Simms Park Side Channel Habitat Enhancement for Fish

Background and Context:

This project involves the reworking of a high priority habitat restoration project in Simms Park on a tidally influenced section of the Courtenay River. In 2010, Project Watershed carried out a study of juvenile salmonid habitat requirements in the Courtenay River 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 (Tryon, 2011). This area of off-channel habitat is located early in the estuarine migration route for chinook and coho fry and smolts. 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 (NOAA Fisheries – West Coast Region, 2016 & The Columbia Basin Fish and Wildlife News Bulletin, 2014). 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 (Beechie et al. 1994, Sommer et al. 2001, Ebersole et al. 2003, Jeffres et al. 2008). In addition, many floodplain restoration projects are specifically directed at reconnecting and/or recreating side channels to increase rearing capacity for juvenile fish (e.g., Richards et al. 1992, Bellmore et al. 2012).

The original construction of fish habitat at this site was completed in 2000 but it did not provide for optimal fish accessibility or connectivity to the Courtenay River. The figures below show the site currently consists of a blind channel (the finger) off the river which is connected to an inner pond by a culvert (the pond is then connected back to the river by a small pipe which does not allow for salmonid access). The culvert is not 'fish friendly' (it is very long and narrow in diameter) and was installed too high so it only flows at very high tide levels. The current status of this area as rearing habitat for juvenile salmonids is considered marginal based on habitat uniformity, inadequate food production and poor water conditions for summer rearing. Both the finger and pond have relatively wide channels and steep banks with little shoreline complexity. High summer temperatures and low oxygen concentrations in the pond result from stagnant water except at the highest tides.

Figure 1 – Site overview.

Figure 2 – Under-sized culvert – linking finger to inner pond.

Figure 3 – Inner pond.

Figure 4 – Current outlet to slough (lower left hand corner of photo).

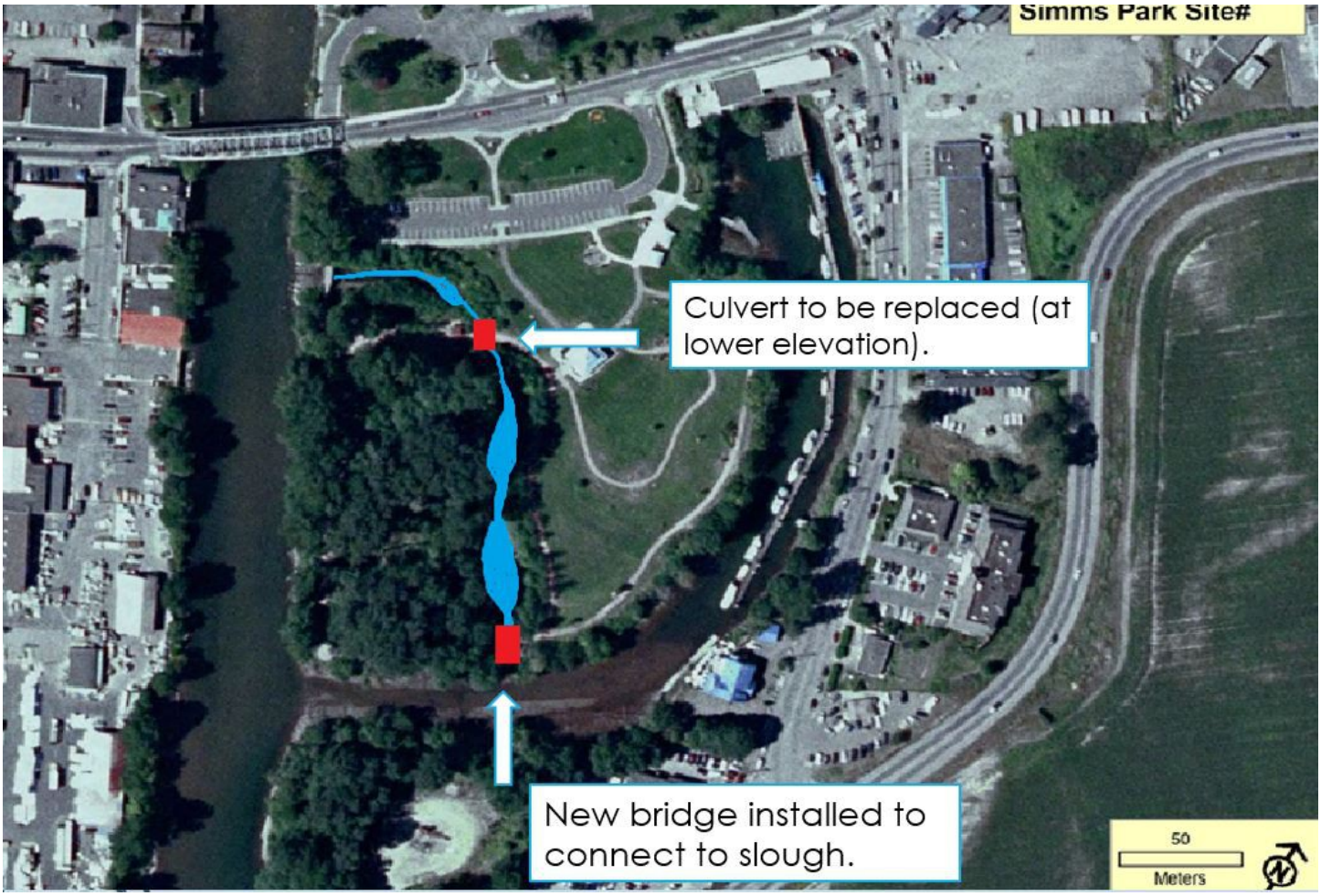

Figure 5 – Project overview.

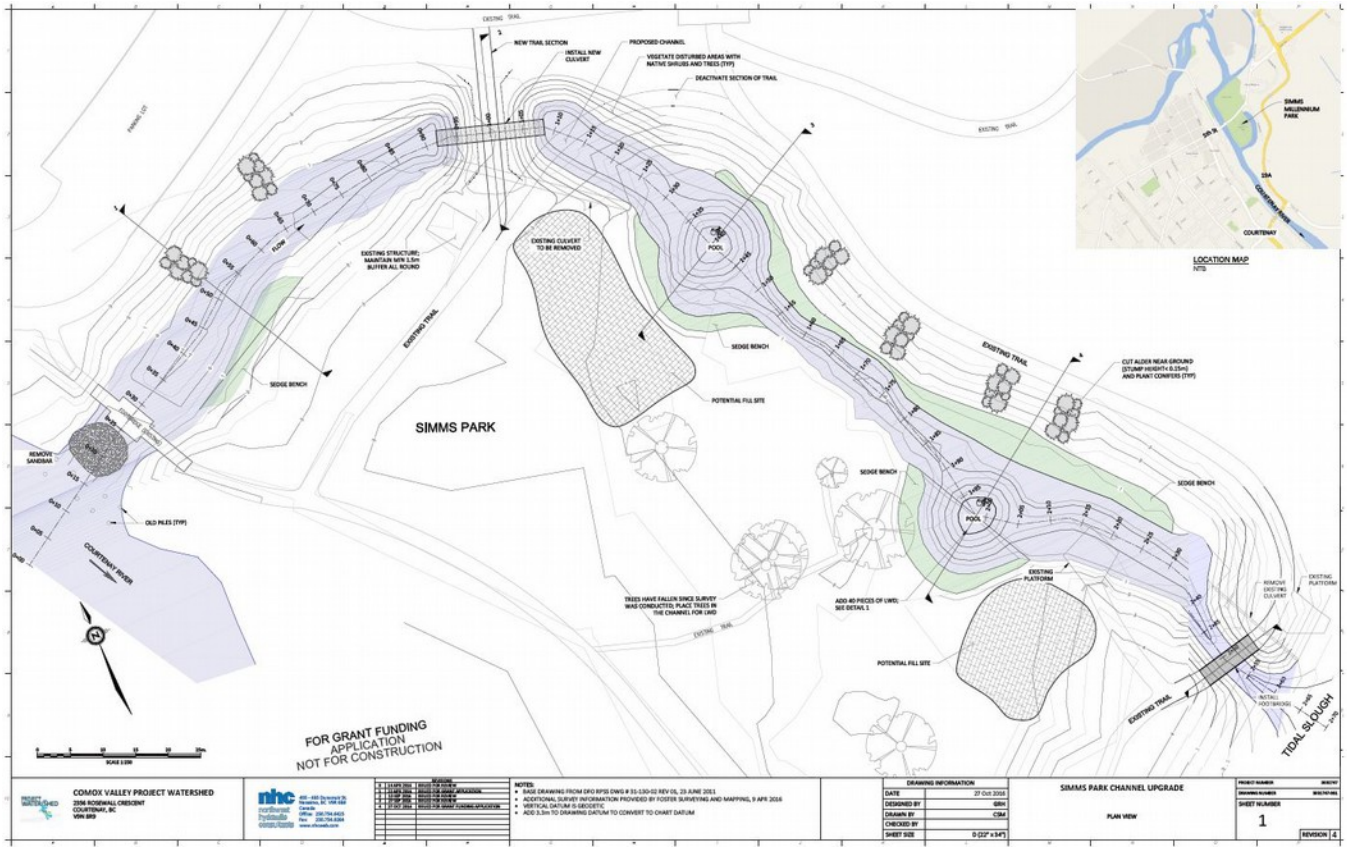

Figure 6 – Engineered drawing of project design.

We propose to remove the current culvert and replace it with a larger 'fish friendly' one installed at a lower elevation. We will also install a pedestrian bridge on the opposite side of the pond to connect it back to the river through the slough; creating a new flow through channel. This design concept has been approved by the landowner (City of Courtenay) and other relevant stakeholders. The new design will improve the accessibility of the area for salmonids and its connectivity to the river. Allowing more circulation through the site will improve the water quality. Water quality monitoring has indicated a large gap in temperatures between the pond and the finger. The greatest differences were an approximate 6°C difference from late July through to early December, with temperatures in the finger remaining lower than those in the pond (Tryon, 2011). Temperatures in the finger remained within the optimal thresholds for rearing chinook and coho (12-14°C) (Bjornn & Reiser 1991), while the pond exceeded these for most of the summer. By opening up the pond to flows from the river, summer temperatures in this area are expected to drop to within optimal thresholds.

There is also opportunity to improve the habitat quality as the original project did not consider the importance of creating ecologically complex habitat reflected in natural tidally inundated off-channel environments. Areas replanted after the original construction have become dominated by alders, which shade out other vegetation, limit riparian diversity, and drop excessive leaves in autumn with the potential of increasing biological oxygen demand in the slow moving water. Invasive plant species have established in some areas and show signs of increasing in patch size. We will engage in riparian restoration as part of the project – invasive species will be removed and replaced with native species. Alders will be taken out in some areas for equipment access, and replanted with native conifers. We will add complexity to the off-channel area by deepening areas of the pond, adding rock and large woody debris and building sedge benches.

Chum, chinook and coho will all benefit from this project through increased access to off-channel refuge and high quality rearing habitat. Trout will also benefit from habitat improvements, as they occupy similar habitats as chinook and coho. This project will improve access through lowering the elevations so more habitat is wetted for longer periods of time, and more habitat will be exposed to a variety of tidal cycles. Further, by increasing the complexity of the habitat there will be greater forage opportunities for fish.

This project will also provide more refuge to salmon and trout from seal predation. Seal predation of both juveniles and adult salmonids is a large problem in the Courtenay River estuary, largely facilitated by heavy channelization and lack of

off-channel refuge. One study estimated that seals foraging in the Courtenay River accounted for 67% of the total pre-spawning salmon predation (Olesiuk et al., 1996). In particular, seals have been observed to frequent the mouth of the Simms finger, likely to feed on juvenile salmonids when they leave the area. Seal predation will be alleviated by providing many refuge areas for salmonids, and providing two entrances (and exits) for juveniles to access and leave the area during all tide heights. This will also benefit returning adult spawners which are currently trapped by seals in the adjacent slough area as they will be provided an alternate escape route.

The environmental benefits are clear; enhancement of this site will improve access to and connectivity of this off-channel area for salmonids. Habitat requirements of juvenile salmon and trout will be addressed by creating more wetted off-channel area and improving the water quality, food production and complexity of this area. The site will also provide refugia from predation for salmonids at various stages of their life history.

The location of this project is in a high use public park with high visibility and therefore has socio-political importance. This location facilitates partnership opportunities, public education, increased community stewardship, and increased social and political support for habitat protection and restoration.

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