Wild Fish Conservancy
NORTHWEST
SCIENCE EDUCATION ADVOCACY

Wild Fish Conservancy Watertype Assessment Project Summary
Gig Harbor Peninsula Water Type Assessment
http://www.wildfishconservancy.org/maps
March 2020

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

Gig Harbor Peninsula Water Type Assessment
During the 2017-2019 water type field seasons, Wild Fish Conservancy crews performed water type assessments on 9 streams that flow directly into Puget Sound on the Gig Harbor Peninsula in Pierce and Kitsap Counties, WA. (Figure 1), adding to previous (Phases I - III) Wild Fish Conservancy West Puget 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 1175 parcels. Of these, access for the WFC staff to perform the survey on their property was granted for 305 parcels. Additionally, survey data were collected from within public right-of-ways.

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 2300 photographs (with associated channel condition descriptions) on an interactive web-based GIS available on our website (Figure 3).

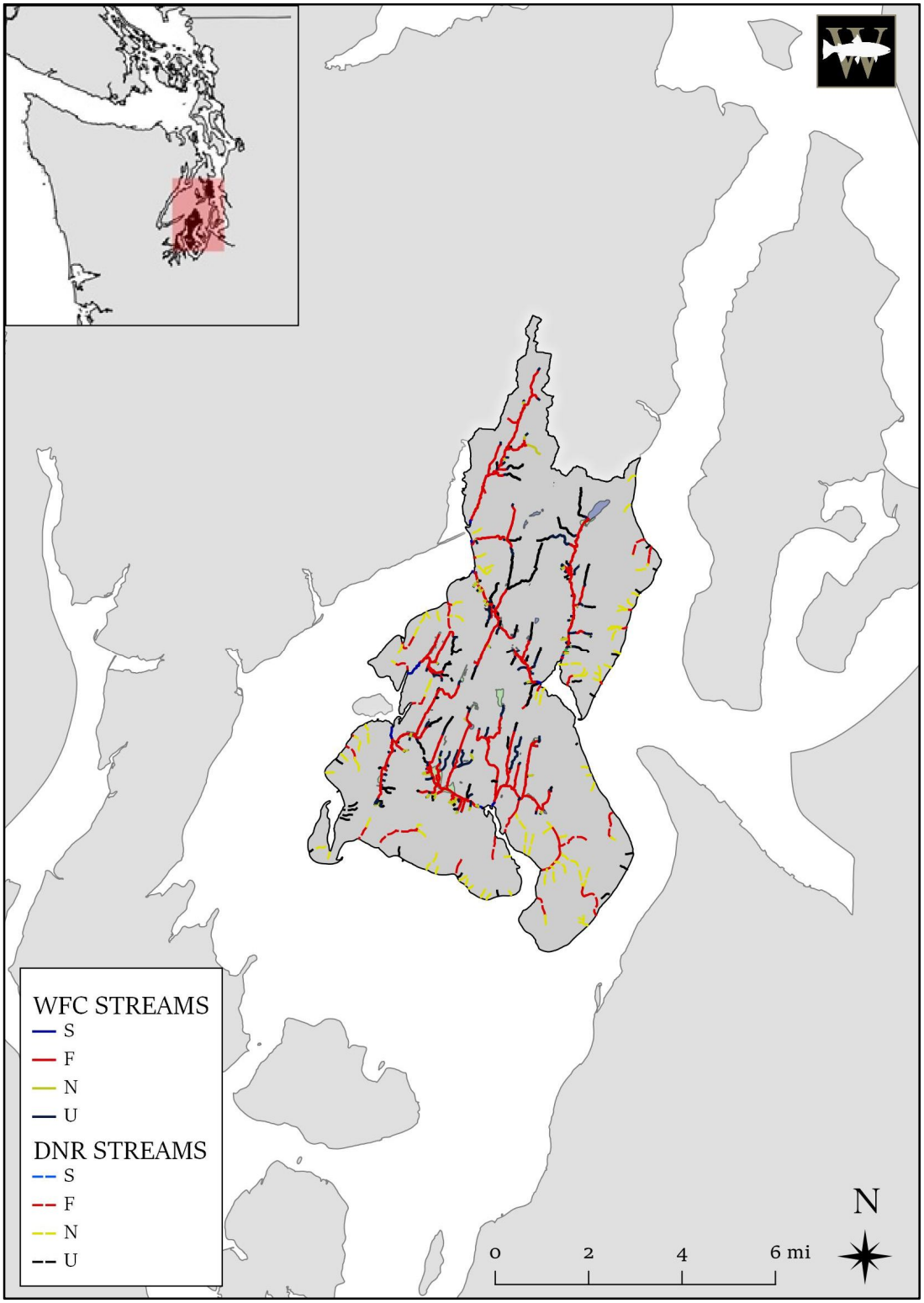

Figure 1. Geographic extent of WFC's Gig Harbor Peninsula Watertype Assessment in Pierce and Kitsap Counties, Washington.

Native Fauna that WFC encountered during te surveys included coho salmon, cutthroat trout, possible rainbow trout, sculpin, and brook lamprey as well as invasive blue gill (Figure 4).

Non-fish species included western pearlshell mussels and signal crayfish. 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 90 miles of streams. Where access was granted, WFC found that 1.8 miles of those WDNR mapped channels did not exist, but that an additional 18.5 miles of stream channels did exist that were not on the official WDNR water type maps.

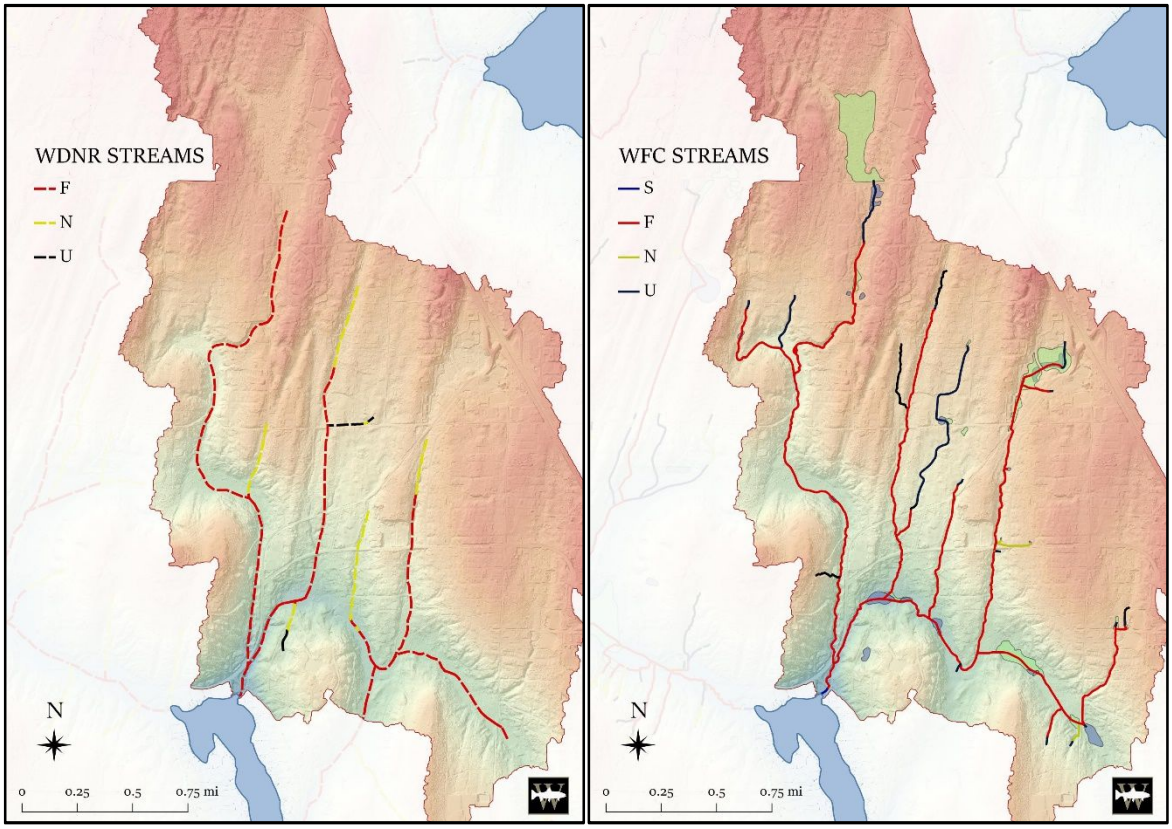

Figure 2. Example of observed discrepancy between WDNR modeled stream location and classification, and WFC field observation in Wollochet Creek.

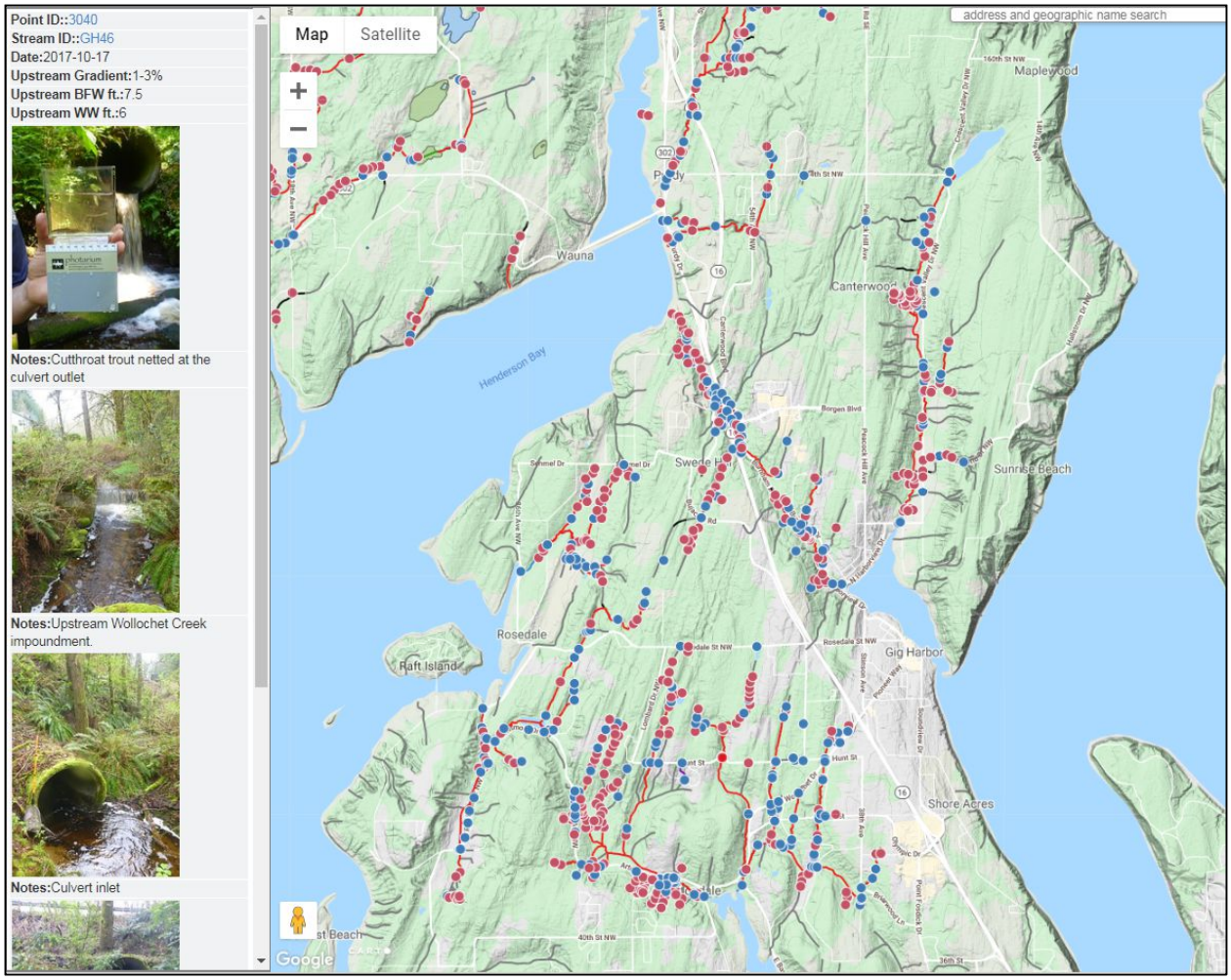

Figure 3. The West Sound Watertype Assessment results and data are provided on Wild Fish Conservancy's web site at: http://wildfishconservancy.org/

Restoration and Protection 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).

WFC's Water Type Assessment project is ongoing; in 2020 Wild Fish Conservancy crews will conduct field surveys in additional Puget Sound drainages in Kitsap County.

Funding for this project was provided by the Recreation and Conservation Office's Salmon Recovery Funding Board, and Pierce County. 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.

Figure 4. Coho netted in North Creek on the Gig Harbor Peninsula.

Appendix A. Restoration and Protection Opportunities observed during WFC's Gig Harbor Peninsula Water Type Assessment. Additional details are provided for the five high-priority projects. For more information on additional restoration and protection opportunities beyond those described below please contact Wild Fish Conservancy.

Priority	Stream	Point ID	Problem / Opportunity	Potential Solution	Comments
Project A High	McCormick Creek (GH06)	WPT 705	Barrier culvert, degraded riparian habitat	Replace the barrier culvert, restore degraded riparian habitat: remove invasive vegetation, add LWD, and native vegetation.	McCormick Creek flows under a derelict private driveway in three side by side perched culverts forming a full barrier to fish migration and blocking approximately 4.8 miles of fish habitat. The channel above and below the culvert is devoid of native vegetation, lacking in large woody debris, and is choked with invasive blackberry. This presents an excellent opportunity to restore fish passage and enhance the riparian corridor (remove invasive blackberry, add native plants, add LWD). WFC documented coho salmon below this crossing but they were not found above these culverts.
Project B High	Purdy Creek (GH01)	WPT 162	Barrier culvert, degraded riparian habitat	Replace the barrier culvert, naturalize channel: add sinuosity, LWD, native riparia.	Purdy Creek flows in a straightened channel through a pasture with very little riparian cover. The stream then flows under SE 106th St. in an undersized culvert with an outfall drop of 2 ft. into what appears to be a fish passage retrofit consisting of a small man-made pool with a notched outlet. The notched outlet is perched an additional 0.9 ft. above the stream bed. This crossing acts as a barrier to fish migration, impeding passage into approximately 4.06 miles of upstream fish habitat. This presents an excellent opportunity to restore fish passage and naturalize the upstream channel (restore sinuosity, add LWD, and restore the riparian corridor.)
Project C High	Garr Creek (GH46A)	WPT 200	Barrier culvert	Replace Barrier culvert; Naturalize channel: add sinuosity, LWD, native riparia.	The eastern branch of Wollochet Creek, known as Garr Creek, flows under Spruce Ln. NW in an undersized, full barrier culvert perched 5.1 ft. This crossing blocks fish access to 5.44 miles of identified fish habitat. The stream below the crossing is substantially incised, scoured to hardpan, and is devoid of all gravels integral to salmonid spawning. WFC found juvenile coho salmon directly downstream of this crossing but not upstream. Replacing this culvert would restore fish passage into Garr Creek, improve sediment transport downstream, and protect the road from flooding during high flow events.

Project D High	Nelyaly Creek (GH13)	N/A Parcel # 0121022002	Protection from Development	Property Acquisition	A 5.59 acre parcel at the mouth of Nelyaly Creek is currently in the process of sale to a developer. This property is uniquely undeveloped relative to others in the Gig Harbor Peninsula, supporting intact shorelines, estuarine habitat, and healthy mature forests. The estuarine portion of this property has been identified by NMFS as critical Chinook salmon habitat, and both coho and chum salmon have been documented in Nelyaly Creek. The landowner has shown interest in working with the Great Peninsula Land Conservancy if the currently proposed development is complicated due to critical areas or shoreline buffer restrictions.
Project E High	Artondale Creek (GH45)	N/A Parcel # 0121141013, 0121141012	Protection from Development	Property Acquisition	A landowner in the perennial headwaters of Artondale Creek is interested in selling a large undeveloped 19.54 acre parcel. This property is bisected by Artondale Creek as well as numerous tributaries feeding into Artondale Creek. On this property the stream and its associated tributaries run through a vast forested wetland, providing excellent salmonid rearing habitat. The acquisition of this property represent a unique opportunity to protect one of the largest remaining undeveloped reaches of Artondale Creek.
Project F Moderate	North Creek (GH63)	WPT 107	Barrier culvert	Replace Barrier Culvert	North Creek crosses under Harborview Dr. in a partial barrier culvert impeding fish access to over 1.8 miles of stream, including excellent salmonid spawning and rearing habitat. This box culvert has an old wood flume and flow-control structure at the outlet. The outfall is 1.1 ft. falling onto a concrete pad. Replacing this culvert would be an excellent complement to the bridge crossing installed downstream on Harborview Dr. in 2014.
Project G Moderate	Artondale Creek (GH45)	WTP 008	Barrier culvert, modified channel	Replace Barrier Culvert	The mouth of Artondale Creek crosses Wollochet Dr. NW in a box culvert that is a partial barrier to fish passage. During low tide, there is a 1.4 ft. high drop at the culvert outlet. The culvert is undersized and lacks substrate throughout and constricts the upper extent of the Wollochet Bay estuary. This crossing accommodates fish passage only during high tides. Replacing this culvert with a bridge structure or stream simulated culvert would restore estuarine processes and improve fish passage.

Project H Moderate	Wollochet Creek (GH46)	WPT 039	Barrier culvert	Replace Barrier Culvert	Wollochet Creek crosses under Hunt St. in a full barrier culvert perched 4.9 ft. The channel below the crossing has been down-cut by the undersized culvert and is now incised. Above the crossing, the stream is impounded behind a concrete retaining wall with a notched outlet. Replacing this culvert and removing the concrete retaining wall would improve sediment and LWD transport, and reestablish fish passage into approximately 1.56 miles of identified type F habitat.
Project I Moderate	Crescent Creek (GH45)	N/A Parcel# 0222292029, 0222292030	Protection from Development	Property Acquisition	Crescent Creek is braided through a large forested wetland on two undeveloped 4.95 acre properties currently for sale. WFC field crews were not granted access to either of these parcels but did inventory the creek directly upstream of the properties. These undeveloped parcels are heavily forested and present a unique opportunity to protect an intact reach of Crescent Creek.
Project J Moderate	Artondale Creek (GH45)	N/A Parcel# 0121132701	Stream Enhancement	Plant riparian corridor with native vegetation	Where Artondale Creek Runs through the Gig Harbor Golf Club, the channel has been straightened, armored, and stripped of all riparian vegetation. This section of channel is now flank by Golf Course Grass and is likely sprayed with chemicals for weed control, and heavily fertilized. Replanting the required riparian buffer with native vegetation would improve the quality of habitat in this lower mainstem reach as well as protect the downstream section of Artondale Creek from the effects of golf course maintenance.
Project K	Purdy Creek (GH01)	WPT 160	Barrier Culvert	Replace Barrier Culvert	Near the mouth of Purdy Creek, the stream flows under 144th St. NW and a gas station in a system of culverts. WDFW's fish passage inventory has identified this crossing as 33% passible, impeding fish migration into nearly the entirety of the watershed. The replacement of this partial barrier culvert will likely be very expensive but would result in improved passage into miles of spawning and rearing habitat for numerous fish species including ESA listed Chinook salmon and Steelhead trout. This culvert replacement was ranked as moderate as it is already being addressed in a feasibly study by Pierce County.

Project A

McCormick Creek - Derelict Driveway Culvert Replacement

McCormick Creek is among the larger watersheds of the Gig Harbor Peninsula, proving a total of 6.03 miles of identified fish habitat (Figure A1). During stream surveys WFC documented cutthroat trout, brook lamprey, and sculpin throughout the majority of the available fish habitat inventoried. WFC also encountered numerous juvenile coho salmon in the lower reaches of McCormick Creek, in the section of stream with documented presence of ESA listed fall Chinook salmon and Steelhead trout, as well as chum salmon (WDFW SalmonScape).

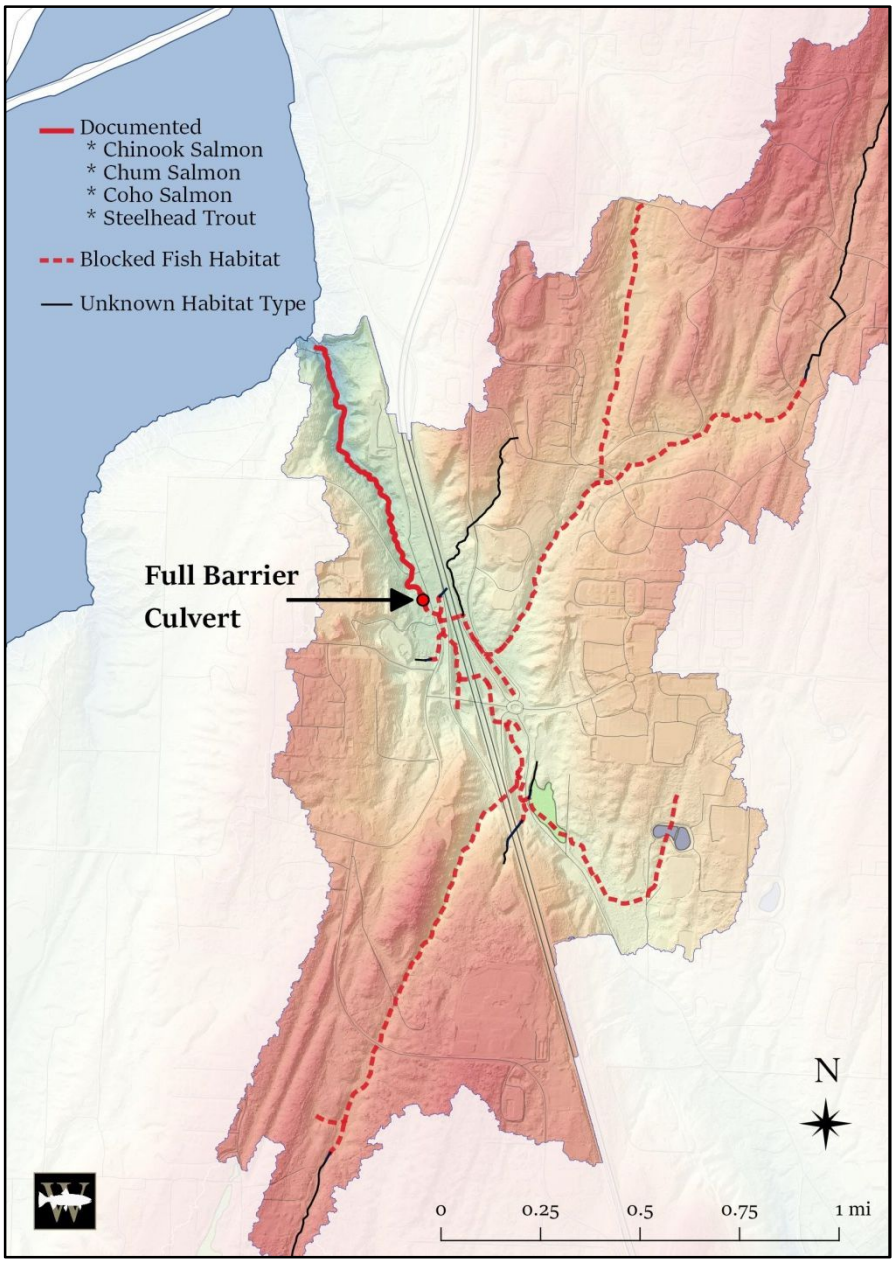

Figure A1. Location of the barrier culvert within the McCormick Creek Watershed.

Of the available 6.03 miles of fish habitat identified in McCormick Creek, only the lower 0.85 miles are accessible to anadromous salmonids, with the upper 5.18 miles blocked by a derelict driveway crossing. This crossing is listed as a full barrier on WDFW's fish passage inventory due to a water surface drops at the culvert outlets (Site Id: 991946). The crossing is comprised of three side by side corrugated steel culverts, ranging in diameter from 2 to 2.5 ft. with water surface drops ranging from 1.7 to 2 ft. during the time of WFC's water typing survey (Figure A2). The property was abandoned at the time of the site visit with the driveway blocked by ecology blocks and in a state of disrepair (Figure A3). Additional to the barrier culvert, the habitat immediately above and below the crossing is notably degraded, lacking large woody debris (LWD) and native riparian vegetation, with stream banks overrun by invasive Himalayan blackberry (Figure A4).

Figure A2. Barrier culvert outlets, perched approximately 2 ft. during the time of WFC survey.

Due to the abundance of potential fish habitat above this crossing, and the presence of ESA listed species impacted by the barrier, WFC strongly recommends replacing these three culverts with either a bridge, or a stream simulated culvert in order to reestablish fish passage, and restore the natural process of sediment and woody debris transport. Supplemental habitat enhancement is recommended at this site in conjunction with the culvert replacement. Installation of LWD, removal of invasive blackberries, and planting native vegetation would complement the culvert replacement, improving the overall quality of habitat available to salmonids. The cost of this project is likely very low relative to similar culvert replacements due to the lack of road fill, and the current absence of driveway usage.

Figure A3. Overview of the derelict driveway, with an abandoned house and outbuilding in the background.

Figure A4. Coho salmon netted below the full barrier culvert (left) and a view of the upstream channel choked with Himalayan blackberry (right).

Project B

Purdy Creek – SE 106th St. Culvert Replacement.

Purdy Creek is another large stream on the Gig Harbor Peninsula providing habitat for numerous salmonids including, Chinook, chum, and coho salmon as well as steelhead and cutthroat trout (WDFW SalmonScape). During water typing surveys WFC documented 6.67 miles of fish habitat bringing numerous cutthroat trout and sculpins to hand. Throughout the watershed WFC field staff documented many partial barrier culverts impeding fish passage and fragmenting available habitat. Of the barriers documented a crossing on SE 160th St. was identified as one of the greatest potential restoration opportunities because of the quantity and quality of habitat it blocks.

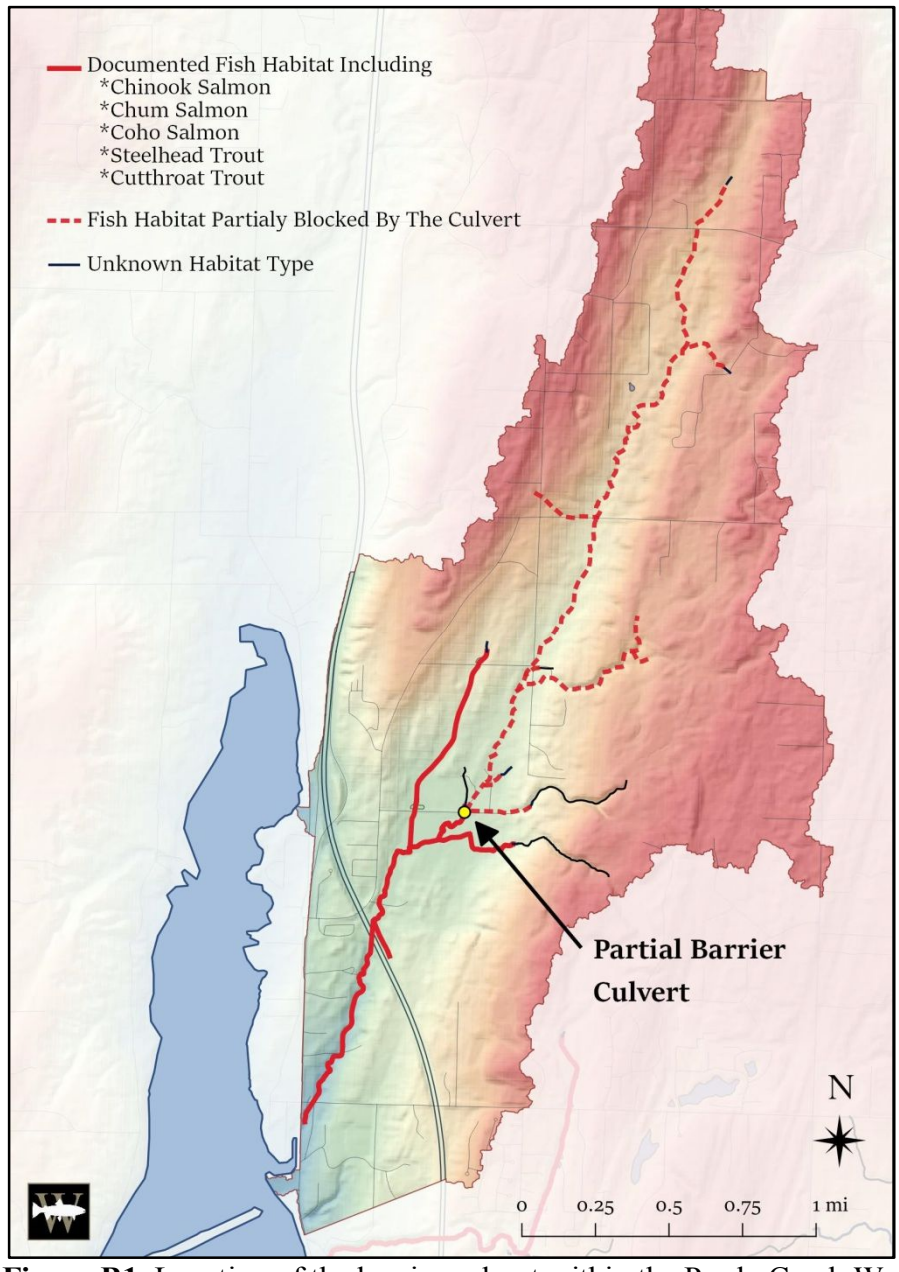

Figure B1. Location of the barrier culvert within the Purdy Creek Watershed.

Of the 6.67 miles of fish habitat identified in Purdy Creek, 4.06 miles are located above the barrier culvert on SE 106th St. WDFW's fish passage inventory lists this culvert as a 33% passable partial barrier, due to a water surface drop located at the culvert outlet (Site Id: 105K050920c). The crossing is comprised of a 4 ft. diameter pre-cast concrete pipe with a baffle at the outlet which caused a 2 ft. high water surface drop onto a weir platform, which in turn dropped and additional 0.9 ft. to the stream bed during the time of WFC's water typing survey (Figure B2). It appears that the weir structure is failing and the stream is scouring around the base of the culvert outlet, and will likely need replacement in the near future.

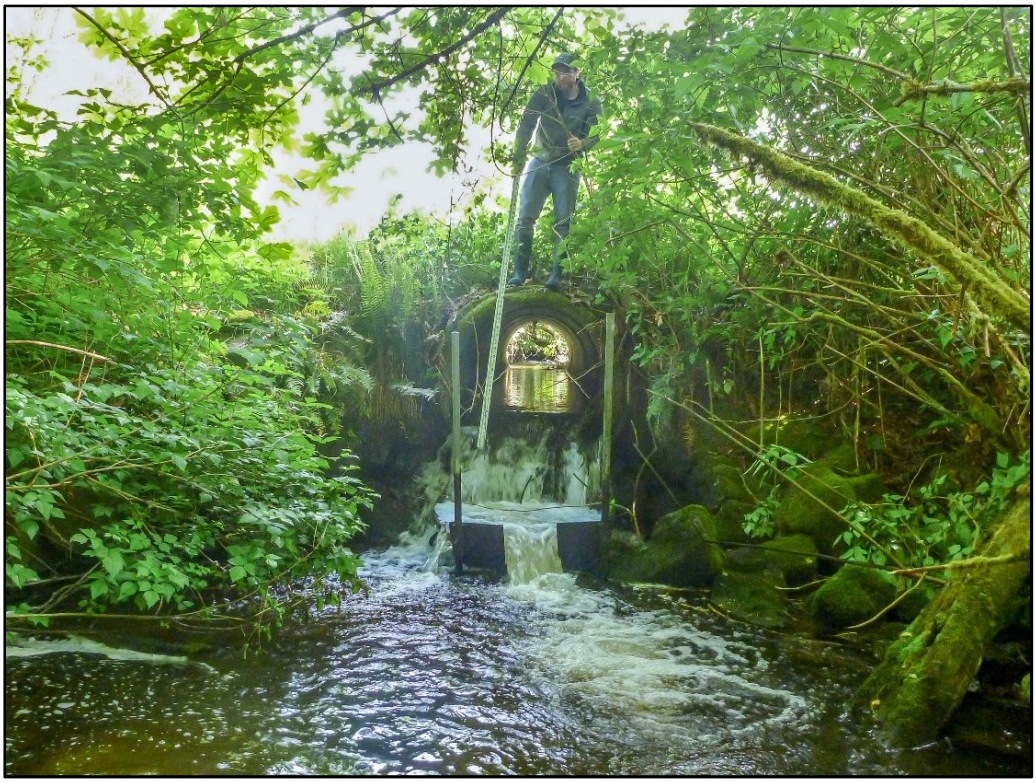

Figure B2. Culvert outlet and failing weir structure.

Due to the abundance of potential fish habitat above this crossing, and the presence of ESA listed Chinook and Steelhead impacted by the barrier, WFC strongly recommends replacing this culvert and failing weir with either a bridge or a stream simulated culvert in order to provide adequate fish passage. It is estimated that the cost of this culvert replacement would be low relative to other barrier culvert replacements within the watershed due to the lack of fill, and infrequent traffic experienced on the dead-end road.

Figure B3. 95mm cutthroat trout netted upstream of the barrier culvert.

Figure B4. Purdy Creek below the barrier culvert.

Project C

Garr Creek – Spruce Ln. NW Culvert Replacement.

Garr Creek is the east-fork branch of the Wollochet Creek Watershed, providing approximately 5.72 miles of potential fish habitat. WFC water typing surveys found numerous coho salmon throughout the lower reaches Garr Creek, overlapping the section of stream with documented presence of both chum and coho salmon (WDFW SalmonScape). Additionally, in the spring of 2019 WFC's eDNA surveys found Chinook salmon DNA present from samples collected just below the confluence of Garr Creek and east-fork of Wollochet. (Figure C1).

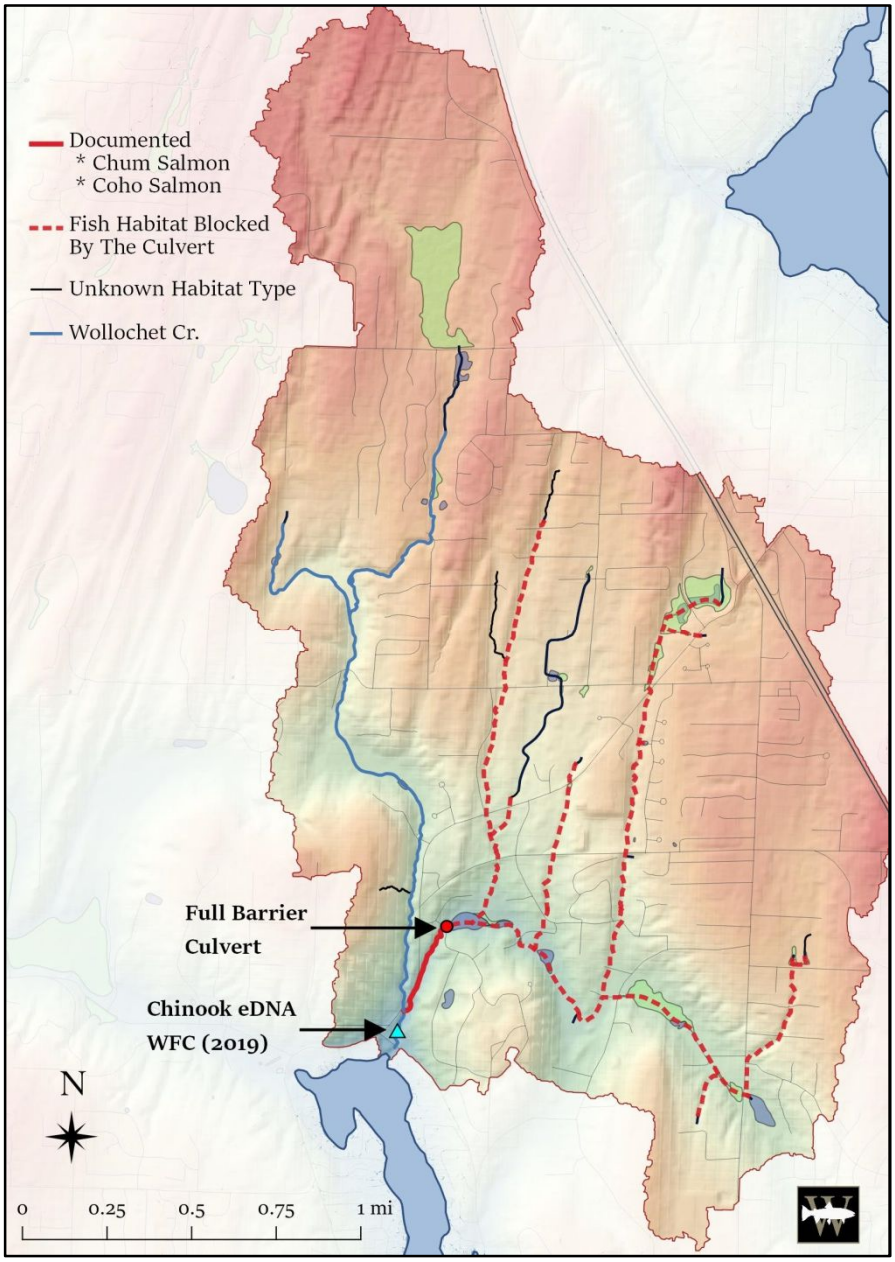

Figure C1. Garr Creek watershed, with the location of Chinook eDNA, and the full barrier culvert.

Of the 5.72 miles of fish habitat documented in Garr Creek, only the lower 0.28 miles are accessible to anadromous salmonids, because the upper 5.44 miles are blocked by a barrier culvert on Spruce Ln. NW. This crossing is identified as a full barrier culvert in WDFW's fish passage inventory due to a water surface drop at the culvert outlet (Site Id: 105K120120a). The culvert is pre-cast concrete, 3 ft. in diameter, with water surface drop that measured 5.1 ft. during the time of WFC water typing surveys (Figure C2). The undersized culvert has caused significant down cutting, scouring the stream bed to hardpan below the crossing. (Figure C3). Above the crossing there is a 2.4 acre pond, impounding Garr Creek. The culvert inlet and the pond are separated by a short 30 ft. section of channel.

Figure C2. Barrier culvert outlet

Due to the significant amount of fish habitat above this crossing, the presence of ESA listed species identified below the crossing, and the habitat degradation caused by this undersized culvert, WFC strongly recommends replacing the current crossing with either a bridge or a stream simulated culvert. Replacement of the culvert would not only reestablish fish passage into miles of rearing and spawning habitat, it would also restore natural stream processes, such as the transport of LWD and sediments. In addition to the culvert replacement, WFC recommends increasing the channel complexity to aggrade the stream bed above and below the culvert, by installing LWD to promote the capture of sediment and rebuild the compromised downstream habitat.

Figure C3. Downstream channel, heavily incised due to the undersized culvert.

Figure C4. 48mm coho netted at the culvert outlet (left), and culvert inlet (right).

Project D

Nelyaly Creek – Property Acquisition.

Nelyaly Creek is a salmon barring stream draining approximately 786 acres of mixed residential and city park lands into Lay Inlet on the east side of the Gig Harbor Peninsula. WFC water typing surveys document roughly 3.35 miles of potential fish habitat in the Nelyaly Creek Watershed bringing numerous cutthroat trout and sculpin to hand (Figure D1). Additional to WFC fish documentation, WDFW has identified coho and chum salmon presence in the lower reaches of Nelyaly Creek (WDFW SalmonScape). At the mouth of the watershed, the stream enters a long and narrow tidal estuary. This tidally influenced portion of stream is classified as shoreline of the state, and provides critical habitat for a diverse range of flora and fauna. A currently undeveloped 5.6 acre parcel of land enfolds the head of this uniquely intact estuary.

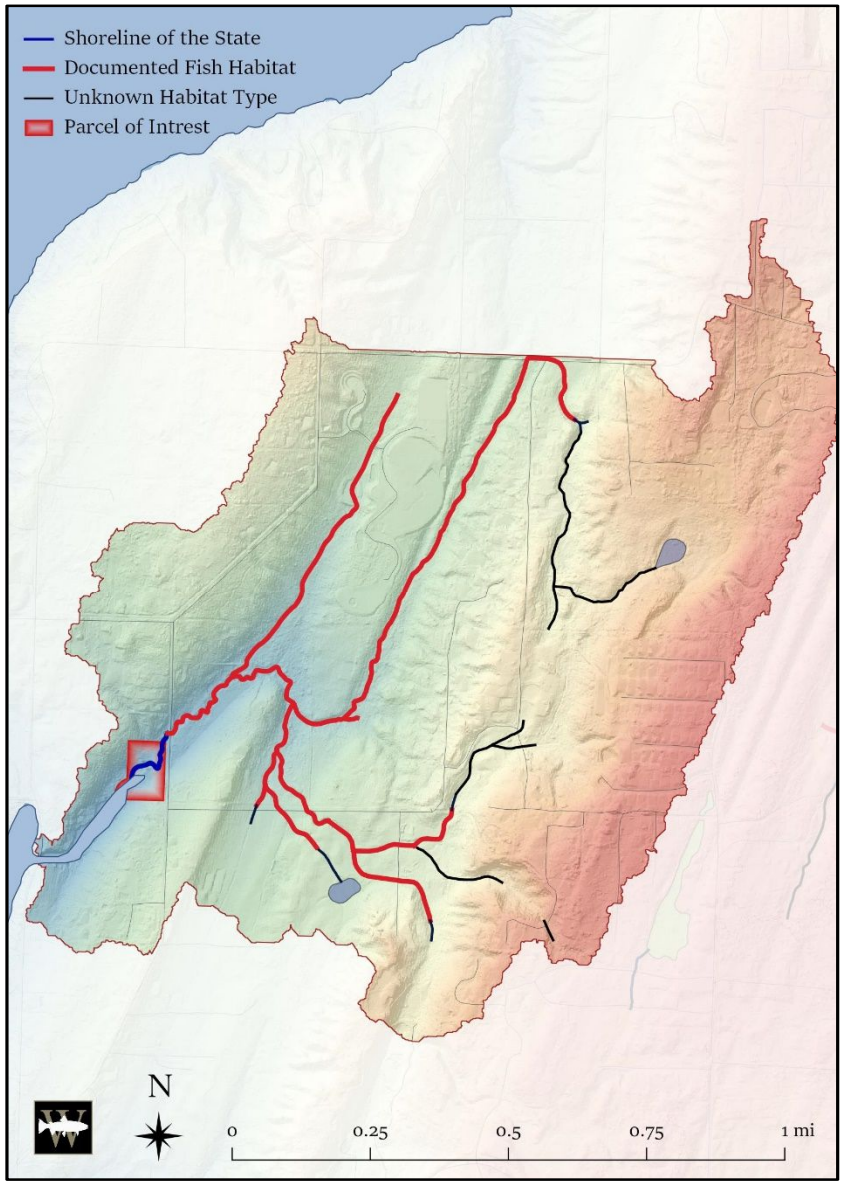

Figure D1. Nelyaly Creek watershed and property of interest.

The 5.6 acre parcel is bisected by the mouth of Nelyaly Creek and its associated estuary (Figure D2). The upland portion of the property is heavily forested with a mixed stand of mature conifer and deciduous trees. The channel cutting through the property is well shaded with undercut banks and an abundance of LWD, providing excellent fish habitat (Figures D3 and D4). Small estuaries such as this one provide both protection from predators and abundant forage for juvenile native salmon and trout, including non-natal species such as ESA listed Puget Sound Chinook Salmon. The lower half of the estuary on the subject property has been identified as critical habitat for ESA-listed Puget Sound Chinook Salmon by the National Marine Fisheries Service.

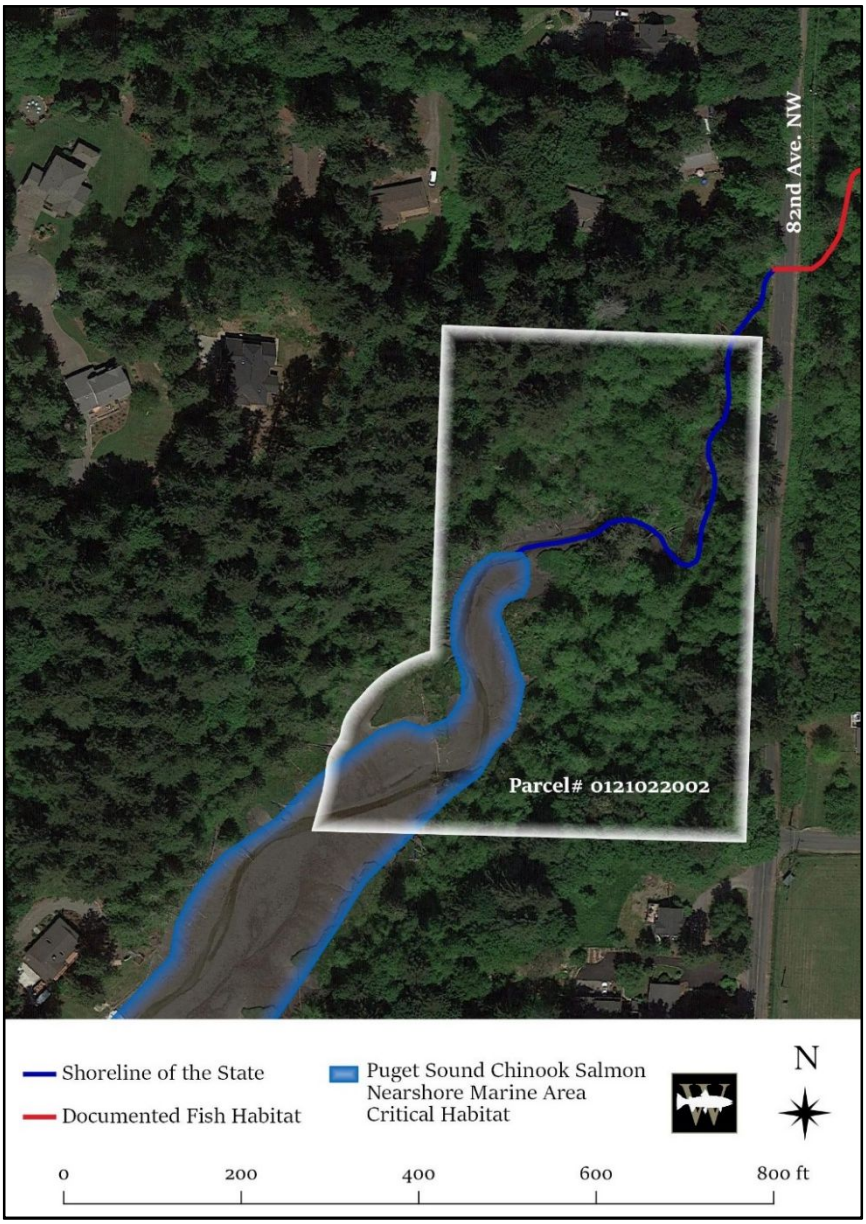

Figure D2. The parcel of interest with channel location and boundary of Chinook Critical Habitat

During water typing surveys WFC field crews contacted the landowner of the 5.6 acre parcel prior to surveying the property. During conversations, the property owner expressed a strong interest in selling the land and with the hope of working with conservation groups. Due to the exceptionally high quality of habitat available on the subject parcel, and the landowner's expressed interest in conservation, WFC strongly recommends working with the landowner to protect this uniquely undeveloped estuarine habitat. Currently the property is under sale to a private developer, but final sale may be dependent on setbacks due critical areas and shoreline restrictions.

Figure D3. Tidally influenced estuary of Nelyaly Creek

Figure D4. Looking upstream at the upper end of the estuary on the subject property (left) and looking downstream at the lower end of the subject property (right).

Project E

Artondale Creek – Property Acquisition.

Artondale Creek drains a 2035 acre basin into Wollochet Bay. WFC field surveys document approximately7.36 miles of potential fish habitat in the Artondale Creek Watershed. Quality of fish habitat varied throughout the basin, ranging from intact forested wetlands to degraded stream corridors lacking riparian cover and stream complexity. Of the habitat surveyed a wetland corridor in the upper reaches of the watershed stood out as exceptionally high quality. The northern margins of this forested wetland are encompassed largely within two 19.5 acre parcels (Figure E1).

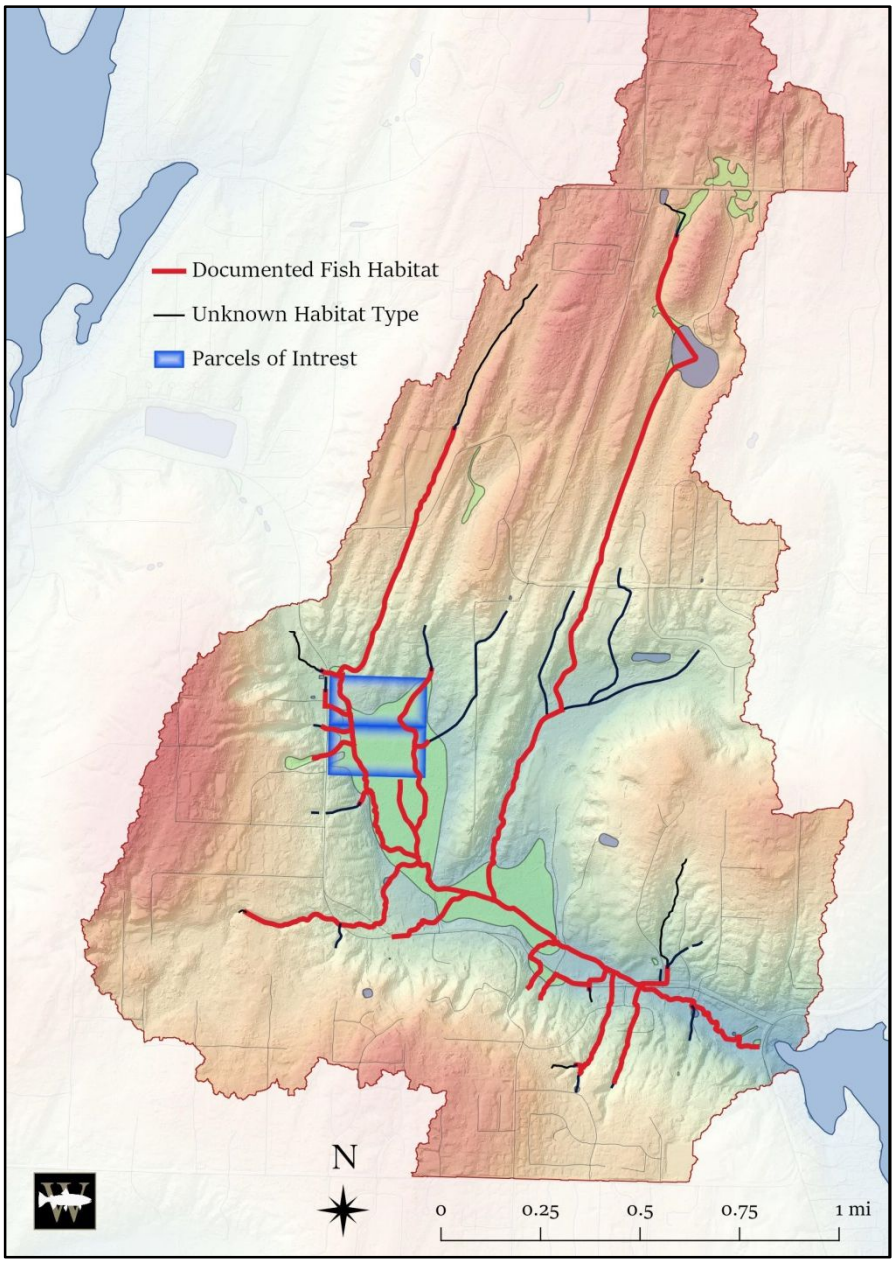

Figure E1. Location parcels of interest within the Artondale Creek watershed.

Within these parcels, Artondale Creek and numerous small tributaries meander through a lush wetland corridor with a predominantly deciduous canopy and a diverse understory of native shrubs (figure E2). This section of the stream provides excellent rearing habitat for juvenile salmonids, with sandy sediments, undercut banks, and LWD (Figure E3). The northern of the two parcels is largely undisturbed, with all infrastructure consolidated to the northwestern corner. The developed section of the property serves as both residential housing as well as the location of the Woodbrook Native Plant Nursery. The southern parcel is completely undeveloped, lacking roads, buildings, or any other signs of human activity outside of walking trails. Both parcels share the same landowner, who expressed an interest in selling off a portion of their land, especially the undeveloped southern parcel.

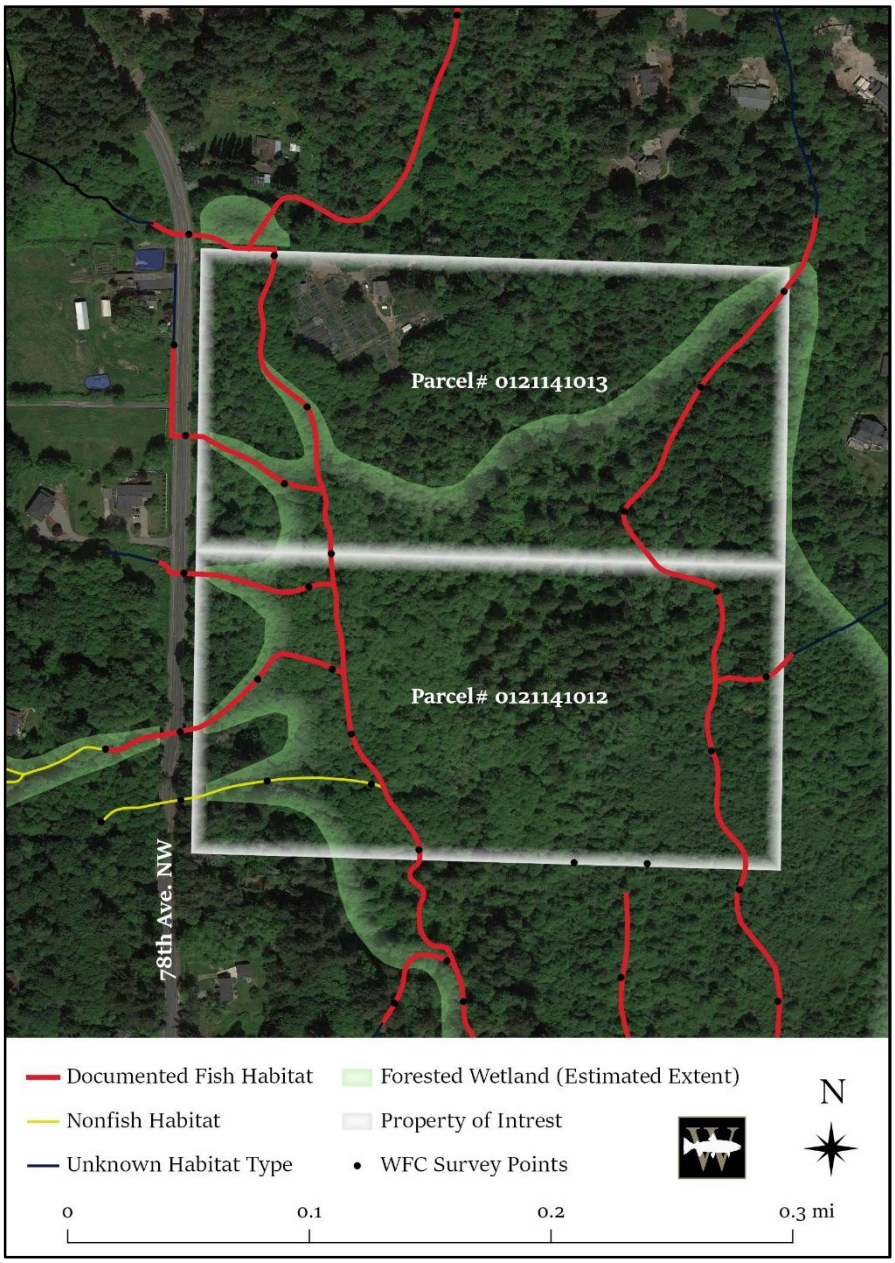

Figure E2. Map of stream habitat, wetlands (extent estimated), and survey points within the parcels of interest.

Due to the high quality of stream habitat within the two 19.5 acre parcels, WFC strongly recommends working with the landowner to further conserve the undeveloped portions of these properties. This section of Artondale Creek and the adjacent wetlands not only provide excellent fish habitat, but also serve other important ecological functions such as surface water detention during periods of high flow, groundwater recharge, nutrient transformation, and provision of habitat critical to other wildlife such as amphibians, aquatic invertebrates, and numerous native bird and mammal species.

Figure E3. Artondale Creek meandering down the wetland corridor on the property of interest.

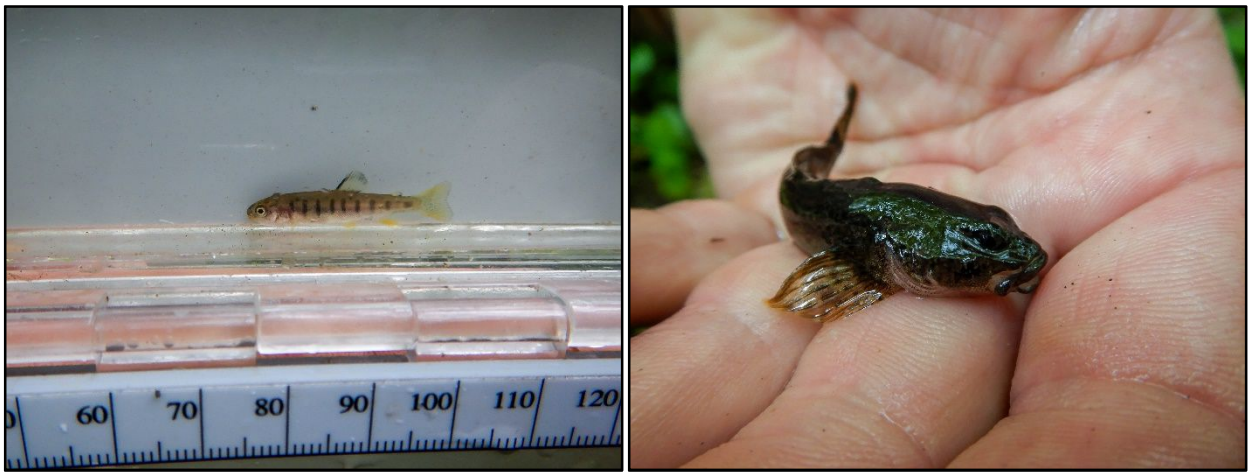

Figure E3. 38mm juvenile trout (left), and sculpin (right) netted on the parcels of interest.

References

WDFW [Internet].Olympia (WA).Washington Department of Fish and Wildlife, SalmonScape. [cited 2020 April]. Available from: http://apps.wdfw.wa.gov/salmonscape/

WDFW [Internet].Olympia (WA).Washington Department of Fish and Wildlife, Fish Passage Inventory. [cited 2020 April]. Available from: https://wdfw.wa.gov/species-habitats/habitat-recovery/fish-passage/assessment