# Restorative Flood Protection Newaukum Pilot Feasibility Study Preliminary Findings

Briefing to Office of Chehalis Basin Board

September 6, 2018



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# Background

- PEIS included Restorative Flood Protection (RFP) as alternative for large-scale flood damage reduction using screening-level analysis
  - Flood level reduction at Chehalis Airport Levee was small relative to area treated
  - Highest economic benefit of alternatives based on getting people and structures to areas safe from erosion and flooding
- Governor's Work Group recommended further detailed modeling and analysis in Newuakum as pilot feasibility study:
  - Modeling to simulate flood reduction benefits
  - Conceptual design
  - Community feasibility
- Pilot feasibility study findings and recommendations are today's subject



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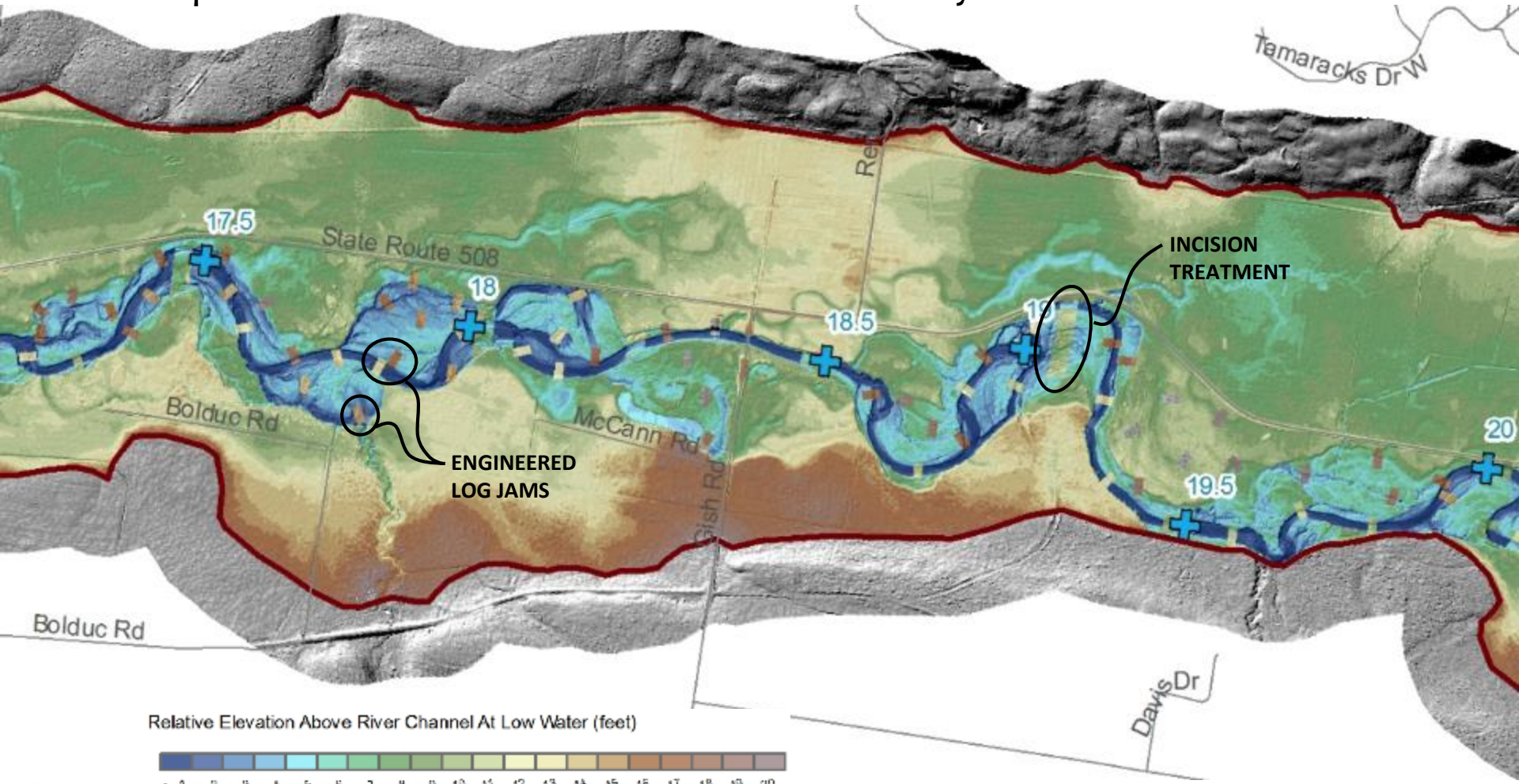
# Restorative Flood Protection (RFP)

## Example from South Fork Newaukum River Valley



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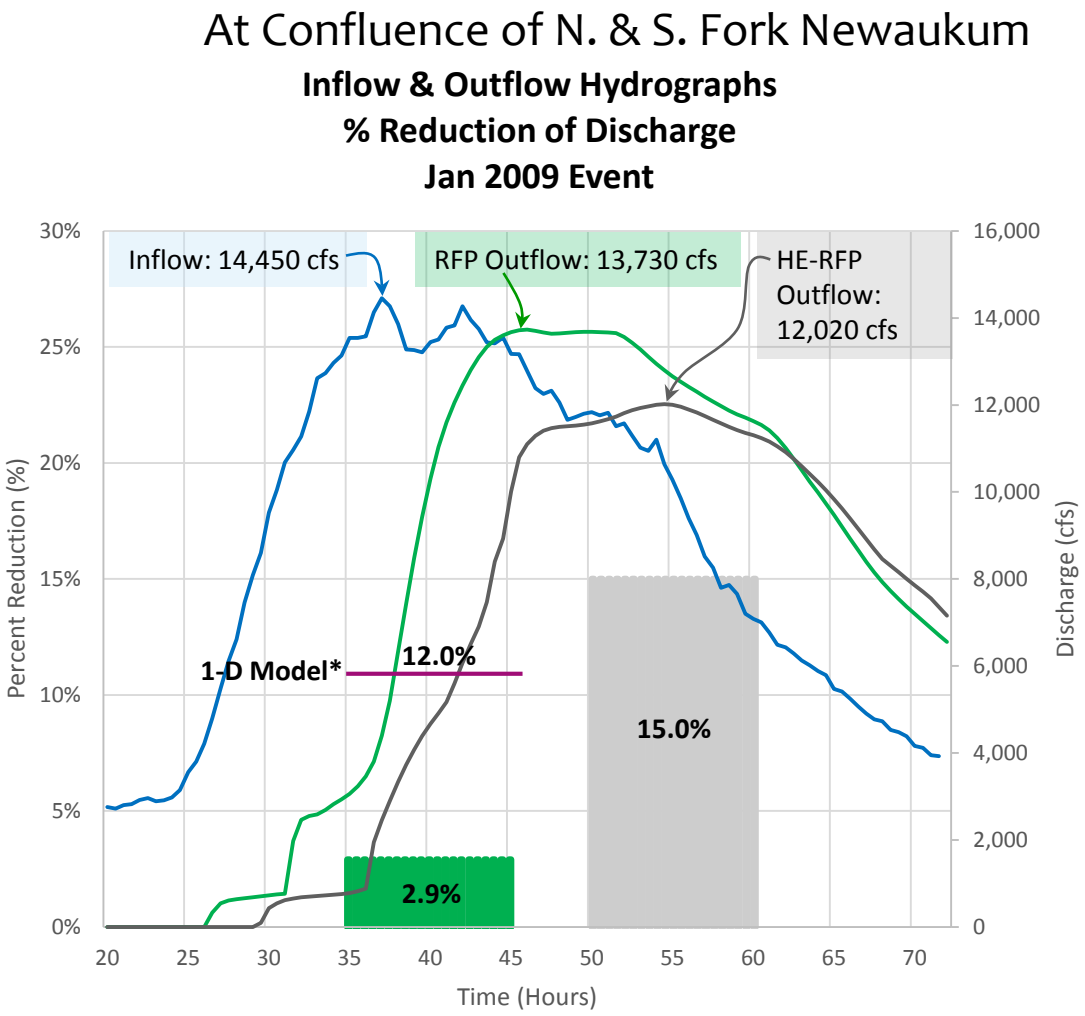
# 2D Model – Results: Summary Flood Attenuation






*** 1-D Model used different hydrograph with shorter-duration flood peak**

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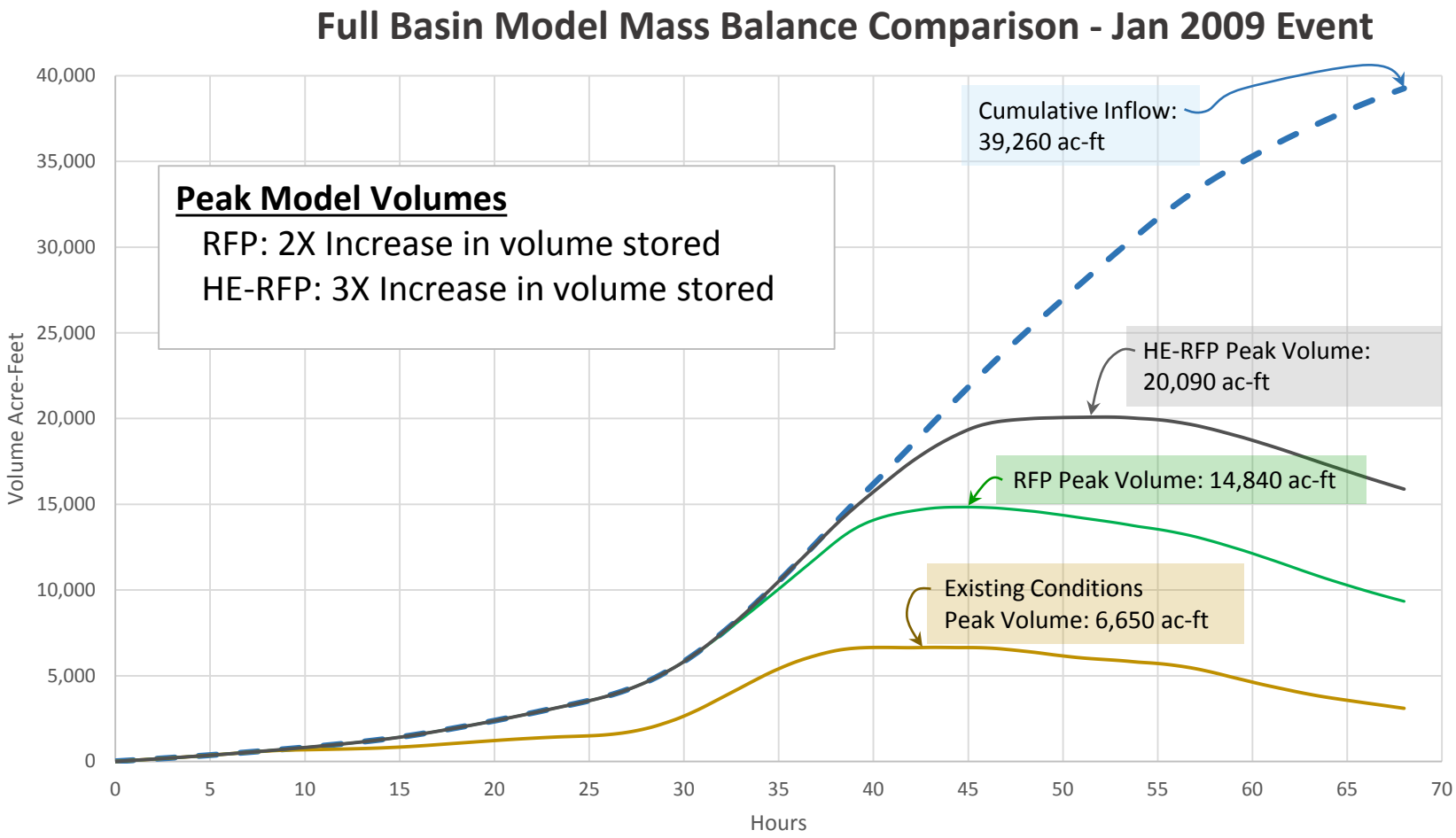
# 2D Model – Results: Water Storage



# Newaukum Flood Attenuation Effectiveness

- Flood Attenuation increases with roughness (river restoration)
- Flood Attenuation increases with lower channel slope

| Performance | Slope | 2009 Flood Peak Attenuation RFP | 10-year Flood Peak Attenuation RFP |
|---|---|---|---|
| **Best** | < 0.3% | 3% | 5% |
| **Moderate** | 0.3 – 0.4% | 2% | 3% |
| **Limited** | > 0.4% | 1% | 1% |

**Flood Attenuation maximized in restored lower-slope channels, example: 0.006% slope yields > 30% reduction**



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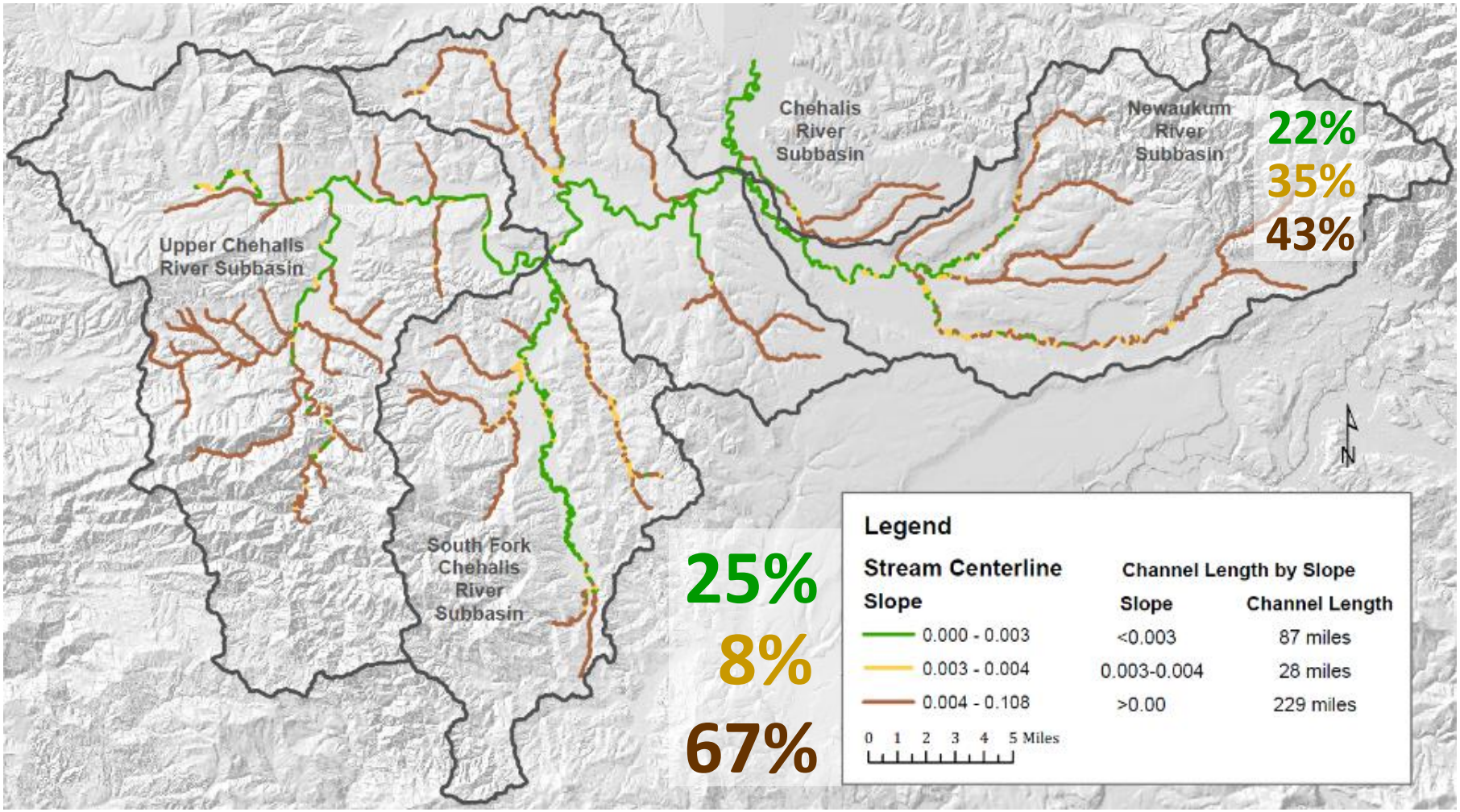
# 2D Model – Results: Broader Applicability



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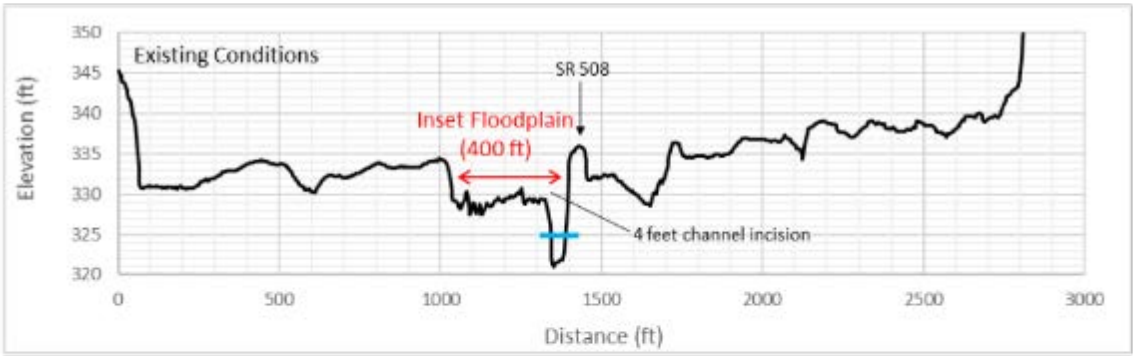
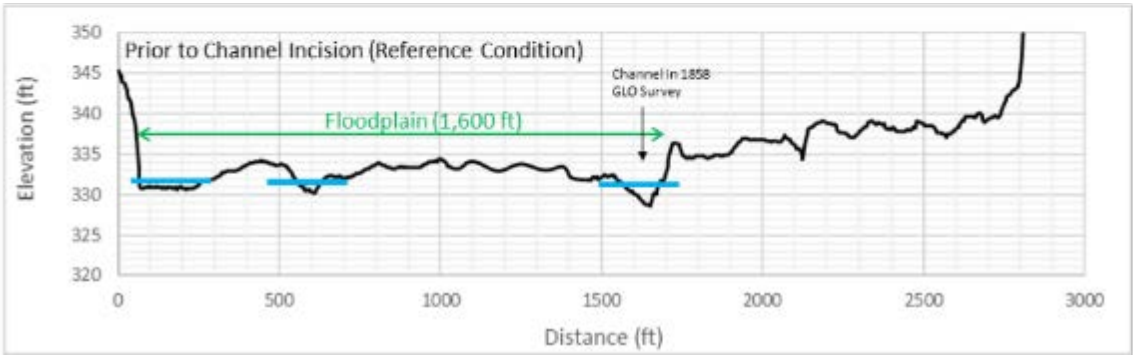
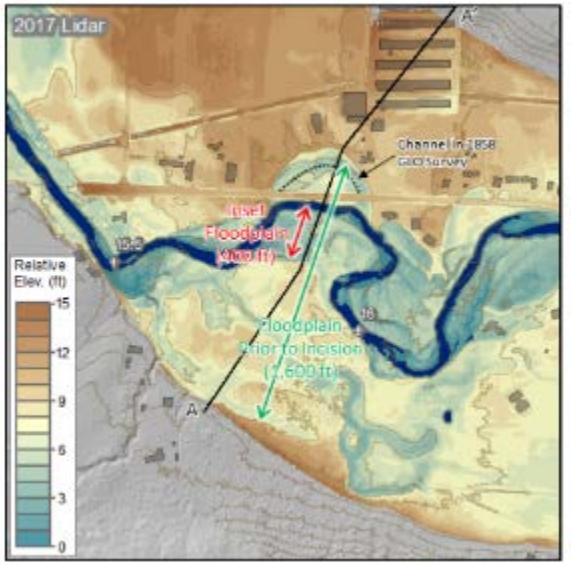
# Historical Reconstruction





Historic Impacts:

- Reduction of historic channel length
- Incision (4'-6'), loss of 75% of effective floodplain



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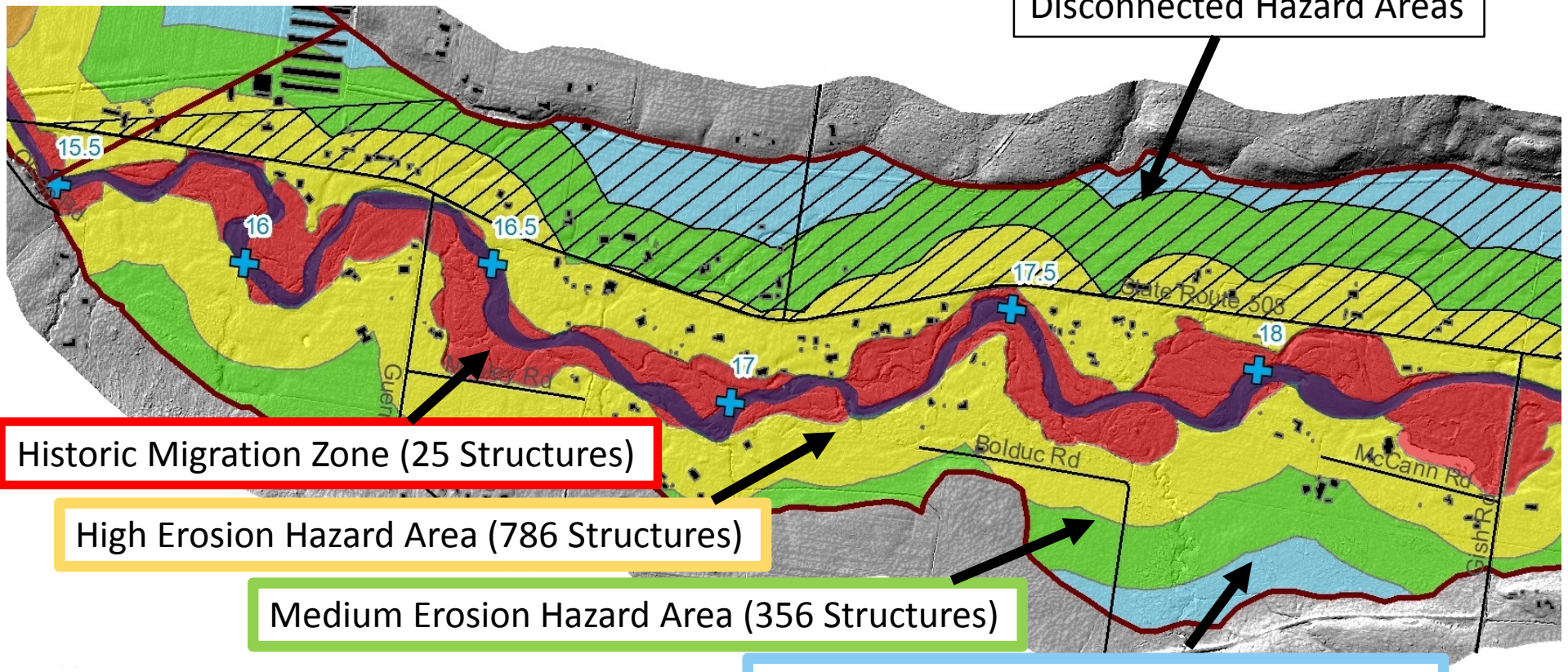
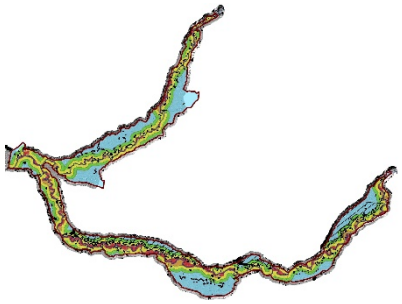
# Erosion Hazards



1,491 Structures w/in Erosion Hazard Areas



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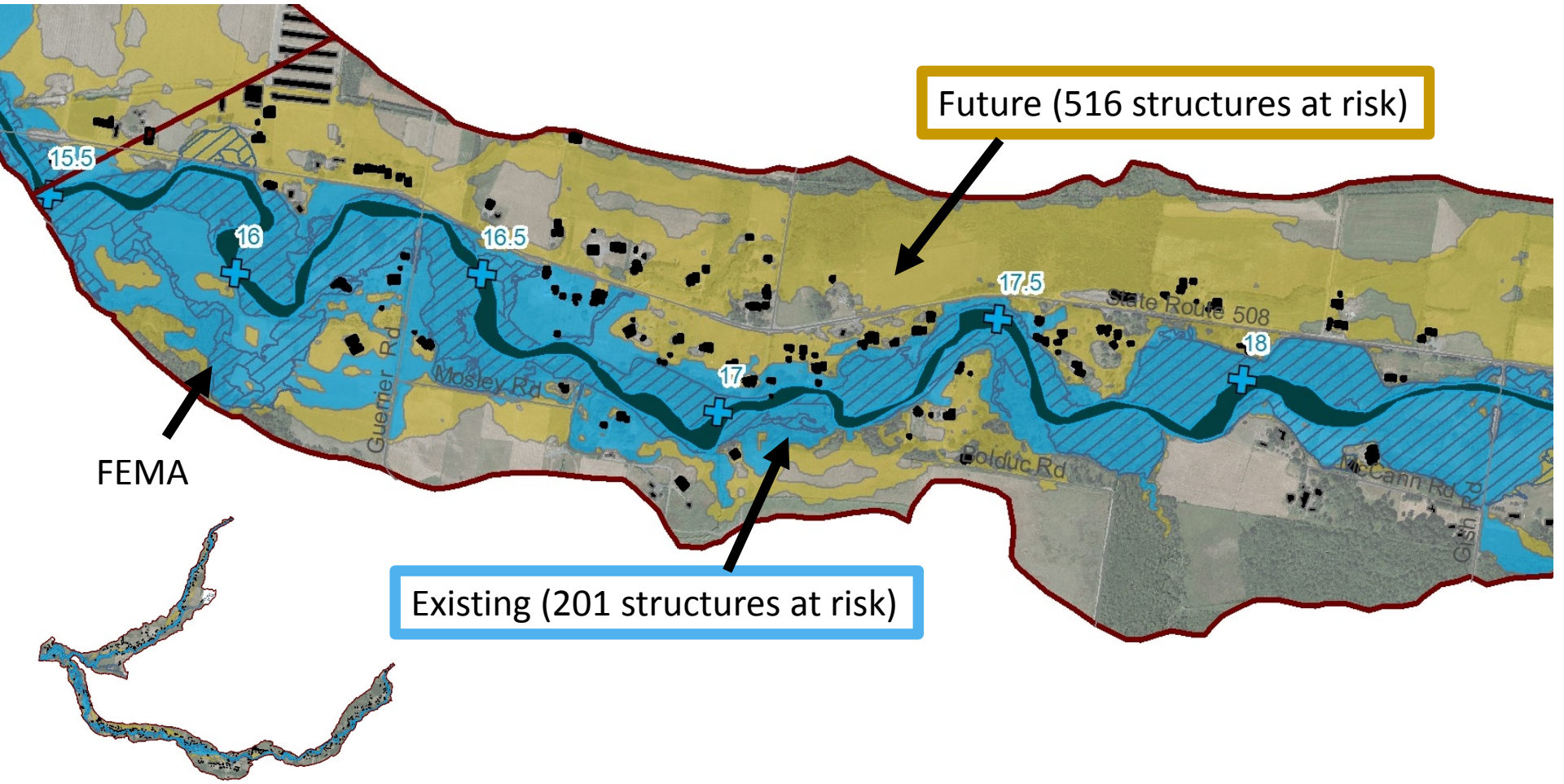
# Flood Hazards – Existing & Future




Climate Change = 66% average increase in 100-year flood peak flow



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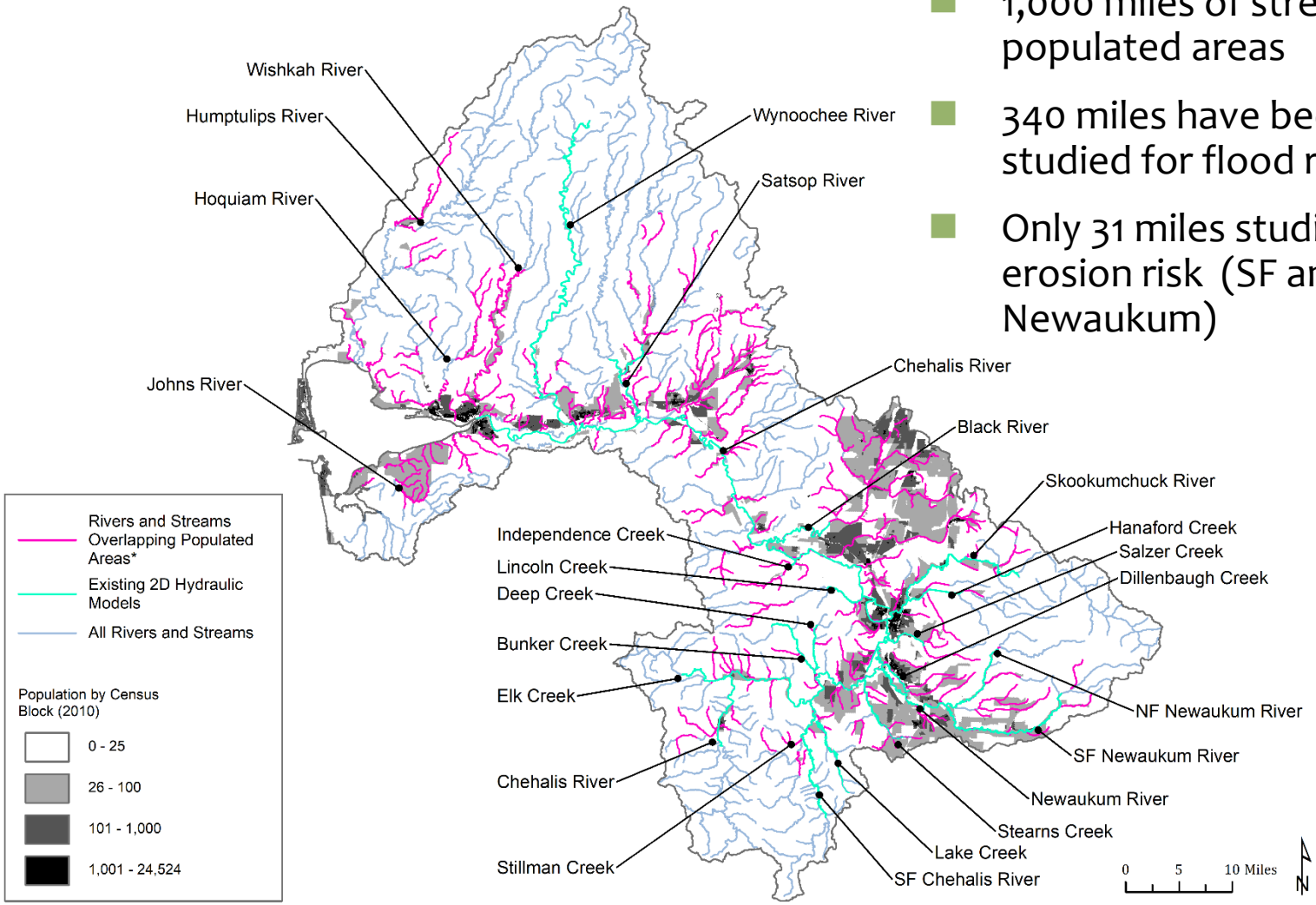
# Erosion & Flood Risk is high




Key points:

- 1,000 miles of streams in populated areas
- 340 miles have been studied for flood risk
- Only 31 miles studied for erosion risk (SF and NF Newaukum)



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# Landowner Interviews – Summary

- 44 river-adjacent landowners interviewed in March-May 2018
- Most river-adjacent landowners have lost property to channel migration
- Property loss / river movements are frequently sudden, and occur during full range of high flows
- Frequent themes from interviewees:
  - Helplessness to save their land, or sell and relocate
  - Frustration
  - Disconnect between constantly changing "science" and their observations on river behavior (role of wood, etc.)
- For every landowner helped with regards to acquisition or relocation, there is an incremental benefit to flood damage reduction. Numerous studies around the United States report a 4 to 7 fold return on these actions, not accounting for the positive ecosystems services that can occur.

# Preliminary Findings & Recommendations

- FINDINGS
  - RFP – 2/3 of upper Chehalis basin too steep to significantly attenuate peak flows
  - HE-RFP – not likely feasible on large scale
  - Channel migration risk to landowners is high
  - Flood risk to landowners is high
  - Riverside landowners subjected to flood and erosion damage are not currently getting help from Chehalis Basin Strategy



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# Preliminary Findings & Recommendations

## RECOMMENDATIONS

- Finish 10% concept for select low-gradient reaches
- Evaluate erosion risk more broadly
- Evaluate flood risk on areas not being studied
- Work products will support Chehalis Basin Strategy's floodproofing program, which we recommend naming Community Flood Protection program



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# Why Community Flood Protection? What is it?

- Flood and erosion problems impact many basin residents in areas outside the mainstem Chehalis. A flexible and adaptable means to address remaining flood and erosion hazards is needed.
- Community Flood Protection includes all the potential solutions for these situations such as floodproofing, structure elevation, bank protection, flood easements, buy-outs, or relocation of structures. All of these tools and others should be available to help people.
- Branding this program with a non-technical name will help the public connect to it, and will help the OCB adapt the program as new tools emerge.
- Floodproofing is a specific technical term; Community Flood Protection includes floodproofing but is not limited to it.

# Products for Community Flood Protection Program

1. Expansion of flood modeling to tributary areas not included in the Flood Authority model. Maps will show areas at greatest risk of flooding under current and future hydrologic conditions, prioritizing areas that make most sense to help get people out of harm's way
2. Maps covering entire Chehalis Basin that show areas at greatest risk of erosion under current and future hydrologic conditions, prioritizing areas that make most sense to help get people out of harm's way
3. Maps showing areas with low erosion, flood and landslide risks best suited for long-term considerations of relocating infrastructure and intensive (non forestry) development
4. Maps showing areas where an RFP treatment has greatest effect on reducing downstream flood peaks.
5. Maps showing areas with greatest benefit to ASRP
6. Maps showing areas best suited to flood tolerant agriculture and low erosion risk
7. Final map set combining above to prioritize acquisition and easement actions



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