

Gig Harbor Peninsula Fish Passage Assessment

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Prepared by:

Wild Fish Conservancy



Wild Fish Conservancy
NORTH WEST

Prepared for:

Lu Winsor Environmental Fund / Greater Gig Harbor Foundation

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Introduction

The streams of the Gig Harbor Peninsula flow through areas of dense human development and are heavily bisected by roads and driveways. Road crossings frequently act as barriers to fish migration, fragmenting watersheds and preventing fish from accessing the full extent of available habitat (Gibson et al., 2005). In addition to blocking fish passage, undersized culverts can disrupt the natural transport of sediment and large woody debris, leading to degraded stream channels downstream (Furniss et al., 1998). The Washington Department of Fish and Wildlife (WDFW) manages the statewide inventory of in-stream structures and their fish passage barrier status. These in-stream structures include culverts, dams, bridges, and fishways. WDFW's data are shared in a Geographic Information System (GIS) as the Fish Passage and Diversion Screening Inventory (FPDSI) point file. The FPDSI dataset represents the most comprehensive GIS inventory of in-stream structure locations and their fish passage status in Washington State. However, despite its breadth, the FPDSI often overlooks the thousands of private road and driveway crossings that bisect smaller fish-bearing streams, including those found on the Gig Harbor Peninsula. The primary focus of this project is to identify the locations of privately owned in-stream structures bisecting fish streams within the Gig Harbor Peninsula, specifically defined as all watersheds south of and including Purdy Creek and Crescent Creek. The secondary focus of the project is to assign each privately owned instream structure an inventory status, highlighting which features are in need of future field inventories.

Methods

Wild Fish Conservancy (WFC) constructed a GIS for the Gig Harbor Peninsula to support the identification of privately owned in-stream structures. The GIS included several key data layers: the FPDSI provided by WDFW; water typing data provided by both the Washington Department of Natural Resources (DNR) and WFC; road and right-of-way data from Pierce and Kitsap counties; light detection and ranging (LiDAR) data provided by the Washington Department of Natural Resources (DNR); and high-resolution aerial imagery provided by Pierce and Kitsap County.

The FPDSI dataset was clipped to the boundaries of the project area (Figure 1), and all documented in-stream structures categorized as “private” in the attribute table were exported to a project point file. Because previously completed culvert assessments have a shelf life of approximately ten years (WDFW, pers com.), private crossings were further classified by survey recency into two bins: those surveyed within 10 years and those older than 10 years, using January 1, 2016, as the cutoff date.

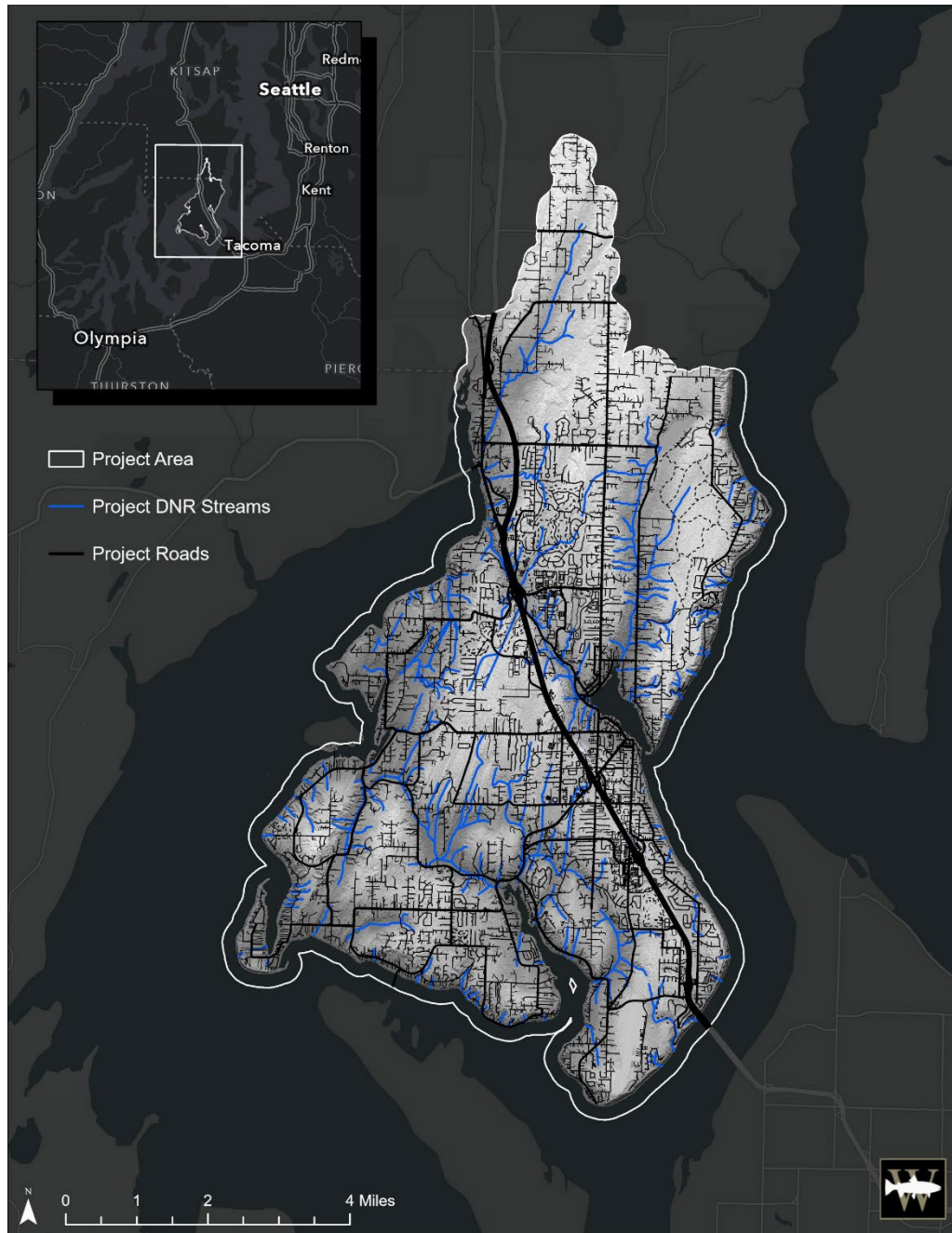


Figure 1. Project area

The WFC water typing dataset was then reviewed to identify all in-stream structures documented during WFC's 2017–2019 field seasons. These structures were compared against the FPDSI dataset, and any in-stream structures that were absent from the FPDSI but identified by WFC on DNR or WFC Type F (fish-bearing) waters that were added to the project point file. A final comprehensive visual review of LiDAR data and aerial imagery was conducted to identify any additional in-stream structures located on Type F waters that were not captured by either the FPDSI or the WFC water typing datasets (Figure 2). These additional points were added to the project dataset.

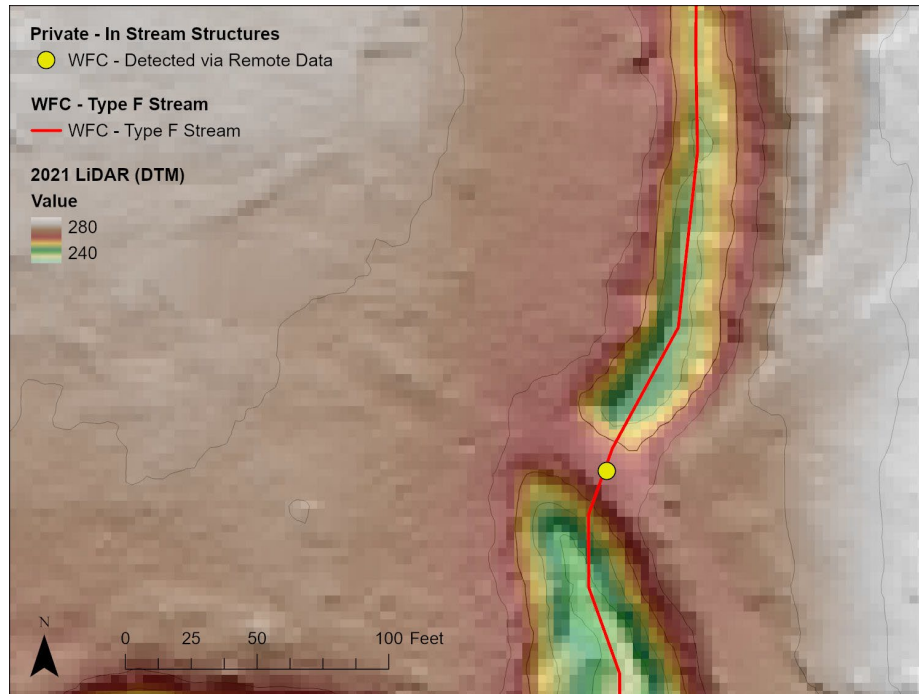


Figure 2. Example of a private road crossing identified using Pierce County 2021 LiDAR

With all potential fish passage barriers identified in the project area, attributes including unique Site IDs; Latitude and Longitude, Stream Names, ‘Tributary To’ Names, WRIA Number, County Name, Incorporated City Name, and HUC12 Names, were assigned to the instream structures that were added from the WFC water typing inventories and the review of LiDAR and aerial imagery.

Results

Within the project area, the FPDSI database identified a total of 277 in-stream structures intersecting type F (fish-bearing) waters. Of these, 91 structures were associated with private ownership and 137 were on either state, city, or county roads. The 91 crossing have FPDSI inventory dates ranging from June of 2000 to February of 2024, with 59 structures having survey dates older than 10 years. A review of the WFC water typing data identified an additional 51 privately owned in-stream structures within the project area that were not present in the FPDSI dataset and lack a formal WDFW fish passage assessment. Further review of LiDAR data and high-resolution aerial imagery identified an additional 99 potential in-stream structures on private property, none of which have been assessed. Altogether, this analysis resulted in the identification of 150 known and suspected privately owned in-stream structures intersecting type F waters that have never received a protocol-level survey or been assigned a formal barrier status (Figure 3).

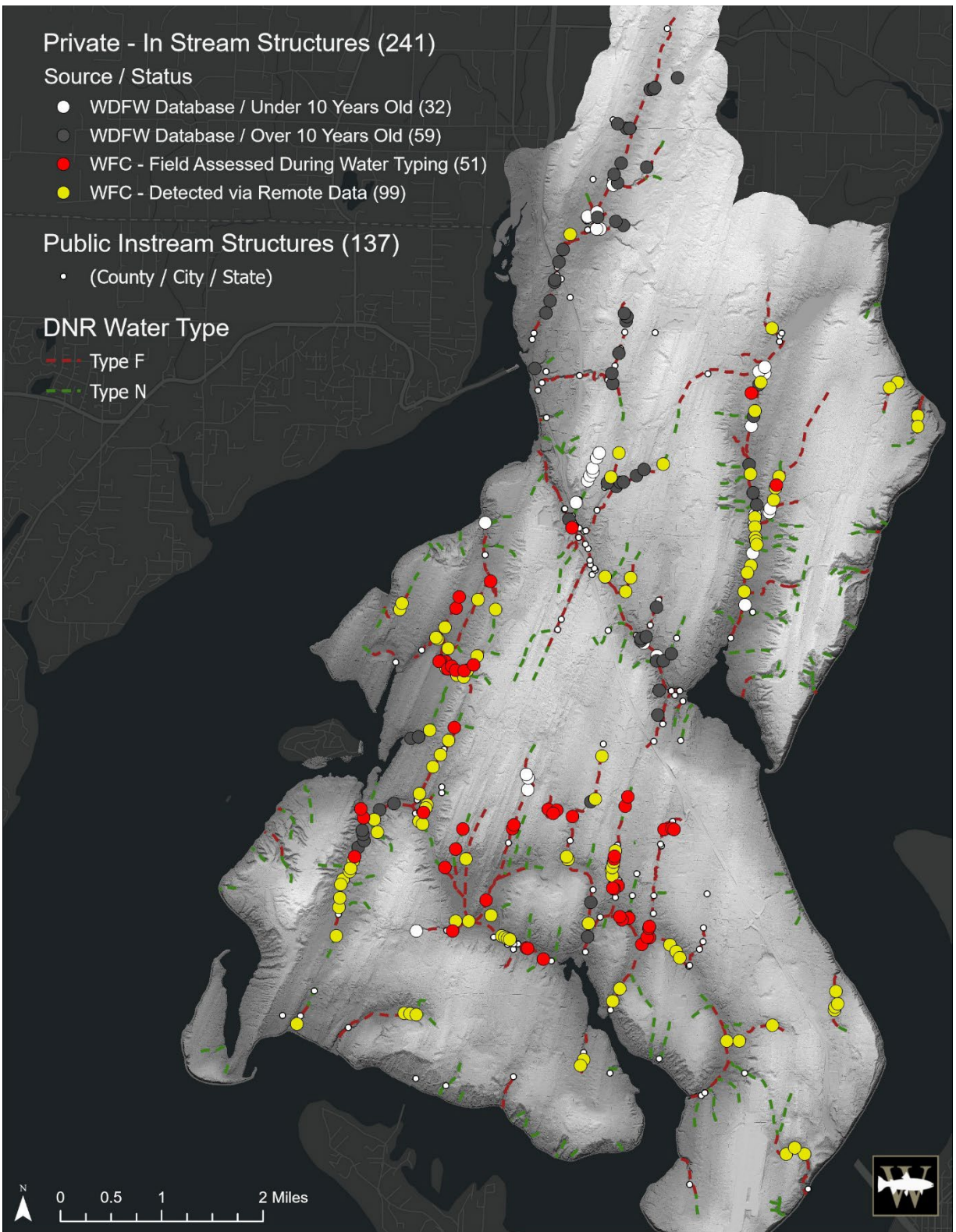


Figure 3. Instream structures identified in the Gig Harbor Peninsula project area.

Discussion

Fish passage restoration represents one of the most cost-effective approaches to restoring the health of watersheds and the fish populations they support (Kemp & O’Hanley, 2010). This project highlights significant gaps in the current statewide inventory of in-stream structures within the Gig Harbor Peninsula. Although the FPDSI database provides a strong foundation, the discovery of 150 additional privately owned in-stream structures intersecting type F waters demonstrates that a large portion of potential fish passage barriers remain undocumented. Many of these crossings likely present partial or full barriers to fish migration, particularly where undersized culverts are present. Without a complete inventory, restoration efforts risk overlooking key bottlenecks in watershed connectivity.

Even in landscapes where fish passage data inventories have been completed, these results emphasize the importance of conducting on-the-ground water type assessments to accurately map watersheds, and a thorough GIS analysis of existing remote data, to more-fully understand the magnitude and extent of fish passage restoration needs.

The results demonstrate the need for comprehensive, up-to-date surveying of privately owned crossings. In addition to the 150 newly identified structures, the 59 private crossings included in the FPDSI with surveys older than 10 years also represent a data gap. Streams are dynamic environments; changes in infrastructure condition, stream morphology, or sediment accumulation over time may have altered the fish passage status of these structures (Anderson et al., 2018). Re-inventorying these older sites is essential to ensure that barrier assessments accurately reflect current conditions.

To support salmon recovery and watershed health efforts, WFC recommends that future work prioritize field assessments of the 150 undocumented structures as well as the 59 private crossings with outdated surveys. Assessments should be performed using WDFW’s Fish Passage Inventory, Assessment, and Prioritization Manual (2019). Updating the FPDSI database with this information will improve local and statewide efforts to prioritize and restore fish passage restoration to help recover wild fish populations.

References

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