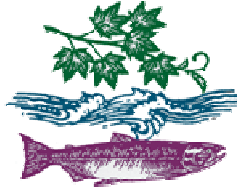


MID SOUND FISHERIES ENHANCEMENT GROUP



# Hawks Hole Creek (15.0347)

## Survey Report

Author: Danielle DeVoe, Project Manager  
December 2010 - January 2011



# Hawks Hole Creek (15.0347) Watershed Report by Mid Sound Fisheries; D. DeVoe Hansville Greenway Association

## Summary:

Hawks Hole Creek enters Hood Canal approximately 0.7 miles south of Coon Bay in Hood Canal. The stream is approximately 2,456 meters (1.8 miles) in length. Canopy and in-stream vegetation coverage is high quality with minimal invasive species present. Limiting factors include lack of estuary habitat, low water flows, and lack of spawning habitat. Residential trout were the only salmonid species suspected to be in the creek; both upstream and downstream of the culvert underneath the Greenway trail crossing. Local land owners have seen small fish that are most likely trout, but possibly sculpin, stickleback or other small freshwater fish. There are no visible indications that the habitat could currently support anadromous salmonid species. The culvert was determined to be a 33% barrier based on Washington Department of Fish and Wildlife (WDFW) criteria using a level B analysis. Although the culvert is not a high priority to be replaced based on passability, its replacement is recommended due to internal sagging of the culvert and structurally unsound conditions. Mid Sounds highest recommendation is the restoration of the estuary habitat of Hawks Hole Creek at its connection to Hood Canal.

## Background:

### Floodplain Connectivity

The lower 200 meters of Hawks Hole Creek was straightened and adjacent salt marsh and tidal channels were filled. This development is believed to have occurred in the 1960s to early 1970s due to residential development within the nearby Shorewood's Community. Floodplain habitat upstream is believed to be in a natural condition. We noted many small seep springs along the entire creek on both banks. As we traveled upstream, elevated wetlands were seen frequently on either side of the stream; further denoting the systems natural propensity to act as flood plain habitat.

### Loss of Floodplain Habitat

Salt marsh and tidal channel habitats filled in the lower 200 meters of stream during the 1960-70s represent an opportunity to reclaim lost habitat. The fill could be removed and the much needed estuarine habitat could be recreated. Floodplain conditions have been



rated *fair*, which corresponds to 25-50% of floodplain area altered or lost according to the habitat rating for Hawks Hole (WDFW; SSHEAR, 2000).

### Channel Conditions

Most streams in this sub-basin have high fine sediment levels, likely the result of past watershed disturbances and naturally low flows which limit flushing of fines.

Large woody debris (LWD) is sparse from the mouth to just past Hood Canal Drive, and more frequent upstream to the pond.

Upstream of the Hood Canal Drive culvert, the creek appears to be in a more natural state with a higher frequency of woody debris, primarily cedar. This woody debris creates more, and deeper, pool habitat, although no pool was measured equal to or great than 1 meter. (rated percent pools 18.3% = poor; few deep pools with little complexity) (Stream bank stability = fair; open flood plain upper half).



(Above: Downstream of Hood Canal Dr.; soft, silt banks)



(Above: Upstream of Hood Canal Dr.; increase in LWD and habitat diversity)

**Methods:**

The Hawks Hole Creek survey was conducted by Mid Sound Fisheries Enhancement Group (Mid Sound) for the purpose of assessing the condition of Hawks Hole Creek and prioritizing potential restoration projects. Mid Sound conducted the survey in accordance with the protocol created by the Washington Department of Fish and Wildlife (WDFW); as described in the *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual*. The protocol looks at two primary components: an assessment of fish passage features (culverts, dams, and fishways), and physical habitat. Barrier Analysis measurements were taken with a Laser Technology Impulse 200 laser level and stadia rod. All measurements are in meters unless otherwise noted.

Culverts were assessed as follows:

Level A

The initial assessment of a culvert is called a Level A analysis. The Level A analysis evaluates such physical attributes as:

- Culvert shape (round, rectangular, etc.)
- Culvert material (steel, plastic, concrete, etc.)
- Span
- Length
- Rise (the slope of the culvert)
- Water depth inside culvert
- Outfall drop
- Culvert slope
- Presence of streambed material in culvert
- Average streambed width downstream of the culvert

If there is streambed material present throughout the culvert and the culvert is at least 75% of the width of the average streambed width, the culvert is considered passable. If the culvert slope is greater than or equal to 1%, or if the outfall drop is greater than 0.24 meters, the culvert is considered a barrier to fish passage. If neither of these is the case then a Level B analysis is needed to determine barrier status (see below).

Barriers are differentiated between passable in levels of .67, .33, and 0, depending on the following attributes (if a culvert is a water surface drop barrier as well as a slope barrier, the lower passability number is used):



Above: noting habitat anomalies and measure meterage on hip chain. Below: measuring culvert slope and length with lazer.



“Percent passability is estimated for all fish passage features, and uses a combination of professional judgment and species ability to negotiate water surface drop, velocity, and depth. A feature may be evaluated as a total barrier (0% passable), a partial barrier (33% passable; some passage), a less severe partial barrier (67% passable), or a non-barrier (100% passable; passable during all times when flow is present, up to the high fish passage flow). ..... based upon the abilities of a 15.24 centimeter (6 inch) trout, so it should not be construed as an absolute value for all salmonid species and life stages. The percent passability estimates are intended to represent general categories of passability, not actual estimates of the number of fish that may pass. The percent passability is one factor used for prioritizing barrier correction (Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual; pg 14).

*Water surface drop:*

>.24m and < .5m = .67 passability

>.5m and < 1.0m = .33 passability

>1.0m = 0 passability

*Slope (culverts shorter than 18.3 meters)*

>1.0% and <2.0% = .67 passability

>2.0% and <4.0% = .33 passability

>4.0% = 0 passability

*Slope (culverts longer than 18.3 meters)*

>1.0% and <2.0% = .33 passability

>2.0% = 0 passability

Level B

The Level B analysis allows for a more thorough evaluation of the culvert and its relation to the stream in order to estimate peak velocities and minimum depths. Peak velocities and minimum depths are both factors in determining whether or not a culvert is a barrier to fish passage. Level B analysis looks at such physical characteristics as:

- Upstream and downstream invert elevations
- Upstream and downstream culvert bed elevations
- Culvert corrugation (1"x3", 2"x6", smooth, paved, etc.)
- Dominant channel substrate composition (boulder, gravel, sand, etc.)
- Stream-cross section (at a control point downstream of the culvert, 7 elevations are taken across the stream to get a cross-section)
- Water surface elevation at the downstream control
- Ordinary high water elevation at the downstream control
- Water surface elevation 15 meters downstream of the downstream control
- Average annual rainfall (in inches, determined from other sources)
- Basin area (the area that topographically drains to the culvert, in square miles, determined from GIS or other mapping techniques)

When this information is entered into the WDFW's Level B worksheet in Microsoft Excel, peak velocities and minimum depths are determined; which in turn determine the barrier status of the culvert. If the culvert is negatively sloped, has streambed material throughout the culvert, or is a double-barrel culvert

(two culverts side-by-side) then the Level B information must go through further analysis to determine passability. Level B analysis results are evaluated for passability as follows (if a culvert is a velocity barrier as well as a depth barrier, the lower passability number is used):

*Velocity (meters per second, culvert less than 30.5 meters long)*

>1.22mps and <1.81mps; = .67 passability

>1.81mps = .33 passability

*Velocity (meters per second, culvert between 30.5 and 61 meters long)*

>.91mps and <1.52mps = .67 passability

>1.52 mps = .33 passability

*Velocity (meters per second, culvert more than 61 meters long)*

>.61 mps and <1.22mps = .67 passability

>1.22 mps = .33 passability

#### *Depth*

>.15m and <.30m = .67 passability

>.05m and <.15m = .33 passability

<.05m = 0 passability

#### Physical Habitat Survey:

The physical habitat surveys begins at the mouth of the stream and continues upstream to the headwater, or until the stream is no longer considered fish bearing ("Water courses having average ordinary high-water widths in excess of 0.6 meters (2 feet) in Western Washington...") (*Assessment and Prioritization Manual*, August 2008, pg 7). In the case of Hawks Hole Creek, the survey began at its confluence with Hood Canal and ended at the beaver pond south of Buck Lake. Linear meters of the stream are measured with a hip chain and notes about the general characteristics of the stream are recorded.

The physical habitat survey divides the stream into riffles, pools, and rapids. No rapids were encountered in Hawks Hole Creek. While measuring the length of each water type length to the nearest 0.1 meter with a hip chain, other physical attributes are also recorded for each:

- Type (riffle, pool, rapid)
- Length
- Wetted width
- Ordinary high water width
- Gradient (% slope, gauged with an inclinometer)
- Substrate composition (% of total for each: boulders, rubble, gravel, sand\*)

For every 320 meters walked, a minimum of 60 consecutive meters are fully analyzed in detail and assessed for the above characteristics; a 60/320 detailed sampling ratio. The following 320 meters are measured and riffle/pools noted and measured, always making sure 3 consecutive riffles and pools are measured for each 320 stretch but more detail characteristics are not measured past the 60 meters

unless an anomaly is found. This continues until a barrier is encountered or 320 meters are recorded and then the 60/320 sampling is started over.

In addition to attributes of individual riffles, pools, and rapids, the following attributes are recorded for each reach:

- Spawning and rearing habitat quality modifier (1.0 = good; .66 = fair; .33 = poor; 0 = no potential)
- Instream cover (high, medium, low)
- Canopy (% cover)
- Water temperature
- Total culverted length

**Data Summary:**

- 2,456 linear meters measured of creek channel were measured and data collection for each reach is summarized as follows:

Reach 1	Habitat Type	Percentage
160 meters	Tidal	100

Reach 2	Habitat Type	Percentage
120 meters	pool	49.4
123 meters	riffle	50.6

Reach 3	Habitat Type	Percentage
75 meters	pool	15.9
398 meters	riffle	84.1

Reach 4	Habitat Type	Percentage
54 meters	pool	18.2
242 meters	riffle	81.8

Reach 5	Habitat Type	Percentage
31 meters	pool	24.6
95 meters	riffle	75.4

Reach 6	Habitat Type	Percentage
53 meters	pool	17.5
249 meters	riffle	82.5

Reach 7	Habitat Type	Percentage
44 meters	pool	13.8
276 meters	riffle	86.2

Reach 8	Habitat Type	Percentage
19 meters	pool	5.9

301 meters	riffle	94.1
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Reach 9	Habitat Type	Percentage
53 meters	pool	29.4
127 meters	riffle	70.6

Head water	Habitat Type	Percentage
Aprox 20 meters	Pond	100

Total	Habitat Type	Total Percentage
449 meters	pool	18.3
1811 meters	riffle	73.7
160 meters	Tidal	6.5
17 meters	Culvert influence	0.70
20 meters	pond	0.80

**Results:**

Culvert Conditions

80011.1

Location: Crossing under Hood Canal Drive

Stream Name: Hawks Hole Creek  
Tributary to: Hood Canal

WRIA: 15

The first culvert we encountered was under Hood Canal Drive. This culvert was not a barrier based on having substrate throughout the culvert and a width over 75% of the average streambed toe width.

Detailed measurements for each culvert and reach can be found in the accompanying spreadsheets.



(Above; Culvert under Hood Canal Dr.)

80021.1

Location: Crossing under Greenway Trail

Stream Name: Hawks Hole Creek  
Tributary to: Hood Canal

WRIA: 15

Fish Use: Yes, Residential Trout

Shape	Material	Span	Rise	Water Depth in culvert	Length	Slope %	Average Streambed Toe width	Culvert span/ toe width
SQSH	2x3 corrugated metal	1.5m	1.15m	0.27m	12.19m	0.410172	2.28m	0.657895

The second, and final culvert that we encountered was under Greenway Trail. The culvert appears undersized for stream width and sagging in multiple locations; projected to fail but not an immediate threat. There is not streambed material throughout the entire length of the culvert and level B data was taken to determine barrier status. The culvert was determined to be a partial barrier with a passability value of 0.67 (0.33 barrier). Details of measurements recorded can be found in attached excel spread sheet.



#### Habitat Conditions

Fish bearing waterway classification by criteria established by WDFW requires a water course to have average ordinary high-water widths in excess of .6m; Hawks Hole Creek meets this criteria. Canopy and stream coverage is good. There is little invasive vegetation; 2 clusters of English Ivy and some scattered blackberry (primarily in the first reach). Alder and salmonberry dominate in the lower reaches and are slowly replaced with Cedar and salmonberry upstream. All stream complexities and shallow pools are created exclusively from woody debris. Rearing habitat is low; lacking deep pools and havens usually provided by woody debris and undercut root wads. Spawning habitat is absent in most reaches and very sparse in reaches further upstream. Gravel that is present upstream is very compact and not suitable for spawning. Water flows are low, which is a naturally occurring condition but limits the fish species that could inhabit the creek.

#### **Limiting Factors**

Lack of suitable spawning habitat and gravel is the primary limiting factor for anadromous fish species to thrive throughout Hawks Hole Creek. A major contributing factor to the lack of spawning gravel is the

geological conditions of the site; there is not a significant gravel source in the watershed. Another contributing factor could be the lack of stream complexities and woody debris that are critical for pool creation; because there are very limited pools within the creek, natural sediment deposition and flushing cycles within pools does not occur. Naturally occurring low water flow throughout the creek results in deposition of fine sediment, particularly in the lower reaches of Hawks Hole Creek; fine sediment replaces gravel substrate as you move downstream.

Within the first reach, the most significant limiting factor is the channelization of what naturally would be transitional estuarine habitat for anadromous fish species. There is no physical location for adequate mixing of fresh and salt water; this brackish environment is critical for salmonid survival.

### **Future Action**

Mid Sound has prioritized suggested actions based on the most immediate site needs, greatest salmonid benefit and best use of funding. The highest priority for restoration is within the first reach; restoring the natural estuarine habitat at the mouth of the creek. This reach has been constricted and does not allow the essential mixing of fresh and salt water critical for salmonid acclimation while using estuarine habitat for protection and foraging. Salmon also use estuaries as havens while they migrate up and down the shoreline. Juvenile salmon are generally thought of as spawning in fresh water; however some subspecies of chum salmon spawn in estuarine habitat near upwelling of fresh water. Chum smolts also rely on estuarine habitat for feeding in tidal marshes before migrating to the ocean. All salmonid species forage and seek refuge in estuaries, some for only a few weeks while others, like spring Chinook, will stay for as long as 18 months. Estuaries not only play a necessary role in the transition from salt to fresh water, but also just as critically provide a huge food source for salmon that usually double or triple in size in estuaries before migrating out to sea. Size is the salmon's best defense against predators. In response to the lack of healthy estuarine habitat, Kitsap County's *West Sound Watershed Counsel* has prioritized nearshore restoration as a main concern for salmon recovery. Hawks Hole Creek's primary contribution to anadromous salmonids is in the potential estuarine habitat, although it is equally important to restore and maintain the integrity of the Creek itself as it provides essential nourishment to the estuary. Through communications with the lead biologist for the Suquamish Tribe, Paul Dorn, beach seining is scheduled to take place in the proposed project's near-shore habitat. This information will be very instrumental to determine the effected fish species and potential gain through habitat restoration.



Our next priority would be to increase stream complexity by creating pools and spawning habitat for residential trout and other small fish species and macroinvertebrates. We suggest installation of engineer-designed woody debris and small engineered log jams to create stream complexity, pools, sites for gravel deposition and gravel bars. Carefully placed debris would also create meanders where appropriate to dissipate high energy water and increase stream area for the variety of organisms that rely on the creek for sustenance. This system likely has never had high levels of spawning gravel, but debris installation and stream complexities would support trout habitat and distribute sediment.

Thirdly, removal of invasive species is critical to maintaining the natural vegetation present. There are a few sites where English Ivy and/or Himalayan Blackberry (see pic; below) is present and quickly taking over the riparian area. At these sites, the ivy can be eradicated and the excellent stream buffer will remain native and functional (see data sheet for GPS locations).



Lastly, we recommend that the Greenway Trail culvert be replaced due to its small size in relation to stream width, but more so due to the fact that it is sagging and structurally unsound. Because the culvert only poses a 33% barrier, it is not as high of a priority, as far as salmon are concerned, as the above issues. Its prioritization is also relatively low on this list due to the fact that this is not a creek that would support salmon and it is very unlikely a salmon would reach the culvert.

Some potential funding sources for the recommended restoration actions are: National Fish and Wildlife Foundation, Washington Department of Fish & Wildlife, Family Forest Fish Passage Program (for non-Pope Resources Land) and others. The Recreation and Conservation Office may be a potential funding source for the removal of the culvert due to its park setting.

Mid Sound is available to provide the following additional services:

- In Depth Funding Opportunity Analysis
- Project Stakeholder Coordination
- Meeting Facilitation
- Project Management
- Grant Writing & Management
- Fiscal Sponsorship
- Permit Writing & Permit Sponsorship (access to streamlined permitting processes)
- Planting Plan Design
- Volunteer Coordination & Management

Mid Sound Fisheries Enhancement Group  
7400 Sand Point Way NE, Suite 202N  
Seattle Washington 98115  
Surveyors: Danielle DeVoe; [danielle@midsoundfisheries.org](mailto:danielle@midsoundfisheries.org)  
Troy Fields; [troy@midsoundfisheries.org](mailto:troy@midsoundfisheries.org)  
206-529-9467 – phone  
206-529-9468 – fax

Survey conducted December 2010 – January 2011

**Keys:**

**\*Mean Particle Diameter Size Class Range**

<b>Category Name</b>	<b>Size Class Range (in)</b>	<b>Size Class Range (mm)</b>
Boulder	< 12 in	>305 mm
Rubble/Cobble	3 to 12 in	76 to 305 mm
Gravel	0.20 to 3 in	5 to 76 mm
Sand	<0.20 in	< 5 mm

**References:**

Washington Department of Fish and Wildlife; Habitat Program; *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual*; Salmon Screening, Habitat Enhancement, and Restoration (SSHEAR) Section; August 2000.

Washington State Conservation Commission; *Salmonid Habitat Limiting Factors Water Resource Inventory Areas 15 (West), Kitsap Basin and 14 (North), Kennedy-Goldsborough Basin*; Kuttel, Michael Jr.; June 2003.