Chehalis Basin Strategy Local Actions Program Technical Advisory Group Meeting #4

December 14, 2020

Agenda

- Welcome
- Introductions (small groups again in breakout rooms)
- Summary of results from November 13 meeting
- Continue discussion of the near-term approaches for:
- Climate change
- Increasing floodplain storage
- Addressing channel migration and floodplain erosion hazards

Climate Change – Near-term Analysis

Review of maps, conclusions and next steps

Tech Group Questions for Meeting

Potential for Increasing Floodplain Storage

1. Is the potential for additional floodplain storage significant enough to pursue as one element of several potential elements within the local actions program? If so, how, why, and where?

Tech Group Question for Meeting

Bank Protection

1. What technical considerations do you have for providing bank protection that would not have a significant impact on natural processes and functions?

2. What technical considerations do you have for providing bank protection in critical locations that may negatively impact natural processes and functions?

3. What thoughts do you have on goals for building a bank protection program?

Introductions

- Breakout rooms of three members
- Introduce yourself (one minute each)

- Name and affiliation
- Another interesting issue you are working on.
- If you could go on a trip, where would you go?

Tech Advisory Group Schedule

Meeting #5: January 8, 2021

- Board feedback on floodplain storage
- Bank protection: criteria and techniques, board feedback
- Structural solutions

Meeting #6: January 13, 2021

- Discussion and follow-up from meetings #1-5

Meeting #7: February 8, 2021

- Discussion and follow-up from meetings #1-6

Summary of November 13th Technical Advisory Group Meeting

November 13 Meeting Feedback

Floodplain Storage

- Ultimately need to understand how action in tributaries might affect the whole basin
- Other potential locations for floodplain storage:

  -Black River has potential.

  -Skookumchuck reservoir: there is an opportunity to create flood storage.

  -Floodplain reconnections provide storage and flow reduction during much smaller floods and local water level reductions

  -Effect of removing natural constriction at Mellon Street

November 13 Meeting Feedback (Continued)

Potential Local Flood Protection Actions (Structural and Nonstructural)

- Other areas that should be considered: Bishop Road or Monte Elma Road, Grand Mound, Satsop, Scatter Creek, Galvin…
- Other structural options: road elevation, I-5, Long Road levee, coordinate with habitat projects…

Future Floodplain

Floodplain Storage (cont.)

Is the potential for additional floodplain storage significant enough to pursue as one element of several potential elements within the local actions program? If so, how, why, and where?

- Restorative Flood Alternative
- Review WSE analysis
- Breakout group discussions

Local Actions Program
Climate Change Near-term Analyses

Technical Advisory Committee Meeting #4

December 14, 2020

Climate Change – Board Desired Outcomes

- Plan for the 100-year flood conditions that are predicted for 2080 when considering outcomes and actions
- This planning assumption provides the foundation for all of the outcome measures agreed to by the Chehalis Basin Board
- This will also focus the Board's initial evaluation on the kinds of actions that can most feasibly reduce risks associated with this expanded future floodplain

Climate Change Near-term Analyses – 50% Increase

- Used available results from a 26% increase for flood flows, and scaled up to a higher end scenario (e.g., 50% increase)
- Completed analyses within the Chehalis River mainstem and portions of key tributaries (2D model area)
- Created maps depicting depth and areal extent for: FEMA floodplain (areal extent only), current modeled floodplain, and 26% and 50% increases

Climate Change Near-term Analyses – Precipitation Analysis

- UW Climate Impacts Group is completing an analysis of spatial variations in precipitation throughout the basin
- Precipitation projections will be obtained from 12 global climate models under RCP 8.5
- Draft analysis completed mid-January for use in near-term additional hydraulic modeling analysis (available end of March 2021)

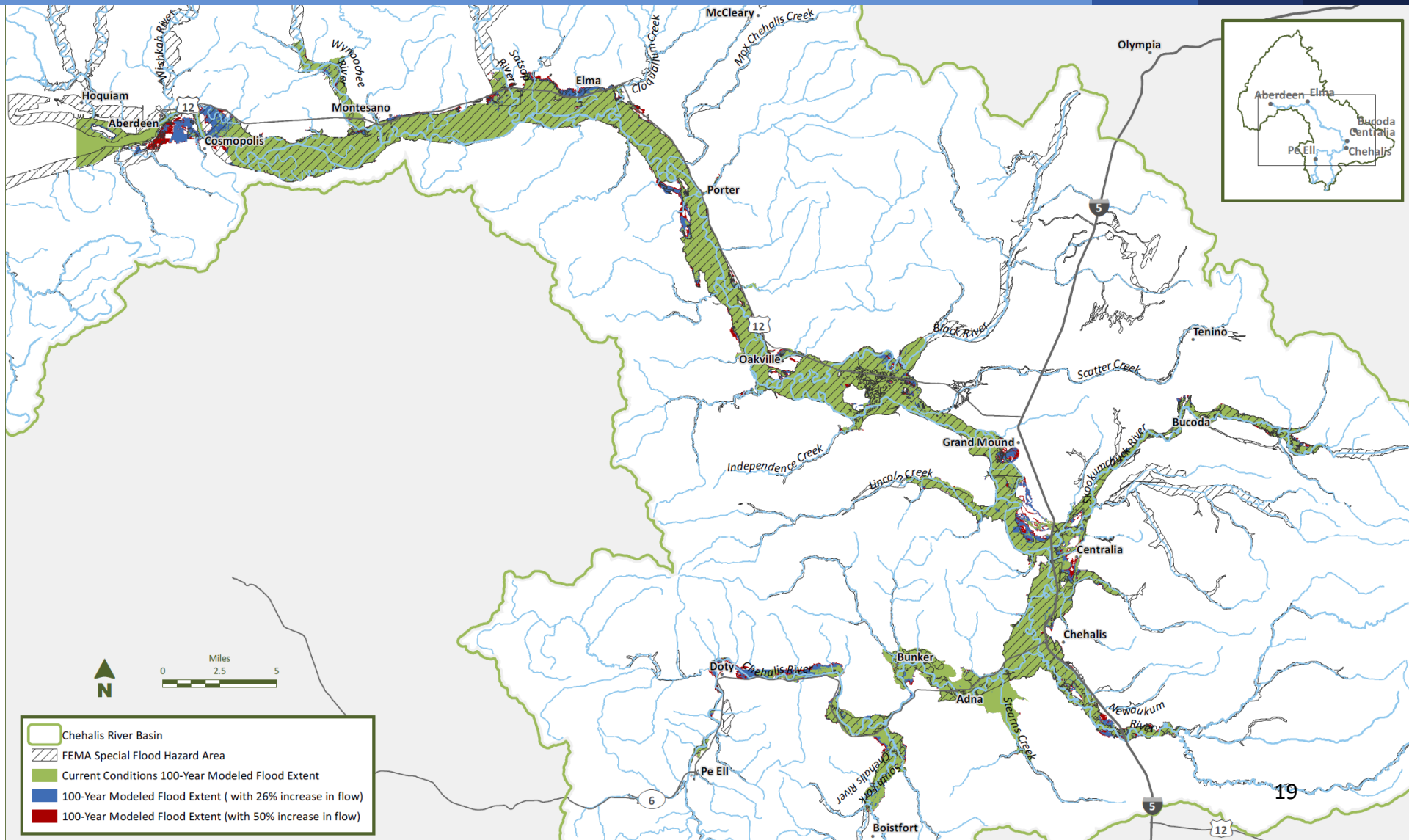
Updated Range of Late-Century 100-year flows

Table 1
Comparison of Historical and Modeled Flows in Chehalis River Basin

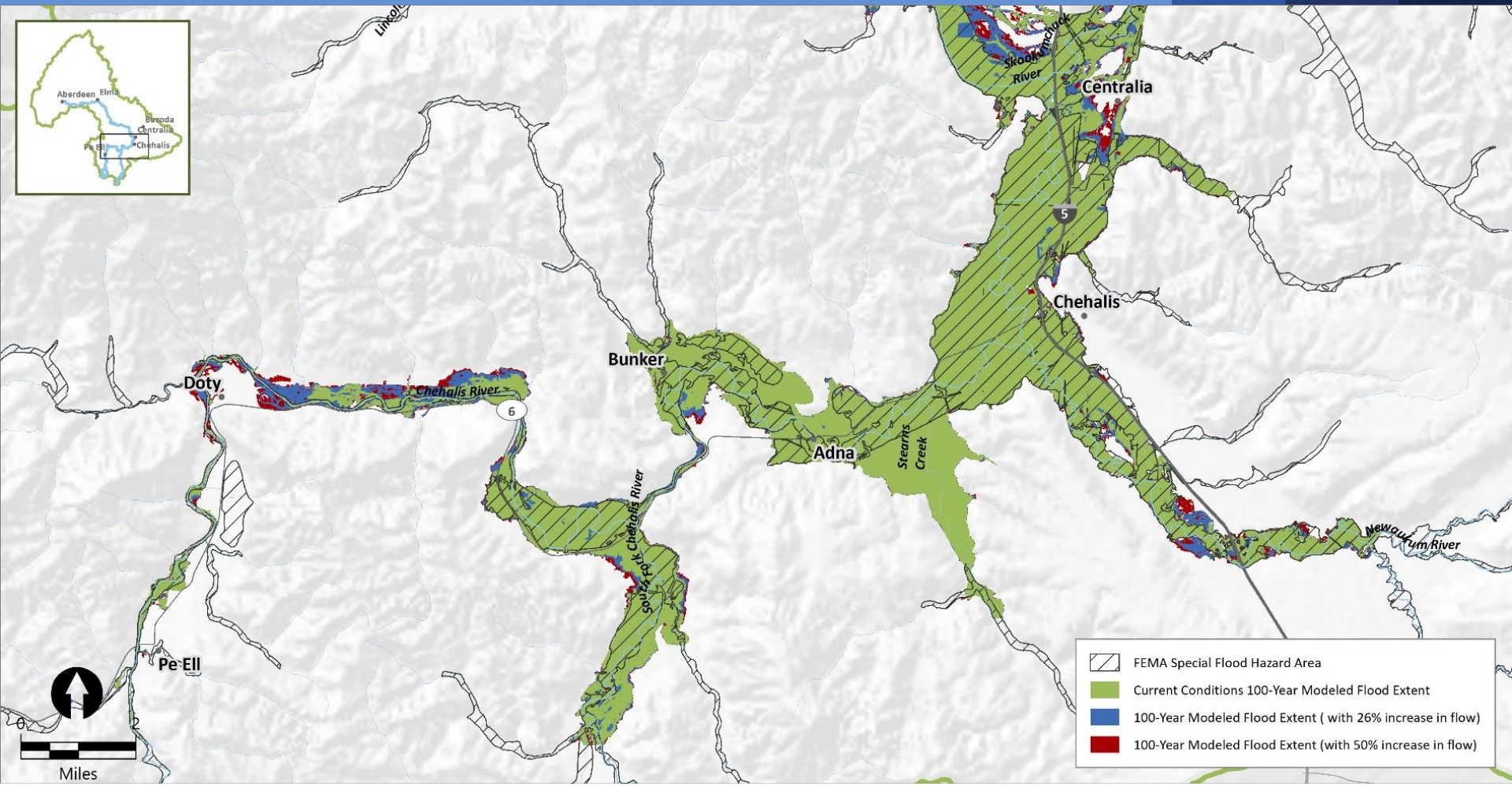
LOCATION	LATE-CENTURY 100-YEAR FLOOD		FLOOD OF RECORD (CFS)	FLOOD OF RECORD DATE
	WITH 26% INCREASE	WITH 50% INCREASE		
Chehalis River near Doty	45,100	53,500	52,600[1]	12/3/2007
Chehalis River near Grand Mound	102,200	128,600	79,100	12/4/2007
Chehalis River at Porter	120,700	151,800	86,500	12/5/2007
South Fork Chehalis River near Wildwood[2]	N/A	N/A	12,200	12/3/2007
South Fork Chehalis River at Boistfort[2]	26,700	31,700	5,700	2/7/1945
Newaukum River near Chehalis	18,500	22,000	13,300	2/8/1996
Skookumchuck River near Bucoda	19,500	23,300	11,300	2/8/1996
Satsop River near Satsop[3]	26,600	31,600	63,600	3/19/1997
Wynoochee River above Black Creek[3]	18,100	21,500	25,600	3/19/1997

FEMA Special Flood Hazard Areas (100-year floodplain)

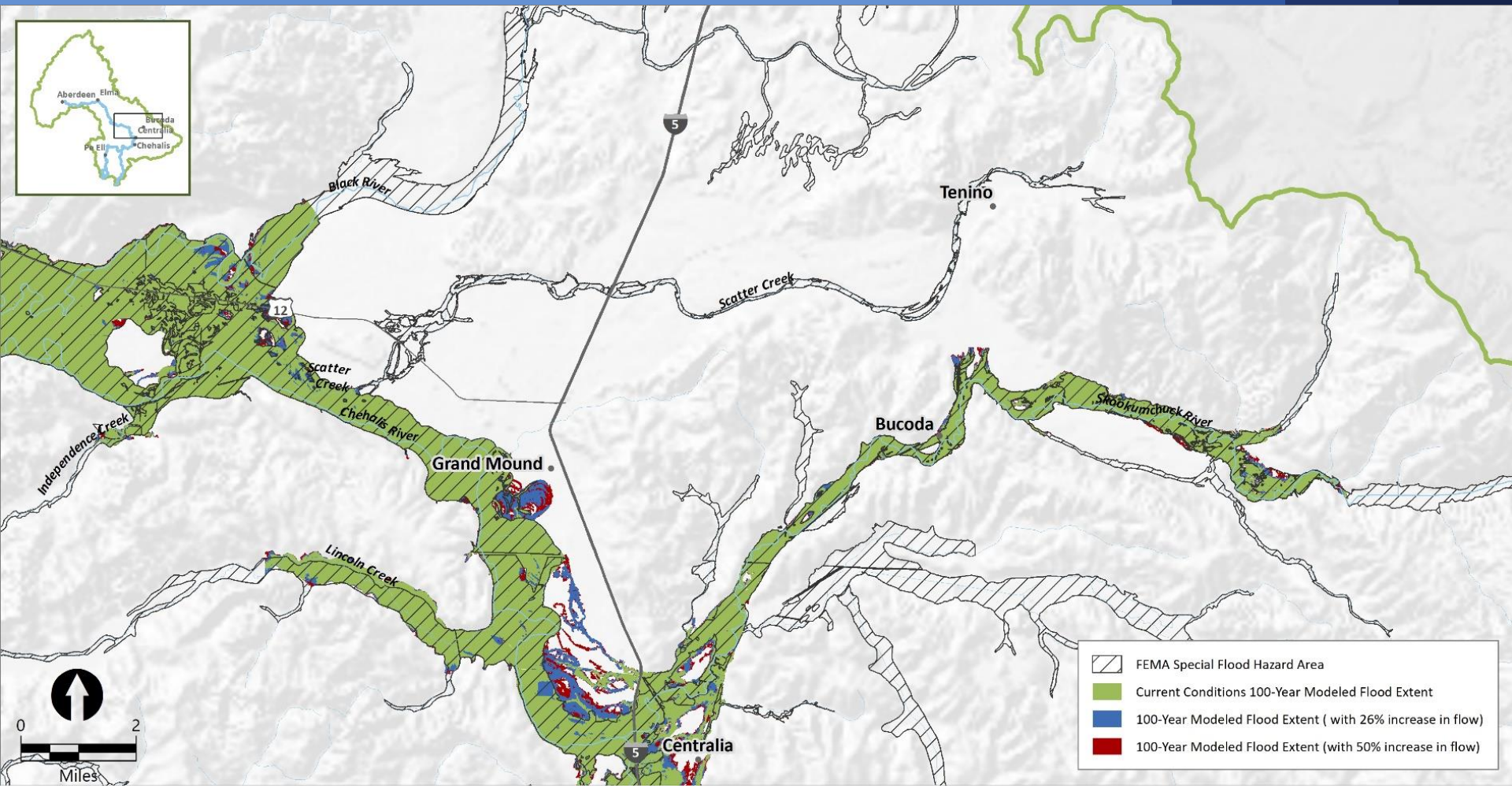
Modeled Flood Extents



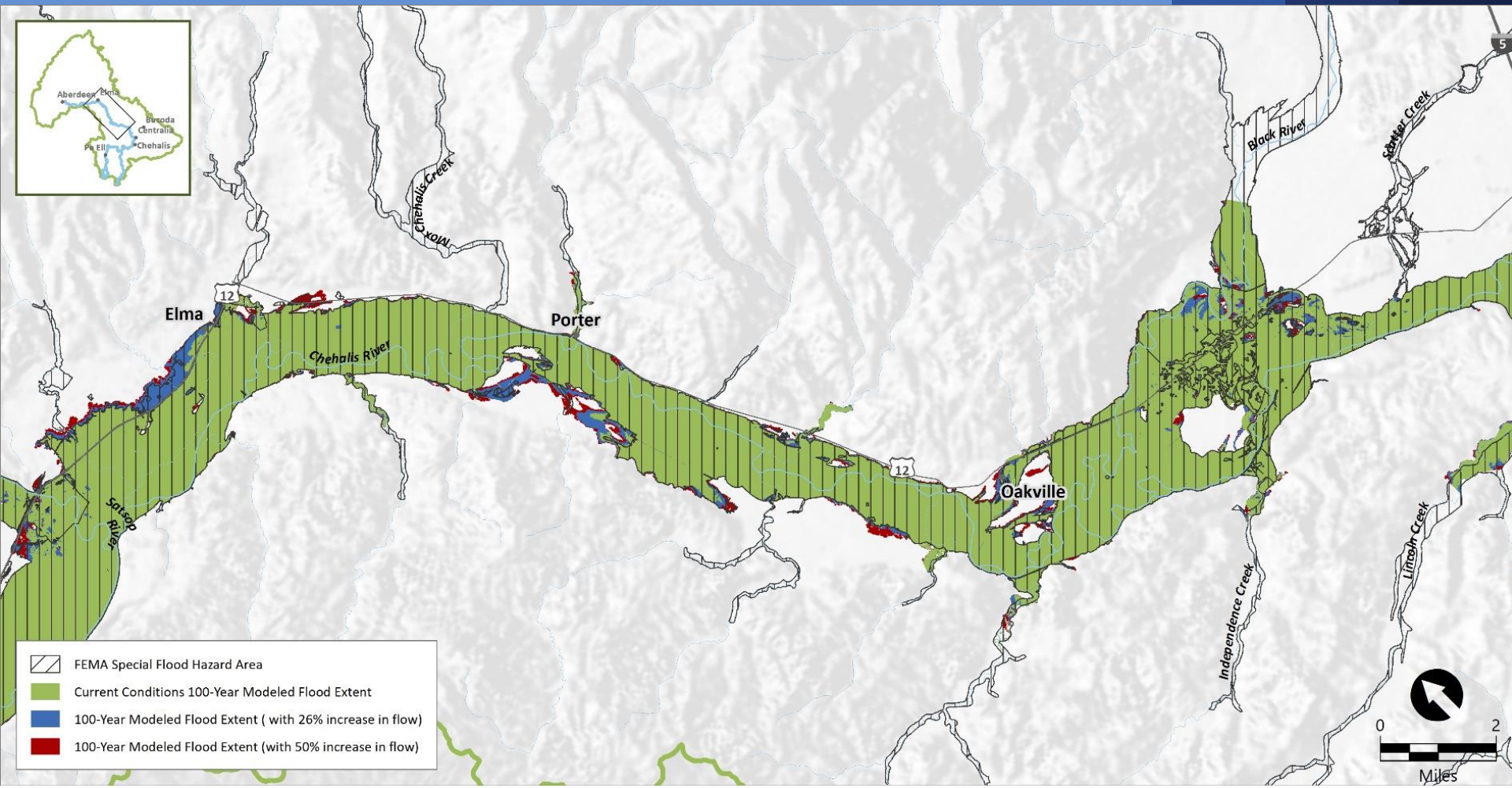
Upper Basin Flood Extents



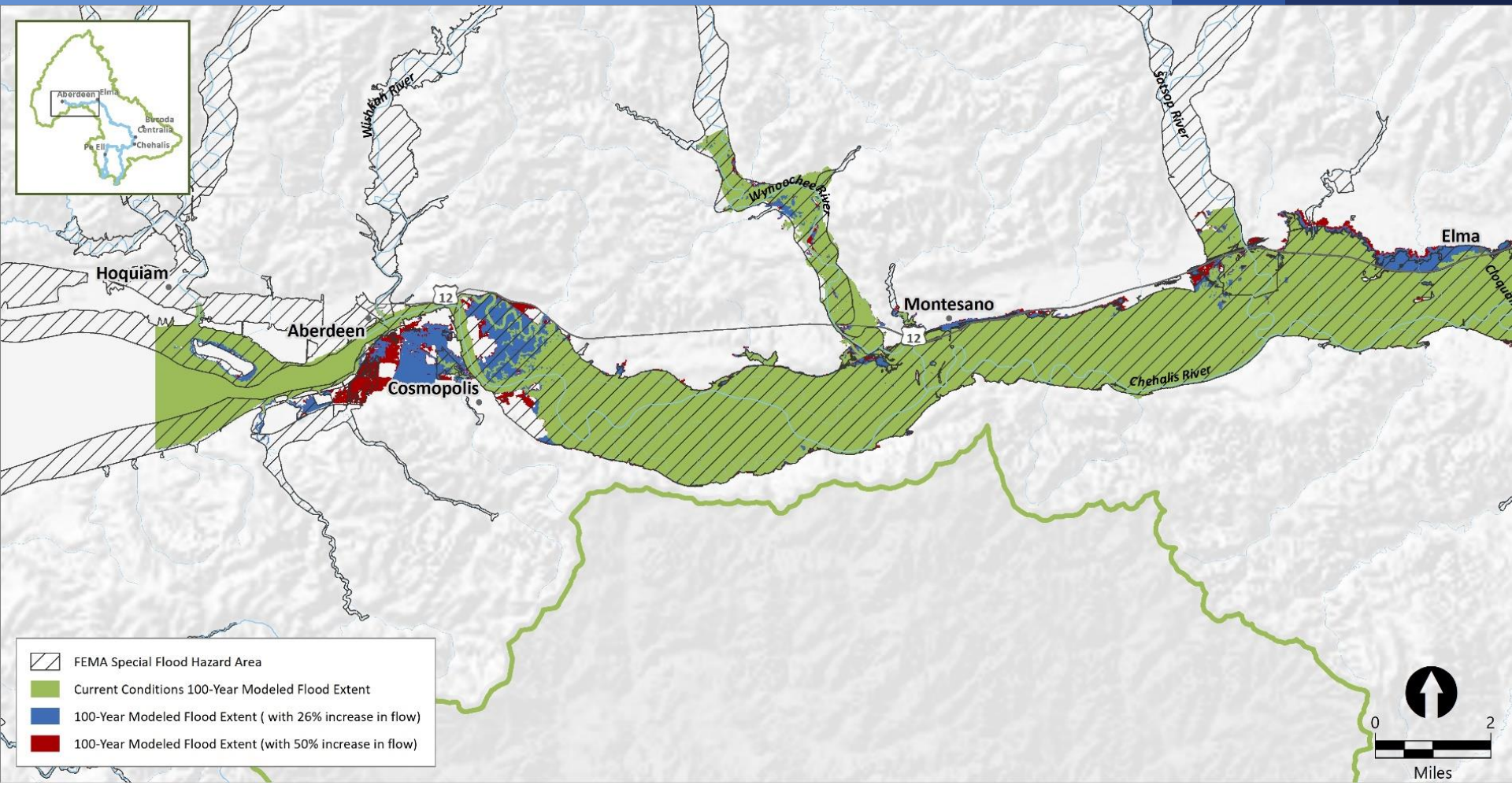
Middle Basin Flood Extents



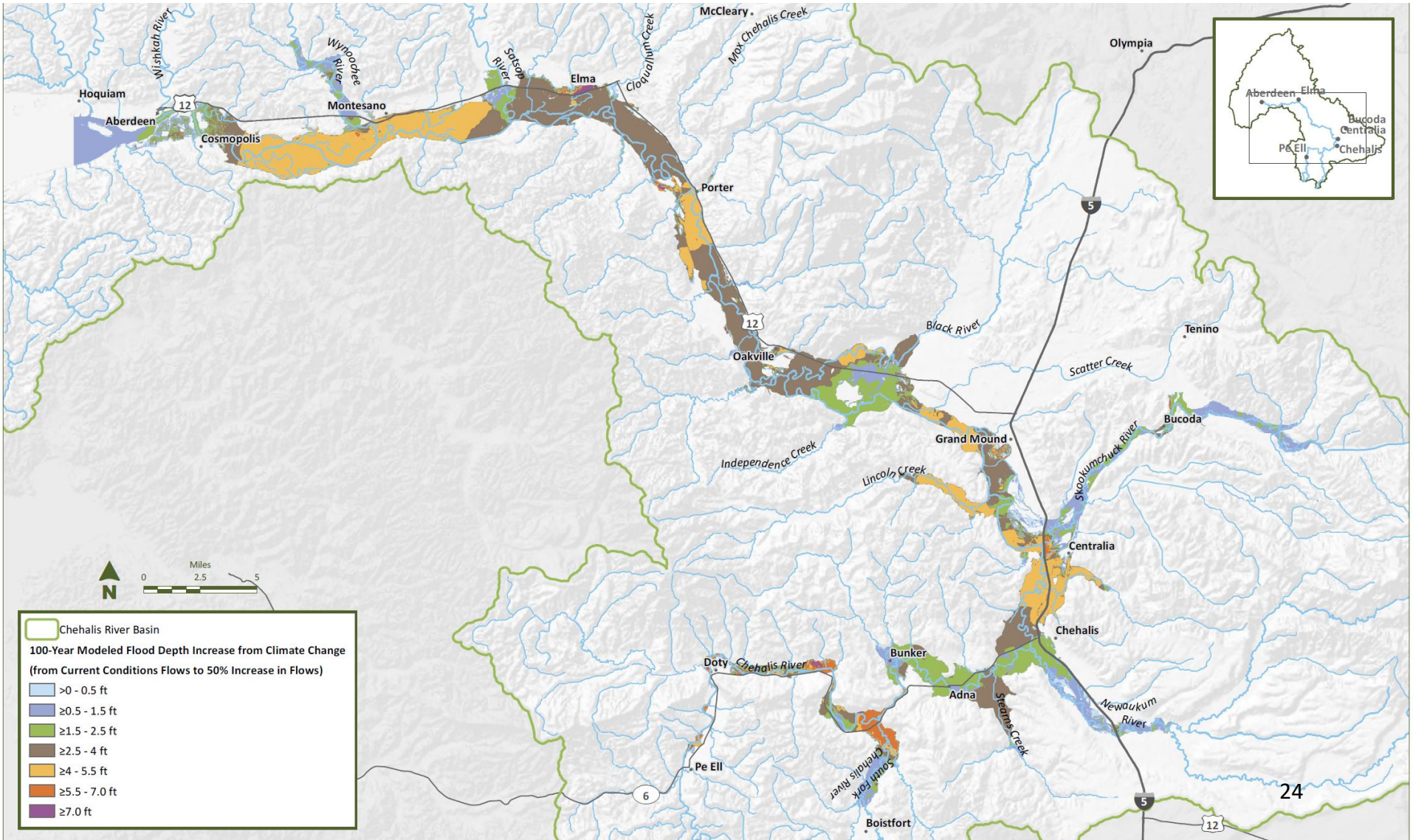
Middle Basin Flood Extents, *cont.*



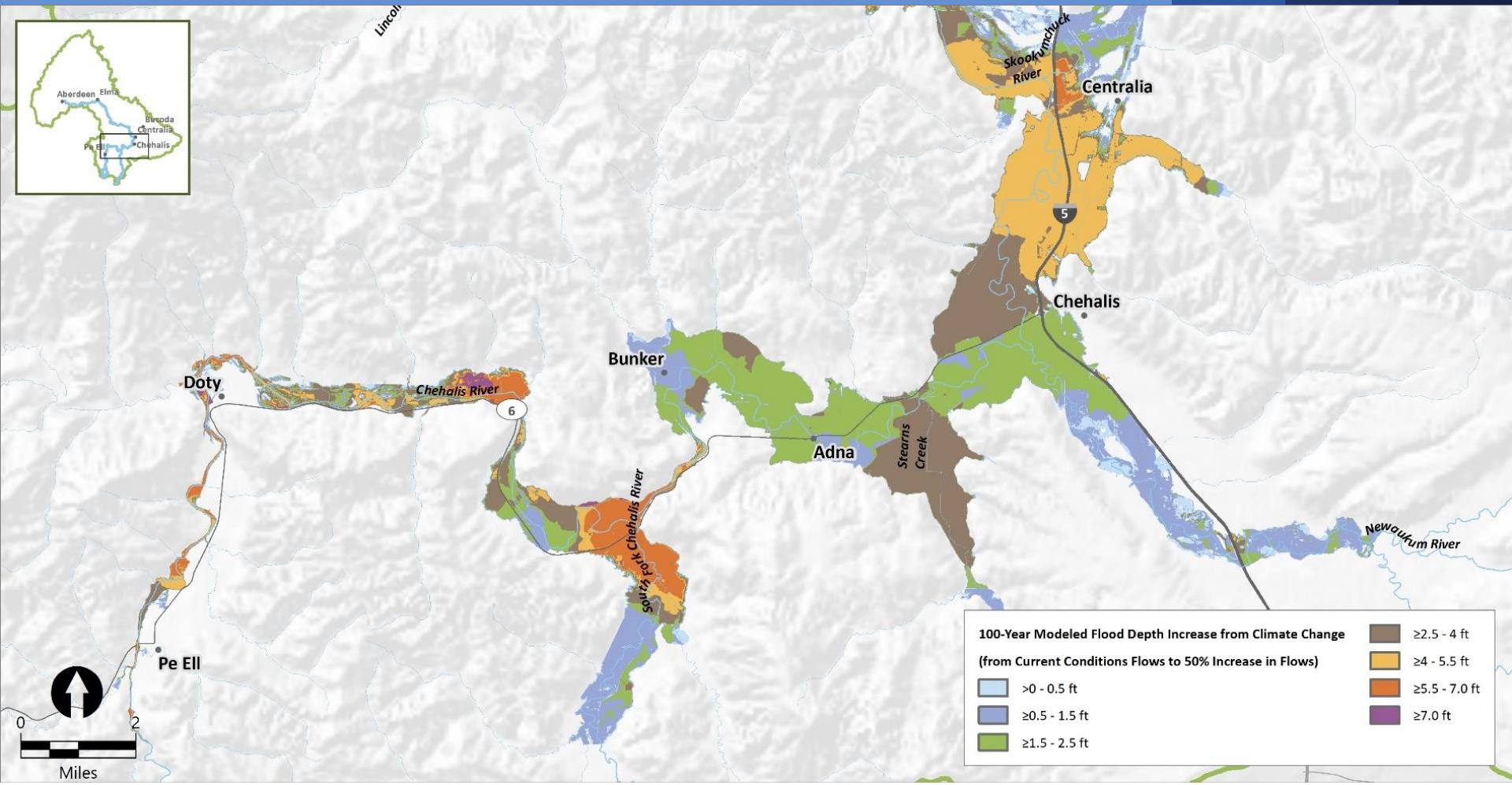
Lower Basin Flood Extents



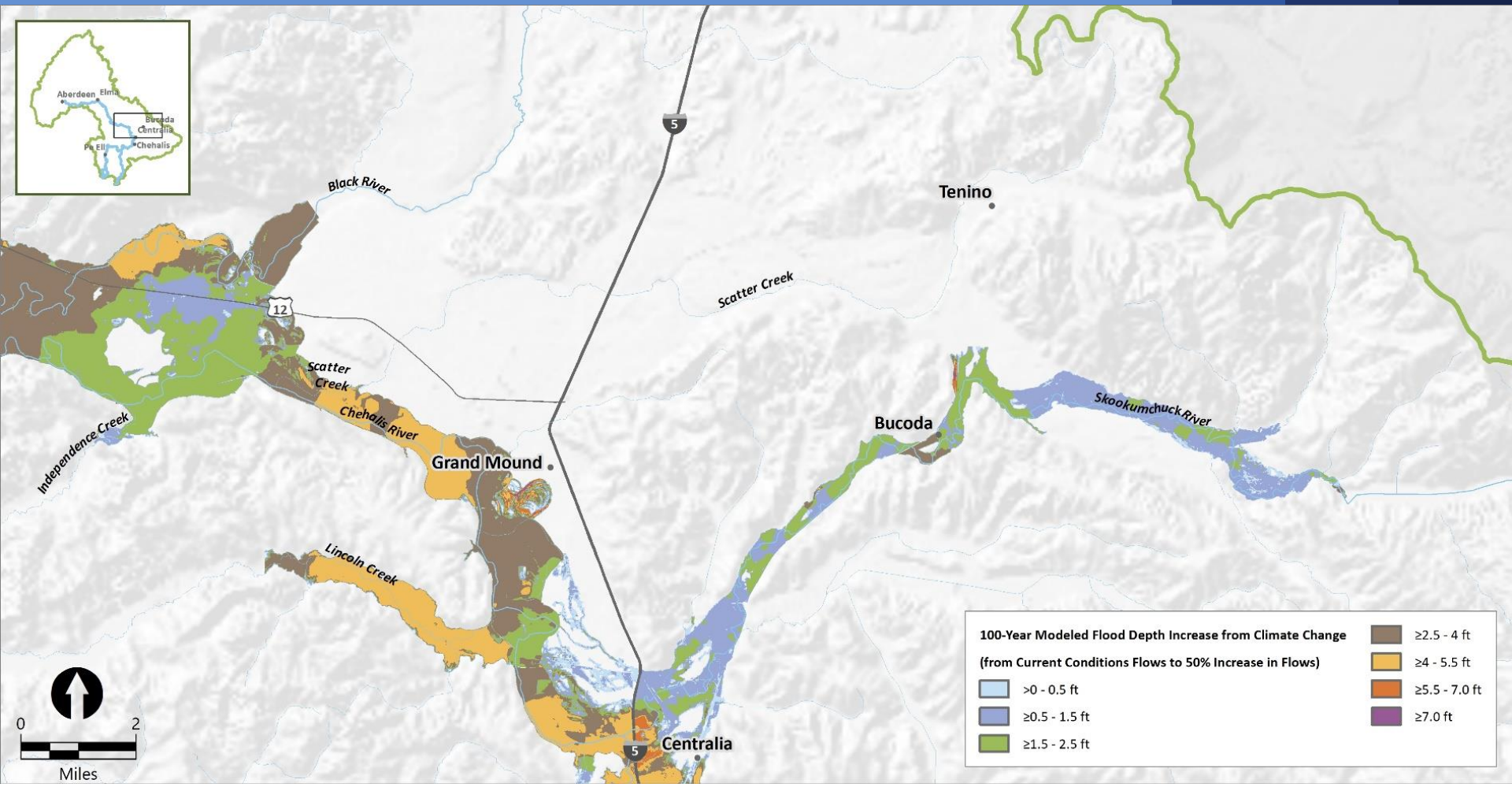
Modeled Flood Depth Comparisons



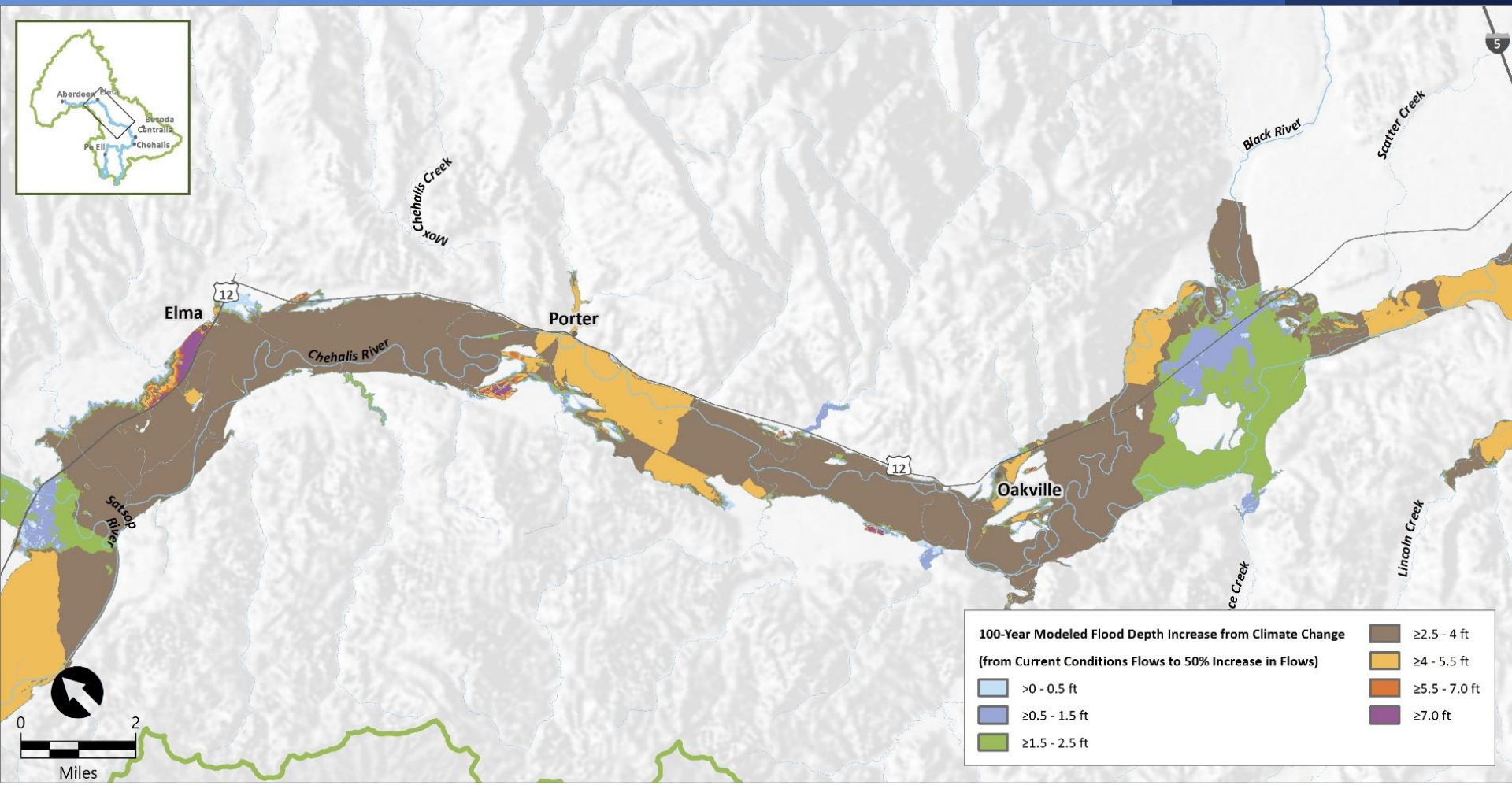
Upper Basin Depth Changes



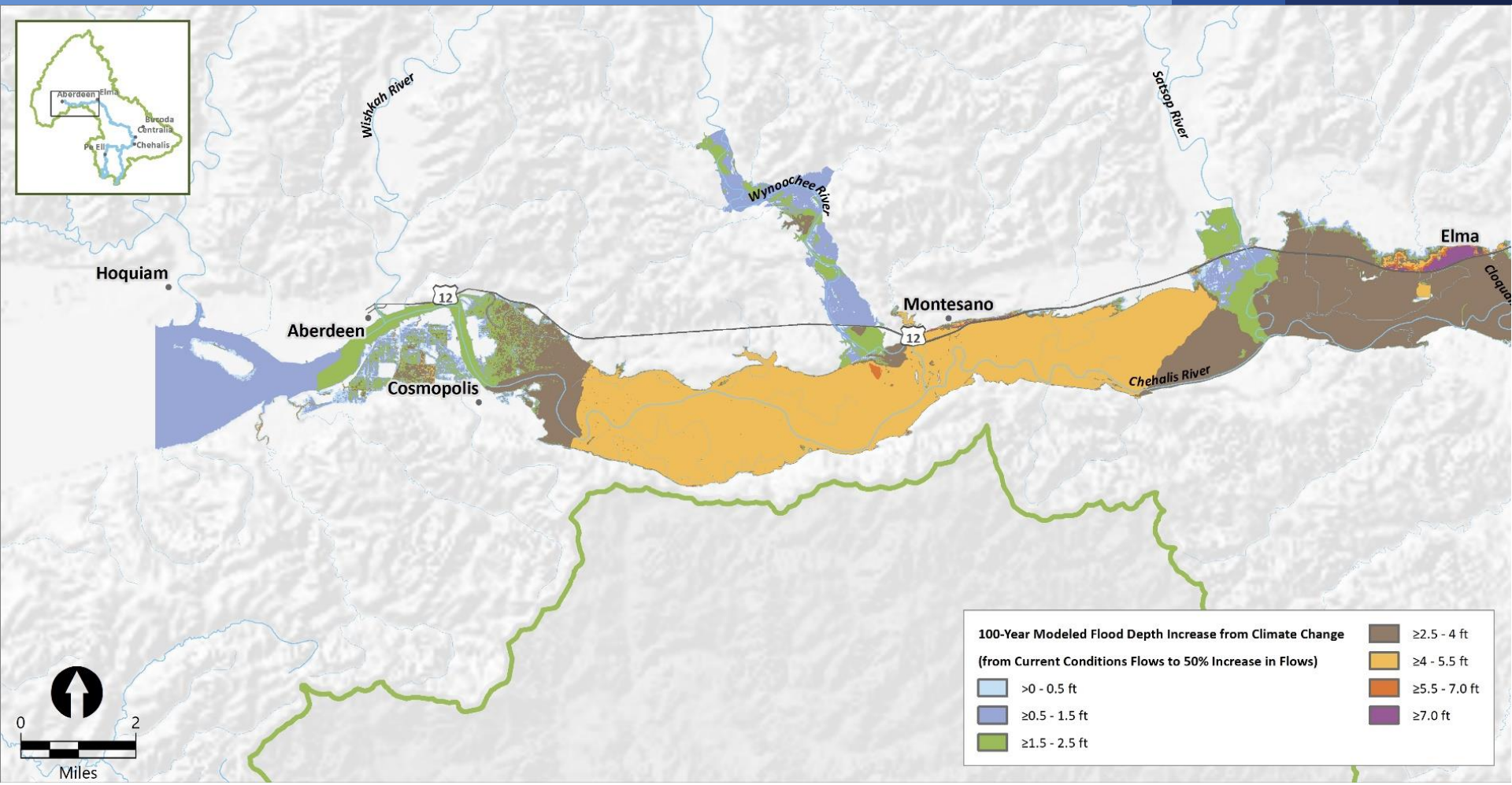
Middle Basin Depth Changes



Middle Basin Depth Changes, *cont.*



Lower Basin Depth Changes



Conclusions

- There are a few discrete areas with significant increase in floodplain extents due to increased flows:
  - South Aberdeen/Cosmopolis
  - Elma
  - Near Porter
  - Oakville
  - Near Black River
  - Centralia
  - Newaukum River
  - Doty-Dryad
- Increased flood depths throughout the floodplain

Discussion

Chehalis Basin Strategy Local Actions Program

Technical Advisory Committee Meeting #4

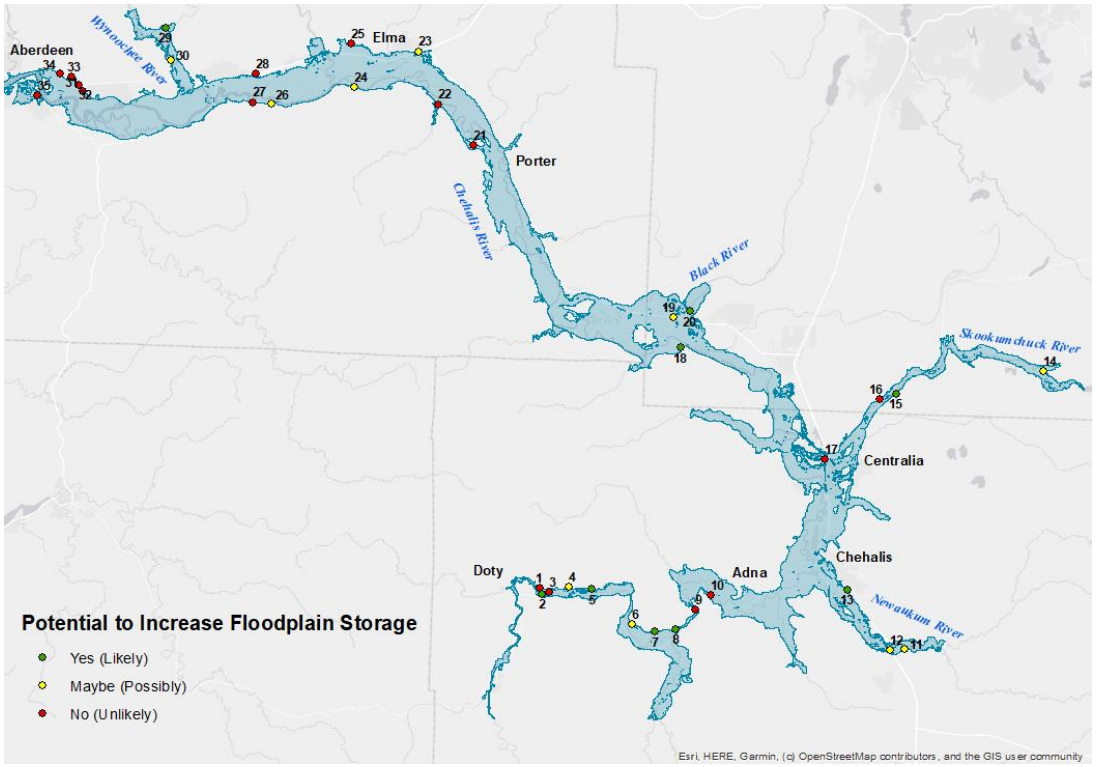
December 14, 2020

Questions for TAG

- Is the potential for additional floodplain storage significant enough to pursue as one element of several potential elements within the local actions program? If so, how, why, and where?

New Evaluation Of Floodplain

- Used latest 2D model results for 2080 100-year flood (WSE, 2019)
- Identified areas for new or augmented flood storage
- Quantified potential additional storage volume
- Qualitatively evaluated potential impacts (eliminated some sites)



Results of New Evaluation Of

- Nine (9) locations with good viability for new storage (YES)
- Ten (10) locations with possible viability (MAYBE)
- Fifteen (15) locations either too small or with likely adverse impacts to warrant further evaluation (NO)
- A total of 2,064 acre-feet of potential floodplain storage was identified within the modeled floodplain
- Total potential storage in nineteen YES or MAYBE locations is 1,553 acre feet
- Sites with a total of 511 acre-feet were categorized as unlikely to provide floodplain storage without impacts (i.e., NO)

Table 1

Summary of Identified Locations for Possibly Increasing Floodplain Storage

POTENTIALLY VIABLE LOCATION FOR FLOODPLAIN STORAGE (YES)			POSSIBLE BUT WITH LIMITED VIABILITY FOR FLOODPLAIN STORAGE (MAYBE)			UNLIKELY TO PROVIDE FLOODPLAIN STORAGE WITHOUT IMPACTS (NO)			NOTES
ID	Description	acre-feet	ID	Description	acre-feet	ID	Description	acre-feet	Additional information for areas unlikely to provide floodplain storage without impacts
2	Doty-Dryad Road along right bank slightly elevated, limiting overflows to farmland with storage potential.	23	4	Floodplain area cut off by Willapa RR trail, likely too small to be significant.	4	1	Backwater from Willapa RR trail already provides upstream storage, downstream properties would be impacted.	0	Floodplain storage reduction upstream of the road grade would exceed the increase in storage downstream; thus, this site would result in a net reduction in floodplain storage.
5	Old road grade blocks flood access to north floodplain.	8	6	Willapa RR trail does not overtop. Landward floodplain backwaters but does not completely fill.	11	3	Chandler Road already stores water upstream but would exacerbate flooding downstream for at least one structure.	0	Floodplain storage reduction upstream of road grade would be approximately equal to storage gained downstream; thus, this site would not result in any net gain in storage.
7	Willapa RR trail prevents complete filling of area north. Would flood several feet deeper.	28	11	Kirkland Road blocking access to south floodplain, but if opened would likely short-circuit flow exacerbating downstream flooding.	11	9	Willapa RR trail blocks left overbank flow, but currently adds some upstream storage and prevents short-circuiting.	5	The estimated storage is very minimal and represents a high-end estimate of storage gained downstream, not accounting for possible storage lost upstream.
8	Willapa RR trail blocks access to modest landward floodplain a	5	12	Levee and I-5 fill flock overflow. Would lose	20	10	Willapa RR trail partially blocks area south. Would	30	This estimate assumes minimal upstream storage reduction ny reductions that might be necessary am impacts, because these are ne without additional modeling. Thus, kely to be less than this amount.
13	I-5 grade blocks acces margin and ponds.								oundment of highway and only a tream. The amount of storage red inconsequential.
15	BNSF RR cuts off landv remnant channel.			limiting flood volume to the north. Could impact farms.			river to downstream floodplain, but this area is too intensively developed to be used for flood storage.		ermine or even reasonably estimate the amount of storage and possible effects at this location without additional modeling. It is unknown where and how deep flow would spread with removal of I-5 (while flooding much of occupied West Centralia). This is a very rough estimate of storage and it is anticipated that impacts would be significant. Basically, this project would increase flooding in one developed area to reduce flooding in a different developed area.
18	Old RR grade does not overtop. Landward floodplain backwaters but does not completely fill.	50	23	US 12 blocking full access to north floodplain. Already floods but could be slightly deeper.	3	21	Nursery perimeter berm may inhibit floodplain storage function, but flooding nursery not an option.	50	Estimated from total flood volume in nursery, because current modeling ignores the likely flood fighting by nursery to plug hole in berm at nursery entry point. The model already stores water here, but would need to plug hole and examine change to flood levels outside nursery to see actual net benefit of flooding nursery.
20	Head difference across RR grade southwest to northeast indicates flood access is constricted into Black River floodplain.	1,100	24	Old RR grade blocks access to tributary backwater storage, but a culvert likely already exists.	11	22	Old RR grade blocking access to small part of floodplain to southwest, but too small to be significant.	1	Blocked floodplain is a very narrow strip, with not much available area.
29	Wynoochee Valley Road only barely overtops, not completely filling landward floodplain.	28	26	Old RR grade blocks access to backwater storage. Small area but reasonably deep.	4	25	RR grade may block access to some north floodplain, but small area at very shallow flood depths.	2	Flood depths added would be very shallow, over a limited area.

See pages 4 to 5 in memo

Summary of New Evaluation Of

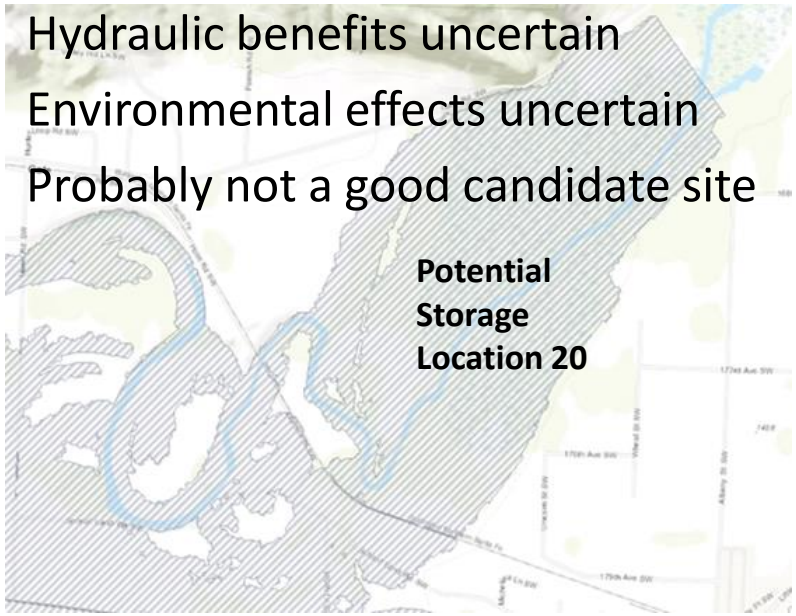
- Largest “NO” site is along Skookumchuck River near I-5 in Centralia
- 300 acre-feet of storage possible
- However, impacts and costs would outweigh potential benefit

Summary of New Evaluation Of

- Using this storage area would shift flooding from east side of I-5 to west side
- Potential storage area is currently fully developed with residential and commercial structures
- Possibly 300 acre-feet here – the FRE provides 65,000 acre-feet of storage and reduces water levels in Centralia by about 0.04 feet per 1,000 acre-feet of storage

Update on Black River

- Largest of all identified storage areas
- Property Ownership – 20+ parcels including private and public owners
- Hydraulic benefits uncertain
- Environmental effects uncertain
- Probably not a good candidate site



Questions for TAG

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Discussion

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Update on Near-Term Erosion Hazard Mapping

- Moving forward with initial map development for Board and stakeholder visualization in about 100 miles of rivers, based on additional feedback from Ecology and CDs:
  - Humptulips River RM 15-22
  - Wynoochee River RM 0-20
  - Satsop/East Fork Satsop Rivers RM 0-11
  - West Fork Satsop River RM 0-7
  - Chehalis River RM 13-25, 33-55
  - Newaukum River RM 0-11
  - South Fork Newaukum River RM 11-25
- Relative elevation maps, historical channel tracing, parcels, structures, infrastructure

Erosion Hazards – Board Desired Outcomes

- **Reduce 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 by an average of X per year over up to 30 years, while protecting ecological processes (Outcome 4A "Farmland and Rural Structures Protected).

- **No new structures would have been developed that are vulnerable to channel erosion or mainstem or tributary flooding from 2080 predicted 100-year flood levels**… (Outcome 8: Prevent New At-Risk Development).

Options for Consideration

- Near-Term
  - Develop goals for a bank protection strategy
  - Identify one or more pilot sub-basins to develop a landowner technical assistance program
- Long-Term
  - Develop technical assistance position(s) at OCB or local governments to support landowners
  - Develop or modify existing standard details for the range of bioengineering techniques that landowners could use
  - Develop streamlined bioengineered bank protection permitting process at local and state level
  - Provide technical training for local governments, maintenance crews, and local contractors, as feasible, on the installation of bioengineered techniques
  - Provide better enforcement of existing codes and regulations to reduce illegal bank protection actions
  - Monitor bioengineered bank protection techniques and report out on their effectiveness

Questions for TAG

1. What technical considerations do you have for providing bank protection that would not have a significant impact on natural processes and functions?

2. What technical considerations do you have for providing bank protection in critical locations that may negatively impact natural processes and functions?

3. What thoughts do you have on goals for building a bank protection program?

Previous Draft Bank Protection Goals

1. Encourage the development and continuation of natural, habitat-forming processes

2. Educate landowners in the Chehalis Basin on stream-friendly ways to protect their property and livelihoods

3. Proactively identify and prioritize areas where bank protection is needed

4. Provide landowners with increased certainty regarding ecologically friendly bank protection methods

Existing Regulations

- Counties, cities and state and federal regulations discourage the use of hard bank protection and encourage an evaluation of alternatives
- Bioengineering is promoted unless it can be demonstrated that it won’t be sufficient

Current Situation

- There are a tremendous number of manuals and guidelines for bio-engineered bank protection
- Existing rules and guidance encourage bio-engineered bank protection
- Difficult and costly for individual landowners
- When something becomes an emergency, rock is placed
- Most recent permits are replacement of rock at existing bank protection sites, some bioengineering is occurring

Bank Erosion Scenarios

- Channel Migrating into Agricultural Field *(page 10 of memo)*
  - Channel is migrating several feet per year and has already eroded pre-existing smaller riparian trees and shrubs and now has entered the agricultural field. Upstream landslides, bank erosion, and channel bed scour have contributed sediment to this reach and a large bar is building across the river. New riparian plantings cannot be established as the rate of erosion outpaces growth of plants. The field is also in a low-lying area and floods regularly, causing saturation and slumping of the bank. No structures or utilities are at immediate threat of erosion, but land is being lost at a rapid rate and structures flood periodically

Bank Erosion Scenarios

- Eroding Bank Near Utility Pipeline *(page 11 of memo)*
  - A high bank has a narrow riparian zone of 30-year-old alder and blackberries and is eroding slowly from the combination of water draining from upslope and causing small bank slumps that are then carried away by river flows. Some rock is already present downstream of the erosion area. A buried regional pipeline is present approximately 50 feet back behind the existing bank and it would be very difficult to move. The rate of bank erosion is about 1 foot per year. The landowner is interested in a narrow riparian zone that can be stable.

Bank Erosion Scenarios

- Bank Erosion at County Road and Bridge *(page 11 of memo)*
  - A steep bank with an existing rock toe continues to erode along a regional county road with a secondary road bridge crossing downstream about 100 feet. The county replaces the rock as it gets damaged. The river continues to erode along the roadway as it is forced to turn to go under the bridge. Relocating the road would be costly because there are numerous residences behind the road and then wetlands and a steep slope farther back from the residences. The secondary road bridge was replaced within the past 20 years but does not span the erosion hazard area.

Bio-Engineered Bank Techniques Reviewed

- Fabrics
- Plantings
- Large Wood
- Bank Sloping and Shaping, Other Excavation/Grading

See Table 1 on pages 14-18 of memo

Options for Consideration

- Near-Term
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Questions

1. What technical considerations do you have for providing bank protection that would not have a significant impact on natural processes and functions?

2. What technical considerations do you have for providing bank protection in critical locations that may negatively impact natural processes and functions?

3. What thoughts do you have on goals for building a bank protection program?

Discussion

Current Regulatory Language on Bank Protection

- Grays Harbor County SMP 2020 (Section 5.9.2)

A) Use structural shoreline stabilization measures only when more natural, non-structural methods, such as vegetative stabilization, beach nourishment, and bioengineering have been determined not feasible. Alternatives for shoreline stabilization should be based on the following hierarchy of preference:

i) Take no action and allow the shoreline to retreat naturally. protect structures by increasing building setbacks or relocating them.

ii) Construct flexible defense works of natural materials that may include soft shore protection, bioengineering, beach nourishment, protective berms, or vegetative stabilization.

iii) Replace failing structures and allow expansion if no other practical alternative exists.

iv) Allow the construction of rigid works consisting of artificial materials such as riprap or concrete when alternative methods have been determined infeasible.

v) Permit the construction of larger works, such as jetties, breakwaters, or groin systems, only when no other practical alternatives exist.

Current Regulatory Language (cont.)

- Thurston County SMP 1990 (Section 3, Part XVIII)

B. Policies

1. Structural solutions to reduce shoreline damage should be allowed only after it has been demonstrated that nonstructural solutions would be unable to prevent further damage.

2. Shoreline protection devices should not be allowed for the purpose of creating new land...

3. Shoreline protection structures should allow passage of ground and surface waters into the main water body, such as weep hole.

4. The use of riprap structures is a preferred shoreline protection structure.

5. Shoreline protection activities should consider the ecological system of sizeable reaches of rivers, lakes or marine shorelines. This consideration should be given to factors such as off-site erosion, accretion or flood damage that might occur as a result of shoreline protection structures or activities. All uses and activities should be developed in a coordinated manner among affected property owners and public agencies.

6. Erosion, littoral drift, and accretions are primary components of the dynamic geohydraulic process that has created much of the unique and scenic shoreline. Therefore, shoreline protective structures should be located, designed and maintained in a manner which protects the integrity of these natural processes.

7. Shoreline protection structures should be allowed to prevent damage to agricultural lands, public roads and bridges, existing structures and areas of unique public interest.

8. Shoreline stabilization projects should be located landward of natural wetlands, marshes and swamps of associated fresh and marine waters.

9. Substantial stream channel modification, realignment and straightening should be discouraged as a means of shoreline protection.

Current Regulatory Language

- Lewis County SMP 2017 (Section 6.07)

A. Use structural shoreline stabilization measures only when nonstructural shoreline stabilization measures have been determined to be infeasible. The use of shoreline stabilization measures should be based on the following hierarchy of preference:

1. Take no action. Allow the shoreline to retreat naturally, increase shoreline buffers, and relocate structures.

2. Use flexible, bioengineered structures constructed of natural materials such as protective berms, large woody debris, or vegetative stabilization.

3. Employ rigid structures constructed of artificial materials such as riprap or concrete.

B. Locate and design shoreline stabilization measures to fit the physical character of the specific shoreline reach, which may differ substantially from adjacent reaches.

C. Coordinate the development of shoreline stabilization measures between affected property owners and public agencies and ensure those measures infringe on private property rights to the minimum extent necessary.

D. Consider the probable effects of proposed shoreline stabilization measures on neighboring properties.

E. Restrict the size of new shoreline stabilization structures to the minimum necessary.