HABITAT AND FLOOD CAPACITY CREATION PROJECT FINAL REPORT EXECUTIVE SUMMARY

FALL 2019

Pierce County

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INTRODUCTION AND OVERVIEW

All of Pierce County's major river systems, including the Carbon, White, and Puyallup, begin their journey as glaciers on the high slopes of Mount Rainier. As these glaciers work their way down the slopes, they grind away at the mountain and pick up sediments, which are then carried downstream by the meltwater that forms our rivers. Mount Rainier provides a lot of sediment throughout the year. This process of sediment transport is natural, but it may be occurring more as climate change causes glaciers to retreat more quickly.

Sediments are carried downstream and deposited along the river channels and in floodplains. Most of this sediment transport occurs during high water events when rivers are full and moving quickly. Historically, the course of rivers would change as sediments migrated downstream, built up, and caused changes in how the river flowed. Today, however, many of our rivers run in a determined course defined by levees and other flood control structures built to protect property and infrastructure. As sediments are deposited in these constrained river channels, it can build up and potentially lead to reduced in-stream capacity and contribute to flooding by overtopping the levees during heavy rains.

Managing flood risks

Flooding in our region is becoming more intense and harder to predict based on past experiences because of a changing climate and increased stormwater runoff associated with more impervious areas from widespread development.

Managing these changing flood risks is complex and requires many different approaches. The county has a Flood Hazard Management Plan that includes many long-term flood management strategies to reduce the risk of damage to property and infrastructure over many years. These long-term strategies include:

- Coordinating with cities and towns to develop coordinated land use policies
- Maintaining and managing existing flood risk-reduction infrastructure
- Acquiring or buying out flood prone properties
- Requiring that new projects do not contribute to increased flood heights (also known as zero-rise requirements)

These strategies may take time to demonstrate results in some areas. Short-term measures help to supplement these plans in some areas. One such short-term strategy that was historically used in Pierce County involved removing some river sediments to increase in-stream capacity.

What are... ?

Floodplains
Low areas adjoining a stream or river channel that overflow at times of high river flow.

Levees
Flood-control structures designed to protect an area from flooding. Levees are typically elongated ridges or walls in a floodplain that parallel a river's course and help to contain floodwaters.

Revetments
Structures that reduce erosion or channel migration along a riverbank.

Sediments and gravel bars
Sediments can range in size from boulders to silt-sized particles; gravel bars occur where rivers slow down and cause sediments to build up. The terms sediment and gravel may sometimes be used interchangeably.

A gravel bar on the Puyallup River

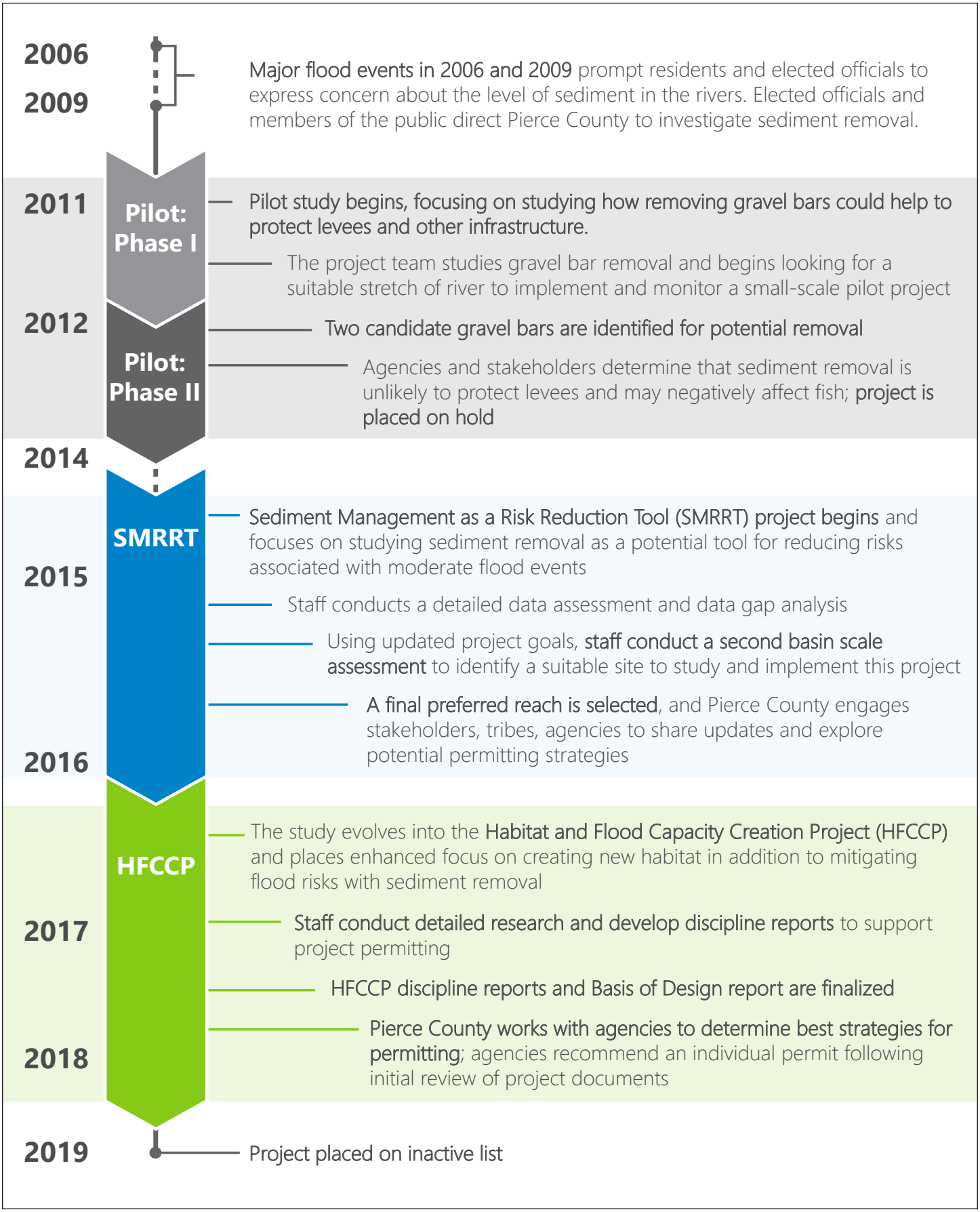


Figure 1 Project timeline

Sediment management for short-term flood risk reduction

In both 2006 and 2009, Pierce County experienced major, damaging floods. Following these events, many residents wondered if removing sediments from rivers could be brought back as a short-term strategy for controlling flooding. Many long-time residents remembered channel dredging as a common practice in the past; however, dredging fell out of favor in the late 1900s because it was not economically viable and, in later years, because of the presences of Endangered Species Act (ESA) listed fish in many rivers.

In 2009, Pierce County was tasked by elected officials on behalf of the public to investigate whether focused sediment removal along the Puyallup River could be used as a short-term management tool to help reduce flood risk. To conduct this analysis, the county began working on a small, fact-finding pilot project to remove sediment from a stretch of river and examine the results to determine how feasible and effective this strategy could be at reducing short-term flood risks. This effort was eventually known as the Habitat and Flood Capacity Creation Project (or HFCCP); however, early phases of the work went through several distinct iterations, which included:

- Pilot Gravel Removal Study, Phase I and Phase II (2011-2012)
- Sediment Management as a Risk Reduction Tool (SMRRT) Project (2014-2016)
- Habitat and Flood Capacity Creation Project (HFCCP, 2016-2018)

All the phases of this pilot project were intended to focus on localized sediment removal to see if it could be implemented in areas where it would be difficult to implement long-term flood hazard reduction strategies, where other cost-effective short-term management strategies do not exist, and where flood damage to public resources is likely to occur in the foreseeable future.

As this work continued and as the project evolved, additional sediment removal benefits, such as reducing levee damage and enhancing degraded habitat, were explored as part of the project design.

The project timeline (Figure 1) on the previous page provides additional detail about how the HFCCP evolved, as well as some of the study considerations incorporated into the different project iterations.

Project wrap up and lessons learned

Due to a variety of factors, including challenges securing needed permits for this work, the HFCCP was placed on Pierce County's inactive project list beginning in 2019.

Though this pilot project was ultimately not implemented, the County worked hard over many years to learn about the feasibility and potential benefits of sediment removal in Washington State. This report documents the work that went into advancing the HFCCP throughout its different phases. It also includes lessons that were learned though

Major flood events in 2006 and 2009 led to citizens expressing concern about the level of sediment in rivers.

the journey that may help Pierce County or other Washington jurisdictions better understand the project approach, as well as potential opportunities and constraints associated with similar future projects.

A summary of the project phases is included on the following pages. Appendix I provides a more detailed look at the project phases, technical findings, and permitting processes, including lessons learned during each iteration of the project.

PILOT GRAVEL REMOVAL STUDY, PHASE I AND PHASE II

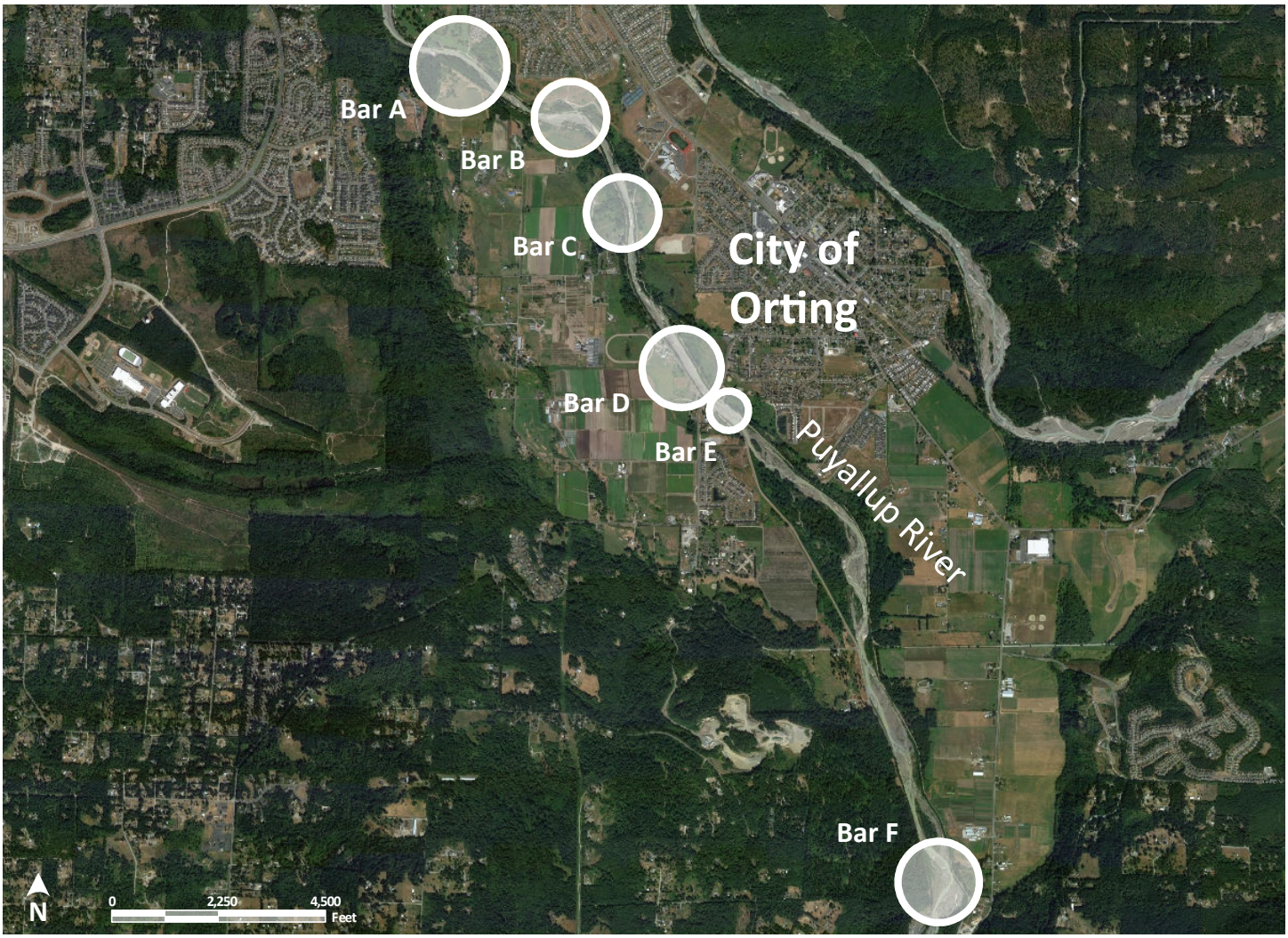
Overview and goals

Between 2011 and 2012, the initial Pilot Study (Phase I and Phase II) began examining how a targeted sediment removal pilot project could be developed in Pierce County to help protect infrastructure and lower flood risk. In this early phase, study goals included:

- Examining the effectiveness of removing gravel bars, especially high-risk ones that could potentially direct flood waters into levees, revetments, riverbanks, private property, or other infrastructure and cause damage
- Studying potential impacts to the natural environment and ESA-listed species

Phase I

The first phase of this initial study involved getting smart on sediment removal and finding a suitable reach of river where the county could test its effectiveness and feasibility as a strategy. Pierce



Gravel bars identified for further analysis in Phase II of the pilot study.

County staff studied 12 potential reaches in the Puyallup River Basin (which includes the Carbon and White rivers) in 2009 and examined river and sediment characteristics as well as nearby, at-risk infrastructure. During this early work, Pierce County staff also collaborated with tribes to collect helpful information on fish within the local systems.

Using a set of selection criteria that examined the social, geologic, hydraulic, and biologic characteristics of each one of the 12 starting reaches, the project team was able to identify two reaches on the Puyallup River to study further.

Phase II

In 2012, Phase II of the pilot study picked up following the identification of two finalist reaches, and the team began looking at individual gravel bars within these two areas. Again, the team developed a set of evaluation criteria to help determine which bars posed the most risk to nearby levees and property. The two gravel bars that presented the most significant and consistent risk to levees over the term were selected for further analysis.

At this point, however, the pilot study encountered challenges. Some stakeholders and agency staff did not think that gravel bar removal could help to protect levees—in fact, they believed that the levees were a big factor in creating the gravel bars. There also were concerns about potential impacts to fish from removing sediments.

In the end, the team was not able to find support from permitting agencies to proceed with the work, and the study was put on hold for a couple of years.

SEDIMENT MANAGEMENT AS A RISK REDUCTION TOOL PROJECT

Overview and goals

After the initial pilot study took a break due to permitting challenges, the county still was interested in continuing to evaluate sediment management for short-term flood risk reduction. The effort was revived in 2014 as the SMRRT project, and during this phase the project goals included:

- Estimating the effectiveness of sediment removal as a method for reducing localized flood risks during moderate flooding
- Avoiding, minimizing, or mitigating potential adverse impacts to habitat and other resources
- Designing a sediment removal project that can be approved and permitted
- Conducting sediment removal at a selected site and monitoring how effective it is at reducing local flood risks during a moderate flood event

In addition, Pierce County established a steering committee to provide technical direction and oversight to the project.

SMRRT Phase 1 – Data gap analysis

To ensure that the SMRRT project was well set up, the project team invested time in an in-depth, year-long data assessment and gap analysis. This involved the project team looking at existing technical studies that could help to identify the best site for removing sediment and to develop mitigation and monitoring plans. Since the team assumed at this point that an Environmental Impact Statement (EIS) likely would be needed to permit and implement any sediment removal, part of the data gap analysis included looking for information to support assumed EIS discipline reports.

During this work, the team also flagged any missing information and highlighted the level of risk that these unknowns potentially posed to completing the project in the future.

SMRRT Phase 2 – Reach-scale selection

Once the team had collected enough information to feel confident moving forward, the SMRRT project rebooted the process of selecting a stretch of river to study and then implement the project.

Once again, beginning with the 12 previously identified reaches, the project team conducted a new, updated ranking process to find the most suitable site for the rebooted project goals. The team looked for a stretch of river in the Puyallup basin that:

- Experienced flooding during moderate events
- Had nearby at-risk population
- Had nearby at-risk infrastructure
- Had large-scale accumulation of sediments
- Was stable enough to likely allow a period of monitoring following sediment removal before additional sediments were deposited

The team conducted several rounds of scoring to determine which two reaches were the most promising. This process involved looking at four initial categories of characteristics, including:

- Geomorphic
- Hydraulics and sediment
- Fisheries
- Land use and social

For each category, each of the 12 reaches were assigned a score. The six highest scoring reaches were modeled to determine which could benefit the most from sediment removal and enhanced channel capacity, and the top two options were selected for a final round of scoring.

SMRRT Phase 3 – Project site selection

A final round of pro/con scoring on the top two sites selected the final, preferred reach. The two finalists were known as Reach P1, Old Cannery Reach (at and upstream of the confluence between the Puyallup and White rivers, between the cities of Puyallup and Sumner) and Reach P2, Sportsman Reach (in unincorporated Pierce County, to the east of the City of Puyallup). The team conducted this pro/con scoring using the same categories that were included in the SMRRT reach-scale selection process, while also adding three additional categories:

- Hazardous materials
- Wetlands and wildlife
- Geology, soils, and groundwater

To complete these pro/con scores, some fieldwork was conducted, including bathymetric surveys and field reconnaissance to measure existing conditions

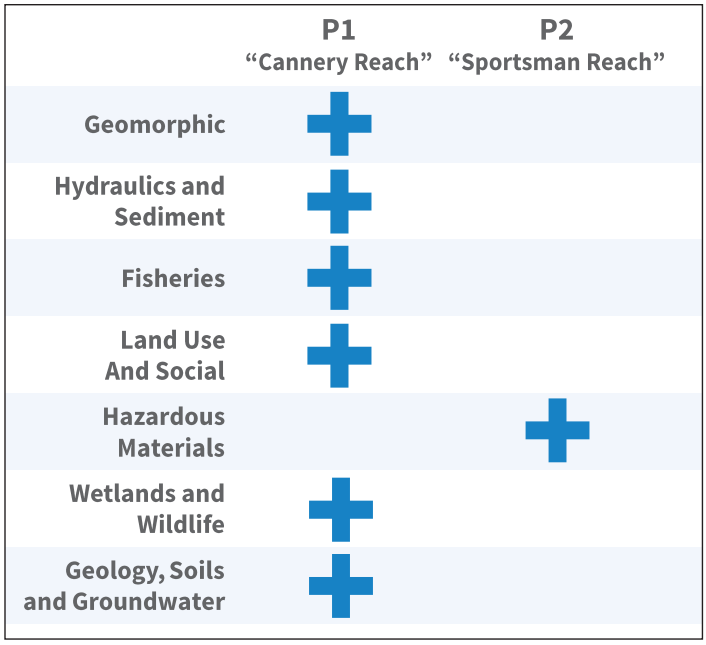


Figure 2 SMRRT pro/con analysis results for the two finalist reaches

in more depth. As shown in Figure 2, Old Cannery Reach scored more favorably than Sportsman Reach in every category, except for hazardous materials (because of a higher likelihood of Old Cannery Reach containing potentially contaminated sediments).

Old Cannery Reach was the final selected site for the pilot project. This site was a half-mile stretch of river located at the confluence of the Puyallup and White rivers. A bridge (E Main Ave) and the Sumner Sewage Treatment Plant exist adjacent to the site, and two primary gravel bars exist along this stretch. The river at this location was mostly confined by levees. Some flood control measures had been identified for the site; however, several factors, such as nearby infrastructure, made implementation of these measures challenging. Due to the site's proximity to a former landfill, there was a higher likelihood of contaminated sediments being present at the site; however, initial characterization work indicated that concentrations of contaminants were below levels that would require future evaluation.

The completion of the SMRRT site selection process provided Pierce County with the opportunity to reengage project stakeholders, tribes, and agencies to discuss progress and next steps. At this stage, permitting was anticipated to include both state and federal permits to support a joint State Environmental Policy Act (SEPA) and National Environmental Policy Act (NEPA) EIS review.

Old Cannery Reach is between river mile 10.1 and 10.75. It includes the Confluence Bar and the Upstream Bar near the confluence of the White and Puyallup rivers.

HABITAT AND FLOOD CAPACITY CREATION PROJECT

Overview and goals

With a site selected and project design ready to begin, the county began exploring potential permitting strategies with management agencies to discuss potential strategies and challenges.

As conversations with stakeholders and agencies continued, however, the opportunity of using the project to enhance habitat presented itself. The site that was selected during the SMRRT process contained little existing habitat of quality and removing sediment at Old Cannery Reach presented the potential for creating more complex features at the site to help create a healthier, more natural environment for fish and other species. These habitat features, such as back-bar channels, large woody debris, and holding pools could be incorporated as part of the project design. This complexity could help to increase resting and rearing areas for young fish and spawning areas for adults.

Focusing on habitat improvements that could also provide potential flood control benefits was beneficial in many ways. Permitting a habitat enhancement and restoration project, for example, could likely be done under a Nationwide 27 approach. This approach was expected to streamline the design process, and it meant that an EIS for a NEPA process would likely not be necessary.

With this new information, the project was reconceptualized as the HFCCP. Project goals were updated at this stage to reflect the reprioritized focus and included:

- Creating new habitat where none currently existed or was degraded
- Increasing channel capacity to reduce some risks associated with moderate flooding for flood risk reduction
- Minimizing and avoiding impacts to the extent possible
- Incorporating lessons learned from previous sediment removal studies and projects

HFCCP close

The completion of the 75% design plans and the Basis of Design report for the project allowed the discipline reports to be finalized in 2017 to prepare for the submission of permits. The Pierce County and the technical teams prepared a new budget for 2018 to complete final design work and obtain permits for construction.

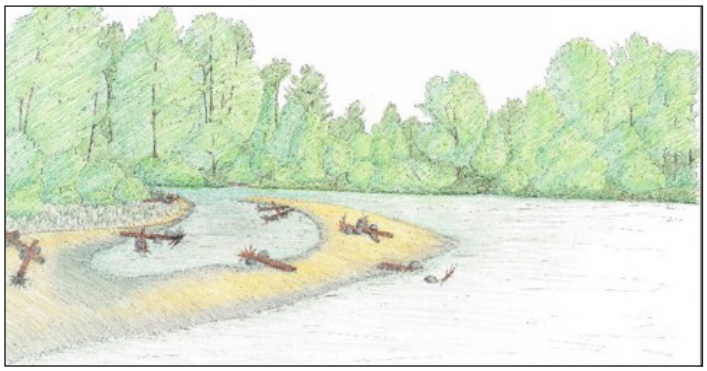
However, initial review by the U.S. Army Corps of Engineers (Corps) occurred later in 2018 than anticipated, and the preliminary feedback that was provided indicated that the HFCCP, as designed, would likely not qualify for the Nationwide 27 permit. This meant that an individual permit process would be required, and the time and level of effort needed for planning and constructing the project would be much higher.

Pierce County evaluated the anticipated level of effort and the costs associated with permitting this project under this new guidance from the Corps and consulted with the steering committee. Due to the enhanced timeline and cost, the county made the decision to place the project on the inactive list.

If future funding or support becomes available, the project could potentially be revived once again.

This stretch of the Carbon River shows low habitat complexity and high sediment loads.

This stretch of the White River shows complexity and high habitat diversity.



Conceptual drawings showing how habitat features could potentially be incorporated as part of a sediment removal project.

OVERALL LESSONS LEARNED

Overall, the effort was very informative in highlighting the strategies for removing sediment and understanding the regulatory and permitting constraints in Washington. The county and project team identified the lessons learned, which may be useful to future project iterations or to other jurisdictions in Washington looking to explore sediment removal in rivers.

Some of the big lessons learned throughout the entire process include:

- Sediment management is a technically feasible, short-term management strategy if given the right advocates and enough time and funding to complete
- Continued political will and public support throughout the entire process, from identification of need to follow-up monitoring and evaluation, is essential for success
- Continued, regular consultation with tribes, stakeholders, the public, elected officials, and agencies is vital
- Public engagement should be done often to share project information and solicit meaningful feedback
- Projects should remain flexible to accommodate changing stakeholder priorities as well as unforeseen mitigation requests
- Sediment management projects may often present opportunities for mutual gain among agencies, tribes, and stakeholders; project planning should seek these opportunities early and incorporate them into guiding project goals
- Sediment management strategies may be most appropriate to implement in conjunction with other flood reduction projects
- Sediment management strategies should be incorporated into planning documents at both the programmatic and site levels
- When told “no,” keep working to find alternative strategies
- Time and budget needed to successfully complete sediment management projects will be substantial—anticipate and plan for this as much as possible!

A comprehensive list of overall lessons learned are included in **Appendix I**, as well as lessons captured at each individual phase of the project.

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