Local Actions Program Update

Chehalis Basin Board

December 3, 2020

Board Objectives thru March

Board's response to Governor committed to determine:

1. Potential for flood damage reduction, with and without dam (including estimated costs)

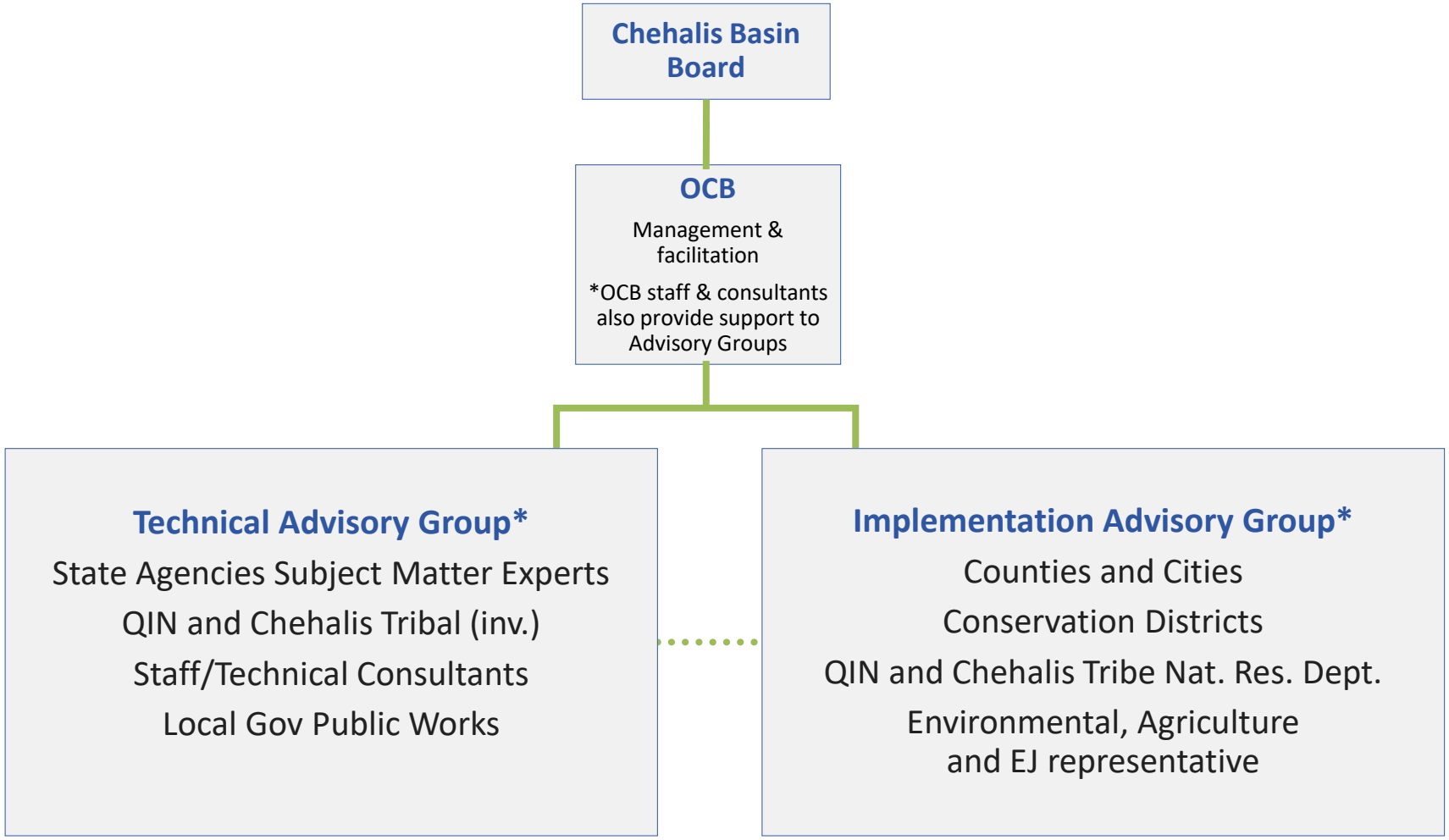
2. Potential to avoid, minimize and/or mitigate aquatic habitat and species impacts of dam (including est. costs)

3. Magnitude, priority and sequence of ASRP actions necessary to protect/restore freshwater habitat and abundance/ resilience of aquatic species (including est. costs)

Board Recommendations by March

- Which actions are ready to be implemented as part of long-term strategy
- Which need more evaluation before determining whether they should be implemented
- Which should not move forward
- Next steps & resources needed to advance long-term Strategy over next 4-6 years
- Detailed 2021-2023 biennial capital budget request

Advisory Groups



Advisory Groups' Progress To Date

Technical Advisory Group

- Near-term climate assumptions for modeling future floodplain
- Refined detail for areas of flood damage
- Near-term approach to delineate erosion areas
- Review of past studies for floodplain storage and structural solutions

Implementation Advisory Group

- Review of past land use recommendations

Basinwide Look at Flood Damage

Approved Planning Assumptions for Local Actions Program

The Board will:

1. Consider a timeframe of up to 30 years to implement the actions necessary to achieve outcomes.

2. Utilize future flood conditions that are predicted for the 100-year flood in 2080 (26% and 50% increase).

3. Require projects funded through the Local Actions Program to be designed, implemented, and mitigated to avoid making flood damage worse in other areas.

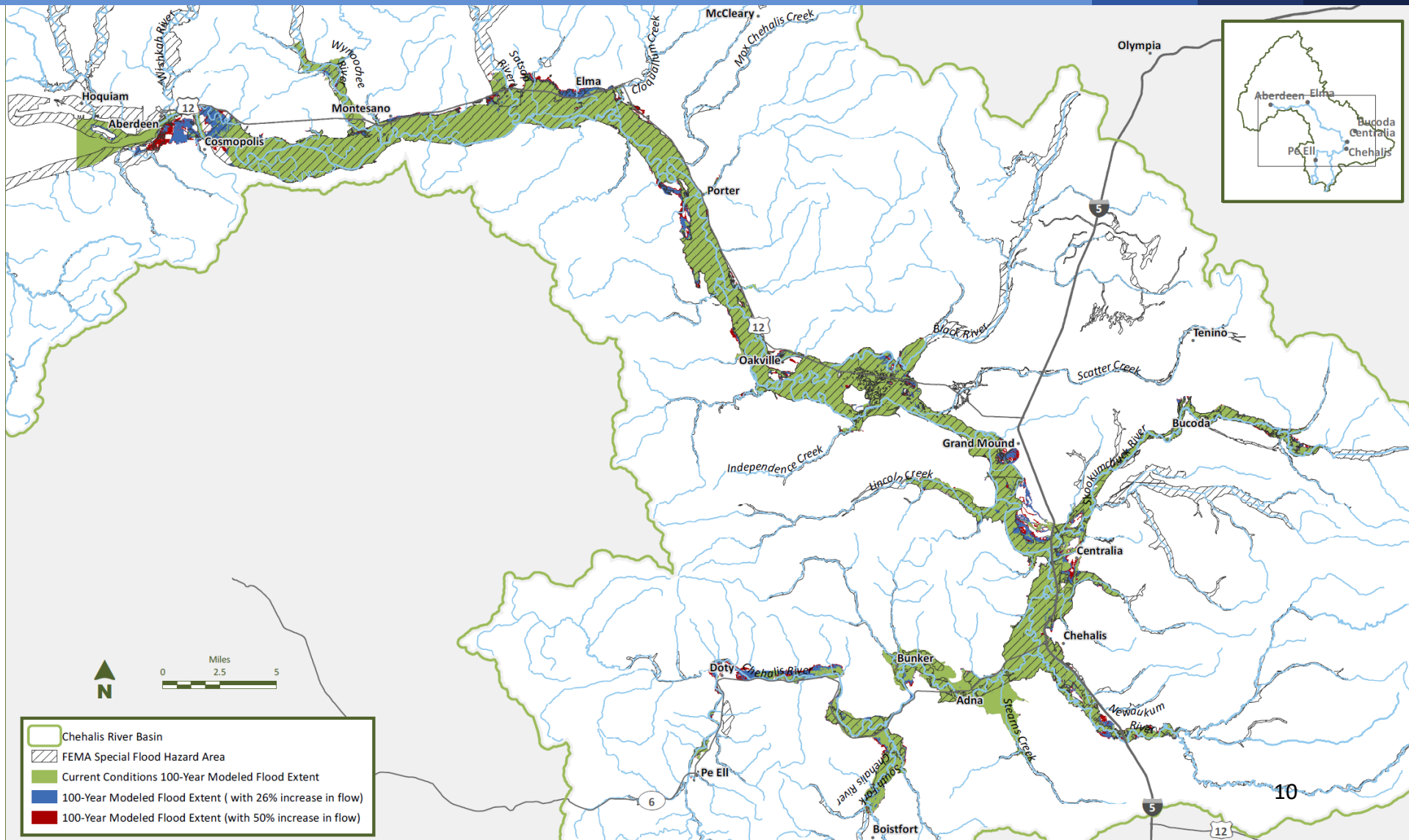
Updated Range of Late-Century 100-year flows

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

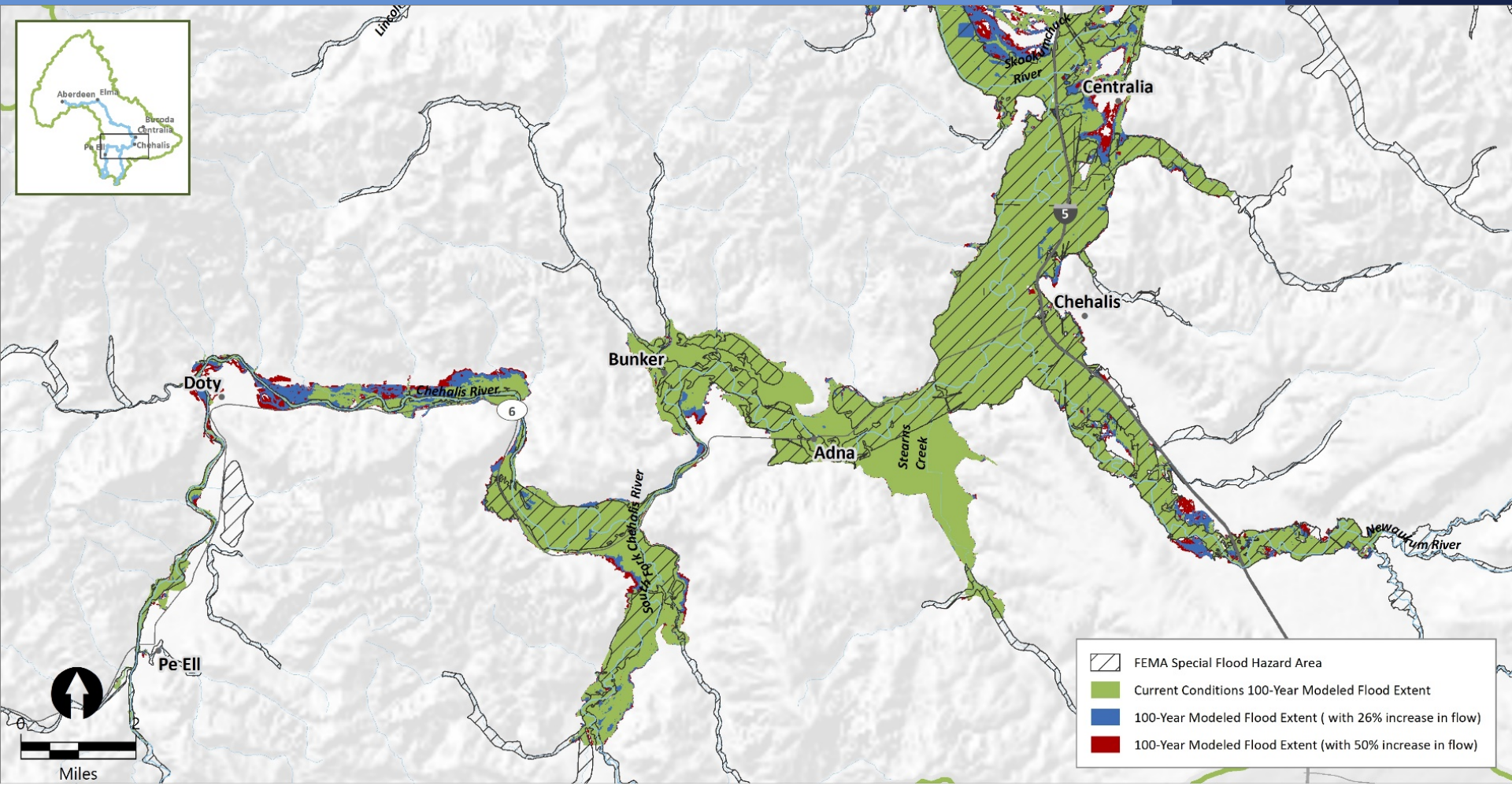
LOCATION	LATE-CENTURY 100-YEAR FLOOD		FLOOD OF RECORD (CFS)	FLOOD OF RECORD DATE
	WITH 26% INCREASE	WITH 50% INCREASE		
Chehalis River near Doty	45,100	53,500	52,600[1]	12/3/2007
Chehalis River near Grand Mound	102,200	128,600	79,100	12/4/2007
Chehalis River at Porter	120,700	151,800	86,500	12/5/2007
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)

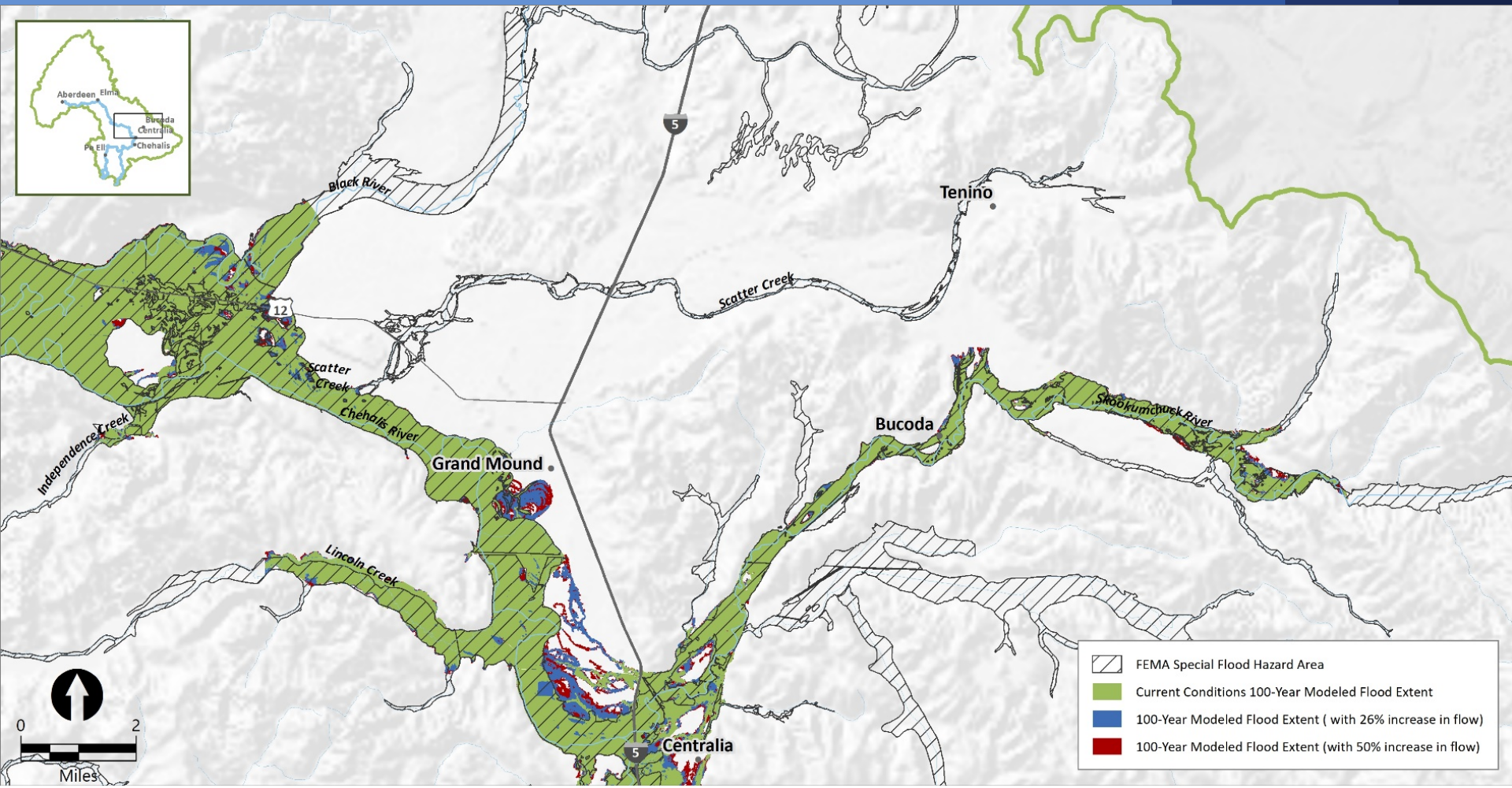
Modeled Flood Extents



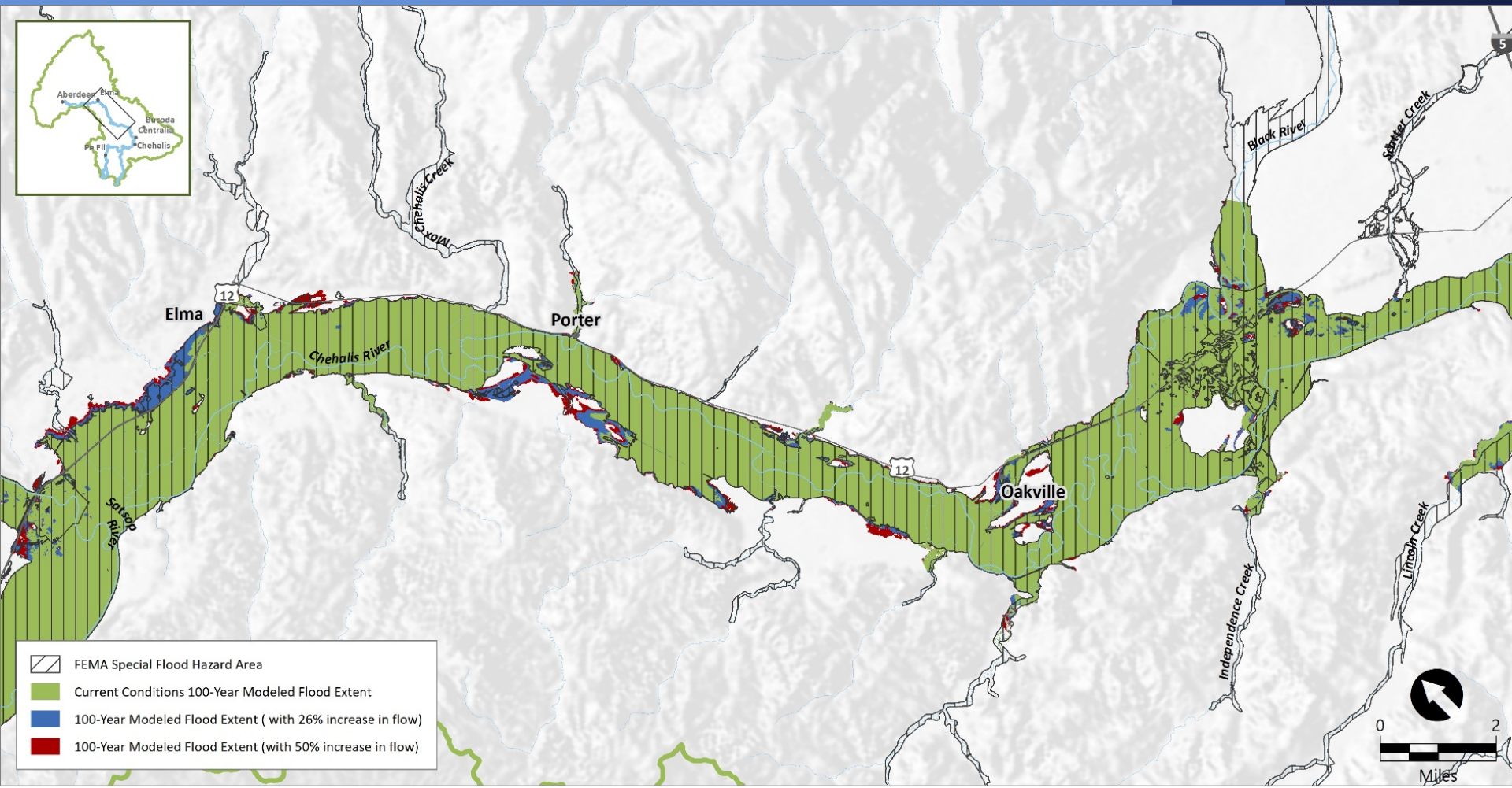
Upper Basin Flood Extents



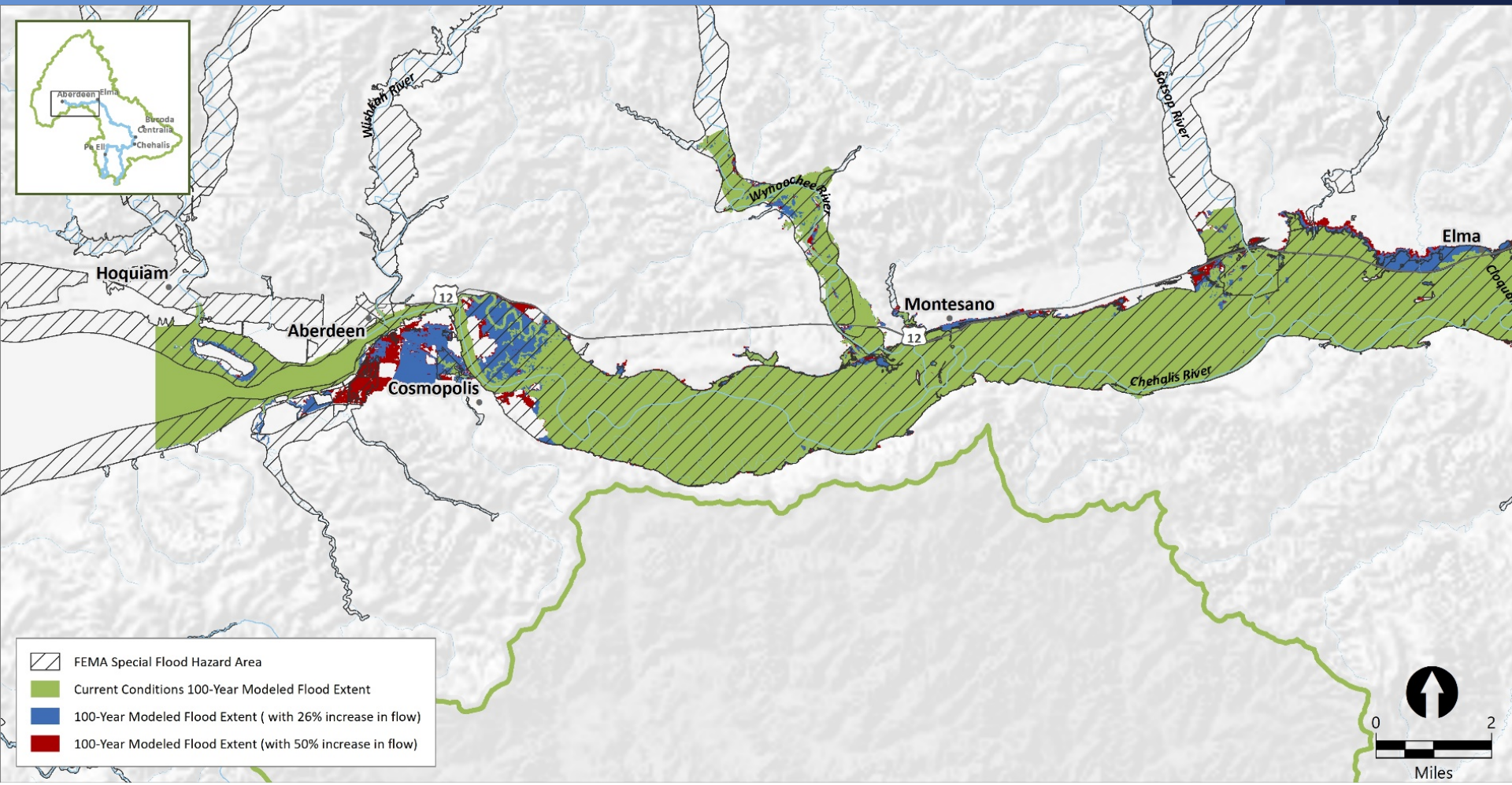
Middle Basin Flood Extents



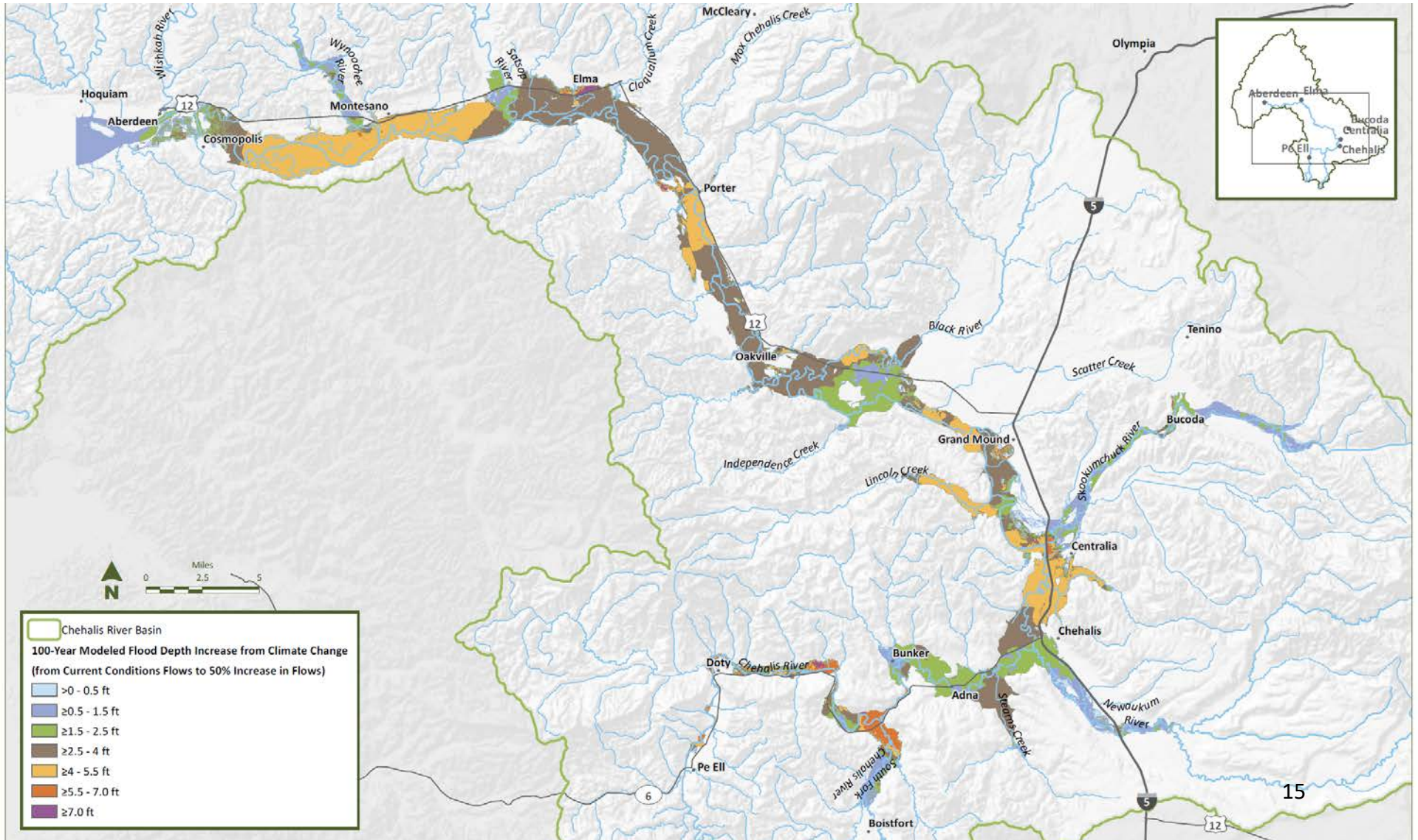
Middle Basin Flood Extents, *cont.*



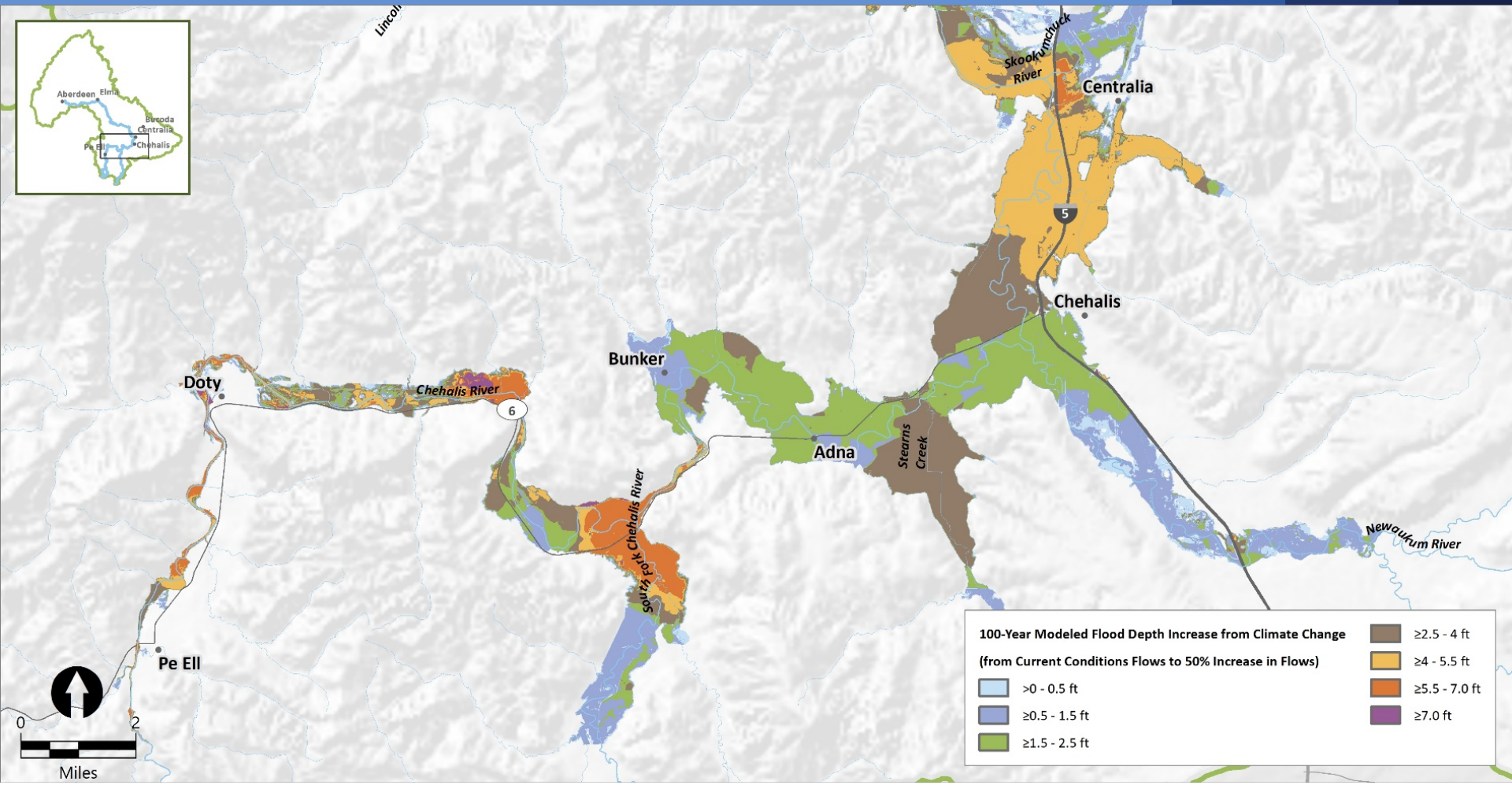
Lower Basin Flood Extents



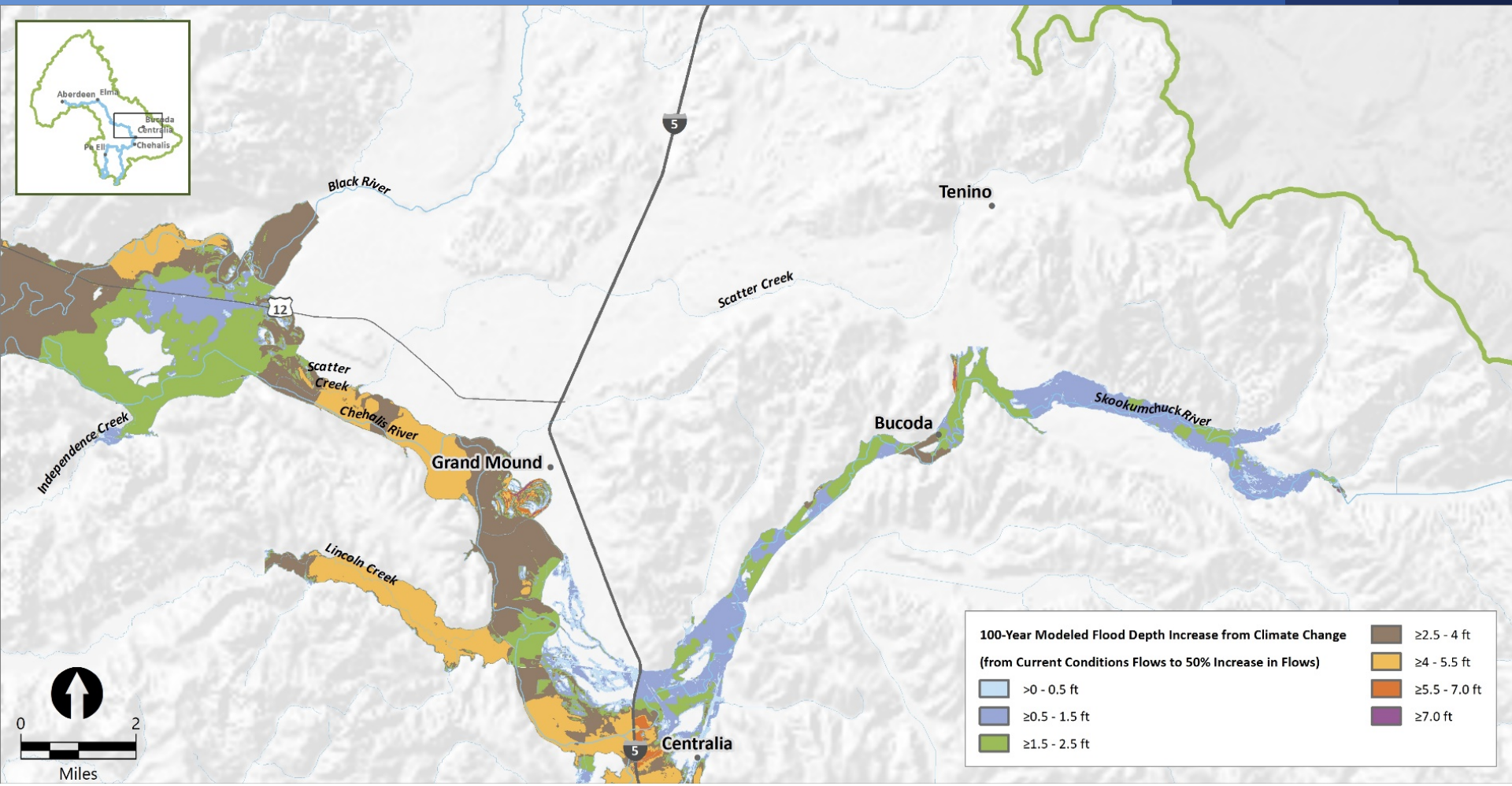
Modeled Flood Depth Comparisons



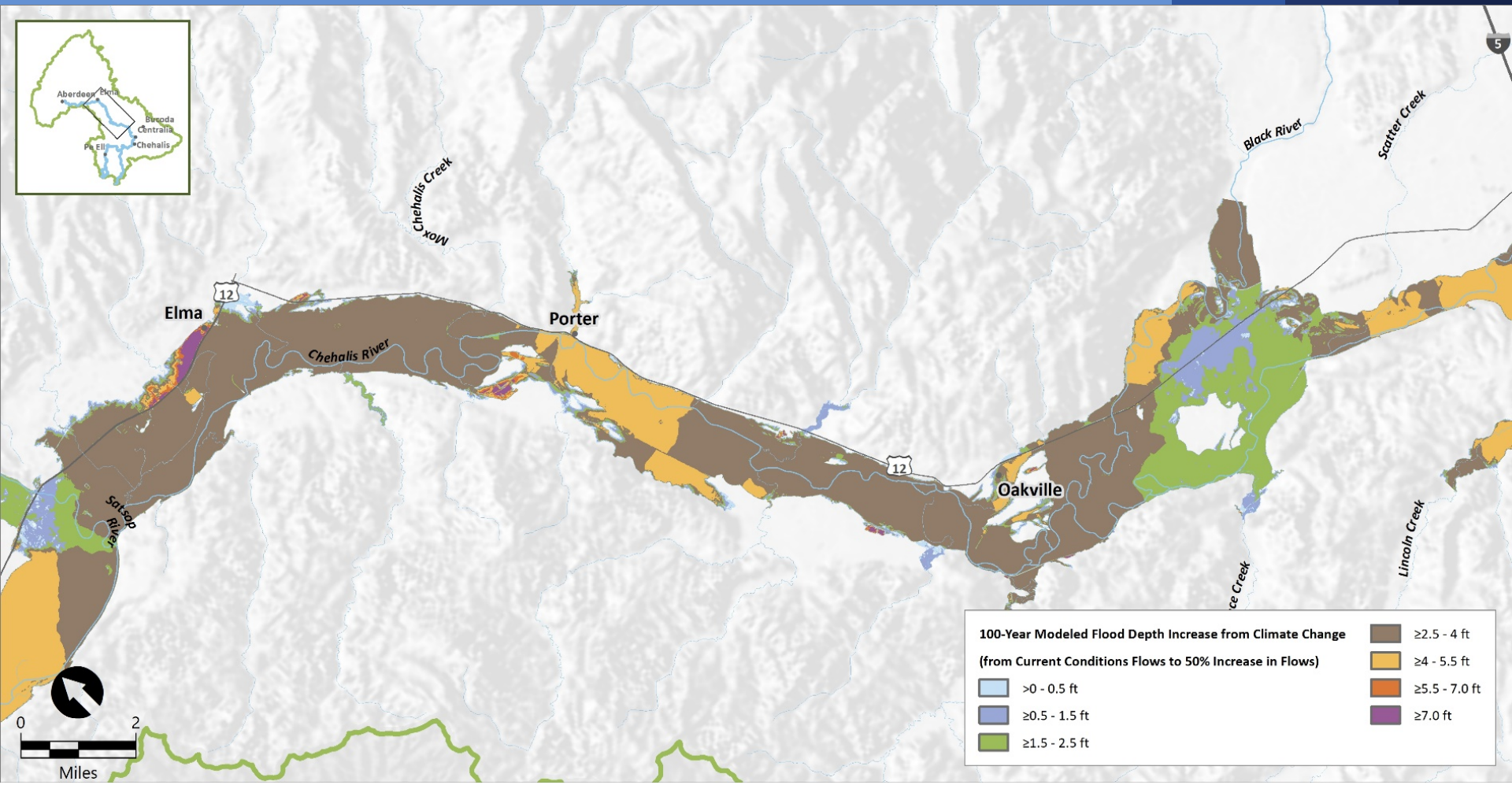
Upper Basin Depth Changes



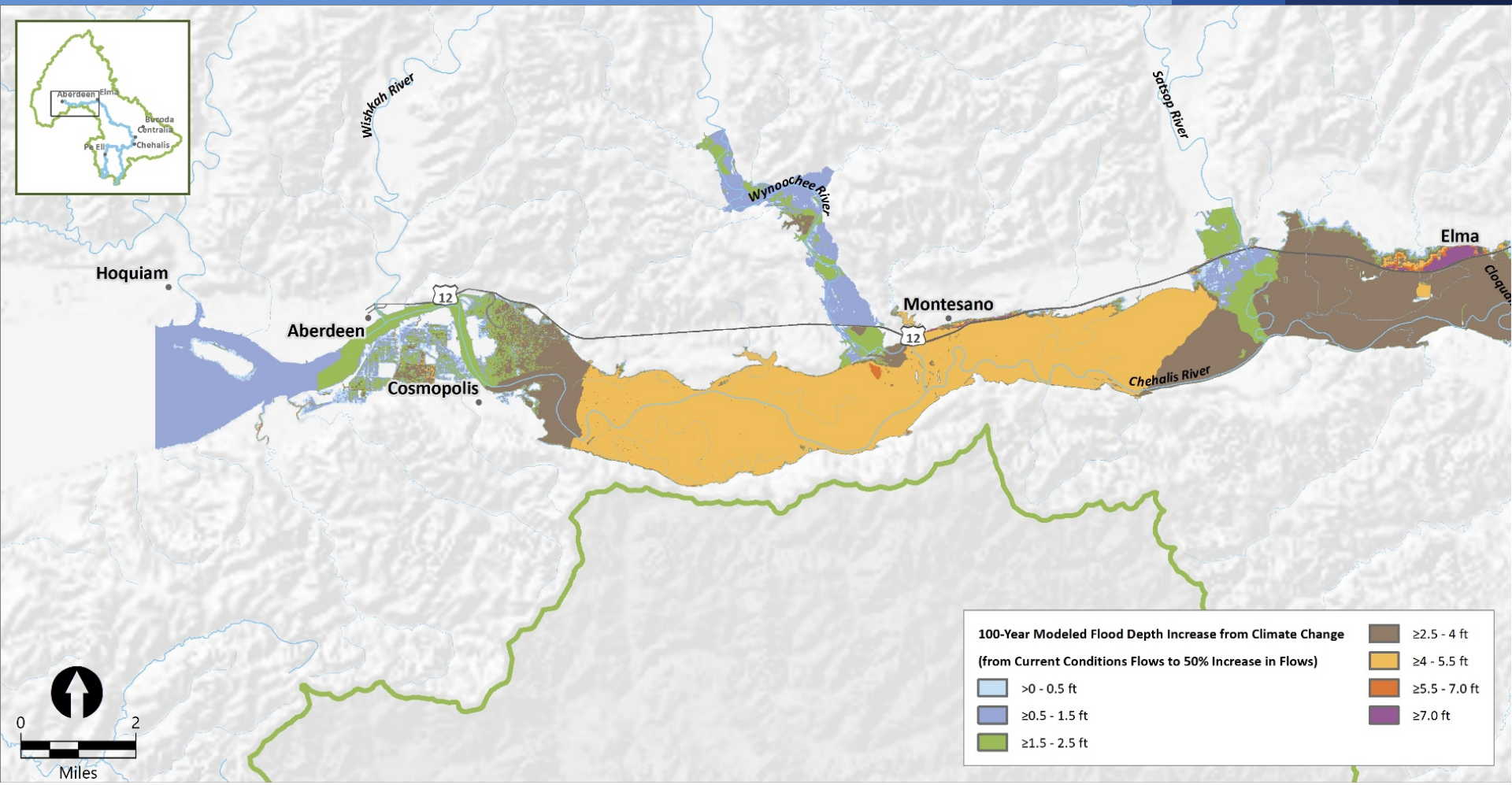
Middle Basin Depth Changes



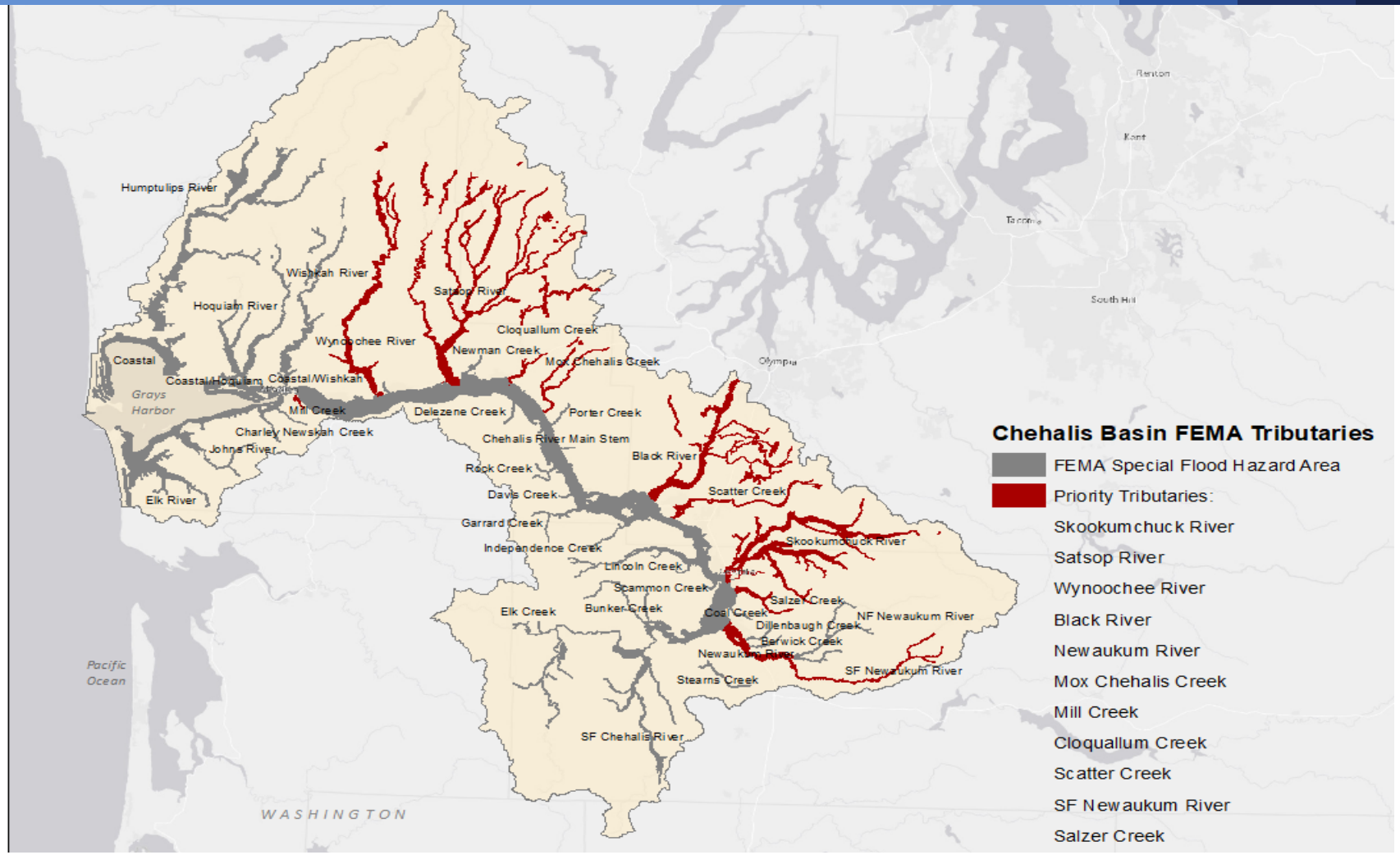
Middle Basin Depth Changes, *cont.*



Lower Basin Depth Changes



Potential Tributary Priorities (additional modeling)



Advisory Groups' Progress To Date

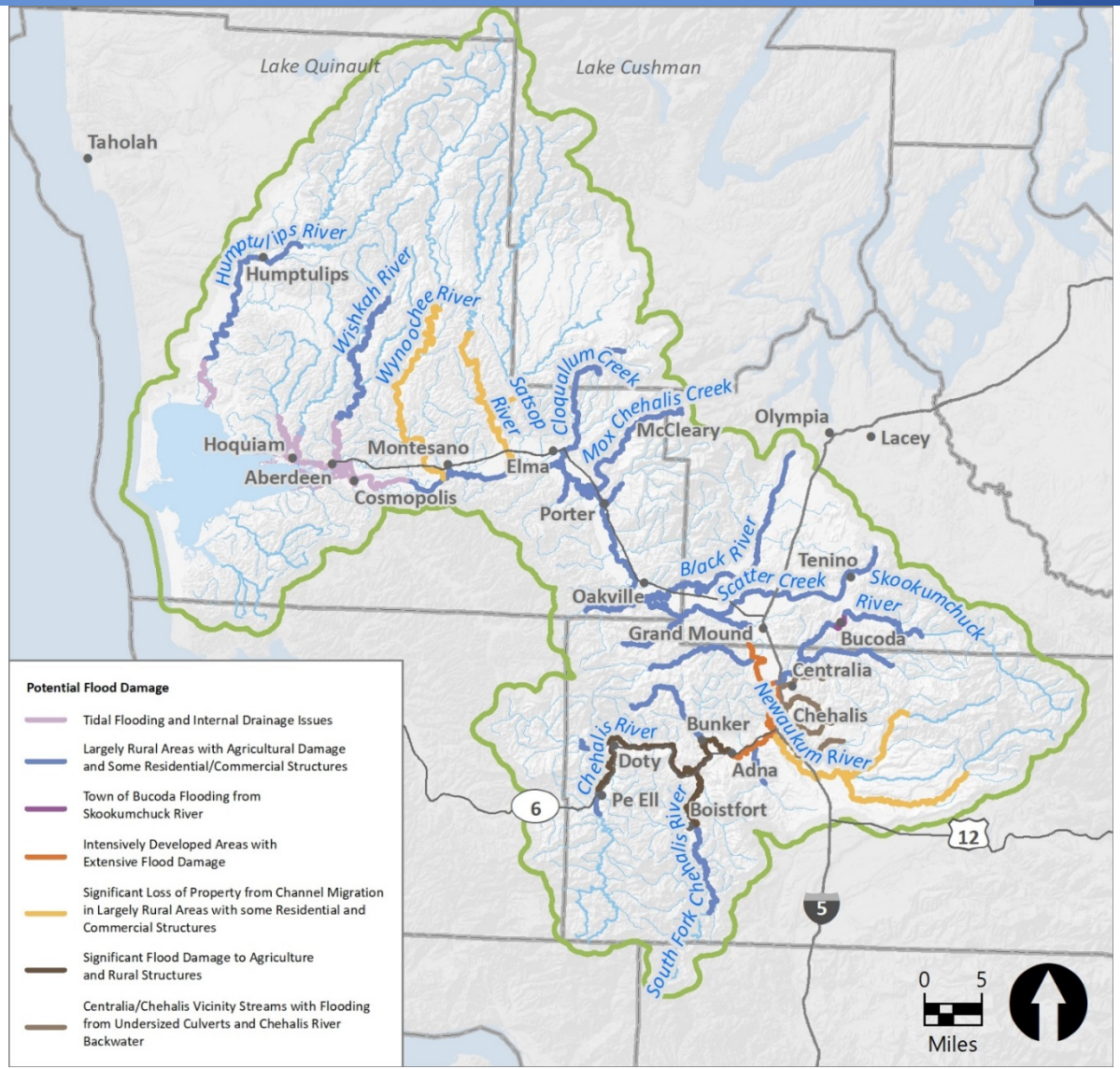
Technical Advisory Group

- Near-term climate assumptions for modeling future floodplain
- Near-term approach to delineate erosion areas
- ***Refined detail for areas of flood damage***
- Review of past studies for floodplain storage and structural solutions

Implementation Advisory Group

- Review of past land use recommendations

Targeting Local Actions



Local Action Analyses & Actions

Identify erosion and channel migration hazards

Evaluate appropriate bank protection options

Identify opportunities to increase floodplain storage

Evaluate potential for structural solutions in high priority areas

Identify opportunities to protect structures through floodproofing, elevation and/or relocation.

Identify opportunities for floodplain agriculture ‘stay-in-place' assistance tailored to address site-specific flood and erosion risks.

Identify opportunities to improve flood emergency response actions.

Prevent new at-risk development.

Summary and Ranking of Flood Damage Potential

Rankings based on:

- Structures
- Developable Acreage
- Agricultural Acreage

Highest Ranked Systems

FLOODING SOURCE	AGRICULTURAL ZONING IN SFHA (ACRES)		DEVELOPABLE ZONING IN SFHA (ACRES)		STRUCTURES IN SFHA (COUNT)		
TOTAL	55,755	RANK	54,213	RANK	14,548	RANK	OVERALL RANK
Chehalis Mainstem	31,387	1	14,094	1	3,860	1	1
Coastal Flood Zone	651	10	8,391	2	3,094	2	2
Skookumchuck River	1,655	6	3,812	5	1,863	4	3
Satsop River	4,378	3	1,675	9	589	5	4
Humptulips River	5,898	2	6,564	3	183	11	5
Wynoochee River	4,280	4	2,537	7	241	8	6
Black River	53	20	2,740	6	234	9	7
Newaukum River	758	9	539	16	295	6	7
Coastal/Hoquiam	0	28	1,147	12	2,193	3	9
Hoquiam River	0	28	3,928	4	205	10	10
Wishkah River	1,538	7	2,053	8	83	20	11
Coastal/Wishkah	0	28	341	17	251	7	11
Mox Chehalis Creek	213	13	697	15	96	18	13
Charley and Newskah Creeks	0	28	801	14	141	14	14
Cloquallum Creek	59	19	334	18	125	15	15
Scatter Creek	15	25	912	13	108	17	16
South Fork Newaukum River	322	12	25	29	144	13	17
Salzer Creek	15	26	88	25	163	12	18

Example Ranking of Flood Damage Potential

FLOODING SOURCE	AGRICULTURAL ZONING IN SFHA (ACRES)		DEVELOPABLE ZONING IN SFHA (ACRES)		STRUCTURES IN SFHA (COUNT)		OVERALL RANK
TOTAL	55,755	RANK	54,213	RANK	14,548	RANK	
Chehalis Mainstem	31,387	1	14,094	1	3,860	1	1
Coastal Flood Zone	651	10	8,391	2	3,094	2	2
Skookumchuck River	1,655	6	3,812	5	1,863	4	3
Satsop River	4,378	3	1,675	9	589	5	4
Humptulips River	5,898	2	6,564	3	183	11	5
Wynoochee River	4,280	4	2,537	7	241	8	6

LOCATION	DESCRIPTION AND NUMBER OF STRUCTURES IN MODELED 2080 FLOODPLAIN	POSSIBLE SOLUTIONS AND TECHNICAL CONSIDERATIONS
1. Adna	Concentration of residences and high school **Structures = 83**	Drainage solution implemented in 2013; potential levee or road raise to further protect Adna
2. Lower Newaukum	Moderate number of residences near Stan Hedwall Park **Structures = 20**	May be too few structures for levee
3. Airport Levee and Chehalis	Airport levee and I-5, commercial district of Chehalis. **Structures = 215**	Possible raise of levee, I-5, or floodwalls; combine with other actions such as raising local roads
4. Centralia	Majority of Centralia east of I-5, flooding from Skookumchuck in north half; from Salzer/Chehalis in south half **Structures = 3,484**	Possible new, raised, or setback Skookumchuck levees; possible extension of Long Road levee to protect South Centralia; possible road raises to protect downtown
5. West Centralia	Centralia west of I-5 **Structures = 508**	Potential new levee similar to segment proposed by Corps studies; combine with other actions such as removing fill, raising roads, or widening bridges
6. Military Road	Residential **Structures = 34**	Potential road raise
7. Galvin	Concentration of residences **Structures = 87**	Possible road raise; could also consider flood storage
8. Independence Road and north floodplain	Right bank floodplain of Chehalis River, nearly 40% of river flow goes north towards Black River; numerous residences, Chehalis Reservation **Structures = 306**	Possible causeway or road raises
9. Oakville	South part of town **Structures = 172**	Possible levee and pump station
10. Elma	South Elma along north side of Highway 12; water flows over Highway 12 to low spot **Structures = 148 structures**	Possible raise of Highway 12, levee and pump station
11. South Aberdeen Levee Area	Area protected by levee still experiences tidal, local, and tributary flooding **Structures = 1,203**	Possible pump station and raise of levee; removal of fill on riverward side of levee for flood storage
12. East Aberdeen	Tidal flooding near Wishkah River in commercial area; not protected by North	Possible pump station and fill removal to

Advisory Groups' Progress To Date

Technical Advisory Group

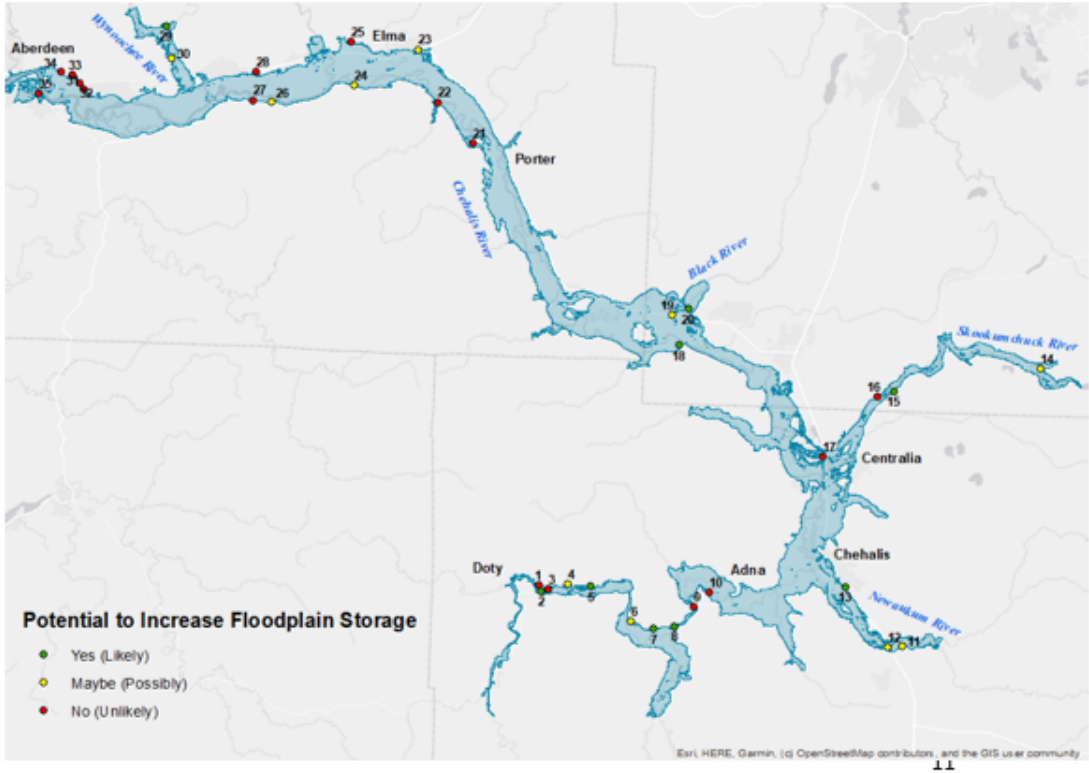
- Near-term climate assumptions for modeling future floodplain
- Near-term approach to delineate erosion areas
- Refined detail for areas of flood damage
- ***Review of past studies for floodplain storage and structural solutions***

Implementation Advisory Group

- Review of past land use recommendations

New Evaluation of Floodplain Storage

- 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)



Advisory Groups' Progress To Date

Technical Advisory Group

- Near-term climate assumptions for modeling future floodplain
- Near-term approach to delineate erosion areas
- Refined detail for areas of flood damage
- Review of past studies for floodplain storage and structural solutions

Implementation Advisory Group

- ***Review of past land use recommendations***

Land Use Recommendations

Implementation Advisory Group review:

- 2016 Flood Authority Recommendations
- 2010 Basin Floodplain Comprehensive Plan

Also identifying other potential land use recommendations for consideration

Survey of Local Jurisdictions

- Survey of local governments and Chehalis Tribe on status of implementing floodplain management recommendations from:
  - 2010 Chehalis River Basin Comp Flood Plan
  - Chehalis River Basin Flood Authority in 2016
- A total of 10 of 15 jurisdictions responded to-date
- OCB staff following up
- Survey of IAG now underway to identify most important recommendations

Past Floodplain Management Recommendations

- Local Government Use of Current Data and Involvement FEMA Community Rating System Planning
- Building/Development Requirements
- Zoning and Permitting
- Water Quality and Critical Areas

Floodplain Management Recommendations

Water Quality / Critical Areas

- Stormwater manual adoption
- Floodplain protection in Critical Areas Ordinance
- Wetland and stream buffers
- Impervious surface limits
- Shoreline Master Program updates
- Associated wetlands in shoreline management zone
- Hazardous materials

Floodplain Recommendations – Next Steps

- Survey of Local Governments
- Implementation Group discussion of implications
- January Board Briefing

What's Next?

TAG Meetings

December 14

January 8

January 13

February 8

IAG Meetings

December 16

January 11

January 13

January 21

February 11

February 22

Local Action Analyses & Actions

Identify erosion and channel migration hazards

Evaluate appropriate bank protection options

Identify opportunities to increase floodplain storage

Evaluate potential for structural solutions in high priority areas

Identify opportunities to protect structures through floodproofing, elevation and/or relocation.

Identify opportunities for floodplain agriculture ‘stay-in-place' assistance tailored to address site-specific flood and erosion risks.

Identify opportunities to improve flood emergency response actions.

Prevent new at-risk development.

Questions?