

SATSOP RIVER INVESTMENT PLAN



Grays Harbor
Conservation
District

your window to healthy lands

February 2019

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ACKNOWLEDGMENTS

Thank you to the many **community members** who met with the project team individually and participated in the community meetings. The people living in the community along the Satsop River are a strong, passionate, and collaborative group and Grays Harbor County looks forward to working together to put this plan into action.

The County would also like to thank the Grays Harbor Conservation District for their participation in this effort, their commitment to working with landowners along the Satsop River, and their leadership in implementing projects on the river.

Many thanks to those who participated in the **Advisory Group.**

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- Anthony Waldrop, Grays Harbor Conservation District
- Rob Wilson, Grays Harbor County

This plan was prepared by **Maul Foster & Alongi**.

EXECUTIVE SUMMARY

The Satsop River Valley is a vital and important area in Grays Harbor and Mason Counties. The landscape supports multi-generational agriculture businesses, commercial forestry, rural residences, and public parks. The Satsop River Valley is also an economic crossroads, with State Route 12 connecting coastal communities to Puget Sound and Keys Road providing access to the Satsop Business Park, which supports over 400 jobs. The Satsop River also provides habitat for salmon, steelhead, and other fish and wildlife.

Communities in the Satsop River Valley are challenged by dramatic migration of the river across its floodplain and frequent flooding. The Satsop is a powerful river, dropping steeply down from its headwaters in the Olympic Mountains to a flat floodplain in its lower valley. The river has a history of migrating widely and at times suddenly across its floodplain.

Erosion of river banks and avulsions, where the river dramatically shifts its channel during a flood event have caused loss of tens of acres of productive agricultural land in recent years. It also threatens public infrastructure including Keys Road. Populations of salmon, steelhead and other fish and wildlife species are also struggling to respond to impacts from decades of habitat degradation.

Grays Harbor County, in partnership with the Grays Harbor Conservation District and supported by funding from the Chehalis River Basin Flood Authority, has developed this Investment Plan through a collaborative effort with public agencies and private landowners to develop shared goals and a prioritized set of projects to reduce risk of erosion while enhancing habitat for fish and wildlife.

Project Goals

A set of common goals was established at the beginning of the planning process and reviewed by a public agency advisory committee and local community members

- Goal 1: Protect public and private infrastructure and agricultural lands from bank erosion.
- Goal 2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.
- Goal 3: Reduce flood hazards and manage flood risk in the project area.
- Goal 4: Protect and maintain recreational opportunities.



Project team members meet with local farmer and property owner to discuss flooding challenges and concerns on his property east of Keys Road.

Investment Plan

The Investment Plan provides a road map indicating which projects should be implemented on the Satsop River in order to address the key issues of erosion, flooding, and loss of farm land.

Investment Plan

PROJECT (LEAD AGENCY)	NEAR-TERM 2019-2020	MEDIUM-TERM 2021-2025	LONG-TERM 2026-2045	FUNDING SOURCE
Large Woody Debris in Upper Watershed (GHCD) <i>Slow river velocity to reduce erosion and enhance habitat</i>	Design & Construct Pilot \$350K	Design & Construct (3-5 mi) \$425K - 725K	Design & Construct (15-20 mi) \$2 M - \$3 M	WQ Grants, WCRI, CRBFA
Engineered Log Jams on East Fork of Satsop River (GHCD) <i>Bank stabilization and habitat enhancement</i>	Design & Construct \$6.8 M			Chehalis Basin Strategy
Keys Road Soft Armoring (GHC) <i>Protection of key public infrastructure while minimizing environmental impact</i>	Coordinated Design \$200K - \$400K	Construction \$2 M - \$2.5 M		CRBFA, GHC
Engineered Log Jams on Lower Satsop River (GHCD) <i>Bank stabilization and habitat enhancement</i>	Construction Initial Phase \$1M - \$1.5M	Construct \$1M - \$2M		WCRI, WWRP, CRBFA, FbD, GHC, DNR
Infrastructure and Long-Term Asset Planning (GHC) <i>Evaluate options for changes in coordination with eventual bridge replacement</i>			Plan for and Implement Modifications \$TBD	GHC
Gravel Ponds, Phase 1 (WDFW) <i>Increase floodplain connectivity and enhance habitat</i>	Construct \$1 M			WCRI
Gravel Ponds, Phase 2 (WDFW) <i>Increase floodplain connectivity and enhance habitat</i>		Construct \$1.7 M		WCRI
Engineered Log Jams — Other Locations (GHCD) <i>Address bank erosion to protect farm land and infrastructure, including bridges</i>		Feasibility Study \$150K - \$250K		CRBFA, FbD, WCRI, WWRP, SRFB
Land Conservation (Multiple Agencies) <i>Increase flood plain connectivity and enhance habitat</i>		As Opportunities Arise with Willing Sellers		CRBFA, FbD, WCRI, WWRP, SRFB

TABLE KEY

Location in the Watershed

- Upper watershed
- Middle watershed
- Lower watershed
- Across entire watershed
- Coordinated Efforts

Acronyms

CRBFA: Chehalis River Basin Flood Authority
DNR: Washington State Department of Natural Resources
FbD: Floodplains by Design
GHC: Grays Harbor County
GHCD: Grays Harbor Conservation District
SRFB: Salmon Recovery Funding Board
WCRI: Washington Coast Restoration Initiative
WDFW: Washington State Department of Fish & Wildlife
WQ Grants: Coordinated Water Quality Grants
WWRP: Washington Wildlife and Recreation Program

INTRODUCTION

CHAPTER OVERVIEW

The Investment Plan builds on previous efforts to address erosion, flooding, and habitat impacts in the Satsop River. This opening section provides context for the Satsop River Investment Plan and describes the project purpose, goals, and planning process.

The Satsop River Valley is a vital and important area in Grays Harbor and Mason Counties. The valley is home to multi-generational families of farmers and ranchers, growing corn, hay, and pumpkins and raising dairy cows and beef cattle.

The Lower Satsop River Valley is also an economic crossroads, with State Route 12 connecting coastal communities to Puget Sound and Keys Road providing access to the Satsop Business Park, which supports over 400 jobs.

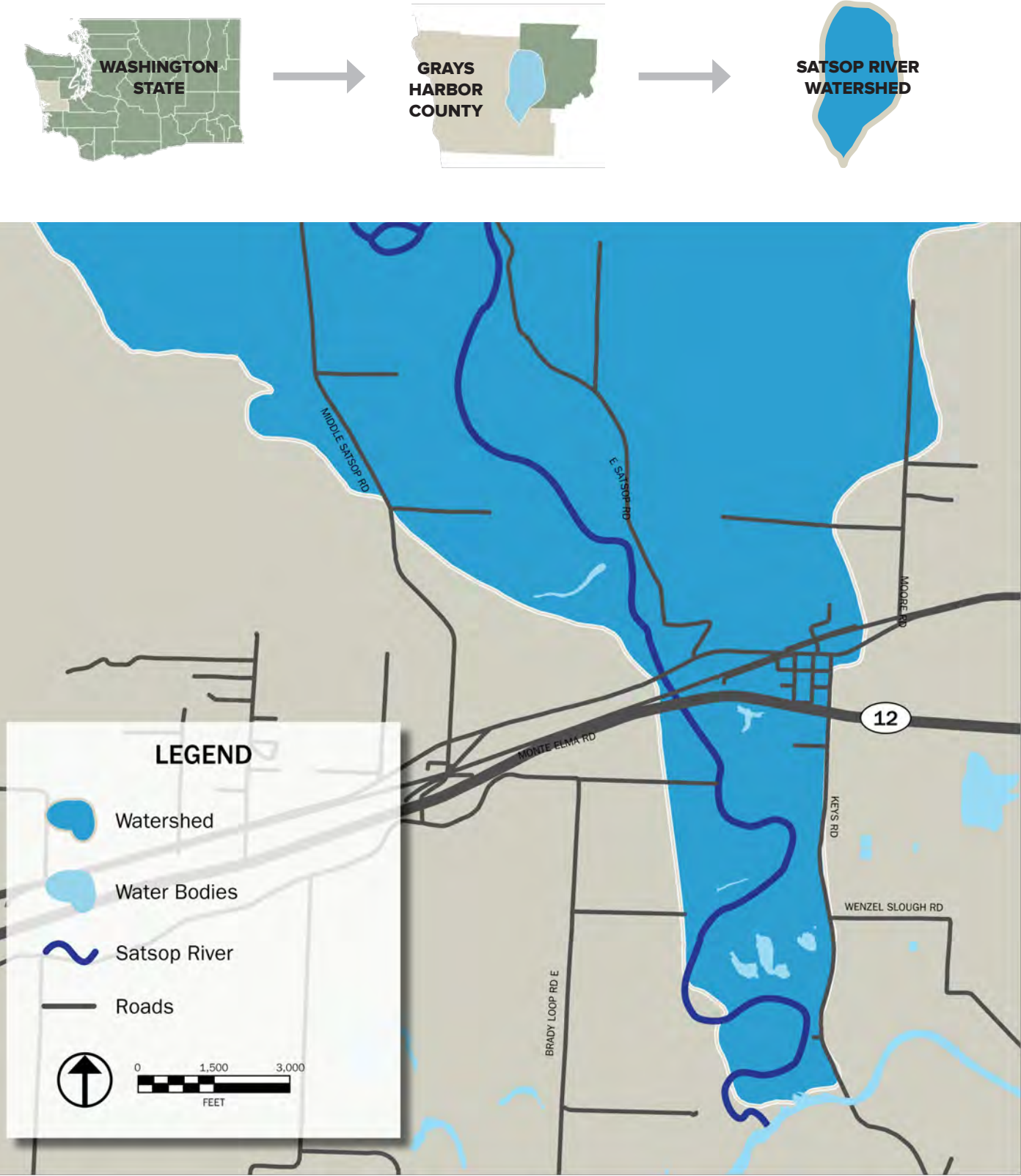
The Satsop River also provides habitat for salmon and steelhead. The Satsop basin contributes approximately 33% of fall-run Chinook, 33% of winter-run steelhead, and 18% of the coho population of the entire Chehalis River Basin upstream of the Wishkah River.

This area has historically developed around the Satsop River and adapted to its natural processes of flooding and migration. In recent years, concerns about bank erosion and migration of the river channel have increased. The river has moved up to 100 feet per year in certain locations. This migration has eroded tens of acres of farmland and is putting the long-term viability of family-owned farms and ranches at risk. Critical infrastructure including Keys Road, a main connection to the Satsop Business Park also faces risk of erosion.

For more than a decade, studies have been conducted and plans developed to try to reduce erosion and flood risk. Individual property owners have taken actions to try to protect their land. No silver bullet solution has been identified. There are multiple drivers of flooding and erosion and multiple areas that are impacted. Projects that prevent erosion in one place may make it worse in another. Projects that may reduce flooding may also impact existing infrastructure or habitat. The different perspectives of various stakeholders have often come into conflict.

Despite these challenges, progress is being made. Funding has been provided by Washington State through the Chehalis River Basin Flood Authority and other programs to support planning and implementation of projects to reduce erosion and flood risk as well as enhancing natural habitat. In 2018, Grays Harbor County convened stakeholders together to coordinate efforts and develop a long-term plan for the Lower Satsop River. The County was supported in this effort by the Grays Harbor Conservation District (GHCD) to increase engagement of local property owners.

Figure 1. Project Location



Project Purpose

The purpose of this planning effort is to build consensus around an investment plan for the Lower Satsop River that achieves shared goals. The investment plan includes a prioritized list of projects that address the different interests of the various stakeholders and includes short-term and long-term phasing and funding strategies.

Project Goals

A set of common goals was established at the beginning of the planning process and reviewed by a public agency advisory committee and local community members

- Goal 1: Protect public and private infrastructure and agricultural lands from bank erosion.
- Goal 2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.
- Goal 3: Reduce flood hazards and manage flood risk in the project area.
- Goal 4: Protect and maintain recreational opportunities.

Planning Process

The Investment Plan builds on previous studies and employed a collaborative process to engage local community members and public agency representatives to find common ground and shared priorities. The planning process was organized around five major steps (See Figure 2):

- Build a shared understanding of the causes and symptoms of erosion, flooding, and fish habitat degradation. Develop a set of common goals.
- Identify a broad set of potential projects and programmatic solutions to addressing challenges and achieving the goals.
- Evaluate the feasibility and benefits of the potential solutions.
- Create a list of priority actions that can be completed in the short-, mid-, and long- term that will address the issues and achieve the goals.
- Plan for implementation by identifying roles and responsibilities for partners, timeline for action, and potential funding sources.

Community and Stakeholder Engagement Summary

The community living and working along the Satsop River has been engaged in this discussion for a long time. The purpose of this project was not to do another technical study of the river, but to work with the community and regulatory agencies to identify feasible solutions, establish priorities, and develop an investment plan that will help the community start implementing projects that have agency support and a clear path forward.

In order to engage both the local community and public agencies, the project team conducted parallel processes of identifying issues, brainstorming solutions, and prioritizing the options.



The project team walks through Terry Willis' farm to see first hand and talk to Terry about the impacts of the Satsop River's migration.

Figure 2. Planning Process





Loggers posing near Brady after having loaded 67 railroad cars and winning a bet with the boss who doubted that they could (Labor Day, 1923).



Two loggers taking down a tree in Grays Harbor County (1890)



Satsop Business Park celebrating the lease expansion of Overstock.com's call center bringing new jobs to the region (2017).



Flooding (1949) at the Buford Goeres farm south of Satsop. A portion of this land is now owned and farmed by Jose Torres.

EXISTING CONDITIONS

CHAPTER OVERVIEW

This chapter describes the physical and biological conditions of the Satsop River watershed, including geology, climate, land use, river dynamics, and fish and wildlife habitat. The chapter concludes with a discussion of how these conditions support an understanding of the drivers of flooding, erosion, and habitat degradation.

Geologic Setting

The geology of the Satsop River Watershed is defined by mountains, valleys, and a history of glaciation. Most of the bedrock in the Satsop basin is overlain by glacial deposits.¹ About 20,000 years ago the Puget Lobe of the continental ice sheet covered some of the smaller sub-basins of the East, Middle, and West Forks of the Satsop River, depositing huge volumes of gravel-rich sediment from meltwater channels. Sub-basins not influenced by the

continental glacier received extensive deposits of outwash from alpine glaciers. The alpine glacial material is derived from local bedrock and consists largely of sandstone and other sedimentary rock that breaks down quickly, making it a poor source of gravel but a significant source of sand and finer material. The abundance of glacial material makes the Satsop River one of the highest sediment-producing rivers on the Olympic Peninsula.

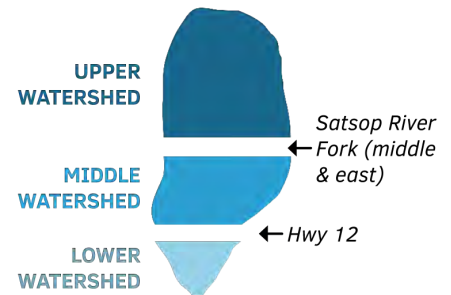
WHAT IS A WATERSHED?



The Satsop River Watershed spans the border of Grays Harbor and Mason Counties.



The watershed includes the area of land where all of the water drains to and collects in the Satsop River.



Potential solutions in Satsop River Watershed can be divided into three separate areas: the upper, middle, and lower watershed.

A watershed includes the area of land where all of the water drains to and collects in a river. The Satsop River has a watershed of about 300 square miles that includes portions of Grays Harbor and Mason Counties. The river originates in the Olympic Mountains with three tributaries, the East, Middle, and West Fork Satsop Rivers. Below the forks, the mainstem Satsop River flows through a broad, flat valley. The Satsop River drains to the Chehalis River, which is tidally influenced at the confluence.

Climate

The climate of the Satsop River watershed is characterized by relatively warm, wet winters and cool, dry summers. Due to the watershed's location relative to the Olympic Mountains, average annual precipitation in the basin ranges from less than 70 inches per year near the town of Satsop to about 180 inches per year in headwater areas.

The effects of climate change are becoming apparent throughout the Pacific Northwest. Several studies have recently been conducted to forecast likely impacts of climate change along the Washington coast and around Grays Harbor. The University of Washington's Climate Impacts Group recently conducted an evaluation of projected climate change impacts in the Puget Sound region² and a study of the potential effects of climate change specifically on the Chehalis River Basin³. Key findings of the studies are summarized below.

Key Findings

- Increased warming of the region over the 20th and 21st centuries is expected to be a key driver of precipitation change in Washington State, particularly surrounding the Washington coast. Warming for the twenty-first century is expected to be double that experienced in the twentieth century. Regional warming is expected to cause an increase in severity and frequency of heavy rainfall events in a given year. The University of Washington report estimates that there could be up to an approximately 25% increase in projected annual precipitation in the Chehalis River Basin by 2060.
- Warmer regional temperatures will additionally cause an increased proportion of precipitation to fall as rainfall versus snow. The University of Washington study predicts that increased rainfall and decreased snowfall will lead to an approximately 80% decrease in snowpack in the Chehalis Basin by 2060. Since snow retains water from fall and winter storms, this shift from snow to rain is projected to result in increased risk of flooding and landslides.
- Stream flows are projected to be affected by changes in temperature and precipitation. Studies generally show an increase in winter stream base flow and decrease in summer stream base flow. The increased flow in winter is in response to higher intensity and more frequent rain events and decrease in snow pack. Lower summer flows are related to decreased precipitation in the summer and increases in evaporation associated with higher temperatures.



The landscape around the Satsop River is highly vegetated. The power of the Satsop River to erode can be seen on this steep bank with corn growing just a few feet away

¹Collins, B.D., and T. Dunne, Gravel Transport, Gravel Harvesting, and Channel-Bed Degradation in Rivers Draining the Southern Olympic Mountains, Washington, USA. *Environmental Geology and Water Sciences* 3:213-224, 1989

²Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M.B. Krosby, and A.K. Snover, 2015. State of Knowledge: Climate Change in Puget Sound. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D

³Mauger, G.S., S.-Y. Lee, C. Bandaragoda, Y. Serra, J.S. Won, 2016. Effect of Climate Change on the Hydrology of the Chehalis Basin. Report prepared for Anchor QEA, LLC. Climate Impacts Group, University of Washington, Seattle.

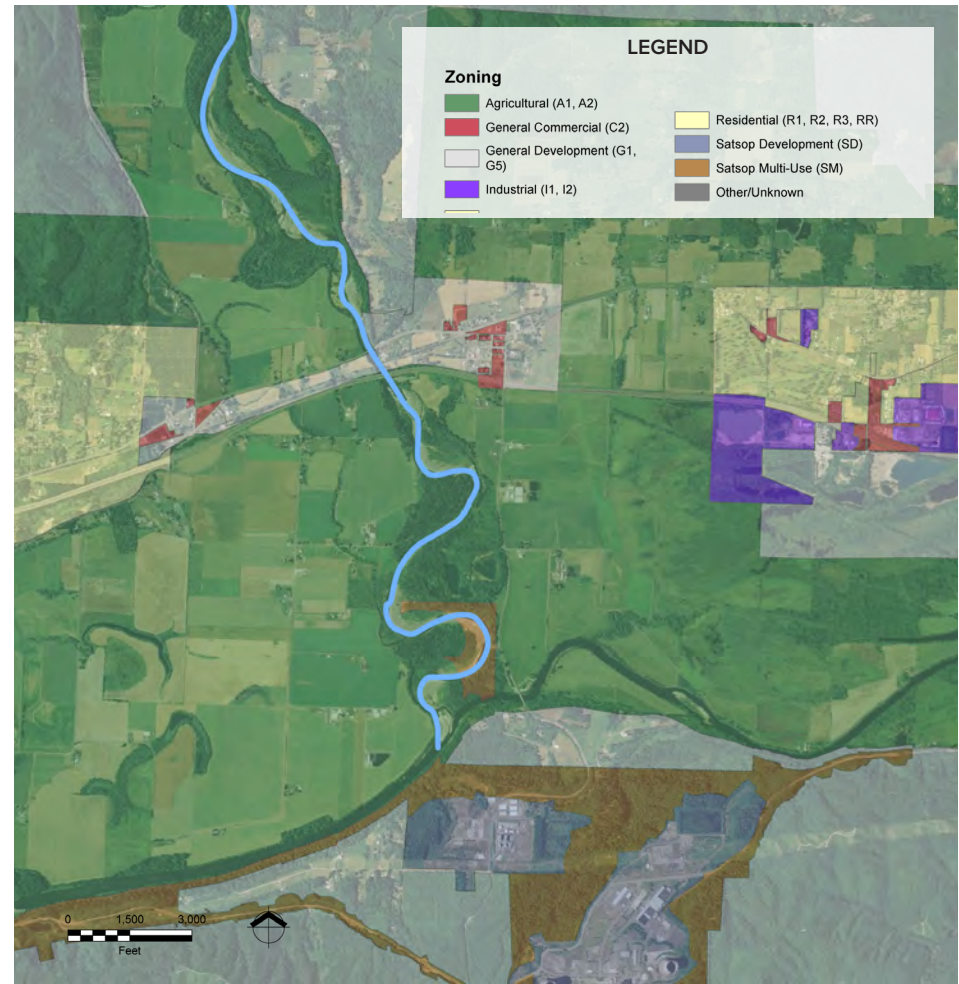
Land Use and Development

The Chehalis Basin and the Satsop River have been inhabited for thousands of years by the ancestors of the Quinault Indian Nation and the Confederated Tribes of the Chehalis Reservation. The first permanent European settlers in Grays Harbor County arrived around the 1850s. Within a few decades of European settlement, the rich natural resources supported growth in farms, timber harvest, lumber mills, salmon fishing, and canning. However, in the 1920s, the timber industry began a long, slow decline. Most of the timber had been cut from private land, and by 1975, much of the local capacity to process timber had declined significantly. Timber harvest was further reduced in the 1980s and 1990s after the Northern Spotted Owl was listed as threatened under the Endangered Species Act.

Early logging techniques dramatically altered the landscape and condition of the river.⁴ Logging removed the old growth forest, including trees in the riparian areas. The logged-over land was typically burned without replanting, which led to regrowth dominated by deciduous trees, which provide less stability to the soils than conifers. A network of logging roads was constructed, which contributed to erosion and sediment loading to streams. Splash dams were constructed to facilitate movement of logs downstream, which led to additional channel impacts. Large woody debris was cleared from streams, which reduced habitat complexity, contributed to bank instability, and allowed water to travel more quickly downstream.

Agriculture and forestry continue to be the predominant land uses in the Satsop River watershed (See Figure 3). Farms in the Satsop River valley primarily produce dairy products, beef cattle, and corn. Small commercial businesses continue to operate in the town of Satsop. Low density rural residences are also spread around

Figure 3. Zoning Map



the valleys. Many of the families in the Satsop watershed have lived there for multiple generations and have very strong connections to the landscape.

The Satsop Business Park is located approximately 1.5 miles southeast of the confluence of the Satsop and Chehalis Rivers. The business park is managed by the Port of Grays Harbor. The Satsop Business Park is an adaptive reuse of the never-completed Washington Public Power Supply System nuclear power plant facility. Keys Road, which parallels the Lower Satsop river, provides a primary transportation connection to the Business Park. Keys Road was

re-aligned to improve truck access to the power plant. This brought the road closer to the Satsop River and reduced the channel migration corridor. A well originally created for the nuclear power plant off Keys Road still serves the Business Park. A rock revetment that protects the well is experiencing erosion. The Port is in the process of constructing an alternative potable water system to serve the Business Park. The alternative water system will serve as a backup in the short-term and become the primary water system when the revetment eventually fails and the well along Keys Road is decommissioned.

⁴Salmon and steelhead habitat limiting factors: Chehalis Basin and nearby drainages Water Resource Inventory Areas 22 and 23. Smith, C.J. and M. Wenger. Prepared for Washington State Conservation Commission, May 2001

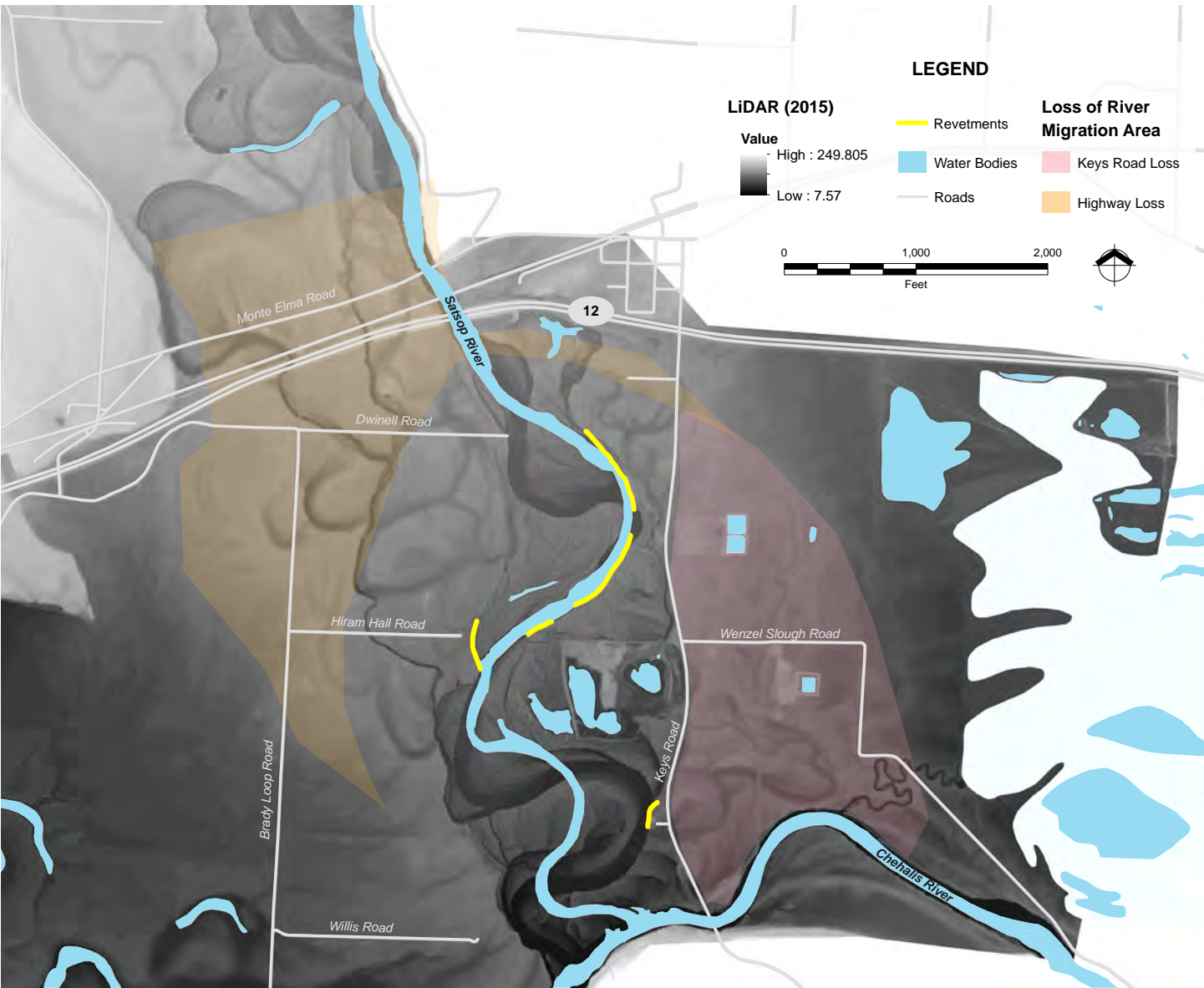
River Dynamics

The Satsop is a powerful river, draining a large watershed with a steep drop from its headwaters in the Olympic Mountains to the flat floodplain in its lower valley. The river has a history of migrating widely and at times suddenly across its floodplain.⁵ This is a typical dynamic in rivers that flow down from steep terrain, carrying high loads of sediment that are deposited when the river reaches flat valleys. The sediments are deposited in a wide area called an alluvial fan. The unconsolidated gravels and sediments are easily eroded by the strong force of the river flow.

Before significant human development, the Lower Satsop River was free to migrate across its alluvial fan. Topographic maps show the scars of historic locations of the Lower Satsop River channel across an approximately 3,000-foot wide area. Notably, most of the channel scars are east of the current river channel. Higher elevation ground on the west side of the river do not have these scars, but currently the west bank is experiencing a high degree of erosion near the mouth of the river (See Figure 4).

⁵Watershed Science and Engineering. Lower Satsop Floodplain Restoration Phase II Final Report. Prepared for Washington Department of Fish and Wildlife. February 16, 2017.

Figure 4. LiDAR Map with Revetments



Data Source: Watershed Science and Engineering

Over time, infrastructure built along the river bank and in the floodplain limited its ability to move across the alluvial fan, including:

- The railroad and highway bridges that confined the main channel into a set location at their crossings.
- Keys Road, which was realigned in the late 1970s to provide better access to what is now the Satsop Business Park, limited the river's ability to migrate east.
- Revetments in multiple locations on the river bank limit erosion in specific locations but likely increase erosive force on the opposite bank.

To address erosion of the western bank at the mouth of the Satsop River, a relic channel was reconnected in 2004. By reconnecting a historic channel, the mouth of the river was shifted eastward, but, by 2013, the channel had moved back to very near its 2003 location.⁶ Since revetments limit channel migration to the east, and there is no similar limit to migration to the west, the channel has continued to migrate westward into the high ground, eroding agricultural land at a rate of up to 80 feet per year.

The steep terrain of the Satsop River watershed leads to the river having a relatively quick response to heavy rain events.^{7,8} The Satsop River typically rises one or two days before the Chehalis River during flood events. When the Chehalis River is in flood stage, it creates a hydraulic barrier that limits the ability of the Satsop River to recede. The highest observed discharges in the period of record occurred in March 1997 (63,200 cubic feet per second [cfs]), December 1999 (54,500 cfs) and December 1994 (50,600 cfs). Recent high flows include the January 2009 event (45,500 cubic feet per second (cfs)) and the November 2012 event (28,900 cfs).

Fish and Wildlife Habitat

The Satsop River Basin is an important component of salmon and steelhead habitat in the Chehalis Basin. The Satsop basin contributes approximately 33% of fall-run Chinook, 33% of winter-run steelhead, and 18% of the coho population of the entire Chehalis River Basin upstream of the Wishkah River.⁹

The Satsop Basin is important habitat for salmon and steelhead and has high enhancement potential. The watershed is predominantly in forest or agricultural land use with less than 10% development. However, studies have indicated that habitat quality in the river and adjacent riparian areas is in relatively poor condition. Contributing factors include:

- Lack of riparian forest and characterization of existing riparian forest as dominated by deciduous, rather than coniferous trees.
- Erosion and high inputs of fine sediments from logging roads and landslides.
- Lack of large woody debris in the channel.
- Water quality impairment, including elevated temperature and elevated siltation.

⁶Watershed Science and Engineering. Lower Satsop Floodplain Restoration Phase II Final Report. Prepared for Washington Department of Fish and Wildlife. February 16, 2017

⁷Watershed Science and Engineering. Lower Satsop Floodplain Restoration Phase II Final Report. Prepared for Washington Department of Fish and Wildlife. February 16, 2017

⁸West Consultants. Satsop River Floodplain Restoration Project. Prepared for US Army Corps of Engineers. May 5, 2004.

⁹Aquatic Species Enhancement Plan. Chehalis Bain Work Group. August 29, 2014.



An example of the major avulsion events that commonly occur on the Satsop River putting homes and infrastructure at risk.

Drivers of Flooding and Erosion

In at least the last 100 years, the Satsop River basin has experienced frequent flooding and wide migration of the river channel. The topography of the basin indicates that the river moved across its floodplain over the past several hundred or thousands of years. While flooding and channel migration appear to be intrinsic characteristics of the Satsop River, it is likely that changes to the watershed have increased the frequency of these events. Based on the previous studies of the Satsop River Basin, the key drivers to flooding and erosion appear to be:

- Steep grades and gravel-rich geology in the upper watershed leads to erosion and large amounts of sediment moving downstream.
- Broad flat topography of the lower watershed leads to slower river flows that allow sediments to drop out, creating a floodplain that is highly susceptible to erosion.
- Land clearing for agriculture and forestry, along with removal of large woody debris from the river, has reduced the natural structures that historically stabilized banks.

GRAVEL HARVESTING

Local community members have stated that historic gravel harvesting reduced bank erosion and channel migration. Because of its abundant gravel supply, the Satsop River and its floodplain were also historically used as a source of gravel. Local landowners used selective gravel removal as a means of protecting their land from erosion, as well as providing a valuable building material. Since this sort of extraction was poorly documented, it is difficult to determine how much gravel was removed from the Satsop. It has been estimated that up to 20,000 cubic yards were extracted annually beginning in the mid 1960s.¹⁰ Between 1978 and 1982, extraction rates ranged from 10,000 to 40,000 yards³ (8,000 m³ to 30,000 m³) per year. As shown in Figure 5, the river also migrated widely across the floodplain during that same period. It is difficult to quantify the effects of gravel harvesting on channel migration, but the practice did not completely halt channel migration.

While historically the Satsop River appears to have moved laterally, development in the floodplain has placed valuable assets at risk from erosion and flooding. Environmental regulations have also changed to reflect the perspective that direct gravel removal on a large scale is problematic for maintaining critical habitat for native fish and wildlife. However, careful gravel management in association with projects that include habitat restoration may be allowable.

¹⁰Collins, B.D., and T. Dunne, Gravel Transport, Gravel Harvesting, and Channel-Bed Degradation in Rivers Draining the Southern Olympic Mountains, Washington, USA. *Environmental Geology and Water Sciences* 3:213-224, 1989

November 2018 Avulsion

Another avulsion of the Lower Satsop River occurred on November 27, 2018 during a heavy rain event. The river cut through a historic channel on the west bank, shortcutting a large meander bend.

This avulsion has put private homes at great risk of complete loss due to erosion. In addition to the actions described in this plan, emergency protection measures are being developed to address this urgent concern.

This most recent avulsion further emphasizes the need for urgent action to implement projects including those in this plan to stabilize the river system.



Map Credit: KPFF.

Figure 5. River Migration Map



THE PLANNING PROCESS

CHAPTER OVERVIEW

The community has been engaged in discussions about the Satsop River for a long time. The purpose of this project was to work with the community and regulatory agencies to identify feasible solutions, establish priorities, and develop an investment plan that will help the community start implementing projects that have agency support and a clear path forward.

For more than a decade, studies of the Satsop River have been conducted and plans developed to try to reduce erosion and flood risk. Individual property owners have taken actions to try to protect their land. No silver bullet solution has been identified. There are multiple drivers of flooding and erosion and multiple areas that are impacted. Projects that prevent erosion in one place may make it worse in another. Projects that may reduce flooding may also impact existing infrastructure or habitat. The different perspectives of various stakeholders have often come into conflict.

Despite these challenges, progress is being made. Funding has been provided by Washington State through the Chehalis River Basin Flood Authority and other programs to support planning and implementation of projects to reduce erosion and flood risk as well as enhancing natural habitat. Grays Harbor County convened different interest groups together to coordinate efforts and develop a long-term plan for the Lower Satsop River. The County was supported in this effort by the GHCD to increase engagement of local property owners.

Identifying solutions on the Satsop River has proven difficult over the past several years with conflicts arising between the surrounding landowners' need for swift and effective action and the regulatory agencies that no longer allow some of the methods of river management that existed in

the past. To address this conflict, the Satsop Investment Plan process held parallel engagement processes with an Advisory Group composed of representatives from the County, GHCD, and federal, state, and local public agencies as well as meetings with the community. Through a series of Advisory Group and community meetings, participants engaged in a planning process involving the following steps.

All materials from the community and Advisory Group meetings are available in Appendices A and B, respectively.



Defining the Challenge

The first step of the planning process was to understand the characteristics of the Satsop River and the problems the community was facing. The project team reviewed and synthesized the findings of previous technical studies of the Satsop River. The project team also met with property owners along the Satsop River to see first hand the issues the community was facing. Throughout the project the GHCD continued to reach out to landowners along the Satsop River. The technical information from previous studies and the local experiences of community members were shared during the first Advisory Group meeting and the first Community Meeting.

ISSUES EXPERIENCED BY PROPERTY OWNERS TODAY

The primary concerns of property owner expressed in personal interviews and the community meetings were:

Bank Erosion: The Satsop River channel has been migrating, causing significant bank erosion. In some places the river has moved 40-80 feet in a year and taken out mature stands of trees. Community members emphasized that bank erosion and loss of property are their biggest concerns.

Sediment Deposition: Community members have watched gravel bars grow and shift in the middle and lower reaches of the river. Anecdotally, people have said that pools are filling with gravel and the river is becoming shallower. Gravel is deposited in large bars in the inside of river bends. Erosion occurs on the outside of the bends.

Combined Flooding from the Satsop and Chehalis River: Long-time residents said that they are used to the Satsop River flooding. There is some perception that river levels are rising faster, and floods are coming at lower river stages. Land along the Lower Satsop River is also in the floodplain of the Chehalis River. When high flows on the Chehalis River coincide with flood events on the Satsop River, the drainage of the Satsop River is limited, and water elevations rise and remain in flood stage for extended periods.

Reduction of Forest Cover: The history of extensive logging in the watershed may be contributing to flooding and channel migration. It was discussed that current forest practices laws are more protective than in the past, but that impacts from past practices are still affecting the dynamics of the river.

PARTICIPANTS ON THE ADVISORY GROUP

- Grays Harbor Conservation District
- Grays Harbor County
- Port of Grays Harbor
- Washington State Department of Fish and Wildlife
- Washington State Department of Natural Resources
- Washington State Department of Ecology
- Washington State Department of Transportation
- U.S. Army Corps of Engineers

Project team members meet with Terry Willis (left) and Tracy Baker (right), both of whom are multi-generational farmers living and working along the Satsop River.



Identifying Solutions

With a shared understanding of challenges, goals, and the work conducted in previous studies, the planning process moved to identifying potential solutions. An open community meeting and an Advisory Group meeting were held in September 2018 to focus on identifying potential solutions. During these meetings, the project team presented the wide range of potential solutions that had been discussed in previous reports, suggested by landowners, and/or implemented on other similar river systems. At each of these meetings, attendees used maps of the watershed to suggest places where different solutions could be implemented. From these meetings, the project team created a list of potential solutions. The potential solutions are described in Figure 6.

It is important to note that throughout the discussion of potential solutions, a general consensus emerged that solutions that could be realistically funded and implemented would need to work with natural processes and provide multiple benefits to property, infrastructure, and habitat. Participants in the planning process demonstrated that they valued the local economy, community, and fish and wildlife. They were open to exploring innovative solutions to meet all of the planning goals.

Evaluating Options

In October 2018, the Advisory Group convened to review the potential solutions and evaluate their feasibility and benefit. Each participant's response was aggregated into an average benefit and feasibility score (see Table 1).

Benefits Elements

Flood reduction: The extent to which the solution will help prevent flooding.

Habitat: The extent to which the solution will enhance habitat in or along the river for fish and wildlife.

Erosion: The extent to which the solution would contribute to erosion prevention.

Recreational: The extent to which the solution has recreational value to people who like to recreate on the Satsop River.

Infrastructure: The extent to which the solution protects important local infrastructure.

Feasibility Elements

Effectiveness: How quickly and effectively the solution would realize its benefits.

Cost/Funding: How expensive the solution is in terms of design, construction, and maintenance.

Permitting: How easy or difficult it would be to get the solution permitted through all the necessary regulatory agencies.

Longevity: How long the solution would be able to remain in place and create benefits for the community.

Table 1. Benefits and Feasibility Assessment of Projects

PROJECT	BENEFITS TOTAL	FEASIBILITY TOTAL	TOTAL
Engineered Log Jams	11.71	10.04	21.75
Small-Scale Large Woody Debris Projects	11.29	10.30	21.59
Flood Easements and Conservation Easements	11.00	10.23	21.23
Keys Road — Relocation	11.79	9.00	20.79
Floodplain Property Acquisition from Willing Sellers	10.00	10.02	20.02
Keys Road — Elevated Causeway	11.00	8.86	19.86
Side Channel Habitats	10.71	9.11	19.82
Conservation Practices on Forestry Lands	10.00	9.55	19.55
Restoration of Gravel Ponds on WDFW Property	9.43	8.95	18.38
In-Stream Gravel Management Trial Project	9.79	8.08	17.87
Keys Road — Armoring	9.29	8.21	17.50
Keys Road — Permeating with Culverts	8.43	8.54	16.96
Pilot Channel	8.29	6.77	15.05

Figure 6. Project Descriptions Provided to Assist in Prioritization



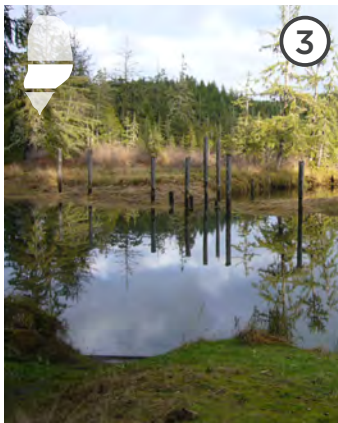
1 CONSERVATION PRACTICES ON WORKING FOREST LANDS

Collaborate with working forest managers to ensure that best practices are being met. Additionally, explore opportunities to increase riparian buffer widths, selectively harvest, or increase harvest rotation intervals. Implementation of conservation practices in the headwaters of the Satsop River has the potential to decrease runoff, erosion, and sediment transport in the system.



2 ENGINEERED LOG JAMS

Place engineered complexes of large wood pieces in strategic locations in stream channels. Engineered log jams would be used to slow bank erosion, promote formation of side channels, increase channel roughness to slow velocity and encourage high flows to spread into the floodplain. Large wood plays a key role in stream morphology. They can promote formation of pools, gravel bars, and side channels. They can stabilize river banks and increase floodplain connectivity.



3 FLOOD EASEMENTS AND CONSERVATION EASEMENTS

Collaborate with willing private property owners to obtain easements for flood storage and habitat conservation on private property. Under a flood easement, the owner would be restricted from building structures in the dedicated area and would manage that land proactively. Provides land area for flood storage and channel migration without impacting infrastructure and structures. Increased roughness and diversity of structure in the floodplain also serves to slow flood velocities.



4 KEYS ROAD - HARD ARMORING

The current alignment of Keys Road would be maintained and protected using traditional techniques such as sheet pile wall. Protect Keys Road as a transportation corridor that connects Satsop Business Park and residences to State Route 12. Maintaining the existing alignment also provides erosion protection to farmland east of the road.



5 KEYS ROAD — SOFT ARMORING

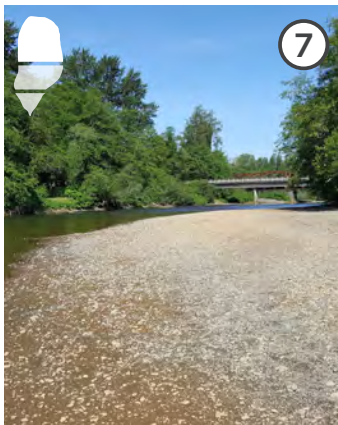
The current alignment of Keys Road would be maintained and protected using bio-engineering techniques such as rip rap and large woody debris. Protect Keys Road as a transportation corridor that connects Satsop Business Park and residences to State Route 12. Maintaining the existing alignment also provides erosion protection to farmland east of the road.



6 KEYS ROAD — RELOCATION

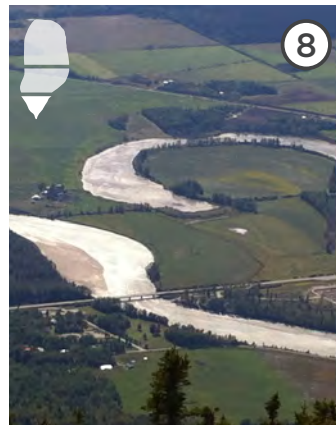
Keys Road and the natural gas line that runs in its right-of-way would be relocated to the east, closer to its historical alignment. This option would allow the Satsop River to migrate more freely to the east within its historical alluvial fan. Allowing the river to migrate to the east should reduce bank erosion on the west side. This option would allow flood water to spread more broadly across the floodplain.

Figure 6. Project Descriptions Provided to Assist in Prioritization (cont.)



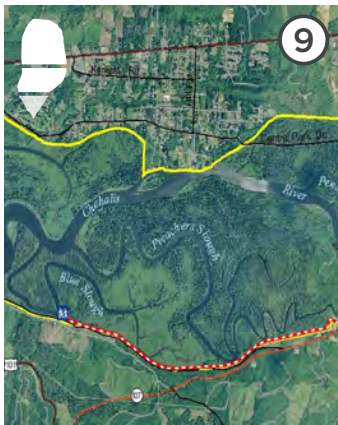
7 IN-STREAM GRAVEL MANAGEMENT TRIAL PROJECT

In coordination with an engineered log jam project or bank stabilization project, relocate gravel within the limits of the top of bank of the river. The movement of gravel could promote adjustments of the channel that the engineered log jam or bank stabilization project is designed to achieve.



8 PILOT CHANNEL

A pilot channel is created by excavating in a low lying area, anticipating the eventual direction of the river, and creating an avulsion that redirects river flows into the pilot channel and away from eroding banks. Pilot channels can reduce the meandering of the river which can result in reduced bank erosion and loss of property within the floodplain. Pilot channels also have the potential to increase storage in the floodplain as the old channel becomes a backwater or oxbow habitat area.



9 PROPERTY ACQUISITION FROM WILLING SELLERS

Purchase land from willing private property owners. These properties would then be managed to allow for periodic flooding and channel migration. The lands could be proactively planted with native trees and shrubs to stabilize river bank, increase floodplain roughness, and increase habitat structure and diversity.



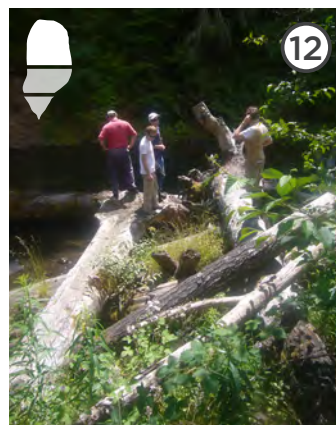
10 RECONNECTING HISTORIC SIDE CHANNELS

Encourage the river to flow more broadly across its floodplain in strategic locations to slow velocities, increase storage in the floodplain, and increase habitat diversity. Side channels distribute and attenuate high river flows by encouraging the river flow to split between the main channel and side channels, the velocity of the water can be slowed and the volume of water that can be stored during flood events can be increased.



11 RESTORATION OF GRAVEL PONDS ON WDFW PROPERTY

Floodplain restoration through removal of approximately 164,000 cubic yards of spoils from the floodplain and using some of the material to partially fill former gravel pits to create shallow water habitat. Hydraulic and hydrologic modeling of the project indicate that it will have a small reduction in flood elevation and erosion risk, but the effect is primarily limited to the WDFW property itself.



12 SMALL-SCALE LARGE WOODY DEBRIS PROJECTS

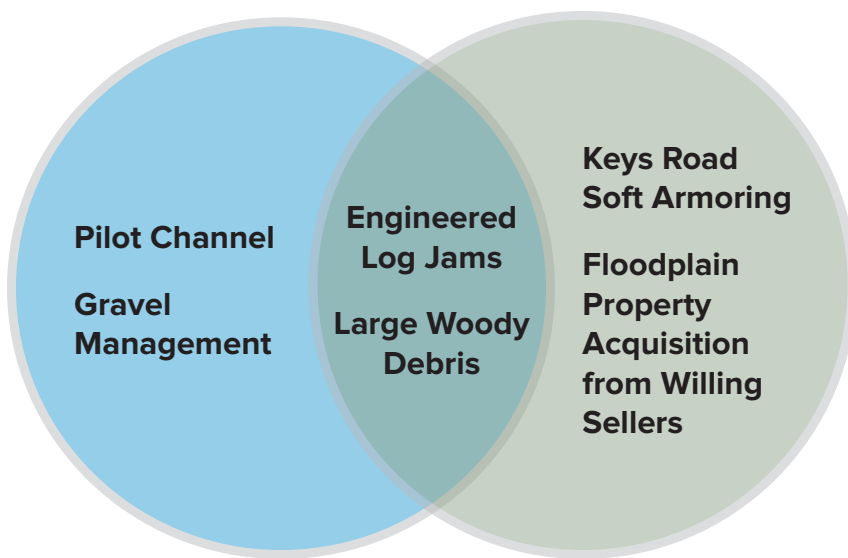
Place large wood in discrete locations in stream channels. The large wood could range from single pieces to multiple pieces configured as a log jam. The large wood could be anchored or not depending on location, design, and risks. Large wood can provide protection against stream bank erosion. The ability of large wood to trap sediment, decrease flow velocity, and spread flood flows in a reach can reduce erosion and flood risk in downstream reaches.

Prioritizing Projects

With the information in hand from the previous steps, the planning process then focused on finding alignment among diverse stakeholders by prioritizing projects. In November 2018, the second community meeting and fourth Advisory Group meeting were held so that these groups could prioritize the potential projects. To do this, the project team walked both groups through a prioritization exercise that gave participants a “budget” and a cost sheet for the projects discussed during Identifying Solutions. This exercise helped the project team understand which projects were the most important to the community. In order to gain as much input from the community as possible, the meeting materials and prioritization exercise were incorporated in an online survey that was held open from November 14, 2018 to November 30, 2018 and received seven responses. The Venn diagram below shows where project priorities overlapped between the community and the Advisory Group. The project descriptions provided to the community and Advisory Group are shown in Figure 6.

COMMUNITY PRIORITIES

ADVISORY GROUP PRIORITIES



The community (left) and Advisory Group (right) meet on November 13, 2018 to prioritize the proposed projects for the Satsop River.



Planning for Action

With the priorities identified, the next step in the planning process was to develop an implementation strategy that included phasing and funding. The project team held the final meetings for this effort on January 16, 2019 with both the Advisory Group and the community. The purpose of these meetings was to discuss the draft investment plan and examine the next steps towards implementation of projects.

During the Advisory Group meeting, the agency representatives provided feedback on the Investment Plan. They also discussed how the group would move forward towards implementation of the Investment Plan, including the group's commitment to meet on a regular basis to continue inter-agency coordination and their willingness to provide support for funding projects along the Satsop River.

The community meeting included a discussion of the November 2018 avulsion to understand the new and growing concerns of local land owners. Community members strongly expressed the need for action to prevent further loss of farmland. These sorts of events are why long-term, basin-wide solutions are of critical importance. The Grays Harbor Conservation District is working to help create immediate-term relief from this avulsion and the threat it poses to a nearby home; however, providing sustainable protection from further erosion will require a more comprehensive approach. The engineered log jam project proposed in the investment plan will address these concerns and serve as a pilot project demonstrating the effectiveness of softer natural systems management approaches. Community members recommended that proposed projects in the Lower Satsop also include removal of the revetments that are preventing eastward migration of the river, along with bank protection for Keys Road.

“USE THIS PLAN TO TRY TO DO SOMETHING BIG AND BOLD. BE DARING.”

- Terry Willis, Property Owner



The final community meeting for the project with more than 20 community members in attendance.

INVESTMENT PLAN

CHAPTER OVERVIEW

The Investment Plan is the result of the collaboration of many stakeholders throughout the planning process. It includes the priority projects, the lead agency responsible for carrying them forward, a timeline for implementation, and a funding plan. There are also programmatic recommendations to establish a standing advisory committee to guide implementation, regular meetings with local landowners to continue their engagement, and creation of a monitoring plan to evaluate the effectiveness of the projects.

A set of recommended programs and projects has been developed based on review of technical studies and input from public agencies and local community members. Because erosion, flooding, and habitat degradation occur throughout the watershed and are driven by a combination of multiple factors, there is no single, silver bullet solution. This plan proposes a set of interrelated programs and projects that can be implemented in multiple locations across the watershed in phases that, collectively, will contribute to reducing erosion and flood risk while also enhancing fish and wildlife habitat and providing other benefits. While some projects are large-scale public works, a number of small-scale, lower cost actions are also recommended. The recommended actions are based on a review of research studies and leading-edge planning in the Pacific Northwest region and across the country. These examples have been combined with local experience and tailored to the challenges and opportunities of the Satsop River Basin.

The Investment Plan is based on an approach that works with natural river processes while respecting the importance of protecting agricultural land and infrastructure that supports the community and the local economy. The approach recognizes that the river will continue to migrate and that some land needs to be set aside to let that natural process occur, while in key places that movement needs to be limited. Bio-engineering with natural materials will be used to the extent practicable so that bank protection projects will also provide habitat value. Projects will be designed to achieve multiple benefits for reducing erosion and flood risk, enhancing habitat, and protecting farm and forestry land.

In natural conditions, rivers regularly overtop their banks, and water flows through the adjacent floodplain. Ecological systems have adapted to this regular flooding in a number of ways. Floodplains are generally flat areas with trees, vegetation, and physical structures that slow and store flood waters. By slowing and storing floodwaters, naturally functioning floodplains can reduce flooding in downstream areas. Large, mature conifer trees and log jams are critical to stabilizing river banks. The Investment Plan approach seeks to re-establish historic riparian and river conditions, when feasible, to stabilize banks and reduce erosion. However, in locations where critical infrastructure and highly valued community and economic assets are at risk, targeted bank protection measures may need to be implemented.

Programmatic

To provide guidance for implementing and updating this Investment Plan, it is recommended that a standing advisory committee be established. The advisory committee should include local property and business owners along with representatives of the public agencies that participated in creation of this plan. Additionally, the community requested that the County hold semi-annual meetings in the spring and fall to update them on the status of the Investment Plan projects.

A monitoring plan should also be established to track implementation and evaluate factors related to flooding, erosion, habitat, and channel morphology in the Satsop Basin. The monitoring plan should be designed to provide accurate and applicable data and should be limited enough in scope and complexity to increase the likelihood of long-term continuation.

Projects

The priority projects can be categorized into five basic types. The appropriate location of these project types depends on location in the watershed and site-specific factors.

Land Conservation. Promoting establishment of mature riparian forests is fundamentally important to reducing erosion in the Satsop Watershed. Land in the floodplain should also be managed to anticipate future channel migration and allow the river room to move when feasible. Land conservation can be achieved through a number of methods. As part of the Chehalis Basin Aquatic Species Restoration Program, a conservation toolbox is being developed to provide property owners and land managers with resources on different approaches and programs. All of these options assume working with willing property owners. Options include:

- **Flood Easements and Conservation Easements.** Property under an easement continues to be in the same ownership, but certain uses are allowed or restricted. Under a flood easement, the owner would be restricted from building structures in the dedicated area and would manage that land proactively, planning for periodic inundation.

Conservation easements also restrict development and may include provisions for managing the land as natural habitat. There are various approaches for completing easements including tax benefits or direct monetary compensation. These areas could be proactively planted with native trees and shrubs to stabilize river bank, increase floodplain roughness, and increase habitat structure and diversity.
- **Conservation Practices on Working Forest Lands.** The Forest Practices Act and the Forests and Fish Law establish high standards for managed timberlands. They also provide incentives for increased riparian buffer widths and selective harvest techniques that could be more actively pursued. Tools such as conservation easements and carbon credits could also be used to promote conservation practices beyond regulatory requirements.

Small-Scale Large Woody Debris Projects. Large wood plays a key role in stream morphology. Historic logging and land management practices removed large woody debris from the Satsop River and rivers across the northwest. Projects adding large wood back into streams attempt to restore the channel forming processes that historically occurred. In small, headwater channels, the large wood is expected to trap sediment, stabilize banks, and increase habitat complexity. In lower gradient channels, large wood can stabilize banks, promote formation of side channels, increase channel roughness, and promote high flows to spread into the floodplain decreasing velocity and flood elevation downstream.

- **Upper Satsop River.** Develop a strategy and implement multiple large woody debris projects in the upper watershed to slow flow, improve floodplain connectivity, and reduce bank erosion.

Engineered Log Jams. Engineered log jams are larger structures than the large woody debris types of projects. Typically, engineered log jams include 10 or more pieces of large wood, ballast rock, and sophisticated design to stabilize the structure. Engineered log jams could be used to slow bank erosion, promote formation of side channels, increase channel roughness to slow velocity, and encourage high flows to spread into the floodplain. Engineered log jams can influence channel morphology. They can promote formation of pools, gravel bars, and side channels. They can stabilize river banks and increase floodplain connectivity. The potential erosion and flood impacts of engineered log jam structures need to be carefully analyzed to evaluate risks to upstream and downstream properties and infrastructure.

- **Lower Satsop River.** A series of engineered log jams and bio-engineered bank protection measures to split flows and reduce bank erosion. This project will be designed to complement and incorporate bank protection measures along Keys Road. With the construction of engineered log jams and Keys Road protection measures, the existing revetments on the WDFW property could be removed, allowing the river to migrate to the east and decreasing erosive force on the western bank.
- **East Fork Satsop River.** A series of engineered log jams and bio-engineered bank protection measures are proposed on River Mile 7.8 to 10.8 to reduce bank erosion and enhance habitat.

Bank Armoring. In locations with critical infrastructure, it may be necessary to employ bank armoring techniques to prevent erosion. New techniques that combine large wood, rock, and engineered concrete structures can be applied to provide bank protection in a manner that isn't as impactful to natural habitat as traditional rip-rap, sheet pile, or levees. These techniques may be needed to protect sections of Keys Road, bridge abutments, and homes on the Satsop River.

Keys Road. Keys Road is an important transportation corridor that connects Satsop Business Park and residences to State Route 12. The road is located within the alluvial fan of the Satsop River in an area with topographic markers of historic channel scars. As the river migrates to the east, portions of Keys Road are at risk of erosion. From a natural river process perspective, the ideal solution for Keys Road would be to relocate it further away from the Satsop River. However, there is limited physical ability to relocate Keys Road away from the Satsop without also constructing a new bridge across the Chehalis River. The combination of a new bridge and new road would likely cost over \$10 million.

This Investment Plan proposes a phased approach to Keys Road. Bank protection should be installed with an expected lifespan of 30-40 years, which is approximately the remaining useful life of the existing bridge over the Chehalis River. In the long-term, a new bridge and new road location can be planned, designed, and constructed to move the transportation corridor into a lower hazard area. With a shorter design life, bio-engineering techniques using large wood and rock could be installed that would have less habitat impact than traditional bank armoring.

HOW THIS PLAN ADDRESSES GRAVEL MANAGEMENT

The geology and topography of the Satsop River watershed make it a gravel-rich system. Historically, gravel was harvested from the river by commercial operations and private landowners. Current environmental regulations restrict this practice. WDFW research on gravel harvesting indicates that effects of the practice on flooding and erosion are mixed. Historic evidence in the Satsop River illustrates that during the period when gravel was actively harvested from the river, lateral migration continued to occur. A number of local community members strongly believe that gravel management is needed to control river migration.

There is an opportunity to test and monitor the effects of gravel management at a pilot scale through integrating movement of gravel within the river banks into the design and construction of projects such as engineered log jams. This approach can work within the requirements of environmental regulations and address the concerns of local community members as much as possible.

Investment Plan

The Investment Plan below demonstrates how projects will progress in the next three biennia. This includes the agency(ies) that have agreed to act as lead advocate for each project. Table 2 below describes how each project will be funded.

Table 2. Investment Plan

PROJECT (LEAD AGENCY)	NEAR-TERM 2019-2020	MEDIUM-TERM 2021-2025	LONG-TERM 2026-2045	FUNDING SOURCE
Large Woody Debris in Upper Watershed (GHCD) <i>Slow river velocity to reduce erosion and enhance habitat</i>	Design & Construct Pilot \$350K	Design & Construct (3-5 mi) \$425K - 725K	Design & Construct (15-20 mi) \$2 M - \$3 M	WQ Grants, WCRI, CRBFA
Engineered Log Jams on East Fork of Satsop River (GHCD) <i>Bank stabilization and habitat enhancement</i>	Design & Construct \$6.8 M			Chehalis Basin Strategy
Keys Road Soft Armoring (GHC) <i>Protection of key public infrastructure while minimizing environmental impact</i>	Coordinated Design \$200K - \$400K	Construction \$2 M - \$2.5 M		CRBFA, GHC
Engineered Log Jams on Lower Satsop River (GHCD) <i>Bank stabilization and habitat enhancement</i>	Construction Initial Phase \$1M - \$1.5M	Construct \$1M - \$2M		WCRI, WWRP, CRBFA, FbD, GHC, DNR
Infrastructure and Long-Term Asset Planning (GHC) <i>Evaluate options for changes in coordination with eventual bridge replacement</i>			Plan for and Implement Modifications \$TBD	GHC
Gravel Ponds, Phase 1 (WDFW) <i>Increase floodplain connectivity and enhance habitat</i>	Construct \$1 M			WCRI
Gravel Ponds, Phase 2 (WDFW) <i>Increase floodplain connectivity and enhance habitat</i>		Construct \$1.7 M		WCRI
Engineered Log Jams — Other Locations (GHCD) <i>Address bank erosion to protect farm land and infrastructure, including bridges</i>		Feasibility Study \$150K - \$250K		CRBFA, FbD, WCRI, WWRP, SRFB
Land Conservation (Multiple Agencies) <i>Increase flood plain connectivity and enhance habitat</i>		As Opportunities Arise with Willing Sellers		CRBFA, FbD, WCRI, WWRP, SRFB

TABLE KEY

Location in the Watershed

- Upper watershed
- Middle watershed
- Lower watershed
- Across entire watershed
- Coordinated Efforts

Acronyms

CRBFA: Chehalis River Basin Flood Authority
DNR: Washington State Department of Natural Resources
FbD: Floodplains by Design
GHC: Grays Harbor County
GHCD: Grays Harbor Conservation District
SRFB: Salmon Recovery Funding Board
WCRI: Washington Coast Restoration Initiative
WDFW: Washington State Department of Fish & Wildlife
WQ Grants: Coordinated Water Quality Grants
WWRP: Washington Wildlife and Recreation Program

Future Funding Strategy

Significant funding will be needed to implement these projects. By taking an approach that incorporates habitat enhancement, flood and erosion risk reduction, and public infrastructure improvements, there are significant benefits generated that outweigh the costs. There are multiple potential sources of federal and state funds to support these projects. Table 2 provides preliminary planning level forecasts and likely funding sources for each project.

While a lot of funding is required to design, construct, maintain, and monitor these projects, there are ample funding sources available. The list below summarizes the funding sources that would be best suited to support both the programmatic efforts and projects.

Federal Funding

- Federal Emergency Management Agency (FEMA)
 - Pre-Disaster Mitigation Grant Program
 - Flood Mitigation Assistance Program
- U.S. Department of Agriculture
 - Business and Industry Guaranteed Loan Program

State Funding

- Washington State Department of Ecology (Ecology)
 - Floodplains by Design
- Washington State Recreation and Conservation Office
 - Aquatic Lands Enhancement Account
 - Washington Wildlife Recreation Program
 - CRBFA “Local Project Grants”
 - Salmon Recovery Funding Board
 - Washington Coast Restoration Initiative
- Washington State Department of Natural Resources
 - Urban and Community Forestry Program
 - Internal funds for habitat restoration
- Transportation Improvement Board (TIB) Programs
 - Urban Arterial Program
 - Arterial Preservation Program

Return on Investment

The investments in this plan are essential for the long-term sustainability of the community and economy of the Satsop River Valley. Farms in Grays Harbor County produce over \$30 million in marketable products every year. Investments in erosion and flood risk reduction protect the agricultural heritage of the Satsop River. These investments also protect critical transportation infrastructure. SR 12 is the primary transportation corridor connecting the Washington coast. Keys Road is the main entrance to the Satsop Business Park that supports over 400 jobs. The proposed projects also enhance habitat for salmon in one of the most productive tributaries to the Chehalis River.

APPENDIX A

Community Meeting Notes and Materials



LOWER SATSOP RIVER COMMUNITY MEETING NOTES

Meeting Date and Time: September 5, 2018 | 6:30 – 8:00 PM

Meeting Location: Montesano City Hall

Attendees: 10 community members

Staff:

Tom Kollasch, Grays Harbor Conservation District

Anthony Waldrop, Grays Harbor Conservation District

Rob Wilson, Grays Harbor County

Maul Foster & Alongi

Kathy Lombardi

Michael Stringer

Lauren Wirtis

On September 5, 2018, the Lower Satsop River Project held a community meeting at Montesano City Hall to introduce the Lower Satsop River Project, hear from the community about their experience along the river, brainstorm solutions to the issues they experience, and talk about the next steps in the project and how the team will reach an actionable project list. Rob Wilson opened the meeting by welcoming everyone and introducing Maul Foster & Alongi (MFA). Michael Stringer then began facilitating the discussion by having people introduce themselves and briefly describe their experience on the Satsop River.

WHAT THE COMMUNITY IS EXPERIENCING

Community members shared their experiences with flooding and erosion in the Lower Satsop River. They have seen acres of property eroded by the river in some places. There was consensus that erosion is a greater concern than flooding. They have learned to manage flood risk, but erosion is causing loss of valuable property.

The group discussed a number of factors that are contributing to erosion and flooding, including:

Sediment Deposition: The geology of the Satsop River watershed is very rich in gravel. The steep slopes of the upper watershed feed large amounts of gravel into the river system. The gravel is transported downstream and is deposited in the lower reaches of the river where the topography flattens and stream velocity decreases. Gravel is deposited in large bars in the inside of bends. Erosion occurs on the outside of bends.

Historic maps of the river channel show that the river has migrated broadly across its floodplain in the past and continues to do so. Some community members discussed how in the past gravel was periodically removed from bars that they perceived this practice reduced erosion and migration of the river. Some community members stated that the river is aggrading in recent years and that pools are being filled with gravel. Natural resource regulatory agencies have not allowed gravel management to occur in recent years.

Reduction in Forest Cover: The harvest of trees in the upper part of the watershed has led to more intensive flooding that reaches the lower part of the Satsop River quicker than it used to. It was discussed that current forest practices laws are more protective than in the past, but that impacts from past practices are still affecting the dynamics of the river.

Flooding from the Chehalis River: When high tides on the Chehalis River coincide with flood events on the Satsop, the drainage of the Satsop is limited and water elevations rise and remain in flood stage for extended periods. Riverine flooding from the Chehalis typically occurs two days later than the Satsop River due to response time of water moving down the watersheds. Large portions of land south of State Route 12 experience flooding from the Chehalis River as well as the Satsop River.

Wynoochee Dam: The Wynoochee Dam provides both flood storage and hydroelectric power. Releases of flood water to protect the integrity of the dam can exacerbate flooding in the Satsop River by increasing water elevations on the Chehalis River, creating a barrier to drainage.

BRAINSTORMING SOLUTIONS

MFA staff led the attendees through an exercise to brainstorm the world of solutions for the Satsop River. The purpose of this exercise was to think of all the potential ways issues on the river could be addressed. Solutions the most supported by the attendees included:

- Pilot channels to push the main channel of the river to a location with less potential for erosion of farmland and infrastructure, and to create side channel habitat
- Engineered log jams to protect river bank in key areas and encourage flood water to spread across the floodplain
- In-stream gravel management, including potential to remove gravel in key locations to place it in engineered log jam structures
- Multiple, small scale projects to increase large woody debris in upper watershed streams to increase floodplain connectivity and reduce flow velocities
- Multiple, small scale flood storage facilities in the upper and middle watershed

NEXT STEPS

The project team continue to work with the Advisory Group to evaluate the feasibility and impacts of these various solutions. The next community meeting is scheduled for November 7, 2018 and will give the community an opportunity to prioritize the different solutions on the Satsop River. This prioritization exercise will help create the final action plan.

ATTACHMENT

MEETING MATERIALS



Satsop River Solutions Community Meeting #1

Wednesday, September 5, 2018
6:30 PM – 8:00 PM
Montesano City Hall

MEETING AGENDA

- Welcome and Introductions
- Purpose of This Planning Process
- Share Your Story
- Brainstorming Solutions
- Next Steps

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Community Meeting

September 5, 2018



Name			Phone	Email
1	ROSS READ		360-310-0072	rread@portgrays.org
2	Tom Kollasch (GHED)		360-589-1033	tkollasch@willapa-bay.org
3	LEONARD WATSON		(360) 533-5323	NONE
4	DARYL BLUMBERG		360-470-8225	d-blummy@botanail
5	MURDOUG CANON		(253) 223-5047	mcannon@forterr.org
6	TERRY WILLIS		360-581-4608	plyviewdairy@centurytel.net
7	Stephen Willis		360-581-9395	steve_willis@comcast.net
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LOWER SATSOP RIVER PLANNING

Community Meeting
September 5, 2018



Grays Harbor
Conservation
District

your window to healthy lands



Name			Phone	Email
1	Sylvia Markham		360 410-3824	markham sy@gmail.com
2	Roy Markham		360 410-3825	roymarkham@yahoo.com
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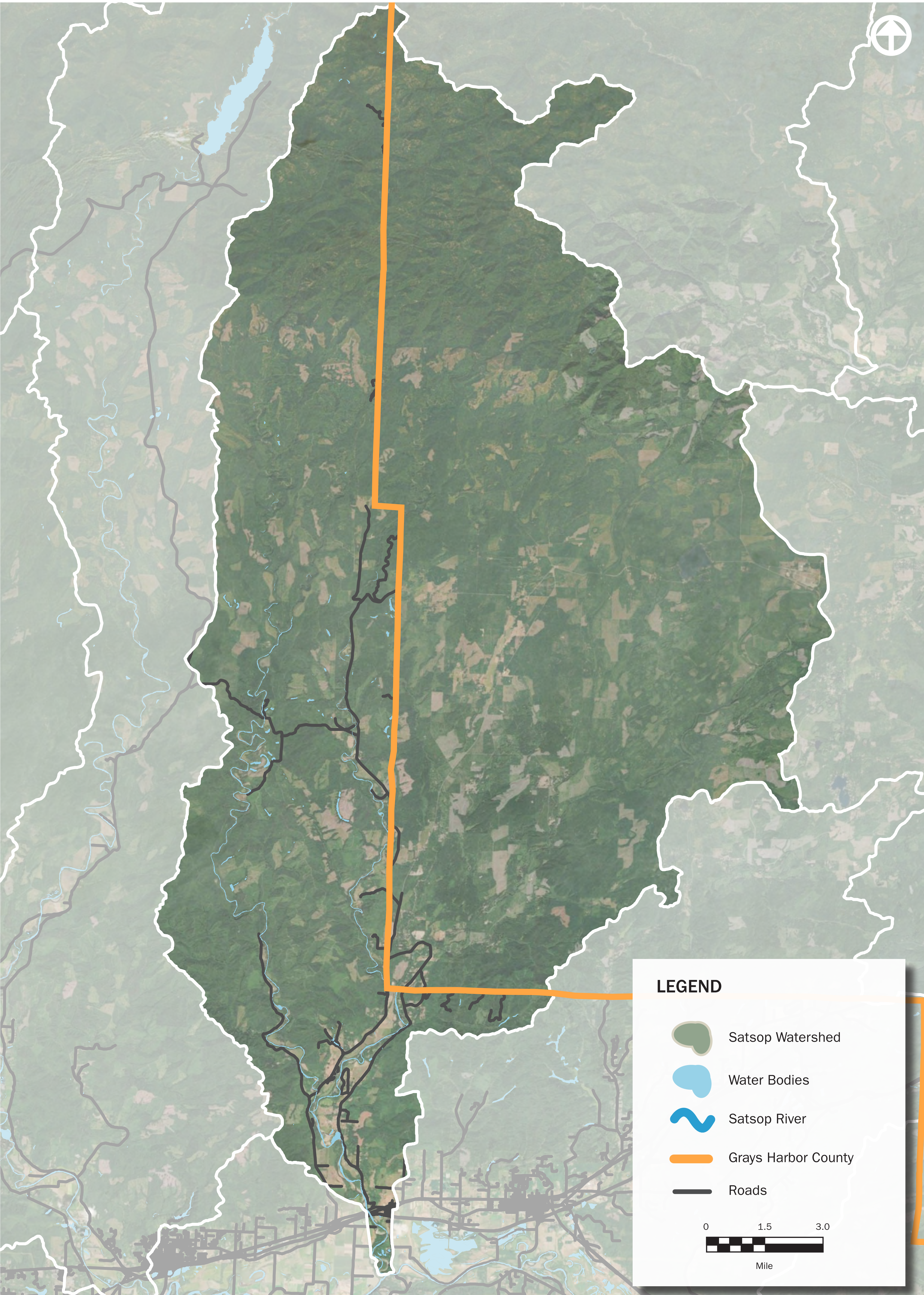
LOWER SATSOP RIVER

Watershed Map



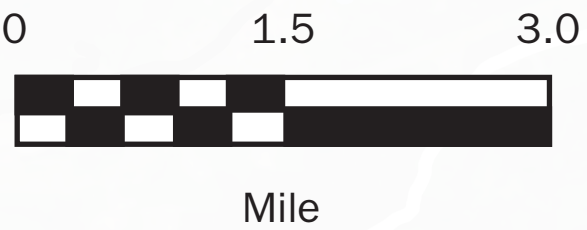
Grays Harbor
Conservation
District

your window to healthy lands



LEGEND

- Satsop Watershed
- Water Bodies
- Satsop River
- Grays Harbor County
- Roads



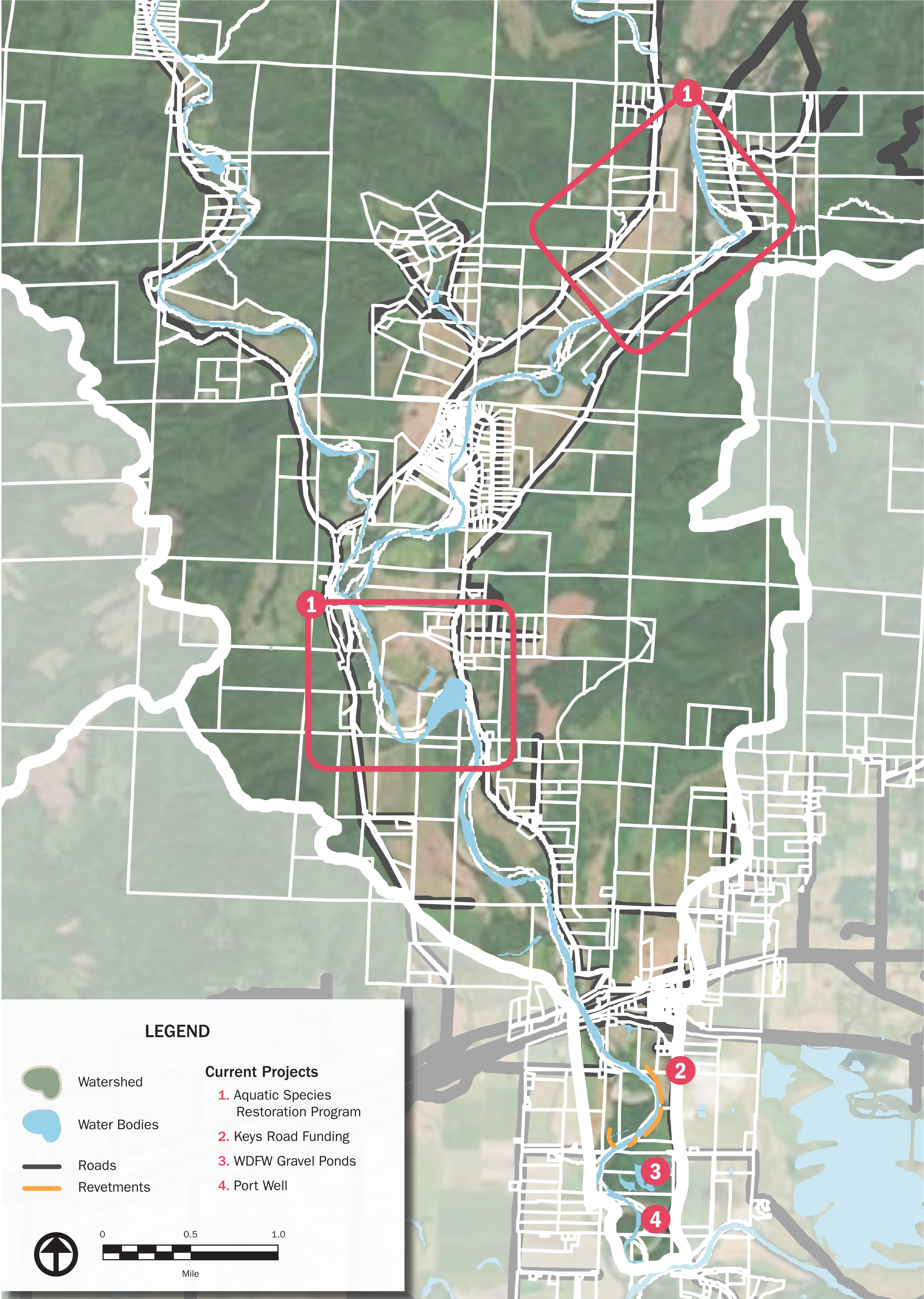
LOWER SATSOP RIVER

Current Projects



Grays Harbor
Conservation
District

your window to healthy lands



LOWER SATSOP RIVER

Community Meeting: September 5, 2018



MAUL FOSTER ALONG I

TOPICS

- Purpose of this Project
- Share Your Story
- Brainstorming Solutions
- Next Steps



PREVIOUS STUDIES & REPORTS

- 2001 – Salmon and Steelhead Habitat Limiting Factors (WRIAs 22 and 23)
- 2002 – US Army Corps of Engineers. Channel Migration Study
- 2004 – US Army Corps of Engineers [WEST Consultants]. Satsop River Floodplain Restoration Project
- 2013 – Grays Harbor County [Watershed Science & Engineering]. Satsop River Riprap Removal Restoration Project
- 2017 – Washington Department of Fish and Wildlife [Watershed Science & Engineering]. Lower Satsop Floodplain Restoration Phase II.



HISTORY OF RIVER MIGRATION



ISSUES AND DRIVERS

Glick Property

2017



MAUL FOSTER ALONG I

GOALS AND OBJECTIVES

- Goal #1: Protect public and private infrastructure, and agricultural lands from bank erosion
- Goal #2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.
- Goal #3: Reduce flood hazards and manage flood risk
- Goal #4: Support recreation opportunities



PURPOSE OF THIS PLANNING PROCESS

- Collaboratively Develop Long-term Vision for the Satsop River Floodplain
- Establish Framework for Long-term and Short-term Projects and Programs
- Promote Coordination Among Parties



SHARE YOUR STORY

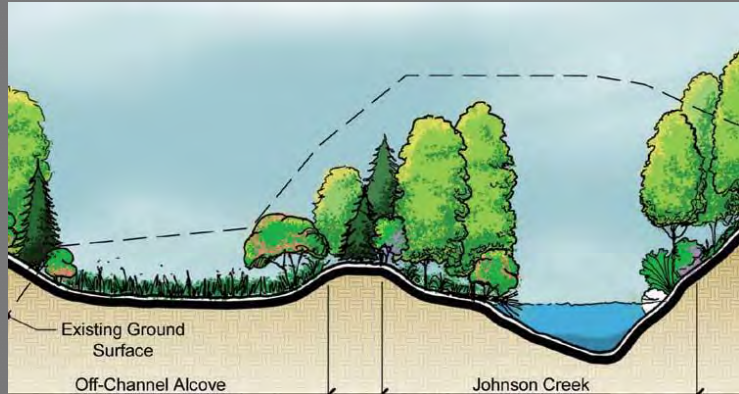


MAUL FOSTER ALONG!

BRAINSTORMING SOLUTIONS



BRAINSTORMING SOLUTIONS



Side Channel



NEXT STEPS

- Advisory Group Meeting 3: October
- Community Meeting 2: November 7

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx





LOWER SATSOP RIVER COMMUNITY MEETING NOTES

Meeting Date and Time: November 13, 2018 | 6:30 – 8:00 PM

Meeting Location: Brady Fire Hall

Attendees: 10 community members

Staff:

Tom Kollasch, Grays Harbor Conservation District

Anthony Waldrop, Grays Harbor Conservation District

Rob Wilson, Grays Harbor County

Scott Boettcher, staff to the Chehalis River Basin Flood Authority

Michelle Cramer, Washington State Department of Fish and Wildlife

Allen Lebovitz, Washington State Department of Natural Resources

Maul Foster & Alongi

Kathy Lombardi

Michael Stringer

Lauren Wirtis

On November 13, 2018, the Lower Satsop River Planning Project held a community meeting at Brady Fire Hall. The purpose of the meeting was to engage community members in prioritization of potential projects and programs to reduce erosion, reduce flood risk, and enhance habitat in the Satsop River. This was the second community meeting focused on the Satsop River held in the fall of 2018. The first meeting held on September 5, 2018 and focused on discussing challenges the community is facing and potential solutions to those challenges.

Rob Wilson opened the meeting by welcoming everyone and introducing Maul Foster & Alongi (MFA). M. Stringer reviewed the purpose of the project and what occurred during the first meeting.

LIST OF POTENTIAL SOLUTIONS

M. Stringer and K. Lombardi shared the list of potential projects, describing what each one was and what flooding, habitat, and erosion benefits that project provided. Attendees were provided a handout with the list of projects and their descriptions (attached). Attendees asked several questions and made comments about the projects that were presented, the themes of which were:

- Restoration of side channels is not likely to reduce flooding, because during significant floods, the water level is so high that these side channels are already filled with water.

- It is important that the projects selected will provide a long-term solution.
- Some attendees expressed concern that the fill material that will be placed in the gravel ponds on the Washington State Department of Fish and Wildlife property will be resuspended during floods and transported downriver.
- There was a general frustration among attendees who felt like a solution was necessary immediately. They cannot wait a long time to put a solution in place.

PRIORITIZATION EXERCISE

MFA staff led the attendees through a prioritization exercise. The purpose of this exercise is to understand what projects the attendees think the County and Conservation District should focus their financial resources on. The exercise provided a \$5,000 budget and all of the proposed projects were assigned costs scaled down from their actual cost relative to this budget. The attendees worked in three different groups to create prioritization lists. The themes of their prioritization and the following discussion is below.

Key Themes from This Exercise

- All teams chose to fund two to four ELJs, two pilot channels, and a gravel management study.
- The attendees said that they supported the pilot channel concept because it redirects the river, provides an immediate solution, and have demonstrated in the past that they work.
 - A. Lebovitz from DNR suggested that the ELJs that they budgeted for would likely have the same effects as a pilot channel but offer a longer-term solution. The attendees were supportive of this concept.
- Attendees supported the concept of using gravel from within the river channel to support ELJs.
- There was a discussion about whether erosion or flooding was the primary concern. Attendees seem to agree that erosion and subsequent lowering of the banks exacerbated the flooding issues and what was important was rebuilding the banks.
 - T. Kollasch from the Conservation District mentioned that flood fences could be used as a mechanism to catch some of the silt and gravel that comes down the river to help build up the banks.
- Attendees favored solutions that would provide relief relatively immediately but that also had a long lifespan so that they could operate with a certain degree of certainty.

ONGOING ENGAGEMENT

A. Waldrop told the community that the Conservation District would continue to reach out to them and keep them informed. Attendees agreed that it would be a good idea to form a standing committee to evaluate the implementation of the solutions proposed in the action plan, but no one volunteered to be a part of a committee that met regularly. Attendees said that they would like to be updated in the fall and spring on progress of implementation.

NEXT STEPS

An online version of the prioritization exercise will be available for community members who are not available to attend the evening meeting (www.surveymonkey.com/r/satsopriver). The survey will remain open until Sunday, November 25, 2018. MFA will provide a summary of the overall prioritization feedback once the survey closes. The Grays Harbor Conservation District will continue reaching out to landowners to have one-on-one meetings. MFA will also be working on drafting the final report. There may be an additional Advisory Group meeting in January 2019 to review the final report.

ATTACHMENT

MEETING MATERIALS



Satsop River Solutions Community Meeting #2

Tuesday, November 13, 2018

6:30 PM – 8:00 PM

Brady Fire Hall

MEETING AGENDA

- Welcome and Introductions
- Purpose of This Planning Process
- Project Updates
 - ASRP
 - WDFW
- Potential Solutions
- Prioritization Exercise
- Next Steps

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Community Meeting

November 13, 2018



your window to healthy lands

Name		Phone	Email
1	Lauren Wirtis	206 406 4525	lwirtis@gmail.com
2	Michelle Cramer		Michelle.Cramer@DFW.wa.gov Michelle.Cramer@DFW.wa.gov
3	Tom Kollasch	360 589-1033	tkollasch@willapa.org
4	Sylvia Markman	360 249-4718	
5	Ray Munk		
6	Allen Hebovitz	360-480-2891	
7	Scott Broethchen	360/480-6600	scottb@SBGH-partners.com
8	Greg Wilkin	360-581-4608	
9	LEONARD WATSON	(360) 533-5323	NONE
10	Ed Mustard	360-249-6859	edmustard@gmail.com
11	Lynn Lubbe	360-249-5475	KurtLynnLubbe@yahoo.com
12	Kurt Lubbe	"	"
13	Stormy Glick	360-581-3366	sglick2001@yahoo.com
14	Steve Schmitz	360-581-4310	Steve.Schmitz@PFF.com
15	Rob Wilson	360-964-1663	rwilson@co.grays-harbor.wa.us

LOWER SATSOP RIVER

Community Meeting: November 13, 2018



MAUL FOSTER ALONG I

AGENDA

- Welcome and Introductions
- Purpose of This Planning Process
- Project Updates
- Potential Solutions
- Prioritization Exercise
- Next Steps

BACKGROUND

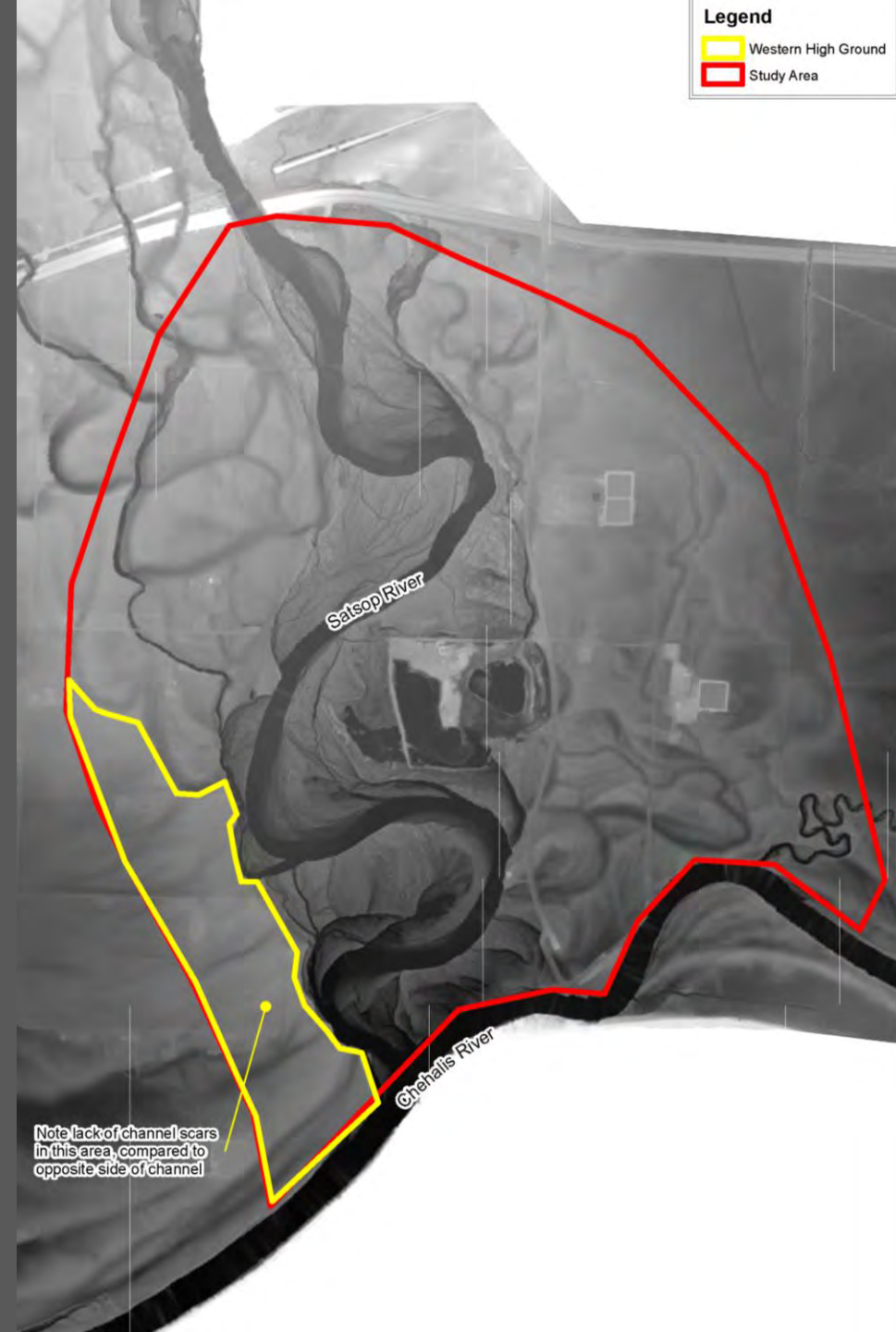
THE WATERSHED



HISTORY OF RIVER MIGRATION



HISTORIC SIDE CHANNELS



PURPOSE OF THIS PROCESS

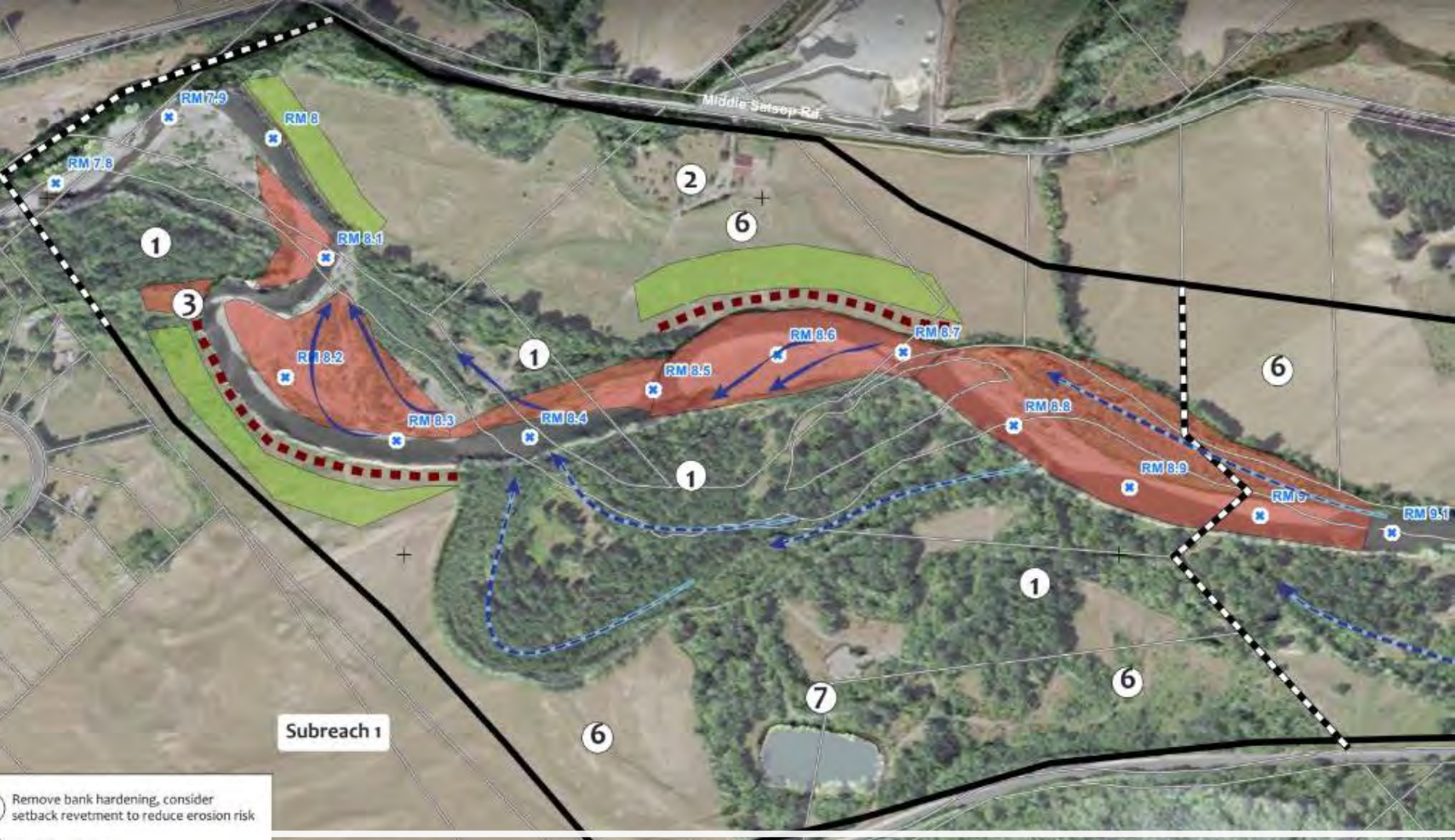
GOALS AND OBJECTIVES

- Goal #1: Protect public and private infrastructure, and agricultural lands from bank erosion
- Goal #2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.
- Goal #3: Reduce flood hazards and manage flood risk
- Goal #4: Support recreation opportunities

PURPOSE

- Collaboratively Develop Long-term Vision for the Satsop River Floodplain
- Establish Framework for Long-term and Short-term Projects and Programs
- Promote Coordination Among Parties

PROJECT UPDATES



Subreach 1

- Remove bank hardening, consider setback revegetment to reduce erosion risk
- Riparian planting
- Create shallow floodplain habitat

ASRP

Program (ASRP): Chehalis Basin Strategy Early Action Plan

K Satsop River - RM 6 - Sheet 3

National Geographic's current map policy. Sources: NCEP-WCMC, USGS, NASA, ESA, METI, NRCAN,

- | | | |
|----------------------------------|--------------------------------------|--------------------|
| Restoration Corridor Extent | Engineered Log Jam Installation Area | Timber Revegetment |
| Timber Revegetment Planting Area | Parcel Boundary | River Mile (RM) |
| Subreach Boundary | Mainstem Flow | Side Channel Flow |





WDFW GRAVEL PONDS

POTENTIAL SOLUTIONS



CONSERVATION PRACTICES ON WORKING FOREST LANDS





ENGINEERED LOG JAMS





FLOOD EASEMENTS AND CONSERVATION EASEMENTS





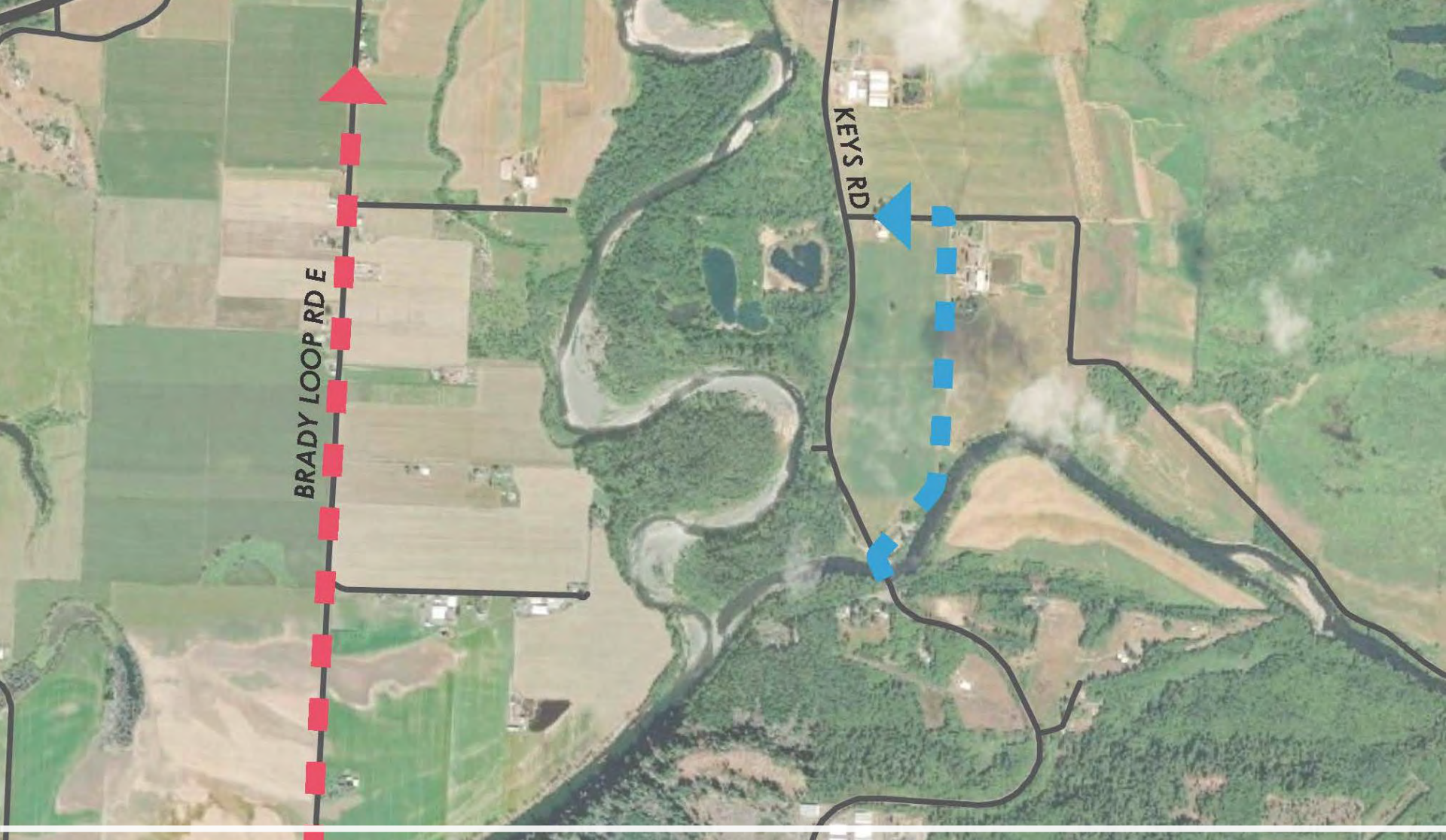
KEYS ROAD – HARD ARMORING





KEYS ROAD – SOFT ARMORING





KEYS ROAD – SOFT ARMORING



IN-STREAM GRAVEL MANAGEMENT STUDY





PILOT CHANNEL





PROPERTY ACQUISITION FROM WILLING SELLERS





RECONNECTING HISTORIC SIDE CHANNELS





RESTORE GRAVEL PONDS ON WDFW PROPERTY



SMALL-SCALE LARGE WOODY DEBRIS PROJECTS



PRIORITIZATION EXERCISE

PROJECT DESCRIPTIONS



1

CONSERVATION PRACTICES ON WORKING FOREST LANDS

Collaborate with working forest managers to ensure that best practices are being met. Additionally, explore opportunities to increase riparian buffer widths, selectively harvest, or increase harvest rotation intervals. Implementation of conservation practices in the headwaters of the Satsop River has the potential to decrease runoff, erosion, and sediment transport in the system.

Flood	Habitat	Erosion
2.2	2.3	2.2

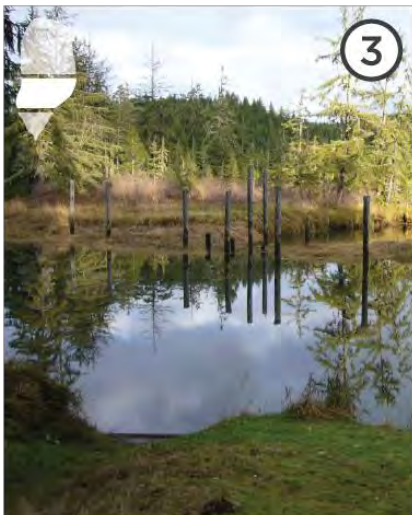


2

ENGINEERED LOG JAMS

Place engineered complexes of large wood pieces in strategic locations in stream channels. Engineered log jams would be used to slow bank erosion, promote formation of side channels, increase channel roughness to slow velocity and encourage high flows to spread into the floodplain. Large wood plays a key role in stream morphology. They can promote formation of pools, gravel bars, and side channels. They can stabilize river banks and increase floodplain connectivity.

Flood	Habitat	Erosion
2.0	2.9	2.7



3

FLOOD EASEMENTS AND CONSERVATION EASEMENTS

Collaborate with willing private property owners to obtain easements for flood storage and habitat conservation on private property. Under a flood easement, the owner would be restricted from building structures in the dedicated area and would manage that land proactively. Provides land area for flood storage and channel migration without impacting infrastructure and structures. Increased roughness and diversity of structure in the floodplain also serves to slow flood velocities.

Flood	Habitat	Erosion
2.6	2.4	2.3



4

KEYS ROAD - HARD ARMORING

The current alignment of Keys Road would be maintained and protected using traditional techniques such as sheet pile wall. Protect Keys Road as a transportation corridor that connects Satsop Business Park and residences to State Route 12. Maintaining the existing alignment also provides erosion protection to farmland east of the road.

Flood	Habitat	Erosion
1.4	1.0	2.7

PROJECT CARDS

12

**Small-Scale Large
Woody Debris Projects**

\$100

Flood
2.2

Habitat
3.0

Erosion
2.5

1

**Conservation Practices
on Forestry Lands**

\$500

Flood
2.2

Habitat
2.4

Erosion
2.2

HOW IT WORKS

\$5,000 Budget

Select project working with your table group

You may select multiple of one type of projects
(i.e., more than one Engineered Log Jam)

Use your calculations sheet

You can come up with more than one set of
priorities

15 minutes!

DISCUSSION

- What were your priorities?
- Did you spend your money on a lot of small projects or a couple large projects?
- Where in the watershed are your projects?

NEXT STEPS

PROJECT WEBSITE

[https://www.ezview.wa.gov/site/alias_1973/37259/
lower-satsop-planning-process.aspx](https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx)

ONLINE OPEN HOUSE

www.surveymonkey.com/r/satsopriver



LOWER SATSOP RIVER COMMUNITY MEETING NOTES

Meeting Date and Time: January 16, 2019 | 6:30 – 8:00 PM

Meeting Location: Brady Fire Hall

Attendees: 22 community members (see sign in sheet attached)

Presenters / Public Agency Representatives:

Vickie Raines, Grays Harbor County Commissioner

Rob Wilson, Grays Harbor County

Scott Boettcher, staff to the Chehalis River Basin Flood Authority

Tom Kollasch, Grays Harbor Conservation District

Anthony Waldrop, Grays Harbor Conservation District

Michelle Cramer, Washington State Department of Fish and Wildlife

Allen Lebovitz, Washington State Department of Natural Resources

Maul Foster & Alongi

Kathy Lombardi

Michael Stringer

Lauren Wirtis

On January 16, 2019, the Lower Satsop River Planning Project held a community meeting at Brady Fire Hall. The purpose of the meeting was to discuss the November 2018 avulsion and review the draft Satsop River Investment Plan, project funding, timeline for implementation, and how to stay involved. This was the final meeting of this process. The draft Investment Plan is the outcome of the two previous community meetings that explored potential solutions for the Satsop River and then prioritized the various options. Commissioner Raines opened the meeting by welcoming everyone and introducing the agenda for the meeting.

NOVEMBER 2018 AVULSION

M. Stringer began the conversation about the November 2018 avulsion by asking property owners to share their experience. Terry Willis shared that the avulsion is approximately 700-800 feet long and 200 feet wide. The river is now running about 40 steps from her front door. She is now working with the Conservation District to obtain an emergency permit to get a small relief channel to provide temporary relief from the erosion to then allow for this plan to take effect.

THE INVESTMENT PLAN

The project team reviewed the investment plan, which works with natural river processes while respecting the importance of protecting agricultural land and infrastructure that supports the community and the local economy. The plan includes the following elements:

- Lower Satsop: Approach to this part of the river includes a complex system of ELJs and bioengineered bank protection measures that will protect farmland and Keys Road on both sides of the river. This work will require funding in 2019-20 from state and local budgets to support design and construction of pilot project. The public agencies are looking at multiple potential funding sources to provide resources to support this effort as soon as possible. These ELJ projects will create an opportunity to conduct targeted gravel management. Plan for long-term changes to Keys Road will occur on a 30- to 40-year time horizon.
- Upper Watershed: This section includes planning and implementation of a series of small scale LWD projects to promote floodplain connectivity, reduce erosion, and decrease downstream impacts over time.
- East Fork: This part of the watershed will be addressed through implementation of the ASRP pilot project.

Additionally, the project team and community reviewed the implementation timeline for the emergency response, design for the Lower Satsop ELJ project, the WDFW gravel ponds project, and upper watershed strategy.

Comments from the Community

- Something needs to happen in the near-term to address the avulsion and make sure that such an event doesn't soon recur.
 - Response: Agreed, the public agencies are coordinating to expedite projects.
- The planning process has been going on for a long time and the community is ready for action. Additionally, there is frustration with the current regulatory framework and the length of time it takes to get projects permitted and constructed.
 - Response: Agreed, with the plan in place, the project can be funded and built. The Advisory Group that this project has convened has allowed the various regulatory agencies to work together and attend these community meetings to better understand the dire needs of the community.
- Why can't WDFW remove the revetments so that the river can reconnect to its historic migration zone? The revetments were put in as a response to an individual interest to protect property.
 - The revetments have not been removed because that would increase risk of erosion of Keys Road. With the proposed approach of multiple ELJs and bank protection of Keys Road, the potential for removing the revetments will be reviewed again.

- Would prefer that the WDFW revetments were removed and the banks of Keys Road were protected.
- Want the project team to “be bold” in their approach to addressing erosion and flooding issues on the Satsop River.

ONGOING ENGAGEMENT

The project team told the community that the Advisory Group is committed to continuing their effort to work together to ensure that projects can move forward on the Satsop River. The Conservation District is going to lead the effort of keeping the community informed by holding update meetings twice per year, in the fall and spring.

NEXT STEPS

The project team is wrapping up the final report which will be completed mid-February. The County, Conservation District, and agency partners are all working on bringing together funding to support the Investment Plan.

LOWER SATSOP RIVER PLANNING

Community Meeting

January 16, 2019



Grays Harbor
Conservation
District

your window to healthy lands



	Name	Phone	Email	Check if Interested in Participating in Standing Committee
1	Ed Mustard	360-249-6859	edmustard@gmail.com	<input type="checkbox"/>
2	Ray TSENHART	360-249-1411	TSENHART@YAHOO.CO	<input type="checkbox"/>
3	Allen Lebovitz	360-480-2891	on file	<input type="checkbox"/>
4	Sylvia Mackham	360 249-4718		<input type="checkbox"/>
5	Roy Mackham	-		<input type="checkbox"/>
6	Albert Hensley	360-249-4751		<input checked="" type="checkbox"/>
7	Barb Chapman	360-470-8227	dbchapman@centurytel.net	<input type="checkbox"/>
8	Kurt & Lynn Lubbe	360-249-5475	KurtLynnLubbe@yahoo.com	<input type="checkbox"/>
9				<input type="checkbox"/>
10				<input type="checkbox"/>
11				<input type="checkbox"/>
12				<input type="checkbox"/>
13				<input type="checkbox"/>
14				<input type="checkbox"/>
15				<input type="checkbox"/>

LOWER SATSOP RIVER PLANNING

Community Meeting

January 16, 2019



your window to healthy lands

Name			Phone	Email	Check if Interested in Participating in Standing Committee
1	Howard Kent				<input type="checkbox"/>
2	Annmarie Willis				<input type="checkbox"/>
3	Michael McQueen			MMZRL@msn.com	<input type="checkbox"/>
4	Gary Wilton				<input type="checkbox"/>
5	Daryl Blumberg				<input type="checkbox"/>
6	Stefany Gluck		360-487-5757	sgluck2010@yahoo	<input type="checkbox"/>
7	Jose Torres		360-500-0823		<input type="checkbox"/>
8	Perly Glosa		360-580-0285	R6loreng@gmail	<input type="checkbox"/>
9	Terry Willis		360-581-4608	CENTURYTEL.NET D/WIEWDARRE	<input type="checkbox"/>
10	FRANK KERSH		360-532-7413		<input type="checkbox"/>
11	Tom Kullaseh				<input type="checkbox"/>
12	Kurt Kulle		360-244-5475		<input type="checkbox"/>
13	GAVIN GLOSAS		360-310-0606	SUAREZ-ENGINEER@GMAIL	<input type="checkbox"/>
14	Russ Duval		360-580-9558	duvallk@yahoo.com	<input type="checkbox"/>
15	Larry Willis		360-580-5809	7kenaz9@gmail.com	<input type="checkbox"/>

APPENDIX B

Advisory Group Notes and Materials



LOWER SATSOP RIVER COMMUNITY MEETING NOTES

Meeting Date and Time: September 5, 2018 | 6:30 – 8:00 PM

Meeting Location: Montesano City Hall

Attendees: 10 community members

Staff:

Tom Kollasch, Grays Harbor Conservation District

Anthony Waldrop, Grays Harbor Conservation District

Rob Wilson, Grays Harbor County

Maul Foster & Alongi

Kathy Lombardi

Michael Stringer

Lauren Wirtis

On September 5, 2018, the Lower Satsop River Project held a community meeting at Montesano City Hall to introduce the Lower Satsop River Project, hear from the community about their experience along the river, brainstorm solutions to the issues they experience, and talk about the next steps in the project and how the team will reach an actionable project list. Rob Wilson opened the meeting by welcoming everyone and introducing Maul Foster & Alongi (MFA). Michael Stringer then began facilitating the discussion by having people introduce themselves and briefly describe their experience on the Satsop River.

WHAT THE COMMUNITY IS EXPERIENCING

Community members shared their experiences with flooding and erosion in the Lower Satsop River. They have seen acres of property eroded by the river in some places. There was consensus that erosion is a greater concern than flooding. They have learned to manage flood risk, but erosion is causing loss of valuable property.

The group discussed a number of factors that are contributing to erosion and flooding, including:

Sediment Deposition: The geology of the Satsop River watershed is very rich in gravel. The steep slopes of the upper watershed feed large amounts of gravel into the river system. The gravel is transported downstream and is deposited in the lower reaches of the river where the topography flattens and stream velocity decreases. Gravel is deposited in large bars in the inside of bends. Erosion occurs on the outside of bends.

Historic maps of the river channel show that the river has migrated broadly across its floodplain in the past and continues to do so. Some community members discussed how in the past gravel was periodically removed from bars that they perceived this practice reduced erosion and migration of the river. Some community members stated that the river is aggrading in recent years and that pools are being filled with gravel. Natural resource regulatory agencies have not allowed gravel management to occur in recent years.

Reduction in Forest Cover: The harvest of trees in the upper part of the watershed has led to more intensive flooding that reaches the lower part of the Satsop River quicker than it used to. It was discussed that current forest practices laws are more protective than in the past, but that impacts from past practices are still affecting the dynamics of the river.

Flooding from the Chehalis River: When high tides on the Chehalis River coincide with flood events on the Satsop, the drainage of the Satsop is limited and water elevations rise and remain in flood stage for extended periods. Riverine flooding from the Chehalis typically occurs two days later than the Satsop River due to response time of water moving down the watersheds. Large portions of land south of State Route 12 experience flooding from the Chehalis River as well as the Satsop River.

Wynoochee Dam: The Wynoochee Dam provides both flood storage and hydroelectric power. Releases of flood water to protect the integrity of the dam can exacerbate flooding in the Satsop River by increasing water elevations on the Chehalis River, creating a barrier to drainage.

BRAINSTORMING SOLUTIONS

MFA staff led the attendees through an exercise to brainstorm the world of solutions for the Satsop River. The purpose of this exercise was to think of all the potential ways issues on the river could be addressed. Solutions the most supported by the attendees included:

- Pilot channels to push the main channel of the river to a location with less potential for erosion of farmland and infrastructure, and to create side channel habitat
- Engineered log jams to protect river bank in key areas and encourage flood water to spread across the floodplain
- In-stream gravel management, including potential to remove gravel in key locations to place it in engineered log jam structures
- Multiple, small scale projects to increase large woody debris in upper watershed streams to increase floodplain connectivity and reduce flow velocities
- Multiple, small scale flood storage facilities in the upper and middle watershed

NEXT STEPS

The project team continue to work with the Advisory Group to evaluate the feasibility and impacts of these various solutions. The next community meeting is scheduled for November 7, 2018 and will give the community an opportunity to prioritize the different solutions on the Satsop River. This prioritization exercise will help create the final action plan.

ATTACHMENT

MEETING MATERIALS



Satsop River Solutions Community Meeting #1

*Wednesday, September 5, 2018
6:30 PM – 8:00 PM
Montesano City Hall*

MEETING AGENDA

- Welcome and Introductions
- Purpose of This Planning Process
- Share Your Story
- Brainstorming Solutions
- Next Steps

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Community Meeting

September 5, 2018



Grays Harbor
Conservation
District

your window to healthy lands



1854

Name			Phone	Email
1	ROSS READ		360-310-0072	rread@portgrays.org
2	Tom Kollasch (GHED)		360-589-1033	tkollasch@willapa-bay.org
3	LEONARD WATSON		(360) 533-5323	NONE
4	DARYL BLUMBERG		360-470-8225	d-blummy@botanail
5	MURDOUG CANON		(253) 223-5047	mcannon@forterr.org
6	TERRY WILLIS		360-581-4608	plyviewdairy@centurytel.net
7	Stephen Willis		360-581-9395	steve_willis@comcast.net
8				
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LOWER SATSOP RIVER PLANNING

Community Meeting
September 5, 2018



Conservation Districts
of Washington State

Your window to healthy lands



Grays Harbor
Conservation
District

Your window to healthy lands

	Name	Phone	Email
1	Sylvia Markham	360 410-3824	markham sy @ gmail . com
2	Roy Markham	360 410-3825	roymarkham@yahoo.com
3			
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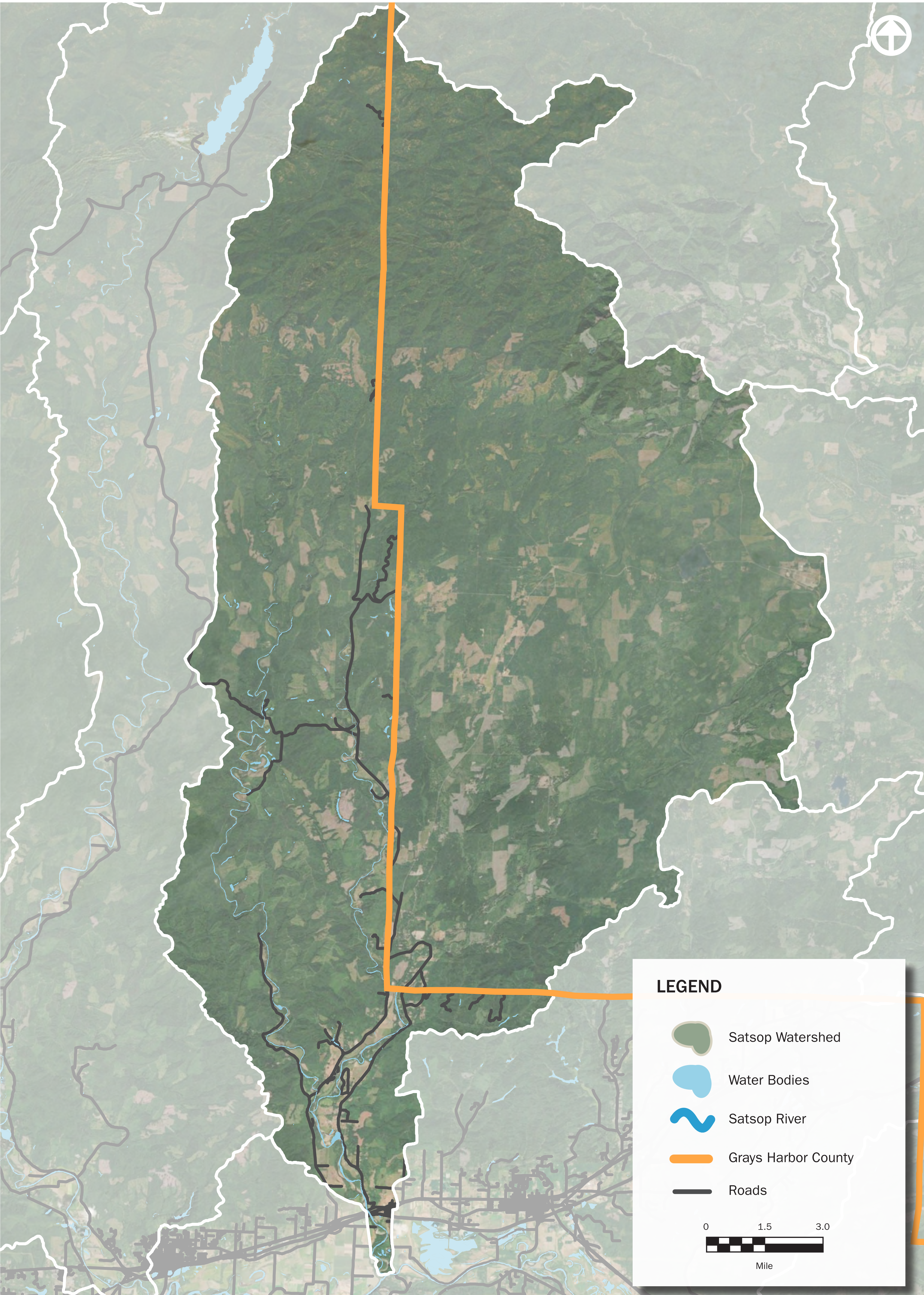
LOWER SATSOP RIVER

Watershed Map



Grays Harbor
Conservation
District

your window to healthy lands



LOWER SATSOP RIVER

Current Projects



Grays Harbor
Conservation
District

your window to healthy lands



LOWER SATSOP RIVER

Community Meeting: September 5, 2018



MAUL FOSTER ALONGI

TOPICS

- Purpose of this Project
- Share Your Story
- Brainstorming Solutions
- Next Steps

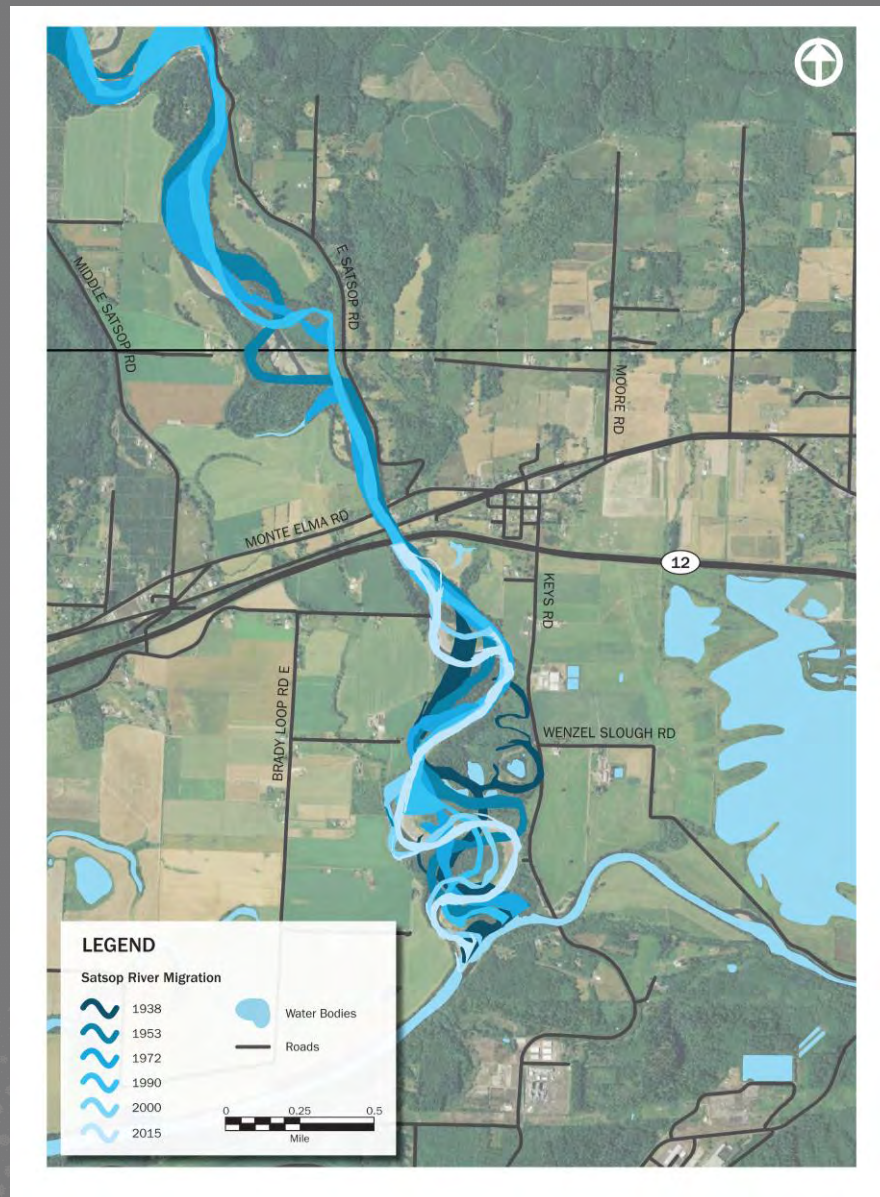


PREVIOUS STUDIES & REPORTS

- 2001 – Salmon and Steelhead Habitat Limiting Factors (WRIAs 22 and 23)
- 2002 – US Army Corps of Engineers. Channel Migration Study
- 2004 – US Army Corps of Engineers [WEST Consultants]. Satsop River Floodplain Restoration Project
- 2013 – Grays Harbor County [Watershed Science & Engineering]. Satsop River Riprap Removal Restoration Project
- 2017 – Washington Department of Fish and Wildlife [Watershed Science & Engineering]. Lower Satsop Floodplain Restoration Phase II.



HISTORY OF RIVER MIGRATION



ISSUES AND DRIVERS

Glick Property

2017



MAUL FOSTER ALONG I

GOALS AND OBJECTIVES

- Goal #1: Protect public and private infrastructure, and agricultural lands from bank erosion
- Goal #2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.
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- Goal #4: Support recreation opportunities



PURPOSE OF THIS PLANNING PROCESS

- Collaboratively Develop Long-term Vision for the Satsop River Floodplain
- Establish Framework for Long-term and Short-term Projects and Programs
- Promote Coordination Among Parties



SHARE YOUR STORY

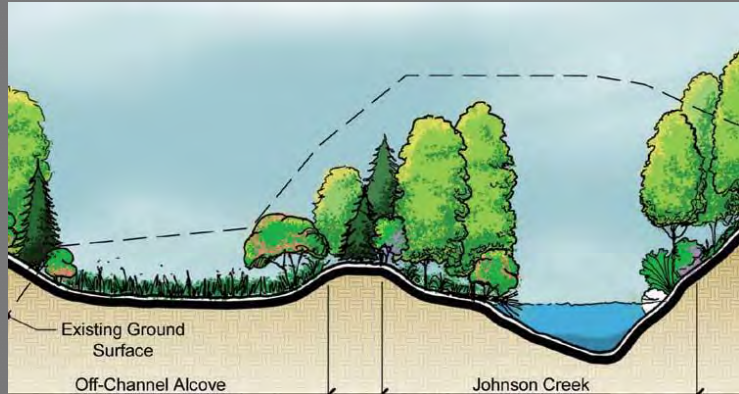


MAUL FOSTER ALONG!

BRAINSTORMING SOLUTIONS



BRAINSTORMING SOLUTIONS



NEXT STEPS

- Advisory Group Meeting 3: October
- Community Meeting 2: November 7

https://www.ezview.wa.gov/site/alias__1973/37259/lower-satsop-planning-process.aspx





LOWER SATSOP RIVER COMMUNITY MEETING NOTES

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Meeting Location: Brady Fire Hall

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Staff:

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Anthony Waldrop, Grays Harbor Conservation District

Rob Wilson, Grays Harbor County

Scott Boettcher, staff to the Chehalis River Basin Flood Authority

Michelle Cramer, Washington State Department of Fish and Wildlife

Allen Lebovitz, Washington State Department of Natural Resources

Maul Foster & Alongi

Kathy Lombardi

Michael Stringer

Lauren Wirtis

On November 13, 2018, the Lower Satsop River Planning Project held a community meeting at Brady Fire Hall. The purpose of the meeting was to engage community members in prioritization of potential projects and programs to reduce erosion, reduce flood risk, and enhance habitat in the Satsop River. This was the second community meeting focused on the Satsop River held in the fall of 2018. The first meeting held on September 5, 2018 and focused on discussing challenges the community is facing and potential solutions to those challenges.

Rob Wilson opened the meeting by welcoming everyone and introducing Maul Foster & Alongi (MFA). M. Stringer reviewed the purpose of the project and what occurred during the first meeting.

LIST OF POTENTIAL SOLUTIONS

M. Stringer and K. Lombardi shared the list of potential projects, describing what each one was and what flooding, habitat, and erosion benefits that project provided. Attendees were provided a handout with the list of projects and their descriptions (attached). Attendees asked several questions and made comments about the projects that were presented, the themes of which were:

- Restoration of side channels is not likely to reduce flooding, because during significant floods, the water level is so high that these side channels are already filled with water.

- It is important that the projects selected will provide a long-term solution.
- Some attendees expressed concern that the fill material that will be placed in the gravel ponds on the Washington State Department of Fish and Wildlife property will be resuspended during floods and transported downriver.
- There was a general frustration among attendees who felt like a solution was necessary immediately. They cannot wait a long time to put a solution in place.

PRIORITIZATION EXERCISE

MFA staff led the attendees through a prioritization exercise. The purpose of this exercise is to understand what projects the attendees think the County and Conservation District should focus their financial resources on. The exercise provided a \$5,000 budget and all of the proposed projects were assigned costs scaled down from their actual cost relative to this budget. The attendees worked in three different groups to create prioritization lists. The themes of their prioritization and the following discussion is below.

Key Themes from This Exercise

- All teams chose to fund two to four ELJs, two pilot channels, and a gravel management study.
- The attendees said that they supported the pilot channel concept because it redirects the river, provides an immediate solution, and have demonstrated in the past that they work.
 - A. Lebovitz from DNR suggested that the ELJs that they budgeted for would likely have the same effects as a pilot channel but offer a longer-term solution. The attendees were supportive of this concept.
- Attendees supported the concept of using gravel from within the river channel to support ELJs.
- There was a discussion about whether erosion or flooding was the primary concern. Attendees seem to agree that erosion and subsequent lowering of the banks exacerbated the flooding issues and what was important was rebuilding the banks.
 - T. Kollasch from the Conservation District mentioned that flood fences could be used as a mechanism to catch some of the silt and gravel that comes down the river to help build up the banks.
- Attendees favored solutions that would provide relief relatively immediately but that also had a long lifespan so that they could operate with a certain degree of certainty.

ONGOING ENGAGEMENT

A. Waldrop told the community that the Conservation District would continue to reach out to them and keep them informed. Attendees agreed that it would be a good idea to form a standing committee to evaluate the implementation of the solutions proposed in the action plan, but no one volunteered to be a part of a committee that met regularly. Attendees said that they would like to be updated in the fall and spring on progress of implementation.

NEXT STEPS

An online version of the prioritization exercise will be available for community members who are not available to attend the evening meeting (www.surveymonkey.com/r/satsopriver). The survey will remain open until Sunday, November 25, 2018. MFA will provide a summary of the overall prioritization feedback once the survey closes. The Grays Harbor Conservation District will continue reaching out to landowners to have one-on-one meetings. MFA will also be working on drafting the final report. There may be an additional Advisory Group meeting in January 2019 to review the final report.

ATTACHMENT

MEETING MATERIALS



Satsop River Solutions Community Meeting #2

Tuesday, November 13, 2018

6:30 PM – 8:00 PM

Brady Fire Hall

MEETING AGENDA

- Welcome and Introductions
- Purpose of This Planning Process
- Project Updates
 - ASRP
 - WDFW
- Potential Solutions
- Prioritization Exercise
- Next Steps

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Community Meeting

November 13, 2018



your window to healthy lands

Name		Phone	Email
1	Lauren Wirtis	206 406 4525	lwirtis@gmail.com
2	Michelle Cramer		Michelle.Cramer@DFW.wa.gov Michelle.Cramer@DFW.wa.gov
3	Tom Kollasch	360 589-1033	tkollasch@willapa-bay.org
4	Sylvia Markman	360 249-4718	
5	Ray Munk		
6	Allen Hebovitz	360-480-2891	
7	Scott Broethchen	360/480-6600	scottb@SBGH-partners.com
8	Greg Wilkin	360-581-4608	
9	LEONARD WATSON	(360) 533-5323	NONE
10	Ed Mustard	360-249-6859	edmustard@gmail.com
11	Lynn Lubbe	360-249-5475	KurtLynnLubbe@yahoo.com
12	Kurt Lubbe	"	"
13	Stormy Glick	360-581-3366	sglick2001@yahoo.com
14	Steve Schmitz	360-581-4310	Steve.Schmitz@PFF.com
15	Rob Wilson	360-964-1663	rwilson@co.grays-harbor.wa.us

LOWER SATSOP RIVER

Community Meeting: November 13, 2018



MAUL FOSTER ALONG I

AGENDA

- Welcome and Introductions
- Purpose of This Planning Process
- Project Updates
- Potential Solutions
- Prioritization Exercise
- Next Steps

BACKGROUND

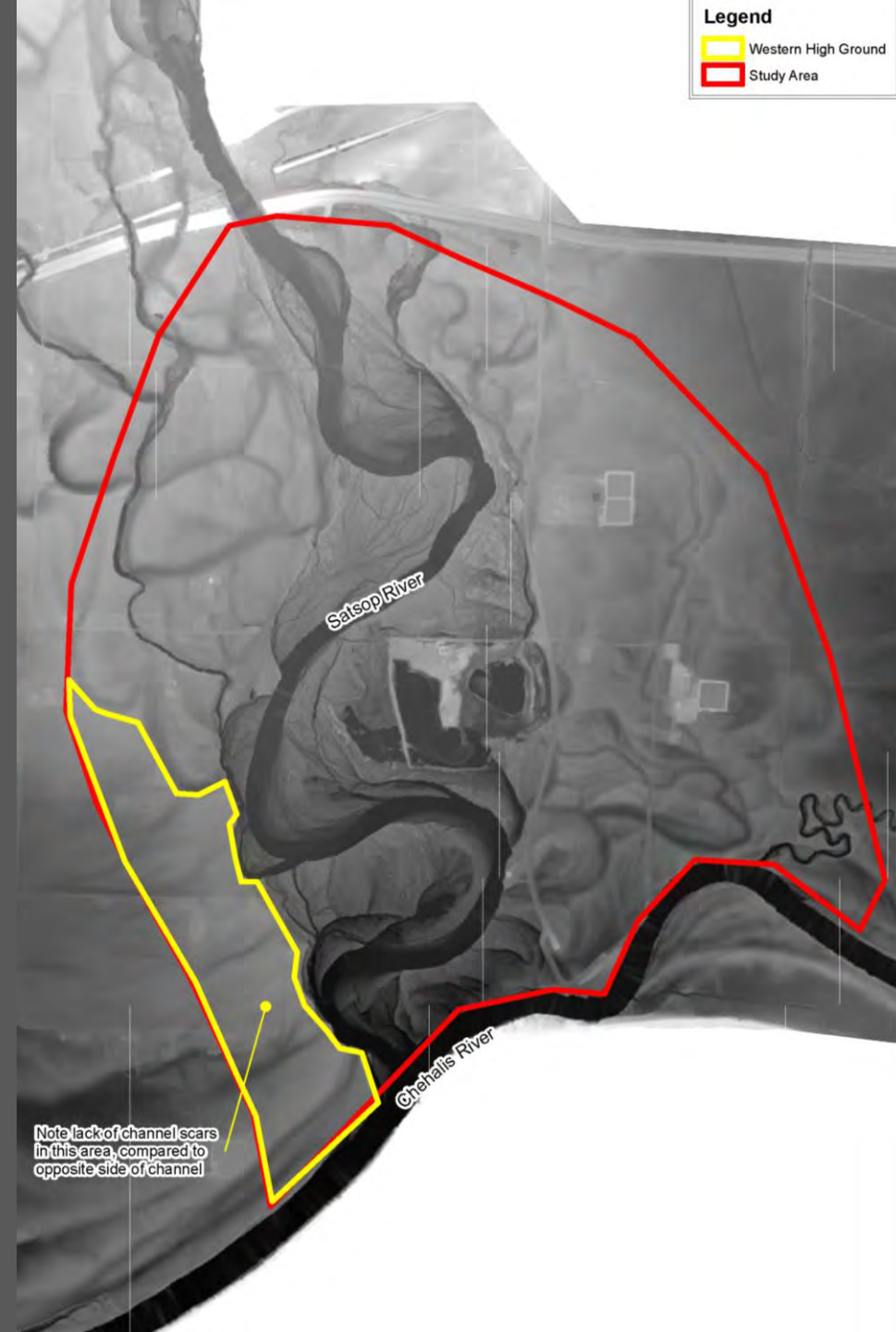
THE WATERSHED



HISTORY OF RIVER MIGRATION



HISTORIC SIDE CHANNELS



PURPOSE OF THIS PROCESS

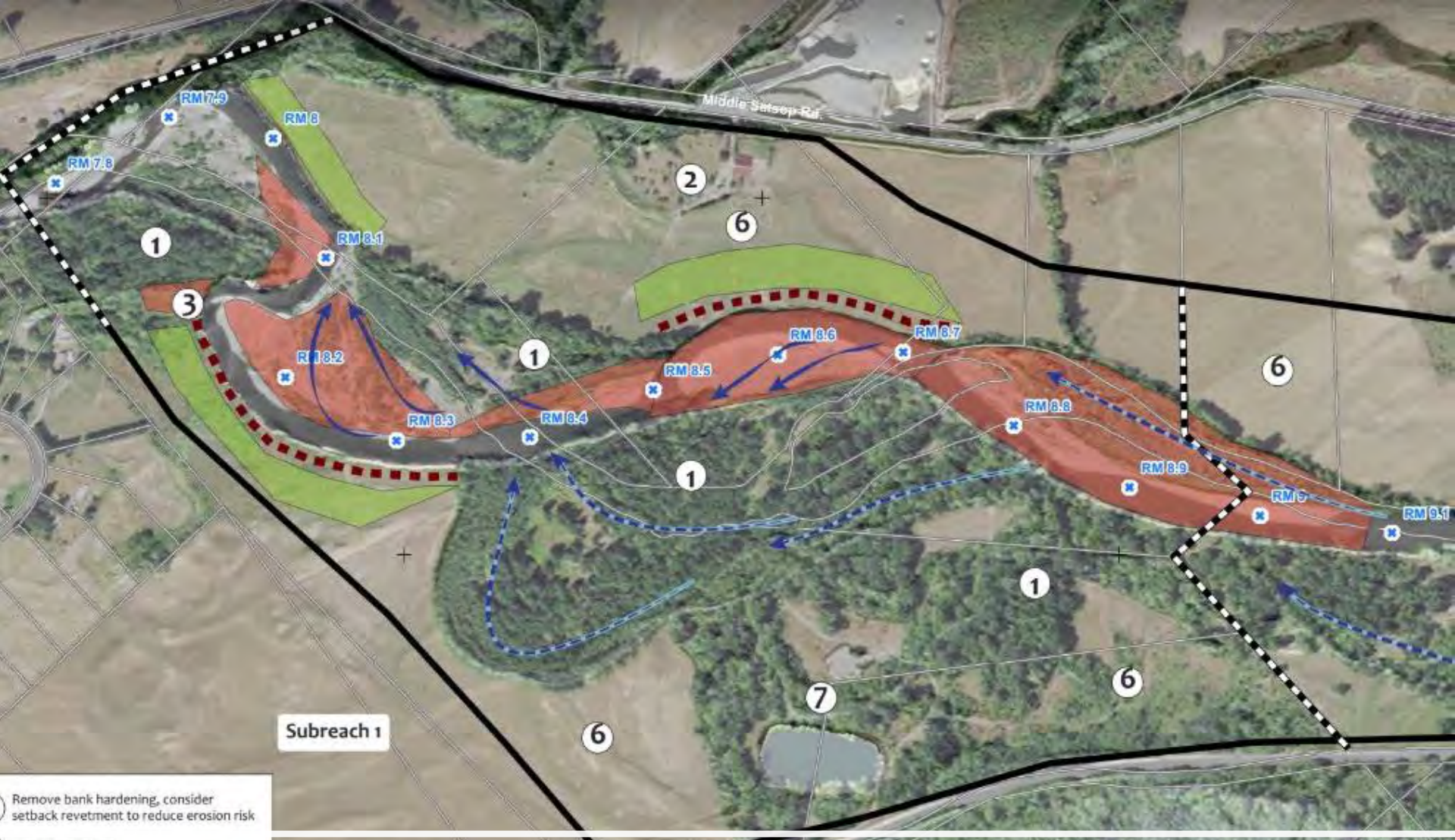
GOALS AND OBJECTIVES

- Goal #1: Protect public and private infrastructure, and agricultural lands from bank erosion
- Goal #2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.
- Goal #3: Reduce flood hazards and manage flood risk
- Goal #4: Support recreation opportunities

PURPOSE

- Collaboratively Develop Long-term Vision for the Satsop River Floodplain
- Establish Framework for Long-term and Short-term Projects and Programs
- Promote Coordination Among Parties

PROJECT UPDATES



ASRP

Program (ASRP): Chehalis Basin Strategy Early Action Plan

K Satsop River - RM 6 - Sheet 3

National Geographic's current map policy. Sources: NCEP-WCMC, USGS, NASA, ESA, METI, NRCAN,

Restoration Corridor Extent
 Timber Revegetation Planting Area

Engineered Log Jam Installation Area
 Parcel Boundary
 Subreach Boundary

Timber Revegetation
 River Mile (RM)
 Mainstem Flow
 Side Channel Flow





WDFW GRAVEL PONDS

POTENTIAL SOLUTIONS



CONSERVATION PRACTICES ON WORKING FOREST LANDS





ENGINEERED LOG JAMS





FLOOD EASEMENTS AND CONSERVATION EASEMENTS





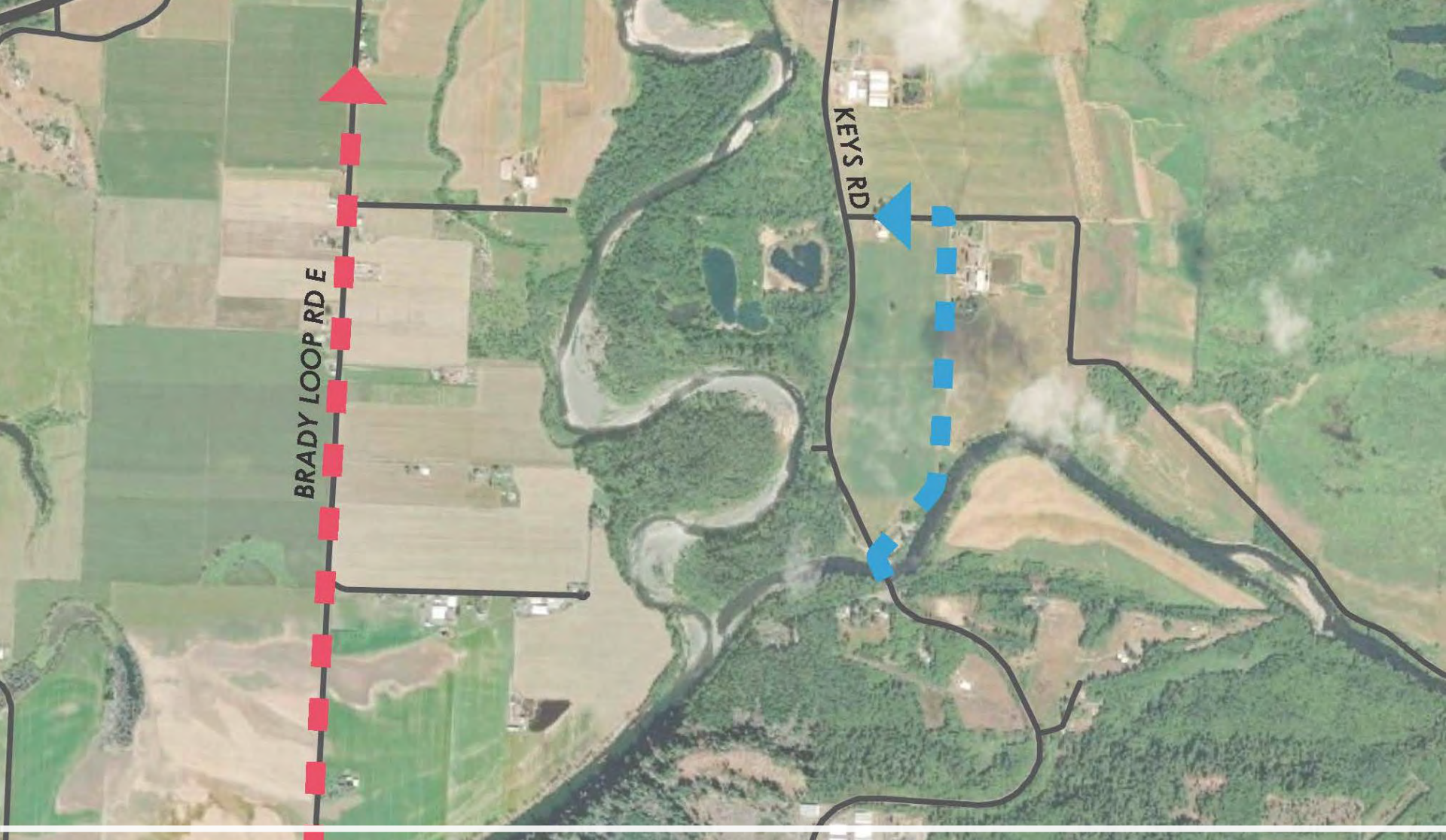
KEYS ROAD – HARD ARMORING





KEYS ROAD – SOFT ARMORING





KEYS ROAD – SOFT ARMORING



IN-STREAM GRAVEL MANAGEMENT STUDY





PILOT CHANNEL





PROPERTY ACQUISITION FROM WILLING SELLERS





RECONNECTING HISTORIC SIDE CHANNELS





RESTORE GRAVEL PONDS ON WDFW PROPERTY





SMALL-SCALE LARGE WOODY DEBRIS PROJECTS



PRIORITIZATION EXERCISE

PROJECT DESCRIPTIONS



1

CONSERVATION PRACTICES ON WORKING FOREST LANDS

Collaborate with working forest managers to ensure that best practices are being met. Additionally, explore opportunities to increase riparian buffer widths, selectively harvest, or increase harvest rotation intervals. Implementation of conservation practices in the headwaters of the Satsop River has the potential to decrease runoff, erosion, and sediment transport in the system.

Flood	Habitat	Erosion
2.2	2.3	2.2

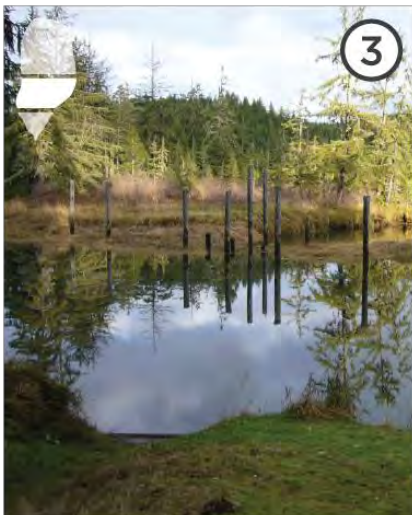


2

ENGINEERED LOG JAMS

Place engineered complexes of large wood pieces in strategic locations in stream channels. Engineered log jams would be used to slow bank erosion, promote formation of side channels, increase channel roughness to slow velocity and encourage high flows to spread into the floodplain. Large wood plays a key role in stream morphology. They can promote formation of pools, gravel bars, and side channels. They can stabilize river banks and increase floodplain connectivity.

Flood	Habitat	Erosion
2.0	2.9	2.7



3

FLOOD EASEMENTS AND CONSERVATION EASEMENTS

Collaborate with willing private property owners to obtain easements for flood storage and habitat conservation on private property. Under a flood easement, the owner would be restricted from building structures in the dedicated area and would manage that land proactively. Provides land area for flood storage and channel migration without impacting infrastructure and structures. Increased roughness and diversity of structure in the floodplain also serves to slow flood velocities.

Flood	Habitat	Erosion
2.6	2.4	2.3



4

KEYS ROAD - HARD ARMORING

The current alignment of Keys Road would be maintained and protected using traditional techniques such as sheet pile wall. Protect Keys Road as a transportation corridor that connects Satsop Business Park and residences to State Route 12. Maintaining the existing alignment also provides erosion protection to farmland east of the road.

Flood	Habitat	Erosion
1.4	1.0	2.7

PROJECT CARDS

12

**Small-Scale Large
Woody Debris Projects**

\$100

Flood
2.2

Habitat
3.0

Erosion
2.5

1

**Conservation Practices
on Forestry Lands**

\$500

Flood
2.2

Habitat
2.4

Erosion
2.2

HOW IT WORKS

\$5,000 Budget

Select project working with your table group

You may select multiple of one type of projects
(i.e., more than one Engineered Log Jam)

Use your calculations sheet

You can come up with more than one set of
priorities

15 minutes!

DISCUSSION

- What were your priorities?
- Did you spend your money on a lot of small projects or a couple large projects?
- Where in the watershed are your projects?

NEXT STEPS

PROJECT WEBSITE

[https://www.ezview.wa.gov/site/alias_1973/37259/
lower-satsop-planning-process.aspx](https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx)

ONLINE OPEN HOUSE

www.surveymonkey.com/r/satsopriver



LOWER SATSOP RIVER PLANNING MEETING NOTES

Meeting Date and Time:	August 21, 2018 1:00 – 3:00 PM
Project Name:	Lower Satsop River Planning Project
Meeting Location:	Grays Harbor County
Attendees:	
Scott Boettcher, Chehalis River Basin River Flood Authority	Steve Schmitz, KPFF
Michelle Cramer, WDFW	Rick Schwartz, WDNR
Kevin Dahl, WSDOT	Alissa Shay, Port of Grays Harbor
Larry Karpack, WSE	Amy Spoon, WDFW
Rick Mraz, Ecology	Anthony Waldrop, Grays Harbor Conservation District
Bethany Nickison, USACE	Rob Wilson, Grays Harbor County
Vickie Raines, Grays Harbor County/BOCC	<u>Maul Foster & Alongi</u>
	Kathy Lombardi
	Michael Stringer
	Lauren Wirtis

On August 21, 2018, Maul Foster & Alongi (MFA) met with the Advisory Group convened for the Lower Satsop River planning project. Vickie Raines and Scott Boettcher opened the meeting by welcoming everyone and beginning introductions. Michael Stringer then began facilitating the discussion around the current project. The following topics were covered during this meeting:

- Discuss Structure Moving Forward and Purpose of this Planning Process
- Review History of the Lower Satsop Studies and Planning Process
- Review Status of On-Going Projects
- Discuss Issues and Drivers
- Discuss Goals and Objectives
- Next Steps and Timeline

The notes below provide a summary of these topics and the discussions that occurred during the meeting.

STRUCTURE AND PURPOSE

MFA has been engaged to build on the previous efforts along the Lower Satsop River to find common ground on projects that can be implemented to reduce erosion and flood risk, while enhancing natural habitat. Extensive modeling and analysis has been completed during previous studies and the purpose of this project is *not* to redo any of that work, but to start to move towards actionable, feasible solutions that work for both the property owners and the regulatory agencies. We want to get to a long-term plan with near-term actions.

Elements of this process will include:

- Meetings with individual property owners
- Two community meetings
- Monthly Advisory Group meetings
- Communications materials (such as the fact sheet)

PLANNING PROJECTS AND STATUS UPDATES

Michael Stringer provided a summary of the planning projects that had been done on the Lower Satsop River beginning in the late 1990s. The Advisory Group also provided updates on the status of several on-going projects:

- **WDFW Gravel Ponds:** This project will use spoils on the WDFW property to partially fill in the gravel ponds. Permit applications will be submitted in the fall and construction is scheduled to commence in 2019. WDFW will begin by filling the pond closest to Keys Road. The objective is to try to fill the margins of the pond with gravel to try to create shallow pond habitat. WDFW will study the pond following Phase 1 to see how effective this approach is and will be seeking funding for Phase 2. WDFW is currently applying for funding to support implementation of Phase 2.
- **Aquatic Species Restoration Program:** As part of a comprehensive strategy to restore the ecological health of the Chehalis River Basin, early action reaches are being identified for design and implementation of restoration projects. Two early action reaches are being considered on the Satsop River, each about two miles long, where this program is focusing on floodplain reconnection. One of these reaches will be chosen to go to final design and construction in 2019-2020.
- **Keys Road Funding:** Grant applications have been submitted by Grays Harbor County to the Chehalis River Basin Flood Authority to design erosion protection for Keys Road. The design for Keys Road will be influenced by what happens during this planning process. The

project team is hoping to commence work before the river reaches the road. The goal is to have construction completed by 2021.

- **Port Well:** The Port of Grays Harbor is developing a new connection for potable water supply for Satsop Business Park. This will provide necessary redundancy in addition to the Port Well, which will serve as a backup. The Port does not intend to abandon the well, because the redundancy is needed and owning the well comes with a specific set of water rights that would potentially be lost if the well were abandoned.
- **Pilot Channel:** The group discussed the pilot channel that was proposed at the mouth of the Satsop River. The project has been put on hold because of several challenges, including
 - a. The need for mitigation and schedule delays related to mitigation
 - b. With movement of the river, ideal location for pilot channel shifted to being off WDFW property

The group discussed the feasibility of permitting the pilot channel.

- **Gravel Management:** The group discussed the fact that gravel was historically harvested from the Satsop River but has not occurred recently. Some property owners have previously expressed interest in conducting gravel management again. The group discussed that in the old Grays Harbor County Shoreline Master Program, a system was established to regulate gravel harvesting. A limit on gravel harvesting was established based on a study of historic harvesting and sediment budget for the Satsop River. The County is in the process of finalizing the update to the Shoreline Master Program. The SMP update also includes policies and regulations for removal of gravel for flood management purposes (Section 3.4). Concerns about impacts to stream dynamics and fish habitat and the relative contribution of gravel management to erosion and flood control were discussed.

ISSUES AND DRIVERS

Michael Stringer facilitated an exercise around brainstorming what the issues are on the Satsop River and what the drivers of those issues are. The Advisory Group wrote down the issues and drivers on a worksheet and then shared them with the group. The results of this exercise were as follows:

Issues

- Loss/erosion of farmland
- Perceived lack of action
- Keys Road protection/access
- Flooding
- Constriction of a dynamic floodplain

- Compromised infrastructure (Port well, bridges)
- Loss of habitat

Drivers

- Floodplain development
- Deforestation
- Accumulation of gravel/lack of capacity to store sediment
- Loss of channel migration corridor (through factors such as bank hardening)
- Changed regulations

GOALS AND OBJECTIVES

The Advisory Group reviewed the goals from the *Lower Satsop Floodplain Restoration Phase II Final Report* (2017) report and provided some comments on how they thought those goals continued to apply to this project.

Goal 1: Protect public and private infrastructure and agricultural lands from bank erosion.

- Comments: This goal still stands for this project and could be viewed through an economic development lens.

Goal 2: Improve floodplain connectivity to spread flood flows throughout the floodplain and restore side-channel and off-channel habitats for anadromous and resident fish, and wildlife.

- Comments: This goal still stands for this project.

Goal 3: Lower flood elevations in the project area.

- Comments: Based on the work completed to date, there is very limited opportunity to actually reduce flood elevations in the lower Satsop. It would be more appropriate and effective to be reworded to say that the goal should be to “reduce flood hazards and manage flood risk.”

Potential New Goal: Protect and maintain recreational opportunities.

- Comments: The group discussed the recreational assets in the Satsop and the importance of recreation in the area and agreed that this should be included as a goal.

NEXT STEPS AND TIMELINE

The project team will continue reaching out to landowners to have one-on-one meetings. The Grays Harbor Conservation District will send out a letter to landowners to give them information about the project and inform them about meeting dates.

ACTION ITEMS:

Item No.	Description	Responsible	Date Due
1	Send Doodle poll to Advisory Group for next meeting.	MFA	8/22
2	Schedule and attend additional landowner meetings	GHCCD	8/22-9/5
3	Send out letters to landowners	GHCCD	8/24
4	Confirm date for Advisory Group Meeting 2	Project team	8/27
5	Advisory Group Meeting 2	Project team	9/5
6	Host Community Meeting	MFA facilitate	9/5

ATTACHMENT

MEETING MATERIALS



Satsop River Planning Advisory Group Meeting #1

Tuesday, August 21, 2018

1:00 PM – 3:00 PM

Grays Harbor County Administration Building

MEETING AGENDA

- Welcome and Introductions
- Review History of the Lower Satsop Studies and Planning Projects
- Discuss Structure Moving Forward and Purpose of This Planning Process
- Review Status of On-going Projects
 - WDFW Gravel Ponds
 - Aquatic Species Restoration Program
 - Keys Road Funding
- Discuss Issues and Drivers
- Discuss Goals and Objectives
- Next Steps and Timeline

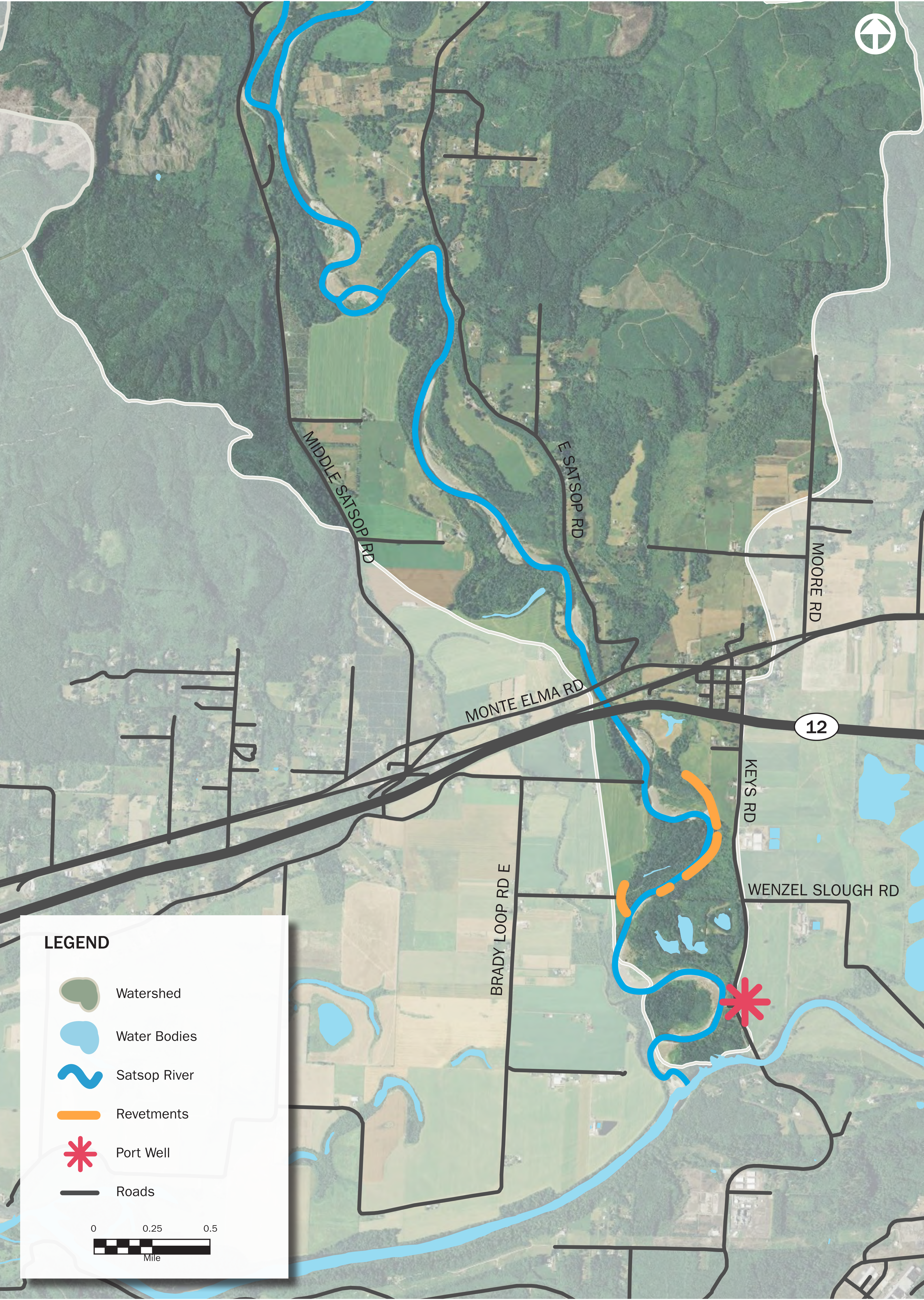
More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Key Features Map



LOWER SATSOP RIVER PLANNING

Satsop River Migration Map



Grays Harbor
Conservation
District

your window to healthy lands



Advisory Group Meeting #1

[illegible]

LOWER SATSOP RIVER PLANNING

Advisory Group Meeting #1



What do you think are the primary DRIVERS of these issues along the Satsop River (loss of forest, development etc.)?

DRIVER	How Influential Is this Driver on the Issues You Identified?				
	Not influential	A little influential	Neutral	Somewhat influential	Very influential



LOWER SATSOP RIVER ADVISORY GROUP MEETING NOTES

Meeting Date and Time: September 5, 2018 | 2:00 – 4:00 PM

Project Name: Lower Satsop River Planning Project

Meeting Location: Montesano City Hall

Attendees:

Kevin Dahl, WSDOT	Tom Kollasch, Grays Harbor Conservation District
Larry Karpack, WSE	Anthony Waldrop, Grays Harbor Conservation District
Rick Mraz, Ecology	Rob Wilson, Grays Harbor County
Rick Schwartz, WDNR	<u>Maul Foster & Alongi</u>
Alissa Shay, Port of Grays Harbor	Kathy Lombardi
Amy Spoon, WDFW	Michael Stringer
	Lauren Wirtis

On September 5, 2018, Maul Foster & Alongi (MFA) met with the Advisory Group convened for the Lower Satsop River planning project. Rob Wilson opened the meeting by welcoming everyone and beginning introductions. Michael Stringer then began facilitating the discussion about potential solutions along the Satsop River. The purpose of this meeting was to brainstorm solutions for the Satsop River and begin to discuss what criteria would need to be met for the various solutions to be permissible and/or supported by the committee members and the agencies they represent.

The notes below provide a summary of these topics and the discussions that occurred during the meeting.

SOLUTIONS BRAINSTORMING

MFA staff led the Advisory Group through an exercise to brainstorm a wide range of potential projects and programs to reduce erosion and manage flood risk from the Satsop River. The purpose of this exercise was to think of all the potential ways issues on the river could be addressed before starting to assess their feasibility. Solutions the Advisory Group brainstormed included:

- Increase the span of the SR 12 highway and bridge overpasses
- Elevate or relocate Keys Road
- Convert Keys Road to a causeway or add culverts
- Sheet pile wall
- Bioengineered structures to stabilize banks
- Flood fences

- Engineered log jams
- Pilot channel(s)
- Floodplain reconnection
- Buy out erosion and flood prone properties
- Gravel management/removal
- Partially remove existing revetments
- Land swaps
- Implement multiple, small scale projects in increase large woody debris in upper watershed streams
- Remove motorized boat access
- Port well decommissioning
- Protection around Keys Road/bridges
- Flood storage basins
- Flood bypass

CAN WE BUILD IT?

The Advisory Group went through an exercise to evaluate how the potential for regulatory agencies to permit and for other organizations to support some of the key ideas that were discussed during the previous exercise. The following table summarizes the feedback. Green shading indicates high likelihood for permitting / support. Yellow shading indicates moderate likelihood for permitting / support (depending on details of a specific proposed project). Red shading indicates low likelihood for permitting / low support.

Ideas	Can We Build It?						
	DNR	WDFW	DOE	ACOE	GHC	GHCD	Port
Pilot channel							
Gravel management							
Large woody debris (ELJ)							
Keys Road armoring							
Bank armoring							
Sheet pile wall							
Flood fence							
Flood storage pool							
Reduce existing revetment							
Keys Road relocation							
Keys Road elevation							

Note: staff from WDFW and DOE were not present during this exercise.

NEXT STEPS

The project team will hold the first community meeting at 6:30 PM on September 5, 2018. Following that, the Grays Harbor Conservation District will continue reaching out to landowners to have one-on-one meetings. The next Advisory Group meeting will be in mid-October to refine the potential projects and discuss feasibility and benefits.

ACTION ITEMS:

Item No.	Description	Responsible	Date Due
1	Provide meeting notes for Advisory Group Meeting 2	Project team	9/14
2	Confirm date for Advisory Group Meeting 3	Project team	9/14

ATTACHMENT

MEETING MATERIALS



Satsop River Planning Advisory Group Meeting #2

Wednesday, September 5, 2018

2:00 PM – 4:00 PM

Montesano City Hall, 2nd floor meeting room

112 North Main Street, Montesano, WA

MEETING AGENDA

- Welcome
- Recap of Previous Meeting & Purpose of Today's Meeting
- Solutions Brainstorming
- Can We Build It?
- Next Steps and Timeline

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias__1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Advisory Group Meeting

September 5, 2018



Name	Affiliation
1 Rick Meaz	Dept. of Ecology
2 Amy Spurr	WDFW
3 Rob Wilson	GHC
4 John Romero	WSDOT-ABERDEEN PED
5 Larry Karpach	WSE
6 Anthony Waldrop	GHCD
7 Tom Kollasch	GHCD
8 Rick Schwartz	DNR
9 Kathy Lombardi	MFA
10 Lauren Wirths	MFA
11	
12	
13	
14	
15	

Name	Affiliation
16	
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LOWER SATSOP RIVER



Grays Harbor
Conservation
District

your window to healthy lands



IDEAS

CAN WE BUILD IT?

● Yes!

● Potentially

● Very Difficult

DNR

WDFW

DOE

ACOE

GHC

GHCCD

Port

CREATIVITY VS. RESOURCES



Grays Harbor
Conservation
District

your window to healthy lands



Out of
the Box

↑

Tried and
True



Very Few
Resources



Substantial
Investment

LOWER SATSOP RIVER



Grays Harbor
Conservation
District
your window to healthy lands



IDEAS

CAN WE BUILD IT?

● Yes!

● Potentially

● Very Difficult

DNR

WDFW

DOE

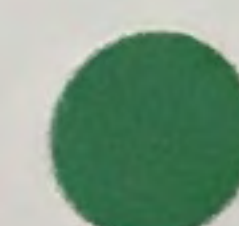
ACOE

GHC
REG ROAD

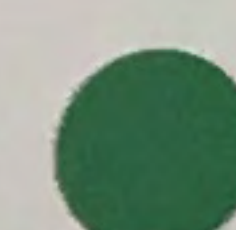
GHCCD

Port

Flood fence



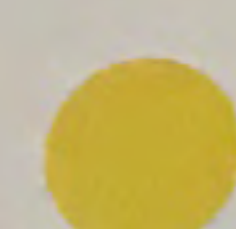
Flood storage pool



Trim revetment



Keys Road Relocate



Keys Road Elevate



LOWER SATSOP RIVER



Grays Harbor
Conservation
District



CAN WE BUILD IT?

● Yes!

● Potentially

● Very Difficult

IDEAS

	DNR	WDFW	DOE	ACOE	GHC REG ROAD	GHCCD	Port
Pilot channel	●		●		●	●	●
Gravel management	●		●		●	●	
Large woody debris (ELJ)	●		●		●	●	●
Keys Road ^{armoring} retention	●		●		●	●	●
Bank armoring	●		●		●	●	
Sheet pile wall	●		●		●	●	●



LOWER SATSOP RIVER ADVISORY GROUP MEETING NOTES

Meeting Date and Time: October 11, 2018 | 2:00 – 4:00 PM

Project Name: Lower Satsop River Planning Project

Meeting Location: Grays Harbor County Administration Office

Attendees:

Michelle Cramer, WDFW	Vicki Raines, Grays Harbor County
Larry Karpack, WSE	Anthony Waldrop, Grays Harbor Conservation District
Allen Lebovitz, WDNR	Rob Wilson, Grays Harbor County
Bethany Nickison, USACE	<u>Maul Foster & Alongi</u>
Rick Schwartz, WDNR	Kathy Lombardi
Alissa Shay, Port of Grays Harbor	Michael Stringer

On October 11, 2018, Maul Foster & Alongi (MFA) met with the Advisory Group convened for the Lower Satsop River planning project. The purpose of this meeting was to evaluate the feasibility and benefits of potential actions and policies for the Satsop River. Vicki Raines opened the meeting by welcoming everyone and beginning introductions.

The notes below provide a summary of these topics and the discussions that occurred during the meeting.

STATUS OF ON-GOING PROJECTS

Funding Request through Chehalis River Basin Flood Authority (CRBFA). V. Raines updated the group on the status of agency submittal to the Governor's budget. The CRBFA funding request includes approximately \$75 M for large scale projects including flood storage in the upper basin and the North Shore Levee in Aberdeen and Hoquiam, \$6 M for local projects including \$395,000 for feasibility analysis and design of improvements to Keys Road.

Gravel Pit Property Restoration Project. M. Cramer stated that WDFW had submitted the Joint Aquatic Resource Permit Application (JARPA) for the floodplain restoration project at the gravel pit property on October 11. The project involves partially filling one of the ponds with spoils on the property to create shallow water habitat and increase floodplain connectivity.

Aquatic Species Restoration Program (ASRP) Early Action Reach. A. Waldrop told the group that the ASRP is recommending moving the East Fork (river mile 9-11) forward for design. The project

is likely to include engineered log jams (ELJ) and riparian forest planting to reduce bank erosion and improve habitat quality. The consulting team is preparing a report on the early action reach that will include habitat assessment and hydraulic and hydrologic modeling. The draft of the report should be available by the end of October.

Satsop Business Park Water System Project. A. Shay stated that the Port is preparing to go to bid for construction of the water interconnection project for Satsop Business Park in November. Construction should be completed in the first quarter of 2019. This will provide a redundant water supply for the Satsop Business Park and make it less reliant on the water well adjacent to the Satsop River.

COMMUNITY MEETING SUMMARY

M. Stringer provided the group with an overview of the community meeting that was held in Montesano on September 5. Key themes:

- Bank erosion was the greatest concern for the meeting participants
- There was general appreciation for the river dynamics, that lateral migration has occurred over time, that landscape and land use changes alter the river, and the interplay of flooding in the Chehalis River and the Satsop River.
- Some individuals expressed concern about accumulation of gravel in the river and that bank erosion and flooding have become worse since gravel mining ceased.
- Participants generally supported solutions to address erosion and flooding that also addressed habitat needs. Ideas discussed included:
 - Efforts in working forest lands to protect riparian corridors and increase large woody debris (LWD) in streams
 - Engineered log jams (ELJs) to reduce lateral river migration and reduce erosion risk
 - Encouraging floodwaters to spread across the floodplain to reduce erosive power downstream
 - Opportunities to increase flood water storage in upper and middle reaches of the watershed
 - Pilot channel near mouth of Satsop River to reduce bank erosion.

DISCUSSION OF FEASIBILITY AND BENEFITS OF POTENTIAL PROJECTS

The group discussed a list of potential policies and projects to reduce risk of erosion and flooding and enhancing habitat. Following the discussion, the group rated the projects based on a set of feasibility and benefit factors. Results are provided in the attached table.

Upper Watershed Conservation Practices – The group discussed whether any additional effort is needed on this topic because regulatory compliance with the Forest Practices Act already includes substantial requirements including riparian buffer protection. A. Lebovitz and A. Waldrop stated that there is little awareness of incentives available through the Forest Practices Manual to conservation measures such as increased riparian buffer protections. There is a need for capacity building and education to increase utilization of those incentives which can increase revenue while also providing watershed protection value.

Upper Watershed LWD Projects – The group discussed the need to make sure forestry land owners including Weyerhaeuser and Green Diamond are engaged to discuss the potential for these projects. A. Waldrop stated that the Grays Harbor Conservation District has been in contact with Green Diamond and will reach out to Weyerhaeuser. The Conservation District is pursuing a water quality grant from the Department of Ecology to support development of an LWD restoration plan for working forests in the Satsop and Wynoochee river basins.

ELJ Projects – The group discussed the potential for ELJs to play a role in key locations to reduce erosion risk and improve habitat. The regulatory agencies stated that there is now substantial experience permitting these kind of projects and that the placement of large wood in streams may even be exempt from Clean Water Act Section 404 and Rivers and Harbors Act permitting requirements.

The group also discussed the potential to combine management of gravel in the stream with an ELJ project. B. Nickison cautioned that gravel management would likely trigger permitting requirements and the need to provide a compelling case for no net environmental impact. The group discussed the need to design the project as a restoration project and demonstrate benefit to reduce permitting challenges.

S. Schmitz suggested that an ELJ project should be considered upstream of the Monte-Elma bridge to keep the river from migrating away from the crossing.

Keys Road Options. The group discussed multiple options for treatment of Keys Road. Key considerations included:

- Potential for the road to be impacted by bank erosion over time as the river migrates.
- Importance of Keys Road as one of two transportation connections to the Satsop Business Park. Approximately 20% of trips on Keys Road in this section are trucks, including trucks serving the business park and logging trucks.
- Periodic flooding of Keys Road could be better managed with communications tools such as portable signs on SR 12 or text message alerts.
- Sediment transport dynamics need to be more carefully evaluated to understand the potential implications of any modification.

- A. Lebovitz suggested the need for a robust cost/benefit analysis that includes standard measures and social and ecological values to inform a decision.

Relocation of Keys Road—This would provide the river with greater ability to move through its historic channel migration zone. It would also put the farmland on the east side of the river at greater risk of erosion. The group discussed the potential to establish and manage an accepted zone of erosion and flooding risk within which natural river processes would be unconstrained. It was recognized that this natural corridor would be limited compared to the historic channel migration zone in the short and mid term with respect to public infrastructure and private property. The zone could be expanded over time as willing sellers and opportunities emerged.

Elevating Keys Road with Causeway or Culverts—This could reduce the frequency of flooding over the road, but would continue to constrain migration of the river.

Armoring Keys Road—L. Karpack cautioned that with the erosive force of the Satsop River, it will be difficult to design and maintain effective erosion control measures such as sheet pile walls. It will be hard to predict what the response of the river would be. There is a concern that any action will create liability associated with impacts to other properties.

Mouth of the Satsop River – The group discussed options to control erosion on the west bank of the river near the mouth through actions to accelerate river migration processes. The group discussed the notch previously proposed to reconnect an existing high flow channel near the mouth. That project would provide a high flow connection to reduce sheer stress on the west bank or potentially expand to become the main channel of the river as it has been in the past. M. Cramer clarified that the project would involve a relatively small amount of earthwork and would reconnect a historic channel. The group also discussed the potential to install ELJ structures that would serve to reduce erosion of the west bank and promote movement of the main channel. B. Nickison stated that based on previous permitting discussions for the notch, there would likely be mitigation required for impacts to forested wetlands. A. Lebovitz discussed the importance of designing the project in a way that restores natural channel forming processes.

NEXT STEPS

The next community meeting will be held on Tuesday, November 13, 2018 at 6:30 PM at Brady Fire Hall. The Grays Harbor Conservation District will continue reaching out to landowners to have one-on-one meetings. The next Advisory Group meeting will also be scheduled on November 13. Both the community meeting and advisory group meeting will focus on prioritizing projects.

ACTION ITEMS:

Item No.	Description	Responsible	Date Due
1	Provide meeting notes for Advisory Group Meeting 3	Project team	10/26
2	Advisory Group Meeting 4	Project team	11/13
3	Community Meeting 2	Project Team	11/13

ATTACHMENT

MEETING MATERIALS



Satsop River Planning Advisory Group Meeting #3

Thursday, October 11, 2018

2:00 PM – 4:00 PM

Grays Harbor County Administration Building, Commission Meeting Room
100 West Broadway, Montesano, WA 98563

MEETING AGENDA

- Welcome and Introductions
- Summary of September 5 Community Meeting
- Review Status of Potential
 - Evaluate Benefits
 - Evaluate Feasibility
- Next Steps and Timeline

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER

Advisory Group Meeting

October 11, 2018

Name	Affiliation
1 Rick Schwartz	WDNR
2 Penny Jackson	USACE
3 Michele Cramer	WDFW
4 Anthony Waldrop	Grays Harbor CD
5 Stace Schmitz	KPFF
6 Allen Lebovitz	WDNR
7 Bob Wilson	GHC
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LOWER SATSOP RIVER

PROJECTS	BENEFITS														
	Flood Reduction Benefit			Habitat Benefit			Erosion Benefit			Recreational Benefit			Infrastructure Benefit		
Multiple Small-Scale LWD Projects	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Conservation Practices on Forestry Lands, such as protecting riparian buffers	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Engineered Log Jams (ELJs)	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Side Channel	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Flood Easements and Conservation Easements	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Acquisition of property from willing sellers	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Pilot In-stream gravel management project in coordination with ELJs and bank stabilization projects	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Restoration of Gravel Ponds on WDFW Property	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Keys Road – Armoring	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Keys Road – Permeating with Culverts	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Keys Road – Elevated Causeway	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Keys Road - Relocation	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Pilot channel near mouth of Satsop River	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Construct ELJs to protect bank and direct river flow	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Eventual relocation of Port well	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

LOWER SATSOP RIVER

PROJECTS	FEASIBILITY														
	Effectiveness			Cost/Funding			Permitting			Longevity			Notes		
Multiple Small-Scale LWD Projects	1	2	3	1	2	3	1	2	3	1	2	3			
Conservation Practices on Forestry Lands, such as protecting riparian buffers	1	2	3	1	2	3	1	2	3	1	2	3			
Engineered Log Jams (ELJs)	1	2	3	1	2	3	1	2	3	1	2	3			
Side Channel	1	2	3	1	2	3	1	2	3	1	2	3			
Flood Easements and Conservation Easements	1	2	3	1	2	3	1	2	3	1	2	3			
Acquisition of property from willing sellers	1	2	3	1	2	3	1	2	3	1	2	3			
Pilot In-stream gravel management project in coordination with ELJs and bank stabilization projects	1	2	3	1	2	3	1	2	3	1	2	3			
Restoration of Gravel Ponds on WDFW Property	1	2	3	1	2	3	1	2	3	1	2	3			
Keys Road – Armoring	1	2	3	1	2	3	1	2	3	1	2	3			
Keys Road – Permeating with Culverts	1	2	3	1	2	3	1	2	3	1	2	3			
Keys Road – Elevated Causeway	1	2	3	1	2	3	1	2	3	1	2	3			
Keys Road - Relocation	1	2	3	1	2	3	1	2	3	1	2	3			
Pilot channel near mouth of Satsop River	1	2	3	1	2	3	1	2	3	1	2	3			
Construct ELJs to protect bank and direct river flow	1	2	3	1	2	3	1	2	3	1	2	3			
Eventual relocation of Port well	1	2	3	1	2	3	1	2	3	1	2	3			



LOWER SATSOP RIVER ADVISORY GROUP MEETING NOTES

Meeting Date and Time: November 13, 2018 | 2:00 – 4:00 PM

Project Name: Lower Satsop River Planning Project

Meeting Location: Grays Harbor County Administration Office

Attendees:

Scott Boettcher, Flood Authority	Anthony Waldrop, Grays Harbor Conservation District
Michelle Cramer, WDFW	Rob Wilson, Grays Harbor County
Allen Lebovitz, WDNR	<u>Maul Foster & Alongi</u>
John Romero, WSDOT	Kathy Lombardi
Steve Schmitz, KPFF	Michael Stringer
Rick Schwartz, WDNR	Lauren Wirtis
Alissa Shay, Port of Grays Harbor	

On November 13, 2018, Maul Foster & Alongi (MFA) met with the Advisory Group convened for the Lower Satsop River planning project. The purpose of this meeting was to evaluate the feasibility and benefits of potential actions and policies for the Satsop River. Rob Wilson opened the meeting by welcoming everyone and beginning introductions.

The notes below provide a summary of these topics and the discussions that occurred during the meeting.

STATUS OF ON-GOING PROJECTS

Aquatic Species Restoration Program (ASRP) Early Action Reach. A. Waldrop told the group that the ASRP is moving forward with the East Fork (river mile 9-11) design. They will be holding a landowner meeting in December. Currently, the Flood Authority is working with their partners to determine who will be the appropriate sponsor during permitting as well as the SEPA lead. The timeframe for this project is that permitting efforts will begin in January 2019 and it is anticipated that design and permitting will be completed by June 2019. Construction will likely begin in 2020.

Funding Request through Chehalis River Basin Flood Authority (CRBFA). S. Boettcher updated the group on the status of agency submittal to the Governor's budget. The CRBFA funding request includes approximately \$75 M for large scale projects. At the end of this year, \$690,000 in grant funds that were not going to be used were reallocated to kick off other projects. Some of this funding will support a survey and internal drainage analysis for the West Hoquiam levee. A total of \$15,000 will go to support preliminary assessment and renderings for Keys Road.

Satsop Business Park Water System Project. A. Shay stated that the Port is going to bid for construction of the water interconnection project for Satsop Business Park in November. Construction should begin in the February 2019. This will provide a redundant water supply for the Satsop Business Park and make it less reliant on the water well adjacent to the Satsop River.

PREVIOUS ADVISORY GROUP MEETING SUMMARY

The Advisory Group reviewed the outcome of the previous meeting's assessment of the potential projects feasibility and benefits (summary **results attached**). Some of the highest ranking projects were the multiple small-scale large woody debris (LWD) projects and engineered log jams (ELJs). The lower ranking projects included the pilot channel (which scored low as a long-term solution) and Keys Road culverts (not favored compared to a protective option).

OPTIONS TO ADDRESS EROSION NEAR MOUTH OF SATSOP RIVER

The group discussed potential options for addressing the high amount of bank erosion that is occurring on the western side of the Satsop River near the confluence with the Chehalis River.

Relic Channel/Pilot Channel—this project rated relatively low in the feasibility and benefit exercise. Committee members expressed concern that the project is only an interim measure that is not likely to provide long-term benefit.

Engineered Log Jams (ELJs)—A. Lebovitz suggested that installation of ELJs in strategic locations could achieve the same benefit of reducing erosive force on the western bank, with greater longevity than the pilot channel. M. Connor stated concern that aggradation of sediment around ELJs at the mouth could increase erosive pressure and flooding upstream and that more robust analysis of sediment transport in the river is needed.

The group discussed the potential costs and benefits of both of these options conceptually. Most comments indicated that the longer term stability and greater potential habitat benefit of ELJs made that solution preferable from a cost/benefit perspective.

OPTIONS FOR PROTECTING KEYS ROAD

As part of the preliminary assessment of protection options for Keys Road, S. Schmitz presented three options along different reaches of the Satsop River for how Keys Road could be protected. These are early concepts of different protection options

Option 1. Along the section of Keys Road near the Port of Grays Harbor's well, there could be a sheet pile wall installed anchored by launchable riprap and anchored woody debris.

Option 2. This reach is along the section of Keys Road near Jose Torres' farm. This type of protection would include large logs and log jacks.

Option 3. This reach is just north of the bridges. This type of protection includes a series of ELJs across the deposited gravel in the center of the river. This is meant to disperse and

slow the flow of the river while collecting debris on the upriver side of the ELJs. The group also discussed whether bank stabilization would be needed in addition to ELJs.

The group also discussed the potential for relocation of Keys Road. The bridge crossing of the Chehalis River is a major factor. The current angle of the bridge and the elevation change of the approach limit the ability to move the road alignment. The group discussed the potential of constructing a new bridge. J. Romero stated that WSDOT bridge crossings in the region have been very expensive with geotechnical considerations driving higher costs. The deep layers of soft, silty soil have required extra-ordinary geotechnical engineering measures to meet seismic design requirements. A. Shay cautioned that across Grays Harbor County there are many aging bridges that are in much greater need of replacement than the Keys Road bridge. It would be difficult for County officials to justify the expense of replacing the Keys Road bridge in that context. The group also discussed other potential changes, such as a slight setback of Keys Road away from the river or operational changes to limit truck traffic.

At the end of the discussion, the Advisory Committee generally favored the softer armoring in options 2 and 3 compared to the sheet pile wall along with consideration of relocation of Keys Road in the long-term when the existing bridge reaches the end of its design life. This preference was also reflected in the prioritization exercise discussed below.

PRIORITIZATION EXERCISE

L. Wirtis led the Advisory Group through a prioritization exercise. The purpose of this exercise is to understand what projects the group thinks the County and Conservation District should focus their financial resources on. The exercise provided a \$5,000 budget and all of the proposed projects were assigned costs scaled down from their actual cost relative to this budget.

Key Themes

- Both groups chose to fund soft armoring of Keys Road, using half of their budget.
- Both groups chose to fund small-scale LWD projects in the upper watershed.
- Both groups were in favor of using ELJs, using the ASRP project on the East Fork of the Satsop River as a pilot project.
- Factors that influenced the Advisory Group's decision-making included:
 - Whether the project would offer a long-term solution
 - Acknowledgement of the need to protect Keys Road, at least in the short-term
 - Creating a suite of projects that would ameliorate flooding and erosion in a variety of ways (e.g. water retention in the upper watershed with LWD, reducing water velocity by diverting flows with ELJs, and planning for future solutions through inquiries about property acquisition from willing sellers)

NEXT STEPS

A community meeting is being held in the evening on November 13, 2018. An online version of the prioritization exercise will be available for Advisory Group members unable to attend this meeting and for community members who are not available to attend the evening meeting. The survey will remain open until Sunday, November 25, 2018. MFA will provide a summary of the overall prioritization feedback once the survey closes. The Grays Harbor Conservation District will continue reaching out to landowners to have one-on-one meetings. MFA will also be working on drafting the final report. There may be an additional Advisory Group meeting in January 2019 to review the final report.

ACTION ITEMS:

Item No.	Description	Responsible	Date Due
1	Provide meeting notes for Advisory Group Meeting 4	Project Team	11/16
2	Distribute prioritization results	Project Team	11/30
3	Final report	Project Team	Jan 2019
4	Final Advisory Group meeting (<i>potential</i>)	Project Team	Jan 2019

ATTACHMENT

MEETING MATERIALS



Satsop River Planning Advisory Group Meeting #4

Tuesday, November 13, 2018

2:00 PM – 4:00 PM

*Grays Harbor County Administration Building, Commission Meeting Room
100 West Broadway, Montesano, WA 98563*

MEETING AGENDA

- Welcome
- Recap of Previous Meeting
 - Potential Solutions
 - Benefits and Feasibility Results
- Prioritization Exercise
- Next Steps and Timeline

More Information:

Documents will be accessible on-line at:

https://www.ezview.wa.gov/site/alias_1973/37259/lower-satsop-planning-process.aspx

LOWER SATSOP RIVER PLANNING

Advisory Group Meeting
November 13, 2018



Name	Affiliation
1 Mike Stringer	Norfolk Foster & Alangi
2 Scott Beetham	Flood Authority
3 Anthony Valdrop	Grays Harbor CD
4 Allen Lebovitz	W DNR
5 Rick Schwartz	WDNR
6 Lauren Wirtis	MFA
7 John Romero	WSDOT - Aberdeen PED
8 Alissa Shaw	Port of G.H.
9 Steve Schmitz	KPFF
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LOWER SATSOP RIVER | BENEFITS AND FEASIBILITY

BENEFITS

	Flood Reduction	Habitat	Erosion	Recreational	Infrastructure	TOTAL
Multiple Small-Scale LWD Projects	2.00	3.00	2.57	1.29	2.43	11.29
Conservation Practices on Forestry Lands	2.17	2.33	2.00	1.50	2.00	10.00
Engineered Log Jams	2.00	2.86	2.71	1.71	2.43	11.71
Side Channel	2.29	2.43	2.29	1.57	2.14	10.71
Flood Easements and Conservation Easements	2.57	2.43	2.29	1.71	2.00	11.00
Property Acquisition	2.14	2.00	2.29	1.71	1.86	10.00
Planned Avulsion – Pilot channel or ELJ	1.86	1.79	2.57	1.43	2.14	9.79
Restoration of Gravel Ponds on WDFW Property	1.71	2.43	1.57	1.86	1.86	9.43
Keys Road – Armoring	1.43	1.00	2.71	1.29	2.86	9.29
Keys Road – Permeating with Culverts	1.86	1.29	1.71	1.43	2.14	8.43
Keys Road – Elevated causeway	2.43	1.86	2.14	1.57	3.00	11.00
Keys Road – Relocation	2.50	2.29	2.43	1.86	2.71	11.79
Pilot channel near mouth of Satsop River	1.43	1.71	2.14	1.43	1.57	8.29
Construct ELJs to protect bank and direct river flow	1.43	2.29	2.71	1.43	1.71	9.57
Eventual relocation of Port well	1.29	2.00	1.57	1.14	2.29	8.29

LOWER SATSOP RIVER | BENEFITS AND FEASIBILITY

	FEASIBILITY				
	Effectiveness	Cost/Funding	Permitting	Longevity	TOTAL
Multiple Small-Scale LWD Projects	2.71	2.71	2.88	2.00	10.30
Conservation Practices on Forestry Lands	2.33	2.00	2.71	2.50	9.55
Engineered Log Jams	2.86	2.29	2.75	2.14	10.04
Side Channel	2.43	2.29	2.25	2.14	9.11
Flood Easements and Conservation Easements	2.29	2.21	2.88	2.86	10.23
Property Acquisition	2.43	1.71	2.88	3.00	10.02
Planned Avulsion – Pilot channel or ELJ	2.29	2.00	1.94	1.86	8.08
Restoration of Gravel Ponds on WDFW Property	1.86	2.29	2.38	2.43	8.95
Keys Road – Armoring	2.36	1.71	2.00	2.14	8.21
Keys Road – Permeating with Culverts	1.86	2.14	2.25	2.29	8.54
Keys Road – Elevated causeway	2.57	1.43	2.00	2.86	8.86
Keys Road – Relocation	2.71	1.57	2.00	2.71	9.00
Pilot channel near mouth of Satsop River	1.71	2.14	1.63	1.29	6.77
Construct ELJs to protect bank and direct river flow	2.43	2.14	2.38	1.86	8.80
Eventual relocation of Port well	2.29	2.00	2.33	2.71	9.33



LOWER SATSOP RIVER ADVISORY GROUP MEETING NOTES

Meeting Date and Time:	January 16, 2019 2:00 – 4:00 PM
Project Name:	Lower Satsop River Planning Project
Meeting Location:	Grays Harbor County Administration Office
Attendees:	
Scott Boettcher, Flood Authority	Rick Schwartz, WDNr
Michelle Cramer, WDFW	Alissa Shay, Port of Grays Harbor
Dave Kloempken, WDFW	Amy Spoon, WDFW
Tom Kollasch, GHCD	Anthony Waldrop, GHCD
Allen Lebovitz, WDNr	Rob Wilson, Grays Harbor County
Rick Mraz, Ecology	<u>Maul Foster & Alongi</u>
Bethany Nickison, USACE	Kathy Lombardi
Vickie Raines, GHC Commissioner	Michael Stringer
John Romero, WSDOT	Lauren Wirtis
Steve Schmitz, KPFF	

On January 16, 2019, Maul Foster & Alongi (MFA) convened the Advisory Group for the Lower Satsop River planning project. The purpose of this meeting was to review the draft Satsop River Investment Plan, discuss the November 2018 avulsion, and review the next steps to move towards implementation. Commissioner Vickie Raines opened the meeting by welcoming everyone and beginning introductions.

The notes below provide a summary of these topics and the discussions that occurred during the meeting.

REVIEW OF THE DRAFT INVESTMENT PLAN

M Stringer reviewed the key points of the draft Investment Plan:

- The approach of the draft Investment Plan is one that will work with natural river processes while respecting the importance of protecting agricultural land and infrastructure that supports the community and the local economy.
- Lower Satsop: Approach to this part of the river includes a complex system of ELJs and bioengineered bank protection measures that will protect farmland and Keys Road on both

sides of the river. This work will require funding in 2019-20 state and local budgets to support design and construction of pilot project (CRBFA, ASRP, DNR, .09 funds). Plan for long-term changes to Keys Road will occur on a 30- to 40-year time horizon.

- Upper Watershed: This section includes planning and implementation of a series of small scale LWD projects to promote floodplain connectivity, reduce erosion, and decrease downstream impacts over time.
- East Fork: This part of the watershed will be addressed through implementation of the ASRP pilot project.

Comments from the Advisory Group

- This document will act as a jumping off point and then be a living document for addressing issues on the Satsop River
- Gravel management language should discuss the habitat benefits of gravel and the difficulty of permitting projects that are solely based on gravel removal.
- Emphasize that the process developed through the County's leadership is a benefit of its own and that supporting this ongoing process will lead to continued dialogue and progress.
- The members of the Advisory Group would be willing to jointly sign a statement of support (noting that it is not a permit or pre-approval of any of the projects listed therein).

NOVEMBER 2018 AVULSION

The Willis family has been working with the GHCD to create a solution in response to the avulsion, which is threatening their home. The Advisory Group members generally stated that, for their permitting purposes, the situation would qualify as an emergency. Typically, in an emergency situation the applicant may act and then obtain permits after the fact. They will, however, still be required to complete the necessary mitigation.

IMPLEMENTATION OF THE INVESTMENT PLAN

In order to get started on the design for the ELJ system on the Lower Satsop River, funding will be required. After a discussion, the Advisory Group identified potential sources of funding that could potentially be available:

- Engineering Design (February – June): DNR restoration funds, reallocation of CRBFA funds that are not expected to be spent by the end of the state fiscal year, and County .09 economic development funds
- Final design and permitting (July 2019 – June 2020): CRBFA local projects funds allocated in governor's budget request for Keys Road protection
- Construction (July 2019 – December 2020): State legislative member request.

Next Steps

- Updates to text of the Investment Plan (by end of February)
- Draft letter to be signed by Advisory Group members. (by end of February)
- Formal adoption by the County (by end of March)

LOWER SATSOP RIVER PLANNING

Advisory Group Meeting
January 16, 2019

Name	Affiliation
1 KATHY LOMBARDI	MFA
2 Anthony Valdivia	Grays Harbor CD
3 Tom Kollasch	GHCD
4 Scott Bockholtz	Flood Authority
5 Riek Schwartz	WDNR
6 Dave Klompken	WOFW
7 Michelle Cramer	WDFW
8 Allen Lebowitz	WDNR
9 Bettany Nickerson	USACE
10 Rick Mraz	Ecology
11 Rob Wilson	GHC
12 Lauren Wirtis	MFA
13 Amy Groen	WDFW
14 Steve Schmitz	KPFF
15 Alissa Shany	Port of G.H.

Name	Affiliation
16 Mike Stringer	MFA
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