Coquitlam/Buntzen Project Water Use Plan

Lower Coquitlam River Fish Habitat Requirements Study –Year 1 Report

Reference: COQMON#3

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Memorandum

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To: Alf Leake, Karla Robison, BC Hydro

From: Living Resources Environmental Services

RE: Coquitlam River Habitat Suitability Index 2008-2009

Introduction

The objective of this component of the Coquitlam River monitoring program is to investigate species and life stage-specific habitat preferences in the Coquitlam River and to aid in comparing habitat suitability criteria for Treatments 1 and 2. Habitat use preference curves will be developed, following the Instream Flow Incremental Methodology (IFIM), a frequently used tool in North America for examining the effect of stream-flow regulation on fish populations (Bovee 1982). Habitat use preference curves will be developed for the following species and life stages under Treatment 2: spawning habitat for adult chum, Chinook, coho and steelhead, and juvenile rearing habitat for coho and steelhead. This work was requested by the Coquitlam River technical committee, but is not directly a part of the Coquitlam River Monitoring Program. Under a separate initiative, IFIM-type habitat data was collected in the Coquitlam River at different flows, and these were used to model habitat availability for Treatments 1 and 2. Because habitat preference data were not collected as part of this study during Treatment 1, provincial habitat suitability index (HSI) criteria (MWLAP 2001) will be used as a substitute. The habitat data collected during Treatment 2 provides habitat preference data specific to the Coquitlam River.

Field Study Methodology

Spawning Habitat

Habitat data was collected at individual or clumped redd locations as a simple and repeatable method for assessing spawning habitat preference. Spawning habitat data was collected for chum, coho, Chinook and steelhead during the peak of spawning activity for each species, with a goal of of 200 redd locations sampled for chum and as many redds as are available for all other species.

For coho, Chinook and steelhead, the number of redds constructed in natural habitats in a single year is usually low enough that all redds can be sampled, thereby assuring that the data collected was representative of spawning habitat preference for the study area as a whole. However, due to the length of the spawning period for these species (approximately 110 days

for chum, 130 for Chinook , and 120 days for steelhead) constructed redds were often washed out before sampling could take place. Therefore, sampling all identifiable redds was not possible. Instead, a sub-sample of redds and the species that constructed them were visually identified by survey crews. Habitat characteristics were then recorded at each redd site, with accompanying habitat data recorded within the river section where the redds were located.

For coho salmon, this is an issue because the majority of identifiable redds are located in enhanced off-channel habitats which are not all effected by flow regulation in the Coquitlam River. As a result, the sample size target of 200 redds may not be achieved for coho during 2009-2011 due to the lack of identifiable redds. The sampling target of 200 redds could likely be achieved in three years for steelhead, though the 200 redd target for Chinook is probably unachievable.

Distinguishing redds by species was done by a combination of survey timing and observation. Steelhead redds were easiest to identify positively due to their spring spawning timing which does not overlap with other species. Chum, coho and Chinook were more difficult to distinguish due to the overlap in their spawning behavior. To distinguish coho redds, surveys were done in late November and December, when other species (pink, chum and Chinook) have completed their spawning. Chum redds were identified by streamside observers walking a transect area to confirm the presence of chum redding only. Areas that were observed to be used by pink and Chinook were rejected. Surveys were also undertaken in late October to minimize the overlap with pink and Chinook spawners.

For chum, sub-sampling of redds was done in transect areas due to the large numbers of redds that were present . This was accomplished by systematically choosing 30-50m long sub-sections within the five existing index sites, and collecting data for all chum redds or clumps of redds found within the sub-sections.

For all species, the following information was collected at each redd location:

1. Depth of the redd pit, tailspill and surrounding undisturbed substrate,
2. Velocity at the head of the redd and on each margin.
3. Distance from bank and closest bank (left or right)
4. Supplemental habitat information will be recorded such as; water temperature (*note that reach specific temperature monitoring was discontinued on Coquitlam River in November 2009)*, riparian cover, channel width, mainstem or side channel spawning.
5. Only redds in natural mainstem braid or sidechannel habitat were sampled.

For all species, the following information was collected at each transect location

1. Transect length
2. Transect width at 5 locations along transect. Depth and velocity collected at 5 points along each cross-section in transect.
3. Supplemental habitat data within transect site: substrate class(dominant and sub-dominant along transect, % cover, % undercut bank, LWD present in m^2
4. One substrate transect in each transect area. Transects will contain between 20-30 grain samples taken directly from the river bed, samples will be measured along their widest axis (each area and grain size sampling will be undertaken to gather information on preferred spawning substrate).

Juvenile Rearing Habitat

As per survey methods used in the stock assessment, habitat characteristics (depth, velocity, substrate category and cover) were collected along representative transects. This information is already gathered as part of the juvenile stock assessment and all discrete juvenile habitat information was gathered within these defined sampling areas. Sampling at each fish capture location involved: habitat characteristics (depth, velocity, substrate category and cover) collected at and adjacent to fish capture locations. Sites selected contained a wide variation of habitat conditions, but were chosen to represent rearing habitats in reaches 2 and 3.

We assessed juvenile habitat preference using the standard IFIM approach of underwater observation by snorkelers. Observations focused on nighttime habitat use during late summer (early August- early September). Underwater fish observations were distributed evenly among the 12 systematically selected snorkeling sites used to assess juvenile abundance thereby ensuring that the data collected would be representative of spawning habitat preference for the study area as a whole. Observations were restricted to a period one to four hours following sunset. At each site a single snorkeler began at the downstream end and moved slowly upstream to observe fish, systematically searching the entire site. The snorkeler was accompanied by a second crew person who would remain several metres downstream recording observations. In cases where fish were judged to be affected by diver presence observations would not be recorded. Visual observations of individual fish would be made for a period of up to one minute, as required to identify the focal point of the fish.

We attempted to make observations for juvenile coho and three age classes of steelhead trout (0+, 1+, and 2+). Data collected at the focal point of each fish observed included species and approximate fork length, vertical distance of the fish's focal position from the substrate, horizontal distance of the fish from the wetted edge of the river bank, water depth, mean water velocity (at 60% depth), velocity at and adjacent to the focal position, D50 and D90. Vertical distance of the focal position from the substrate would be estimated by the snorkeler, but the

remaining habitat information would be collected following the completion of the underwater observations.

Results

Surveys were initiated in the fall of 2008, beginning with adult chum and coho salmon. Data collected this first year included a total of13 coho redds and 60 chum redds, within a total of 4 coho transect sites and 5 chum transect sites. To date we have data for 36 coho redds (2008 and 2009 combined), 50 steelhead redds (2009 only) and 160 chum redds (2008 and 2009 combined) plus transect data from all the redd sites.

In 2008 and 2009 we were unable to positively identify enough Chinook redds to make a survey with redds and transects feasible. This is due to the low numbers of Chinook and their habit of spawning within and alongside pink and chum salmon, making positive identification of Chinook redds very difficult. Furthermore, despite a record number of Chinook entering Coquitlam River in 2009, the overwhelming majority of Chinook observed were not actively spawning. Only redds that crews were 100% certain were Chinook could be considered for data collection.

Data from 50 steelhead redds was collected in the spring of 2009. Steelhead redds are spread out and contained in small clusters within Coquitlam River making data collection very time consuming. A total of 8 separate transects locations were surveyed over three dates in order to gather data from the 50 redds. A total of 133 steelhead redds were observed from March to May 2009, the 50 redds surveyed represent 38% of all steelhead redds recorded.

Juvenile data has been gathered for 2009 only and includes 6 transect areas with 5 discrete fish observation locations in each transect area. All juvenile age categories, (juvenile coho and three age classes of steelhead trout,0+, 1+, and 2+) were observed in the 30 fish observation locations surveyed. Data was collected on 56 coho juveniles, 37 trout (0+), 17 trout (1+), and 6 trout (2+) over the survey period.

For chum and steelhead the data collected is representative of the entire Coquitlam River study area (Reach 1 through Reach 4). Redds from these two species are able to be identified in all areas surveyed. Data collected from coho redds is heavily concentrated in Reach 4 and Reach 3 (30 of 36 redds surveyed were in Reach 3 and 4). This is due their well documented preference for spawning habitat in the upper reaches of Coquitlam River. Juvenile data collected was representative of Reaches 2a, 2b, and Reach 3.

Data collection goals for adults have largely been met for chum (160 redds from a goal of 200), but are still lacking for coho (36 redds) and steelhead (50 redds). Data collected from steelhead redds will certainly exceed 100 in total following the 2010 survey period, as will chum redds exceed 200 following the 2010 spawning period. However, for coho redds to exceed even 100 will likely take until 2011 at a minimum. The possibility of gathering enough data on Chinook redds appears to be a doubtful at this point.

Data collection goals have not been formalized for the juvenile standing stock component at this time. The number of fish observed at each discrete location and the total number observed for each age class required for analysis still needs to be determined. In addition, the required number of discrete fish observation locations from each transect area needs to be determined.