Wild Fish Conservancy
NORTHWEST
SCIENCE EDUCATION ADVOCACY

Wild Fish Conservancy Watertype Assessment Project Summary
West Sound Watersheds Phase III
http://www.wildfishconservancy.org/maps
September 2016

Water typing is the state-sanctioned process of mapping the distribution of fish and fish habitat. Regulatory water type maps are used to regulate land use decisions adjacent to streams, ponds, and wetlands. Because existing (modeled) regulatory maps often significantly misrepresent the presence, location, and extent of fish habitat, the effectiveness of state and local government fish habitat protection regulations is compromised. More information about the water typing process and its significance is available at: http://wildfishconservancy.org/resources/maps/what-is-water-typing

West Sound Watertype Assessment Project –Phase III
During the 2014-2016 water type field seasons, Wild Fish Conservancy crews performed water type assessments on 72 streams that flow directly into Puget Sound on Bainbridge Island and Key Peninsula (Kitsap and Pierce Counties, Figure 1), adding to previous (Phase I and II) West Sound watertyping efforts.

WFC conducted water type surveys using the protocols and definitions provided in WAC 222-16-031 and Section 13 of the Forest Practices Board Manual. WFC collected data only on properties where permission to do so was granted. During this phase of the project WFC requested permission from property owners to access 3050 parcels. Of these, access for the WFC staff to perform the survey on their property was granted for 379 parcels. Additionally, survey data were collected from within public right-of-ways. The survey encompassed 275 miles of streams.

WFC documented stream channel location and characteristics, fauna, riparian condition, and restoration opportunities via GPS and photographs. Wetted width, bankfull width, channel gradient, and other data were recorded at each GPS point and are visible, with photographs, by clicking on the points in the interactive map. We present more than 3500 photographs (with associated channel condition descriptions) on the interactive web-based GIS.

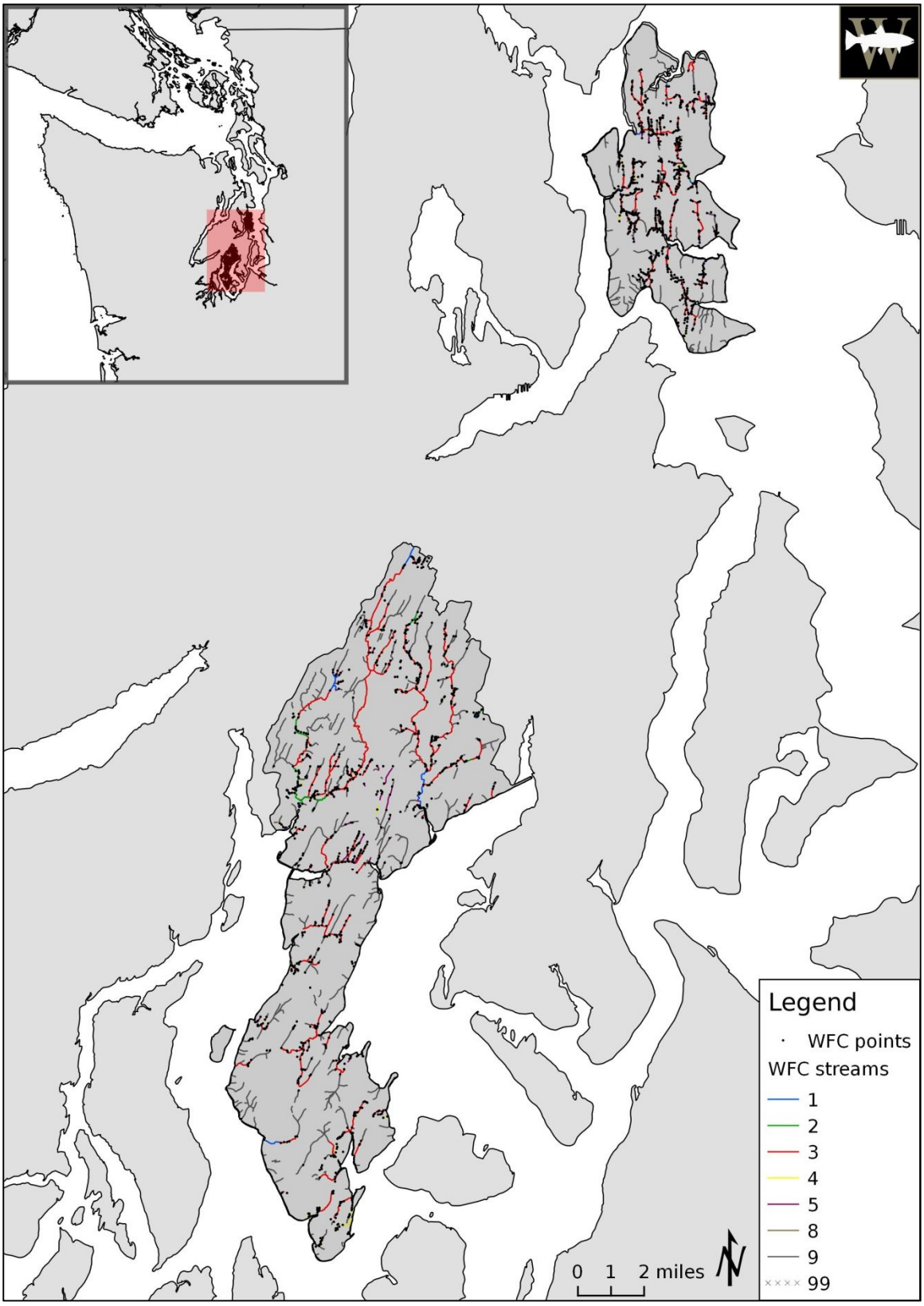


Figure 1. Geographic extent of WFC's West Sound Watersheds Assessment - Phase III in Kitsap and Pierce Counties, Washington.

Fauna that WFC encountered during the surveys included cutthroat trout, possible rainbow trout, chum salmon, coho salmon, chinook salmon, sculpin, brook lamprey, 3-spined stickleback, and northwestern salamanders. Habitat features and fauna were documented via GPS and photographs that are viewable in the interactive GIS located on the WFC website at: http://wildfishconservancy.org/resources/maps.

As expected based on previous Wild Fish Conservancy water type assessments, significant discrepancies existed between the Washington Department of Natural Resources (WDNR) regulatory maps and what we found on the ground (Figure 2). For example, over the study area WDNR had identified 211 miles of streams. WFC found that 15.4 miles of those WDNR mapped channels did not exist, but that an additional 57.5 miles of stream channels did exist that were not on the official WDNR water type maps.

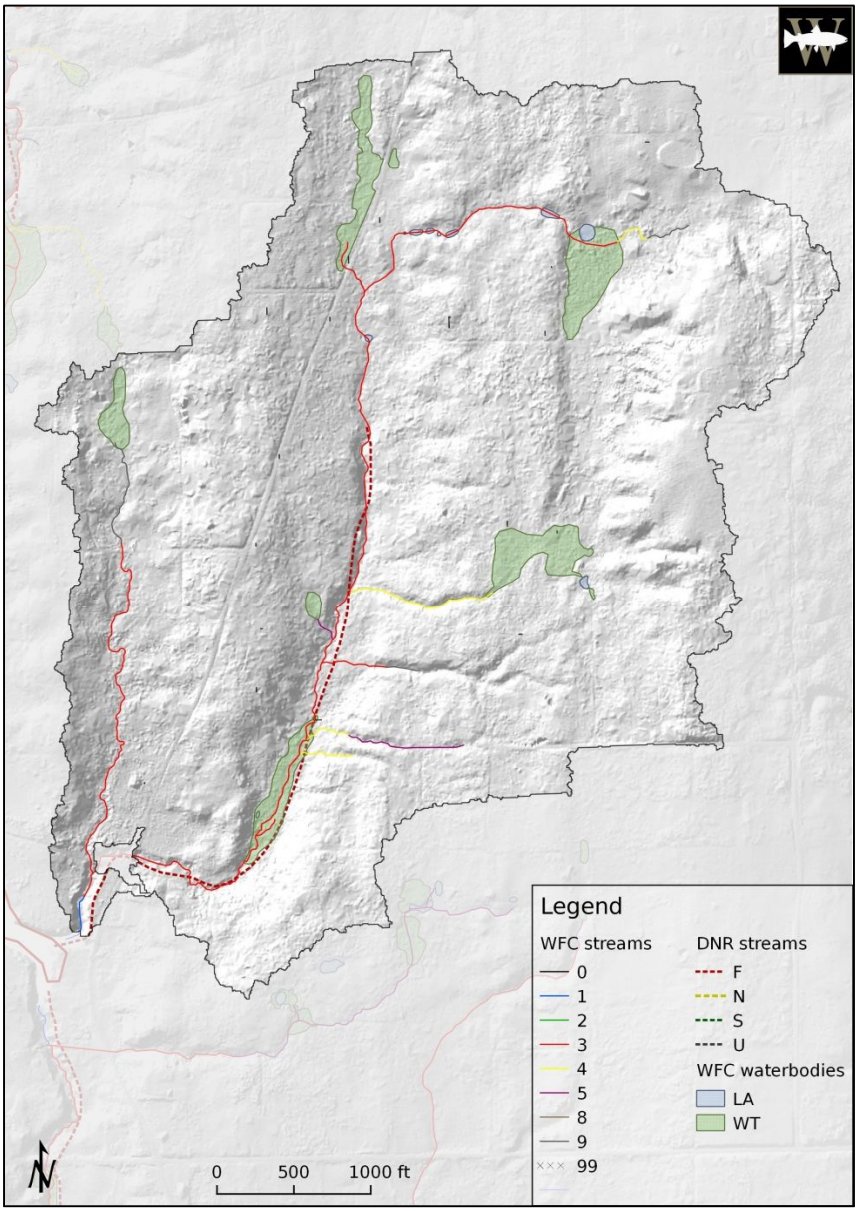
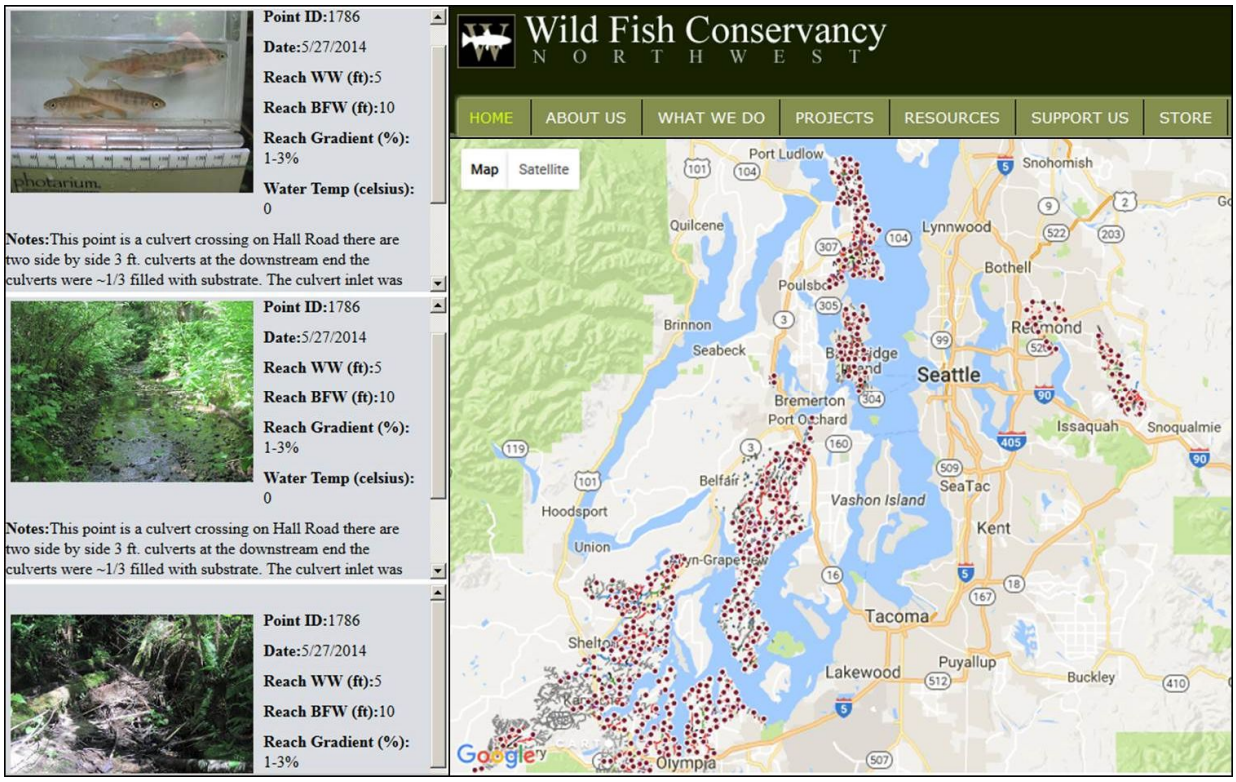


Figure 2. Westsound Phase III example of discrepancy between DNR modeled stream channel location and classification, and WFC field observations.

Restoration Opportunities

During the course of the field surveys, Wild Fish Conservancy staff observed and documented habitat restoration and protection opportunities; these are presented in Appendix A. WFC is coordinating with potential project sponsors to develop restoration and protection projects based on these and other observations made during the watertype assessment. Initial WFC prioritization of the projects was based on the area and quality of habitat affected, and the number and ESA-status of species likely to be impacted. Discussion with members of the Lead Entity Technical Advisory Group led to the final prioritization and included consideration of benefit (high priority habitat features or processes, high priority geographic area, species affected, life history stage affected, reasonable cost per gain) and certainty (project is consistent with scientific methods, appropriate sequencing, addresses a high potential threat, and likelihood of willing landowners).



The West Sound Watertype Assessment results and data are provided on Wild Fish Conservancy's web site at: http://wildfishconservancy.org/

WFC's Water Type Assessment project is ongoing; in 2016 Wild Fish Conservancy crews will conduct field surveys in additional Puget Sound drainages in Mason County (WRIA 14), Thurston County (WRIA 13), the Stillaguamish Basin (WRIA 06), the Snohomish Basin (WRIA 07), the Chehalis watershed (WRIA 22), and other regions of the state.

Funding for this project was provided by the Puget Sound Acquisition and Restoration Fund. The Bainbridge Island Land Trust provided much-appreciated field and logistical assistance. Wild Fish Conservancy would also like to acknowledge the support and assistance provided to this project by the West Sound Lead Entity process, including but not limited to the Suquamish Tribe, Kitsap County, Pierce County, the Bainbridge Island Land Trust, the Great Peninsula Conservancy, the Kitsap Conservation District, and WDFW.

Appendix A. Restoration and Protection Opportunities observed during WFC's West Sound Watertype Assessment Project –Phase III

Priority	Stream	GPS point	Problem/opportunit	Potential solution	Comments
Project A High	KY68	point ID 2915	Tide gate and control structure	Remove or reconfigure tide gate to improve fish passage and restore natural processes	Two culvert/tidegates on Bay Rd Kp South control water surface elevation in Whiteman Cove. The control structures are barriers to fish passage and constrict tidal processes in ~29 acres of tidal estuary. Improving fish passage would restore access to the cove and several thousand feet of associated stream habitat that would benefit Chum, Coho, Steelhead and Cutthroat Trout. The property is owned by the YMCA; SPS Salmon Enhancement Group has performed a feasibility study for restoration at this site.
Project B High	KY86	point ID 2773	Partial barriers on lower mainstem Dutcher Cr. at an earthen dam and Lackey Rd Kp North	Replace fish ladder at dam with a roughened channel. Repair culvert at Lackey Rd. to improve fish passage and restore natural processes.	There are two opportunities to improve fish passage on lower Dutcher Creek. WFC did not have access to the downstream-most opportunity - an earthen dam with a fish ladder - info on that site is provided in the Key Peninsula - Island Basin Plan (Pierce County, 2006). The fish ladder is located at approx. Lat 47.31710, long -122.77498. The failing culvert at Lackey Rd. had two 4-foot sections of culvert lying in the plunge pool creating a partial barrier to fish passage. The culvert is in need of repair. Improving fish passage and sediment transport here would improve spawning and rearing habitat to almost 3 milesof mainstem and tributary channel to Coho, Steelhead and Cutthroat trout.
Project C High	BI51	point ID 8698	The two culverts draining Issei Creek under Miller Rd. NE are partial barriers to upstream fish migration and disruptive to natural stream processes.	Replace the two side by side 2 ft. culverts under Miller Rd. NE. with a large single culvert or bridge. Remove the downstream English Ivy and invasive Bamboo. Revegetate the riparian corridor with native plant species to increase bank stabilization	Issei Creek provides over a mile of excellent fish habitat on Bainbridge Island. Beginning in wetland headwaters, the stream meanders through a lush second growth forest in the Grand Forest Park before feeding into Fletcher Bay.

Priority	Stream	GPS point	Problem/opportunit	Potential solution	Comments
Project D High	BI56	point ID 8711	Manzanita Creek crosses Miller Rd. NE in a barrier culvert perched 1.3' into a large plunge pool.	Replace the undersized and perched culvert with a larger culvert capable of carring Manzanita Creek's flows during all flood cycles. Remove or redesign the downstream weirs and regrade the stream channel to match the new culvert. Replant the riparian corridor to impove bank stability.	Manzanita Creek is one of the largest watersheds on Bainbridge Island, and provides habitat for numerous fish and amphibian species. There were multiple restoration opportunities and partial barrier culverts found on this system during WFC's field survey, though the majority were in the headwaters of this system. The most prominant disruption to fish migration and natural stream process was found where Manzanita Creek is piped under Miller Rd. NE. Here, the concrete culvert is 3 ft in diameter and the outfall is perched 1.3 ft. The undersized culvert constricts flow druinging high flow events resulting in substantial downstream erosion and a large plunge pool.
Project E High	BI62	point ID 8729 point ID 8483	Barrier culvert at NE Country Club Rd.; and Derelict Dam on Islandwood Property	Replace the undersized culvert on NE Country Club Rd. with a large box culvert or bridge. Install grade controls / roughness in the channel above the culvert. Coordinate with the IslandWood education center to remove the derilict dam and restore fish passage and sediment/wood transport.	Mac's Creek contains excellent fish habitat as it meanders through a large swath of undisturbed second growth forest on Bainbridge Island's IslandWood environmental education center. Fish access to this excellent habitat is compromised at the mouth of Mac's Creek, where the stream is piped under NE Country Club Rd. The culvert is undersized, steep, and the outfall is perched 1 ft. Throughtout the extensive field survey no fish were brought to hand above this crossing in the approximatly 4,700 ft of fish habitat. Downstream from the NE Country Club Rd. culvert crossing WFC documented coho, cutthrout trout and sculpin species. There are more barriers on Mac's Creek including a full barrier derilict dam on the IslandWood education center. The education center has shown great interest in removing the dam if the NE County Club Rd. culvert was replaced and fish once again had access to their property.
Medium	KY57	point ID 2902	Total barrier culvert	Replace the culvert to improve fish passage and restore natural processes.	The culvert on Erickson Road is only ~350ft upstream of the tidal zone and is a total barrier to fish passage. The culvert blocks over 0.5 miles of upstream fish habitat through residential, agricultural, and forest lands. With restored fish passage, this stream would provide excellent anadromous spawning and rearing habitat to Coho, Steelhead and Cutthroat trout.

Priority	Stream	GPS point	Problem/opportunit	Potential solution	Comments
Medium	KY59	point ID 5765	Full barrier culvert with a 4ft standpipe at the inlet	Repair barrier culvert to improve fish passage and restore natural processes.	The culvert on Yeazell Road is ~0.2mi upstream of the tidal zone and is a total barrier to fish passage. There is over 0.5 miles of upstream habitat through rural residential,forest land, and agricultural fields. This stream would provide idea anadromous spawning and rearing habitat to Coho, Steelhead and Cutthroat trout.
Medium	KY35C.1	point ID 2796	Barrier culvert on Cornwall Rd. Kp North	Replace culvert to improve fish passage and restore natural processes	The culvert on this headwater tributary at Cornwall Rd. Kp North impedes fish access to over 1000ft of excellent habitat that for Coho, Steelhead and Cutthroat trout. The upstream habitat is mostly undeveloped with a forested corridor along the stream channel up to a upper crossing on Heron Rd Kp North. Upstream, the channel flows along a new development up to a perennial headwater pond. Protection of the upstream watershed would ensure water quality to the marine estuary at Van Geldern Cove.
Medium	KY35C	point ID 3000 to	Channel and adjacent wetland habitat was dredged and ditched	Naturalize channel to restore channel and wetland function	This channel was ditched and straightened for agriculture in thet 1930s. There are over 8000ft of upstream channel habitat through rural homes and fields. Improving riparian and wetland function to this stream reach would provide anadromous habitat to Coho, Steelhead and Cutthroat trout. Protection of the upstream watershed would ensure water quality to the marine estuary at Van Geldern Cove.
Medium	KY55A	point ID 2746	Barrier culvert on Mahncke Rd. Kp South	Replace culvert to improve fish passage and restore natural processes	The culvert on Mahncke Rd. Kp South is a barrier to fish passage, blocking fish access to over 0.45 miles of upstream channel up to a county flood control pond where the channel is culverted and altered through a field creating an additional fish passage barrier. Above the flood control pond the channel heads up another ~.5 miles to a perennial pond. Restoring fish passage would provide spawning and rearing habitat to Coho, Steelhead and Cutthroat trout.
Medium	KY58	point ID 5749	Full barrier culvert with a 1.6ft outfall on Key Pen Hwy S	Repair barrier culvert to improve fish passage and make improvements to the riparian corridor upstream.	This culvert on Key Peninsula Hwy S is a barrier to fish passage, blocking fish access to over 0.7 miles of upstream habitat through rural homes and agricultural fields. Restoring passage at this culvert would provide spawning and rearing habitat to Coho, Steelhead and Cutthroat trout. Upstream the channel has been ditched and altered through pasture, where there is an opportunity for riparian restoration.

Priority	Stream	GPS point	Problem/opportunit	Potential solution	Comments
Medium	KY86	point ID 2946	Partial barrier culvert crossing on 166th Ave Kp South	Repair culvert to improve fish passage and restore natural processes.	This crossing is on an abandoned forest access road, 166th Ave Kp North. The crossing consists of three pipes - one 2ft and two 1ft culverts. WFC netted fish upstream and downstream from this crossing. Tires in the channel at the inlet partially plug the culvert creating a depositional zone upstream with much silt and sediment. Improving fish passage and sediment transport here would improve spawning and rearing access to more 3000ft of mainstem and tributary habitat for Coho, Steelhead and Cutthroat trout.
Low	KY86B	point ID 2952	Total barrier dam and control structure on private stock pond	Replace or reconfigure dam outlet to improve fish passage	This private stream crossing on 68th Street Court Kp North functions as a dam with a culvert and overflow outlet structure of a stock pond. Improving fish passage would provide access to more than 1500 feet of spawning and rearing habitat for Coho, Steelhead and Cutthroat trout.

Project A

Whiteman Cove

One of the most beneficial projects that WFC staff identified during the West Sound Watertype Assessment (III) is an opportunity for which the South Puget Sound Salmon Enhancement Group (SPSSEG) and partners have already performed a SRFB-funded feasibility study. Implementation of this important project hinges on future negotiations with the landowner (YMCA) and regulatory agencies.

Information provided by SPSSEG states:

"SPSSEG and project partners (WA Dept of Natural Resources, Squaxin Tribe, WA State Parks, and YMCA) completed an alternative analysis and conceptual designs for restoration of Whiteman Cove, a historical barrier embayment located south of Joemma Beach State Park, in Case inlet on Key Peninsula. Originally a long barrier spit framed the embayment; tidal flow was connected via a large outlet channel on the north end. Now a sheet pile and log revetment impound the historic channel, and tidal flow is controlled by two tide gates which breach the

barrier spit forming a dike. Aside from these structures, and a bulkhead to the south of the spit, habitat within the Cove remains largely intact."

"Topographic and bathymetric surveys were completed to develop a HEC-RAS hydraulic model and inform a suite of restoration/enhancement actions to restore fish passage, improve tidal flow and sediment transport, improve forage fish spawning habitat, and increase/enhance salt marsh vegetation within the Cove. The Department of Natural Resources contributed cash match to the project to support water quality testing, additional hydraulic modeling, and a technical memo addressing coastal processes and sediment transport dynamics to estimate how the site will respond to a full-scale ecological restoration."

"Given the implications a Permanent Injunction against the State or Washington in United States of America et al. v. State of Washington et al., Western District of Washington Case No. C70-9213, Subproceeding 01-01 has on the future movement of this project, a public meeting and extensive public outreach was not able to be accomplished within the timeframe of this grant agreement. Instead, grant funds were used to complete a data driven analysis of the site which could be utilized by stakeholders in future project negotiations."

"Removal of a few stressors at Whiteman Cove would provide salmonid access to a 29 acre pocket estuary w/ 1.5 mi of shoreline and 1 mi of freshwater spawning and rearing habitat. Identified as a WRIA 15 priority for nearshore restoration in a report prepared by the SPSSEG (RCO 06-2271), it was also targeted as # 1 of 6 near-term restoration projects, and a high level feasibility study was performed (Anchor QEA, 2010, Att 5)."

Additional details, including the Feasibility Report, are available on PRISM under SPSSEG's Project #13-1142. Photographs and data collected during the watertype assessment are on WFC's web map at: http://wildfish.beardedmaps.com/?lat=47.22132&lng=-122.80612&zoom=19

WDFW Fish Passage Forms for Whiteman Cove structures:

WDFW Fish Passage and Diversion Screening Inventory Database

Other Feature Assessment Repor

Site ID:	**105 K041717a**				
Latitude:	**47.22131**	Stream:	**Whiteman Cove**	WRIA:	**15.0032**
Longitude:	**-122.80643999**	Trib To:	**Case Inlet**	Fish Use Potential:	**Yes**

Data Source

Organization	Washington Department of Fish and Wildlife		
Field Crew:	Thompson;Romero	Review Date:	6/12/2012

Details

Structure Category: Dike/Levee Fishway Present: No

Description:

Levee blocks mouth of cove, culvert drains to sound. Barrier at all tides, control structure at upstream end to retain saltwater in the cove. Additional structure ~250m to the south: tidegate has failed and acts as dam/ cove water level control.

Results

Barrier:	Yes
Reason:	Tidegate
Passability (%):	0
Recheck:	

Comment

Culvert outlet has failed, downstream section has settled into the sand and gravel

Potential Habitat Gain

Survey Type:	RSFS	Spawning (sq m):	15	Length (m):	1,645
Significant Reach:	Yes	Rearing (sq m):	17,391	**PI Total:**	20.59

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Reason:	Tidegate
Passability (%):	0
Recheck:	

Comment

Culvert outlet has failed, downstream section has settled into the sand and gravel

Potential Habitat Gain

Survey Type:	RSFS	Spawning (sq m):	15	Length (m):	1,645
Significant Reach:	Yes	Rearing (sq m):	17,391	**PI Total:**	20.59

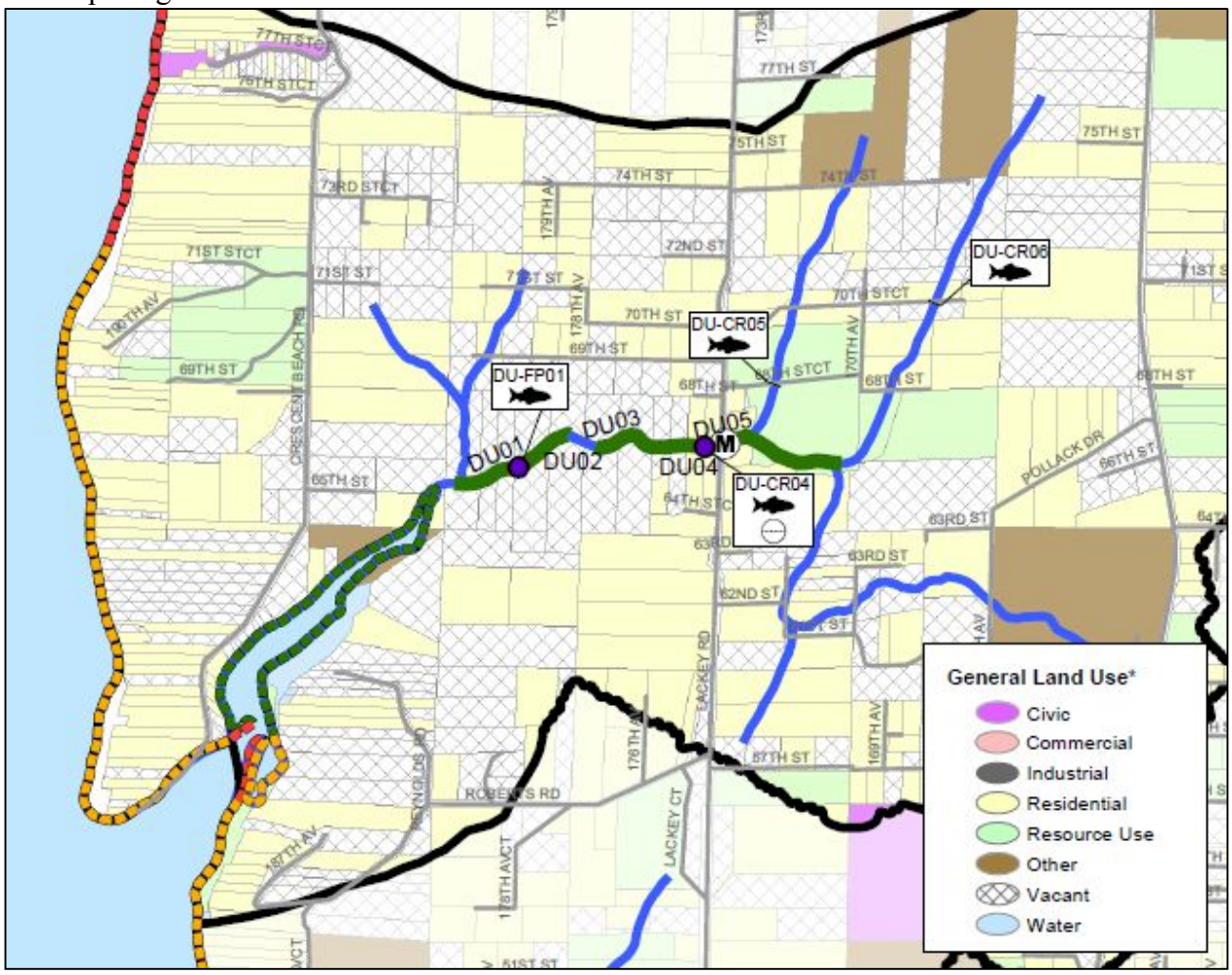
Project B

Dutcher Creek

Dutcher Creek (15.0026) enters Dutcher Cove on the east side of Case Inlet (west side of Key Peninsula). There are two important opportunities to improve fish passage on lower mainstem Dutcher Creek.

DU-FP01 on the map below is an earthen dam with a failing fish ladder. While WFC did not have access to that site, info is provided in the Key Peninsula - Island Basin Plan (Pierce County, 2006). Further, the site was a short-lived Family Forest Fish Passage Program project until it was withdrawn, so there is additional information in PRISM under project #05-1408 (SPSSEG).

DU-CR04 on the map below is an undersized failing culvert at Lackey Rd. that is a partial barrier to fish passage.



Map excerpted from Figure 4-7 from Key Peninsula - Island Basin Plan (Pierce County, 2006) shows dam+fish ladder at site DU-FP01, and the Lackey culvert at DU-CR04.

DU-FP01 – Earthen dam and fishway

Fishway at dam, site DU-FP01. The fishway consists of a six-step wooden weir ladder fed by an 18 inch culvert at its top. This site was a FFFPP project (05-1408, SPSSEG), but the project was withdrawn prior to permitting.

DU-FP01 – Earthen dam and fishway

Family Forest Fish Passage Program: Barrier Evaluation Form - Dam

Location Information

Project Name: **Landeros - Dutcher Creek**			IAC/SRFB Project #: **05-1408**	Date of Visit: **8/22/2005**
Old FPA #:	New FPA #:			HPA #:
GPS Location: Datum - WGS84; Format - decimal degrees			Latitude: **47.3171005**	Longitude: **122.7749786**
¼ Section: **sw**	Section: **11**		Township: **21**	Range: **01** ☐ East ☒ West
County: **Pierce**			Parcel #:	
Stream Name: **Unnamed (Dutcher Creek)**			WRIA #: **15.0026**	Stream #: **0026**
Tributary To: **Puget Sound**				
Driving Directions: From SR 302 go south on Wright-Bliss road which becomes Vaughn road. Bear left on Lackey rd and go 1.8 to driveway on Right at 6412, go 0.30 miles to chain gate, walk downhill to crossing.				

Landowner Information

Landowner Name: **Victor and Lupe Landeros**			Landowner Agent:		
Mailing Address: **5487 Cadbury Rd**			Mailing Address:		
City: **Whittier**	State: **CA**	Zip: **90601**	City:	State:	Zip:
Phone: **(562) 699-6540**	Fax: ( )		Phone: ( )	Fax: ( )	
Cell: **(562) 305-9733**	Email: **victor.landeros@charter.net**		Cell: ( )	Email:	

Evaluator Information

Evaluator Name: **Laura Till**		Affiliation: **WDFW**		
Mailing Address: **600 Capitol Way N**		City: **Olympia**	State: **WA**	Zip: **98501-1091**
Phone: **360-902-2352**	Fax: **360-902-2946**	Cell:	Email: **tilllet@dfw.wa.gov**	

Barrier Information (measurements in meters)

Is the stream fish-bearing? ☒ Yes ☐ No ☐ Unknown		Species, if known: **CH/CO/SH/SCT**	
Is this dam a fish passage barrier? ☒ Yes ☐ No ☐ Unknown		Dam name:	Reservoir name:
Type: ☐ Concrete ☒ Earth ☐ Rock ☐ Masonry ☐ Metal ☐ Timber ☐ Other			Span: ☒ Full ☐ Partial
Length: **328**	Height: **2.44**	Water surface difference: **na**	Plunge pool depth: **1.5**
Primary purpose: ☐ Debris control ☐ Flood Control ☐ Hydroelectric ☒ Irrigation ☐ Navigation ☐ Stock Pond ☐ Water Quality ☒ Recreation ☐ Water Supply ☐ Tailings ☒ Other (describe) Fish propagation			
Road width (if present): **3.0**	Spillway type: ☐ Over Dam ☒ Culvert ☒ Culvert with standpipe ☒ Flume ☒ Other **Fishway**		
Percent passability: ☐ 0% ☒ 33% ☐ 67% ☐ 100%		Bankfull width (outside of dam influence): **3.5**	
Will this dam be entered into the WDFW-FPDSI (formerly SSHEAR) database? ☒ Yes ☐ No If yes, Site ID #: **15.0026 0.50**			
Additional description/comments: **Earth dam with footpath on top has concrete spillway with wood footbridge over top, squash culvert through road that is for overflow and a fishway fed by an 1.8 foot SST culvert through road. Bottom sections of fishway are gone. 7 weirs have drops ranging from 0.10m to 0.38m, pool depths range from 0.75m to 0.85m. Pools are about 1.3m long. Log control below fishway has a 0.5m drop and is eroding on upstream side showing erosion control material. Old spillway is deteriorated and not functional. Side of fishway is eroding exposing bottom of fishway. Trash rack at upstream end of SST culvert was in open position. Fish observed DS and in US pond. Well forested all around site. LO wants to maintain pond.**			

DU-CR04 - Lackey Road Culvert

Lackey Rd. culvert outlet, with culvert sections in plunge pool. This undersized 5.0 foot span culvert should be replaced with a 16 foot box culvert or bridge. In conjunction with improving passage at the downstream earthen dam, restoring fish passage here would improve spawning and rearing habitat to almost 3 miles of mainstem and tributary channel to Coho, Steelhead and Cutthroat trout. Additional photos and data are available on WFC's interactive web map at: http://wildfish.beardedmaps.com/?lat=47.31707&lng=-122.76959&zoom=19

Lackey Rd. Barrier Form from WDFW

WDFW Fish Passage and Diversion Screening Inventory Database

Site Description Report

Site ID 105 K042518b **Project** FPGRANT

Geographic Coordinates

Latitude (WGS 84):	47.31703
Longitude (WGS 84):	-122.76963999
East (NAD 83 HARN)	1,077,517.8
North (NAD 83 HARN	731,528.6

Waterbody

Stream:	Dutcher Cr
Tributary To:	Dutcher Cove
WRIA:	15.0026
River Mile:	-999.99
Fish Use Potential:	Yes
FUP Criteria:	Mapped

General Location

Road Name:	Lackey Rd
Mile Post:	-999.99
County:	Pierce
WDFW Region:	4

Owner

Type:	County
Name:	Pierce County

PI Species

☐ Sockeye	☐ Chinook	☑ Sea Run Cutthroat
☐ Pink	☑ Coho	☑ Resident Trout
☑ Chum	☐ Steelhead	☐ Bull Trout

Associated Features

☑ Culvert	☐ Dam	☐ Natural Barrier	☐ Diversion
☐ Non-Culvert Xing	☐ Other	☐ Fishway	

Location/Directions

Between 68th St & 64th St on Lackey

Site Comments

SASSI reports winter steelhead in this creek

WDFW Fish Passage and Diversion Screening Inventory Database

Level A Culvert Assessment Report

Site ID:	**105 K042518b**				
Latitude:	**47.31703**	Stream:	**Dutcher Cr**	WRIA:	**15.0026**
Longitude:	**-122.76963999**	Tributary To:	**Dutcher Cove**	Fish Use Potential:	**Yes**

Data Source Pierce Conservation District

Field Crew: Adicks;Cookson Review Date: 4/25/2000

Culvert Details — **Level A Parameters**

ID	Shape	Material	Span	Rise	Length	WDIC	Apron	WSDrop	Location	Countersunk	Backwater	Slope (%)
1.1	RND	PCC	1.52	1.52	23.20	0.15	NO	0.55	Outlet	No	No	0.78

All dimensions in meters

Channel Description

Toe Width (m):	1.85
Average Width (m):	-99.99
Culvert/Stream Width Ratio:	0.82

Plunge Pool

Length (m):	10.00
Max Depth (m):	1.35
OHW Width (m):	3.50

Road

Fill Depth (m):	-999.90

Assessment Results

Barrier:	Yes	Passability (%):	33	Method:	Level A
Reason:	WS Drop	Fishway Present:	No	Recheck:	

Comments

Bottom section has fallen into plunge pool, causing scouring, measurements are for smaller plunge pool below pipe. Larger pool formed before section broke off.

Potential Habitat Gain

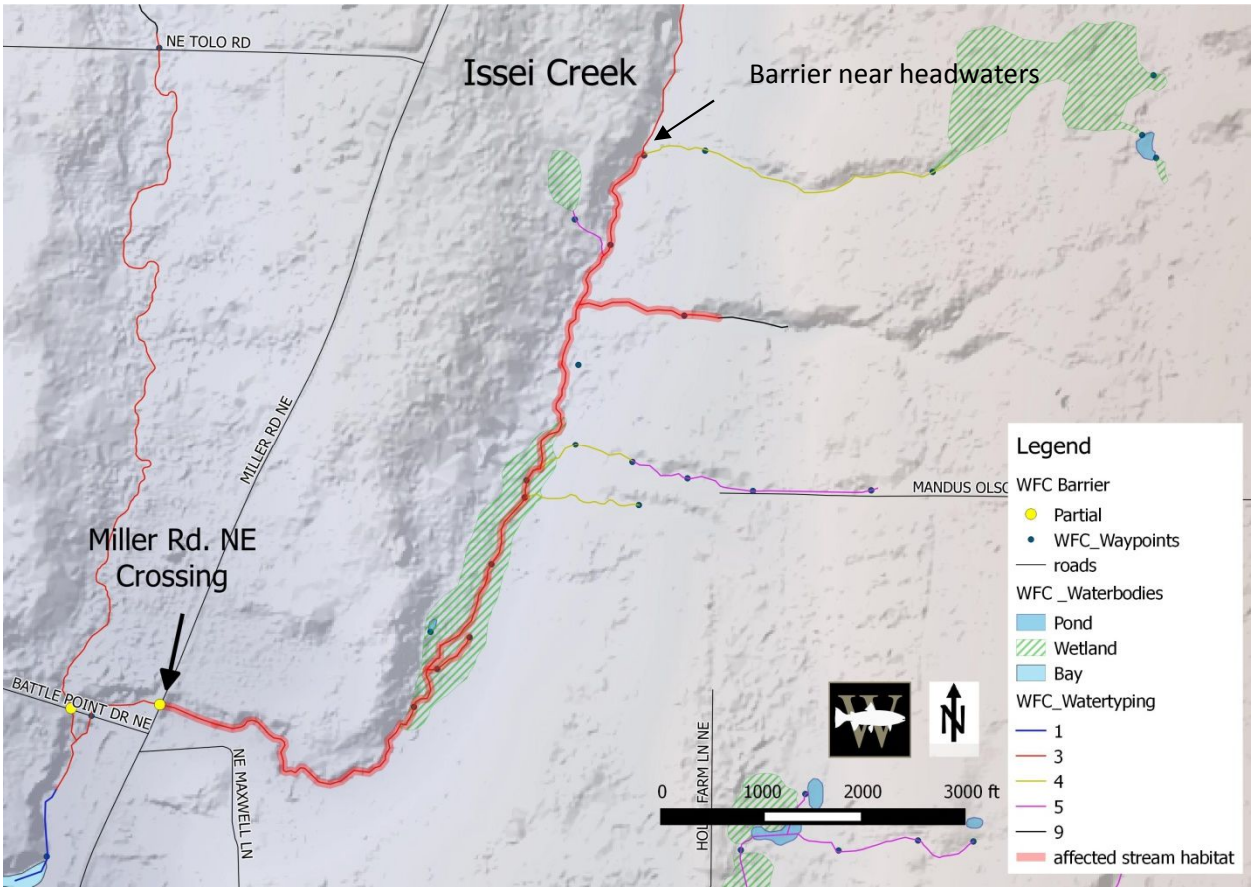
Survey Type:		Spawning (sq m):		Length (m):	
Significant Reach:	Yes	Rearing (sq m):		**PI Total**	

Project C

Issei Creek

Issei Creek provides over a mile of excellent fish habitat on Bainbridge Island. Beginning in wetland headwaters, the stream meanders through a lush second growth forest in the Grand Forest Park before feeding into Fletcher Bay. During field surveys WFC found the two culverts draining Issei Creek under Miller Rd. NE to be partial barriers to upstream fish migration and disruptive to natural stream processes. The two culverts, also described as partial barriers by WDFW culvert inventories, are undersized and fail to transport Issei Creek's water/sediment/wood during high flow events. This has resulted in downstream bank erosion and scouring. There is now a 1 ft perch and a plunge pool at the outlet of the culverts. Cutthroat trout, coho and rainbow trout were documented both above and below the crossing.

Additional data and photos are available on WFC's interactive web map at:
http://wildfish.beardedmaps.com/?lat=47.6485&lng=-122.5653&zoom=20



Solution

Replace the two side by side 2 ft. culverts under Miller Rd. NE. with a large single culvert or bridge. Remove the downstream English Ivy and invasive Bamboo. Revegetate the riparian corridor with native plant species to increase bank stabilization.

Outlet of the side by side culverts running under Miller Rd. NE. Perched 1 ft and undercut.

Cutthroat trout captured and released in Issei Creek within the Grand Forest Park upstream of the barrier culverts.

WDFW Fish Passage and Diversion Screening Inventory Database

Site Description Report

Site ID 881042 **Project** CITY

Geographic Coordinates

Latitude (WGS 84):	47.648496
Longitude (WGS 84):	-122.565355
East (HARN 83)	1,131,337.6
North (HARN 83)	850,992.8

Waterbody

Stream:	Issei Cr
Tributary To:	Puget Sound
WRIA:	15.0341
River Mile:	-999.99
Fish Use Potential:	Yes
FUP Criteria:	Physical

General Location

Road Name:	Miller Rd NE
Mile Post:	-999.99
County:	Kitsap
WDFW Region:	6

Owner

Type:	City
Name:	City of Bainbridge Island

PI Species

☐ Sockeye	☐ Chinook	☑ Sea Run Cutthroat
☐ Pink	☑ Coho	☑ Resident Trout
☑ Chum	☑ Steelhead	☐ Bull Trout

Associated Features

☑ Culvert	☐ Dam	☐ Natural Barrier	☐ Diversion
☐ Non-Culvert Xing	☐ Other	☐ Fishway	

Level A Culvert Assessment Report

Site ID:	**881042**				
Latitude:	**47.648496**	Stream:	**Issei Cr**	WRIA:	**15.0341**
Longitude:	**-122.565355**	Tributary To:	**Puget Sound**	Fish Use Potential:	**Yes**

Data Source: WDFW

Field Crew: Peterson;Phinney Review Date: 6/25/2014

Culvert Details / **Level A Parameters**

ID	Shape	Material	Span	Rise	Length	WDIC	Apron	WSDrop	Location	Countersunk	Backwater	Slope (%)
1.2	RND	OTH	0.61	0.61	18.30	0.04	NO	0.36	Outlet	No	0	3.36
2.2	RND	OTH	0.61	0.61	17.50	0.02	NO	0.28		No	0	3.49

All dimensions in meters

Channel Description

Toe Width (m):	1.9
Average Width (m):	3.40
Culvert/Stream Width Ratio:	0.36

Plunge Pool

Length (m):	5.00
Max Depth (m):	0.67
OHW Width (m):	4.25

Road

Fill Depth (m):	4.00

Assessment Results

Barrier:	Yes	Passability (%):	33	Method:	Level A
Reason:	WS Drop	Fishway Present:	No	Recheck:	

Comments

Both pipes have internal grade breaks. Us and DS ends of pipes are CAL, middle of pipe is PCC.

Potential Habitat Gain

Survey Type:	FS	Spawning (sq m):	1,929	Length (m):	267
Significant Reach:	Unknown	Rearing (sq m):	700	**PI Total**	19.28

Habitat Survey Summary Report

Site ID:	881042				
Latitude:	47.648496	Longitude:	-122.565355	WRIA:	15.0341
Stream:	Issei Cr	Tributary To:	Puget Sound	PI Total:	19.28

Survey Type FS

Spreadsheet File(s):

881042

Downstream Survey

Date: 5/8/2005 Crew: Boyce;Klages Length (m): 267

Downstream Comments:

Upstream Survey

Date: 5/8/2008 Crew: Boyce;Klages Length (m): 267

Upstream Comments:

Potential Habitat Gain

Lineal (m):	267
Spawning Area (sq m):	1,929
Rearing Area (sq m):	700

Distribution
- (•) Anadromous
- ( ) Resident Only
- ( ) Unknown

Gain Direction (Resident Only)

Potential Species Benefit

☐ Sockeye / Kokanee	☐ Chinook	☑ Searun Cutthroat
☐ Pink	☑ Coho	☑ Resident Trout
☑ Chum	☑ Steelhead	☐ Bull Trout

WDFW Fish Passage and Diversion Screening Inventory Database

Barrier Priority Index Report

Site ID: 881042

Stream	Issei Cr	Trib To	Puget Sound	WRIA	15.0341

Habitat (H) Estimation Method: FS

	B	H	M	D	C	Species PI
Sockeye					2	
Pink			2		2	
Chum	0.33	2,028	2	2	2	9.04
Coho	0.33	747	2	2	2	3.15
Chinook			2		2	
Steelhead	0.33	747	2	3	2	1.57
Searun Cutthroat	0.33	747	2	2	2	2.92
Resident Trout	0.33	844	1	2	2	2.58
Dolly/Bull Trout					2	
				TOTAL PI		19.28

B = proportion of fish passage improvement (1, 0.67, 0.33).

H = potential habitat gain (square meters), spawning habitat for sockeye, pink and chum, rearing habitat for the rest.

M= mobility modifier (anadromous = 2, resident = 1).

D = stock condition modifier (critical = 3, depressed = 2, not 2 or 3 = 1).

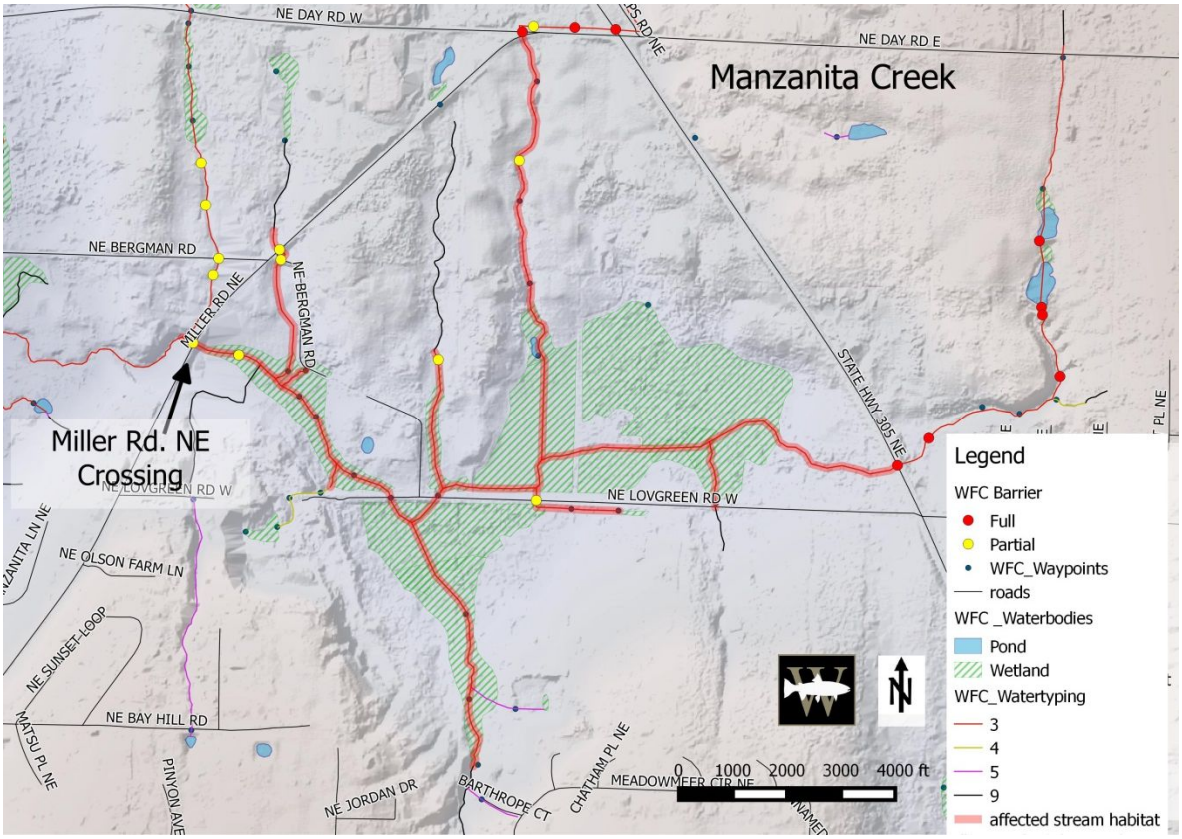
C= repair cost modifier (<$100K = 3, $100K - $500K = 2, >$500K = 1).

Project D

Manzanita Creek

Manzanita Creek is one of the largest watersheds on Bainbridge Island, and provides habitat for numerous fish and amphibian species. There were multiple restoration opportunities and partial barrier culverts found on this system during WFC's field survey, though the majority were in the headwaters of this system. The most prominant disruption to fish migration and natural stream process was found where Manzanita Creek is piped under Miller Rd. NE. Here, the concrete culvert is 3 ft in diameter and the outfall is perched 1.3 ft. The undersized culvert constricts flow druinging high flow events resulting in substantial downstream erosion and a large plunge pool. This plunge pool has a rock weir at its outlet which was likely installed to raise the water level of the pool and thus improve fish passage to the culvert. There is a second pool and weir approximately 10 ft. downstream. The culvert was also found to be a partial barrier by WDFW culvert inventories cunducted in 2014.

Additional data and photos are available on WFC's interactive web map at:
http://wildfish.beardedmaps.com/?lat=47.6745&lng=-122.5488&zoom=20



Solution: Replace the undersized and perched culvert with a larger culvert capable of carring Manzanita Creek's flows during all flood cycles. Remove or redesign the downstream weirs and regrade the stream channel to match the new culvert. Replant the riparian corridor to impove bank stability.

Miller Rd. NE Culvert outlet perched 1.3 ft into a large plunge pool.

Two boulder weirs downstream from the Miller Rd. NE plunge pool.

Two cutthroat trout netted upstream of the barrier culvert.

WDFW Fish Passage and Diversion Screening Inventory Database

Site Description Report

Site ID 881024 **Project** CITY

Geographic Coordinates

Latitude (WGS 84):	47.674496
Longitude (WGS 84):	-122.548758
East (HARN 83)	1,135,673.9
North (HARN 83)	860,367.9

Waterbody

Stream:	Manzanita Cr
Tributary To:	Manzanita Bay
WRIA:	15.0344
River Mile:	-999.99
Fish Use Potential:	Yes
FUP Criteria:	Physical

General Location

Road Name:	Miller Rd NE
Mile Post:	-999.99
County:	Kitsap
WDFW Region:	6

Owner

Type:	City
Name:	City of Bainbridge Island

PI Species

☐ Sockeye	☐ Chinook	☑ Sea Run Cutthroat
☐ Pink	☑ Coho	☑ Resident Trout
☑ Chum	☑ Steelhead	☐ Bull Trout

Associated Features

☑ Culvert	☐ Dam	☐ Natural Barrier	☐ Diversion
☐ Non-Culvert Xing	☐ Other	☐ Fishway	

Level A Culvert Assessment Report

Site ID:	**881024**				
Latitude:	**47.674496**	Stream:	**Manzanita Cr**	WRIA:	**15.0344**
Longitude:	**-122.548758**	Tributary To:	**Manzanita Bay**	Fish Use Potential:	**Yes**

Data Source WDFW

Field Crew: Barret;Peterson;Phinney Review Date: 6/18/2014

Culvert Details — **Level A Parameters**

ID	Shape	Material	Span	Rise	Length	WDIC	Apron	WSDrop	Location	Countersunk	Backwater	Slope (%)
1.1	RND	PCC	0.91	0.91	39.60	0.05	NO	0.62	Outlet	No	0	1.04

All dimensions in meters

Channel Description

Toe Width (m):	2
Average Width (m):	2.40
Culvert/Stream Width Ratio:	0.38

Plunge Pool

Length (m):	7.60
Max Depth (m):	1.40
OHW Width (m):	7.00

Road

Fill Depth (m):	8.00

Assessment Results

Barrier:	Yes	Passability (%):	33	Method:	Level A
Reason:	WS Drop	Fishway Present:	No	Recheck:	

Comments

Rock dam is plunge pool control.

Potential Habitat Gain

Survey Type:	FS	Spawning (sq m):	414	Length (m):	1,079
Significant Reach:	Yes	Rearing (sq m):	1,151	**PI Total**	17.14

Barrier Priority Index Report

Site ID: 881024

Stream	Trib To	WRIA
Manzanita Cr	Manzanita Bay	15.0344

Habitat (H) Estimatiom Method: FS

	B	H	M	D	C	Species PI
Sockeye					2	
Pink			2		2	
Chum	0.33	414	2	2	2	6.08
Coho	0.33	1,018	2	2	2	3.40
Chinook			2		2	
Steelhead	0.33	1,018	2	3	2	1.70
Searun Cutthroat	0.33	1,018	2	2	2	3.15
Resident Trout	0.33	1,151	1	2	2	2.79
Dolly/Bull Trout					2	
				TOTAL PI		17.14

B = proportion of fish passage improvement (1, 0.67, 0.33).

H = potential habitat gain (square meters), spawning habitat for sockeye, pink and chum, rearing habitat for the rest.

M= mobility modifier (anadromous = 2, resident = 1).

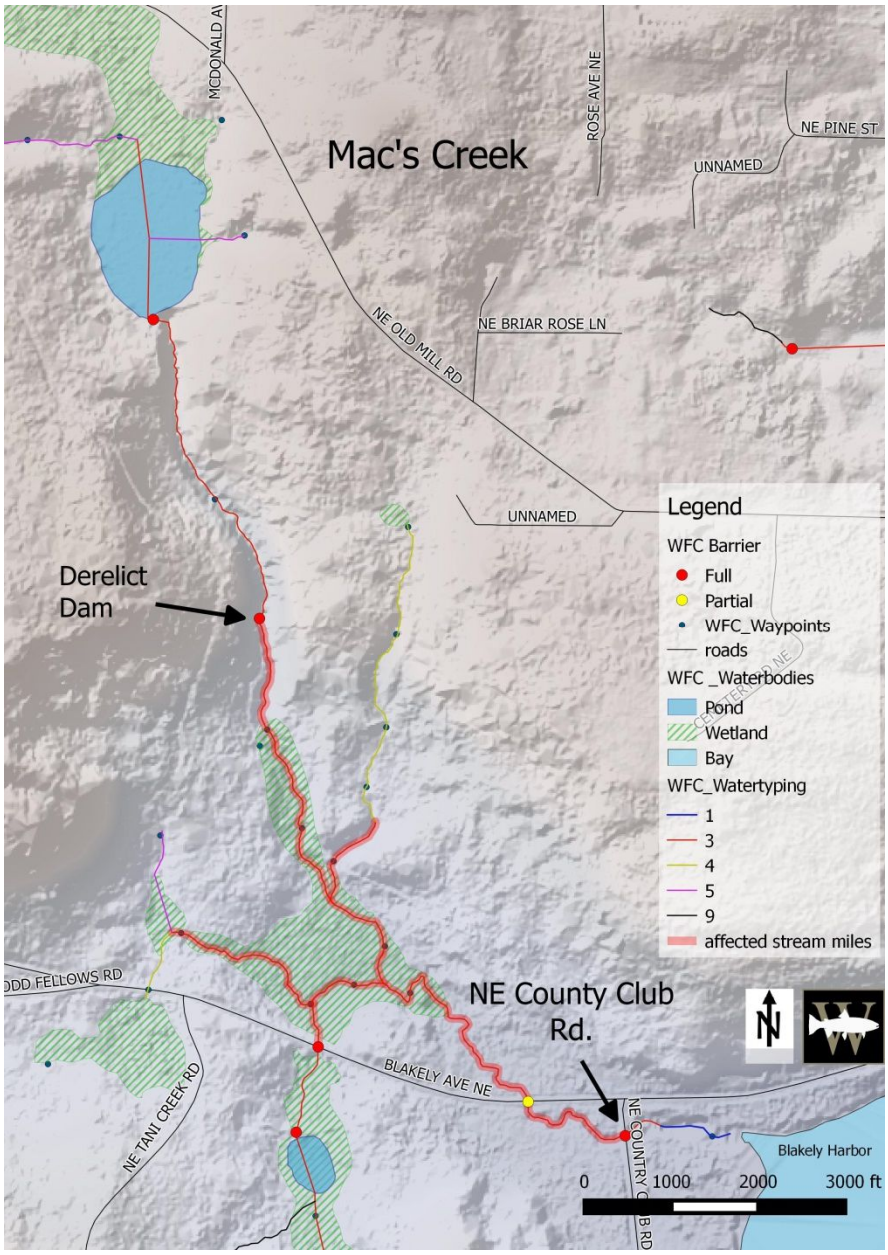
D = stock condition modifier (critical = 3, depressed = 2, not 2 or 3 = 1).

C= repair cost modifier (<$100K = 3, $100K - $500K = 2, >$500K = 1).

Project E

Mac's Creek.

Mac's Creek contains excellent fish habitat as it meanders through a large swath of undisturbed second growth forest on Bainbridge Island's IslandWood environmental education center. Fish access to this excellent habitat is compromised at the mouth of Mac's Creek, where the stream is piped under NE Country Club Rd. The culvert is undersized, steep, and the outfall is perched 1 ft. Throughtout the extensive field survey no fish were brought to hand above this crossing in the approximatly 4,700 ft of fish habitat. Downstream from the NE Country Club Rd. culvert crossing WFC documented coho, cutthrout trout and sculpin species. There are more barriers on Mac's Creek including a full barrier derilict dam on the IslandWood education center. The education center has shown great interest in removing the dam if the NE County Club Rd. culvert was replaced and fish once again had access to their property.



Additional data and photos are available on WFC's interactive web map at:

Country Club Road:

http://wildfish.beardedmaps.com/?lat=47.5971&lng=-122.5203&zoom=20

Derelict Dam on IslandWood:

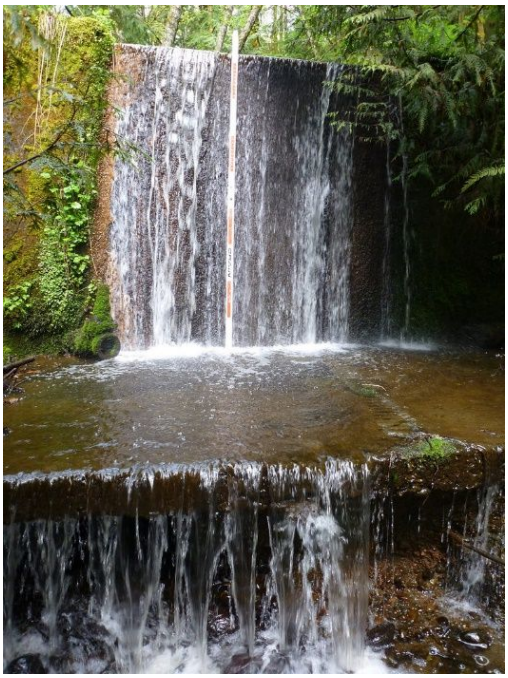
http://wildfish.beardedmaps.com/?lat=47.6020&lng=-122.5257&zoom=20

Solution

Replace the undersized culvert on NE Country Club Rd. with a large box culvert or bridge. Install grade controls / roughness in the channel above the culvert which is currently incised. Remove the extensive english ivy above the crossing and revegetate the riparian corridor with native plant species. Coordinate with the IslandWood education center to remove the derilict dam and restore fish passage and sediment/wood transport.

NE Country Club Rd. culvert outlet perched 1 ft with concrete retaining wall.

Mac's Creek with extensive English Ivy at the Blakley Harbor Park



Derelict dam on the IslandWood education center

Site Description Report

Site ID 881032 **Project** CITY

Geographic Coordinates

Latitude (WGS 84):	47.597159
Longitude (WGS 84):	-122.520308
East (HARN 83)	1,141,959.0
North (HARN 83)	831,983.6

Waterbody

Stream:	Macs Dam Cr
Tributary To:	Puget Sound
WRIA:	15
River Mile:	-999.99
Fish Use Potential:	Yes
FUP Criteria:	Physical

General Location

Road Name:	Country Club Rd
Mile Post:	-999.99
County:	Kitsap
WDFW Region:	6

Owner

Type:	City
Name:	City of Bainbridge Island

PI Species

☐ Sockeye	☐ Chinook	☑ Sea Run Cutthroat
☐ Pink	☑ Coho	☑ Resident Trout
☑ Chum	☑ Steelhead	☐ Bull Trout

Associated Features

☑ Culvert	☐ Dam	☐ Natural Barrier	☐ Diversion
☐ Non-Culvert Xing	☐ Other	☐ Fishway	

Level A Culvert Assessment Report

Site ID:	**881032**				
Latitude:	**47.597159**	Stream:	**Macs Dam Cr**	WRIA:	**15**
Longitude:	**-122.520308**	Tributary To:	**Puget Sound**	Fish Use Potential:	**Yes**

Data Source WDFW

Field Crew: Fredley;Phinney;Trim Review Date: 9/16/2014

Culvert Details / **Level A Parameters**

ID	Shape	Material	Span	Rise	Length	WDIC	Apron	WSDrop	Location	Countersunk	Backwater	Slope (%)
1.1	RND	PCC	0.91	0.91	19.70	0.01	NO	0.31	Outlet	No		3.70

All dimensions in meters

Channel Description

Toe Width (m):	1.6
Average Width (m):	1.80
Culvert/Stream Width Ratio:	0.51

Plunge Pool

Length (m):	-999.99
Max Depth (m):	-99.99
OHW Width (m):	-999.99

Road

Fill Depth (m):	4.00

Assessment Results

Barrier:	Unknown	Passability (%):	Unknown	Method:	Level A
Reason:	nsufficient Data	Fishway Present:	No	Recheck:	ER

Comments

Tidally influenced, 3m retaining wall RB US, visited site at 13:53 at approximately low tide.

Potential Habitat Gain

Survey Type:	FS	Spawning (sq m):	624	Length (m):	750
Significant Reach:	Yes	Rearing (sq m):	897	**PI Total**	20.45

WDFW Fish Passage and Diversion Screening Inventory Database

Barrier Priority Index Report

Site ID: 881032

Stream	Macs Dam Cr	Trib To	Puget Sound	WRIA	15

Habitat (H) Estimatiom Method: FS

	B	H	M	D	C	Species PI
Sockeye					2	
Pink			2		2	
Chum	0.67	624	2	2	2	8.04
Coho	0.67	793	2	2	2	3.81
Chinook			2		2	
Steelhead	0.67	793	2	3	2	1.91
Searun Cutthroat	0.67	793	2	2	2	3.54
Resident Trout	0.67	897	1	2	2	3.13
Dolly/Bull Trout					2	
				TOTAL PI		20.45

B = proportion of fish passage improvement (1, 0.67, 0.33).

H = potential habitat gain (square meters), spawning habitat for sockeye, pink and chum, rearing habitat for the rest.

M= mobility modifier (anadromous = 2, resident = 1).

D = stock condition modifier (critical = 3, depressed = 2, not 2 or 3 = 1).

C= repair cost modifier (<$100K = 3, $100K - $500K = 2, >$500K = 1).