FINAL

CITY OF BELLINGHAM FISH BARRIER CULVERT REMEDIATION

Implementation Plan

Prepared for:
Nooksack Indian Tribe
City of Bellingham
Lummi Nation
Washington Department of Fish and Wildlife

October 2025

ESA

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Washington Department of Fish and Wildlife

[Additional info, if needed]

October 2025

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CHAPTER 1 INTRODUCTION

Representatives of the City of Bellingham (City) and fisheries co-managers, i.e., Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife (WDFW) (MOA signatories) signed a voluntary Memorandum of Agreement (MOA) in 2022 to work together "*to prioritize and create a schedule for remediating* ***culverts*** *owned by the City of Bellingham that block or that partially block anadromous and resident fish passage.*" This Implementation Plan is in partial fulfillment of the MOA, as described in detail herein. For the purposes of this Implementation Plan, the term "culvert" is defined consistent with the MOA to mean "any structure, including dams, weirs, tidegates and floodgates, other than a full-span bridge, that is constructed to convey water beneath a roadway, footpath or railway, and shall also include associated fishways."

The MOA (**Appendix A**) outlines the shared roles and responsibilities of the parties, including supporting the technical work involved, expanded coordination, jointly securing funding, and supporting obtaining necessary regulatory permissions for remediation construction. Reflecting this voluntary agreement, the City has and continues to be committed to being a responsible steward of natural resources and watersheds located in the city. Prior to signing the MOA, the City inventoried, prioritized, and remediated culverts within the city and will continue to take measures to work with the other MOA signatories to improve fish habitat in city streams by removing fish passage barriers and improving instream conditions to address historical impacts to Treaty fisheries resources.

To advance the goals of the MOA, the Nooksack Tribe sought funding from the National Oceanic and Atmospheric Administration's Fisheries Service (NOAA- NMFS), under their Restoring Tribal Fish Passage Through Barrier Removal grant program. In partnership with the other MOA signatories, the Nooksack Tribe contracted Environmental Science Associates (ESA) to support fulfillment of key objectives identified in the MOA:

- update and complete the inventory for city-owned culverts that may block fish passage
- prioritize remediation actions using a habitat-based goal, and
- determine a schedule (implementation plan) for remediation actions.

This Implementation Plan describes the current inventory and prioritization work and documents how MOA signatories will complete the fish passage remediation work. The following sections include a summary of inventory results, a summary of the prioritization results, the values guiding the work, an implementation strategy, coordination, adaptive management guidelines, and potential grant funding sources.

1.1 Purpose and Background

The City of Bellingham lies within the traditional homelands of the Lummi and Nooksack people. Both have a shared history of use of the land and waters in the Nooksack River watershed and the areas around Bellingham Bay. The City includes four major tributaries to Bellingham Bay: Squalicum (Nuxwkw'ol7exwem), Whatcom (Xwotqwem), Padden (Xwsisel7echem) and Chuckanut (Chukwenet) creeks. Together, these watersheds cover the majority of the city's land and growth area and provide habitat for several Pacific salmonid species, including steelhead, coho salmon, chum salmon, chinook salmon, pink salmon, sea-run cutthroat trout, and bull trout. Both steelhead and chinook are listed as

"Threatened" under the Endangered Species Act and are a critical food source for Southern Resident Killer Whales. The Whatcom Creek watershed is home to three fish hatcheries that release a variety of trout and salmon species.

The City of Bellingham has been a leader in assessing and restoring habitat in the Bellingham Bay nearshore and addressing salmon habitat limitations in the watersheds within the city. For more than 25 years, the City has implemented a combination of fish passage, estuarine and freshwater habitat projects to improve salmon habitat and water quality improvement projects. While grants provide the majority funding for these improvement projects, the City currently provides foundational funding through the City's Storm and Surface Water Utility Fund. These utility funds support permanent staff positions, long-term maintenance, and grant match. In 2003 the City of Bellingham formally began a fish passage improvement program. This program helps meet the goals and policies of the Bellingham City Council's Strategic Commitments, the Bellingham Comprehensive Plan and the goals and objectives of the City of Bellingham Surface and Stormwater Comprehensive Plan. As part of the program, the City inventoried known culverts and identified high priority barrier improvement projects for planning and implementation. This Implementation Plan serves as the most recent update to the City's fish passage program and is the first done in formal partnership with MOA signatories.

The Fish Barrier Culvert Remediation Project MOA is a voluntary agreement that attempts to integrate tribal treaty rights, as agreed to in the 1855 Treaty of Point Elliot, and the State of Washington's salmon co-management goals into the City's on-going fish barrier remediation program. These goals are explicitly incorporated into the *Fish Passage Barriers Prioritization: City of Bellingham Culvert Inventory, Prioritization and Implementation Plan Development* (ESA 2024). As described in the prioritization report, all salmon and steelhead stocks are essential to the Nooksack Tribe and Lummi Nation's ability to exercise their treaty rights and maintain their livelihood and culture. To both tribes, recovery of salmon requires a harvestable surplus of salmon that can provide a "moderate living", as described in the Boldt Decision, through commercial fishing and also provide enough salmon for ceremonial purposes. The fish barrier culvert remediation MOA between the City of Bellingham and the local fisheries co-managers is a unique, cooperative agreement between a local government, the state and two native tribes. This collaboration will develop and implement management actions based on sound conservation biology principles to integrate planning, regulation, action implementation, funding and monitoring.

1.2 Overview of the City's Watersheds

The City of Bellingham contains eight watersheds and their associated streams. The majority of these independently drain into the marine waters of Bellingham and Chuckanut Bays: Whatcom Creek, Squalicum Creek, Padden Creek, Chuckanut Creek, and Little Squalicum Creek (**Figure 1**). Tributaries in the Silver Creek Watershed drain westward and join the Nooksack River at its estuary. Combined, these watersheds drain 129 square miles in Water Resources Inventory Area (WRIA) 1 south of the mainstem Nooksack River. Four of these watersheds comprise much of the city area, Squalicum Creek, Whatcom Creek, Padden Creek, and Chuckanut Creek, with their headwaters extending beyond city limits.

The watersheds around the city provide over 90 miles of naturally accessible habitat for 8 anadromous salmonids of which nearly 50 miles are within the City boundaries (NWIFC and WDFW 2024) (**Table 1**).

Another 44 miles of habitat accessible only to resident fish are contained in the watersheds with 23 of those miles within the City boundaries (NWIFC and WDFW 2024). As described in the WRIA 1 Salmonid Recovery Plan (WRIA 1 Salmon Recovery Board 2005), these salmon and steelhead stocks are essential ecologically, culturally, and economically.

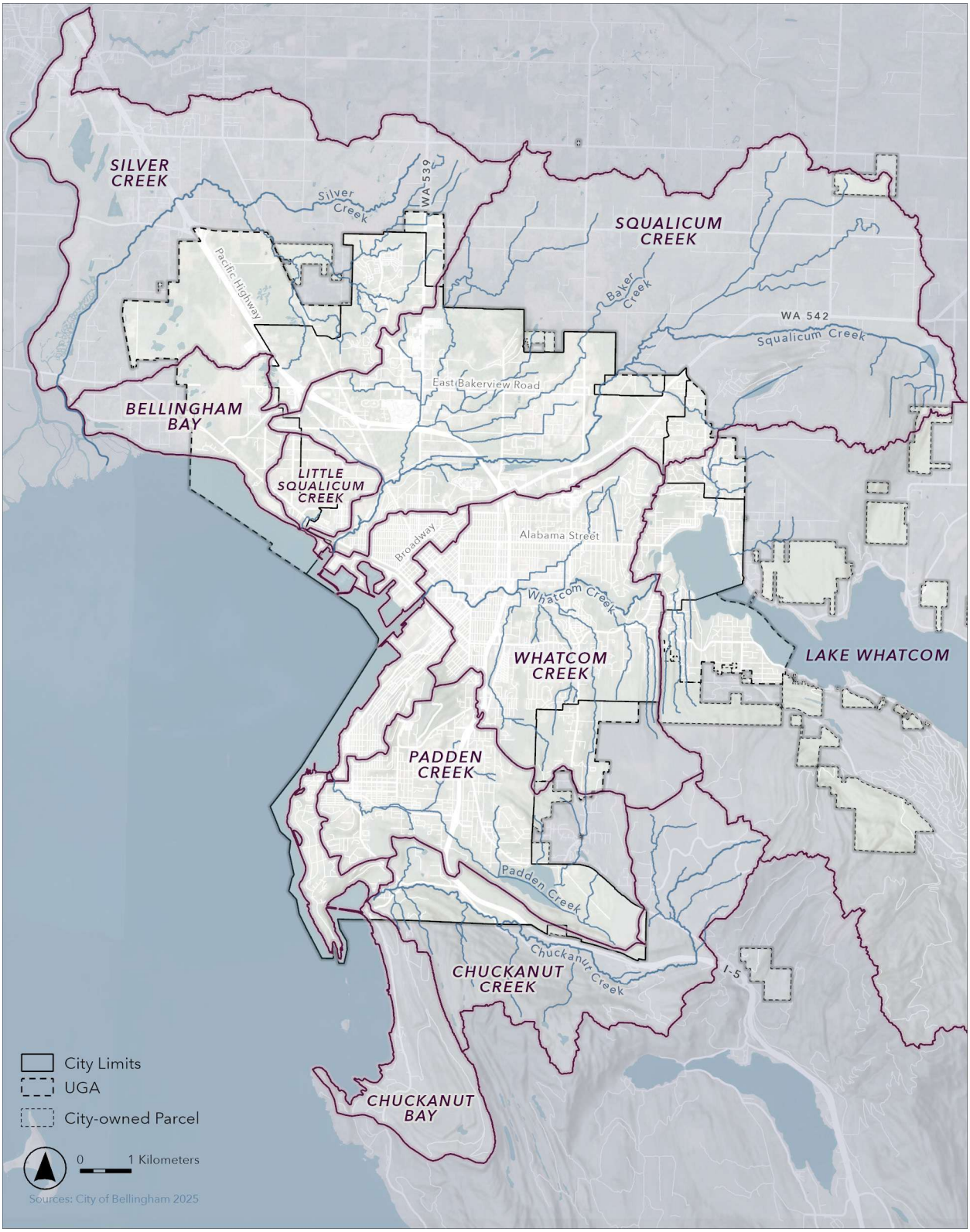

Figure 1
Map of City of Bellingham Watersheds

TABLE 1
ANADROMOUS ACCESSIBLE AND RESIDENT-ONLY ACCESSIBLE STREAM LENGTHS BY WATERSHED

Watershed	Anadromous Accessible		Resident-Only Accessible	
	Stream Length in Watershed (miles)	Stream Length in City Portion of Watershed (miles)	Stream Length in Watershed (miles)	Stream Length in City Portion of Watershed (miles)
Squalicum Creek	40.4	19.2	10.5	5.3
Whatcom Creek	10.0	10.0	11.7	11.2
Padden Creek	9.7	8.6	2.5	2.0
Chuckanut Creek	7.3	3.6	13.2	0.9
Silver Creek	22.7	9.8	0.6	0.2
Lake Whatcom tributaries	0.0	0.0	6.1	5.1
Little Squalicum Creek	0.4	0.4	0.0	0.0
Total	90.5	51.6	44.6	24.7

CHAPTER 2 FISH PASSAGE CULVERT INVENTORY

MOA signatories with support from ESA staff updated fish distribution information for the City and completed an updated inventory of all City-owned culverts that partially or fully block fish passage.

The City owns 174 culverts on fish-bearing streams. Most of the culverts are round culverts (pipes), but there are also square (box) culverts, bridges, weirs, and fishways. Among the culvert crossings, most include a single culvert to convey flow, however a subset includes multiple culverts to increase the capacity for conveying water during higher flow events. Crossings comprised of multiple culverts are evaluated collectively as one crossing for determining fish passability.

Of the 174 City-owned culverts, 126 partially or fully block fish passage according to the WDFW (2019) guidelines for assessing fish passage. Ninety of the City-owned culverts that partially or fully restrict fish access are in locations that are naturally accessible to anadromous salmonids. The remaining 36 are at locations only accessible by resident fish species. **Table 2** summarizes the fish passage assessment results for the City-owned culverts. A more detailed description of the methods and results are provided in *City of Bellingham Fish Passage Barrier Remediation: Fish Passage Prioritization* (ESA 2025) (**Appendix B**).

TABLE 2
SUMMARY OF FISH PASSAGE AT CITY-OWNED CULVERTS

Percent Passable According to WDFW (2019) Guidelines	Number of Sites
100% Passable (not a barrier)	48
67% Passable	32
33% Passable	35
Barriers of Unknown Passability	8
0% Passable (total barrier)	51
Total Number of City-owned Culverts	174
Total Number of City-owned Culverts that are not 100% Passable	126

CHAPTER 3 FISH PASSAGE CULVERT PRIORITIZATION

3.1 Guiding Values

To gain perspective and guidance on goals, priorities, and implementation, the MOA signatories conducted outreach to members of vested-interest communities (VIC). The vested-interest communities are those groups that may be directly impacted by the prioritization project or have interests in the project area. The VIC consisted of various department representatives, outreach experts, and elected officials from the Nooksack Indian Tribe, Lummi Nation, WDFW, and City of Bellingham. NOAA was also included as the funding partner. The purpose of the outreach to the VIC was to understand more of the cultural considerations of the tribes and agency interests and make sure that the prioritization process and implementation plan reflected the values of the affected communities. This engagement focused on sharing information, receiving guidance on what is important for them, and involving participants in review of the inventory and prioritization. Two meetings were conducted with the VIC during the development of the prioritization. The meetings were conducted during the early development of a prioritization approach and when near-final results were available to make sure that the approach reflected the information shared by the VIC. The VIC dialogue identified the following values regarding fish passage priorities:

- A priority is placed on populations that contribute to tribal fisheries
- All historically accessible habitat is important
- An emphasis is placed on restoring passage to the most productive and resilient habitats

Summaries of the VIC meetings are provided as **Appendix C**.

The *WRIA 1 Salmonid Recovery Plan* aims to recover self-sustaining salmonid runs to harvestable levels in fulfillment of treaty-reserved rights to fishing by tribal communities, as well as preservation of recreational and commercial fishing (WRIA 1 Salmon Recovery Board 2005). An update of the 2005 *Plan* is in progress, and habitat goals have been identified. A specific goal is for unimpeded access to allow full upstream and downstream passage of juveniles and adults. Meeting the fish passage goal of the *Plan* will require multiple partners coordinating on fish passage restoration across jurisdictions in the WRIA.

3.2 Fish Passage Prioritization of City-owned Culverts

The City of Bellingham has implemented a fish passage program to address City-owned fish barriers for more than 20 years. The City first developed a local prioritization of City-owned fish passage barriers in 2010 (Anchor QEA LLC 2010). The City then updated the prioritization in 2019 and 2022. As a part of the MOA, the signatories agreed to build on the existing prioritization approach and update it to reflect recent best available science and the group's shared goals and values. The prioritization method was developed and revised through an iterative process working with MOA signatories and reflects the goals and values shared by city, state and tribal participants during the VIC workshops.

The prioritization methods and results are presented in *Fish Passage Barriers Prioritization: City of Bellingham Culvert Inventory, Prioritization and Implementation Plan Development* (ESA 2024), provided as **Appendix B**. Each of the 126 City-owned culverts that restrict fish passage were evaluated using the prioritization framework and given a value that reflects the benefit of restoring passage at the site. To account for the emphasis on salmon recovery and tribal fisheries, the 90 anadromous accessible sites were ranked separately from the 36 sites only accessible by resident fish. The highest ranked sites were in the Squalicum, Whatcom, and Padden Creek watersheds. **Appendix B** includes figures and a table with the full prioritization list.

CHAPTER 4 IMPLEMENTATION STRATEGY

Remediating fish passage barriers will occur over multiple years through the joint participation of the MOA signatories. The prioritization which is based on benefits to salmonids will guide the implementation of this work with the expectation that adaptive management during implementation will occur to maximize the success of the work (see Updates to Barrier Status and Adaptive Management, below). The City expects that it will restore fish passage at culverts, regardless of priority, during other capital construction projects if a culvert needs to be substantially repaired or upgraded or when the structure reaches the end of its useful life. WDFW has the authority to permit maintenance and repair activities on structures and will establish timelines for replacement, if needed, as part of their Hydraulic Code authority.

Fish passage implementation is anticipated to be funded by a combination of funding per the MOA, with the majority of funding anticipated from federal and state funds. Grant funding availability is unreliable. Based on recent history and projecting forward, it is expected that the availability of grant funding will be cyclical over the years. Three measures of progress have been established to guide implementation: Goals, Milestones, and Projections. The measures guide the overall program, help identify near-term focus actions and define longer-term desired outcomes.

4.1 Goals, Milestones, and Projections

4.1.1 Program Goal

The Program Goal is to restore access to 100% of the length of anadromous and resident fish habitat blocked or partially blocked by City-owned culverts. Total length of fish habitat to achieve 100% is calculated as the total length of stream habitat above the furthest downstream City-owned barrier to the upstream extent of potentially accessible fish habitat, regardless of regulatory jurisdiction, as defined in the prioritization (**Appendix B**).

Progress toward achieving the Program Goal will be presented in the 6-year Milestones and longer term (30- and 60-year) Projections to reflect the schedule described in the MOA, as described below. Consistent with the MOA, the City, Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife commit to working together to invest significant effort to obtain necessary regulatory permissions and obtain necessary funding to restore fish passage at City-owned culverts.

4.1.1.1 Milestones

Milestones describe the near-term work that MOA signatories will focus on in the coming 6 years. Milestones are intended to be realistically achievable based on available resources, including anticipated funding levels. It is acknowledged by all MOA signatories that the portion of the work that is dependent on funding external to City sources, e.g., grant funding, is uncertain and contingent on the City receiving external funding. This 6-year timeframe advantageously aligns with the City's planning cycle for transportation improvements. The City of Bellingham will update the 6-year Milestones annually to incorporate adjustments to costs, timelines, and other factors. Milestones will include the status and upcoming actions of active projects in the 6-year period and the habitat gain anticipated to be

accomplished in the period. Habitat gain will be calculated as the length of potential fish accessible habitat upstream of the subject culvert to the next City-owned barrier or to the extent of potentially accessible fish habitat, whichever is smaller.

The first milestones are included in **Appendix E** and extend through 2030.

4.1.2 Projections

Projections describe the longer-term estimate of progress desired towards the Program Goal of restoring access to 100% of the length of anadromous and resident fish habitat blocked or partially blocked by City-owned culverts. Reflective of all MOA signatories' urgency for restoring fish passage, projections include work that will require funding from the City and external sources. Given the uncertainty of receiving external funding through federal and state grants, MOA signatories do not have full control over being able to meet these projections. The City of Bellingham will report Projections annually as part of the annual Milestone updates.

Following are the projection timeframes and guidelines for restoring fish passage at City-owned culverts:

- In the first 30 years of implementation, i.e., by the year 2054, attempt to complete construction and design work toward restoring access to 25% of anadromous fish habitat.
    - The emphasis will be on advancing as many projects through to construction as possible.
    - The emphasis will be on higher priority sites, subject to constraints such as landowner willingness, logistical readiness, and available resources.
    - The expectation is that if this amount is met within 30 years, the effort to obtain more external funding will continue with the same urgency.
- In the first 60 years of implementation, i.e., by the year 2084, attempt to complete construction and design work toward restoring access to 50% of anadromous fish habitat.

Sites included in the 2025 thirty and sixty-year projections are presented in **Appendix E**.

4.2 Feasibility Assessment

The City of Bellingham conducted a feasibility assessment of the highest priority City-owned fish passage barriers to preliminarily identify constraints or considerations that may affect the schedule for restoring fish passage. The results can reveal potential adjustments to site tiering assignments, inform Milestone actions, and determine how the sites fit in the longer-term Projection. The City completed the assessment for the 60 highest priority sites from the *Fish Passage Barriers Prioritization: City of Bellingham Culvert Inventory, Prioritization and Implementation Plan Development* (ESA 2024) using eight factors:

- Contamination and structural considerations
- type and quantity of remediation actions

- cost estimate
- dependence on other landowners
- affected utilities
- cultural or historic resources
- staff capacity
- funding availability

Feasibility assessment results are included in **Appendix E**.

4.3 Mitigation Approach (If Needed)

The decision about when mitigation is appropriate in lieu of full fish passage remediation will be made through agreement of all MOA signatories. Any mitigation decision by MOA signatories will also be subject to the decisions and conditions of all regulatory authorities issuing permits or approvals for the work.

If the City seeks MOA signatory approval to not fully restore fish passage at a site, the City will seek concurrence from the MOA signatories as part of the Program-level coordination process described below. A proposed mitigation approach for the site will be identified as early in the planning or design process as feasible to allow for adequate MOA signatory review.

MOA signatory review of proposals for mitigation are expected to entail three main questions:

- is there a justifiable need to not fully restore fish passage at this time?
- what is the biological cost of not restoring passage at the site?
- does the proposed mitigation sufficiently offset the impacts caused by maintaining the passage barrier?

An example of a fish passage barrier site with extraordinary complexities that affected the decision to restore full fish passage was the City's Valencia Street Watermain Replacement Project (City Project Number EW238) constructed in 2023. The project included replacing multiple utility lines including the City's stormwater culvert conveying Fever Creek under Valencia Street for approximately 1,800 feet through a fully developed urban industrial complex. In this case, the City addressed a structure need by replacing the culvert in place with improvements for fish passage and off-site mitigation to sufficiently offset the impacts of continued restricted access for salmon to the creek, but without fully restoring access. This occurred before the MOA but included the City working with other MOA signatories to agree on appropriate mitigation measures. The other MOA signatories agreed not to oppose the City's permit applications for partial fish passage improvements and associated habitat mitigation.

If mitigation at a site is proposed, the City will be responsible for providing the information needed by MOA signatories to make an informed decision. For the Fever Creek at Valencia Street example described above, the City developed a framework for comparing the impacts (debits) of not restoring fish passage and benefits (credits) of the mitigation (ESA 2022). The MOA signatories used this framework to evaluate whether the proposed mitigation satisfactorily offset the impacts of not restoring full passage in Fever Creek at the Valencia Street barrier.

CHAPTER 5 IMPLEMENTATION COORDINATION

Four levels of coordination will be conducted during implementation of the City's fish passage remediation program as outlined in **Table 3** and described in detail, below.

TABLE 3
IMPLEMENTATION COORDINATION

Coordination Level	Purpose	Frequency	Lead
Program Coordination	MOA signatory involvement in decisions and updates regarding implementation of the City of Bellingham Fish Passage Barriers Remediation Implementation Plan	Year 1 – quarterly All other years - annually	City of Bellingham
Project Coordination	MOA signatory technical staff involvement in the design and construction of individual fish passage project sites	Project dependent - project scoping; 30%, 60%, 90% design; substantial completion	City of Bellingham
Watershed Coordination	Communication with other entities working on fish passage remediation to reduce the occurrence of "stranded" projects and reconnect fish access to larger portions of watersheds	Included in WRIA 1 Salmon Staff Team Meetings- revised as needed Annual WRIA 1 Culvert Committee Meeting, revised as needed	WRIA 1 Lead Entity and City of Bellingham
Community Coordination	Community awareness of efforts to remediate City-owned fish passage barriers	As needed	City of Bellingham

Successful coordination will require decisions making by the appropriate people within each participating organization. It will be the responsibility of all MOA signatories to ensure that representatives working at the different levels of the implementation plan are authorized to represent and make decisions on behalf of their organization.

5.1 Program-level Coordination

The City will be responsible for maintaining Program Coordination among MOA signatories for this Implementation Plan. In the first year of plan implementation, it is expected that there will be quarterly Program Coordination meetings. As implementation progress proceeds, the Program Coordination meetings may occur less frequently (e.g., annually) depending on the preferences of MOA signatories and staff capacity.

On at least an annual basis, the City will provide an update on the:

- 6-year Milestones
- Projections

The updates will identify work completed since the last meeting and work planned for the upcoming year. Program Coordination meetings will provide opportunities for MOA signatories to identify additional program topics requiring discussion. The meetings will also provide the opportunity to propose any changes to the Implementation Plan. See Updates to Barrier Status and Adaptive Management, below, for the process of updating the Implementation Plan.

Milestones may be updated more frequently, as needed, to maintain certainty for the 6-year period. These Milestone and Projection updates will not require a revision to the broader Implementation Plan.

During the annual meeting, the MOA signatories will discuss the 6-year Milestones that track active projects and an anticipated funding approach with target grant funding programs identified to the extent possible at the time of the update. Information will be included on the roles and responsibilities of MOA signatories in the completion of each upcoming remediation action.

5.2 Project-level Coordination

The City will be responsible for maintaining Project Coordination among MOA signatories for individual fish passage remediation projects. Project Coordination will focus on encouraging MOA signatory involvement in the design and construction of individual fish passage project sites. This coordination may be accomplished by integrating MOA signatories into the standard project review process (baseline conditions, 30% design, 60% design, 90% design, and substantial completion, as relevant).

Beyond any regulatory or funding roles, Tribal and State signatory roles in projects include:

- participate as reviewers in the development of individual fish passage projects from the planning and early design stage, to the best of their abilities. MOA signatories will provide timely feedback on design at key design phases.
- participate in scoping field visits to establish baseline conditions and expectations, such as identifying reference reaches or channel width concurrence.
- participate in facilitating necessary regulatory permissions.
- offer support as available for securing and administering funding.

Program Coordination is intended to facilitate a shared understanding of projects and provide an opportunity to incorporate feedback into the design process before the permit-review period and is not intended to unnecessarily delay project implementation or create additional regulatory requirements. While MOA signatories will be invited to participate, their participation or response is not required for the City to advance the project.

5.3 Watershed Coordination

The Watershed Coordination will focus on communicating the status of City efforts with the goal of reducing the occurrence of "stranded" investments (i.e. projects where the benefit is diminished by adjacent non-City barriers) and promote shared investments to reconnect fish access to larger portions of watersheds than just those areas impacted by City-owned water crossings. The watershed coordination

effort will inform the City's Milestones and Projections and may identify new project opportunities. Updates on the City's progress on fish passage restoration will be communicated to the WRIA 1 Salmon Recovery Staff Team and other entities, as needed.

5.4 Community Coordination

Community coordination will entail updating City webpages and continuing project-specific public outreach to facilitate community members awareness of efforts to remediate City-owned fish passage barriers. Communication will acknowledge MOA signatory participation, where relevant.

5.5 Updates to Barrier Status and Adaptive Management

Implementation of fish passage remediation will occur over multiple decades per the Projections described above. Changes to the Program Goal, Milestones and Projections approach, Prioritization approach or Program Coordination may require updating the Implementation Plan.

As part of the Implementation Plan update, the fish passage barrier inventory may be updated using the latest WDFW fish passage barrier assessment guidance (currently WDFW 2019). The State (WDFW) periodically reassesses stream crossings to ensure that they meet the current guidance for fish passage. In addition, the City occasionally assesses stream crossings during project planning and design. Any changes to the barrier status of a site will be brought to the MOA signatories at the Program Coordination Meeting and updated in the FPDSI after concurrence. During an Implementation Plan update, any newly identified barriers will be prioritized according to the benefit level of the site and documented in the annual barrier tiering table and schedule.

The Implementation Plan may need to be updated if the underlying Prioritization approach needs to be revised. While the Program Goal is based on linear gain, the prioritization incorporates other attributes that reflect the habitat quality and expected productivity of the streams and guides the selection of sites in the Milestones and Projections.

If the MOA signatories agree that an update is needed to the Implementation Plan, then the City will initiate the update. Updates may be done in coordination with the update to the City of Bellingham's Surface and Stormwater Comprehensive Plan. Updates to the Plan will also track decisions made by MOA signatories related to adaptively managing the program since the last Plan update.

CHAPTER 6 GRANT FUNDING OPPORTUNITIES

The City currently provides foundational funding for culvert remediation through the City's Storm and Surface Water Utility Fund. These utility funds support permanent staff positions, long-term maintenance, and grant match. In addition to City-provided funding, remediation of fish passage barriers will also require substantial external funding, likely in the form of grants. Grant funding programs are competitive and therefore present uncertainty to the implementation schedule for any project site. The MOA establishes a shared commitment by all signatories to actively support the City in efforts to obtain necessary funding. Many of the Tier 1 sites will entail costs that exceed the funding amount that can be awarded by a single funding source. For this reason, and to improve likelihood of success, it is expected multiple grant programs will be applied to piece together a funding package to fully implement restoration at each site. **Table 4** identifies available funding programs with a focus or direct link to fish passage restoration.

TABLE 4
FISH PASSAGE GRANT FUNDING PROGRAMS

Program – Agency	Match Requirements	Duration of Funding Award
Brian Abbott Fish Barrier Removal Board (FBRB) – WDFW	Planning grants >$200K require 15%; restoration/ construction require 15% of grant total	2 years +
National Culvert Removal, Replacement and Restoration Grants, Culvert Aquatic Organism Passage (AOP) Program – USDOT	At least 20%	Not specified. May not be available after 2027
National Fish Passage Program – USFWS	1:1 desired, but not required	2 years
Salmon Recovery Funding Board (SRFB) – WA RCO	Match requirement may change in upcoming grant rounds; previously 15% match required, except for design projects less than $200K	3 years
Puget Sound Acquisition and Restoration Fund (PSAR) – large capital projects – WA RCO	(new policies being developed for the next biennium)	
Estuary and Salmon Restoration Program (ESRP)	Match requirement may change in next biennium; previously 30% for regular ESRP; 10% for enhanced requests	2 years, but the program has a pipeline approach to funding phases of a project
Coastal Habitat Restoration and Resilience Grants for Underserved Communities	None	3 years

CHAPTER 7 REFERENCES

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Appendix A
Fish Barrier Culvert Remediation Project
Memorandum of Agreement

FISH BARRIER CULVERT REMEDIATION PROJECT
MEMORANDUM OF AGREEMENT

Between
Lummi Natural Resources Department, Nooksack Indian Tribe Natural Resources Department,
City of Bellingham, and the Washington Department of Fish and Wildlife

PREAMBLE:

The City of Bellingham has the legal right and legal obligation to design, to construct, and to maintain a road network, including culverts and other passageways over streams, for its residents. The Nooksack Indian Tribe and the Lummi Nation assert that they have federal reserved water rights in the Nooksack River basin, including the right to instream flows for fisheries purposes. This Memorandum of Agreement is intended solely to address remediation of fish passage that may be blocked or partially blocked by culverts owned by the City of Bellingham.

PURPOSE:

The purpose of this Memorandum of Agreement is to prioritize and create a schedule forremediating culverts owned by the City of Bellingham that block or that partially block anadromous and resident fish passage.

PARTIES TO THE AGREEMENT:

The parties to this agreement are the Lummi Natural Resources Department, the City of Bellingham, the Nooksack Tribe Natural Resources Department, and the Washington Department of Fish and Wildlife.

OBJECTIVES:

The objectives of this Memorandum of Agreement are:

1. To use best available information to compile an inventory of those culverts owned by the City of Bellingham that may block fish passage, pursuant to the Washington State Department of Fish and Wildlife's database, as updated from time to time. For the purposes of this Memorandum of Agreement, the term, " culvert," is used to mean any structure, including dams, weirs, tidegates and floodgates, other than a full-span bridge, that is constructed to convey water beneath a roadway, footpath or railway, and shall also include associated fishways;

2. To develop the priority of remediation efforts in the case of those culverts as defined above that block or partially block fish passage using a habitat-based goal;

3. To determine a schedule for those remediation efforts. The parties to this Memorandum of Agreement recognize that the schedule may be impacted by available resources; and

4. The foregoing objectives are not intended to and do not create any legal rights or liabilities for or against any party to this Memorandum of Agreement.

ROLES AND RESPONSIBILITIES:

The parties to this Memorandum of Agreement commit, to the best of their abilities, to:

1. Provide support as needed to compile an inventory of culverts owned by the City of Bellingham and to share all relevant information of that inventory with the parties to this Memorandum of Agreement in a timely manner.

2. Provide support as needed to develop a priority list for remediation efforts at e culverts identified through this Memorandum of Agreement

3. Provide support as needed to evaluate possible remediation designs and associated costs.

4. Confer and agree on a proposed schedule for remediation efforts.

5. Provide support as needed and as available to obtain necessary regulatory permissions for any remediation efforts agreed upon by the parties to this Memorandum of Agreement.

6. Provide support as needed and as available to obtain necessary funding for remediation efforts as agreed upon by the parties to this Memorandum of Agreement.

It is the intent of the parties to secure funding for remediation efforts jointly and severally and upon doing so one of the parties may be selected as the financial lead for receipt and disbursement of funds.

Once the parties agree on an inventory of culverts as defined above owned by the City of Bellingham, the parties will enter into a separate agreement that will govern the substance and priority of remediation efforts.

DECISION MAKING:

1. Decisions shall be based on the best available information.
2. Decisions shall be made by consensus of all parties to this Memorandum of Agreement.

TERMINATION:

Any party to this Memorandum of Agreement may terminate its participation with 30 days written notice of intent to terminate to all other parties to this Memorandum of Agreement.

No amendment or alteration of this Memorandum of Agreement shall arise by implication, course of conduct, or change in state law, tribal or federal law. This Memorandum of Agreement may be altered only by a subsequent written agreement signed by all parties, expressly stating the parties' intention to amend this Memorandum of Agreement.

LIABILITIES/RIGHTS:

Nothing in this Memorandum of Agreement shall be interpreted in any manner to create any rights or liabilities for or against any party hereto. This Agreement is entered into by the parties in a good faith effort to work cooperatively to improve and to maintain fish passage through culverts owned by the City of Bellingham and is not entered into in order to create any legal rights or liabilities.

CITY OF BELLINGHAM

see attached

By:_____ _____

Authorized Representative **Date**

LUMMI NATION

By: _____ 4/7/22

Authorized Representative **Date**

NOOKSACK INDIAN TRIBE

By: _____ 10-5-22
Authorized Representative **Date**

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE

By: _____ 08/12/2022
Authorized Representative **Date**

EXECUTED, this the 10 day of June, 2022, for the **CITY OF BELLINGHAM**:

Approved as to Form:

Office of the City Attorney

Mayor

Attest:

Finance Director

Department Head

Appendix B
Fish Passage Barriers Prioritization

FINAL

CITY OF BELLINGHAM FISH PASSAGE CULVERT REMEDIATION

Fish Passage Prioritization

Prepared for
Nooksack Indian Tribe
City of Bellingham
Lummi Nation
Washington Department of Fish and Wildlife

September 2024, revised October 2025

FINAL

CITY OF BELLINGHAM FISH PASSAGE CULVERT REMEDIATION

Fish Passage Prioritization

Prepared for:
Nooksack Indian Tribe
City of Bellingham
Lummi Nation
Washington Department of Fish and Wildlife

September 2024, revised October 2025

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CITY OF BELLINGHAM FISH PASSAGE CULVERT REMEDIATION

Introduction

The City of Bellingham (City) is committed to being a responsible steward of natural resources and watersheds. The City has and will continue to take measures to improve fish habitat by removing City-owned fish passage barriers and improving instream conditions to restore salmon runs and address historic treaty rights violations. As part of this commitment, in 2003 the City of Bellingham formally began a fish passage improvement program and has maintained a list of high priority barrier improvement projects for planning and implementation. To expand these efforts, the City and fisheries co-managers, i.e., Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife (WDFW) signed a voluntary Memorandum of Agreement in 2022 to work together "*to prioritize and create a schedule for remediating culverts owned by the City of Bellingham that block or that partially block anadromous and resident fish passage.*" The Memorandum of Agreement (Appendix A) outlines the shared roles and responsibilities of the parties, including supporting the technical work involved, expanded coordination, jointly securing funding, and supporting obtaining necessary regulatory permissions for remediation construction.

The City, Nooksack Indian Tribe, Lummi Nation, and WDFW, herein referred to as Project Leads, hired Environmental Science Associates (ESA) to support their work on the assessment, prioritization, and implementation planning per the Memorandum of Agreement. This work is funded by a grant awarded to the Nooksack Indian Tribe from NOAA's Restoring Tribal Priority Fish Passage through Barrier Removal funding opportunity under the Bipartisan Infrastructure Law and Inflation Reduction Act.

Work commenced in January 2023. Project Leads created a database of all City-owned water crossings that partially or fully block fish passage. The database includes culverts assessed as part of this project to determine fish passability at crossings that had not previously been assessed, as well as previously assessed crossings which are included in WDFW's Fish Passage and Diversion Screening Inventory (FPDSI) database[1]. Fisheries co-managers also developed a higher resolution fish distribution layer based on field-verified hydrography provided by the City of Bellingham's Public Works Department. This data was used to evaluate species use (resident and anadromous) and upstream extent of habitat for each fish passage site.

This report describes the methods and results of a prioritization for remediation of all City-owned water crossings that partially or fully block fish passage. This prioritization is intended to build upon and replace earlier fish passage prioritizations prepared by the City including a 2022 version. The following sections include a summary of current fish passage conditions at City-owned crossings, the goals and values guiding the prioritization, methods, and results.

[1] Data for the crossings assessed in this project will be submitted to WDFW for inclusion in the FPDSI database so that the WDFW database will be complete for City-owned crossings.

Fish Passage Conditions at City-owned Crossings

The Project Leads conducted an update to the inventory of City-owned crossings from January 2023 through August 2024. The City owns 174 water crossings on fish-bearing streams. Most of the crossings are round culverts (pipes), but there are also square (box) culverts, bridges, weirs, gates, and fishways. Among the culvert crossings, most include a single culvert to convey flow, however a subset includes multiple culverts to increase the capacity for conveying water during higher flow events. Crossings comprised of multiple culverts are evaluated collectively as one crossing for determining fish passability.

Of the 174 City-owned water crossings, 126 partially or fully block fish passage according to the WDFW (2019) guidelines for assessing fish passage. **Table 1** summarizes the fish passage assessment results for the City-owned water crossings.

TABLE 1
SUMMARY OF FISH PASSAGE AT CITY-OWNED WATER CROSSINGS

Percent Passable According to WDFW (2019) Guidelines	Number of Sites
100% Passable (not a barrier)	48
67% Passable	32
33% Passable	35
Barriers of Unknown Passability	8
0% Passable (total barrier)	51
Total Number of City-owned Water Crossings	174
Total Number of City-owned Water Crossings that are not 100% Passable	126

Goals and Values Guiding the Prioritization

The Memorandum of Agreement was established "*to address remediation of fish passage that may be blocked or partially blocked by culverts owned by the City of Bellingham.*" The goal of this work is to remediate City-owned water crossings that currently prevent anadromous and/or resident salmonids (salmon and trout) access to the natural extent of their habitats.

To gain perspective and guidance on goals, priorities, and implementation, the Project Leads conducted outreach to vested interest communities. The vested interest communities are those groups that may be directly impacted by the prioritization project or have interests in the project area. The vested interest communities consisted of various department representatives, outreach experts, and elected officials from the Nooksack Indian Tribe, Lummi Nation, WDFW, City of Bellingham, and NOAA to understand more of the cultural considerations of the tribes and agency interests. Two meetings were conducted with the vested interest communities during the development of the prioritization. The meetings were conducted during the early development of a prioritization approach and when near-final results were available. This engagement with vested interest communities focused on sharing information, receiving guidance on

what is important for them, and involving participants in approval of prioritization developed. The vested interest communities dialogue identified the following values regarding priorities:

- A priority is placed on populations that contribute to tribal fisheries
- All historically accessible habitat is important
- An emphasis is placed on restoring passage to the most productive and resilient habitats

Prioritization Method

The prioritization method was developed through an iterative process working with Project Leads. The prioritization method focused on characterizing the potential benefits to anadromous and resident fish species of remediating water crossings that partially or fully block fish passage. The prioritization method incorporates the values identified by vested interest communities.

The development of a prioritization method started with a review of other fish passage prioritization frameworks being used in the Pacific Northwest. The review focused on identifying the parameters being included in other frameworks and pros, cons, and lessons learned described in the documentation for each framework. The other frameworks reviewed are listed below.

- City of Bellingham (City of Bellingham 2022)
- King County (King County 2022)
- Chehalis River Watershed (WDFW 2020)
- Upper Columbia Salmon Recovery Region (Upper Columbia Regional Technical Team 2020)
- Washington State Priority Index (WDFW 2019)

During the development of a prioritization method, Washington State began the development of a comprehensive statewide strategy outlining an approach for prioritizing the removal of small-scale fish passage barriers. Due to the City's efforts preceding the State's work, WDFW's role as one of the Project Lead's included consistency and eventual State acceptance of the City's approach.

To begin to develop a prioritization for the City, framework components in other prioritizations were considered for alignment with the values, fit to the watersheds in the City, and the availability of data in the City watersheds, and uniformity of data across watersheds. **Table 2** summarizes the parameters included in those frameworks.

The prioritization framework was developed through iterative testing and adjustment. Components were tested in multiple individual calculations and combinations for contributing to the differentiation among water crossings. A points-based scoring system was developed. Points were assigned to each component based on conditions. The maximum number of points varied among the components which served to emphasize or de-emphasize the relative contribution of individual components in the overall formula.

TABLE 2
PRIORITIZATION COMPONENTS INCLUDED IN OTHER PRIORITIZATIONS

Component	City of Bellingham	King County	Chehalis River Watershed	Upper Columbia Region	Washington State Priority Index
Quantity of Upstream Habitats	Yes	Yes	Yes	Yes	Yes
Quality of Upstream Habitats	Yes	Yes	Yes	Yes	
Barriers Upstream	---	Yes	Yes	---	---
Barriers Downstream	---	Yes	Yes	Yes	---
Barrier Severity	Yes	---	Yes	Yes	Yes
Species Benefitting	Yes	Yes	Yes	Yes	Yes
Core Salmon Population Area	---	---	---	Yes	---
Climate Change Effects	---	---	Yes	Yes	---
Colonization Potential	---	---	---	Yes	---

Following is the final prioritization formula used. The following sections describe the scoring of each component.

Prioritization Score = (Quantity of Upstream Habitats)*(Barrier Severity)
+
(Downstream Barriers)
+
(Core Salmon Production Area)
+
(Quality of Upstream Habitat)

Upstream Habitat Quantity

Upstream habitat quantity was calculated based on stream lengths and fish distributions. More quantitative information on habitat area upstream, such as is used in the WDFW Priority Index calculation (WDFW 2019), would have been preferred, but there are no available datasets to provide that information for all City-owned crossings and it is a very time-intensive dataset to collect. Stream lengths were calculated based on the City's Waterbody Monitoring Stream Network and the Statewide Integrated Fish Distribution watercourse and fish distribution database and modified by Project Leads (SWIFD; NWIFC and WDFW 2024). Project Leads applied their familiarity with the stream networks to refine the endpoints of fish-bearing streams for the subset of streams in the City.

Four elements of upstream habitat quantity were included in the scoring and added together:

1. Total length of anadromous salmon accessible habitat upstream (5 points per miles)

2. Length of anadromous salmon accessible habitat upstream to next human-made barrier (incremental gain length) (2 points per mile)

3. At resident-accessible only sites, total length of resident fish accessible habitat upstream (1 point per miles)

4. At resident-accessible only sites, length of resident fish accessible habitat upstream to next human-made barrier (incremental gain length) (0.5 points per mile)

These elements factored in the total potential habitat length and incremental gain associated with remediating a fish passage barrier. In doing so, both the immediate gains and longer-term potential were factored in. The incremental gain lengths were to the next barrier upstream, regardless of ownership. Also, the elements credit anadromous salmon habitat gains higher than resident fish-only habitat gains. Anadromous salmon accessible habitats are those portions of the stream where anadromous salmon could access if no human-made barriers limited their ability to reach the sites. The upstream end of anadromous salmon accessible habitat is based on SWIFD or Project Lead-informed distributions of the uppermost extent of anadromous salmon distribution among the Pacific salmon and steelhead species. Anadromous accessible habitats can be used by resident and anadromous fish species. Resident fish accessible habitats are located upstream of anadromous habitats. These areas tend to be upstream of a natural barrier (e.g., waterfall) blocking anadromous salmon access or in parts of the watershed where a stream is too small to support anadromous salmon. The upstream end of resident fish distribution was based on SWIFD or Project Lead-informed distributions for the uppermost extent of resident accessible habitats.

The upstream habitat quantity score is the sum of the four elements identified above. There is no limit to the maximum score other than what is calculated; therefore, this component was the largest contributing component for many of the water crossings evaluated. Detailed prioritization methodology is provided in **Appendix B**.

Barrier Severity

Different scores were assigned based on whether a water crossing created a partial barrier or a total barrier to fish access. Partial barriers and unknown barriers were scored the same because for some sites there is no method to determine severity (e.g., tidal sites) and because the percent passability assignments can be arbitrary. Barrier severity information is in the fish passage database of City-owned barriers and is established based on the guidelines in WDFW (2019).

Barrier severity was included in the scoring formula as a multiplier of Quantity of Upstream Habitat. Full barriers received full credit as a 1.0 multiplier. Partial barriers were included with a 0.8 multiplier. This way, the partial access provided by partial barriers is accounted for in the quantity calculation.

Downstream Barriers

The number and severity of barriers downstream affect the likelihood of fish ever reaching a crossing, especially anadromous salmon. Since anadromous salmon migrate upstream upon their re-entry to freshwater for spawning, the number of barriers blocking access affects the quantity of fish impacted by an upstream barrier. The scoring of this component considers the relative location of a barrier compared to other downstream barriers as a factor in prioritization.

The scoring assignments for downstream barriers considered whether the site is in the anadromous accessible zone or resident fish only, the number of barriers, and the severity of the downstream barriers.

All human-made downstream barriers were included in the scoring, not only City-owned barriers. Information from WDFW FPDSI (WDFW 2024) was used to characterize this component. Following are the scores assigned with a maximum of 5 points:

- Anadromous accessible culvert with no downstream barriers = 5
- Anadromous accessible culvert with one partial downstream barrier = 4
- Anadromous accessible culvert with multiple partial downstream barriers = 2.5
- Anadromous accessible culvert with one total downstream barrier = 1.5
- Anadromous accessible culvert with one total downstream barrier and one or more partial barriers = 0.5
- Anadromous accessible culvert with multiple total downstream barriers = 0
- Resident-only accessible culvert with no downstream barriers = 1
- Resident-only accessible culvert with one or more partial barriers downstream = 0.5
- Resident-only accessible culvert with one or more total barriers downstream = 0

Core Salmon Production Area

This component was included to assign more points to sites within or downstream of the portion of watersheds that have the most documentation of salmon use, including spawning, with the understanding that restoring fish passage to those areas will especially benefit the population. Salmon and trout habitat use from SWIFD (NWIFC and WDFW 2024) (e.g., documented spawning) and WDFW information on significant reach upstream (660 linear feet) informed the scoring. WDFW data forms indicating no, blank, or unknown for "significant reach" were considered to not have a significant reach upstream. Following are the scores assigned with a maximum of 5 points:

- Barrier is located downstream of or in documented spawning habitat for anadromous salmon or steelhead = 5
- Barrier is located downstream of or in either: 1) documented habitat for anadromous salmon or steelhead or 2) a "significant reach" per WDFW = 3.5
- Barrier is located downstream of or in presumed or gradient accessible habitat for anadromous salmon or steelhead = 2
- Barrier is located downstream of or in documented habitat for only resident fish = 1
- Barrier is located downstream of or in presumed or gradient accessible habitat for only resident fish = 0.5

Upstream Habitat Quality

This component was included to assign more points to sites within or downstream of habitat considered more resilient and with higher restoration potential. Points were assigned based on whether the barrier was in a tidally influenced area and based on the City's Habitat Restoration Technical Assessment (ESA 2015). Tidally influenced barriers are documented to affect fish originating in the stream, as well as juvenile salmon, most notably juvenile Chinook salmon, originating from other stream systems. Research

shows that some juvenile Chinook salmon outmigrate from their natal stream, migrate along the nearshore of Puget Sound, and move into non-natal estuaries for feeding and refuge (e.g., Beamer et al. 2013, Beamer et al. 2016, Lambert and Chamberlin 2023). In addition, the City's Habitat Restoration Technical Assessment included a comprehensive restoration prioritization of subwatersheds in the City and assigned each to Tier 1, 2, or 3 based on habitat resilience and general likelihood of habitat restoration success. Tier 1 sub-watersheds are identified as having the highest habitat resilience and likelihood of restoration success. Following are the scores assigned with a maximum of 5 points:

- Barrier is tidally influenced (regardless of Tiers) = 5
- Barrier is located downstream of or in Tier 1 subwatershed = 3
- Barrier is located downstream of or in Tier 2 subwatershed = 2
- Barrier is located downstream of or in Tier 3 subwatershed = 0

Components and Formula Calculations Not Included

Additional components were tested for inclusion in the framework as removed based on an issue with contribution to scoring and input from Project Leads. Multiple formula combinations were also tested. These additional components and formula calculations that were not included are described below.

- Species Benefitting – Versions of a metric were tested that assigned scores based on the presence of Endangered Species Act-listed salmon, the number of anadromous salmonid species, whether presence is documented or presumed, and whether resident trout were present. The City contains habitat used by Endangered Species Act-listed Puget Sound Chinook, Puget Sound steelhead, and Coastal-Puget Sound bull trout, but does not include designated critical habitat for their recovery. This metric was not included in subsequent iterations in part because, although the City's watersheds contain Endangered Species Act-listed Chinook salmon, he Chinook salmon using freshwater habitat within the City are primarily hatchery-origin fish released as juveniles for harvest upon their return as adults. The exception to this is the use of estuaries by juvenile Chinook salmon from the Nooksack River and other river systems. Furthermore, the distribution of anadromous species in the City's watersheds were so similar that the metric did not meaningfully differentiate between sites. Other components include scoring differences for anadromous accessible versus resident-only accessible, so a separate metric was not deemed necessary.
- Climate Vulnerability – Versions of a metric were tested that assigned scored based on projected changes to stream temperatures and flows. The available stream temperature data from the U.S. Forest Service Northwest Stream Temperature Database (NorWeST) and stream flow data from the University of Washington Climate Impact Group provided some projections of differences among the City's watersheds. The climate vulnerability metric was found to not meaningfully add to the Upstream Habitat Quality metric which indicates resilience and excluded too many other important factors affecting site vulnerability. In addition, vested interest communities expressed the desire to incorporate a climate resilience strategy of retaining a broad range of potential habitats rather than reduce priority habitat areas based on projected climate changes.
- Upstream Barriers – Versions of a metric based on the count and severity of upstream barriers were tested using data from the WDFW FPDSI database (WDFW 2024). The versions tested greatly influenced the overall scores of many sites. It was concluded that the metric had a stronger influence

on the total score than desired and did not produce results that aligned with general expectations of priorities. One part of the challenge was that watersheds, particularly Squalicum and Whatcom Creeks, extended far upstream of the City borders and culverts in those upper portions of the watershed substantially altered scores.

- Multiple iterations of the scoring formula were run during framework development and were discussed with Project Leads. After the components to include in the prioritization were identified, another 21 scoring combinations were tested. These combinations tried different weighting of the components and different formula structure as entirely additive or including some multiplicative parts. The later iterations began to show consistency among them in the highest scoring sites and the lowest scoring sites. That is, the highest scoring sites were consistently scoring among the highest even as the formula was adjusted. The greatest variations occurred in the middle scoring sites. The consistency among the highest and lowest scoring sites is considered a positive finding that the final formula properly characterizes priorities based on the selected components included in the framework.

Prioritization Results

Prioritization scores among the 126 sites evaluated ranged from 2.96 to 170.10. The highest scores were due to exceptionally long distances of upstream habitat that would be more accessible to anadromous salmon. Only six sites scored higher than 100 points. The mean score was 20.03 and the median score was 8.10. To account for the emphasis on salmon recovery and tribal fisheries, all anadromous accessible sites were ranked higher than resident fish access only sites. **Figure 1** displays the scoring distribution among the sites in ranked order from high to low. The scoring assignments for each component and the total score are provided for each site in **Appendix C**.

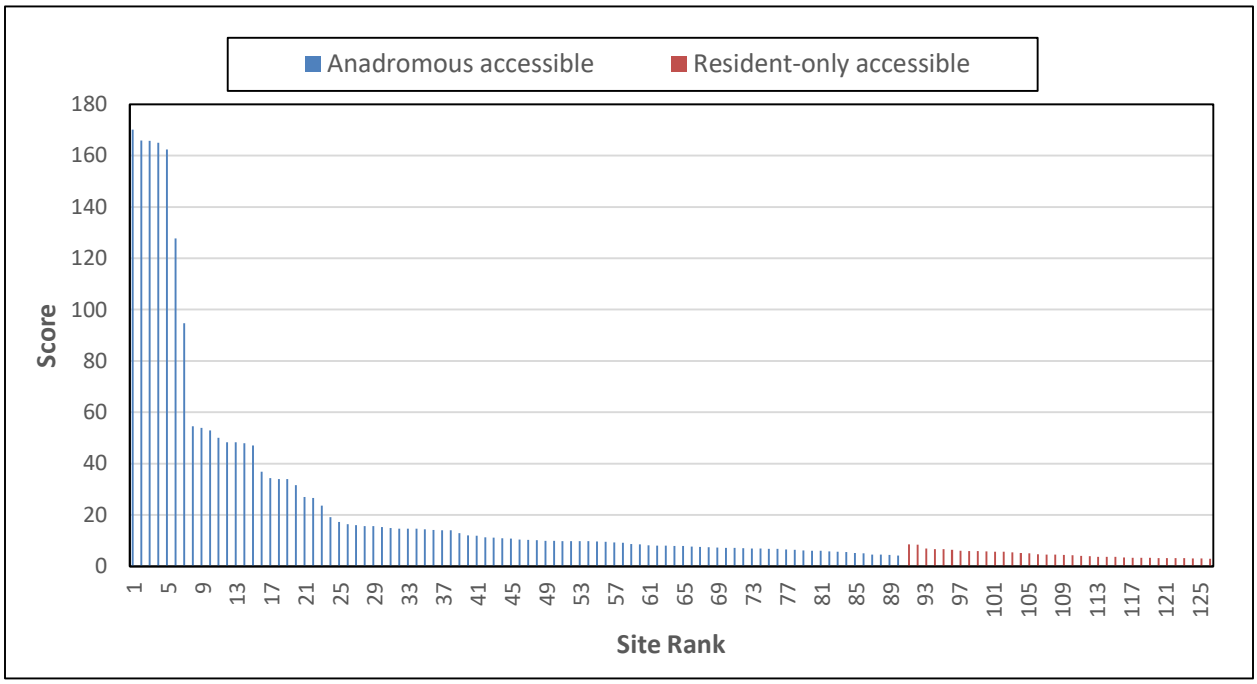

Figure 1 Distribution of Prioritization Scores

The seven highest scoring sites were in Squalicum Creek. The top 20 sites were in the Squalicum, Whatcom, and Padden Creek watersheds. **Table 3** lists the top 20 sites with their WDFW Site Identification Number from WDFW FPDSI (WDFW 2024). **Figure 2** shows a ranking label for the location of the top 20 sites. **Figures 3, 4, and 5** are maps of the Squalicum, Whatcom, and Padden Creek sites, respectively, among the top 20 sites in the City.

TABLE 3
TOP 20 SITES BY PRIORITIZATION SCORE

Rank	WDFW Site ID	Watershed
1	991104	Squalicum Creek
2	602273	Squalicum Creek
3	811121	Squalicum Creek
4	991105	Squalicum Creek
5	920646	Squalicum Creek
6	920649	Squalicum Creek
7	01.0552 2.00	Squalicum Creek
8	920625	Whatcom Creek
9	994375	Padden Creek
10	994390	Padden Creek
11	370647	Whatcom Creek
12	01.0622 0.30	Padden Creek
13	01.0622 0.80	Padden Creek
14	01.0622 0.50	Padden Creek
15	01.0622 0.70	Padden Creek
16	992984	Spring Creek (tributary to Squalicum Creek)
17	991599	Padden Creek
18	991600	Padden Creek
19	994370	Padden Creek
20	992981	Spring Creek (tributary to Squalicum Creek)

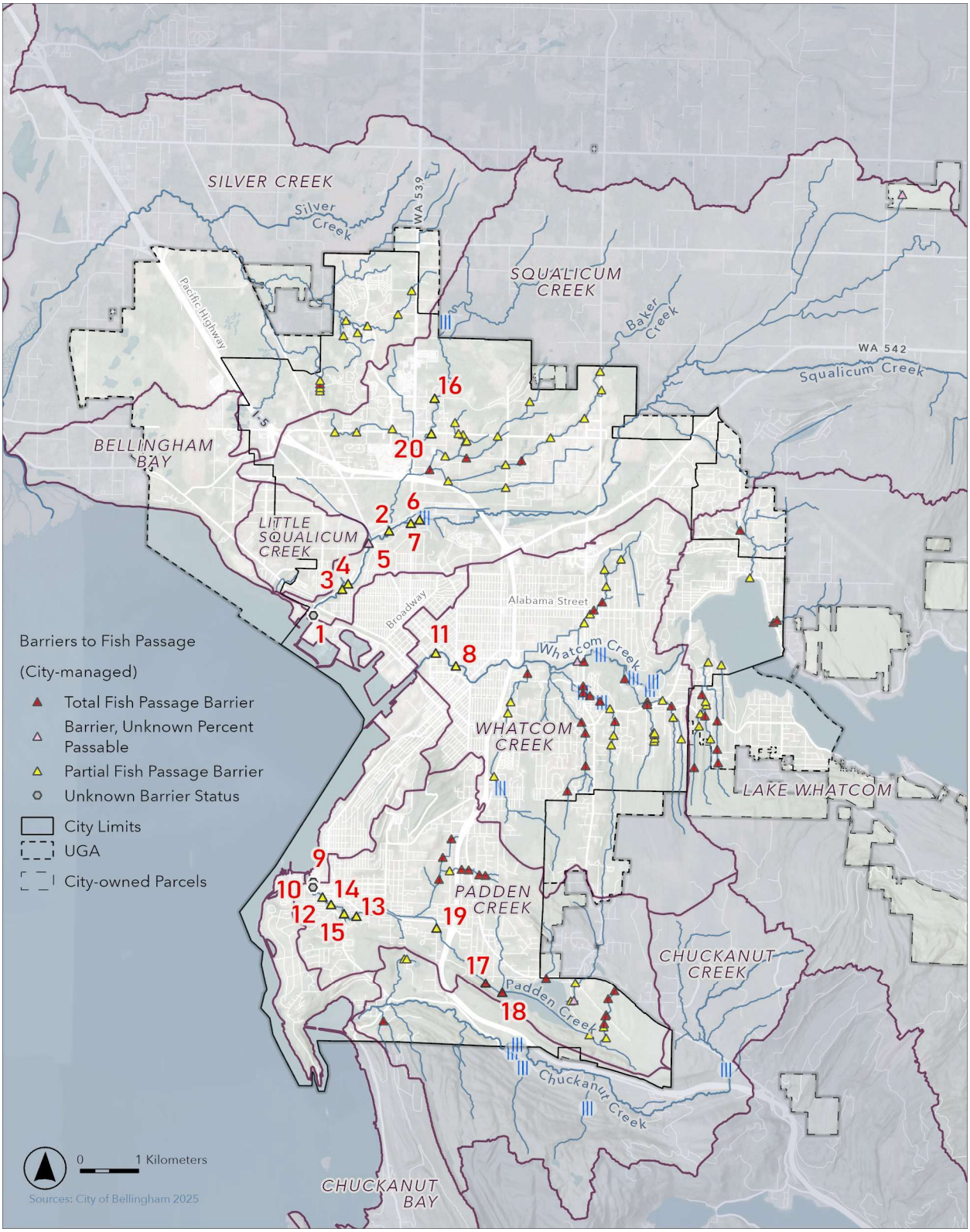

Figure 2 Map of Top 20 Sites By Prioritization Score
Note: Top 20 rankings shown in red labels.

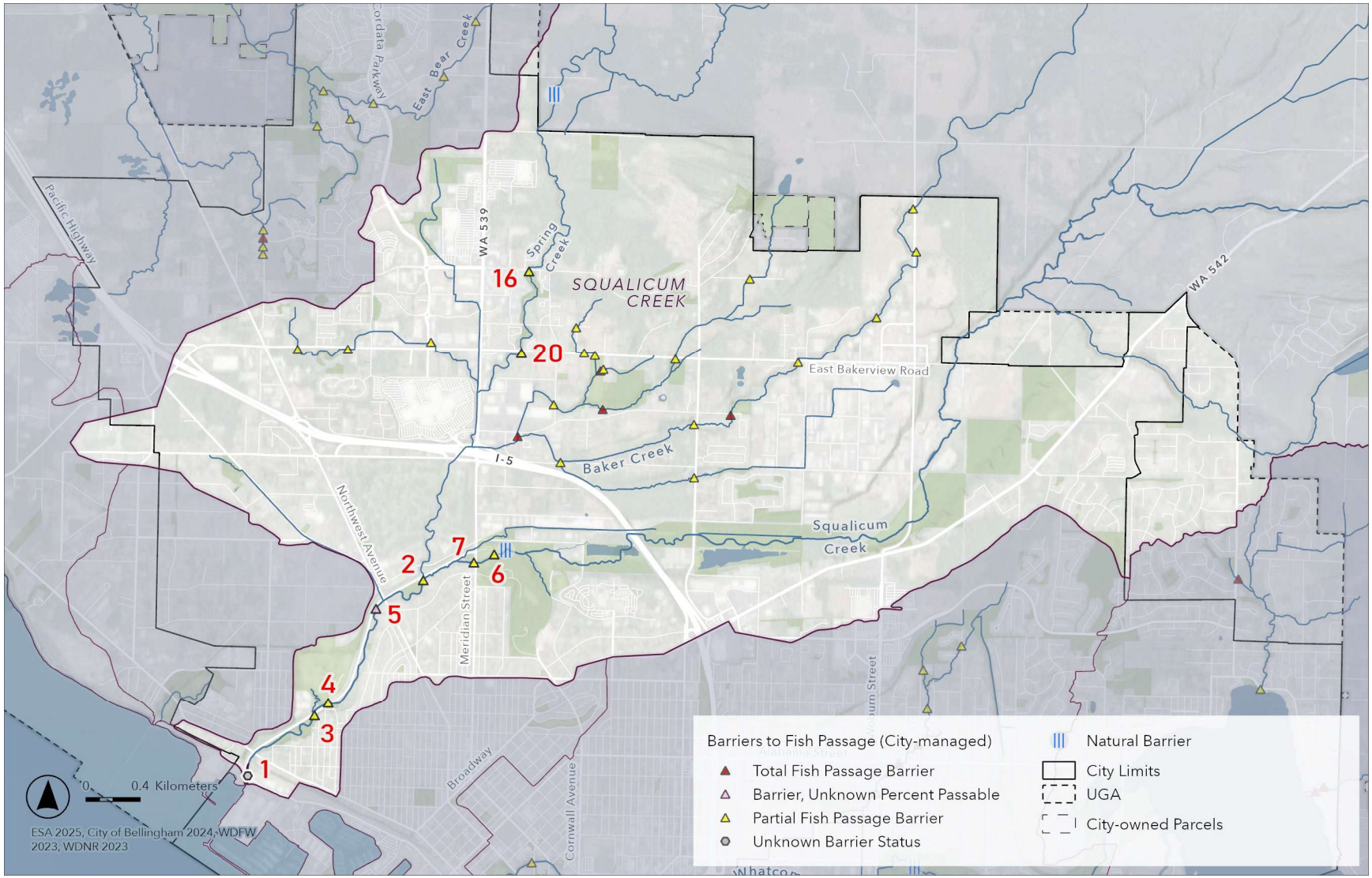

Figure 3 Map of Squalicum Creek Sites Among the Top 20 Sites By Prioritization Score

Note: Top 20 rankings shown in red labels.

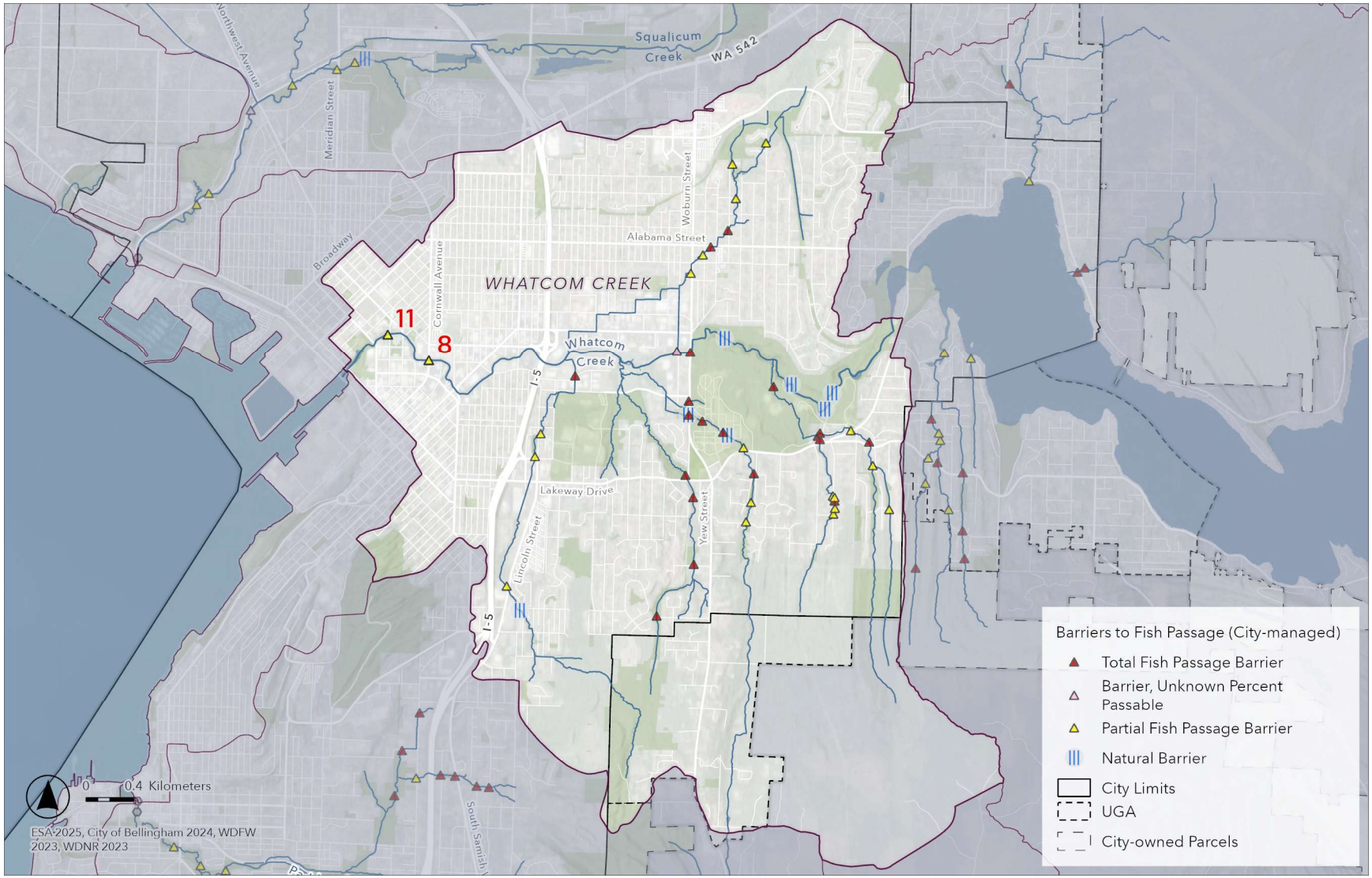

Figure 4 Map of Whatcom Creek Sites Among the Top 20 Sites By Prioritization Score

Note: Top 20 rankings shown in red labels.

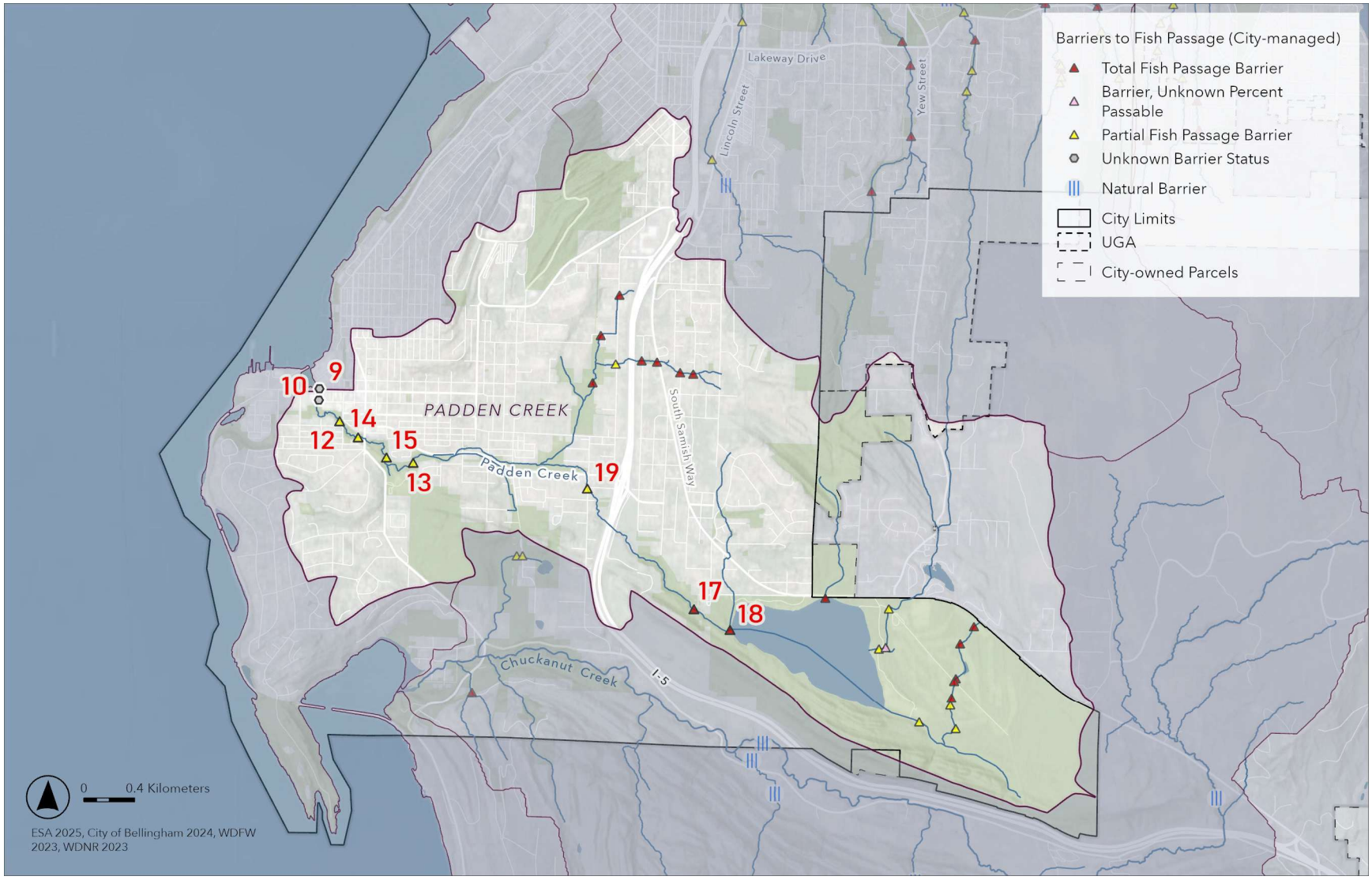

Figure 5 Map of Padden Creek Sites Among the Top 20 Sites By Prioritization Score

Note: Top 20 rankings shown in red labels.

Summary and Next Steps

This prioritization of City-owned fish passage barriers was developed with input from Project Leads and was supported by the vested interest communities. This prioritization is an important step identified in the Memorandum of Agreement. The next step is to develop an implementation plan that establishes how the prioritization will inform the schedule for remediation and how Project Leads will work together on decision-making and collaborative participation for remediating City-owned fish passage barriers.

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Appendix A
Fish Barrier Culvert Remediation Project
Memorandum of Agreement

FISH BARRIER CULVERT REMEDIATION PROJECT
MEMORANDUM OF AGREEMENT

Between
Lummi Natural Resources Department, Nooksack Indian Tribe Natural Resources Department,
City of Bellingham, and the Washington Department of Fish and Wildlife

PREAMBLE:

The City of Bellingham has the legal right and legal obligation to design, to construct, and to maintain a road network, including culverts and other passageways over streams, for its residents. The Nooksack Indian Tribe and the Lummi Nation assert that they have federal reserved water rights in the Nooksack River basin, including the right to instream flows for fisheries purposes. This Memorandum of Agreement is intended solely to address remediation of fish passage that may be blocked or partially blocked by culverts owned by the City of Bellingham.

PURPOSE:

The purpose of this Memorandum of Agreement is to prioritize and create a schedule forremediating culverts owned by the City of Bellingham that block or that partially block anadromous and resident fish passage.

PARTIES TO THE AGREEMENT:

The parties to this agreement are the Lummi Natural Resources Department, the City of Bellingham, the Nooksack Tribe Natural Resources Department, and the Washington Department of Fish and Wildlife.

OBJECTIVES:

The objectives of this Memorandum of Agreement are:

1. To use best available information to compile an inventory of those culverts owned by the City of Bellingham that may block fish passage, pursuant to the Washington State Department of Fish and Wildlife's database, as updated from time to time. For the purposes of this Memorandum of Agreement, the term, " culvert," is used to mean any structure, including dams, weirs, tidegates and floodgates, other than a full-span bridge, that is constructed to convey water beneath a roadway, footpath or railway, and shall also include associated fishways;

2. To develop the priority of remediation efforts in the case of those culverts as defined above that block or partially block fish passage using a habitat-based goal;

3. To determine a schedule for those remediation efforts. The parties to this Memorandum of Agreement recognize that the schedule may be impacted by available resources; and

4. The foregoing objectives are not intended to and do not create any legal rights or liabilities for or against any party to this Memorandum of Agreement.

ROLES AND RESPONSIBILITIES:

The parties to this Memorandum of Agreement commit, to the best of their abilities, to:

1. Provide support as needed to compile an inventory of culverts owned by the City of Bellingham and to share all relevant information of that inventory with the parties to this Memorandum of Agreement in a timely manner.

2. Provide support as needed to develop a priority list for remediation efforts at e culverts identified through this Memorandum of Agreement

3. Provide support as needed to evaluate possible remediation designs and associated costs.

4. Confer and agree on a proposed schedule for remediation efforts.

5. Provide support as needed and as available to obtain necessary regulatory permissions for any remediation efforts agreed upon by the parties to this Memorandum of Agreement.

6. Provide support as needed and as available to obtain necessary funding for remediation efforts as agreed upon by the parties to this Memorandum of Agreement.

It is the intent of the parties to secure funding for remediation efforts jointly and severally and upon doing so one of the parties may be selected as the financial lead for receipt and disbursement of funds.

Once the parties agree on an inventory of culverts as defined above owned by the City of Bellingham, the parties will enter into a separate agreement that will govern the substance and priority of remediation efforts.

DECISION MAKING:

1. Decisions shall be based on the best available information.
2. Decisions shall be made by consensus of all parties to this Memorandum of Agreement.

TERMINATION:

Any party to this Memorandum of Agreement may terminate its participation with 30 days written notice of intent to terminate to all other parties to this Memorandum of Agreement.

No amendment or alteration of this Memorandum of Agreement shall arise by implication, course of conduct, or change in state law, tribal or federal law. This Memorandum of Agreement may be altered only by a subsequent written agreement signed by all parties, expressly stating the parties' intention to amend this Memorandum of Agreement.

LIABILITIES/RIGHTS:

Nothing in this Memorandum of Agreement shall be interpreted in any manner to create any rights or liabilities for or against any party hereto. This Agreement is entered into by the parties in a good faith effort to work cooperatively to improve and to maintain fish passage through culverts owned by the City of Bellingham and is not entered into in order to create any legal rights or liabilities.

CITY OF BELLINGHAM

see attached

By:_____ _____

Authorized Representative **Date**

LUMMI NATION

By: _____ 4/7/22

Authorized Representative **Date**

NOOKSACK INDIAN TRIBE

By: _____ 10-5-22
Authorized Representative **Date**

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE

By: _____ 08/12/2022
Authorized Representative **Date**

EXECUTED, this the 10 day of June, 2022, for the **CITY OF BELLINGHAM**:

Approved as to Form:

Office of the City Attorney

Mayor

Attest:

Finance Director

Department Head

Appendix B
GIS Methods for Prioritization Inputs

GIS METHODS FOR PRIORITIZATION INPUTS

Purpose and use

This document outlines the methodology employed for quantifying potential fish habitat gain related to fish passage barriers in the City of Bellingham.

The purpose of this analysis was to calculate potential anadromous and resident fish habitat gain upstream of City-owned fish passage barriers. Components of the analysis included compiling a database of City-owned fish passage barriers, consolidating information on known and presumed fish distribution, identifying a specific stream course network to use for habitat length calculations, and finally completing calculations of total and incremental potential anadromous and/or resident habitat gain above City-managed barriers.

Data Inputs

Data was sourced from City of Bellingham, Washington Department of Fish and Wildlife, and the Nooksack Indian Tribe (Mike Maudlin). Selections and modifications of data inputs are described in **Table B-1**.

TABLE B-1
DATA INPUTS – ANALYSIS LAYERS

Feature Class	Description	Source	Queries Applied
Env_Waterbody MonitoringRoutes_021424.shp	Stream Routes layer; aligns with City utility network.	City of Bellingham	none
SWIFD	SWIFD watercourse, used for reference	WDFW	DISTTYPE_DESC IN ('Artificial - Documented', 'Documented', 'Gradient Accessible', 'Presumed', 'Transported - Documented', 'Artificial - Presumed', 'Transported - Presumed')
Env_Watersheds	Watershed boundaries	City of Bellingham	none
Env_SubWatersheds	Subwatersheds with tier designations	City of Bellingham	none
Bham_FishPassageBarriers_forReview_20240123	All fish passage barriers identified by WDFW as "City" owned within Bellingham city limits or on City-owned property. Features identified as not barriers were ignored. Features on non-fish bearing streams were not prioritized. Prioritized barriers are marked as "Y" under the field "Prioritize" (127).	City of Bellingham	Cartograph <> 'No barrier'
Wdfw_watershed_2023	Downloaded copy of the WDFW Fish Passage Barrier database, limited to the watersheds around City of Bellingham (707 features). Query applied for purpose of fish habitat calculations to select only features plausibly aligned to waterbody monitoring stream courses (based on proximity and discretion), features not classified as "not barriers" or "NA" meaning non-fish, and barriers not otherwise identified in the Bham barriers layer.	WDFW	SiteId_copy NOT IN (…[duplicates of bham*]…) And FishPassageBarrierStatusCode NOT IN (20, 0) And ESA_nearwc IN ('y', 'm') *see below
FishDistributionPoints_20240311	Modified copy of BellinghamFishDistribution_022024. Consolidated fish distribution points snapped to the waterbody monitoring stream courses. Includes distribution points from SWIFD, WDFW, and Nooksack (as compiled by Mike Maudlin). Edited 9 points to snap with stream courses, moved one point based on WDFW input, created points for Squalicum Creek where missing. Modified version of fish distribution points retained as 'fish_dist_copy'	Mike Maudlin (Nooksack)	none

Methodology for Quantifying Potential Lineal Habitat Gain

Components of the analysis included compiling a database of City-managed fish passage barriers, consolidating information on known and presumed fish distribution, identifying a specific stream course network to use for habitat length calculations, and quantifying total and incremental anadromous and/or resident habitat gain above City-managed barriers.

Desktop analysis was performed in GIS software that enabled data visualization, data manipulation, data querying, and export of data to tabular formats. Exported data was incorporated into the prioritization scheme calculated in tabular format.

Step 1. Create a database of City-managed Fish Passage Barriers

An initial step was to compile a database of City-managed potential Fish Passage Barriers with input from the City and other Project Leads. Of those City Fish Passage Barriers, Project Leads identified barriers to prioritize for remediation. All crossings on fish-bearing streams were included in prioritization.

- Completely passable crossings (i.e. not barriers) were removed from the City's Fish Passage Barriers feature class.
- Any barriers erroneously identified as City-managed were removed.
- Site-specific information from Project Leads was recorded as pertaining to barrier status, fish-bearing nature of associated stream, and any other relevant information.
- To facilitate geoprocessing, each City Fish Passage Barrier was snapped to a Waterbody Monitoring stream course. Any crossing not snapped to a stream course was individually reviewed.
- From the City's Fish Passage Barriers feature class, barriers were identified for inclusion in prioritization. All barriers on fish-bearing streams were included in the prioritization.

Step 2. Identify a single source of stream course information

High resolution field-verified hydrography, the Waterbody Monitoring stream course layer, was created by the City of Bellingham's Public Works Department and subsequently provided to Project Leads for analytic purposes. To facilitate efficient calculation of potential fish habitat gain, the Waterbody Monitoring stream courses were split at intersections with tributaries, barriers, and fish distribution points.

- All habitat length calculations referenced the City's water course layer.

Step 3. Create a database of relevant Fish Passage Barriers not managed by the City

To consider non-City-managed barriers on streams of interest to the City, fish passage barrier data was downloaded from the WDFW's FDPSI database. Potential fish passage barriers not otherwise in the City Fish Passage Barriers layer that occurred near the City's stream network (Waterbody Monitoring stream course) were reviewed. Each WDFW barrier was individually reviewed for plausibility of aligning with water courses of interest to the City. Inclusion of such a barrier in the habitat length calculations was reviewed on a case-by-case basis. Features identified as "not a barrier" were excluded.

- Fish Passage Barriers sourced from WDFW's FDPSI were downloaded for the following watersheds: Silver Creek, Squalicum Creek, Whatcom Creek, Lake Whatcom, Padden Creek, and Chuckanut Creek.
- Non-City-managed barriers were included in the potential habitat gain calculations if they were associated with a water course of interest (Waterbody Monitoring water course).
- Features identified as "not a barrier" were excluded.

Step 4. Consolidate fish distribution information

A point layer representing end points of documented or presumed anadromous or resident fish distributions was prepared by Nooksack Tribe (c/o Mike Maudlin) that consolidated fish distribution information from SWIFD, WDFW, and Project Leads in relation to the City's high-resolution hydrography. Fish distribution point hierarchy followed: WDFW non-fish determination, natural barrier, SWIFD projected distribution (End of Presumed), Based on WDFW culvert survey length. If no Fish Distribution point was identified for a particular stream segment, it implied that the measurement extended to the upstream end of the City's Waterbody Monitoring stream course. Any discrepancies in fish distribution information across entities were resolved by Project Leads.

- Fish distribution information was consolidated using the following hierarchy: WDFW non-fish determination, natural barrier, SWIFD projected distribution (End of Presumed), Based on WDFW culvert survey length.
- Habitat lengths were calculated referencing the Fish Distribution points in relation to the City's Waterbody Monitoring stream course layer.

Step 5. Calculate Potential Lineal Habitat Gain

Total and incremental potential anadromous and/or resident upstream habitat length were calculated for each prioritized City Fish Passage Barrier.

The following 'rules' guided the analysis:

- Incremental upstream habitat potential was measured from a City Fish Passage Barrier to the next barrier regardless of if the next barrier was partial or complete.
- Incremental upstream habitat potential was measured from a City Fish Passage Barrier to the next natural or man-made barrier regardless of ownership of that next barrier.
- Incremental upstream habitat potential up to 'next barrier' may have included multiple barriers if there existed a fork in a stream course upstream of the City Fish Passage Barrier.
- Anadromous incremental potential habitat assumed anadromous + resident, however, is reported as 'anadromous' henceforth.
- Resident incremental potential habitat assumed resident-only.
- Each stream segment was classified as either documented or presumed, not double counted.
- For tributaries directly to Lake Whatcom, upstream potential resident habitat was measured from the confluence with the lake.

- For barriers above complete natural barriers, resident fish habitat is included in the incremental and total potential habitat gain.
- For barriers downstream of complete natural barriers, resident fish habitat above the natural barriers is not included in the incremental and total potential habitat gain.

Additional Quantified Attributes

The following data fields were collected in a tabular format and later incorporated into the prioritization scheme.

- SiteID (barrier identifier as listed in WDFW)
- Sum, all potential upstream habitat
- Sum potential upstream length anadromous - documented
- Sum potential upstream length anadromous - presumed
- Sum potential upstream length below natural barrier, resident only
- Sum potential upstream length above natural barrier, resident only
- Incremental to next barrier, anadromous - documented
- Incremental to next barrier, anadromous - presumed
- Incremental to next barrier below natural barrier, resident only
- Incremental to next barrier above natural barrier, resident only
- Count of upstream barriers, total
- Count of upstream barriers – City
- Count of upstream barriers – Non-city
- Count of downstream barriers, total - City
- Count of downstream barriers, unknown - City
- Count of downstream barriers, any - City
- Count of downstream barriers, partial - City
- Count of downstream barriers, full - City
- Count of downstream barriers, total - Non-city
- Count of downstream barriers, unknown - Non-city
- Count of downstream barriers, any - Non-city
- Count of downstream barriers, partial - Non-city
- Count of downstream barriers, full - Non-city

Appendix C

Prioritization Scoring Results for City-owned Fish Passage Barriers

WDFW Site ID	Creek	Anadromous-Accessible or Resident-Only	Upstream Habitat Quantity Score	Barrier Severity Score	Upstream Quantity * Barrier Severity	Downstream Barriers Score	Core Salmon Production Area Score	Upstream Habitat Quality Score	Prioritization Total Score	Rank
991104	Squalicum Creek	Anadromous	197.00	0.8	157.60	2.5	5	5	170.10	1
602273	Squalicum Creek	Anadromous	194.22	0.8	155.38	2.5	5	3	165.88	2
811121	Squalicum Creek	Anadromous	194.04	0.8	155.24	2.5	5	3	165.74	3
991105	Squalicum Creek	Anadromous	193.18	0.8	154.54	2.5	5	3	165.04	4
920646	Squalicum Creek	Anadromous	189.89	0.8	151.91	2.5	5	3	162.41	5
920649	Squalicum Creek	Anadromous	146.59	0.8	117.27	2.5	5	3	127.77	6
01.0552 2.00	Squalicum Creek	Anadromous	105.19	0.8	84.15	2.5	5	3	94.65	7
920625	Whatcom Creek	Anadromous	54.39	0.8	43.51	4	5	2	54.51	8
994375	Padden Creek	Anadromous	48.63	0.8	38.91	5	5	5	53.91	9
994390	Padden Creek	Anadromous	48.70	0.8	38.96	4	5	5	52.96	10
370647	Whatcom Creek	Anadromous	48.78	0.8	39.03	4	5	2	50.03	11
01.0622 0.30	Padden Creek	Anadromous	47.33	0.8	37.86	2.5	5	3	48.36	12
01.0622 0.80	Padden Creek	Anadromous	47.22	0.8	37.78	2.5	5	3	48.28	13
01.0622 0.50	Padden Creek	Anadromous	46.83	0.8	37.46	2.5	5	3	47.96	14
01.0622 0.70	Padden Creek	Anadromous	45.65	0.8	36.52	2.5	5	3	47.02	15
992984	Spring Creek	Anadromous	34.86	0.8	27.89	2.5	3.5	3	36.89	16
991599	Padden Creek	Anadromous	26.39	1	26.39	2.5	3.5	2	34.39	17
991600	Padden Creek	Anadromous	28.48	1	28.48	0	3.5	2	33.98	18
994370	Padden Creek	Anadromous	31.16	0.8	24.93	2.5	3.5	3	33.93	19
992981	Spring Creek	Anadromous	28.27	0.8	22.62	2.5	3.5	3	31.62	20
01.0555 0.00	North Fork Baker Creek	Anadromous	18.01	1	18.01	2.5	3.5	3	27.01	21
993038	Baker Creek	Anadromous	17.58	1	17.58	2.5	3.5	3	26.58	22
993006	Baker Creek	Anadromous	18.28	0.8	14.63	2.5	3.5	3	23.63	23
993040	Baker Creek	Anadromous	15.18	0.8	12.14	0.5	3.5	3	19.14	24
993093	Baker Creek	Anadromous	12.75	0.8	10.20	0.5	3.5	3	17.20	25
993821	Baker Creek	Anadromous	11.68	0.8	9.34	0.5	3.5	3	16.34	26
370683	West Cemetery Creek	Anadromous	9.05	1	9.05	0.5	3.5	3	16.05	27
1280163	East Bear Creek	Anadromous	10.87	0.8	8.69	0.5	3.5	3	15.69	28
370658	West Cemetery Creek	Anadromous	9.19	1	9.19	0	3.5	3	15.69	29
993443	Baker Creek	Anadromous	10.29	0.8	8.23	0.5	3.5	3	15.23	30
370673	Lincoln Creek	Anadromous	8.89	1	8.89	0.5	3.5	2	14.89	31
370648	West Cemetery Creek	Anadromous	8.18	1	8.18	0	3.5	3	14.68	32
993883	North Fork Baker Creek	Anadromous	9.54	0.8	7.63	0.5	3.5	3	14.63	33
992656	Connelly Creek	Anadromous	6.62	1	6.62	2.5	3.5	2	14.62	34
932767	Padden Creek	Anadromous	7.91	0.8	6.33	2.5	3.5	2	14.33	35
993886	North Fork Baker Creek	Anadromous	8.90	0.8	7.12	0.5	3.5	3	14.12	36
993880	Baker Creek	Anadromous	6.25	0.8	5.00	2.5	3.5	3	14.00	37
920647	Fever Creek	Anadromous	9.33	0.8	7.46	2.5	2	2	13.96	38
935975	East Bear Creek	Anadromous	7.33	0.8	5.87	0.5	3.5	3	12.87	39
992059	Our Lake Creek	Anadromous	7.57	0.8	6.05	0.5	3.5	2	12.05	40

WDFW Site ID	Creek	Anadromous-Accessible or Resident-Only	Upstream Habitat Quantity Score	Barrier Severity Score	Upstream Quantity * Barrier Severity	Downstream Barriers Score	Core Salmon Production Area Score	Upstream Habitat Quality Score	Prioritization Total Score	Rank
370661	Fever Creek	Anadromous	5.44	1	5.44	2.5	2	2	11.94	41
370663	Fever Creek	Anadromous	4.80	1	4.80	2.5	2	2	11.30	42
920634	Whatcom Creek	Anadromous	2.17	1	2.17	2.5	3.5	3	11.17	43
996048	California St Creek	Anadromous	1.90	1	1.90	2.5	3.5	3	10.90	44
920635	Lincoln Creek	Anadromous	5.90	0.8	4.72	0.5	3.5	2	10.72	45
920652	East Bear Creek	Anadromous	4.18	0.8	3.34	0.5	3.5	3	10.34	46
993884	North Fork Baker Creek	Anadromous	3.27	1	3.27	0.5	3.5	3	10.27	47
991609	Our Lake Creek	Anadromous	7.02	0.8	5.61	0.5	2	2	10.11	48
370664	Fever Creek	Anadromous	4.30	0.8	3.44	2.5	2	2	9.94	49
932760	Our Lake Creek	Anadromous	6.76	0.8	5.40	0.5	2	2	9.90	50
370678	Lincoln Creek	Anadromous	5.39	0.8	4.31	0	3.5	2	9.81	51
993483	Hoags Creek	Anadromous	1.01	0.8	0.81	2.5	3.5	3	9.81	52
934428	North Fork Baker Creek	Anadromous	3.46	0.8	2.77	0.5	3.5	3	9.77	53
993482	Hoags Creek	Anadromous	0.90	0.8	0.72	2.5	3.5	3	9.72	54
993487	Hoags Creek	Anadromous	0.42	0.8	0.34	2.5	3.5	3	9.67	55
932757	Governor Creek	Anadromous	3.50	1	3.50	0.5	3.5	2	9.50	56
936083	East Bear Creek	Anadromous	2.85	0.8	2.28	0.5	3.5	3	9.28	57
370660	Fever Creek	Anadromous	6.42	0.8	5.13	0	2	2	9.13	58
609961	East Bear Creek Trib #2	Anadromous	3.90	0.8	3.12	0.5	2	3	8.62	59
370659	Fever Creek	Anadromous	5.64	0.8	4.51	0	2	2	8.51	60
932746	Golf Course Creek	Anadromous	3.28	0.8	2.63	0	3.5	2	8.13	61
992659	Connelly Creek	Anadromous	2.59	0.8	2.07	0.5	3.5	2	8.07	62
370679	Magnolia Creek	Anadromous	0.53	1	0.53	2.5	2	3	8.03	63
932748	Golf Course Creek	Anadromous	2.42	1	2.42	0	3.5	2	7.92	64
370649	West Cemetery Creek	Anadromous	2.88	1	2.88	0	2	3	7.88	65
932750	Golf Course Creek	Anadromous	2.15	1	2.15	0	3.5	2	7.65	66
932747	Golf Course Creek	Anadromous	2.51	0.8	2.01	0	3.5	2	7.51	67
609965	Cammack Creek	Anadromous	1.89	1	1.89	0.5	2	3	7.39	68
609966	Landon Creek	Anadromous	2.21	0.8	1.77	0.5	2	3	7.27	69
609967	Landon Creek	Anadromous	2.13	0.8	1.70	0.5	2	3	7.20	70
609962	East Bear Creek Trib #3	Anadromous	2.02	0.8	1.62	0.5	2	3	7.12	71
932749	Golf Course Creek	Anadromous	1.86	0.8	1.49	0	3.5	2	6.99	72
993881	South Baker Creek	Anadromous	1.80	0.8	1.44	0.5	2	3	6.94	73
920636	Lincoln Creek	Anadromous	1.06	0.8	0.85	0.5	3.5	2	6.85	74
998079	McCormick Creek	Anadromous	0.37	0.8	0.30	2.5	2	2	6.80	75
992657	30th St Creek	Anadromous	2.28	1	2.28	0.5	2	2	6.78	76
609993	Landon Creek	Anadromous	1.34	0.8	1.07	0.5	2	3	6.57	77
932752	Golf Course Creek	Anadromous	0.93	1	0.93	0	3.5	2	6.43	78
920640	St Clair Creek	Anadromous	0.83	0.8	0.67	0	3.5	2	6.17	79
936155	Bear Creek Trib #2	Anadromous	0.65	0.8	0.52	0.5	2	3	6.02	80

WDFW Site ID	Creek	Anadromous-Accessible or Resident-Only	Upstream Habitat Quantity Score	Barrier Severity Score	Upstream Quantity * Barrier Severity	Downstream Barriers Score	Core Salmon Production Area Score	Upstream Habitat Quality Score	Prioritization Total Score	Rank
936156	Bear Creek Trib #2	Anadromous	0.47	1	0.47	0.5	2	3	5.97	81
996054	Connelly Creek	Anadromous	1.76	1	1.76	0	2	2	5.76	82
932753	Golf Course Creek	Anadromous	0.21	1	0.21	0	3.5	2	5.71	83
992662	Connelly Creek	Anadromous	1.53	1	1.53	0	2	2	5.53	84
936157	Bear Creek Trib #2	Anadromous	0.26	0.8	0.21	0	2	3	5.21	85
936159	Bear Creek Trib #2	Anadromous	0.03	0.8	0.03	0	2	3	5.03	86
992664	Connelly Creek	Anadromous	0.59	1	0.59	0	2	2	4.59	87
920644	30th St Creek	Anadromous	0.53	1	0.53	0	2	2	4.53	88
920641	Fever Creek	Anadromous	0.45	0.8	0.36	0	2	2	4.36	89
992665	Connelly Creek	Anadromous	0.18	1	0.18	0	2	2	4.18	90
609969	Mill Wheel Creek	Resident	4.38	0.8	3.50	1	1	3	8.50	91
370670	Hanna Creek	Resident	4.40	1	4.40	0	1	3	8.40	92
370680	Cemetery Creek	Resident	2.43	1	2.43	0.5	1	3	6.93	93
370650	Cemetery Creek	Resident	2.12	0.8	1.70	1	1	3	6.70	94
370681	Cemetery Creek	Resident	2.19	1	2.19	0.5	1	3	6.69	95
370682	Cemetery Creek	Resident	2.37	1	2.37	0	1	3	6.37	96
370672	Hanna Creek	Resident	3.08	1	3.08	0	1	2	6.08	97
370652	Cemetery Creek	Resident	1.94	1	1.94	0	1	3	5.94	98
609980	Cemetery Creek	Resident	2.41	0.8	1.93	0	1	3	5.93	99
370666	Hanna Creek	Resident	2.75	1	2.75	0	1	2	5.75	100
370155	Mill Wheel Creek	Resident	2.12	1	2.12	0.5	1	2	5.62	101
370601	Mill Wheel Creek	Resident	2.00	0.8	1.60	1	1	2	5.60	102
370653	Cemetery Creek	Resident	1.77	0.8	1.42	0	1	3	5.42	103
609991	Lakeside Creek	Resident	0.87	0.8	0.70	1	0.5	3	5.20	104
370665	Hanna Creek	Resident	2.53	0.8	2.03	0	1	2	5.03	105
370236	Mill Wheel Creek	Resident	2.04	0.8	1.63	0	1	2	4.63	106
609989	Silver Beach Creek	Resident	0.67	0.8	0.53	1	1	2	4.53	107
609990	Academy Creek	Resident	0.49	1	0.49	1	1	2	4.49	108
370335	Mill Wheel Creek	Resident	0.85	1	0.85	0.5	1	2	4.35	109
609972	Hanna Creek	Resident	1.35	1	1.35	0	1	2	4.35	110
370668	Park Creek	Resident	1.05	1	1.05	0	1	2	4.05	111
370334	Mill Wheel Creek Trib West	Resident	1.10	0.8	0.88	0	1	2	3.88	112
370669	Park Creek	Resident	1.20	1	1.20	0	0.5	2	3.70	113
370143	Silver Breach Creek Trib	Resident	0.16	1	0.16	0.5	1	2	3.66	114
609994	Academy Creek	Resident	0.64	1	0.64	0	1	2	3.64	115
609970	Mill Wheel Creek	Resident	1.09	0.8	0.87	0	0.5	2	3.37	116
370154	Mill Wheel Creek Trib East	Resident	0.35	1	0.35	0	1	2	3.35	117
370336	Mill Wheel Creek Trib East	Resident	0.84	1	0.84	0	0.5	2	3.34	118
609971	Mill Wheel Creek Trib West	Resident	0.79	1	0.79	0	0.5	2	3.29	119
609975	Park Creek	Resident	0.85	0.8	0.68	0	0.5	2	3.18	120

WDFW Site ID	Creek	Anadromous-Accessible or Resident-Only	Upstream Habitat Quantity Score	Barrier Severity Score	Upstream Quantity * Barrier Severity	Downstream Barriers Score	Core Salmon Production Area Score	Upstream Habitat Quality Score	Prioritization Total Score	Rank
609978	Park Creek	Resident	0.67	1	0.67	0	0.5	2	3.17	121
609977	Park Creek	Resident	0.66	1	0.66	0	0.5	2	3.16	122
609997	Mill Wheel Creek Trib West	Resident	0.14	1	0.14	0	1	2	3.14	123
609979	Park Creek	Resident	0.68	0.8	0.54	0	0.5	2	3.04	124
609976	Park Creek	Resident	0.62	0.8	0.49	0	0.5	2	2.99	125
370469	Mill Wheel Creek Trib East	Resident	0.46	1	0.46	0	0.5	2	2.96	126

Appendix C

Vested Interest Community Engagement Meeting Summaries

City of Bellingham Culvert Inventory, Prioritization, & Implementation Plan Development

Vested Interest Communities (VIC) Meeting #1 Notes
October 5, 2023, 1:30 – 3:30 PM – virtual meeting

Attendees:

Nooksack Tribe
- Ned Currence, Natural Resources Director
- Trevor Delgado, Tribal Historic Preservation Officer
- Abby Yates, Public Outreach and Engagement Lead
- Mike Maudlin, Resource Protection Manager

Lummi Nation
- Lena Tso, Tribal Historic Preservation Officer
- Tamela Smart, Deputy Tribal Historic Preservation Officer
- Gregg Dunphy, Forest and Fish Manager

WDFW
- Marcus Reaves, Assistant Regional Habitat Program Manager

City of Bellingham
- Analiese Burns, Habitat and Restoration Manager
- Brent Baldwin, Development Manager
- Renee LaCroix, Public Works Assistant Director - Natural Resources

ESA
- Paul Schlenger, Project Manager, Principal Fish Biologist
- Nicole Lobodzinski, Outreach Specialist
- Mike Higgins, Fish Biologist

Whatcom County
- John Thompson, Senior Salmon Recovery Planner

Notes

<u>Discussion of Tribal values associated with salmon, fish passage, and the watersheds in the City of Bellingham: How do salmon play a role in your cultural practices? How do fish passage barriers impact your cultural practices?</u>

- Cultural significance of salmon. Nooksack people identify as salmon people. Part of who they are every day, year-round.
- Nooksack people fish on the Nooksack River. Majority of access points on the river are WDFW. When fishing at Whatcom Creek they are treated like they're doing illegal activities and many Nooksack people experience harassment, vandalism and physical violence. Tribes need others to support treaty rights with outreach. Need more awareness and

communication about treaty rights and access points so that it does not only fall on the Tribes to speak up about this.

- Whatcom Creek is a historical site and fishing area.
- City of Bellingham is the front door to the Nooksack people's home.
- Add traditional and historical fish cooking pits at sites, possibly Whatcom Creek. Important to give back beyond just talking about these issues.
- There are many racist comments made on social media channels about fish and treaty rights to fishing.
- Fishing rights support families.
- Need a clear way of explaining treaty rights and more voices speaking up about them. Would be beneficial for the project to develop succinct talking points that can be used in media publications and verbal communications.
- Salmon plays a huge role in communities and is a main source of diet. This aspect of Tribal communities has been hugely impacted. Family used to be able to reliably fish from Bellingham Bay for dinner. Can't do that anymore. Almost no fish. Fishing is highly regulated for Tribal members.
- Fishing is a way of life and feeding families. The Spirit gave the fish to the people to care for. Impacts to fishing impacts Spirit and relationships.
- Tribes were left out when it came to building, salmon farming, how water is treated, etc. They have been a partner in preservation but preservation wasn't thought of as key, only now thought of as important.
- Scrambling trying to find ways to preserve what's best.
- Historically and prehistorically speaking, areas were given to certain families to use and protect. This determined how you were regarded in your community and in your Tribe. With Boldt decision, fish allocation went from 100% to 50%. Fishing turned into commercial fishing, impacting communities.
- Fish passage barriers have made a huge impact on the salmon population. Glad talking about ways to make improvements. Salmon's role in Tribal communities plays both a cultural and a natural resource treaty right role.

<u>Discussion of how Fish Passage Prioritization Framework can reflect values and priorities: Should we focus only on salmon biology or habitat?</u>

- Concerned that in less than 20 years we might be bringing salmon back where we don't think they're viable. It's important to prioritize climate change's impact to salmon populations.
- When looking at future, look at where Tribal members could fish rather than where they historically have fished. Tribal fishing may well go beyond current or historic locations.
- As we look towards viability with climate change, hope we'll collectively increase shading on creeks.
- The parameter "Same site as other planned work" hasn't proven very useful in a prioritization. There will be other barriers they will address when the opportunity is

presented e.g., sidewalk or road improvement in the proximity of another project. This is a prioritization to identify the priority barriers, do not mix opportunity into a prioritization instead put it into the implementation plan.

- Does the City have a climate adaption plan this could be part of? City has a Climate Action Plan (mitigation plan) and is working on an adaptation plan. Makes sense for climate adaptation to be reflected in the culvert prioritization, and vice versa. (Lake Whatcom vulnerability analysis, Lake Padden water budget for future climate projects, Port and City have jointly completed a Sea-Level Rise with coastal surge studies).
- Are there other considerations that should be considered as implementation criteria rather than prioritization criteria? E.g., cost. Community support, funding opportunity, and cost may be best for implementation.
- Steelhead uses streams more than others. Steelhead and Coho may be most important. Chum that tend to be lower in these systems are important for tribal fisheries.
- Can see the value of adding cost to the prioritization, getting the most bang for the buck.
- Project team wanted to explore Chinook salmon in estuaries and lower reaches. Understand group's interest in considering Chinook also. While reliant on large rivers, they are known to come out of big rivers and into estuaries and lower reaches of smaller streams. Should Chinook be prioritized or scored higher? Yes, if it benefits the two ESA-listed populations in the Nooksack River.
- How do people characterize upstream habitat quality? Use remote sensing databases such as gradient.
- Historical and cultural significance of sites are important. Future potential sites and future potential use are also important e.g., Whatcom Creek hadn't been used in a century.
- Outreach opportunities may be included in the prioritization or implementation plan. Could do cultural awareness signs at the locations. Include tribal place names and uses so the community can be more aware of treaty rights, take more ownership.
- Community support is important and maybe should be incorporated in the prioritization. At Padden Creek there was enough community support for a project to happen. There are all kinds of things that could happen, if for example a landowner with adjacent barriers wanted to get involved.
- Perhaps remove community support, cost, and funding opportunity from prioritization and instead incorporate into implementation plan.

City of Bellingham Culvert Inventory, Prioritization, & Implementation Plan Development

Vested Interest Communities (VIC) Meeting #2 Notes
June 10, 2024, 2 – 4 PM - virtual meeting

Attendees:

Nooksack Tribe
- George Swanaset Jr., Cultural Resources Director
- Trevor Delgado, Tribal Historic Preservation Officer
- Abby Yates, Public Outreach and Engagement Lead
- Mike Maudlin, Resource Protection Manager

Lummi Nation
- Lena Tso, Tribal Historic Preservation Officer
- Tamela Smart, Deputy Tribal Historic Preservation Officer
- Gregg Dunphy, Forest and Fish Manager
- Frank Bob, Natural Resources Policy

WDFW
- Marcus Reaves, Assistant Regional Habitat Program Manager
- Elizabeth (Lizzi) Lutes, Area Habitat Biologist

City of Bellingham
- Analiese Burns, Habitat and Restoration Manager
- Mike Wilson, City Engineer, Public Works
- Eric Johnston, Public Works Director
- Tim Hohmann, Engineering Manager, Public Works
- Riley Grant, Communications and Outreach Manager

ESA
- Paul Schlenger, Project Manager, Principal Fish Biologist
- Nicole Lobodzinski, Outreach Specialist

NOAA
- Garret Engelke, Marine Habitat Resource Specialist

Whatcom County
- John Thompson, Senior Salmon Recovery Planner

Notes

- Mike Maudlin introduced the meeting.
- Analiese Burns provided land acknowledgement and described the project background.
- Paul Schlenger presented on how input received from the VIC was incorporated into the prioritization framework, the framework component, and the top prioritized sites based on benefit to salmon.

Questions and Discussion:

- John Thompson asked if the 129 barriers includes the City of Bellingham (City) Urban Growth Area (UGA), or are they within the existing City limits? He noted that the UGA area could be good future conversation between the City and County about MOAs.
    - The total includes all fish passage barriers that are owned by the City, including those outside the City limits. Culverts owned by the City outside the City limits are culverts on City-owned parcels.
- Mike Maudlin asked how barrier severity was included.
    - Full barriers received a higher score than partial barriers. Barrier severity was included in the formula as a multiplier times number of miles of stream length that would be opened. Full barriers received a multiplier of 1.0. Partial barriers received a multiplier of 0.8, thus scored lower. The recommended formula includes 0.8 multiplier for partial barriers but the team also tried different numbers and didn't find that either of those worked to calibrate and test the system.
- Lena Tso asked how barriers would be corrected. How do you know what repair needs to be done to them, and would you do a cleaning to unblock or replace them?
    - Crossings are considered blocked or barriers because they're generally considered too small compared to the size of the stream. Fixing them includes creating a larger opening. So instead of a small pipe or culvert, there might be a larger pipe or bridge. All 129 culverts, including the top 20 city-owned barriers, are expected to need some new replacement structure.
- Lena Tso asked if there are funds for the projects yet, who signed the culvert MOA, and if Trevor Delgado was consulted about the MOA.
    - NOAA grant that is funding this prioritization project includes preparing 30% (preliminary) design for up to three barriers. Fish passage projects, are generally in the millions of dollars and additional design and construction would be funded through separate solicitation processes. Generally funding is provided by grants. In addition to grant funding, a project need to have match funding and staffing capacity to do it. The implementation plan will consider funding, staff capacity, and timing. In the culvert MOA, signatories have committed to work together to permit and fund fish passage at these sites. The MOA includes Nooksack Indian Tribe, Lummi Nation, WDFW, and the City. Trevor replied that he had been consulted about the MOA.
- Lena Tso noted there should be more discussion about cultural resources in the projects more in depth because that can determine design constraints, consultants and initial surveys, which can impact budget and timeline. Should find innovative ways to minimize ground disturbance. That's the biggest need for the future. That may change the top 20 fish barriers. There should be a meeting just about cultural resources and the culverts to see what can be done.
- Trevor Delgado agreed with Lena's points. He asked what the prioritization list and ranking along Squalicum Creek was based upon and if it is related to habitat connectivity.

- Habitat connectivity in the form of upstream habitat was a large part of the formula and starting point for the formula, as well as reconnecting salmon to all habitats they would naturally be able to access if it weren't for human-made barriers.

- Frank Bob asked how water quality fits into this.
  - Water quality is an important consideration in the City's watersheds. Not explicitly included in the ranking, but part of upstream habitat component. The upstream habitat component factored in portions of City that are more resilient to environmental conditions than others by using Tier 1 subwatersheds from the Bellingham Habitat Restoration Technical Assessment (BHRTA). Tier 1 subwatersheds are high functioning habitats, or habitats that could be restored to high functioning. Therefore, Tier 1 subwatersheds includes habitat with high water quality today or where processes can be restored to get water quality in the future. The City separately from this discussion on fish passage, has actions to address water quality such as riparian restoration and floodplain connection to address non-point source water quality improvements, stormwater retrofits to build infrastructure to improve water quality, TMDL requirements under the state to address temperature and bacteria, and stormwater NPDES permit compliance.
- Lena Tso asked if anyone has done research with other counties or towns that have done a culvert initiative such as this one to see how they did it and if there are any parts that can be repurposed.
  - The team looked at fish passage prioritizations from other areas to see how their scoring system was developed, parameters, etc. which informed what's been proposed here. Trying to match good ideas from past work with available data. This is the first time that there has been a joint prioritization process with Tribes, state, and local government to address fish passage so trying something new rather than just technical prioritization. Trying to reflect co-managers and Tribal values. There have been prior technical prioritization formulas, whether one culvert is more important than another, usually done based on fish needs. The state has a priority index that was referenced. There are a few other jurisdictions that have had prioritization, but there aren't many to look at. Instead, other jurisdictions are asking the City what we are doing. The City of Bellingham's prior prioritization is one of the few existing in the state. The City's prior prioritization is based a lot on WDFW and then added local considerations. This current effort to update the prioritization allows us to incorporate what the City has learned during the prior prioritization. One thing City found that didn't work well was mixing feasibility (implementation constraints) with prioritization. They learned it is more transparent and useful to separate prioritization from implementation because a culvert may be identified as high priority during prioritization but may be lower (later) in implementation due to logistical constraints.
- Analiese Burns asked how Tribal Historic Preservation Officers (THPOs) would like to receive this information to weigh in on cultural resources.

- George Swanaset Jr. replied he'd like to receive information about all the sites because it would be more thorough.
- Tamela Smart noted all of them are helpful, but knowing which ones are near-term and need to be addressed sooner would be most helpful. If there is a complex archaeological site, it may impact implementation as well.
- Analiese noted the project team can provide more specifics on timing once it's determined.

- Mike Maudlin noted Paul Schlenger has been through prioritizations before and asked from a fish biologist lens if the results make sense and hit the mark from that standpoint.
  - Paul noted through iterations you start to understand what changes in the formula. He doesn't work in isolation -- shared draft results, questions, and reviewed opportunities with core project leads. Ended up satisfied with the recommended prioritization. There are many sites in the watershed. Top sites are in the biggest systems and have the greatest potential to influence salmon production.
- Mike Maudlin noted the importance of estuarine rearing areas for Chinook because that's where the fish would most likely be using creeks. Mike noted it looks like the mouth of Padden Creek is ranked low given its potential importance for highest priority species. Fish species were lumped together but he wondered if barriers in estuarine areas are the highest priority.
  - More points were assigned for estuary fish passage barriers. It provides habitat for chinook salmon, even those coming from other systems.
- Analiese Burns referred to the Prioritization Scores graph on slide 16. She asked if resident and anadromous sites are in the same low score range, should they all be low, or should resident be put lowest and anadromous higher.
- Lizzi Lutes asked how agencies and groups should be involved in next steps for implementation.
  - Analiese Burns noted Joel Ingram has been involved in developing inventory. May require site visits for a subset of top 20 fish passage barriers to discuss cultural resources and any other implementation logistical considerations.
  - Marcus Reaves noted WDFW will be issuing HPA permits for these projects. For more complicated sites that need more concurrence, WDFW can provide technical assistance. WDFW would like to be involved in early pre-app site visits to get on the same page before submitting permits.
- Tim Hohmann asked about the impact of cultural resources on implementation. 129 sites are a lot for THPOs to review but would be great to get their preliminary review. Tim suggested the Implementation Plan include some policy level cultural resource consultation process to clarify expectations that will be applied at the project-specific level.
  - Analiese noted it would be helpful if the Implementation Plan clarified what the City is providing when to provide assurance there will be cultural resource consultation at the appropriate times. The benefit of providing this clarity in the Implementation

Plan, is that it precedes the funding and permitting phase and helps align expectations from the project outset.

- Tim noted there presumably will be many different funding partners and they may all have a different nexus when it comes to cultural resources, so the Implementation Plan defining universal expectations would be helpful.
- Garret Engelke noted there is an archaeologist at the restoration center at NOAA so they can initiate consultation with Tribes to handle NHPA Section 106 permitting for projects funded by NOAA.
- George Swanaset Jr. also noted the Section 106 process. If they can look at all the proposed projects they can review for cultural resources when the times comes. Can communicate proactively to identify concerns.

Appendix D
Feasibility Assessment

City of Bellingham Fish Barrier Culvert Remediation

Feasibility Assessment

Introduction and Purpose

This Feasibility Assessment is associated with the voluntary 2022 *Fish Passage Culvert Remediation Project Memorandum of Agreement* (MOA) between the City of Bellingham, Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife. The MOA objectives are to complete an inventory, prioritization, and schedule to remediate City-owned culverts that block or partially block anadromous and resident fish passage. This Feasibility Assessment was conducted by the City of Bellingham to inform the schedule for fish passage remediation.

Background

The City of Bellingham has a long history of proactively assessing and restoring habitat in the Bellingham Bay nearshore and addressing salmon habitat limitations in city watersheds. For more than 25 years, the City has implemented a combination of fish passage, estuarine and freshwater habitat projects to improve salmon habitat and water quality improvement projects totaling more than $43,000,000. While grants provide the majority funding for these improvement projects, the City currently provides foundational funding through the City's Storm and Surface Water Utility Fund. These utility funds support permanent staff positions, long-term maintenance, and grant match for habitat restoration projects. In addition to funding restoration, the utility is responsible for funding other critical environmental improvements including: reducing discharge of pollutants, maintaining compliance with the City's National Pollution Discharge and Elimination System (NPDES) Phase II Permit, reducing flood risk, and responding to flooding and erosion damages.

Fish habitat improvements have been the centerpiece of City restoration efforts. Fish passage became a more intentional focus in 2003 when the City of Bellingham formally began a fish passage improvement program. This program helps meet the goals and policies of the Bellingham City Council's Strategic Commitments, the Bellingham Comprehensive Plan and the goals and objectives of the City of Bellingham Surface and Stormwater Comprehensive Plan. As part of the program, the City inventories known culverts and identifies high priority barrier improvement projects for planning and implementation. The MOA is a recent update to the City's fish passage program and is the first formal partnership with Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife for improvements to City-owned barriers.

Methods

In 2023 and 2024, the City of Bellingham, Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife completed an inventory and prioritization of City-owned fish passage barriers. City engineering and restoration staff conducted a feasibility assessment on the highest priority culverts with the purpose of identifying constraints or

considerations that may affect the schedule for restoring fish passage. This feasibility assessment is a preliminary screening, conducted as a desktop review with available information.

The 60 highest priority sites from the *Fish Passage Barriers Prioritization: City of Bellingham Culvert Inventory, Prioritization and Implementation Plan Development* (ESA 2024) were reviewed by a City engineer and biologist for the eight factors (**Table 1**, below).

Table 1. Feasibility assessment factors

Factor	Description	Sources
Contamination and structural considerations	Presence of known contamination and/or conditions likely to affect structure depth or complexity such as geotechnical conditions and channel width	site-specific information, identified sites of contamination, USDA soils mapping, 2022 aerial photo
Type and quantity of remediation actions	Identified type of actions from three potential options consistent with Brian Abbott Fish Passage Improvement Board (FBRB) guidance: abandonment, culvert, bridge. Quantity of action based on estimated location of remediation, stream width, number of road/driveway crossings.	2022 aerial photo, City GIS databases, experience with three FBRB design projects in 2024-2025
Estimated cost	Used three basic cost categories based on remediation type: $500K (abandonment), $3M (culvert), $7M (bridge).	60% - 90% cost estimates from three design projects in 2024-2025 designed to FBRB standards
Dependence on other landowners	Right-of-entry requirements, associated private infrastructure, single structure with multiple ownership	City GIS databases, site-specific information
Affected utilities	Storm, sewer, water utilities potentially affected by project	City GIS databases
Sensitive cultural or historic resources	Known cultural/archaeological sites, high probably sites	prior City projects
Staff capacity	Staff availability for restoration, engineering, accounting, grant management, construction inspection, and contracts support	2025 City staffing levels
Funding availability	City utility funding, grant funding	City Storm and Surface Water Utility expenses/revenue projections (including cost escalation, debt service, existing capital expenditures)

Results and Conclusions

The results of the feasibility assessment are shown in **Table 2**. While all factors are important considerations for implementation, estimated cost and funding availability are expected to be the most influential factors for schedule. The estimated costs identified in this feasibility assessment are high-level, generalized costs based on the anticipated type of structure and number of structures. The type of structure was determined primarily based on any known geotechnical concerns and channel span, with bridges assigned to sites with expectations for unstable soils and/or spans greater than 25 feet. Costs included three generalized project categories (abandonment, culvert, and bridge). The general cost assigned to each project category is based on 60% and 90% engineers estimates from 2024 and 2025 City of Bellingham fish passage projects designed to meet Brian Abbott Fish Barrier Removal Board criteria. Based on this approach, remediation of all 60 prioritized sites is estimated to require the equivalent cost of 13 abandonment projects, 39.33 culvert projects, and 23.5 bridge projects. In 2025 dollars, with no accounting for inflation for future projects, the total cost is estimated at $289,000,000.

The schedule for fish passage remediation will primarily depend on the availability of grant funding. The City currently provides foundational funding through the City's Storm and Surface Water Utility Fund. These utility funds support permanent staff positions, long-term maintenance, and grant match. However, due to the high cost of fish passage remediation, the majority of funding will need to come from external sources, likely grants. Grant funding has been uncertain and cyclical. The City of Bellingham has dedicated significant staff time to grant management and has been successful in obtaining grant funding; nevertheless, there are limited grant opportunities for fish passage projects.

Table 2. Feasibility assessment results

Prioritization Ranking	Barrier No	City Project Number	Stream	Road Crossing	Abandonment/ Other ($0.5M)	Culvert ($3M)	Bridge ($7M)	Notes
1	991104	EN060	Squalicum Creek	Roeder Ave			3	City barrier must be addressed in conjunction with 2 other entity barriers, BNSF and Port
2	602273	EN059	Squalicum Creek	Squalicum Pkwy			1	
3	811121	EN064	Squalicum Creek	Squalicum Way			1	BNSF
4	991105	EN064	Squalicum Creek	West St			1	BNSF
5	920646		Squalicum Creek	Squalicum Way			2	BNSF
6	920649		Squalicum Creek	footpath	1			
7	01.0552 2.00	ES564	Squalicum Creek	Meridian St			1	
8	920625		Whatcom Creek	Cornwall Ave			1	
9	994375	EN061	Padden Creek	Harris St			1	cultural resources
10	994390	EN061	Padden Creek	footpath; 8th St		1		cultural resources
11	370647		Whatcom Creek	Grand Ave			1	
12	01.0622 0.30		Padden Creek	10th St			1	

Prioritization Ranking	Barrier No	City Project Number	Stream	Road Crossing	Abandonment/ Other ($0.5M)	Culvert ($3M)	Bridge ($7M)	Notes
13	01.0622 0.80		Padden Creek	16th St		1		
14	01.0622 0.50	EN056	Padden Creek	12th St		1		
15	01.0622 0.70	EN056	Padden Creek	14th St		1		
16	992984		Spring Creek	Kellogg Rd			1	
17	991599		Padden Creek	39th St ROW	1			
18	991600		Padden Creek	Lake Padden Outlet		1		policy decisions needed
19	994370	EN062	Padden Creek	30th St			1	Landowner permission needed
20	992981		Spring Creek	E Bakerview Rd			1	
21	01.0555 0.00		Baker Creek	Telegraph Rd			1	Limited habitat value unless private barrier remediated
22	993038		Baker Creek	Telegraph Rd		1		Landowner permission needed
23	993006		Baker Creek	James St			1	
24	993040		Baker Creek	E Bakerview Rd		1		Landowner permission needed

Prioritization Ranking	Barrier No	City Project Number	Stream	Road Crossing	Abandonment/ Other ($0.5M)	Culvert ($3M)	Bridge ($7M)	Notes
25	993093		Baker Creek	Hannegan Flood Dam	1			Needs Ecology dam safety review
26	993821		Baker Creek	Hannegan Rd		1		Landowner permission
27	370683		West Cemetery Creek	Old Lakeway Dr			1	
28	1280163		East Bear Creek	Horton Flood Dam		1		Needs Ecology dam safety review
29	370658		West Cemetery Creek	Lakeway Dr			1.5	Deep ravine, costs higher than typical
30	993443		Baker Creek	Hannegan Rd		1		
31	370673	EV181	Lincoln Creek	Fraser St			1	Coordinate with private barrier remediation
32	370648		West Cemetery Creek	Lopez St		1		Landowner permission needed
33	993883		North Baker Creek	Deemer Rd		1		
34	992656		Connelly Creek	Happy Valley Flood Dam	1			Minor cost, not abandonment. Needs Ecology dam safety review
35	932767		Padden Creek	footpath		0.5		

Prioritization Ranking	Barrier No	City Project Number	Stream	Road Crossing	Abandonment/ Other ($0.5M)	Culvert ($3M)	Bridge ($7M)	Notes
36	993886		North Baker Creek	Bakerview Rd		1		
37	993880		Baker Creek	E McLeod Rd		1		
38	920647	EW238	Fever Creek	Valencia St	6	4		Permit agreements for partial fish passage with EW238, will address fish passage again at end of life of pipe (2074)
39	935975		East Bear Creek	Cordata Pkwy		2.5		Higher than typical utility and easement costs
40	992059		Our Lake Creek	Lake Padden Park Golf Course access road		0.33		Lower cost due to small road size, good access, narrow stream
41	370661		Fever Creek	Alabama St		3		Landowner permission needed
42	370663		Fever Creek	Superior St		1.5		Landowner permission needed
43	920634		Whatcom Creek	Woburn St			1	
44	996048		California St Creek	Interurban Trail		1		

Prioritization Ranking	Barrier No	City Project Number	Stream	Road Crossing	Abandonment/ Other ($0.5M)	Culvert ($3M)	Bridge ($7M)	Notes
45	920635		Lincoln Creek	Potter St		1	1	Limited habitat value unless private barrier remediated
46	920652		East Bear Creek	Horton Rd		1		Landowner permission needed, coordinate with private barrier remediation
47	993884		North Baker Creek	Telegraph Flood Dam				Minor cost, not abandonment, needs Ecology dam safety review, needs landowner permission
48	991609		Our Lake Creek	footpath	1			
49	370664		Fever Creek	E Maryland		1		
50	932760		Our Lake Creek	not a road				
51	370678		Lincoln Creek	Lincoln St		1		Landowner permission needed
52	993483		Hoags Creek	Interurban Trail		0.5		
53	934428		North Baker Creek	Montgomery Rd		1		
54	993482		Hoags Creek	25th St		0.5		
55	993487		Hoags Creek	not a road		0.5		

Prioritization Ranking	Barrier No	City Project Number	Stream	Road Crossing	Abandonment/ Other ($0.5M)	Culvert ($3M)	Bridge ($7M)	Notes
56	932757		Governor Creek	Samish Wy and footpath		1		
57	936083		East Bear Creek	Silver Creek		1		
58	370660		Fever Creek	Whatcom Creek	2	2		Landowner permission needed
59	609961		East Bear Creek Trib #2	Silver Creek		1		
60	370659		Fever Creek	Xenia St		1		Landowner permission needed
	TOTAL				**13**	**39.33**	**23.5**	
	Cost (2025 Dollars)				**$6.5M**	**$118.0M**	**$164.5M**	
	GRAND TOTAL COST (2025 Dollars)				**GRAND TOTAL $289M**			

Appendix E

Remediation Milestones and Projections in MS Excel File

Milestones and Projections for City-owned Barriers Affecting Anadromous Fish Passage

City of Bellingham Fish Barrier Culvert Remediation
Milestones and Projections: 2025 - 2030

Introduction and Purpose

This Milestones and Projections document is associated with the voluntary 2022 *Fish Passage Culvert Remediation Project Memorandum of Agreement* (MOA) between the City of Bellingham, Nooksack Indian Tribe, Lummi Nation, and the Washington Department of Fish and Wildlife. The MOA objectives are to complete an inventory, prioritization, and schedule to remediate City-owned culverts that block or partially block anadromous and resident f ish passage. This Milestones and Projections document was created by the City of Bellingham to fulfill the Milestones and Projections progress measurements described in the *City of Bellingham Fish Passage Barrier Culvert Remediation: Implementation Plan* (ESA, 2025).

The purpose of Milestones is to describe the near-term work that MOA signatories will focus on in the coming 6 years. Milestones are intended to be realistically achievable based on anticipated funding levels. All MOA signatories acknowledge that the portion of the work that is dependent on funding external to City sources, e.g., grant funding, is uncertain and contingent on the City receiving external funding. This document is for the 6-year timeframe 2025 through 2030. The purpose of the Projections is to describe the longer-term estimate of progress desired towards the Program Goal of restoring access to 100% of the length of anadromous and resident fish habitat blocked or partially blocked by City-owned culverts. Given the uncertainty of receiving external funding through federal and state grants, MOA signatories do not have full control over being able to meet these projections. The City of Bellingham will provide annual updates to this Milestones and Projections document as part of the Implementation Plan's Program-level Coordination.

Milestones and Projections for 2025 -2030

The schedule for fish passage remediation will primarily depend on the availability of grant funding. The City currently provides foundational funding through the City's Storm and Surface Water Utility Fund. These utility funds support permanent staff positions, long-term maintenance, and grant match. However, due to the high cost of fish passage remediation, the majority of funding will need to come from external sources, likely grants. Grant funding has been uncertain and cyclical. The City currently provides foundational funding for fish passage remediation through the City's Storm and Surface Water Utility Fund. These utility funds support permanent staff positions, long-term maintenance, and grant match. The "City Direct Contribution" in the table below reflects direct cash contributions and does not include the additional operational funding contributions including engineering, biology, accounting, inspection, real property, and legal services.

Prioritization Ranking	WDFW Site ID	Creek Name	Watershed	Road Crossing	Anadromous-accessible or only Resident fish accessible?	Length (miles) of upstream anadromous habitat below the next City-owned barrier upstream	Length (miles) of upstream non-anadromous habitat below the next upstream barrier	6-year Milestones	60-year Projections	2025 Total Cost Estimate	2025 Project Status	2025 Funding Status
1	991104	Squalicum Creek	Squalicum Creek	Roeder Ave	Anadromous	0.50	0.00	X	X	TBD	0%-60% Design: EN060 Squalicum Creek Estuary	$1.84M Federal Culvert AOP (secured), $300K Ecology Toxics Cleanup (pending), $80K Port of Bellingham (secured), $80 City of Bellingham (secured)
2	602273	Squalicum Creek	Squalicum Creek	Squalicum Pkwy	Anadromous	3.35	0.96	X	X	$8.1M	60% Design - Construction: EN059 Squalicum Creek at Baker Creek Fish Passage Improvements (pending landowner permissions)	$4.1M State FBRB (secured), $730K City of Bellingham (secured), $4.1M Federal NOAA (pending)
3	811121	Squalicum Creek	Squalicum Creek	Squalicum Way	Anadromous	0.28	0.00	X	X	TBD	0%-30% Design: EN064 Squalicum Creek at West St Fish Passage Improvements	$300K Federal NOAA (secured), $90K City of Bellingham (secured)
4	991105	Squalicum Creek	Squalicum Creek	West St	Anadromous	0.55	0.00	X	X	TBD	0%-30% Design: EN064 Squalicum Creek at West St Fish Passage Improvements	$300K Federal NOAA (secured), $90K City of Bellingham (secured)
5	920646	Squalicum Creek	Squalicum Creek	Squalicum Way	Anadromous	0.34	1.08					
6	920649	Squalicum Creek	Squalicum Creek	footpath	Anadromous	20.94	0.00		X			
7	01.0552 2.00	Squalicum Creek	Squalicum Creek	Meridian St	Anadromous	0.11	0.00	X	X	TBD	0%-60% Design: ES-564 Meridian-Birchwood Multimodal Transportation Improvements	$300K Local EDI (secured), $6.69M Federal Culvert AOP (pending)
8	920625	Whatcom Creek	Whatcom Creek	Cornwall Ave	Anadromous	3.89	0.00		X			
9	994375	Padden Creek	Padden Creek	Harris St	Anadromous	0.06	0.00	X	X	TBD	0%-30% Design: EN061 Padden Creek Estuary Fish Passage Improvements	$204K City of Bellingham (secured), $1,57M State FBRB (secured)
10	994390	Padden Creek	Padden Creek	footpath; 8th St	Anadromous	0.23	0.00	X	X	TBD	0%-30% Design: EN061 Padden Creek Estuary Fish Passage Improvements	same as above
11	370647	Whatcom Creek	Whatcom Creek	Grand Ave	Anadromous	0.31	0.00					
12	01.0622 0.30	Padden Creek	Padden Creek	10th St	Anadromous	0.14	0.00		X			
13	01.0622 0.80	Padden Creek	Padden Creek	16th St	Anadromous	1.55	0.88		X			
14	01.0622 0.50	Padden Creek	Padden Creek	12th St	Anadromous	0.23	0.00	X	X	$3.1M	Construction: EN056 Padden Creek at 12th St Fish Passage Improvement	$2.6M State FBRB (secured), $468K City of Bellingham (secured)
15	01.0622 0.70	Padden Creek	Padden Creek	14th St	Anadromous	0.22	0.05	X	X	$3.2M	Construction: EN056 Padden Creek at 14th St Fish Passage Improvement	$2.7 State FBRB (secured), $498 City of Bellingham (secured)
16	992984	Spring Creek	Squalicum Creek	Kellogg Rd	Anadromous	4.98	0.00					
17	991599	Padden Creek	Padden Creek	39th St ROW	Anadromous	0.22	0.00					
18	991600	Padden Creek	Padden Creek	Lake Padden	Anadromous	1.80	0.00					
19	994370	Padden Creek	Padden Creek	30th St	Anadromous	0.90	0.00	X	X	TBD	30% - 60% Design: EN062 Padden Creek at 30th St Fish Passage Improvements (pending landowner permissions)	$4.1M State FBRB (secured), $287K City of Bellingham (secured), $3.7M Federal NOAA (pending)
20	992981	Spring Creek	Squalicum Creek	E Bakerview Rd	Anadromous	0.48	0.00					
21	01.0555 0.00	North Fork Baker Creek	Squalicum Creek	Telegraph Rd	Anadromous	0.35	0.00					
22	993038	Baker Creek	Squalicum Creek	Telegraph Rd	Anadromous	0.48	0.00					
23	993006	Baker Creek	Squalicum Creek	James St	Anadromous	0.24	0.00		X		Planned as part of future James St multimodal improvements	
24	993040	Baker Creek	Squalicum Creek	Bakerview Rd E	Anadromous	0.47	0.00					
25	993093	Baker Creek	Squalicum Creek	Hannegan Flood Dam near Strider Lp	Anadromous	0.43	0.00					
26	993821	Baker Creek	Squalicum Creek	Hannegan Rd	Anadromous	1.67	0.00					
27	370683	West Cemetery Creek	Whatcom Creek	Old Lakeway Dr	Anadromous	0.37	0.00					
28	1280163	East Bear Creek	Silver Creek	Pacific Rim Ct	Anadromous	0.45	0.00					
29	370658	West Cemetery Creek	Whatcom Creek	Lakeway Dr	Anadromous	0.13	0.00					
30	993443	Baker Creek	Squalicum Creek	Hannegan Rd	Anadromous	0.28	0.00					
31	370673	Lincoln Creek	Whatcom Creek	Fraser St	Anadromous	0.54	0.00					
32	370648	West Cemetery Creek	Whatcom Creek	Lopez St	Anadromous	0.87	0.05					
33	993883	North Fork Baker Creek	Squalicum Creek	Deemer Rd	Anadromous	0.54	0.00					
34	992656	Connelly Creek	Padden Creek	footpath; Mill Ave	Anadromous	0.37	0.00					
35	932767	Padden Creek	Padden Creek	footpath	Anadromous	0.70	0.11					
36	993886	North Fork Baker Creek	Squalicum Creek	Bakerview Rd	Anadromous	0.92	0.00					

Prioritization Ranking	WDFW Site ID	Creek Name	Watershed	Road Crossing	Anadromous-accessible or only Resident fish accessible?	Length (miles) of upstream anadromous habitat below the next City-owned barrier upstream	Length (miles) of upstream non-anadromous habitat below the next upstream barrier	6-year Milestones	60-year Projections	2025 Total Cost Estimate	2025 Project Status	2025 Funding Status
37	993880	Baker Creek	Squalicum Creek	E McLeod Rd	Anadromous	0.71	0.00					
38	920647	Fever Creek	Whatcom Creek	Valencia St	Anadromous	0.45	0.00				EW238 Valencia St Watermain, 2024 construction in coordination with MOA signatories, partial barrier remains until end of life, mitigated	$4M (secured)
39	935975	East Bear Creek	Silver Creek	Cordata Pkwy	Anadromous	0.54	0.00					
40	992059	Our Lake Creek	Padden Creek	Lake Padden Park Golf Course access road	Anadromous	1.08	0.00					
41	370661	Fever Creek	Whatcom Creek	Alabama St	Anadromous	0.14	0.00					
42	370663	Fever Creek	Whatcom Creek	Superior St	Anadromous	0.21	0.07					
43	920634	Whatcom Creek	Whatcom Creek	Woburn St	Anadromous	0.31	0.00					
44	996048	California St Creek	Chuckanut Creek	Interurban Trail	Anadromous	0.28	0.38					
45	920635	Lincoln Creek	Whatcom Creek	Potter St	Anadromous	0.73	0.00					
46	920652	East Bear Creek	Silver Creek	Horton Rd	Anadromous	0.32	0.00					
47	993884	North Fork Baker Creek	Squalicum Creek	Telegraph Rd	Anadromous	0.47	0.18					
48	991609	Our Lake Creek	Padden Creek	footpath	Anadromous	0.09	0.00					
49	370664	Fever Creek	Whatcom Creek	E Maryland	Anadromous	0.48	0.00					
50	932760	Our Lake Creek	Padden Creek	not a road	Anadromous	0.19	0.00	X	X	$8K	COMPLETE	$8K City of Bellingham (secured)
51	370678	Lincoln Creek	Whatcom Creek	Lincoln St	Anadromous	0.14	0.00					
52	993483	Hoags Creek	Chuckanut Creek	Interurban Trail	Anadromous	0.03	0.00					
53	934428	North Fork Baker Creek	Squalicum Creek	Montgomery Rd	Anadromous	0.49	0.00					
54	993482	Hoags Creek	Chuckanut Creek	25th St	Anadromous	0.05	0.00					
55	993487	Hoags Creek	Chuckanut Creek	not a road	Anadromous	0.06	0.00					
56	932757	Governor Creek	Padden Creek	Samish Wy and footpath	Anadromous	0.50	0.20					
57	936083	East Bear Creek	Silver Creek	Tremont Ave	Anadromous	0.47	0.00					
58	370660	Fever Creek	Whatcom Creek	Woburn St	Anadromous	0.13	0.00					
59	609961	East Bear Creek Trib #2	Silver Creek	W Horton Rd	Anadromous	0.56	0.03					
60	370659	Fever Creek	Whatcom Creek	Xenia St	Anadromous	0.07	0.00					
61	932746	Golf Course Creek	Padden Creek	golf course crossing	Anadromous	0.12	0.00					
62	992659	Connelly Creek	Padden Creek	32nd St	Anadromous	0.14	0.00					
63	370679	Magnolia Creek	Whatcom Creek	Woburn St	Anadromous	0.08	0.01					
64	932748	Golf Course Creek	Padden Creek	golf course crossing	Anadromous	0.08	0.00					
65	370649	West Cemetery Creek	Whatcom Creek	San Juan Blvd	Anadromous	0.41	0.00					
66	932750	Golf Course Creek	Padden Creek	golf course crossing	Anadromous	0.21	0.00					
67	932747	Golf Course Creek	Padden Creek	golf course crossing	Anadromous	0.04	0.00					
68	609965	Cammack Creek	Squalicum Creek	not a road	Anadromous	0.27	0.00					
69	609966	Landon Creek	Squalicum Creek	Bakerview Rd	Anadromous	0.06	0.00					
70	609967	Landon Creek	Squalicum Creek	Landon Ave	Anadromous	0.17	0.00					
71	609962	East Bear Creek Trib #3	Silver Creek	W. Horton Rd	Anadromous	0.29	0.00					
72	932749	Golf Course Creek	Padden Creek	golf course cart path	Anadromous	0.02	0.00					
73	993881	South Baker Creek	Squalicum Creek	James St	Anadromous	0.26	1.03		X		Planned as part of James St multimodal improvements	
74	920636	Lincoln Creek	Whatcom Creek	Lincoln St	Anadromous	0.15	0.00					
75	998079	McCormick Creek	Squalicum Creek	not a road	Anadromous	0.05	0.00					
76	992657	30th St Creek	Padden Creek	Taylor Ave	Anadromous	0.27	0.00					
77	609993	Landon Creek	Squalicum Creek	Landon Ave	Anadromous	0.19	0.00					
78	932752	Golf Course Creek	Padden Creek	golf course crossing	Anadromous	0.11	0.00					
79	920640	St Clair Creek	Whatcom Creek	New Haven Pl	Anadromous	0.12	0.33					
80	936155	Bear Creek Trib #2	Silver Creek	Aldrich Rd	Anadromous	0.04	0.00					
81	936156	Bear Creek Trib #2	Silver Creek	Aldrich Rd	Anadromous	0.04	0.00					
82	996054	Connelly Creek	Padden Creek	34th St	Anadromous	0.08	0.00					
83	932753	Golf Course Creek	Padden Creek	golf course crossing	Anadromous	0.03	0.00					
84	992662	Connelly Creek	Padden Creek	Samish Wy	Anadromous	0.15	0.00					
85	936157	Bear Creek Trib #2	Silver Creek	Aldrich Rd	Anadromous	0.03	0.00					
86	936159	Bear Creek Trib #2	Silver Creek	Aldrich Rd	Anadromous	0.00	0.00					
87	992664	Connelly Creek	Padden Creek	37th St	Anadromous	0.07	0.26					
88	920644	30th St Creek	Padden Creek	32nd St	Anadromous	0.08	0.00					
89	920641	Fever Creek	Whatcom Creek	St Clair St	Anadromous	0.06	1.08					
90	992665	Connelly Creek	Padden Creek	38th St	Anadromous	0.03	0.00					
91	609969	Mill Wheel Creek	Lake Whatcom	Flynn St	Resident	0.00	0.91					
92	370670	Hanna Creek	Whatcom Creek	Water Plant Rd	Resident	0.00	0.46					
93	370680	Cemetery Creek	Whatcom Creek	Woburn	Resident	0.00	0.08					
94	370650	Cemetery Creek	Whatcom Creek	Lakeway Dr	Resident	0.00	0.17					
95	370681	Cemetery Creek	Whatcom Creek	road in Bay View Cemetery	Resident	0.00	0.03					
96	370682	Cemetery Creek	Whatcom Creek	road in Bay View Cemetery	Resident	0.00	0.13					
97	370672	Hanna Creek	Whatcom Creek	Lakeway Dr	Resident	0.00	1.46					

Prioritization Ranking	WDFW Site ID	Creek Name	Watershed	Road Crossing	Anadromous-accessible or only Resident fish accessible?	Length (miles) of upstream anadromous habitat below the next City-owned barrier upstream	Length (miles) of upstream non-anadromous habitat below the next upstream barrier	6-year Milestones	60-year Projections	2025 Total Cost Estimate	2025 Project Status	2025 Funding Status
98	370652	Cemetery Creek	Whatcom Creek	W Clearbrook Dr	Resident	0.00	0.15					
99	609980	Cemetery Creek	Whatcom Creek	Alvarado Dr	Resident	0.00	1.61					
100	370666	Hanna Creek	Whatcom Creek	Silver Beach Rd	Resident	0.00	0.19					
101	370155	Mill Wheel Creek	Lake Whatcom	Cedarbrook Ct	Resident	0.00	0.09					
102	370601	Mill Wheel Creek	Lake Whatcom	Willowbrook Ln	Resident	0.00	0.04					
103	370653	Cemetery Creek	Whatcom Creek	Likely Ct	Resident	0.00	0.11					
104	609991	Lakeside Creek	Lake Whatcom	Lakeside Ave	Resident	0.00	0.58					
105	370665	Hanna Creek	Whatcom Creek	Electric Ave	Resident	0.00	0.12					
106	370236	Mill Wheel Creek	Lake Whatcom	Fir St	Resident	0.00	0.20					
107	609989	Silver Beach Creek	Lake Whatcom	Northshore Dr	Resident	0.00	0.45					
108	609990	Academy Creek	Lake Whatcom	Northshore Rd	Resident	0.00	0.04					
109	370335	Mill Wheel Creek	Lake Whatcom	Lakeway Dr	Resident	0.00	0.28					
110	609972	Hanna Creek	Whatcom Creek	Portal Dr	Resident	0.00	0.90					
111	370668	Park Creek	Whatcom Creek	Silver Beach Rd	Resident	0.00	0.02					
112	370334	Mill Wheel Creek Trib West	Lake Whatcom	Lakeway Dr	Resident	0.00	0.16					
113	370669	Park Creek	Whatcom Creek	Lakeway Dr	Resident	0.00	0.35					
114	370143	Silver Breach Creek Trib	Lake Whatcom	Britton Rd	Resident	0.00	0.11					
115	609994	Academy Creek	Lake Whatcom	not a road	Resident	0.00	0.43					
116	609970	Mill Wheel Creek	Lake Whatcom	Oriental Ln	Resident	0.00	0.71					
117	370154	Mill Wheel Creek Trib East	Lake Whatcom	Cedar Hills Ave	Resident	0.00	0.23					
118	370336	Mill Wheel Creek Trib East	Lake Whatcom	Lakeway Dr	Resident	0.00	0.31					
119	609971	Mill Wheel Creek Trib West	Lake Whatcom	Parkstone Wy	Resident	0.00	0.47					
120	609975	Park Creek	Whatcom Creek	Raymond St	Resident	0.00	0.57					
121	609978	Park Creek	Whatcom Creek	parallel to Raymond St	Resident	0.00	0.02					
122	609977	Park Creek	Whatcom Creek	parallel to Raymond St	Resident	0.00	0.04					
123	609997	Mill Wheel Creek Trib West	Whatcom Creek	not a road	Resident	0.00	0.09					
124	609979	Park Creek	Whatcom Creek	Raymond St	Resident	0.00	0.01					
125	609976	Park Creek	Whatcom Creek	parallel to Raymond St	Resident	0.00	0.03					
126	370469	Mill Wheel Creek Trib East	Lake Whatcom	Ridgewood Ave	Resident	0.00	0.15					
Anadromous and Resident Habitat Gain[1] PROGRAM GOAL												
Anadromous Miles						62.05						
Resident Miles							18.37					
Total Miles							80.42					
30-Year Projection Miles (25% anadromous habitat gain by 2054)						15.51		6.63				
60-Year Projection Miles (50% anadromous habitat gain by 2084)						31.02			31.95			
% anadromous habitat gain COMPLETED								0.3%				
% anadromous habitat gain IN PROGRESS								10.4%				

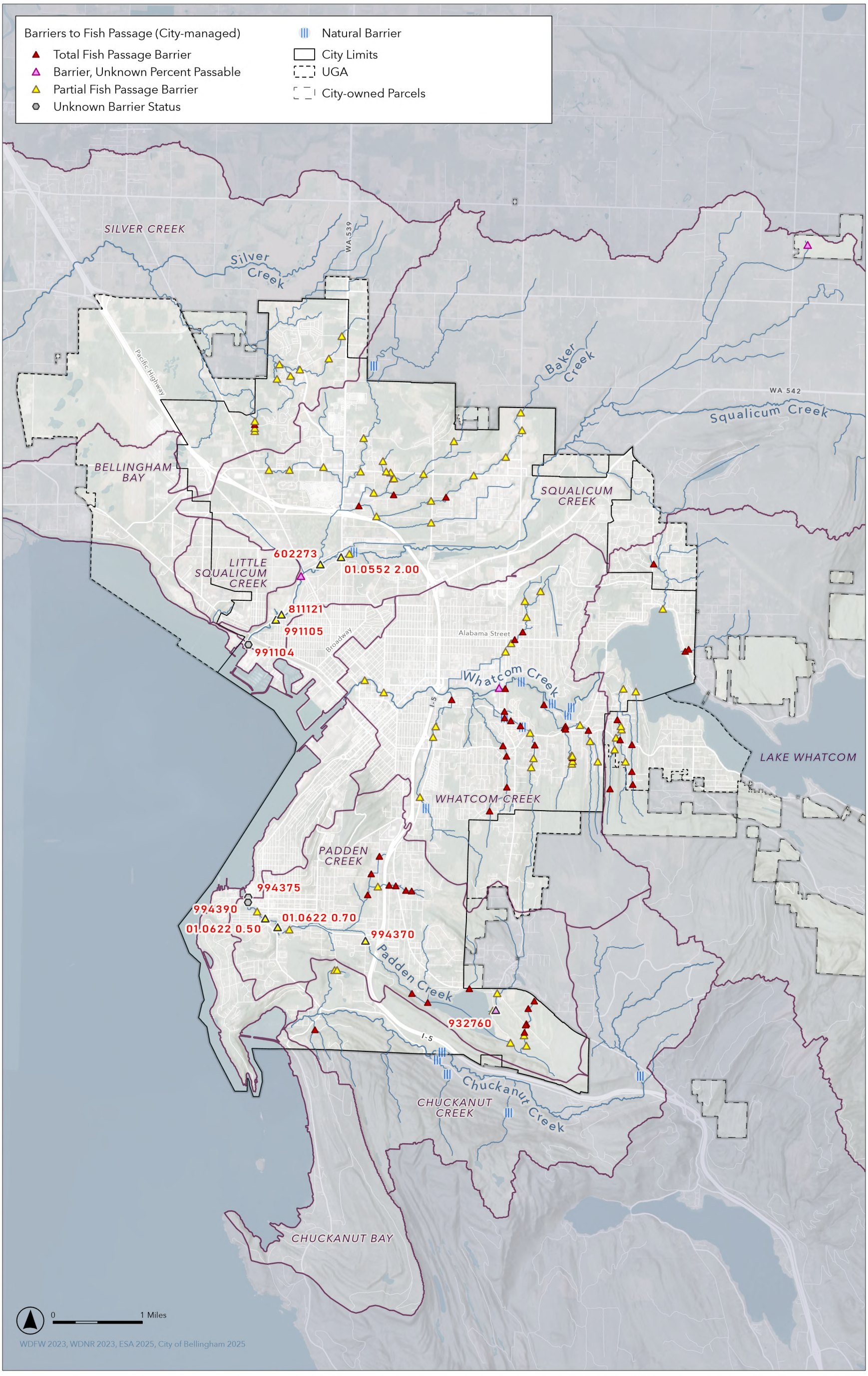
[1] % = of the anadromous-accessible salmonid habitat that is currently blocked or partially blocked by City-owned culverts as defined for the Program Goal in the *City of Bellingham Fish Passage Culvert Remediation Implementation Plan*

Appendix F

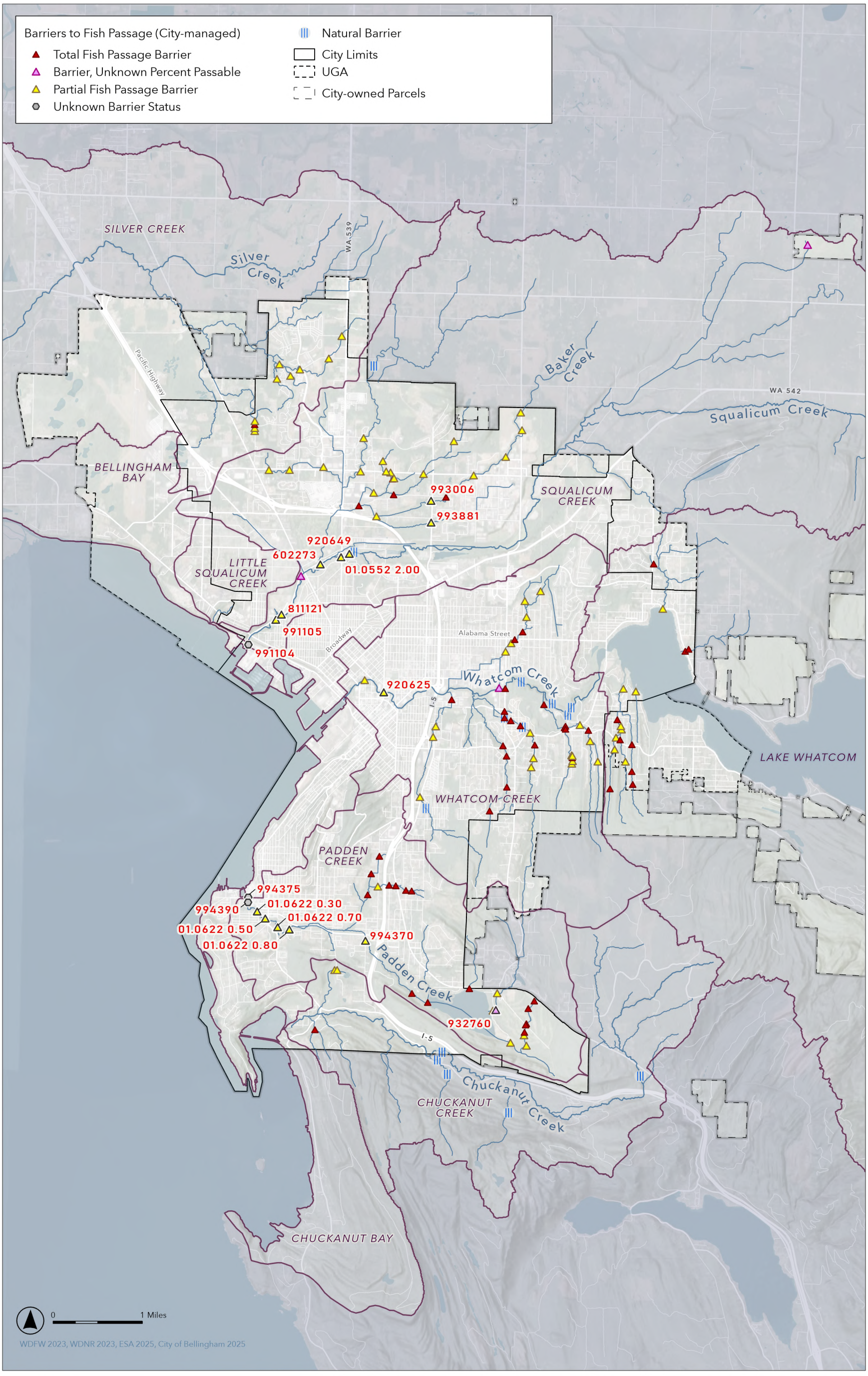
Maps of 6-Year Milestones and 60-Year Projections

Appendix F

Maps of 6-Year Milestones and 60-Year Projections



Appendix F
Fish Passage Barrier Remediation 6-Year Milestones



Appendix F
Fish Passage Barrier Remediation 60-Year Projections