

MEMORANDUM

Date: March 31, 2021
To: Andrea McNamara Doyle, Office of Chehalis Basin
From: Merri Martz and Tracy Drury, PE, Anchor QEA, LLC
cc: Chrissy Bailey, Office of Chehalis Basin; Jim Kramer and Ken Ghalambor, Office of Chehalis Basin consultant staff; Bob Montgomery and Heather Page, Anchor QEA, LLC; Larry Karpack, Watershed Science and Engineering
Re: Erosion Management Strategy in Priority Erosion Hazard Areas

Overview

This memorandum summarizes the continued development of a proposed erosion management strategy that could be implemented as part of the Chehalis Basin Strategy. Developing goals for a bank protection strategy (herein called erosion management strategy) and identifying one or more pilot sub-basins to develop a technical assistance program to assist landowners in addressing erosion issues were identified as near-term options in the *Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Summary and Evaluation of Potential Bank Protection Strategies* memorandum (Anchor QEA 2020). This memorandum is also informed by the concurrent initial mapping of priority erosion hazard areas (approximately 100 miles of river channels in five sub-basins) provided in *Chehalis Basin Strategy: Initial Historical Channel Mapping and Floodplain Topography in Priority Erosion Hazard Areas* draft memorandum (Anchor QEA 2021).

The Chehalis Basin Board has agreed upon several outcome measures for a Local Actions Program, with the following being the most directly relevant to erosion and channel migration hazards:

- The number of locations where migrating river channels and bank erosion pose a high risk of near-term damage to valuable structures or loss of economically productive land uses would be reduced by an average of X per year up to 30 years, while protecting ecological processes (Outcome 4A “Farmland and Rural Structures Protected”).
- No new structures would be developed that are vulnerable to channel erosion or mainstem or tributary flooding from 2080 predicted 100-year flood levels, because all basin local governments have adopted model floodplain management ordinances that exceed the State and National Flood Insurance Programs’ minimum requirements; all local government construction and building code standards support flood damage risk reduction through measures such as subdivision set-asides, filling restrictions, freeboard height of new buildings, critical facility placement and protection, and non-conversion agreements; and incentives direct future development out of harm’s way (Outcome 8: Prevent New At-Risk Development).

This memorandum is provided for Chehalis Basin Board and local jurisdiction consideration on potential additional steps to support reducing erosion hazards as part of the Chehalis Basin Strategy. An erosion

management technical assistance program could be provided by the Office of Chehalis Basin through the Community Flood Assistance and Resilience (CFAR) program to support local jurisdictions and tribes in their efforts to reduce near-term and long-term risks and economic damages from channel migration through actions such as reach-scale erosion management projects, and removal or relocation of at-risk structures and infrastructure.

Background

Riverbank erosion occurs in many areas of the Chehalis Basin and can affect property and infrastructure adjacent to the rivers and streams, within the valley bottom, or on adjacent hillslopes. Depending on the rate of erosion, or during an avulsion or major channel shift, a river could move rapidly outside of its current channel into a new or historical channel. Areas of easily erodible soils, such as sand and gravel deposits from alluvial processes or from past glacial deposition, or loamy soils, are particularly susceptible to bank erosion and channel migration. Areas with limited vegetation cover can also be more susceptible to erosion.

Channel migration is a natural process, and the movement of a channel through its floodplain creates new habitats, stores and recruits sediment and wood, and creates bare alluvial surfaces for the regeneration of cottonwoods and other important native riparian plant species. Even though channel migration is a natural process and has ecological benefits, human activity can affect where erosion occurs and can also dramatically increase the rate of erosion, which can cause a destabilization of the river system and negatively impact aquatic species and human investments. Identifying areas where erosion is occurring at high rates or threatens human investments will allow for the development of a more holistic and comprehensive strategy to address the problem.

Several options for developing a bank protection (now termed erosion management) strategy were outlined in the *Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Summary and Evaluation of Potential Bank Protection Strategies* memorandum (Anchor QEA 2020). Based on input received from the Local Actions Program Technical Advisory Group (TAG) and discussions with the Chehalis Basin Board, guiding principles and draft criteria have been developed for an erosion management strategy.

Some of the key considerations discussed by the TAG included concerns that addressing erosion issues at a single property is often not effective over the long term or could cause adverse effects to adjacent landowners. Thus, addressing erosion issues over a larger reach can be more effective and integrate the concerns and needs of adjacent landowners into a project. Also, it is important to ensure that public dollars are spent on solutions that can benefit multiple parties and reduce future damages; thus, providing solutions over a larger reach and multiple landowners (whether public or private) is preferred.

Guiding Principles

The following guiding principles are intended to guide landowners and project sponsors to develop projects that reduce erosion while also protecting and enhancing aquatic habitat:

- Channel migration and bank erosion are natural processes that form and maintain habitats. However, erosion rates can become accelerated above natural rates due to land uses, facilities, hard bank protection, or other factors.
- Erosion management projects should be developed and implemented in the context of reach-scale conditions and geomorphic processes and promote the use of bioengineering techniques to protect and enhance habitat.
- Erosion management projects proposed to be included within the Chehalis Basin Strategy should be developed where: 1) they can be combined with habitat enhancement or Aquatic Species Restoration Plan (ASRP) projects; or 2) critical infrastructure is present and threatened; or 3) an expanded reach-scale project can be pursued that benefits both public and private landowners while also enhancing habitat.
- Erosion management projects should include elements that provide initial and long-term elements to reduce hydraulic energy, provide refugia for juvenile salmonids, and promote long-term naturalization of the bank and adjacent riparian zone.

Proposed Criteria for Screening Projects for Erosion Management Assistance

The following proposed criteria would be used to screen projects submitted for consideration for technical assistance.

PROJECT MUST MEET THESE FIRST THREE CRITERIA:

1. A local project sponsor (e.g., conservation district, county, non-profit) can be identified that is willing to develop a reach-scale project with multiple landowners (whether public or private).
2. The erosion risk at the site or reach is rapid (above natural rates) and would cause significant damage to valuable structures, infrastructure, or productive agricultural land within the near term (within approximately the next 3 years).
3. The landowner is interested in a bioengineered solution and willing to maintain a bioengineered solution as part of a funding agreement.

PROJECT SHOULD ALSO MEET AT LEAST TWO OF THE FOLLOWING CRITERIA:

1. The landowner (whether public or private) is willing to consider relocation that could provide long-term reduced erosion risk or damages (either with or without an associated bioengineered or habitat solution). This consideration would be further informed by the design process.
2. The site provides opportunities for a reach-scale approach to reduce velocities and bank scour through a multi-element solution that could include placement of large wood, riparian revegetation, bank sloping/terracing, reconnecting former channels or swales, or other elements that would benefit the reach and maintain or restore natural processes and habitats.
3. The project is likely to provide multiple benefits.

Outline of a Potential Technical Assistance Program

The following river segments were identified through discussions with TAG and the Implementation Advisory Group members as high-priority erosion areas. These river segments are also shown in Figure 1:

- Humptulips River, river mile (RM) 15 to 22
- Wynoochee River, RM 0 to 20
- Satsop River, RM 0 to 11
- West Fork Satsop River, RM 0 to 7
- Chehalis River, RM 13 to 25 and RM 33 to 55
- Newaukum River, RM 0 to 11
- South Fork Newaukum River, RM 11 to 25

Initial mapping of historical channel locations (historical channel tracing) and relative elevation maps were prepared for these reaches and are attached to the *Chehalis Basin Strategy: Initial Historical Channel Mapping and Floodplain Topography in Priority Erosion Hazard Areas* draft memorandum (Anchor QEA 2021). Table 1 summarizes the number of structures, parcels, and lengths of roads identified within the average representative historical migration buffer around the historical channel locations and within the entire low-lying valleys as shown on the relative elevation maps. The Wynoochee River and South Fork Newaukum River segments have the most structures present in the buffer around the 70-year historical channel locations as well as fairly substantial lengths of roads that could be subject to erosion. Thus, these two sub-basins are proposed for consideration for a pilot technical assistance program.

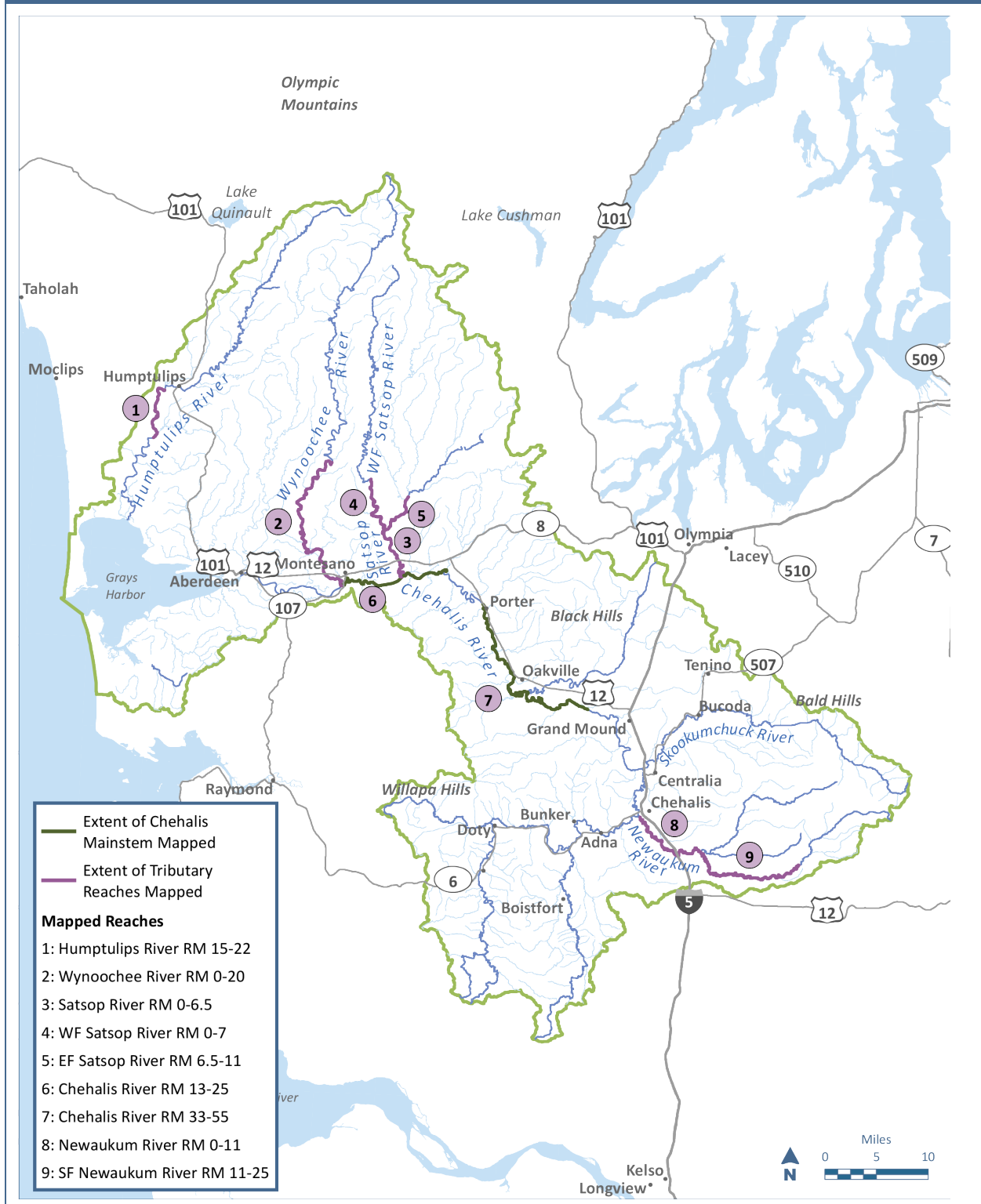
Table 1
Summary of Structures, Parcels, and Roads Present in the River Segments

River Segment	Number Within Historical Channel Migration Buffer				Number Within Low-Lying Valley		
	Buffer (feet)	Roads (feet)	Structures	Parcels	Roads (feet)	Structures	Parcels
Humptulips	500	3,054	19	68	11,479	61	114
Wynoochee	400	43,305	205	274	113,258	351	487
Satsop	700	27,820	95	117	96,346	368	347
EF Satsop	500	13,847	106	215	43,614	193	309
WF Satsop	600	26,934	90	124	11,529	71	121
Chehalis 13-25	500	48,830	107	243	442,634	1,872	1,608
Chehalis 33-55	400	51,465	53	301	496,867	2,185	1,835
Newaukum	300	21,389	105	210	76,805	422	392
SF Newaukum	300	34,357	327	237	82,871	624	639

EF: East Fork
SF: South Fork
WF: West Fork

Figure 1

River Reaches Included for Initial Focused Historical Channel and Avulsion Hazard Mapping



A technical assistance program could be provided by a staff member (up to 0.25 FTE) within the CFAR program under the Office of Chehalis Basin and could leverage the proposed Project Technical Review Team being developed for the ASRP. The technical assistance program could provide partial funding to support the Project Technical Review Team, which is anticipated to require approximately 0.5 FTE per team member as part of the ASRP. The Project Technical Review Team would be a multi-disciplinary team recruited through a public solicitation to select experts with a high level of experience in the design and construction of riverine and estuarine habitat restoration projects and representing habitat biology, geomorphology, civil/hydraulic engineer, and construction management. An additional up to 0.1 FTE could be provided per team member to use their expertise to support the erosion management strategy. Depending on interest in the program, if additional staff support is required in future years, additional time from the Project Review Team could be required (up to 0.25 FTE per team member).

To start the erosion management technical assistance program, the CFAR program could develop outreach materials to provide to local jurisdictions and Conservation Districts (CDs) that would describe the erosion management strategy, including the guiding principles and criteria. The following type of process to solicit interest and projects could be developed:

1. CFAR provide outreach materials to local jurisdictions, tribes, and CDs within the Chehalis Basin to provide information upon request or conduct outreach with landowners in known high-priority erosion areas. For the proposed pilot program, conduct outreach in the Wynoochee and South Fork Newaukum rivers sub-basins.
2. A landowner identifies an erosion problem (can be private or public) and requests assistance by either directly contacting the CFAR program or by requesting support from a local jurisdiction, tribe, or CD (or other project sponsor in the basin) who then contacts the CFAR program for consideration.
3. CFAR staff discusses erosion issue/project with the landowner or local sponsor to determine if the project could fit into the erosion management strategy. If needed, CFAR staff would contact local sponsors to identify interest in developing a reach-scale project with the landowner(s).
4. If the project could fit the erosion management strategy, CFAR staff requests that the ASRP Project Technical Review Team conduct a site visit with the local sponsor and landowner(s) to evaluate erosion issues and recommend a route for undertaking the project as one of the following:
 - A. Project is very urgent and temporary or emergency measures should be taken to avoid imminent damages. → Project may not fit within the erosion management strategy unless the landowner is willing to work for a long-term solution that may remove temporary or emergency measures and result in a long-term bioengineered solution.
 - B. Project is of near-term urgency, but the landowner(s) are not interested in a sufficiently large-scale riparian or floodplain restoration element (e.g., landowners are only interested in narrow riparian buffers directly associated with erosion management elements) to

- propose through the ASRP program but are interested in reach-scale measures that reduce erosion and do not harm habitat. → Project enters into the erosion management strategy.
- C. Project is of near-term or long-term concern and is located in a priority ASRP area and the landowner(s) would be interested in solving the issue as a direct ASRP reach-scale project.
→ Project enters into the ASRP program.
- D. Project is not of near-term urgency or the landowner is not interested in working within the erosion management strategy guidelines. → Project does not enter into the erosion management strategy.
5. If the project meets the erosion management criteria, then provide initial seed funding for local sponsors to work with adjacent landowners and develop an initial reach-scale project (initial concepts with initial landowner buy-in). The CFAR program would request the ASRP Project Technical Review Team review the initial concepts and provide recommendations based on their design and construction experience and habitat review standards for ASRP. Projects do not need to meet the goals of the ASRP but should protect or enhance habitats through bioengineering.
 6. If the initial concept is recommended by the ASRP Project Technical Review Team and CFAR staff to move forward, then the local sponsor can apply for design funds through the erosion management strategy. The Chehalis Basin Board could consider if a required match would be appropriate (fixed or sliding scale) for design and permitting from either the local sponsor or landowners, and the multiple landowners would need to enter into landowner agreements with the local sponsor for funding and future maintenance of the project, if ultimately constructed.
 7. CFAR staff would discuss with the agencies if reach-scale erosion management projects that include habitat enhancement can fit into and use the ASRP permit templates and streamlined reviews. The ASRP Project Technical Review Team would review design deliverables.
 8. Once a project design is approved and permitted, the local sponsors could apply for construction funding from the erosion management strategy. The Chehalis Basin Board could also consider if a required match would also be appropriate for construction (from the local sponsor or landowners), which could include materials or temporary or permanent easements as appropriate.
 9. Initial funding recommendation of \$500,000 in the 2021 to 2023 biennium to start the pilot program and provide initial technical assistance. This would accommodate 0.25 FTE in the CFAR program to manage the program; up to 0.1 FTE each for the ASRP Project Technical Review Team support/reviews; provide seed funding (\$20,000 each) for up to five conceptual projects; and design funding for one project (\$100,000). This would not support construction of any projects in the 2021 to 2023 biennium.
 10. The estimated potential need in future biennia of \$2 million if the pilot technical assistance program develops sufficient interest from landowners and local sponsors to potentially design three to five projects and construct one to two projects per biennium. There would be an ongoing need for inspections and occasional technical support associated with the long-term maintenance of a bioengineered solution.

References

Anchor QEA, 2020. *Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Summary and Evaluation of Potential Bank Protection Strategies*. Memorandum prepared for the Office of Chehalis Basin, October 23, 2020.

Anchor QEA, 2021. *Chehalis Basin Strategy: Initial Historical Channel Mapping and Floodplain Topography in Priority Erosion Hazard Areas*. Memorandum prepared for the Office of Chehalis Basin, Draft February 12, 2021.