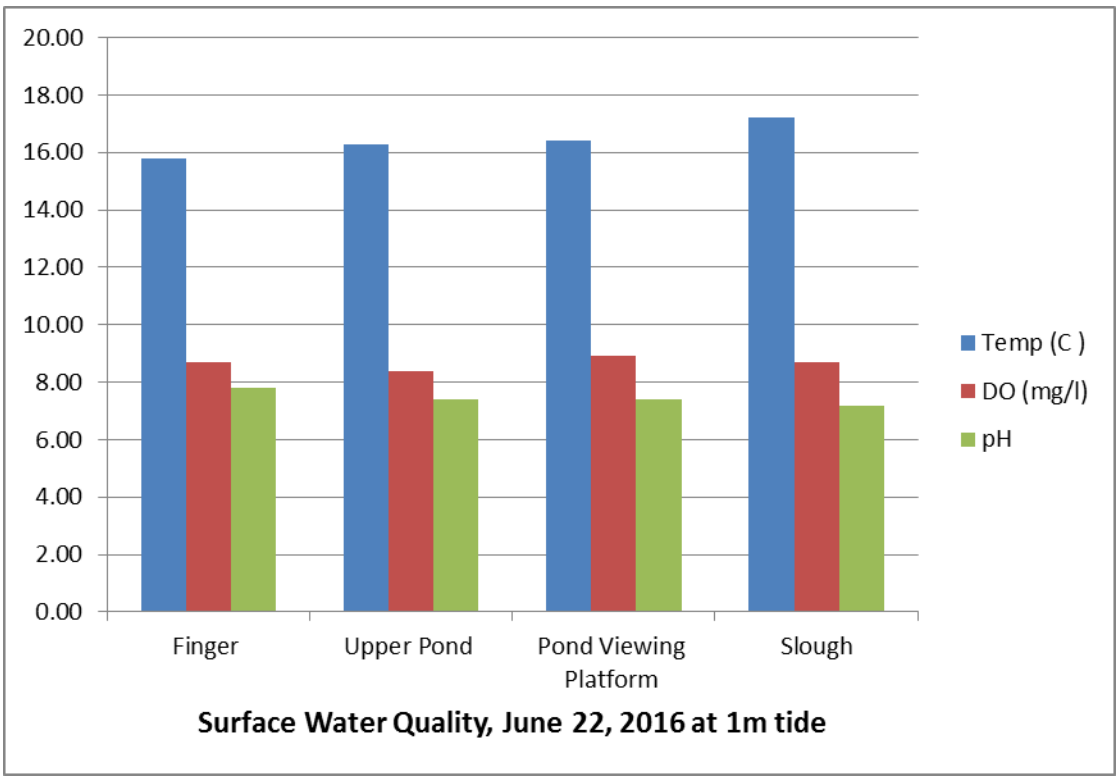
Northwest Hydraulic Consultants (NHC) were contracted to develop engineered drawings for the proposed habitat enhancement works at Simms Park (see Appendix 1). The scope of work undertaken by NHC included a site reconnaissance, review of the site surveys and data, development of the design concept plan and cross-sections as well as a project budget which included specifications for materials to construct the work and a +/- 10% cost estimate based on commercially available materials and equipment and labour rates. The contractor also met on several occasions with the planning team, and other stakeholders, including City of Courtenay staff, in order to refine the design plan based on the feedback received from these parties. The contractor also helped present the final engineered drawings and design concept to Mayor and Council for approval. The final design was one which all parties could agree to, and which will provide the maximum benefits for fish and wildlife at the site.

3. PROJECT OUTCOMES

3.1 WATER QUALITY

In June, surface temperatures, dissolved oxygen and pH were consistent and well within the limits for supporting fish and other aquatic organisms in all three sample locations throughout the Simms Park channel (Table 1). In August, the most noteworthy change in water quality parameters was dissolved oxygen which was low in the finger (4 to 4.5mg/l) and upper pond (5.4 to 5.6 mg/l) compared with other sites sampled. Low oxygen in these locations is likely due to lack of water circulation and the high Biological Oxygen Demand (BOD) resulting from abundant organics (leaf litter and fines) in the water. Limited water circulation in the finger has contributed to deposition of silt/ fines in the channel to a depth of 0.8m in some locations. The deposited silt is anoxic, and contributes to the low oxygen levels observed. Dissolved oxygen levels in the viewing platform pond were higher than in the other two sample stations in the Simms Park Channel, which is due to the circulation provided by the culvert to the slough which exchanges water in this section at every tide cycle. Proposed improvements to the instream habitat as well as culvert improvements will result in improved dissolved oxygen levels in the finger and upper pond areas, and less bed deposition.

Table 1 - Graph of surface water quality data in early summer, 2016.

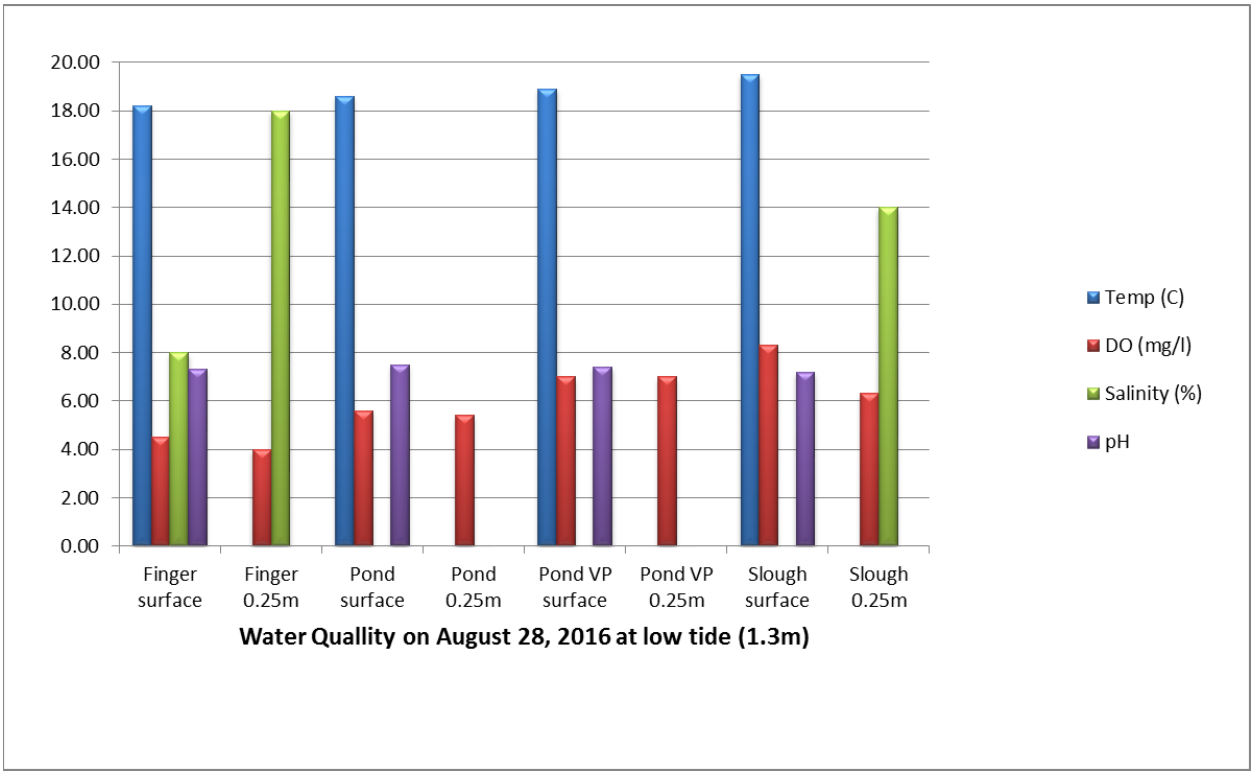


Surface temperatures on August 28 (late summer conditions) in the Simms Park channel ranged from 18.2^0 to 18.9^0C, and were slightly lower than the surface temperature in the slough which was 19.5^0C. Temperatures in June were also slightly higher in the slough than throughout Simms channel, which is due to overhanging shade which regulates temperature throughout the channel.

Salinity was measured at the three main areas in June and August at high and low tides. Samples were collected at the surface and at a depth of 0.25m. Salinity was 0% at all stations and depths during the high and low tide sampling in June. On August 28 at low tide, surface salinity in the finger channel was 8% at the surface, and 18% at 0.25m depth. Salinity was 0 in the other sample locations within the Simms Park channel, and 14% at 0.25m depth in the slough. During high tide August sampling, salinity was 0% at all sample locations and depths. Note that since only one sample was collected at each station, there may be areas of salinity that were not captured during the sampling.

These measurements were taken in order to determine if a connection from the inner pond to the slough would dramatically change the amount of salinity in the pond. Although initial measurements do not indicate that this will be the case, in order to accurately gauge salinity in the Simms Park channel and surrounding areas, more detailed sampling is necessary. However, even if the salinity levels increase with the new connection to the slough, this will not impact the use of the area by salmonids as they have the ability to tolerate saltwater and a great potential for rearing in areas with limited freshwater supply[15].

Table 2 - Graph of water quality data in late summer, 2016.



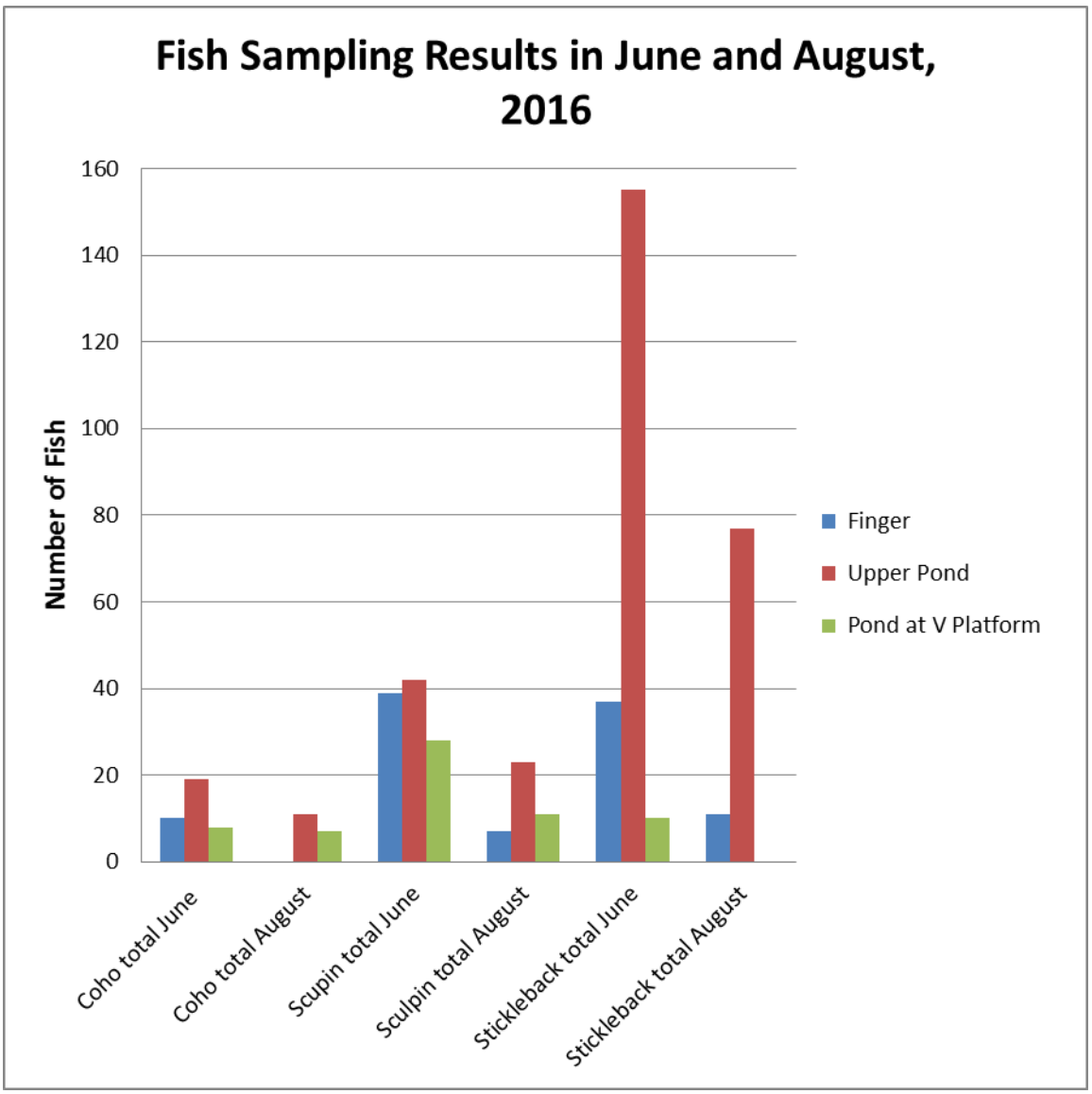
3.2 FISH SAMPLING

Results of the fish trapping are presented in Table 3. In terms of fish totals for both sample sets, the upper pond had the most fish use (327 fish), followed by the finger (104 fish) and the Viewing platform pond (64). There was a dramatic difference between the

numbers of fish captured in late August compared to late June. For all species and traps combined, numbers of fish captured reduced by half from late June to late August. Coho use decreased from 38 in the June sample set to only 18 in late August. In the finger, there were 10 Coho captured in early summer, and no Coho in late summer. Poor water quality (low DO combined with high temperatures) is likely a factor in this decrease. The majority of Coho were captured in the upper pond, with a total of 19 fry captured in five traps in that location in June, compared to 11 in the same area in August. At the Viewing platform pond, Coho numbers were consistent in early and late summer (8 and 7 respectively), but lower than the upper pond location.

Stickleback were the most abundant species captured in all three locations, with highest numbers in June in the upper pond area (155 in total in five traps). Stickleback use in all three sample areas decreased significantly in August. Sculpin were present in consistent numbers in all three locations in June, with numbers significantly lower in August, particularly in the finger and viewing platform pond locations.

Table 3 - Fish sampling results.



3.3 SURVEY RESULTS

Geodetic elevations were taken from the new Courtenay Museum (207 4th St.), and the 5th St. bridge to Simms Park. This work was provided in-kind at no charge to the project. A topographic survey to pick up the edge water, top and bottom banks, culverts, riprap and other features was completed. The files were downloaded from the Total Station and AutoCAD drawings were produced for use by the Hydraulic Engineer

(see Appendix 1 - Simms Park Topographic Survey). CVPWS provided a survey assistant, again at no charge to the project. The Surveyor also did not charge for mileage to and from the site. The topographic survey was used to pick up features for future enhancement works at the site.

3.4 DISCUSSION AND RECOMMENDATIONS

Based on the data collected, stakeholder input and a review of the earlier developed restoration plan a newly refocused restoration prescription has been developed to enhance the fish and wildlife benefits at the site (*see Appendix 2 – Simms Park Channel Upgrade – Engineered Drawings)*. The aim of the enhancement work is to increase the habitat quality and tidal exchange in the pond and finger of Simms Park. Baseline work confirms that both the pond and the finger are utilized by fish, however habitat quality is low, and tidal flushing is restricted due to the elevations of the culverts at either end of the pond. The culvert connecting the finger to the inner pond will be replaced with a new 14.5 m CSP Aluminized CSP culvert. The current culvert at the site runs at an angle to connect the finger to the inner pond. The new culvert will be installed to connect the finger and pond via the shortest route possible, allowing it to be less than half the length of the current one. It will also be larger in diameter (2.4 m) and will be installed at a 3.5 m geodetic elevation to allow more frequent inundation by tide and river flows. At the south end of the inner pond an aluminium pedestrian bridge which is 3 m wide by 12 m long will be installed to connect through to the Courtenay Slough (the slough then connects back to the Courtenay River). Thereby creating a true flow through channel. This plan will allow for increased access to the pond and finger which will provide rearing and foraging opportunities for fish. The pond and finger both contain large woody debris anchored in place when the original project was undertaken. In-stream complexity will be further improved through the addition of sedge benches and additional large woody debris placement. This additional complexing of the habitat will

provide salmon – both juveniles and adults with refuge from seals and adverse water conditions. This project is one of the recommended restoration options identified in a study of the Courtenay River estuary[13]. It also fits with the management objectives in the Courtenay River Estuary Management Plan, the Comox Valley Land Trust's: Nature Without Boarders and the Comox Valley Sustainability Strategy.

In comparison to the first restoration plan which was developed for the site, the new restoration prescription is a less complicated design and requires much less earth moving and no reorientation of the existing trails within Simms Park. The new plan also eliminated some additional upper wetland restoration which was originally proposed, but this work could be undertaken later down the road if needed. This has resulted in a significant cost savings to implement the project and the current budget is over $100,000.00 less than what had been originally proposed; making it more palatable for potential funders. Indeed the Recreational Fisheries Conservation Partnerships Program has already agreed to fund approximately half of the total cost of the new restoration prescription, and it is the intention of the CVPWS to apply to FWCP for funding in their fall 2016 application intake.

The restoration design also calls for riparian restoration and enhancement which will take place with help from the public and the K'ómoks First Nation guardians. Invasive species will be removed and native streamside vegetation planted, which will improve habitat for waterfowl and amphibians by increasing habitat complexity in the riparian areas surrounding the slough. This area is in a high-use public park and provides opportunities to promote community stewardship. Two high quality interpretive educational signs, which explain the work undertaken and acknowledge the project partners, are planned as part of the project. Overall, this initiative will benefit the environment, foster partnerships and involve the community.

COMMUNICATIONS / RECOGNITION OF FWCP FUNDING

The CVPWS maintains a website which is regularly updated and features a post on the Simms Park off-channel habitat enhancement project that acknowledges the funding received from FWCP. This post can be viewed at: http://projectwatershed.ca/improving-salmon-survival-in-simms-a-plan-for-habitat-restoration/

The FWCP logo is also featured prominently under the 'Funders and Partners' section of our website: https://projectwatershed.ca/about-us/funders-partners/

Furthermore all the Estuary Working Group, Technical Subcommittee and CVPWS Board members have been made aware of the FWCP support for this project and this fact has been recorded in the minutes of these groups.

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APPENDICES

Appendix 1 – Simms Park Topographic Survey

(Attached separately)

Appendix 2 – Simms Park Channel Upgrade – Engineered Drawings

(Attached separately)