

Appendix 7

Hart (Washer) Creek Watershed Mapping and Inventory Project

Sensitive Habitat Inventory and Mapping (SHIM) Surveys for

**Hart Creek,
"Stray Creek" (Hart TP 132),
"Trout Tributary" (Hart TP 193), and
"Van West Tributary" (Hart TP 132_TP 188)**

Reports Prepared by:

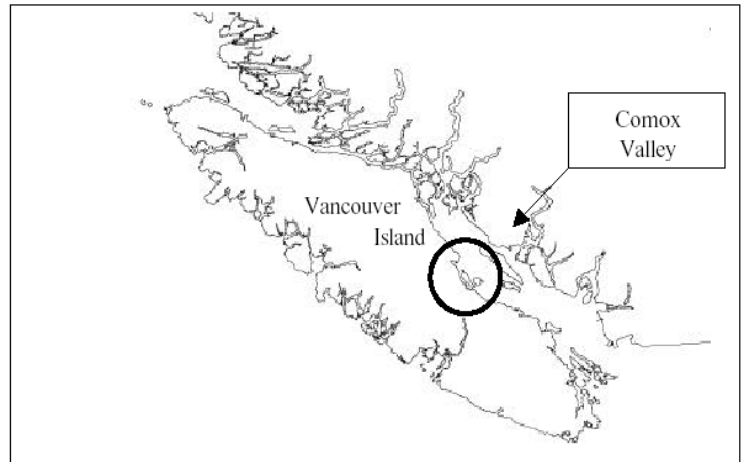
Gord Bainbridge, Christine Kuta, and Lee Wilpert

Comox Valley Project Watershed Society
Box 3007
Courtenay, BC
V9N 5N3

December 1999

Executive Summary

Hart/Washer Creek is located in the south of the Comox Valley in the Union Bay area and flows through the Regional District of Comox Strathcona. Extending for approximately 5.218 km, with a total watershed area of 11.683 km, Hart/Washer has 3 main tributaries: Stray Creek, Van West & Trout Tributary. Separate reports on each of these tributaries are contained in this report. The headwaters of Hart/Washer Creek consist of wetlands located at the head of Trout Tributary, Van West Tributary & Stray Creek. Most of the land in the Hart/Washer watershed is either private forest land or crown. Land.



Vancouver Island Map showing location of Comox Valley

During 1998 - 1999 Comox Valley Project Watershed Society conducted a Sensitive Habitat & Inventory Mapping (SHIM) survey on Hart/Washer Creek. The SHIM method combined Trimble Pro XR GPS, compass & chain mapping techniques with stream inventory data collection, resulting in geo-referenced point data for viewing in ArcView GIS. This report is the outcome of this survey and should be read in conjunction with the accompanying map of Hart/Washer Creek.

Limiting factors in Hart/Washer Creek are low summer flow and lack of channel complexity. Restoration opportunities identified include stabilization of large woody debris, side channel enhancement and removal of barriers to juvenile fish.

Report Prepared by: C Kuta, G Bainbridge, and L Wilpert
Date of Report: Nov 30, 1999

Background

The information presented in this report was gathered over two field seasons, 1999 and 2000 of Project Watershed's Watershed Mapping and Inventory Project. Sponsors include Dept. of Fisheries and Oceans Habitat Restoration and Salmon Enhancement Program, Human Resources Development Canada and Fisheries Renewal BC.

Survey Summary

Stream Gazette Name: Hart Creek **Alias:** Washer Creek
Watershed Code: – 920-538600-00000
Map locations: – 92F 056-4-3, 3-4
Dates of Survey: April 20-27 1999, Oct 29- Nov 3, 1999
Stream Length Surveyed: Main-5,218 m Total watershed-11,683 m

List of Supporting Documentation

orthophoto maps for filed use; photographs taken during SHIM survey; The Friendly Port – A History of Union Bay 1880-1960 by Janette Glover-Geidt (1990); Ulta Vires Consultants' Coal Hills Sampling Report (1999).

Purpose of Survey

The stream inventory and mapping is to provide information for:

- updating the Regional District of Comox Strathcona's Sensitive Habitat Atlas
- initiating or making additions to a set of "Streamkeepers Data" for the watershed
- determining rehabilitation, restoration or protection opportunities for the watershed

Methods

The methodology used for this mapping and inventory project is "*Stream Mapping Procedures for Land-Use Planning in Coastal Urban Watersheds*" (Sensitive Habitat Inventory and Mapping – SHIM: An extension of Streamkeepers Habitat Survey Modules 1 & 2), edition # 3.1. The Department of Fisheries and Oceans, Ministry of Environment Lands and Parks and other partners, developed this methodology.

Overview

The survey of Hart Creek was undertaken at the request of The Hart (Washer) Watershed Committee that is presently involved with a liquid waste management plan, for Village of Union Bay. The mapping of Hart Creek, Stray Creek and associated wetlands will better enable the waste committee to make an informed decision on their options for a management plan.

Time and budget allowed for the mapping of Hart Creek to the new Vancouver Island Inland Highway right of way, which is several hundred meters upstream of a bedrock falls, which is a traditional anadromous fish barrier.

Stray Creek (Tp 132) was mapped to Tributary 188 which is 150m upstream of the Van West Logging road culvert crossing. See separate report for Stray Creek(Tp132)

Most of the land associated with these creeks is either private forest land or crown land. The landowner contact was undertaken by the Union Bay stream-keepers.

Features of Interest and Rehabilitation/Protection Opportunities for Hart Creek

Feature #3: Spawning Gravel

Approximately 230m of moderate quality pink and chum sized spawning gravel (moderately embedded with fines) in lower Hart Creek.

Feature # 12: Side Channel

This overflow channel contains a high percentage of spawning gravel and has significance for spawning adults. The side-channel appears to maintain flow from mid ranges of flow in Hart Creek. Flowing at approximately .5 L/S on April 20. No rearing habitat is evident in the side-channel.

Feature # 16: Car Hulks

Four old car hulks along the right bank are within the wetted channel during winter floods. The right bank coal slag heap, apparently has various unknown sources of garbage and pollution buried amongst the heaps. (personal com. Chris Walthers- Hart Creek Watershed Committee).

Feature #18: Spawning Gravel

Moderately embedded algae covered spawning gravel extends for 120m.

Feature #24: Instream Crossing

Summer instream crossing for hikers & motorcycles. The banks are compacted and relatively stable. This site is not a serious source of creek sedimentation. Building a bridge in the vicinity would be an asset to walkers and reduce sediment loading at this site.

Feature #26: Timber Cribbing

Timber cribbing on both banks is the remnant of a coal washing system. Left bank has suffered from erosion and has been scoured out a further 2m (channel width) beyond the cribbing.

Feature # 34: Highway Runoff

Highway bridge has drain holes which could be a potential source of pollutants into Hart Creek.
Restoration Opportunity

Allowing the bridge runoff to flow through the riparian vegetation before it enters Hart creek could reduce the potential inputs of pollution to Hart Creek and Baynes Sound.

Feature # 36: Fertilizer Runoff

PVC tile drain presumed to be draining community park field could potentially be a source of pollutants and fertilizer inputs to Hart Creek if there is a "weed and feed" program underway.

Feature #42: Stream Keepers Benchmark

The location of a water quality/ quantity monitoring station operated by the Hart (Washer) Watershed Committee.

Feature #44: Side Channel

Right bank side-channel extends for 85m, presently carrying approximately 50% of the flow. This channel borders the playing field and has poor riparian on the right bank. Chum sized spawning gravel is evident in the lower 20m.

Feature # 46: Side Channel

This overflow channel is controlled by a log jam at the upper end. During the survey the lower end of the channel was being fed by subsurface flow, while the upper end was dry. The lower end has numerous rearing pools which are being utilized by juvenile coho.

These pools should be monitored in the summer for water quality and as potential juvenile salvage sites.

Feature #50: Log Jam

This logjam is creating a deep scour pool and providing good quality juvenile rearing habitat.

Restoration Opportunity

As juvenile rearing appears to be a serious limiting factor in lower Hart creek it would be beneficial to cable it into place to ensure its stability.

Location #66: Lack of Channel Complexity

There has been a lack of channel complexity for the previous 400m. Large woody debris and pool habitat is non-existent.

Feature # 72: Side Channel

This right- bank side-channel extends for 230m. This sidechannel was flowing (during the time of survey) and contains salmonid winter (and potentially summer) rearing habitat. The upper

end is controlled by a logjam feature, which is regulating and protecting the channel from floods. This side-channel has been the recipient of work by the Union Bay stream keepers who have added a pvc pipe to the upper end in an attempt to augment summer flow. A log jam at the lower end of the channel has been back-filled with sediment which is suspected to be a barrier to juvenile and possibly adult salmonids. Salmonids still have access via the upstream end but this may not be an option during low summer flows.

Enhancement Opportunity

This side channel would be a good candidate for enhancement work to offer good quality winter and summer rearing refuge.

- Modifications to improve summer flow
- Complexing to increase cover and encourage pool scouring
- Modifications to the lower logjam to create dependable passage
- Logjam at the upstream end of the side-channel should be cabled in place to offer stable flooding protection

Feature # 82: Side Channel

This left bank side-channel extends for 82m. During the time of the survey it was transmitting approximately 20% of the total flow of Hart Creek. Juvenile coho were visibly seen to be using the side-channel for rearing. The channel is heavily complexed with small and large woody debris. The upstream end is protected by an alder vegetated cobble- gravel bar. The channel looks functional and no restoration opportunities could be identified.

Feature # 86: Side Channel

This right bank side-channel extends for 79m. It has stable banks, stable flow, good riparian cover, shallow pools, pockets of spawning gravel amongst boulder & gravel substrate. A debris jam at the upstream end of the side-channel is regulating high flows and protecting the side-channel.

Enhancement Opportunity

Cabling the debris jam in place would contribute to long term channel stability.

Feature # 94: Historic Dam Site

This historic dam site was apparently removed by the Department of Fisheries and Oceans in 1964. The dam was the beginning of a flume, which shunted water to the Union Bay coal washing site.

Feature # 108: Future Walking Bridge

Future Creek crossing site for a walking bridge proposed by the Union Bay Stream Keepers.

X-section # 112: Restoration Opportunity

Logs on right bank, "blow-down", may be of a suitable size and quality to reposition by hand and use in channel complexing This could help address the need for more rearing habitat in Lower Hart Creek.

Location #118: Dippers Nest

Two dippers nests built within bedrock under-cropping on the left bank. Four chicks were observed in the nest on April 24. They were out of the nest and foraging for themselves by April 28.

Feature #125: Tributary

This right bank tributary was flowing at 1-2 litres per second at the time of the survey. The confluence with Hart Creek does not look passable by adult anadromous species except perhaps during flood conditions. This tributary was not considered a priority for mapping, as advised by the Union Bay Stream-keepers involved in this project.

Feature #132: Tributary "Stray Creek"- Please see separate report

This tributary supports the many of the fisheries values of the Hart Creek Watershed

Feature # 149: Side Channel

This left bank overflow channel extends for 62m. It was dry during the April 1999 survey.

Feature #162: Side Channel

This left bank overflow channel extends for 70m. It has a relatively high gradient (3 degrees). Its coarse substrate consists mostly of cobble. There is no rearing habitat available within the sidechannel.

Feature # 164

This logjam is potentially a barrier but is suspected to be passable at high water.

Restoration Opportunity

The logjam could be slightly modified with handwork to ensure dependable passage.

Feature # 172: Bank erosion

This small 18m long slide has been identified as bank erosion. It is not considered significant. It is inputting mostly coarser materials into the system, and may be contributing to gravel recruitment.

Location # 180: Wind-throw

Restoration Opportunity

Logs on left bank, "blow-down", may be of a suitable size and quality to reposition by hand and use in channel complexing, to address the need for more rearing habitat in Hart Creek.

End # 184: End/ Start survey

End survey at power-line right of way May/ 99. Resume survey Nov/99. The survey is continued to the Vancouver Island Inland Highway.

Feature # 186: Instream Crossing

This truck/ motorcycle in-stream crossing is rarely used. Banks are stable and no erosion was detected. Substrate is cobble- boulder at this location. No serious concerns were identified.

Feature # 190: Erosion

Slope failure/ Bank erosion. Four trees down including root balls. This is a natural erosion event.

Restoration Opportunity

Logs could be cabled together to ensure stability and promote pool scouring and habitat complexity.

Feature # 193: Trout Tributary- Please refer to separate report

This tributary extends to the Inland Highway right of way. It has not previously been accurately represented in the Sensitive Habitat Atlas. It does support some fisheries values.

Feature # 194& 196: Log Jam

These log- jams are not an obstruction.

Restoration Opportunity

These jams could be cabled into place to ensure stability and promote fish habitat.

Feature # 200- 202:Erosion

Clay, gravel, cobble banks presently sloughing and inputting gravel and some fines into Hart Creek. These three sites are contributing to natural gravel recruitment. These are natural erosion events and no stabilization is required.

Feature # 204: Falls

This bedrock falls 6m high with no plunge pool. This feature is the traditional limit for the upstream migration of anadromous species on Hart Creek.

Feature # 206: Side Channel

This point marks the beginning of a continuous bedrock cascade on Hart main which extends to the highway right of way.

This 156m side channel flows during moderate water levels in Hart Creek. 100% bedrock substrate. No fisheries values were identified.

Feature # 212: Erosion

Naturally eroded undercutting banks are causing tree loss on this corner. This site is recruiting wood for downstream habitat complexity.

Feature # 214: Storm Drain

This storm drain deposits highways sediment pond overflow water, onto right bank riparian area of Hart Creek. There is no direct contact with the creek. Water is filtered through the riparian area.

Feature # 216: Storm Drain

This storm drain from a settling pond on the left bank was emitting silty water onto a cobble bed, adjacent to the creek during the fall 1999 survey.

Feature # 217: Arch Culvert

This steel arch culvert is built on bedrock.

Feature # 220: Bedrock Falls

This upstream migration barrier at the foot of the culvert marks the end of the survey

Conclusions

Generally speaking the mainstem of Hart Creek below the Hydro right of lacks channel complexity and dependable summer flow. There is very little off channel habitat and a low incidence of pools. Refuge is lacking for juveniles in the main stem of Hart Creek during winter flood events. Much of lower Hart Creek has a very good mature conifer riparian band. If left untouched, this riparian band will begin to naturally recruit large woody debris (LWD) into the channel in the near future. This may increase channel complexity, and contribute to natural scouring of pools and creation of back-eddy habitat.

One strategy that could help this process along would be a campaign of anchoring debris jams and strategically placing and anchoring individual windfalls to accelerate channel complexity.

The Stray Creek system, which flows into Hart Creek at point 132, appears to offer the largest portion of potential coho habitat in the Hart Creek watershed.

Recommendations

Summer flow is a limiting factor for salmonid production in the Hart Creek main-stem, for those species, which reside year round in-stream. It may be redundant to make specific recommendations that would improve habitat until the summer flow issue is addressed.

Stray Creek (Hart Tp- 132)

Executive Summary

Stray Creek is located south of the Comox Valley in the Union Bay area and flows through the Regional District of Comox Strathcona . Extending for approximately 3.333 km, Stray Creek is the main tributary of Hart/Washer Creek. Stray Creek is fed by Van West Tributary and by Upper Stray Creek. Van West Tributary details are in a separate report. Mapping of upper Stray Creek has not been completed.

During 1998 - 1999 Comox Valley Project Watershed Society conducted a Sensitive Habitat & Inventory Mapping (SHIM) survey on Hart/Washer Creek. The SHIM method combined Trimble Pro XR GPS, compass & chain mapping techniques with stream inventory data collection, resulting in geo-referenced point data for viewing in ArcView GIS. This report is the outcome of this survey and should be read in conjunction with the accompanying map of Hart/Washer Creek.

High density of coho juveniles were reported by by the mapping survey crew. Few limiting factors are apparent in Stray Creek, however low summer flow may be a limiting factors.

Report Prepared by: Gord Bainbridge

Date of Report: November 1999

Background

The information presented in this report was gathered during the 1999 winter field of Project Watershed's Watershed Mapping and Inventory Project. Sponsors include Dept. of Fisheries and Oceans Habitat Restoration and Salmon Enhancement Program, Human Resources Development Canada and Fisheries Renewal BC.

Survey Summary

Stream Gazette Name:

Alias: Stray Creek

Watershed Code: – 920-538600

Map locations: – 92F 056 3-4

Start Date of Survey: April 28,1999

End Date of Survey: May 4, 1999

Survey Crew: Gord Bainbridge, Lee Wilpert

Stream Length Surveyed: 3333m

List of Supporting Documentation

orthophoto maps for filed use; photographs taken during SHIM survey; The Friendly Port – A History of Union Bay 1880-1960 by Janette Glover-Geidt (1990)

Purpose of Survey

The stream inventory and mapping is to provide information for:

- updating the Regional District of Comox Strathcona's Sensitive Habitat Atlas
 - initiating or making additions to a set of "Streamkeepers Data" for the watershed
 - determining rehabilitation, restoration or protection opportunities for the watershed

Methods

The methodology used for this mapping and inventory project is "*Stream Mapping Procedures for Land-Use Planning in Coastal Urban Watersheds*" (Sensitive Habitat Inventory and Mapping – SHIM: An extension of Streamkeepers Habitat Survey Modules 1 & 2), edition # 3.1. The Department of Fisheries and Oceans, Ministry of Environment Lands and Parks and other partners, developed this methodology.

Overview

Stray Creek is a major left bank tributary of Hart Creek. The confluence is situated 2.3km upstream from the mouth of Hart Creek. Stray Creek provided about 40% of Hart Creek's flow at the time of the survey. The lower end of Stray Creek wanders through crown forest with a mature coniferous riparian band for 800m. The balance of the survey to the Van West Logging Road has a mature conifer forest on the right bank and periodically logged cut-blocks with an average of 20m of coniferous riparian buffer.

The survey crew encountered a very dense population of juvenile coho, within Stray Creek, for the duration of the May 1999 survey.

The Hart (Washer) Watershed Committee undertook an Urban Stream Habitat Program habitat assessment on Stray Creek and tributaries, beginning in the summer of 1999.

Features of Interest and Rehabilitation/Protection Opportunities for Stray Creek

Feature # 32: Erosion

This 8m long by 8m high erosion site is inputting fines at this site. This is not a significant erosion site.

Feature # 54: Log Jam

This logjam is likely not a barrier during flood conditions. This site should be monitored as a potential future barrier. The logjam may accumulate debris and backfill further with sediments.

Location # 58: Complexing Site

The next 200m stretch is a good candidate for LWD complexing. Very few pools, no Large woody debris and poor complexity exists to L68. Windfalls are scarce and access is poor. Coho juveniles are present but not as abundant as downstream. The bank materials seem to contain about 40% gravel. This would provide gravel recruitment in pool tail-outs, if LWD is added to create pool scour.

Feature # 73: Spawning Gravel

This is a 60m by 12m fan of good quality spawning gravel. Pockets of good quality spawning gravel extend for 280m beyond this 60m uninterrupted stretch.

Feature # 100: Side Channel

This left bank overflow channel extends for 80m. It is very low lying and swampy, presently with standing water. It likely offers off-channel winter rearing habitat for juveniles.

Feature # 136: Tributary

This short channel connects a beaver dammed wetland complex to Stray Creek.

Restoration Opportunity

This inactive beaver dam does not look accessible by juveniles except during extremely high flows. As winter rearing habitat is possibly a limiting factor for Stray Creek, creating passage would be an asset.

X Section # 144: Major Change in Channel Characteristics

This cross section marks a major change in channel characteristics. The floodplain spreads out dramatically and the substrate reverts to fines. Instream vegetation is abundant and pools are littered with woody debris. It appears the area, which was once influenced by beaver activity.

This section, which continues to the Van West Culvert, would be considered extremely high quality rearing habitat.

Feature # 156: Beaver Dam- Elk Watering

This abandoned beaver dam is breached on the left bank. It offers good juvenile passage. It creates a dammed pool upstream, which is being frequented by elk, as evidenced by the high number of tracks.

Feature # 161: Tributary

Union Bay Streamkeeper Chris Walthers mapped this right bank tributary, labeled S-10. The tributary extends west past the power-line right of way, and is connected to a wetland, as previously identified in the Sensitive Ecosystem Inventory. Project Watershed used Trimble GPS equipment to geo-reference strategic points of the traverse. There was no water in the channel on June 22, 99. No spawning gravel was viewed in this tributary. This tributary likely has significance as juvenile over-wintering habitat only.

Feature # 180: Culvert

This culvert has extremely good juvenile passage. No problems were identified with the culvert.

Feature # 188: Tributary 188- Please See Separate Report for Van West Tributary

Conclusions

Stray Creek has very few factors that limit fish production. It seems to support a very healthy population of coho. It is suspected that many coho offspring from Hart mainstem utilize Stray Creek for rearing also.

The most limiting factor may be dependable summer flow. Chris Walthers of the Hart Creek Committee has been collecting year round flow data to define this issue. The lower reaches of Stray Creek are lacking winter rearing habitat in the form of off-channel or back-eddy habitat. These reaches could be improved with the addition of wood to increase channel complexity. Evidence suggests that Stray Creek was originally logged to its banks. The mature conifer riparian cover is at a stage where it will naturally begin to recruit wood into the stream if left untouched. A program of strategically hand-wincing windfalls into the creek would help to jumpstart the process.

If the waste water management plan had options to redistribute good quality waste water, the high quality rearing habitat in the mid and upper reaches of Stray Creek, Van West Tributary would tend to be a suitable benefactor.

Recommendations

- 1.** Protect a 30m mature forest riparian buffer above the flood plain on Stray Creek.
- 2.** Begin a program of adding large woody debris or cabling existing wood into place, in lower Stray Creek, to encourage channel and habitat complexity. These decisions will be better defined, after data from the USHP habitat diagnostics have been reviewed.
- 3.** Consider promoting beaver activity in the upper Stray Creek watershed to encourage water storage and to increase the quality of rearing habitat.

Van West Tributary (Hart Creek Tp-132_Tp-188)

Executive Summary

Van West Tributary is located south of the Comox Valley in the Union Bay area and flows through the Regional District of Comox Strathcona. Fed by a stable wetland and extending for approximately 2.140 km, Van West Tributary is one of two tributaries of Stray Creek.

During 1999 Comox Valley Project Watershed Society conducted a Sensitive Habitat & Inventory Mapping (SHIM) survey on Van West Creek. The SHIM method combined Trimble Pro XR GPS, compass & chain mapping techniques with stream inventory data collection, resulting in geo-referenced point data for viewing in ArcView GIS. This report is the outcome of this survey and should be read in conjunction with the accompanying map of Hart/Washer Creek.

Van West Tributary has high quality juvenile coho habitat. However, low summer flows may be a limiting factor.

Report Prepared by: Gord Bainbridge

Date of Report: December 1999

Background

The information presented in this report was gathered during the 1999-2000 winter field season of Project Watershed's Watershed Mapping and Inventory Project. Sponsors include Dept. of Fisheries and Oceans Habitat Restoration and Salmon Enhancement Program, and Fisheries Renewal BC.

Survey Summary

Stream Gazette Name:

Alias: Van West Tributary

Watershed Code: – 920-538600

Map locations: – 92F 056 3-4

Start Date of Survey: Nov 5, 1999

End Date of Survey: November 11, 1999

Survey Crew: Gord Bainbridge, Christine Kuta

Stream Length Surveyed: 2140m

List of Supporting Documentation: orthophoto maps for filed use; photographs taken during SHIM survey; The Friendly Port – A History of Union Bay 1880-1960 by Janette Glover-Geidt (1990)

Purpose of Survey

The streams inventory and mapping is to provide information for:

- updating the Regional District of Comox Strathcona's Sensitive Habitat Atlas
 - initiating or making additions to a set of "Streamkeepers Data" for the watershed
 - determining rehabilitation, restoration or protection opportunities for the watershed

Methods

The methodology used for this mapping/inventory project was "*Stream Mapping Procedures for Land-Use Planning in Coastal Urban Watersheds*" (Sensitive Habitat Inventory and Mapping – SHIM: An extension of Streamkeepers Habitat Survey Modules 1 & 2), edition # 3.1. The

Department of Fisheries and Oceans, Ministry of Environment Lands and Parks and other partners developed this methodology.

Overview

Van West Tributary begins approximately 150 m upstream of the Van West Forestry road, connecting to the right bank of Stray Creek. This tributary extends for two (2) km and is connected with two sizable wetlands identified in the Sensitive Ecosystem Inventory. This tributary has attributes, which are extremely valuable to salmonid production in the Hart Creek watershed. The lower portion of the stream, from the confluence to the Hydro lines, is inaccurately portrayed in the Sensitive Habitat Atlas. There is only one main channel, compared to the network of many presented in the Atlas.

The lower reaches of the creek exhibit a very low gradient, a silt substrate, and very dense over-stream vegetation, consisting of cascara and ninebark. These attributes are consistent with high quality juvenile coho summer and winter rearing habitats. The channel is undefined along the BC Hydro right-of-way. There is dense willow and hard hack growing along the edges and instream, over a very wide floodplain.

The stream becomes more complex from the BC Hydro right-of-way to the first wetland. There are pools and large woody debris (LWD), but it is still a low gradient stream. At the time of the survey, there was intermixing of water from the stream and the lower wetland.

The stream becomes very complex from the first wetland to the second wetland, is the stream headwaters. This is a higher gradient section, within an incised gully, with lots of pools and LWD. This also contains a long section of moderate quality spawning gravel.

Features of Interest, and Rehabilitation and Protection Opportunities

Feature # 8: Tributary

This very short tributary collects water from forest run-off. It is presumed to be ephemeral. It has minimal fisheries values due to its shallow channel depth, lack of pools and lack of summer flow.

X-Section #23: Hydro Line Right of Way

The BC Hydro right-of-way marks the point where this tributary loses defined channel characteristics. The flow spreads out over a very wide floodplain with much instream vegetation such as willow and hard hack.

Restoration Opportunity

The creek could benefit from creation of a more defined channel through this section. Low summer flows could create pockets of diminishing pools, which may be juvenile fish traps. As the Hart watershed as a whole seems to be lacking in good quality spawning habitat, this would be an ideal location (with extremely good access) to create several spawning platforms within a redefined channel.

Feature # 42: Tributary

This tributary extends for only 67m. The stream is fed by a long skinny seasonal wetland, which is fed by forest seepage. The seasonal wetland may possibly have some significance as juvenile winter rearing habitat but its very shallow characteristics suggest otherwise.

Feature #55: Wetland

This complex wetland was connected via flow to the right bank of the creek, at the time of the survey. The wetland presently has good adult and juvenile access, but this connection may be seasonal. ***The wetland is suspected to have high significance as juvenile summer and overwintering habitat.*** The wetland is identified in the Sensitive ecosystem inventory.

Feature # 58: Spawning Gravel

Good quality spawning gravel extends for 40m.

Feature # 63: Spawning Gravel

Moderate quality spawning gravel extends for approximately 150m. The gravel is somewhat embedded with fines.

Feature #65: Complex Channel

This location marks the location of separate reach characteristics. The gradient increases and the channel structure becomes more complex with abundant LWD and increased pool frequency.

Feature # 88: Wetland

This wetland is the main source of flow for Tp-188. The wetland has very good juvenile/ adult salmonid access. ***The wetland is suspected to have significant juvenile summer and overwintering habitat.*** This wetland is identified in the Sensitive Ecosystem Inventory. It is bordered on the west side by the new Inland Island Highway.

Conclusions

This stable wetland fed system is a self-sustaining system that is well represented with all salmonid habitats. The lower portion is high quality juvenile rearing. The mid to upper reaches have spawning habitat and two wetlands to provide nicely spaced rearing habitat. The mid reaches are not as highly complexed as the upper reaches but, with a mature coniferous riparian band, this will improve naturally with time. The amount of water present in the summer is suspected to be marginal.

Recommendations

- 1.** Preserve the integrity of the mature riparian forest along the banks of Van West Tributary (Tp188). This will ensure adequate inputs of large woody debris into the future and preserve and improve present habitat characteristics.
- 2.** Consider re-channelizing the portion of the creek that transits the hydro right of way. As the Hart Creek watershed as a whole seems to be lacking in good quality spawning habitat, this would be an ideal location (with extremely good access) to create several spawning platforms within a redefined channel.
- 3.** If there is to be good quality waste- water produced as a by-product of a treatment operation. The upper end of Tributary 188 would be a useful destination for the water. It would flow through most of the high value fish habitat of the Stray system, with a minimum of evaporation. . With the exception of the BC Hydro right-of-way, there is good riparian vegetation and an abundant forest canopy.

Trout Tributary (Hart Creek Tributary TP 193)

Executive Summary

Trout Tributary is located south of the Comox Valley in the Union Bay area and flows through the Regional District of Comox Strathcona . Fed by a seasonal wetland and extending for approximately 0.993 km, Trout Tributary is one of two tributaries of Stray Creek.

During 1999 Comox Valley Project Watershed Society conducted a Sensitive Habitat & Inventory Mapping (SHIM) survey on Trout Creek. The SHIM method combined Trimble Pro XR GPS, compass & chain mapping techniques with stream inventory data collection, resulting in geo-referenced point data for viewing in ArcView GIS. This report is the outcome of this survey and should be read in conjunction with the accompanying map of the Hart/Washer Creek Watershed.

Trout Tributary has high quality over wintering juvenile coho habitat. However, as with other Hart/Washer Tributaries low summer flows may be a limiting factor.

Report Prepared by: Gord Bainbridge

Date of Report: December 1999

Background

The information presented in this report was gathered during the 1999-2000 winter field season of Project Watershed's Watershed Mapping and Inventory Project. Sponsors include Dept. of Fisheries and Oceans Habitat Restoration and Salmon Enhancement Program, and Fisheries Renewal BC.

Survey Summary

Stream Gazette Name:

Alias: Trout Tributary

Watershed Code: – 920-538600

Map locations: – 92F 056 3-4

Start Date of Survey: Oct 29, 1999

End Date of Survey: November 2, 1999

Stream Length Surveyed: 993m

List of Supporting Documentation

orthophoto maps for filed use; photographs taken during SHIM survey; The Friendly Port – A History of Union Bay 1880-1960 by Janette Glover-Geidt (1990)

Purpose of Survey

The stream inventory and mapping is to provide information for:

- updating the Regional District of Comox Strathcona's Sensitive Habitat Atlas
 - initiating or making additions to a set of "Streamkeepers Data" for the watershed
 - determining rehabilitation, restoration or protection opportunities for the watershed

Methods

The methodology used for this mapping/inventory project was "*Stream Mapping Procedures for Land-Use Planning in Coastal Urban Watersheds*" (Sensitive Habitat Inventory and Mapping –

SHIM: An extension of Streamkeepers Habitat Survey Modules 1 & 2), edition # 3.1. The Department of Fisheries and Oceans, Ministry of Environment Lands and Parks and other partners developed this methodology.

Overview:

Tp193 begins approximately 150 m upstream from the Hydro right- of -way on Hart Creek. This is approximately 500 m downstream from where this confluence is portrayed in the 1998 Comox-Strathcona Sensitive Habitat Atlas.

The tributary is 940 m long with no major barriers. The stream travels mostly within a coniferous forest canopy with an estimate age of 80 – 100 years.

Its upper portions have been modified by the Vancouver Island Highway Project. It connects with a manmade pond system along the ditch line of the highway. Based on their proximity to the highway, the ponds appear to be designed as a combination of settling ponds and fish habitat, with placed large woody debris (LWD). These ponds are connected (via a 75 cm culvert) to a second set on the west side of the highway. A major source of water for Tp193 is a seasonal wetland that parallels the east side of the highway. This wetland is not identified in the Sensitive Ecosystem Inventory.

Features of Interest and Rehabilitation/ Protection Opportunities

Location # 4: Pockets of Spawning Habitat

Small patches of anadromous and resident sized spawning gravel available- in small patches.

Cross Section #5: Boulder Cascade

Begin boulder cascade. Begin steeply incised gully. Poor anadromous juvenile upstream passage. This reach of the stream has trout habitat characteristics.

Location # 11: Ephemeral Characteristics

Instream cottonwoods and salmonberry suggest minimal summer flows. Occasional patches of resident sized spawning gravel. Trout habitat characteristics continue. Minimal channel complexity.

Feature # 35: Instream Crossing

Logging road used as an access road during highways construction; Stream crossing has been deactivated; Grass seeded and silt fenced; no issues

Feature # 39: Ditch

Creek connects with manmade ditchline/ ponds along highways right of way.

Conclusion:

The lower portions of the tributary offer significant overwintering habitat for juveniles. Instream vegetation in the upper portions implies low to marginal summer flow. Approximately 110 m upstream, there is a small boulder cascade. This might prove difficult for anadromous juvenile passage. There are small patches of spawning gravel present, suitable for resident trout. In general, the higher gradient and minimal stream complexity suggest trout habitat.

No significant impacts from the highway are identified; however, the water quality in the manmade ponds appears poor. The water is quite turbid. The efforts put into building the ponds near the highway suggest fish presence.

Recommendations:

- 1.** Trapping should be carried out by volunteers to determine species use.
- 2.** A riparian buffer along the creek should be protected to allow for natural recruitment of LWD. Overtime, this will promote increased stream channel complexity.