Washington State Department of Transportation

CHRONIC ENVIRONMENTAL DEFICIENCY 2020 ANNUAL REPORT

WSDOT Environmental Services and Hydraulics Offices

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Environmental Services Office
Biology Branch
Stream Restoration Program

WSDOT Chronic Environmental Deficiency (CED) Program Annual Report 2020

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Cover Photo: SR 504 Wooster Creek CED, two years post-construction, December 2020. Drone footage provided by Tony Bush and Keisha Chinn, WSDOT Environmental Services Office.

Table of Contents

List of Tables

List of Figures

CED Program Summary

Since 2002, WSDOT has worked to fix sites along state highways that require chronic maintenance or emergency repairs that result in adverse impacts to fish or fish habitat. These sites are known as Chronic Environmental Deficiencies or "CEDs". CED projects are designed to reduce or eliminate the need for maintenance activities while protecting or enhancing fish habitat.

To date, WSDOT has:

- Constructed 57 CED stream habitat and infrastructure improvement projects. One of these was constructed in 2020.
- Invested more than $94 M[1] in dedicated CED improvement funds in designing and constructing CED projects.
- CEDs are also addressed using FHWA emergency funds and other sources, such as preservation, maintenance, fish passage, or transportation improvement projects that amount to more than $139 M[1].
- Planned stand-alone CED project funding level for the 19-21 biennium is approximately $3.9M.
- Planned stand-alone CED project funding level for the 21-23 biennium is approximately $5.4M.
- Currently there are 63 active CED sites.

[1] Historic expenditures were obtained from WSDOT's Transportation Executive Information System (TEIS) database, Version CPMS-DM on January 6, 2021 and filtered for A, C, H, L, S, T, V, X, and Y funding approval status. Historic CED I-4 expenditures were determined by filtering for I-4 CED dedicated funds. Costs of recently completed projects were determined from Version ACT-DM on February 4, 2021. Total expenditures on CED projects were determined by adding the historic expenditures (from any WSDOT funding source) of each constructed stand-alone project. CED projects that were constructed by maintenance or as part of other Transportation projects were not included.

Introduction

This report summarizes WSDOT's progress in implementing the Chronic Environmental Deficiency program during the 2020 calendar year, and accomplishments since program inception in 2002. There are seven main sections of this report, which describe:

- Background information on the CED Program
- CED Program accomplishments in 2020
- CED Program planning for 2021 and beyond
- Inventory of all non-active CED sites by status
- Active CEDs in each WSDOT region
- CED project monitoring
- An Appendix that lists all CEDs and their status by road and milepost

Background

Reducing the impacts of maintenance and emergency actions on the aquatic environment and improving aquatic habitat adjacent to state highways is an important part of the State's efforts to restore fish habitat and contribute to salmon recovery efforts.

When roads are located along waterbodies, over time they may become damaged by seasonal high flows, mass wasting, and severe storms. Traditionally, the maintenance or emergency response has been to protect the road using rock armor to stabilize eroding banks and protect them from the force of high stream flows, or to dredge and rechannelize streams to prevent blockage of stream crossing structures. Often these actions only address a symptom of larger-scale watershed processes, can exacerbate the contributing problem, require frequent repetition, and result in continued threats to the roadway and potential road closures. This approach can have direct impacts on fish and result in significant loss of aquatic habitat in the ongoing cycle of damage and repair.

While historic design of the road system often ignored ecological and fluvial processes, new highway projects consider these processes in their design. Many of WSDOT's roads, bridges, and culverts were built years ago when natural watershed processes were poorly understood. Avoiding future chronic repairs at these sites often requires construction of complex in-water structures or redesign of culverts and bridges.

Overview of the Chronic Environmental Deficiency (CED) Program

A Chronic Environmental Deficiency (CED) is a location along a state highway that is adjacent to a waterbody, and where recent, frequent repairs or maintenance (typically 3 times in 10 years) to WSDOT infrastructure cause adverse impacts to fish or fish habitat. These sites are often subject to frequent streambank erosion, sedimentation, flooding, washouts, or other environmental threats that if left unaddressed can require emergency repairs, result in road closures, and reduce the safety of the traveling public (Figure 1).

In 2002 WSDOT signed a Memorandum of Agreement (MOA) with the Washington Department of Fish and Wildlife (WDFW) wherein WSDOT agreed to establish the CED Program. The CED Program implements a process between WSDOT and WDFW to collaboratively develop and construct long-term solutions that reduce impacts to fish from repetitive repairs, optimize process-based improvements to fish habitat, and meet WSDOT's

Figure 1. Typical CED sites - Sauk River Side Channel CED, Mud Creek CED, May Creek Tributary CED.

infrastructure preservation needs. As part of this, WSDOT developed a funding category to provide an inventory, scoping, prioritization, and programming process for CED correction projects. The MOA was subsequently updated in 2008 and 2016.

CED Program Goals

The goals of the CED Program are to

- Protect WSDOT infrastructure from environmental threats.
- Reduce the need for repetitive maintenance and emergency actions that impact fish and aquatic habitat.
- Improve fish habitat by constructing solutions that minimize the use of damaging material (angular rock) in the aquatic environment and emulate habitat features and natural instream processes.
- Reduce maintenance costs and support WSDOT's mandate to maintain state highway infrastructure.
- Increase the safety of WSDOT roadways and their resiliency to climate change.
- Reduce the loss of commerce due to road closures.
- Simplify the permitting process with WDFW.

As such, CED solutions encourage the natural watershed processes that improve fish habitat and minimize maintenance using techniques that:

- Reduce the need for frequent fish salvage or removal of streambed material.
- Incorporate large wood
- Encourage pool formation
- Reconnect floodplains
- Activate side channels, and
- Encourage establishment of riparian vegetation.

Although the CED Program is not a restoration program, it can result in significant habitat improvement, especially when a CED project overlaps other restoration efforts and there are partnership opportunities with which to coordinate efforts.

Targeted Solutions

CED solutions are based on a Site and Reach Assessment, which is a study conducted by a hydrologist or geomorphologist that evaluates the processes occurring in the watershed and identifies the mechanism for failure. It discusses alternative solutions and provides a recommendation. It describes the context of the problem so that the best possible targeted solution can be developed. Figure 2 below shows the types of CED problems and CED solutions often constructed in the CED Program.

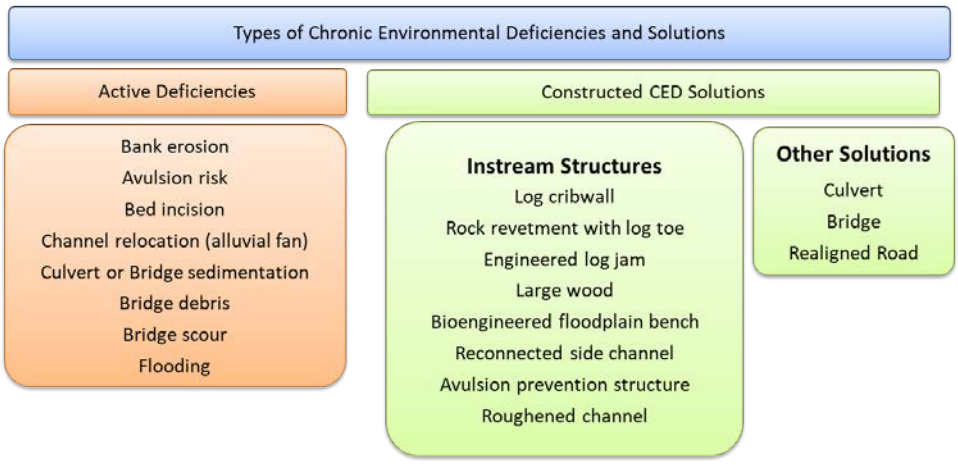


Figure 2. Types of CED problems and CED solutions.

Stakeholder Coordination

Early coordination and collaboration are key parts of the CED process. When a concept is developed, a stakeholder meeting and field visit are held to get input, discuss the problem, discuss potential solutions, and decide on a path forward. A concurrence form is signed between WDFW and WSDOT to ensure that all agree with the proposed solution.

CED Process

The following is an overview of the CED process:

Nomination and analysis

- CEDs are nominated by WSDOT, WDFW, tribes, or other stakeholders by contacting the CED Coordinator.
- CED staff determine site eligibility. To qualify, two factors must be present:
    1. Adverse habitat conditions or impacts to fish are associated with repairs to WSDOT infrastructure, and
    2. The infrastructure has been repaired or maintained 3 times in the past ten years, or there is an active threat (determined by a hydrologist) of a catastrophic failure that would require significant ongoing emergency repairs.
- A WSDOT hydrologist develops a site and reach assessment. This study evaluates the mechanism for failure, discusses alternative solutions, and recommends a feasible solution.

Concept selection and stakeholder coordination

- CED Coordinator schedules a concurrence meeting and field visit with WDFW and WSDOT regional staff to present the results of the site and reach assessment, discuss the CED problem and proposed solutions, and agree on a solution.
- WDFW and WSDOT sign a CED Concurrence form verifying that the proposed concept meets the goals of the CED agreement.
- CED Coordinator prioritizes the project relative to other CEDs based on many factors, including potential benefits to fish and aquatic habitat, risk to infrastructure and safety, maintenance burden, and WDFW and stakeholder input or partnership opportunities.
- The prioritization is used by WSDOT's Program Management staff to request funds from the legislature each biennium.

Project implementation

- CED projects are allocated limited funds from the legislature each biennium. Projects can also be funded using other sources such as preservation, maintenance, as part of other improvement projects (fish passage or transportation) or using emergency funds (if one occurs and the proposed CED solution is cost-effective and can be constructed during emergency conditions).
- Once funded, the region designs, permits, and constructs the CED project with input and assistance from CED Program staff and WDFW to ensure it continues to meet the intent of the CED Program.

Post-project monitoring

- CED sites are often experimental structures and are monitored to ensure that they continue to function as intended.

The CED Program is a Practical Solution

The CED Program has changed the way that WSDOT addresses chronic maintenance problems by taking a proactive approach to prevent the need for future repairs. The context of problems is explored through a site and reach assessment to develop targeted, innovative solutions. By doing this analysis up front and including stakeholders throughout the process, solutions aim for maximum results with limited funding. This also results in permitting efficiencies and opens the door for partnering opportunities. Ultimately, the CED Program builds trust of the public and permitting agencies and results in more resilient infrastructure.

2020 Accomplishments

CED Program Updates

COVID-19 workplace changes

Since March 2020, WSDOT staff have primarily been teleworking, and have tried to minimize the need for and size of large field meetings to prevent the spread of COVID-19. While conducting field work has become more challenging, the virtual format of most of WSDOT's communication has allowed a broader participation among stakeholders.

Prioritization scheme

Early in 2020 CED staff developed an improved method of ranking CED priorities. CEDs are located throughout the state and there is often limited quantitative information on individual site conditions. Because requests for funding and prioritization of site and reach assessments need to happen very early, it had been challenging to consistently prioritize projects across different regions and watersheds. CED program staff focused on the same factors that have been used in the past – potential fish benefit, infrastructure risk, maintenance burden, and stakeholder interest. However, they developed a consistent scoring criterion for each of those factors to assist in ranking the projects more objectively and consistently across watersheds. More information and the most recent CED priority list are included on Page 14 of this report. This prioritization is used to identify funding priorities and site and reach assessment needs.

New CED GIS layer

WSDOT updated the CED GIS layer during Fall 2020. The GIS layer had not been updated since 2017. The reformatted CED GIS layer contains the site status and other information found in Appendix 1 of this document. The new GIS layer is available both internally on the GIS Workbench and within the Geoportal, and externally at the WSDOT Online Map Center and WSDOT GIS Data Download websites.

CED projects and fish passage

As WSDOT ramps up fish passage barrier correction efforts associated with the culvert injunction, the CED program has focused on identifying CED sites that are within the culvert case area, working to update reach assessments to ensure CED problems are addressed in the fish passage project, and obtaining concurrences on projects that require a more complex solution than simply a larger water crossing structure.

Stakeholder participation in concurrence meetings

WSDOT has increased its efforts to be more inclusive of Tribal co-managers and other stakeholders in the CED concurrence process. Although the MOA is between WDFW and WSDOT, we recognize the value and responsibility to include those that have a stake in our projects at the conceptual stage. Our tribal partners were invited and enthusiastically participated in each of the three CED concurrences that were held in 2020. We believe this participation leads to better CED projects.

Seeking potential partnerships

In 2018 WSDOT successfully completed a CED project on SR 20 Beaver Creek CED in partnership with the Yakama Nation as the project lead. The success of the project inspired more creativity and focus on coordinating efforts with others and seeking partnerships. WSDOT is currently actively partnering with the Yakama Nation on the SR 207 Nason Creek CED project and the US 2 Skinny Creek project. CED program staff have also provided support to Wild Fish Conservancy on a levee setback project underneath the Dosewallips River bridge on US 101, which may benefit hydrologic conditions at that stabilized CED site. CED staff are actively pursuing partnership opportunities in the Skagit River Basin with Seattle City Light and restoration groups to coordinate studies and potentially develop a larger scale CED solution at the SR 20 Skagit River 2 CED.

New funding sources

WSDOT has pursued creative means of leveraging limited funding and partnerships. WSDOT also worked closely with the Governor's Office to address funding needs.

In 2020, WSDOT applied for and is pending legislative approval of Salmon Recovery Funding Board (SRFB) funds for a feasibility study in the Skagit River. This study would evaluate restoring a very large reach of disconnected floodplain habitat, which would benefit WSDOT by reducing flooding of SR 20 at the Skagit River 2 CED. This effort is in coordination with and intended to enhance the within-right-of-way CED solution to protect the highway embankment at this location. Seattle City Light (SCL) agreed to partner and provide additional funding for this study. One of the CED program hydrologists chose to coordinate a separate sediment transport modeling study with this effort, and secured SCL support as well.

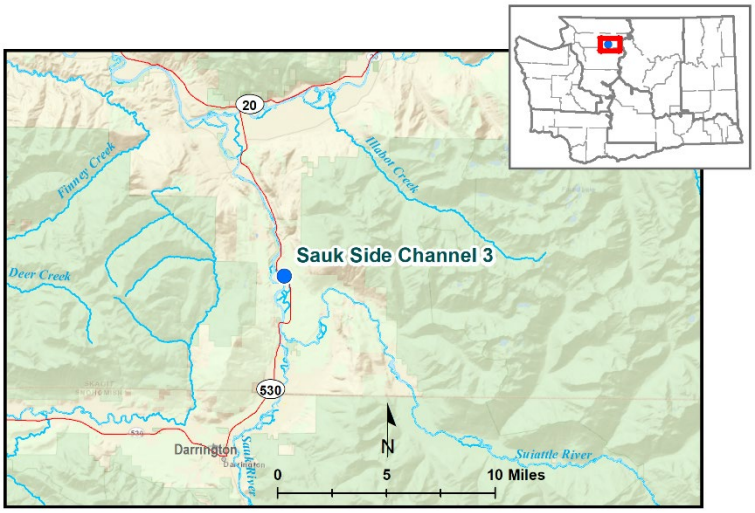
The SR 410 White River CED is located within Mount Rainier National Park (MRNP). WSDOT maintains the highway at this location but does not have an easement or responsibility for construction projects on MRNP land. To try to get funding for the CED project, WSDOT recently applied for a Federal Lands Access Program (FLAP) grant to help fund this project in partnership with MRNP.

A high flow event at SR 530 Sauk River CED necessitated an emergency repair in February 2020. The CED program had already developed a conceptual solution for this CED and were able to install it using emergency funds from Federal Highway Administration (FHWA). Several sections of this reach are still vulnerable, and CED program worked closely with Northwest Region staff to ensure that the imminent threat repair, fully funded by FHWA, is fish friendly and has the concurrence of WDFW and other stakeholders. Find out more about this project in the next section.

CED Projects Constructed in 2020

SR 530 Sauk River Side Channel Emergency Repair at MP 58.8

WSDOT constructed one project in 2020. Following a large storm event in February 2020 that washed out a portion of SR 530, WSDOT constructed an emergency rock and log toe revetment at the SR 530 Sauk River Side Channel CED. As is the case with many CED sites, this site has a long history of erosion and repairs dating back to 2003.



CED Problem

A side channel of the Sauk River that flows adjacent to SR 530 has been gradually widening over time as it captures more Sauk River flows. The CED Program installed pile-anchored rock and log cribwall structures in three locations in 2008 to protect the bank from further erosion.

During a high-flow event in November 2018, a section of the riverbank failed along the highway embankment between two of the existing cribwalls. The erosion caused several trees that were protecting the bank to fall in, putting the entire bank at risk of unraveling along the highway embankment. This necessitated an emergency repair that month, and then a larger fish-friendly maintenance repair in summer 2019. This repair was intended to be forward compatible with a more comprehensive CED repair in the future.

Figure 3. Riverbank failure November 2018.

Figure 4. Sauk River Side Channel log cribwall, 2008.

Figure 5. Sauk Side Channel interim maintenance repair, September 2019.

Figure 6. SR 530 after February 2020 high flow event.

Several months later, a high flow event in February 2020 washed away a large stable log jam that had been blocking the inlet to the side channel from Sauk River flows. The side channel significantly widened and washed out the newly constructed rock and log toe revetment and part of SR 530. Due to a lack of detour, traffic had to be routed into one lane, which also resulted in a month-long disruption to the traveling public.

Impacts on Fish

Many species of fish are presumed to spawn and rear in this side channel based on habitat and proximity to the Sauk River mainstem, including spring, summer, and fall Chinook, fall chum, pink, sockeye, and coho salmon, summer and winter steelhead, coastal cutthroat trout and bull trout. The stream gradient in the project reach results in deep and swift flows, so hydraulic complexity and refuge areas along the edge of the channel are important for juvenile salmonids. Typical emergency repairs involve adding riprap to stabilize the site, which increases velocities in the channel, continues to scour the streambed along the bank, prevents large wood from racking, reduces riparian cover, and simplifies habitat for fish.

CED Solution

Using the 2019 Site and Reach Assessment and a design similar to a recently constructed CED project at the nearby Sauk River Confluence CED, WSDOT designed a robust log cribwall with a bioengineered floodplain bench.

The repair was installed during emergency conditions and high winter flows. This is not the ideal time to install large wood, as the buoyancy of the wood makes it difficult to place it along the toe of the bank during these flows. Regardless, the cribwall provides hydraulic complexity and cover at lower stream flows.

We are not yet finished with this site.

Figure 7. SR 530 Sauk River Side channel CED during construction of the emergency repair in February 2020. This project was constructed during high flows.

Next Steps

A WSDOT hydrologist prepared an imminent threat memo, which resulted in receipt of additional emergency funds to construct a fish-friendly revetment along the still-vulnerable streambanks between the existing 2008 cribwalls. WSDOT updated the 2019 Site and Reach Assessment and led a CED concurrence to select an appropriate repair at this site. This project is planned for construction in summer 2022.

Figure 8. Sauk River Side Channel post-construction, May 2020.

Reach Assessments and Studies Completed in 2020

A Site and Reach Assessment is a technical study conducted by a WSDOT hydrologist that identifies the cause of the CED problem and identifies a suite of project alternatives to address the problem. This is an important part of the CED process, as it clearly defines the CED problem so that WSDOT, in collaboration with WDFW and other interested parties can agree on the most feasible, targeted solution. It also enables regional staff to scope the repair and provide a more accurate estimate of the cost of the CED project. This information helps ensure CED funds are applied to the highest priority projects and that the most cost-effective, practical solutions are implemented. Usually, a CED Site and Reach Assessment or update is a stand-alone document. However, these are also included as part of WSDOT Preliminary Hydraulic Design (PHD) reports.

In 2020 the CED Program completed seven Site and Reach Assessments, updates, or PHDs for CED projects. These are shown in Table 1 and Figure 9 below. These are available on request by contacting the CED Coordinator.

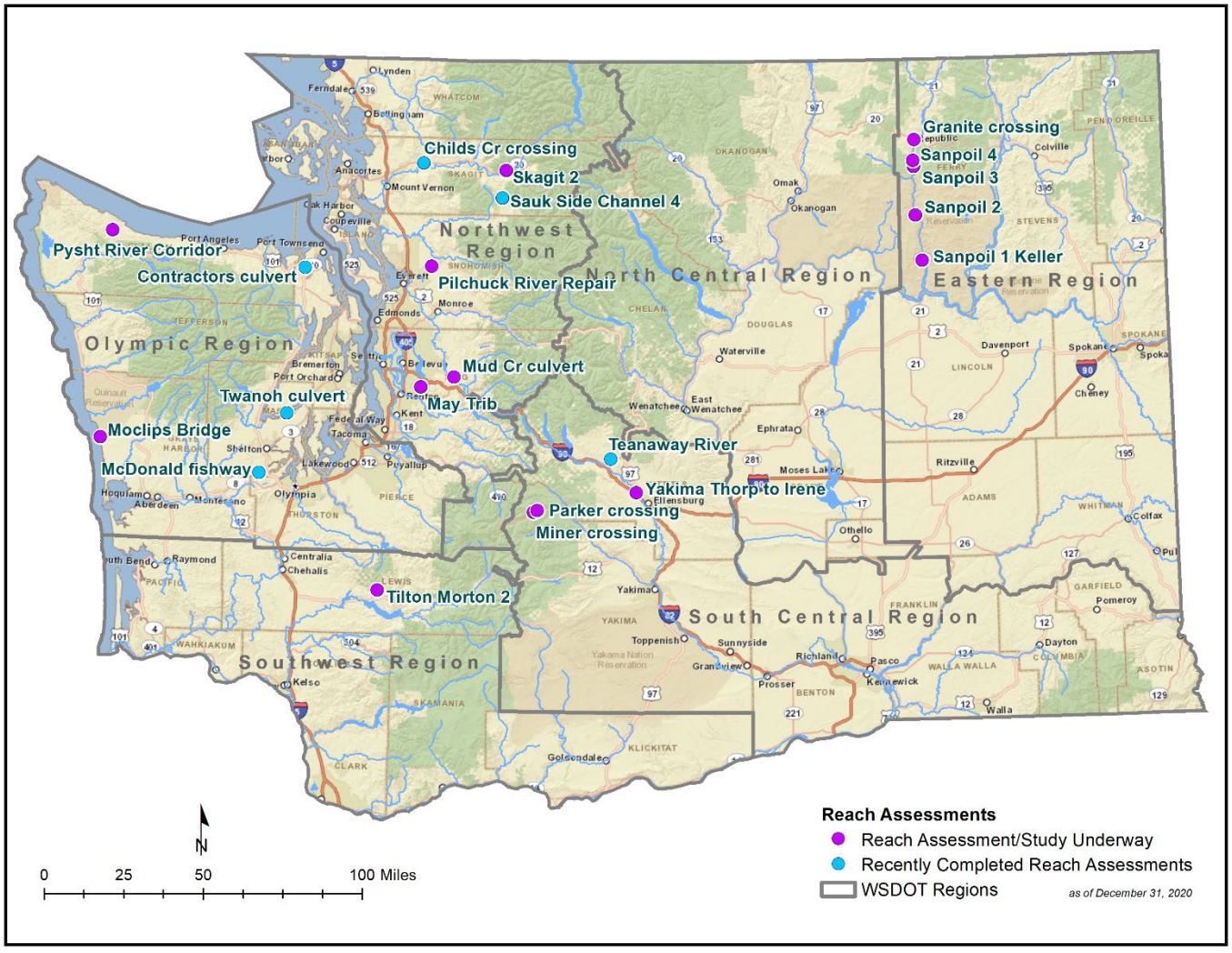


Figure 9. Locations of recently completed and planned CED Site and Reach Assessments and studies.

Table 1. CED Reach Assessments, updates, and studies completed in 2020.

Road	MP	CED Site / Corridor	Region	CED Problem	Fish Passage ID	Study Dates	Authors	WRIA
SR 20	72.8	Childs Cr crossing	NWR	Culvert sediment, avulsions, flooding	991146	2020, 2013	Rapp, Lautz	3
SR 530	58.9-59.0	Sauk River Side Channel	NWR	Bank erosion		2020	Jackson, Schanz	4
US 101	277.9	Contractors Cr culvert	OR	Culvert sediment	990090	2020phd, 2005	NHC, Schanz	17
SR 106	12.3	Twanoh Cr culvert	OR	Culvert sediment	990450	2020phd, 2012	Molash, McGuire	14
SR 108	8.8	McDonald Cr fishway	OR	Fishway sediment	990278	2020phd	HDR	14
I-90	102.9-105.0	Yakima River Thorp to Irene Rinehart Corridor Prioritization	SCR	Bank erosion, avulsion risk, levees		2020, 2012	NHC, Molash	39
SR 970	5.5-6.1	Teanaway River	SCR	Bank erosion, levees, flooding		2020phd, 2010	Natural Waters, Molash	39

Figure 10. SR 20 Childs Cr CED. Childs Creek overtops a berm and floods SR 20 during a high flow event in February 2021. WSDOT recently completed a site and reach assessment and held a CED concurrence for this CED.

Concurrences Completed in 2020

The CED program facilitated three concurrence meetings during 2020, including for the SR 20 Childs Creek Crossing CED, SR 530 Sauk River Side Channel CED imminent threat project, and the SR 970 Teanaway River CED.

SR 20 Childs Creek Crossing CED at MP 72.8 Concurrence

Childs Creek crosses SR 20 through an undersized culvert that is located on an alluvial fan. Immediately upstream of the crossing, the alignment parallels SR 20 for approximately 400 feet along the top of a berm about 3 feet above the road surface elevation. It makes two abrupt 90 degree turns as it approaches SR 20 and then enters the culvert under SR 20. Although it is a relatively small stream, this site also has very high fish use.

Figure 11. Childs Creek 400 feet upstream of the SR 20 crossing, October 2020. Note the 90-degree bend and the height above SR 20 in this reach.

Because of the crossing's location on an alluvial fan, large quantities of sediment are delivered to the crossing and deposit upstream and downstream of the culvert, at times causing stream avulsions and flooding of the highway and adjacent properties. Every year or two high stream flows and sediment inundate the crossing and require emergency response from WSDOT maintenance crews to clear the highway and clean out the culvert and upstream and downstream channels.

This crossing is also an injunction-relevant fish passage barrier and is scheduled in the Fish Passage Delivery Plan. CED staff held a concurrence meeting and separate field meeting to discuss the site and reach assessment and potential concepts for a new crossing that would restore natural floodplain processes as much as feasible and require a minimum amount of maintenance over the life of the crossing. The meetings were attended by representatives from WDFW, the Upper Skagit, Sauk-Suiattle and the Swinomish Indian Tribes, and Skagit County (owners of an adjacent parcel and nearby stream crossing).

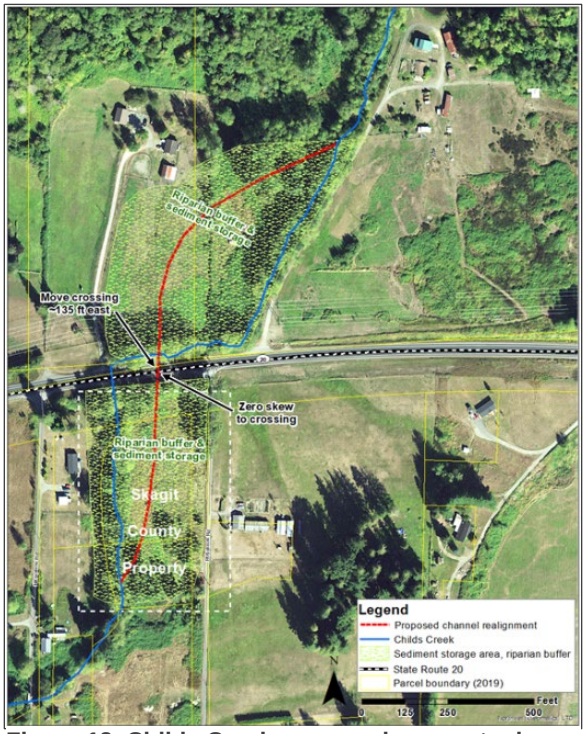


Figure 12. Childs Creek proposed conceptual channel alignment.

The group agreed on a preferred concept to replace the crossing with one wide crossing and realign the stream channel approximately 135 feet west to remove the dogleg and provide a floodplain corridor for sediment deposition and channel migration. It would be designed to accommodate the channel instability associated with an active alluvial fan, stream processes, and some sediment deposition. The new alignment and stream corridor upstream and downstream of the crossing would significantly reduce sediment deposition at the crossing, likely reducing the frequency of maintenance to once every 15 to 20 years.

SR 530 Sauk River Side Channel 4 CED at MP 58.9 Concurrence

In 2006, a flood event increased the amount of river flow in a side channel directly adjacent to SR 530 between milepost 58.6 and 59.3. In the past, a large log jam at the difluence of the side channel protected this reach of the highway by minimizing river flows into the side channel and preventing an avulsion of the river. Over the last 14 years, several CED projects have been constructed in this reach. See Page 7 for a history of this CED site.

Figure 13. Sauk Side Channel CED, April 2020. This cribwall was installed during an emergency repair in February. Remaining vulnerable streambanks that would be protected are in the background.

By February 2020, most of the large log jam had floated away, and then a high flow event washed out a recent repair and one lane of the highway. In response, WSDOT constructed a robust log cribwall along several sections of the reach, which consisted of a dense layer of rootwads installed as low into the water as possible. Two sections of the riverbank in this reach remain vulnerable to scour and at risk of catastrophic failure. WSDOT received approval for funds from FHWA to complete this repair.

CED staff updated the site and reach assessment and led two virtual CED concurrence meetings to discuss recommended alternatives and decide on a conceptual design. Representatives from WDFW, the Upper Skagit, Sauk-Suiattle and the Swinomish Indian Tribes participated in these discussions. Permitting agencies, including USFS, USACE, NMFS, USFWS, and Department of Ecology were included in the first meeting, which gave an introduction and overview of the CED problem and potential solutions. The intention was to streamline and facilitate permitting the project within this Wild and Scenic River and valuable fish corridor.

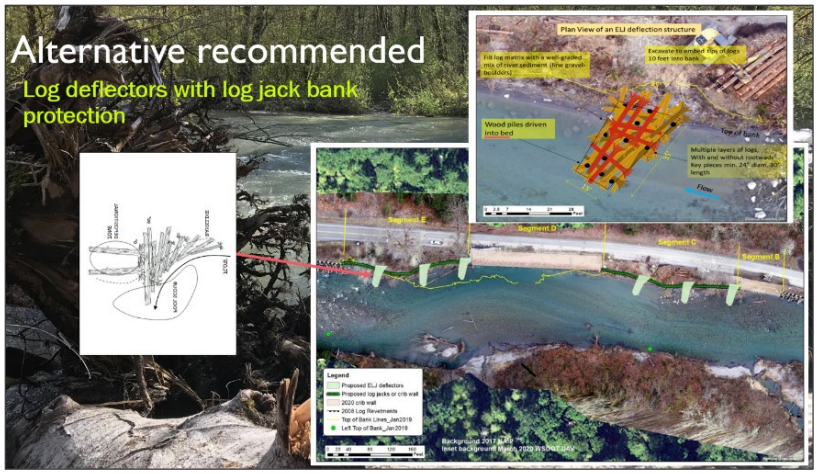


Figure 14. Sauk River Side Channel ELJ concept.

Figure 15. Sauk River Side Channel log jack concept.

The group agreed on a concept that includes 6 engineered log jam (ELJ) deflectors that would project into the flow of the river to force the thalweg (and thus scour) away from the bank, while providing zones of relative quiet in the lee of each deflector to provide cover and refuge for fish. Log jacks would be installed along the toe of the banks between the ELJs to buttress the streambank from erosion and prevent it from slumping.

No excavation is required to install log jacks. Thus, it would minimize construction disturbance to fish and potentially protect portions of existing riparian zone. The jacks would also provide deformable bank protection that could shift and adjust to the currently downcutting channel while still providing protection and interacting with stream flows.

SR 970 Teanaway River CED at MP 6.1 Concurrence

Figure 16. SR 970 Teanaway River CED project vicinity. The river has been encroaching on SR 970 since 1991, which has resulted in erosion and flooding of the roadway multiple times over the years. A CED project is scheduled for construction in 2022.

SR 970 at MP 6.1 along the Teanaway River has been a CED since 2009 due to bank erosion, flooding, and repeated placement of rip-rap bank protection. SR 970 bisects the floodplain and levees constrain the river, severely restricting the floodplain to 30% of its original area. The river has flashy stream flows, rapid channel migration, and high sediment inputs from the upper watershed.

When the reach assessment for the CED was prepared in 2010, there was still a dense riparian zone adjacent to SR 970 that helped stabilize the channel and embankment. In the last 10 years, continued channel migration eliminated many of the alders and cottonwoods that once protected the streambank, sediment aggradation split the flows, and the channel migrated to within 35 feet of the edge of pavement. Without some form of bank treatment to arrest the northward migration of the river channel into SR 970, continued emergency maintenance would be needed. WSDOT began preliminary hydraulic design of a fish-friendly revetment to protect the highway.

There were two big project constraints at this site, including a FEMA no-rise requirement, that mandates minimizing the footprint of the structure within the channel, and ensuring that adequate flows remain within the stream channel for Chinook spawning during low summer flows

A virtual concurrence meeting was held in Fall 2020, and attended by representatives from WDFW, the Confederated Tribes of Colville, and the Yakama Nation, and was followed by a field meeting with WDFW to discuss project concepts. The participants agreed on a 590-foot-long bank stabilization structure using integrated large wood and rootwads along the bank to provide roughness and aquatic habitat. The structure includes 150-foot-long log cribwall in the critical area directly adjacent to the highway, and a log deflector / rock to along either side of the cribwall. Soil lifts with riparian plantings will be placed above the log cribwall.

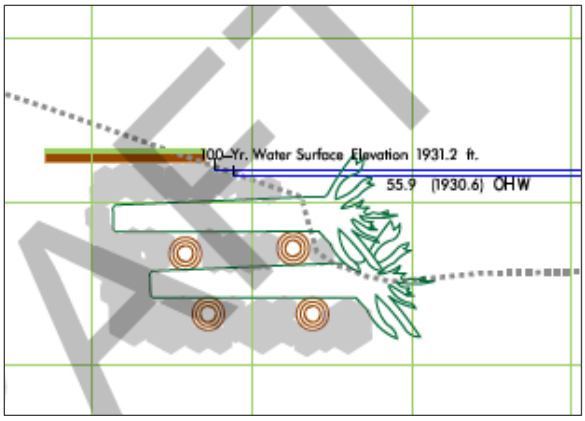


Figure 17. Teanaway River log cribwall concept.

This structure is intended to increase hydraulic diversity and instream cover along the banks. The soil wraps with riparian plantings would help re-establish a riparian zone along the revetment to provide additional cover and stream shading. The structure would arrest continued erosion of the adjacent streambanks and associated sedimentation of spawning areas.

CED Project Planning

CED Prioritization

CED projects are ranked relative to each other based on a qualitative assessment of four factors. These are based on objective criteria to account for the regional context and unique circumstances of each CED.

1. **Relative Fish benefit** associated with implementation of the proposed concept. WSDOT biologists, including the CED coordinator with assistance from the Regional Maintenance Environmental Coordinators (RMECs), evaluate this score based on repeated impacts to fish from maintenance activities, listed species, numbers of species, and types or magnitudes of impacts.
2. **Risk to infrastructure and safety**. A WSDOT hydrologist evaluates this score based on temporal likelihood and magnitude of the risk to the highway from the environmental threat, include loss of service.
3. **Maintenance burden**. Maintenance staff and RMECs score this based on logistics of responding to the threat, including the permitting and expense of the repeated maintenance to maintenance staff and programs.
4. **Partnership opportunities/stakeholder interest**. This score is included to ensure that we recognize priority watersheds (biological and cultural) and take advantage of partnership opportunities.

WSDOT qualitatively scores each factor, and then uses those scores to rank CEDs statewide. By their nature CEDs are unique sites with vastly different needs and impacts. Comparing them this way has helped us to visualize the trade-offs.

All active CEDs are ranked within the CED Program annually into a prioritized list. To coincide with our agency-wide annual planning processes, we update our priority list each August. We currently have 63 active CEDs. The most recent ranking is included in Table 2. At an executive level at WSDOT, the CED ranking is balanced with other priorities, such as fish passage, failing infrastructure, other transportation needs, and available funding.

Figure 18. SR 207 Nason Creek embankment failure, April 2011. This CED project is the top priority for the CED program due to high fish benefit, high risk to infrastructure, and a partnership opportunity with the Yakama Nation. The project is planned for construction 21-23 in partnership with the Yakama Nation as the project lead.

CED Project Funding

WSDOT constructs projects using funds from various sources. For the 19-21 biennium, the legislature allocated approximately $3.9 million for construction of stand-alone CED projects. Projects can also be funded using other sources such as maintenance (using maintenance staff), preservation, as part of other improvement projects (fish passage, transportation), or using emergency funds if one occurs and the proposed CED solution is cost-effective and can be completed during emergency conditions. Once funded, the region is responsible for designing, permitting, and constructing the CED project with input and assistance from CED Program staff and WDFW to ensure it continues to meet the goals of the CED Program.

CED Reach Assessment Funding

The CED Program has a dedicated budget for evaluating CEDs and conducting reach assessments. Reach assessments and updates are planned and prioritized in a similar manner as construction priorities. However, reach assessments are only valid for around five years, and should be updated periodically to reflect current environmental conditions, new technologies that increase understanding of watershed processes, and new methods for addressing CED problems.

WSDOT is committed to ensuring that the highest priority sites are addressed first. WSDOT is currently exploring partnership opportunities to coordinate efforts within the larger restoration community and develop the best possible solutions that provide the largest benefits to fish habitat.

Table 2. CED Program Priorities August 2020 and the prioritization criteria used to help rank them. This list shows all Active CEDs and is used to rank projects for construction and needed reach assessment work.

CED Priority	Road	MP	CED Project	WSDOT Region	WRIA	WRIA Name	Project Status	Design Biennium	Construction Biennium	Prioritization Criteria			
										Fish Benefit	Risk	Maintenance Burden	Stake-holder Interest
1	SR 207	0.4-0.9	Nason Cr	NCR	45	Wenatchee	Delivery	19-21	21-23	5	5	4	5
2	SR 530	58.9-59.0	Sauk Side Channel 4	NWR	4	Upper Skagit	Delivery	19-21	21-23	3	5	4	2
3	SR 105	18.7-20.0	Graveyard Spit erosion	SWR	24	Willapa				3	4	5	4
4	SR 20	101.0	Skagit River 2	NWR	4	Upper Skagit				5	4	5	4
5	SR 508	28.7	Tilton Morton 2	SWR	26	Cowlitz				4	4	5	1
6	I-90	102.9-105.0	Yakima River Thorp to Irene Rinehart	SCR	39	Upper Yakima				4	4	5	2
7	SR 900	18.5-19.0	May Trib (Tibbets)	NWR	8	Cedar - Sammamish				3	4	4	2
8	SR 20	72.8	Childs Cr crossing	NWR	3	Lower Skagit - Samish	Hydraulic Design	21-23	21-25	4	4	3	5
9	SR 112	24.3-28.4	Pysht River Corridor	OR	19	Lyre - Hoko				4	2	5	4
10	SR 970	6.1	Teanaway River	SCR	39	Upper Yakima	Delivery	19-21	21-23	4	3	5	3
11	SR 542	33.5	Glacier Cr Bridge	NWR	1	Nooksack				5	3	3	4
12	SR 410	102.3	Rock Cr culvert	SCR	38	Naches	Delivery	19-25	25-27	3	4	3	4
13	SR 105	20.8	Washaway Seastrand Dynamic Revetment	SWR	24	Willapa	Delivery	19-21	21-23	3	3	5	2
14	SR 109	31.5	Moclips River Bridge	OR	21	Queets - Quinault			25-27	4	3	3	3
15	SR 410	81.0-81.4	Miner Cr crossing	SCR	38	Naches				3	3	4	3
16	SR 202	23.4	Mud Cr culvert	NWR	7	Snohomish	Hydraulic Design	23-25		3	2	3	5
17	SR 21	150.4	Sanpoil River 3	ER	52	Sanpoil	Delivery	19-21	21-23	3	4	3	2
18	US 12	190.4-192.5	Naches River 2 Locust Lane	SCR	38	Naches				3	4	3	1
19	SR 21	152.5	Sanpoil River 4	ER	52	Sanpoil	Delivery	19-21	21-23	3	4	2	2
20	SR 410	58.3	Upper White River 1&2 - ELJs	NWR	10	Puyallup - White	Programmed	21-23	23-25	4	3	3	2
21	SR 10	104.2	Lower Dry Cr Bridge	SCR	39	Upper Yakima				3	3	3	3
22	SR 142	16.3	Klickitat River Wahkiacus	SWR	30	Klickitat				3	3	3	2
23	SR 21	117.3	Sanpoil River 1 Keller	ER	52	Sanpoil				2	4	2	3
24	US 2	83.2	Nason Cr 2 - Kahler	NCR	45	Wenatchee				3	2	3	3
25	SR 21	132.9	Sanpoil River 2	ER	52	Sanpoil				3	3	3	3
26	US 2	46.5	SF Skykomish River 2	NWR	7	Snohomish				3	3	3	2

CED Priority	Road	MP	CED Project	WSDOT Region	WRIA	WRIA Name	Project Status	Design Biennium	Construction Biennium	Prioritization Criteria			
										Fish Benefit	Risk	Maintenance Burden	Stake-holder Interest
27	SR 20	184.5	Methow River Weeman Bridge	NCR	48	Methow				3	3	3	2
28	SR 410	57.7-60.0	Upper White River 4 - cribwall, relief culverts	NWR	10	Puyallup - White				3	3	3	2
29	US 101	133.5	Boulder Trib culvert	OR	21	Queets - Quinault				3	3	2	3
30	SR 300	2.0	Union River at Sand Hill Road	OR	15	Kitsap				4	3	2	1
31	I-82	46.1	Yakima River gabion site	SCR	37	Lower Yakima				3	3	3	1
32	SR 410	50.9	White River gabion site 2	NWR	10	Puyallup - White				3	3	3	1
33	US 2	89.4	Skinney Cr channel restoration	NCR	45	Wenatchee	Delivery	19-21	21-23	3	1	1	5
34	SR 21	173.8	Curlew Cr culvert	ER	60	Kettle				3	3	3	1
35	US 12	109.2	EF Stiltner Cr culvert	SWR	26	Cowlitz				3	3	2	1
36	SR 21	159.5-159.6	Granite Cr crossing	ER	52	Sanpoil				3	3	2	2
37	US 101	277.9	Contractors Cr culvert	OR	17	Quilcene - Snow	Delivery	19-21	21-23	3	3	2	1
38	SR 106	6.8	Big Bend Cr Estuary culvert	OR	14	Kennedy - Goldsborough				4	2	2	1
39	SR 108	8.8	McDonald Cr fishway	OR	14	Kennedy - Goldsborough	Delivery	19-21	21-23	3	2	3	1
40	US 12	159.2-159.3	Andy Cr crossing	SCR	38	Naches				2	3	2	3
41	SR 21	188.1-191.3	Kettle River Corridor	ER	60	Kettle				3	3	2	1
42	SR 106	4.3-16.1	Lower Hood Canal Stabilize Shoreline	OR	16	Skokomish - Dosewallips				3	2	2	2
43	US 12	199.2	Cowiche Cr Bridge	SCR	38	Naches				2	2	2	4
44	US 101	332.8	Hood Canal Embankment Erosion	OR	16	Skokomish - Dosewallips				3	3	1	1
45	US 101	321.7-332.0	Hood Canal Beach Nourishment	OR	16	Skokomish - Dosewallips				3	2	1	2
46	SR 508	5.7	SF Newaukum 3b	SWR	23	Upper Chehalis				3	2	1	1
47	SR 18	8.9	Soosette Cr weirs	NWR	9	Duwamish - Green				3	3	1	1
48	SR 410	83.8	American River Fife's Bluff	SCR	38	Naches				3	3	1	1
49	SR 8	15.3	Kennedy Cr culvert	OR	14	Kennedy - Goldsborough				2	2	3	1
50	SR 410	82.2-82.4	Parker Cr crossing	SCR	38	Naches				2	3	2	1
51	US 101	174.4	Hoh River 1 revisit	OR	20	Soleduc				3	3	1	1
52	US 2	39.9	SF Skykomish River 1 Barclay	NWR	7	Snohomish				3	2	1	2
53	US 97	143.2	Upper Dry Cr culvert	SCR	39	Upper Yakima				2	3	2	1
54	I-90	22.1	EF Issaquah Cr and Trib	NWR	8	Cedar - Sammamish				2	2	2	1
55	SR 108	7.0	Slide Cr culvert	OR	14	Kennedy - Goldsborough				2	2	1	1
56	SR 7	10.5	Roundtop Trib culvert	SWR	11	Nisqually				1	4	5	1

CED Priority	Road	MP	CED Project	WSDOT Region	WRIA	WRIA Name	Project Status	Design Biennium	Construction Biennium	Prioritization Criteria			
										Fish Benefit	Risk	Maintenance Burden	Stake-holder Interest
57	SR 109	3.4	Harborview Court crossing	OR	22	Lower Chehalis				1	3	2	1
58	SR 508	24.3	No Name Cr (Tilton Trib) Bridge	SWR	26	Cowlitz				1	2	2	1
59	US 12	108.1	Rainey Cr Bridge	SWR	26	Cowlitz				1	2	2	1
60	US 101	130.0	Milbourn Cr crossing	OR	21	Queets - Quinault				1	2	1	1

Note: This list is for planning purposes only and is subject to change. Chronic Environmental Deficiency sites are dynamic sites that change as rivers change, new sites are nominated, and existing sites stabilize. These sites are ranked only with regards to their priority as a CED project relative to other CED priorities. They were ranked qualitatively by balancing relative fish benefits (species present and potential habitat improvement), infrastructure risk, maintenance burden, and stakeholder interest (including partnership opportunities). These were ranked independently of project cost or current delivery status.

CED Projects Planned for Construction

Projects that are currently planned for design or construction in the next two biennia are shown in Table 3 and Figure 19 below. This list reflects current priorities and is subject to change based on funding availability and changing priorities.

Table 3. CED projects planned to begin design or construction by 2023 (18).

Road	MP	CED Project	Region	CED Problem	Fish Barrier	Date Nominated	Design Biennium	Construction Biennium	Funding Source/Sponsor	WRIA
SR 21	150.4	Sanpoil River 3	ER	Bank erosion		2017	19-21	19-21	Maintenance	52
SR 21	152.5	Sanpoil River 4	ER	Bank erosion		2017	19-21	19-21	Maintenance	52
US 2	89.4	Skinney Cr channel restoration	NCR	Grade controls	Yes	2018	19-21	21-23	Partnership w/ Yakama Nation	45
SR 207	0.4	Nason Cr	NCR	Bank erosion		2012		19-23	Partnership w/ Yakama Nation	45
SR 20	72.8	Childs Cr crossing	NWR	Culvert sediment, avulsions, flooding	Yes	2003	21-23	21-25	Fish Passage	3
SR 92	5.1	Pilchuck River Repair	NWR	Bank erosion		2018	19-21	21-23	CED	7
SR 202	23.4	Mud Cr culvert	NWR	Culvert sediment	Yes	2009	23-25	25-27	Fish Passage	7
SR 410	35.7	*Clay Cr culvert	NWR	Culvert debris, erosion	Yes	2009	23-25	25-27	Fish Passage	10
SR 410	58.3	Upper White River 1&2 - ELJs	NWR	Bank erosion		2016	21-23	23-25	CED, FLAP grant request	10
SR 530	58.9	Sauk Side Channel 4	NWR	Bank erosion		2018	19-21	21-23	Preservation	4
SR 3	41.0	*Chico Cr crossing	OR	Culvert debris, channel avulsion	Yes	2005	19-21	21-23	Fish Passage	15
US 101	277.9	Contractors Cr culvert	OR	Culvert sediment	Yes	2005	19-21	21-23	Fish Passage	17
US 101	306.6	*Dosewallips River Bridge levee setback	OR	Bridge debris, abutment erosion	No	2006		21-23	Wild Fish Conservancy	16
SR 106	12.3	*Twanoh Cr culvert	OR	Culvert sediment	Yes	2011	19-21	21-23	Fish Passage	14
SR 108	8.8	McDonald Cr fishway	OR	Fishway sediment	Yes	2007	19-21	21-23	Fish Passage	14
SR 410	102.3	Rock Cr culvert	SCR	Culvert sediment	No	2007	19-25	25-27	CED	38
SR 970	5.5	Teanaway River	SCR	Bank erosion, levees, flooding		2009	19-21	21-23	CED	39
SR 105	20.8	Washaway Seastrand Dynamic Revetment	SWR	Bank erosion		2006	19-21	21-23	CED	24

* Not currently an active CED; the CED problems have stabilized on their own.

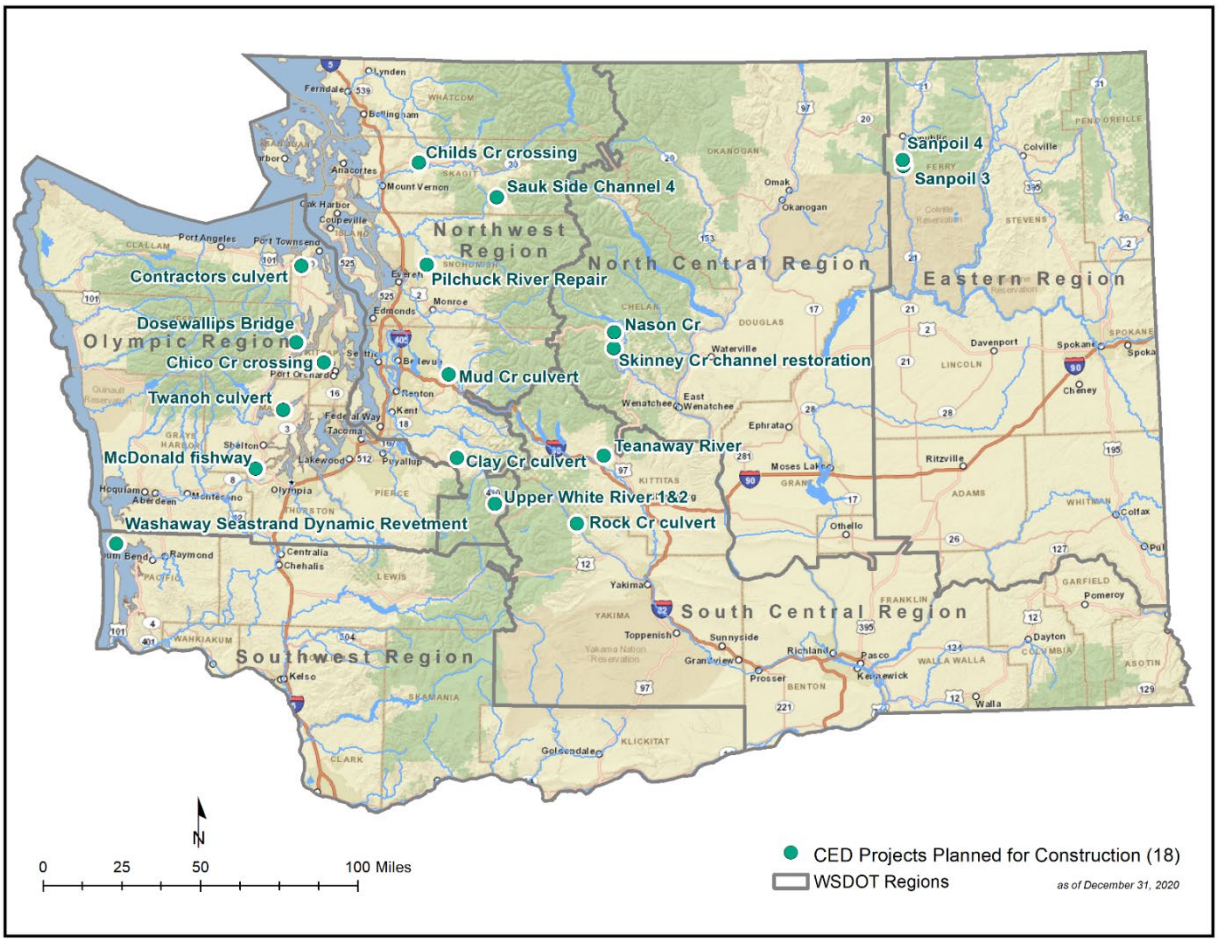


Figure 19. CED Projects planned to begin design or construction by 2023.

Figure 20. SR 21 Sanpoil River 4 CED, August 2019. The Sanpoil River has been migrating adjacent to the highway at this location and frequently changes course. Eastern Region maintenance staff plan to construct a rock with log toe revetment and bioengineered floodplain bench in summer 2021.

Reach Assessments and Studies Planned and In-Progress

Currently planned CED site and reach assessments, updates, and other studies undertaken by WSDOT are shown below in Table 4 and Figure 9 (Page 9). The other types of studies are intended to inform the proposed CED concept and reflect an effort to coordinate CED studies with other WSDOT and stakeholder needs, and develop potential partnerships that could enable larger, better projects. Some of these studies are currently in progress, and others are contingent on staff availability and funding. Stakeholder input is welcome during each evaluation to help determine the scope of the assessment and develop a reasonable list of feasible alternatives.

When WSDOT is ready to propose a CED solution (which may be contingent on the priority of the CED), the CED Coordinator will schedule a concurrence meeting with WDFW and other stakeholders to review the reach assessment and agree on the best feasible solution to the CED problem.

Table 4. Planned CED Reach Assessments and Studies (11).

Road	MP	CED Site / Corridor	Region	CED Problem	WRIA	Notes
SR 21	106-165	Sanpoil River Corridor	ER	Bank erosion	52	
SR 21	159.5	Granite Cr crossing	ER	Culvert avulsions	52	
SR 20	101.0	Skagit River 2 Site and Reach Assessment	NWR	Bank erosion and flooding	4	SRA to address bank erosion coordinated with 2 related studies.
		Skagit River O'Brian Reach Reconnection Feasibility Study				SRFB grant request in partnership with Seattle City Light
		Skagit River Bedload sediment sampling, acoustic data collection for sediment transport modeling				TPF Project 5(386) in partnership with Seattle City Light
SR 202	23.4	Mud Cr culvert	NWR	Culvert sediment	7	Update to 2010, Fish Passage
SR 900	18.5-19.0	May Trib (Tibbets)	NWR	Road adj Channel sediment, flooding	8	
SR 109	31.5	Moclips River Bridge	OR	Bridge debris, sediment, flooding	21	Update to 2007
SR 112	24.3-28.4	Pysht River Corridor	OR	Bank erosion	19	Update to 2005
I-90	102.9-105.0	Yakima River Thorp to Irene Rinehart	SCR	Bank erosion, avulsion risk, levees	39	
SR 410	81.0-81.4	Miner Cr crossing	SCR	Culvert sediment, avulsions	38	Collecting LiDAR
SR 410	82.2-82.4	Parker Cr crossing	SCR	Culvert sediment, avulsions	38	Collecting LiDAR
SR 508	28.7-28.9	Tilton Morton 2	SWR	Bank erosion	26	Update to 2019 to address additional bank erosion

Figure 21. SR 20 Skagit River 2 CED at MP 101 after a high flow event in November 2017. WSDOT is preparing an assessment in conjunction with two other studies to fix this CED.

Figure 22. SR 508 Tilton River Morton CED following a high flow event in January 2020, which eroded the embankment upstream of a 2018 CED maintenance repair (shown in background of photo). WSDOT plans to prepare an update to the recently completed 2019 site and reach assessment in order to address current conditions.

CED Inventory and Status

Background on the CED Inventory

The inventory of active CEDs is updated annually and as new sites are nominated or constructed. A challenge to keeping a current inventory is that the CED inventory is constantly evolving with changing environmental and stream conditions. As an example, if a stream channel that is fast approaching the toe of a WSDOT highway stabilizes and changes direction on its own (for 10 years), then it would be removed from the CED inventory. Alternatively, because of the dynamic nature of streams, a stable reach of a river may begin actively migrating, or mass wasting may cause debris and sediment to accumulate at a stream crossing. In this case, a new site may be nominated, or a stable site re-added to the CED Program. Maintaining an accurate CED inventory requires up-to-date information on maintenance occurring at CED sites, emergency actions, and impacts to fish from those actions.

WSDOT updates the inventory and status of CED sites throughout the year. CED staff review the CED inventory with regional staff, conduct site visits at all potential new CEDs, review Hydraulic Project Approval (HPA) records, and contact WSDOT maintenance to collect updated information on each CED and identify new problem areas. This information is used to document the status of all CEDs. Figure 23 outlines the CED process and the path of a CED from active to resolved or stabilized.

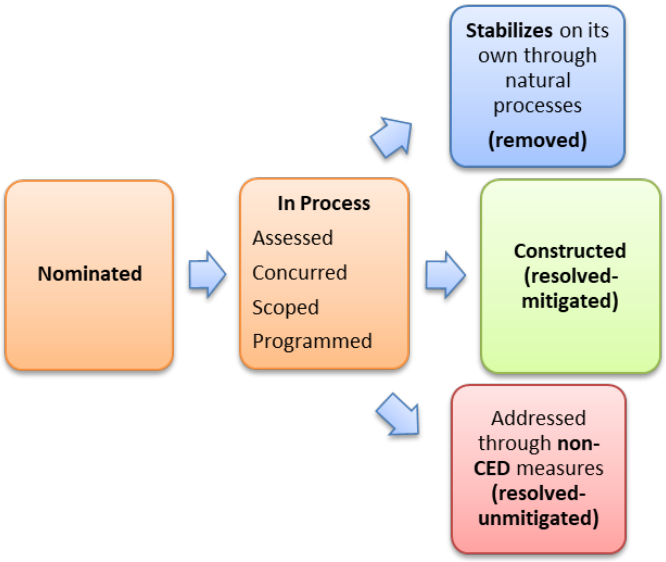


Figure 23. CED status and process.

CEDs are categorized as active, stable, or resolved. An Active CED is a nominated site that currently meets the requirements for a CED, meaning that the site is actively eroding or has continued to require active maintenance in the last 5 to 10 years. A Stable CED is a nominated site that is not actively eroding and has not required maintenance in 5 to 10 years. Stabilized CEDs remain in the inventory but are not included in the CED Program.

A Resolved CED is one that has been addressed through the CED Program or other entity using CED-appropriate means (that do not cause ongoing impacts to fish or aquatic habitat), or through a non-CED repair. A non-CED repair is usually a maintenance repair or emergency action at a nominated CED, which resolves the risk of future infrastructure damage, but does not address the ongoing impacts on aquatic habitat. An example would be an extensive bank repair with a stable riprap revetment.

Refer to Appendix 1 for the status of all Active, Stable and Resolved CEDs.

In 2020, WSDOT added three new sites to the CED inventory. WSDOT currently has 63 Active CEDs and has constructed 57 CED projects since program inception in 2002. Figure 24 shows the locations of all currently active and constructed CEDs.

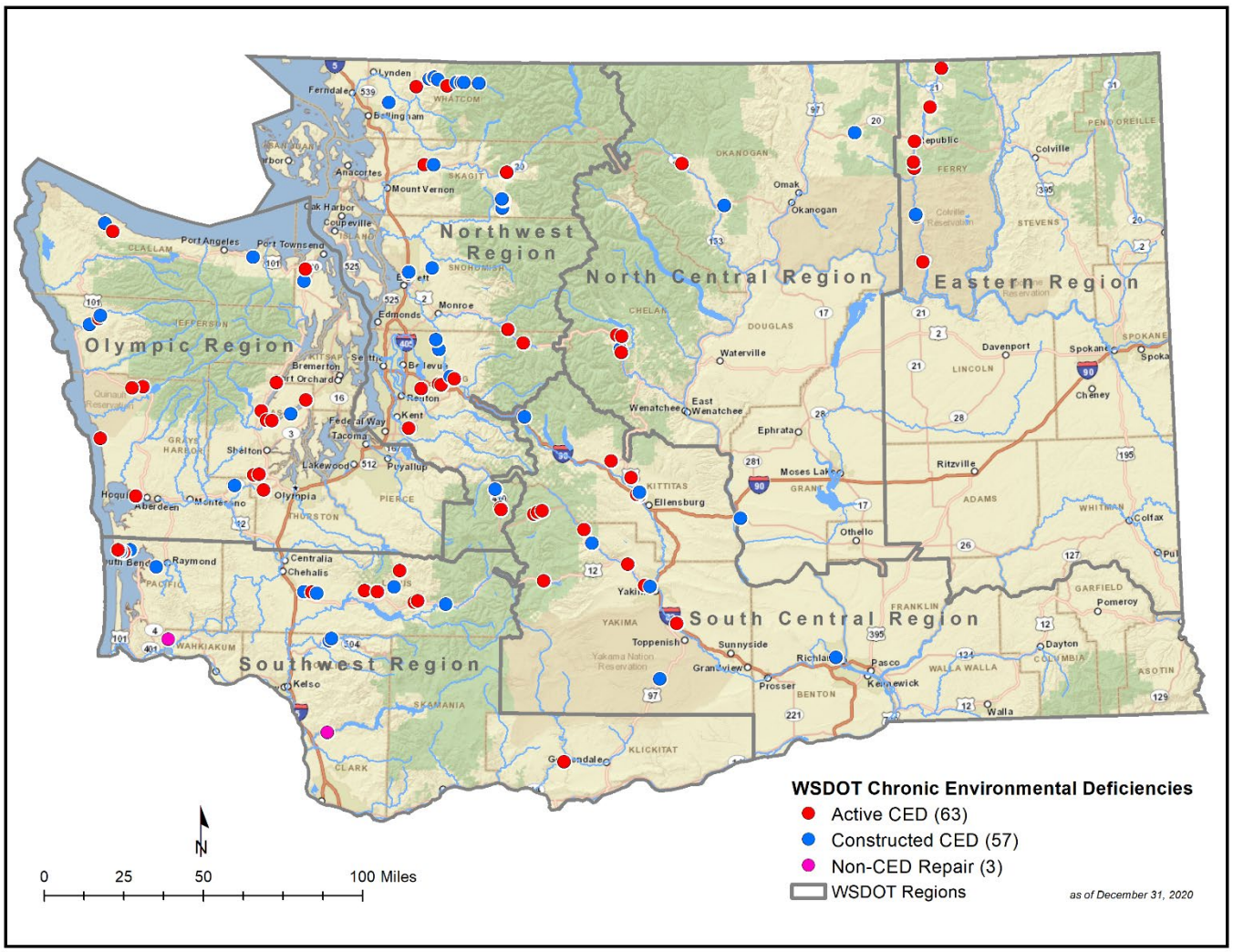


Figure 24. Active and Constructed Chronic Environmental Deficiencies.

Constructed CED Projects

Since 2002, WSDOT has dedicated $94.3 million (unadjusted) of stand-alone I-4 funding to repair CED sites, and more than $138.9 million total funding towards CED repairs. This has funded 27 of the 57 projects that have been constructed to date. These are shown in Figure 24 above and Table 5 below.

Table 5. CED Projects constructed since program inception in 2002 (57).

Road	MP	CED Project	Region	CED Problem	Constructed Date	Fund Source / Sponsor	WSDOT Cost	Repaired Fish Barrier?
SR 21	133.6	S Nanamkin culvert	ER	Culvert sediment, avulsions	2014	Preservation	$ 843,000	Yes
US 2	88.5	Skinney culvert	NCR	Culvert flooding, beaver	2014	Preservation	$ 995,000	Yes
SR 20	206.3	Beaver Cr	NCR	Bank erosion	2018	Partnership w/ Yakama Nation	$ 170,000	
SR 20	278.0	Bonaparte Cr	NCR	Bank erosion	2011	*Partnership w/ Colville, WDFW		
SR 26	1.8	Sand Hollow Wasteway	NCR	Bank erosion	2008	CED	$ 193,000	
SR 20	75.8	Red Cabin culvert	NWR	Culvert sediment	2011	CED	$ 3,667,000	Yes
SR 20	100.7	Skagit 1	NWR	Bank erosion	2014	CED	$ 9,325,000	
SR 92	5.1	Pilchuck River	NWR	Bank erosion	2016	CED	$ 2,835,000	
SR 202	21.8	Snoqualmie Preston-Falls City	NWR	Bank erosion	2004	Preservation	$ 690,000	
SR 203	11.0	Snoqualmie Sinnema-Quaale	NWR	Bank erosion	2016	King County		
SR 203	14.5	Coe Clemmons culvert	NWR	Culvert sediment	2015	CED	$ 3,215,000	Yes
SR 410	51.0	White River gabion	NWR	Bank erosion	2018	Maintenance		
SR 529	5.8	Steamboat Dike	NWR	Flooding, failing levees	2019	*Transportation		
SR 530	55.5	Sauk-Suiattle Confluence 1	NWR	Bank erosion	2011	Preservation	$ 2,288,000	
SR 530	55.7	Sauk-Suiattle Confluence 2	NWR	Bank erosion	2019	CED	$ 2,895,000	
SR 530	58.7	Sauk Side Channel 1	NWR	Bank erosion	2008	CED	$ 3,236,000	
SR 530	58.8	Sauk Side Channel 2	NWR	Bank erosion	2019	Maintenance		
SR 530	58.8	Sauk Side Channel 3	NWR	Bank erosion	2020	Preservation	$ 3,116,000	
SR 530	59.2	Sauk River realignment	NWR	Bank erosion	2011	CED	$ 4,815,000	
SR 542	6.5	Anderson Cr culvert	NWR	Culvert sediment, debris, fishway	2015	CED	$ 8,029,000	Yes
SR 542	20.2	NF Nooksack revetment	NWR	Bank erosion	2007	Partnership w/ USFS	$ 30,000	
SR 542	26.6	NF Nooksack washout	NWR	Bank erosion	2007	Preservation	$ 179,000	
SR 542	28.0	Bruce Cr culvert	NWR	Culvert sediment	2009	Preservation	$ 637,000	N/A
SR 542	28.3	Boulder Cr Bridge	NWR	Bridge sediment	2007	Preservation	$ 6,056,000	
SR 542	29.7	NF Nooksack Warnick Bluff	NWR	Bank erosion	2015	CED	$ 2,455,000	
SR 542	33.4	Gallup Bridge	NWR	Bridge sediment, flooding, alluvial fan	2010	CED	$ 12,364,000	
SR 542	37.2	NF Nooksack powerline	NWR	Bank erosion	2007	Partnership w/USFS	$ 90,000	
SR 542	38.7	NF Nooksack Church Mt.	NWR	Bank erosion	2010	CED	$ 3,800,000	
SR 542	38.9	Nooksack reinforcement	NWR	Bank erosion	2006	Preservation	$ 187,000	
SR 542	39.5	NF Nooksack emergency	NWR	Bank erosion	2016	Preservation	$ 1,152,000	
SR 542	44.9	NF Nooksack Twin Lakes Rd	NWR	Bank erosion	2018	Preservation	$ 558,000	
SR 542	45.0	Nooksack logjam	NWR	Bank erosion	2007	Partnership w/ USFS	$ 15,000	
SR 8	5.0	MF Wildcat culvert	OR	Culvert erosion, roughened channel	2018	Fish Passage	$ 7,466,000	Yes
SR 20	0.1	Snow Cr Bridge	OR	Bridge sediment, debris	2017	NOSC		
US 101	170.4	Nolan Cr Bridge	OR	Bridge scour	2004	Preservation	$ 4,917,000	
US 101	174.4	Hoh 1	OR	Bank erosion	2006	Preservation	$ 9,170,000	

Road	MP	CED Project	Region	CED Problem	Constructed Date	Fund Source / Sponsor	WSDOT Cost	Repaired Fish Barrier?
US 101	175.7	Hoh 2	OR	Bank erosion	2014	CED	$ 4,806,000	
US 101	258.2	McDonald Cr Bridge	OR	Bridge scour, incision	2015	Preservation	$ 4,613,000	
SR 106	13.5	Twanoh Falls culvert	OR	Culvert sediment, flooding	2013	CED	$ 2,865,000	Yes
SR 112	19.6	Clallam River	OR	Bank erosion	2006	CED	$ 146,000	
US 12	201.0	Naches 1 N Yakima	SCR	Bank erosion	2008	CED	$ 4,439,000	
I-90	55.5	Gold Cr Bridge	SCR	Bridge sediment, dewatering	2014	*Transportation		
US 97	45.8	Satus Cr Bridge	SCR	Bridge debris, flooding	2015	Preservation	$ 9,757,000	
US 97	137.8	Dry culvert Ellensberg	SCR	Culvert sediment, flooding	2015	Preservation	$ 2,310,000	N/A
SR 224	8.9	Yakima 2 Richland	SCR	Bank erosion	2009	Preservation		
SR 410	107.4	Naches Rattlesnake	SCR	Bank erosion	2008	CED	$ 251,000	
SR 7	4.7	Tilton River 2	SWR	Bank erosion	2018	Maintenance		
US 12	118.3	Cowlitz River	SWR	Bank erosion	2015	CED	$ 2,614,000	
US 101	54.3	Willapa River	SWR	Bank erosion	2016	CED	$ 107,000	
SR 105	16.5	Norris Slough culvert	SWR	Culvert failing, sinkhole, tidegate	2013	CED	$ 3,023,000	Yes
SR 105	19.9	North Cove Dynamic Revetment	SWR	Bank erosion	2018	CED	$ 3,623,000	
SR 504	16.0	NF Toutle River	SWR	Bank erosion	2015	CED	$ 614,000	
SR 504	17.0	Wooster Cr culvert	SWR	Culvert erosion, piping	2018	CED	$ 3,694,000	Yes
SR 508	3.2	SF Newaukum 2	SWR	Bank erosion	2015	*Maintenance		
SR 508	5.7	SF Newaukum 3	SWR	Bank erosion	2016	*Maintenance		
SR 508	7.3	SF Newaukum 1	SWR	Bank-hillslope rotation	2008	Preservation	$ 625,000	
SR 508	28.7	Tilton Morton	SWR	Bank erosion	2018	*Maintenance		

*Note, there were costs to WSDOT for CED projects constructed by maintenance or as part of a larger transportation project. However, we are unable to break those costs out and provide an estimate for just the CED portion of the project.

CEDs Resolved using Non-CED Methods

Emergency actions often result in non-CED maintenance repairs at CED sites, such as addition of large riprap to stabilize an eroding stream bank, or replacement or addition of a wing wall to protect a crossing structure. Since program inception, three sites have been repaired in this way, and subsequently stabilized. These are shown in Table 6 below, and Figure 24 above.

Table 6. CEDs resolved using non-CED methods (3).

Route	MP	CED Site	Region	CED Problem	Constructed Date
SR 4	10.5	Campbell Creek	SWR	Culvert tidegate	2015
SR 7	4.6	Tilton River 1	SWR	Bank erosion	2016
SR 503	47.8	Houghton Creek	SWR	Bank erosion	2018

Stabilized CEDs

CED sites occasionally stabilize on their own. If there is no maintenance or significant movement of the stream channel for 5 to 10 years and the site is considered stable by a CED hydrologist, the site is removed from the active CED inventory and is no longer considered for CED stand-alone funding. In 2019 CED staff reviewed all sites that were on the CED list, contacted regional maintenance staff, and determined which sites had stabilized on their own or were originally nominated as a CED due to a one-time extreme event. We continue to monitor these sites in case they become active again. They are shown in Figure 25 and Table 7 below. In 2020, one site was restored to the Active CED list – I90 EF Issaquah Tributary.

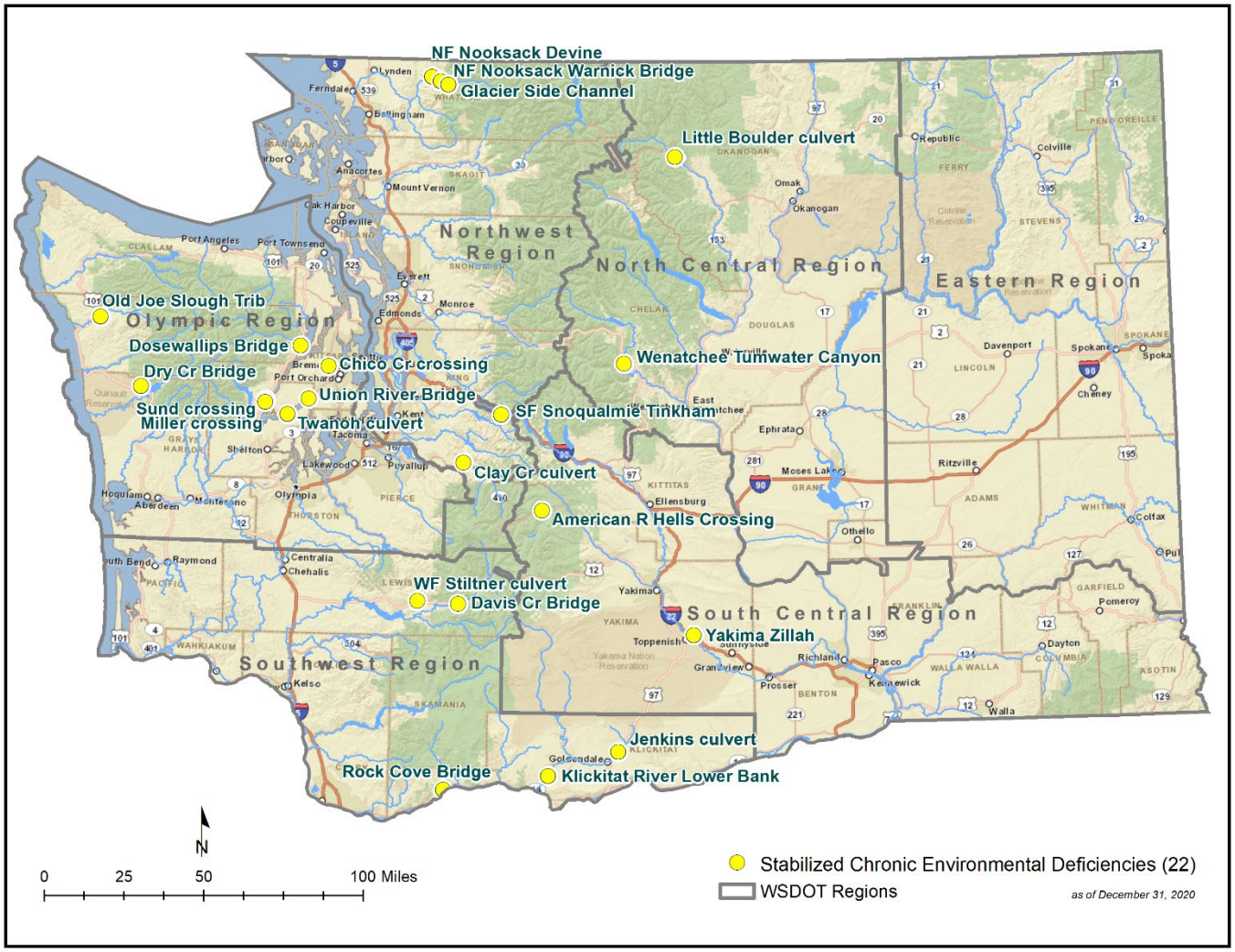


Figure 25. CED Sites that stabilized or resolved on their own.

Table 7. CED sites that stabilized or resolved on their own (22).

Road	MP	CED Site	Region	CED Problem	Nomi-nation Date	Reach Assessment Date	Stabilized Date
US 2	94.0	Wenatchee River Tumwater Canyon	NCR	Bank erosion	2007	2009	2019
SR 20	181.3	Little Boulder Cr culvert	NCR	Culvert aggradation, erosion, incision	2011	2013	2019
SR 410	35.7	Clay Cr culvert	NWR	Culvert debris, erosion	2009	2009	2019
SR 542	27.3	NF Nooksack River Devine	NWR	Bank erosion	2007	2013	2019
SR 542	30.9	NF Nooksack Warnick Bridge	NWR	Bridge debris	2004	2009	2019
SR 542	33.6	Glacier Side Channel culvert	NWR	Culvert erosion	2011	2019phd, 2013	2019
SR 3	41.0	Chico Cr crossing	OR	Culvert debris, channel avulsion, FP weir scour	2005	2006	2019
US 101	130.7	Dry Cr Bridge	OR	Bridge sediment	2008	2009	2019
US 101	175.1	Old Joe Slough Trib culvert	OR	Culvert sediment	2006		2019
US 101	306.6	Dosewallips River Bridge	OR	Bridge debris	2006	2007	2019
US 101	329.0	Sund Cr crossing	OR	Bridge sediment, avulsions	2009	2010	2019
US 101	329.9	Miller Cr crossing	OR	Bridge sediment, avulsions	2009	2010	2019
SR 106	12.3	Twanoh Cr culvert	OR	Culvert sediment	2011	2020phd, 2012	2019
SR 300	2.8	Union River Bridge	OR	Bridge debris	2007	2008	2019
I-82	52.8	Yakima River Zillah	SCR	Bank erosion	2007		2019
I-90	44.7	SF Snoqualmie River Tinkham	SCR	Bank erosion	2007	2015	2019
SR 410	83.4	American River Hells Crossing Bridge	SCR	Bridge debris-caused bank erosion	2006	2007	2019
US 12	108.9	WF Stiltner Cr culvert	SWR	Culvert sediment, avulsions	2009	2009	2019
US 12	121.9	Davis Cr Bridge	SWR	Bridge sediment, avulsions	2009	2010	2019
SR 14	43.9	Rock Cove Bridge	SWR	Bridge sediment, abutment erosion	2016	2018	2019
US 97	17.2	Jenkins (Carl) Cr culvert	SWR	Culvert sediment	2009	2012	2019
SR 142	7.0	Klickitat River Lower Bank	SWR	Bank erosion	2014	2015	2019

Active CEDs

An Active CED is a nominated site that currently meets the requirements for a CED, meaning that the site is actively eroding or has continued to require active maintenance in the last 5 to 10 years. There are currently 63 active CEDs in the CED inventory. This section shows all the active CEDs in each region, and their current progress in the CED process towards construction. Four new sites were added to the CED inventory in 2020. CEDs that were added in 2020 are highlighted in each table below.

Eastern Region

There are seven active CEDs in Eastern Region, all located along a 70-mile corridor on SR 21. Five of these in the Sanpoil River basin are currently under analysis in the CED Program (Table 8 and Figure 27).

Table 8. Active CED sites in Eastern Region (7).

Road	MP	CED Site	CED Problem	CED Status	Project Status	Nomination Date	Reach Assessment Dates	Fish Passage ID	Fish Barrier	WRIA
SR 21	117.3	Sanpoil River 1 Keller	Bank erosion	Under Analysis		2017				52
SR 21	132.9	Sanpoil River 2	Bank erosion	Under Analysis		2017				52
SR 21	150.4	Sanpoil River 3	Bank erosion	Under Analysis	Proposed Maintenance	2017				52
SR 21	152.5	Sanpoil River 4	Bank erosion	Under Analysis	Proposed Maintenance	2017				52
SR 21	159.5	Granite Cr crossing	Culvert avulsions	RA Queue		2017		999343	No	52
SR 21	173.8	Curlew Cr culvert	Culvert erosion, sediment	Nominated		2018		990097	Yes	60
SR 21	188.1	Kettle River Corridor	Bank erosion, flooding	Nominated		2017				60

Figure 26. SR 21 Curlew Cr culvert CED, July 2018. Curlew Cr currently approaches the crossing at an angle and erodes the streambank and highway embankment. WSDOT maintenance frequently dredges the inlet of the channel during the frequent emergencies when the culvert gets blocked with sediment.

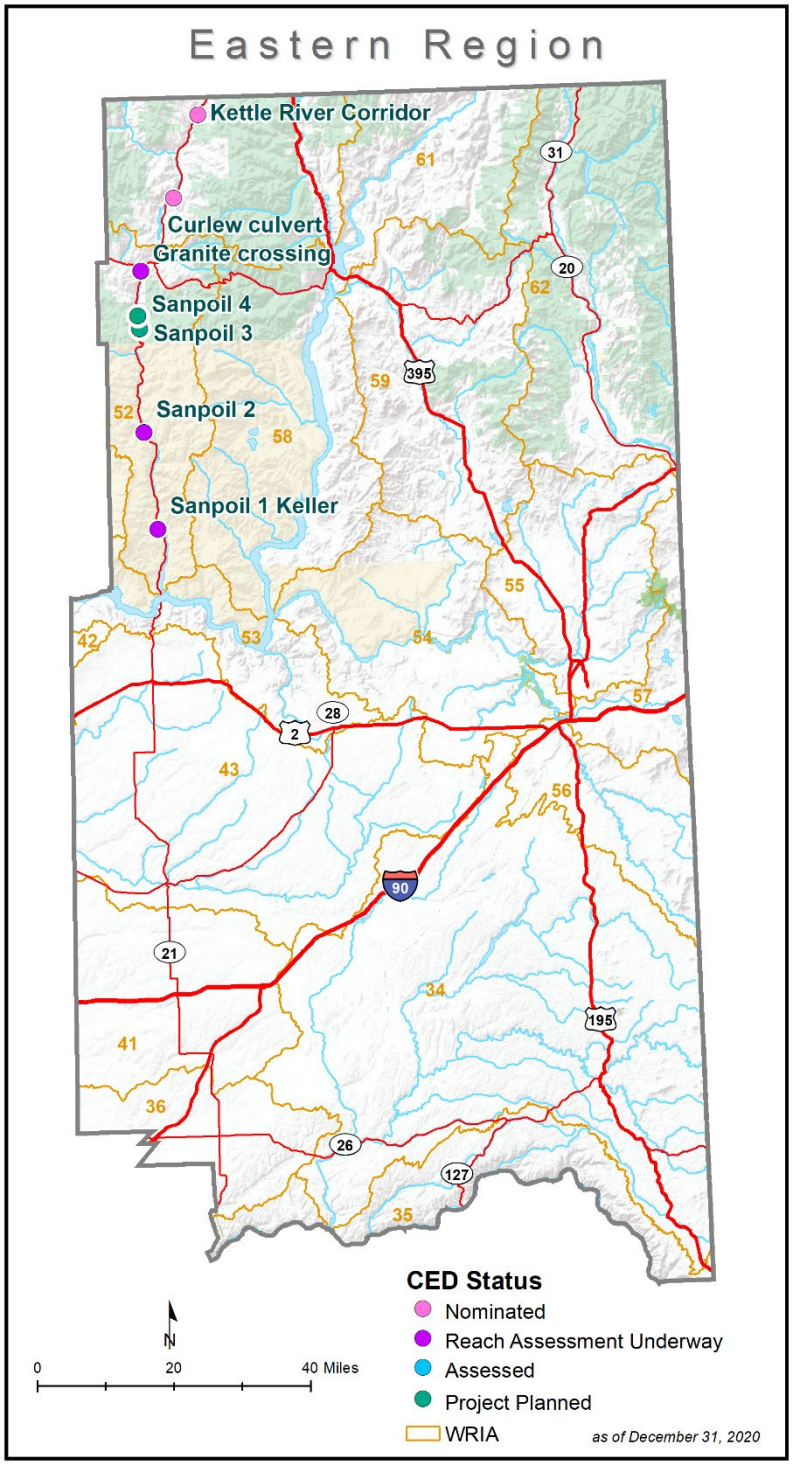


Figure 27. Active CEDs in Eastern Region.

North Central Region

There are four active CEDs in North Central Region. WSDOT is currently working in partnership with Yakama Nation to design and construct CED solutions at three CED locations along Nason Creek on SR 207 and at the US 2 Skinney Cr CED (Table 9 and Figure 30).

Table 9. Active CED sites in North Central Region (4).

Road	MP	CED Site	CED Problem	CED Status	Project Status	Nomination Date	Reach Assessment Dates	Fish Passage ID	Fish Barrier	WRIA
US 2	83.2	Nason Cr 2 - Kahler	Bank erosion threat	Nominated		2018				45
US 2	89.4	Skinney Cr channel restoration	Grade controls	Assessed	Programmed Partnership	2018	2019		Yes	45
SR 20	184.5	Methow Weeman Bridge	Bank erosion	Nominated		2018				48
SR 207	0.4	Nason Cr	Bank erosion	Concurred	Programmed Partnership	2012	2019			45

Figure 29. US 2 Nason Cr Kahler CED, September 2018.

Figure 28. US 2 Nason Cr Kahler CED, November 2019. This site is actively eroding toward US 2.

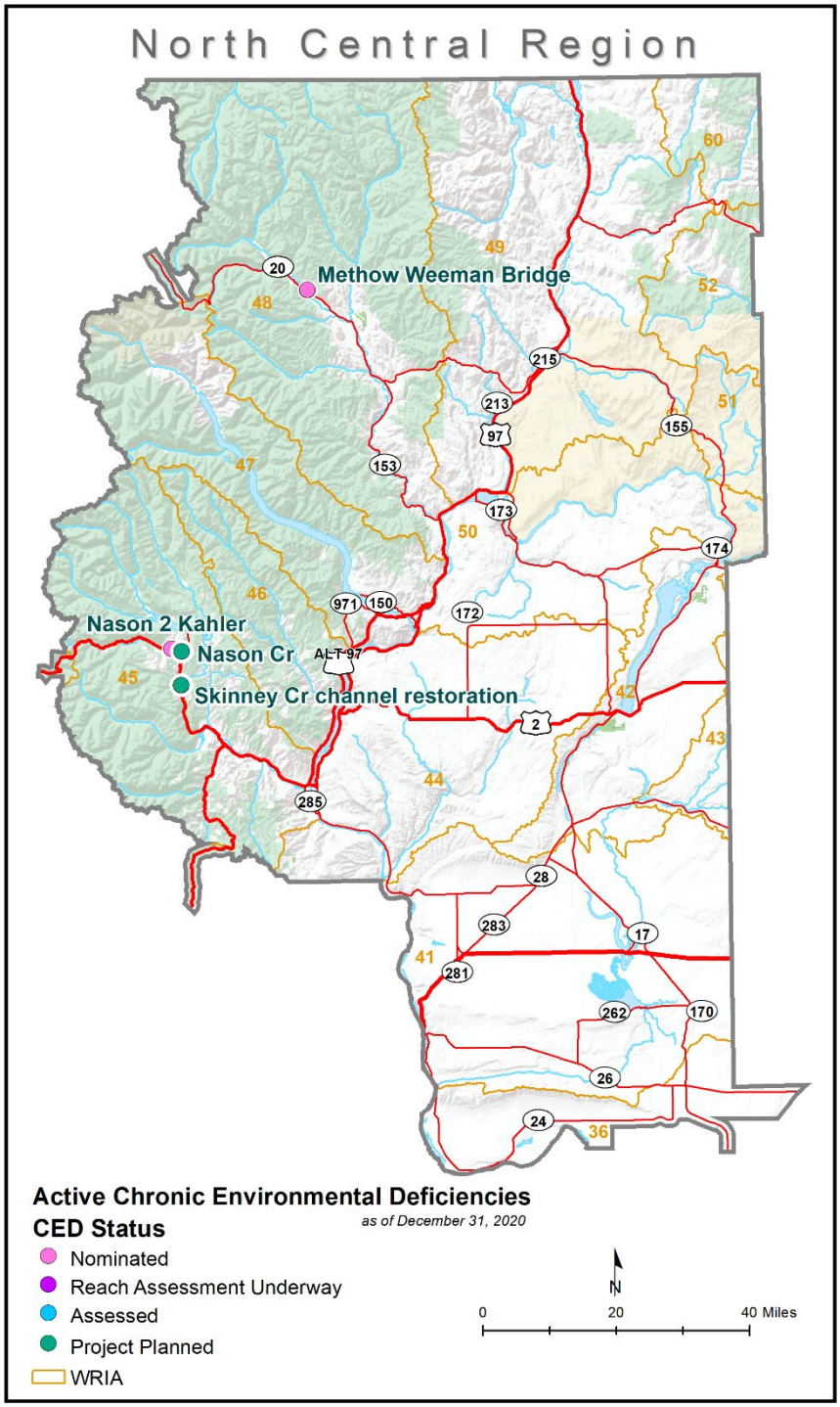


Figure 30. Active CEDs in North Central Region.

Northwest Region

Northwest Region has 16 active CEDs located throughout the region. Four of these were recently added. These include SR 529 North Union/South Steamboat dikes, SR 530 Sauk Side Channel 4 (phase 2 of the 2020 emergency repair), SR 542 Nooksack River near Coal Cr, and SR 900 May Cr. Trib (Table 10 and Figure 33).

Table 10. Active CED sites in Northwest Region (16).

Road	MP	CED Site	CED Problem	CED Status	Project Status	Nomination Date	Reach Assessment Dates	Fish Passage ID	Fish Barrier	WRIA
US 2	39.9	SF Skykomish 1 Barclay	Bank erosion - threat	Assessed		2013	2019, 2017, 2013			7
US 2	46.5	SF Skykomish 2	Bank erosion - threat	Assessed		2015	2017			7
SR 18	8.9	Soosette Cr weirs	Bridge Grade controls	Nominated		2015		990390	Yes	9
SR 20	72.8	Childs Cr crossing	Culvert sediment, avulsions, flooding	Concurred	Fish Passage Delivery	2003	2020, 2013	991146	Yes	3
SR 20	101.0	Skagit 2	Bank erosion	Under Analysis		2018				4
I-90	21.2	EF Issaquah Trib	Culvert sediment, flooding	Assessed		2009	2009	996473-EB, 996474-WB	Yes	8
I-90	22.1	EF Issaquah and Trib	Culvert sediment, flooding	Assessed		2009	2009	991701	Yes	8
SR 202	23.4	Mud Cr culvert	Culvert sediment	Under Analysis	Fish Passage Design	2009	2010	101s-10	Yes	7
SR 410	50.9	White River gabion 2	Bank erosion	Assessed		2019	2019			10
SR 410	57.7	Upper White River 4	Bank erosion	Concurred		2016	2018			10
SR 410	58.3	Upper White River 1&2	Bank erosion	Concurred	Programmed FLAP proposal	2016	2018			10
SR 529	5.2	*N Union / S Steamboat Dike	Flooding, failing levees	Nominated		2020	2016			7
SR 530	58.9	*Sauk Side Channel 4	Bank erosion	Concurred	Programmed	2018	2020			4
SR 542	20.3	*NF Nooksack Coal Cr	Bank erosion	Nominated		2020				1
SR 542	33.5	Glacier Bridge	Bridge sediment, flooding, alluvial fan	Designed		2004	2019phd, 2009			1
SR 900	18.5	*May Cr Trib	Road adj Channel sediment, flooding	Under Analysis		2020				8

*New CED in 2020

Figure 32. SR 900 May Cr Tributary CED, February 2020. This site was added to the CED list in April 2020.

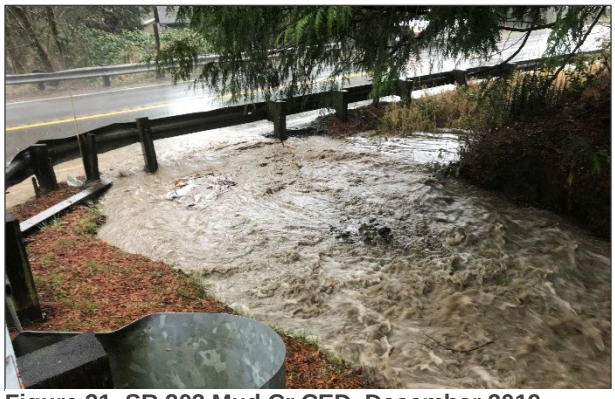


Figure 31. SR 202 Mud Cr CED, December 2019. WSDOT is preparing a site and reach assessment and PHD for a CED / Fish Passage repair at this location.

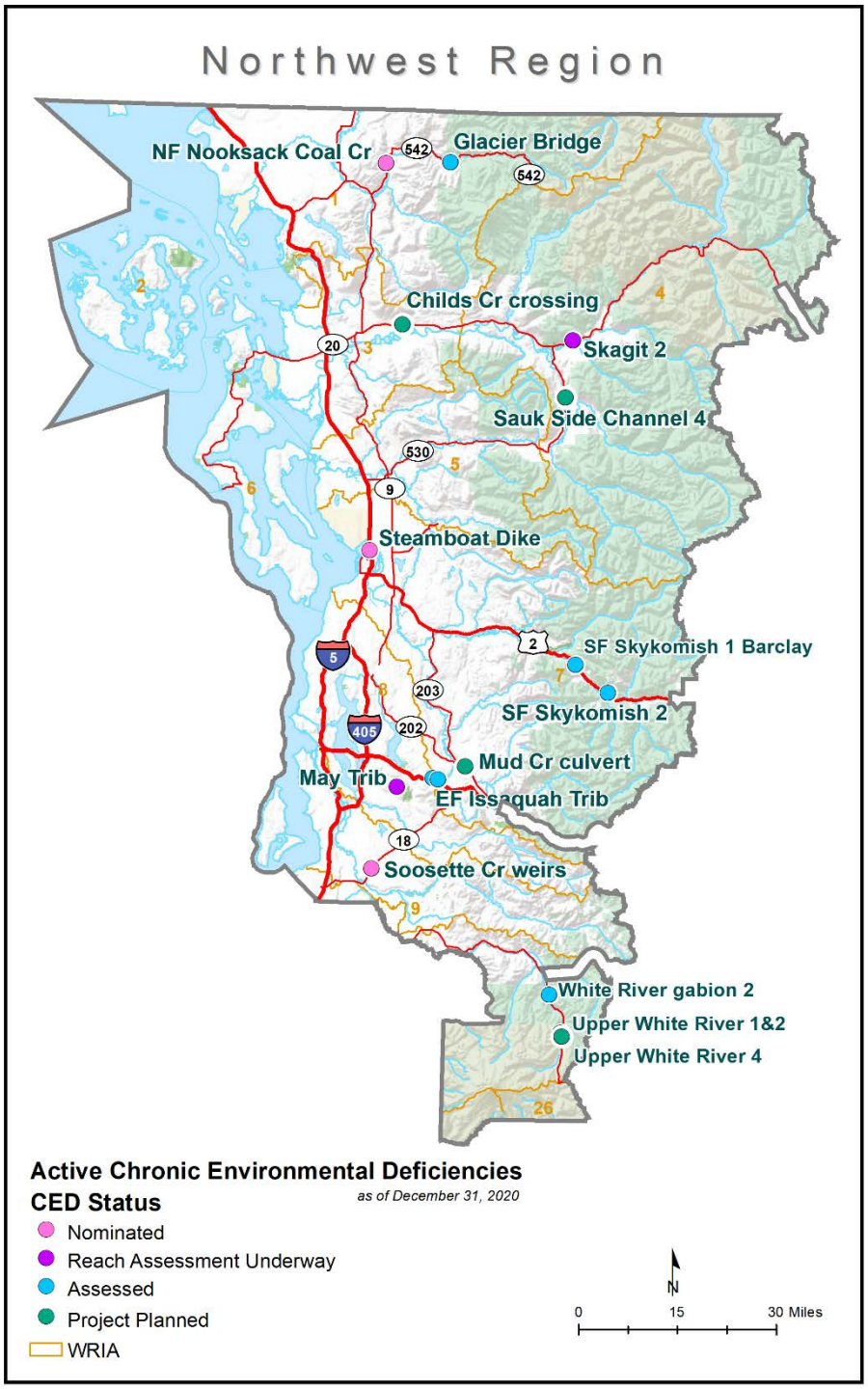


Figure 33. Active CEDs in Northwest Region.

Olympic Region

There are 15 active CEDs in Olympic Region. Two of the active CEDs, US 101 Contractors Creek crossing, and SR 108 McDonald Creek crossing are currently in the 21-23 Fish Passage delivery plan for construction (Table 11 and Figure 34).

Table 11. Active CED sites in Olympic Region (15).

Road	MP	CED Site	CED Problem	CED Status	Project Status	Nomination Date	Reach Assessment Dates	Fish Passage ID	Fish Barrier	WRIA
SR 8	15.3	Kennedy culvert	Culvert sediment, mass wasting, flooding	Assessed		2007	2008	997201	Yes	14
US 101	130.0	Milbourn crossing	Bridge Grade control, bed incision	Assessed		2014	2014	997325	Yes	21
US 101	133.5	Boulder Trib culvert	Culvert sediment	Assessed		2017	2018	990545	No	21
US 101	174.4	Hoh 1 revisit	Bank erosion	Assessed		2015	2015			20
US 101	277.9	Contractors culvert	Culvert sediment	Assessed	Fish Passage Delivery	2005	2020PHD, 2005	990090	Yes	17
US 101	321.7	Hood Canal Beach Nourishment	Bank erosion, landslide debris	Assessed		2015	2016			16
US 101	332.8	Hood Canal Erosion	Bank erosion	Nominated		2018				16
SR 106	4.3	Lower Hood Canal Stabilize Shoreline	Bank erosion, landslide debris	Ongoing project		2007	2008			16
SR 106	6.8	Big Bend Estuary	Bank erosion	Nominated		2018		990008	No	14
SR 108	7.0	Slide Cr culvert	Culvert sediment	Assessed		2009	2011	991671	No	14
SR 108	8.8	McDonald Cr fishway	Fishway sediment	Assessed	Fish Passage Delivery	2007	2020PHD	990278	Yes	14
SR 109	3.4	Harborview Court	Culvert flooding	Nominated		2018		991835, 994829, 995148	Yes	22
SR 109	31.5	Moclips Bridge	Bridge debris, sediment, flooding	RA Queue		2005	2007	997785	No	21
SR 112	24.3	Pysht River	Bank erosion	RA Queue		2009	2005			19
SR 300	2.0	Union River Sand Hill	Bank erosion, flooding, culvert erosion	Assessed	Fish Passage	2007	2008	996699, 996700, 996730	Yes, Yes, No	15

Figure 34. Active CEDs in Olympic Region.

Figure 35. SR 106 Lower Hood Canal Stabilize shoreline CED at MP 5.3, July 2020. This CED consists of a series of small bank washouts along the Hood Canal Shoreline between MP 4.3 and 16.1. This CED is an ongoing effort to address individual sites with various embankment protection techniques including bioengineering and beach nourishment (where feasible).

South Central Region

South Central Region has 12 active CEDs. Two of these projects, SR 410 Rock Cr culvert and SR 970 Teanaway River CED began design work in 2020 (Table 12 and Figure 36).

Table 12. Active CED sites in South Central Region (12).

Road	MP	CED Site	CED Problem	CED Status	Project Status	Nomination Date	Reach Assessment Dates	Fish Passage ID	Fish Barrier	WRIA
SR 10	104.2	Lower Dry Cr Bridge	Bridge sediment, levees	Assessed		2014	2016		No	39
US 12	159.2	Andy Cr crossing	Culvert sediment, avulsions	Nominated		2018		998490	Yes	38
US 12	190.4	Naches 2 Locust Lane	Bank erosion	Assessed		2005	2008			38
US 12	199.2	Cowiche Cr Bridge	Bridge sediment, flooding, levees	Nominated		2018				38
I-82	46.1	Yakima gabion	Bank erosion	Nominated		2018				37
I-90	102.9	Yakima Thorp to Irene	Bank erosion, avulsion risk, levees	RA Queue		2009	2020, 2012			39
US 97	143.2	Upper Dry Cr culvert	Culvert sediment, avulsions	Assessed		2014	2014	990129		39
SR 410	81.0	Miner Cr crossing	Culvert sediment, avulsions	RA Queue		2017				38
SR 410	82.2	Parker Cr crossing	Culvert sediment, avulsions	RA Queue		2017				38
SR 410	83.8	American R Fife's Bluff	Bank erosion	Assessed		2012	2014			38
SR 410	102.3	Rock Cr culvert	Culvert sediment	Assessed	Programmed	2007	2014	991009	No	38
SR 970	5.5	Teanaway River	Bank erosion, levees, flooding	Concurred	Programmed	2009	2020phd, 2010			39

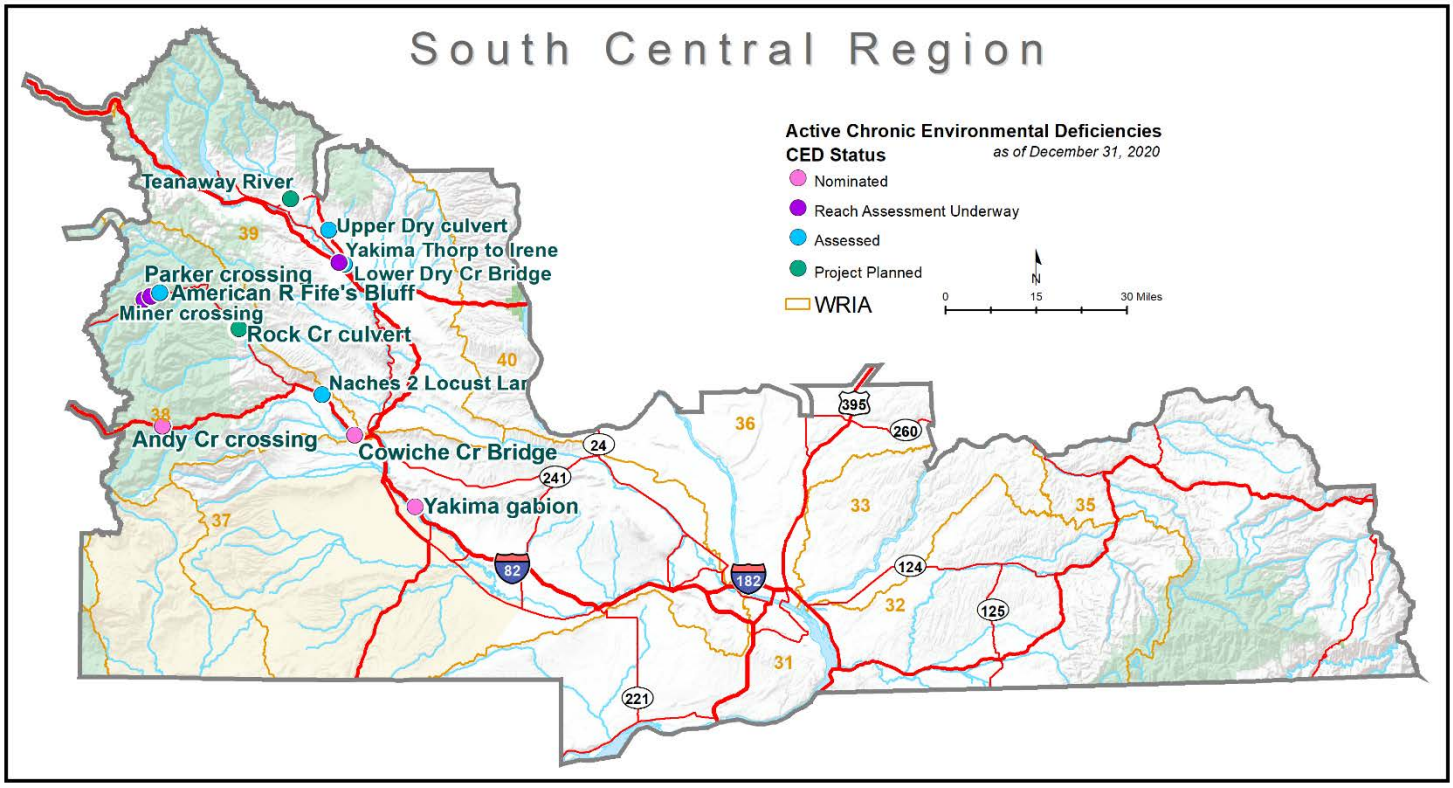


Figure 36. Active CEDs in South Central Region.

Southwest Region

There are nine active CEDs in Southwest Region. One of these projects, SR 105 Washaway Seastrand Dynamic Revetment is currently in design (Table 13 and Figure 37).

Table 13. Active CED sites in Southwest Region (9).

Road	MP	CED Site	CED Problem	CED Status	Project Status	Nomination Date	Reach Assessment Dates	Fish Passage ID	Fish Barrier	WRIA
SR 7	10.5	Roundtop Trib culvert	Culvert sediment, mass wasting	Assessed		2017	2019	990691	Yes	11
US 12	108.1	Rainey Cr Bridge	Bridge sediment	No-build option		2005	2017, 2007		No	26
US 12	109.2	EF Stiltner culvert	Culvert sediment	Assessed		2007	2007	990401	Yes	26
SR 105	18.7	Graveyard Spit	Bank erosion, flood risk	Assessed		2019				24
SR 105	20.8	Washaway Seastrand Dynamic Revetment	Bank erosion	Assessed	Programmed	2006	2015			24
SR 142	16.3	Klickitat River Wahkiacus	Bank erosion	Assessed		2008	2009			30
SR 508	5.7	SF Newaukum 3b	Bank erosion	Nominated		2019	2009			23
SR 508	24.3	No Name Cr Bridge	Bridge sediment	Assessed		2014	2015			26
SR 508	28.7	Tilton Morton 2	Bank erosion	RA Queue		2015	2019			26

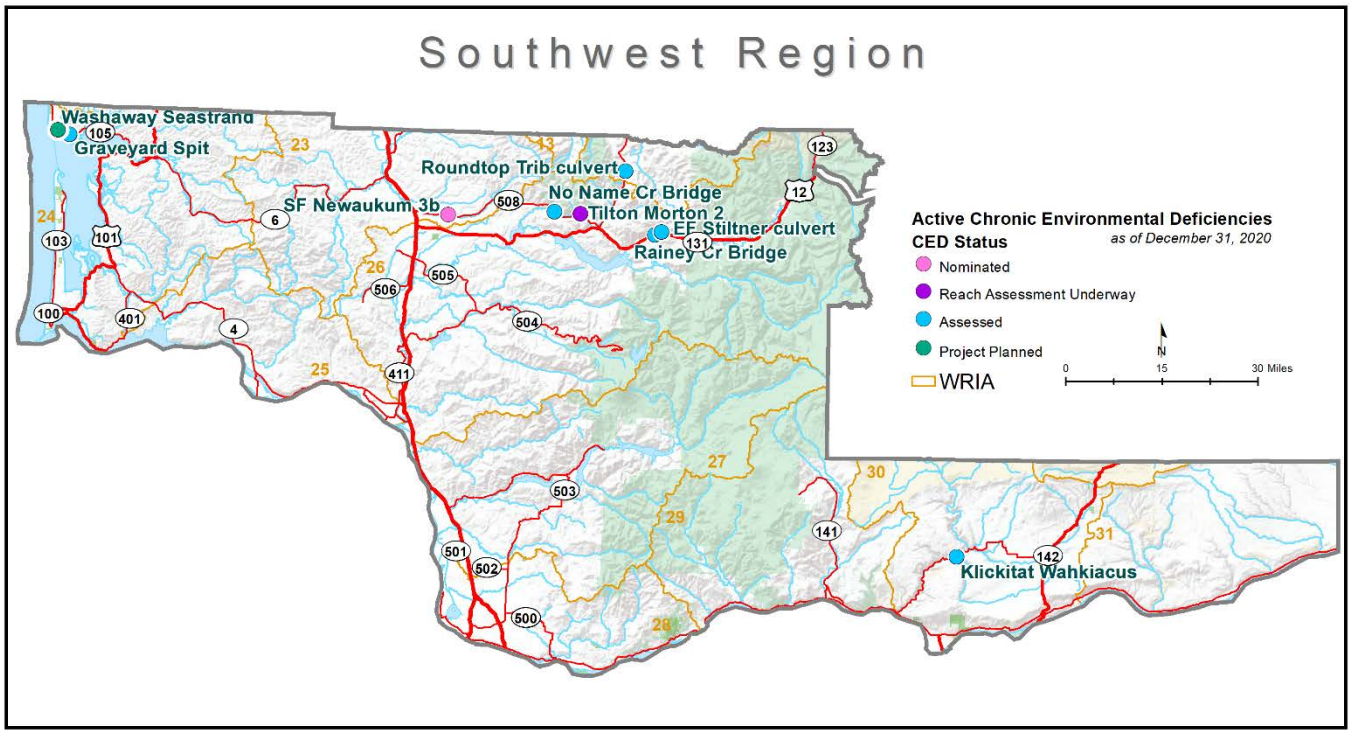


Figure 37. Active CEDs in Southwest Region.

Monitoring

CED projects are subject to uncertainties in design and watershed conditions and monitoring project effectiveness is important to ensure that CED methods are addressing the problem as expected. Hydraulic monitoring of CED projects is often required by project construction permits. Typical monitoring plans include photo points or drone monitoring of instream structures, fish passage monitoring of culvert projects, and ad hoc monitoring by CED hydrologists to ensure projects are performing their intended function and to improve future CED projects. Additionally, WSDOT maintenance staff regularly monitor how constructed projects are protecting WSDOT infrastructure.

This year WSDOT actively monitored 10 CED sites:

- SR 20 Skagit River Dolotimber CED – drone and photo point monitoring
- SR 20 Red Cabin Creek crossing – ad hoc monitoring
- SR 92 Pilchuck River CED
- SR 530 Sauk River Confluence – drone and photo point monitoring
- SR 530 Sauk River Side Channel 2 and 3 – ad hoc monitoring, drone monitoring
- SR 105 Washaway Beach North Cove Dynamic Revetment – video monitoring, ad hoc monitoring
- SR 504 Wooster Creek Crossing – fish passage monitoring, drone monitoring of regrade
- SR 542 Anderson Creek Crossing – fish passage monitoring
- SR 508 Tilton River Morton CED – ad hoc monitoring
- SR 542 Boulder Creek Crossing – ad hoc monitoring

In addition to post-project monitoring, the CED program also conducts threat monitoring of active CEDs to determine current risk to WSDOT infrastructure, help with prioritization of reach assessment updates and CED projects, and determine if an at-risk site should be added to the CED list. WSDOT conducted threat monitoring at the following active CED sites:

- SR 410 White River 1 and 2
- US 2 Skykomish River Barclay
- US 2 Skykomish River 2
- US 12 Newaukum River 3
- SR 542 NF Nooksack River Coal Cr vicinity – added to CED list
- SR 529 N Union / S Steamboat Dike – added to CED list
- SR 900 May Cr Tributary – added to CED list

SR 504 Wooster Creek Culvert CED monitoring

The Wooster Creek CED was constructed in 2018. Prior to CED project construction, high sediment loading from the eruption of Mount Saint Helens and interrupted instream processes due to the existence of an undersized culvert under SR 504 had resulted in development of a ten-foot cascading drop downstream of the culvert and creation of a forested wetland upstream (Figure 38 and Figure 39). To provide a continuous stream channel, the new channel would need to be regraded to remove the elevation drop and reach equilibrium. If the regrade was constructed mechanically, it would require up to 400 feet of channel construction upstream of the culvert, which would have significant impacts to the forested wetland upstream. WDFW and WSDOT agreed during the concurrence that despite the risk, allowing the stream channel to regrade naturally would have the least construction impacts and would minimize long-term impacts to the stream corridor and wetland habitat upstream.

Figure 38. Forested wetland upstream of Wooster Cr crossing prior to construction, April 2014.

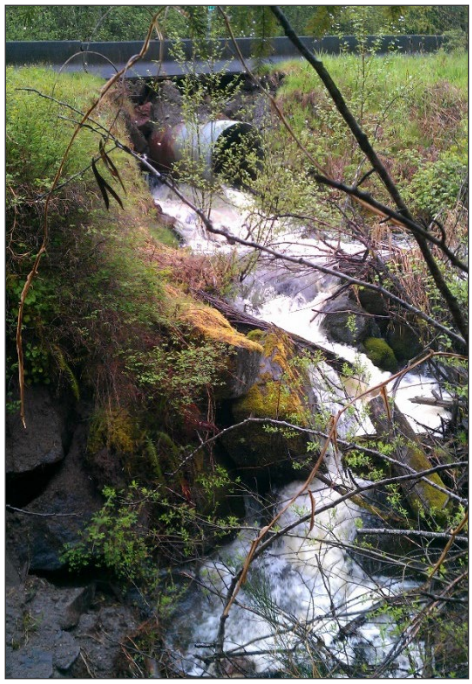


Figure 39. SR 504 Wooster Creek CED, April 2014. The failing culvert had developed a 10-foot cascading elevation drop downstream of the pipe.

In fall 2018, the failing barrier culvert was replaced with a 19-foot span bridge with 35-foot-deep abutments that were designed to allow for up to 14 feet of vertical regrade of the streambed, and would allow the streambed to regrade naturally downstream and upstream of the crossing (Figure 40 and Figure 41).

Figure 41. Outlet of the Wooster Creek crossing immediately after construction, October 2018.

Figure 40. Wooster Creek CED project upstream of the SR 504 crossing, post construction. October 2018.

Figure 44. Downstream of Wooster Cr crossing 1.5 years after construction, February 2020.

This site has been closely monitored by WSDOT's Fish Passage Monitoring Program and WDFW spawning survey crews. A WSDOT fish passage biologist collected channel measurements through the project area immediately post construction, at 6 months, 11 months, 16 months, and 24 months post-construction, and evaluated the success of the project at providing adequate fish passage. The streambed downstream and through the crossing has regraded significantly since construction - up to 3.2 feet at the outlet as of December 2020, and the streambed slope through the project area has decreased to an average 5.6%. The biologist observed pool development, streambed substrate sorting, and braiding of the channel upstream and downstream (Figures 41 to 44 and cover photo).

Figure 43. Channel regrade under the Wooster Cr Bridge, February 2020.

Figure 42. Channel regrade and wood recruitment upstream of the crossing in the forested wetland, 1.5 years post-construction.

Figure 45. Drone photo of the upstream channel, December 2020.

Upstream of the crossing, incision has recruited streambank trees into the channel providing channel complexity and structure as the channel incises through the wetland. Downstream, temporary debris deposits have formed steps as streambed substrate and wood moves through crossing, gradually reducing the steep cascade in the downstream channel. WDFW spawning survey crews observed five coho redds upstream of the crossing in fall 2020.

Appendix 1 - Status of all active, stable, and resolved CED sites, sorted by road and milepost (145).

Road	MP	CED	Region	CED Status	CED Problem	Nomination Date	Reach Assessment Dates	Constructed Date	Fish Passage ID	Current Fish Barrier?	WRIA
US 2	39.9	SF Skykomish 1 Barclay	NWR	Active	Bank erosion - threat	2013	2019, 2017, 2013				7
US 2	46.5	SF Skykomish 2	NWR	Active	Bank erosion - threat	2015	2017				7
US 2	83.2	Nason 2 Kahler	NCR	Active	Bank erosion threat	2018					45
US 2	88.5	Skinney culvert	NCR	Resolved	Culvert flooding, beaver	2009	2010	2014	991849	No	45
US 2	89.4	Skinney Cr channel restoration	NCR	Active	Grade controls	2018	2019			Yes	45
US 2	94.0	Wenatchee Tumwater Canyon	NCR	Stable	Bank erosion	2007	2009				45
SR 3	41.0	Chico Cr crossing	OR	Stable	Culvert debris, channel avulsion, FP weir scour	2005	2006		15.0229 0.10	Yes	15
SR 4	10.5	Campbell Cr tidegate	SWR	Resolved	Culvert tidegate	2009	2005	2015	991352	No	25
SR 7	4.6	Tilton River 1	SWR	Resolved	Bank erosion	2010	2010	2016			26
SR 7	4.7	Tilton River 2	SWR	Resolved	Bank erosion	2010	2019, 2016, 2010	2018			26
SR 7	10.5	Roundtop Trib culvert	SWR	Active	Culvert sediment, mass wasting	2017	2019		990691	Yes	11
SR 8	5.0	MF Wildcat culvert	OR	Resolved	Culvert erosion, roughened channel	2006	2007	2018	22.0507 0.10	No	22
SR 8	15.3	Kennedy culvert	OR	Active	Culvert sediment, mass wasting, flooding	2007	2008		997201	Yes	14
SR 10	104.2	Lower Dry Cr Bridge	SCR	Active	Bridge sediment, levees	2014	2016			No	39
US 12	108.1	Rainey Cr Bridge	SWR	Active	Bridge sediment	2005	2017, 2007	2017		No	26
US 12	108.9	WF Stiltner culvert	SWR	Stable	Culvert sediment, avulsions	2009	2009				26
US 12	109.2	EF Stiltner culvert	SWR	Active	Culvert sediment	2007	2007		990401	Yes	26
US 12	118.3	Cowlitz River	SWR	Resolved	Bank erosion	2013	2016, 2013	2015			26
US 12	121.9	Davis Cr Bridge	SWR	Stable	Bridge sediment, avulsions	2009	2010				26
US 12	159.2	Andy Cr crossing	SCR	Active	Culvert sediment, avulsions	2018			998490	Yes	38
US 12	190.4	Naches 2 Locust Lane	SCR	Active	Bank erosion	2005	2008				38
US 12	199.2	Cowiche Cr Bridge	SCR	Active	Bridge sediment, flooding, levees	2018					38
US 12	201.0	Naches 1 N Yakima	SCR	Resolved	Bank erosion	2007	2003	2008			38

Road	MP	CED	Region	CED Status	CED Problem	Nomination Date	Reach Assessment Dates	Constructed Date	Fish Passage ID	Current Fish Barrier?	WRIA
SR 14	43.9	Rock Cove Bridge	SWR	Stable	Bridge sediment, abutment erosion	2016	2018			No	29
SR 18	8.9	Soosette Cr weirs	NWR	Active	Bridge Grade controls	2015			990390	Yes	9
SR 20	0.1	Snow Cr Bridge	OR	Resolved	Bridge sediment, debris	2012	2012	2017	932561	No	17
SR 20	72.8	Childs Cr crossing	NWR	Active	Culvert sediment, avulsions, flooding	2003	2020, 2013		991146	Yes	3
SR 20	75.8	Red Cabin culvert	NWR	Resolved	Culvert sediment	2005	2005	2011	AR11	No	3
SR 20	100.7	Skagit 1	NWR	Resolved	Bank erosion	2004	2007	2014			4
SR 20	101.0	Skagit 2	NWR	Active	Bank erosion	2018					4
SR 20	181.3	Little Boulder culvert	NCR	Stable	Culvert aggradation, erosion, incision	2011	2013		990228	No	48
SR 20	184.5	Methow Weeman Bridge	NCR	Active	Bank erosion	2018					48
SR 20	206.3	Beaver Cr	NCR	Resolved	Bank erosion	2016	2018	2018			48
SR 20	278.0	Bonaparte Cr	NCR	Resolved	Bank erosion	2008		2011			49
SR 21	117.3	Sanpoil 1 Keller	ER	Active	Bank erosion	2017					52
SR 21	132.9	Sanpoil 2	ER	Active	Bank erosion	2017					52
SR 21	133.6	S Nanamkin culvert	ER	Resolved	Culvert sediment, avulsions	2010	2010	2014	990362	No	52
SR 21	150.4	Sanpoil 3	ER	Active	Bank erosion	2017					52
SR 21	152.5	Sanpoil 4	ER	Active	Bank erosion	2017					52
SR 21	159.5	Granite crossing	ER	Active	Culvert avulsions	2017			999343	No	52
SR 21	173.8	Curlew culvert	ER	Active	Culvert erosion, sediment	2018			990097	Yes	60
SR 21	188.1	Kettle River Corridor	ER	Active	Bank erosion, flooding	2017					60
SR 26	1.8	Sand Hollow Wasteway	NCR	Resolved	Bank erosion	2006	2006	2008			41
I-82	46.1	Yakima gabion	SCR	Active	Bank erosion	2018					37
I-82	52.8	Yakima Zillah	SCR	Stable	Bank erosion	2007					37
I-90	21.2	EF Issaquah Trib	NWR	Active	Culvert sediment, flooding	2009	2009		996473-EB, 996474-WB	Yes	8
I-90	22.1	EF Issaquah and Trib	NWR	Active	Culvert sediment, flooding	2009	2009		991701	Yes	8
I-90	44.7	SF Snoqualmie Tinkham	SCR	Stable	Bank erosion	2007	2015				7
I-90	55.5	Gold Cr Bridge	SCR	Resolved	Bridge sediment, dewatering	2006	2006	2014			39
I-90	102.9	Yakima Thorp to Irene	SCR	Active	Bank erosion, avulsion risk, levees	2009	2020p, 2012				39

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SR 92	5.1	Pilchuck River	NWR	Resolved	Bank erosion	2012	2015, 2013	2016			7
US 97	17.2	Jenkins culvert	SWR	Stable	Culvert sediment	2009	2012		990206	No	30
US 97	45.8	Satus Cr Bridge	SCR	Resolved	Bridge debris, flooding	2005	2008	2015	997984		37
US 97	137.8	Dry culvert Ellensberg	SCR	Resolved	Culvert sediment, flooding	2009	2012	2015	990127	No	39
US 97	143.2	Upper Dry culvert	SCR	Active	Culvert sediment, avulsions	2014	2014		990129		39
US 101	54.3	Willapa River	SWR	Resolved	Bank erosion	2008	2014	2016			24
US 101	130.0	Milbourn crossing	OR	Active	Bridge Grade control, bed incision	2014	2014		997325	Yes	21
US 101	130.7	Dry Cr Bridge	OR	Stable	Bridge sediment	2008	2009		997326	No	21
US 101	133.5	Boulder Trib culvert	OR	Active	Culvert sediment	2017	2018		990545	No	21
US 101	170.4	Nolan Cr Bridge	OR	Resolved	Bridge scour	2003	2001	2004	999725	No	20
US 101	174.4	Hoh 1	OR	Resolved	Bank erosion	2003	2002	2006			20
US 101	174.4	Hoh 1 revisit	OR	Active	Bank erosion	2015	2015				20
US 101	175.1	Old Joe Slough Trib	OR	Stable	Culvert sediment	2006			991644	Unknown	20
US 101	175.7	Hoh 2	OR	Resolved	Bank erosion	2007	2008	2014			20
US 101	258.2	McDonald Cr Bridge	OR	Resolved	Bridge scour, incision	2010	2011	2015			18
US 101	277.9	Contractors culvert	OR	Active	Culvert sediment	2005	2020PHD, 2005		990090	Yes	17
US 101	306.6	Dosewallips Bridge	OR	Stable	Bridge debris	2006	2007			No	16
US 101	321.7	Hood Canal Beach Nourishment	OR	Active	Bank erosion, landslide debris	2015	2016				16
US 101	329.0	Sund crossing	OR	Stable	Bridge sediment, avulsions	2009	2010		930283	No	16
US 101	329.9	Miller crossing	OR	Stable	Bridge sediment, avulsions	2009	2010		930284	No	16
US 101	332.8	Hood Canal Erosion	OR	Active	Bank erosion	2018					16
SR 105	16.5	Norris Slough culvert	SWR	Resolved	Culvert failing, sinkhole, tidegate	2005	2007	2013	990307	No	24
SR 105	18.7	Graveyard Spit	SWR	Active	Bank erosion, flood risk	2019					24
SR 105	19.9	North Cove Dynamic Revetment	SWR	Resolved	Bank erosion	2006	2015	2018			24
SR 105	20.8	Washaway Seastrand Dynamic Revetment	SWR	Active	Bank erosion	2006	2015				24
SR 106	4.3	Lower Hood Canal Stabilize Shoreline	OR	Active	Bank erosion, landslide debris	2007	2008				16

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SR 106	6.8	Big Bend Estuary	OR	Active	Bank erosion	2018			990008	No	14
SR 106	12.3	Twanoh culvert	OR	Stable	Culvert sediment	2011	2020PHD, 2012		990450	Yes	14
SR 106	13.5	Twanoh Falls culvert	OR	Resolved	Culvert sediment, flooding	2006	2008	2013	991246	No	14
SR 108	7.0	Slide culvert	OR	Active	Culvert sediment	2009	2011		991671	No	14
SR 108	8.8	McDonald fishway	OR	Active	Fishway sediment	2007	2020PHD		990278	Yes	14
SR 109	3.4	Harborview Court	OR	Active	Culvert flooding	2018			991835, 994829, 995148	Yes	22
SR 109	31.5	Moclips Bridge	OR	Active	Bridge debris, sediment, flooding	2005	2007		997785	No	21
SR 112	19.6	Clallam River	OR	Resolved	Bank erosion	2009	2005	2006			19
SR 112	24.3	Pysht River	OR	Active	Bank erosion	2009	2005				19
SR 142	7.0	Klickitat Lower Bank	SWR	Stable	Bank erosion	2014	2015				30
SR 142	16.3	Klickitat Wahkiacus	SWR	Active	Bank erosion	2008	2009				30
SR 202	21.8	Snoqualmie Preston-Falls City	NWR	Resolved	Bank erosion	2003	2007, 2006, 2003	2004			7
SR 202	23.4	Mud Cr culvert	NWR	Active	Culvert sediment	2009	2010		101s-10	Yes	7
SR 203	11.0	Snoqualmie Sinnema-Quaale	NWR	Resolved	Bank erosion	2013	2013	2016			7
SR 203	14.5	Coe Clemmons culvert	NWR	Resolved	Culvert sediment	2010	2013, 2010	2015	991718	No	7
SR 207	0.4	Nason Cr	NCR	Active	Bank erosion	2012	2019				45
SR 224	8.9	Yakima 2 Richland	SCR	Resolved	Bank erosion	2005	2007	2009			37
SR 300	2.0	Union River Sand Hill	OR	Active	Bank erosion, flooding, culvert erosion	2007	2008		996699, 996700, 996730	Yes, Yes, No	15
SR 300	2.8	Union River Bridge	OR	Stable	Bridge debris	2007	2008				15
SR 410	35.7	Clay Cr culvert	NWR	Stable	Culvert debris, erosion	2009	2009		990082	Yes	10
SR 410	50.9	White River gabion 2	NWR	Active	Bank erosion	2019	2019				10
SR 410	51.0	White River gabion	NWR	Resolved	Bank erosion	2017	2018	2018			10
SR 410	57.7	Upper White River 4	NWR	Active	Bank erosion	2016	2018				10
SR 410	58.3	Upper White River 1&2	NWR	Active	Bank erosion	2016	2018				10
SR 410	81.0	Miner crossing	SCR	Active	Culvert sediment, avulsions	2017					38
SR 410	82.2	Parker crossing	SCR	Active	Culvert sediment, avulsions	2017					38

Road	MP	CED	Region	CED Status	CED Problem	Nomination Date	Reach Assessment Dates	Constructed Date	Fish Passage ID	Current Fish Barrier?	WRIA
SR 410	83.4	American R Hells Crossing	SCR	Stable	Bridge debris-caused bank erosion	2006	2007				38
SR 410	83.8	American R Fife's Bluff	SCR	Active	Bank erosion	2012	2014				38
SR 410	102.3	Rock Cr culvert	SCR	Active	Culvert sediment	2007	2014		991009	No	38
SR 410	107.4	Naches Rattlesnake	SCR	Resolved	Bank erosion	2004	2005	2008			38
SR 503	47.8	Houghton Cr	SWR	Resolved	Bank erosion	2014	2014	2018			27
SR 504	16.0	NF Toutle River	SWR	Resolved	Bank erosion	2013	2013	2015			26
SR 504	17.0	Wooster Cr culvert	SWR	Resolved	Culvert erosion, piping	2014	2014	2018	991634	No	26
SR 508	3.2	SF Newaukum 2	SWR	Resolved	Bank erosion	2008		2015			23
SR 508	5.7	SF Newaukum 3	SWR	Resolved	Bank erosion	2008	2009	2016			23
SR 508	5.7	SF Newaukum 3b	SWR	Active	Bank erosion	2019	2009				23
SR 508	7.3	SF Newaukum 1	SWR	Resolved	Bank-hillslope rotation	2006	2006	2008			23
SR 508	24.3	No Name Cr Bridge	SWR	Active	Bridge sediment	2014	2015				26
SR 508	28.7	Tilton Morton	SWR	Resolved	Bank erosion	2015	2018	2018			26
SR 508	28.7	Tilton Morton 2	SWR	Active	Bank erosion	2015	2019				26
SR 529	5.8	Steamboat Dike	NWR	Resolved	Flooding, failing levees	2013	2016, 2013	2019			7
SR 529	5.2	N Union / S Steamboat Dike	NWR	Active	Flooding, failing levees	2020	2016				7
SR 530	55.5	Sauk-Suiattle Confluence 1	NWR	Resolved	Bank erosion	2006	2007	2011			4
SR 530	55.7	Sauk-Suiattle Confluence 2	NWR	Resolved	Bank erosion	2014	2013	2019			4
SR 530	58.7	Sauk Side Channel 1	NWR	Resolved	Bank erosion	2003	2007, 2004	2008			4
SR 530	58.8	Sauk Side Channel 2	NWR	Resolved	Bank erosion	2018	2019	2019			4
SR 530	58.8	Sauk Side Channel 3	NWR	Resolved	Bank erosion	2018	2019	2020			4
SR 530	58.9	Sauk Side Channel 4	NWR	Active	Bank erosion	2018	2020				4
SR 530	59.2	Sauk River realignment	NWR	Resolved	Bank erosion	2003	2009	2011			4
SR 542	6.5	Anderson Cr culvert	NWR	Resolved	Culvert sediment, debris, fishway	2009	2010	2015	01.0228 4.80	No	1
SR 542	20.2	NF Nooksack revetment	NWR	Resolved	Bank erosion	2004	2009	2007			1
SR 542	20.3	NF Nooksack Coal Cr	NWR	Active	Bank erosion	2020					1
SR 542	26.6	NF Nooksack washout	NWR	Resolved	Bank erosion	2008	2009	2007			1
SR 542	27.3	NF Nooksack Devine	NWR	Stable	Bank erosion	2007	2013				1
SR 542	28.0	Bruce Cr culvert	NWR	Resolved	Culvert sediment	2006	2009	2009	990046	No	1
SR 542	28.3	Boulder Cr Bridge	NWR	Resolved	Bridge sediment	2004	2009	2007			1

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SR 542	29.7	NF Nooksack Warnick Bluff	NWR	Resolved	Bank erosion	2004	2009	2015			1
SR 542	30.9	NF Nooksack Warnick Bridge	NWR	Stable	Bridge debris	2004	2009				1
SR 542	33.4	Gallup Bridge	NWR	Resolved	Bridge sediment, flooding, alluvial fan	2004	2009	2010			1
SR 542	33.5	Glacier Bridge	NWR	Active	Bridge sediment, flooding, alluvial fan	2004	2019PHD, 2009				1
SR 542	33.6	Glacier Side Channel	NWR	Stable	Culvert erosion	2011	2019PHD, 2013		932740	No	1
SR 542	37.2	NF Nooksack powerline	NWR	Resolved	Bank erosion	2004	2009	2007			1
SR 542	38.7	NF Nooksack Church Mt.	NWR	Resolved	Bank erosion	2004	2005	2010			1
SR 542	38.9	Nooksack reinforcement	NWR	Resolved	Bank erosion	2004	2009	2006			1
SR 542	39.5	NF Nooksack emergency	NWR	Resolved	Bank erosion	2015	2015	2016			1
SR 542	44.9	NF Nooksack Twin Lakes Rd	NWR	Resolved	Bank erosion	2015	2015	2018			1
SR 542	45.0	Nooksack logjam	NWR	Resolved	Bank erosion	2004	2009	2007			1
SR 900	18.5	May Trib	NWR	Active	Road adj Channel sediment, flooding	2020					8
SR 970	5.5	Teanaway River	SCR	Active	Bank erosion, levees, flooding	2009	2020PHD, 2010				39