

A photograph of a rural landscape heavily inundated with floodwater. In the middle ground, a barn and a tall silo are partially submerged. The background is a dense forest of bare trees. The sky is overcast and grey. The image is framed by a green header bar at the top and a blue footer bar at the bottom.

Flood Retention Facility Project Update

Chehalis River Basin Flood Control Zone District

July 7, 2022

SEPA Resources of Significant Concern

- ✓ Air Quality and Greenhouse Gases
- ✓ Environmental Health and Safety
- ✓ Recreation

○ **Wetlands**

○ **Fish Species and Habitats**

- ✓ Fish Passage

- ✓ Public Services and Utilities
- ✓ Wetlands – Airport Levee
- ✓ Land Use

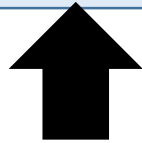
○ **Water**

○ **Wildlife Species and Habitats**

SEPA Draft EIS Conclusion & Assumptions

- **Wetlands, Fish Species and Habitats, Water, Wildlife Species and Habitats**

Up to 3°C increase in water temperature in the reservoir area and immediately downstream.



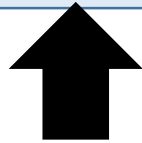
Assumption

All trees larger than 6 inches diameter breast height would be cut down. Trees would not grow back in the entire inundation area.

SEPA Draft EIS Conclusion & Assumptions

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Commitments

Minimize disturbance and leave existing vegetation.

Active Monitoring: Monitor vegetation survivability

Active Management: Replace dead non flood tolerant species

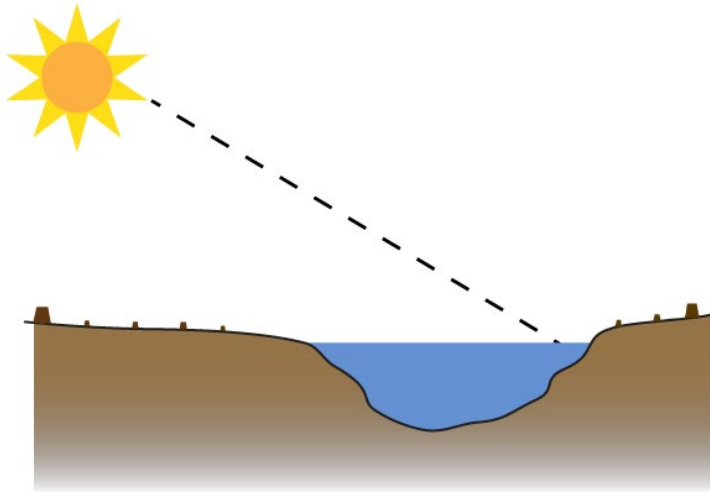
Investigation of Temperature Impact

- District sponsored additional studies
 - Vegetation
 - Removal vs. Management
 - Survivability by Location
 - Types, Heights and Shade
 - Water Temperature Modeling
- Introduce Principal Investigators
 - Mike Witter, HDR
 - Michael Kasch, PE, PH, with HDR
 - Dr. Scott Wells, PE, Portland State University



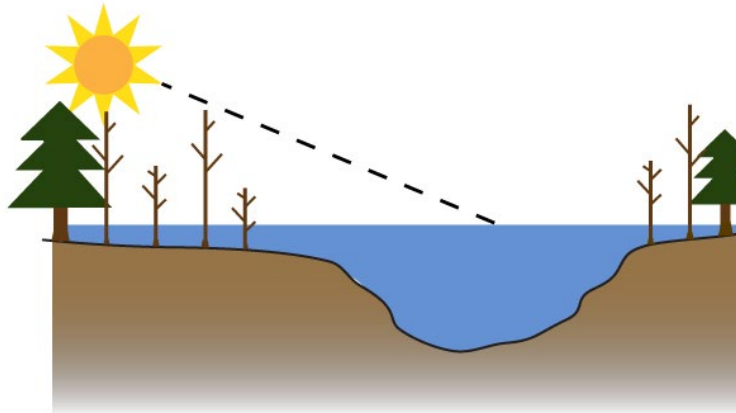
Vegetation Management

SEPA Draft EIS

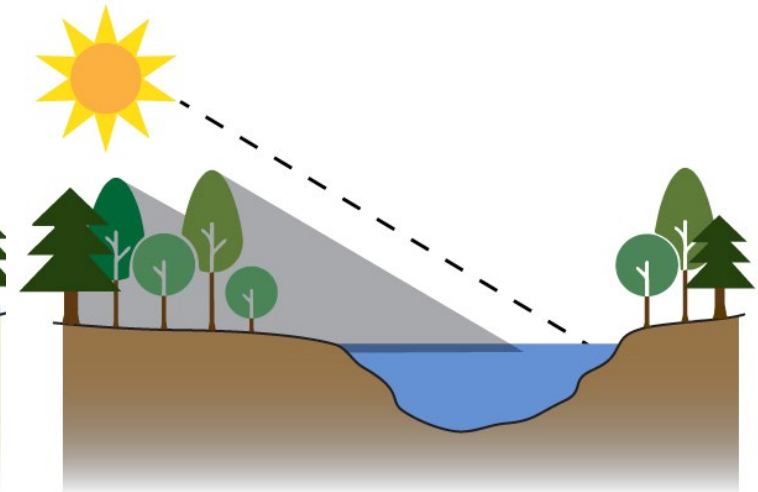


Vegetation Cut Down
No Shade

District Study



Flood Operation
Winter Dormant Leaf Off



Non-flood Operation
Summer Leaf On
Shade

Location Survivability

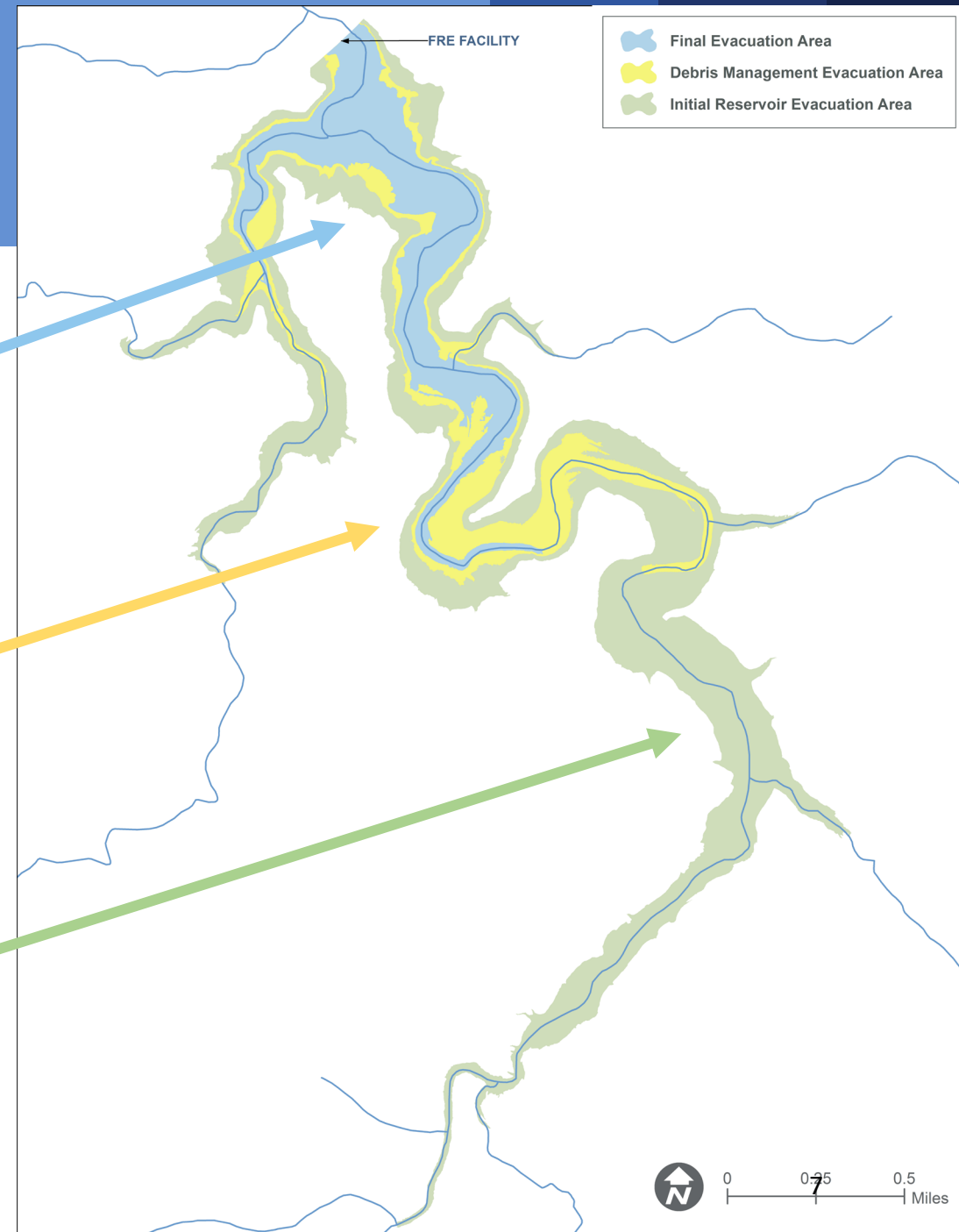
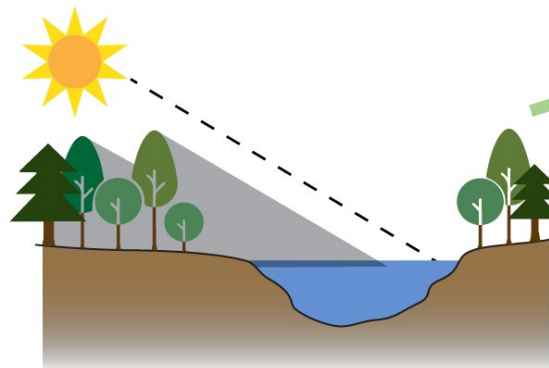
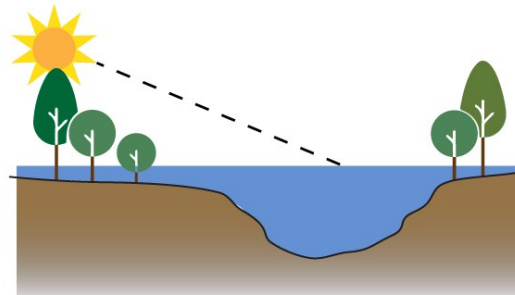
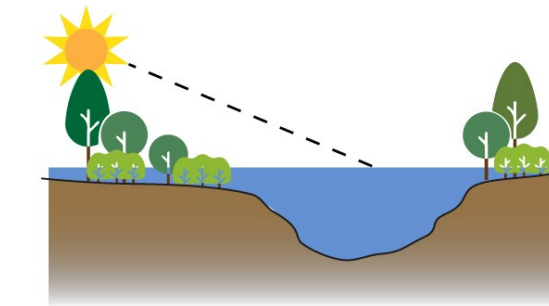
- Low Survival



- Flood Tolerant

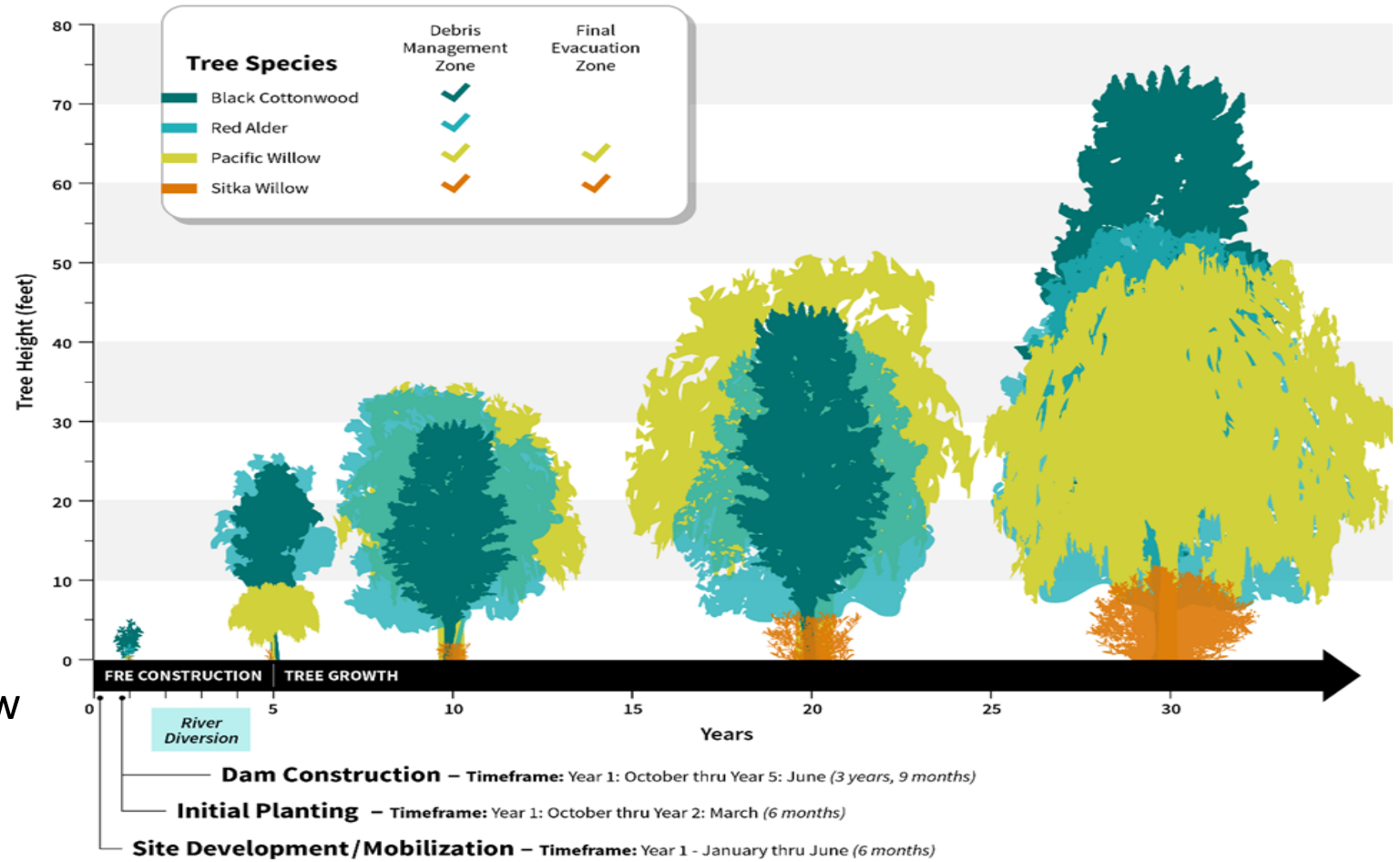


- Natural/High Survival







Type and Height Survivability

- Tree Species
 - Black Cottonwood
 - Red Alder
 - Pacific and Sitka Willow
- Tree Height
 - 5 to 20 feet Low
 - 75 to 90 feet High
- Validation
 - Mud Mtn Dam Vegetation
 - Independent Silviculturist Review



Vegetation in Water Temperature Model

	SEPA Draft EIS	District Study
Reservoir Inundation Area	Cut trees 	Manage trees (VMP) 
Model Used	CE-QUAL-W2 2-dimensional hydrodynamic and water quality model	CE-QUAL-W2 2-dimensional hydrodynamic and water quality model
Modelers	Portland State University Dr. Scott Wells, Dept. Of Civil and Environmental Engineering	Portland State University Dr. Scott Wells, Dept. Of Civil and Environmental Engineering
Impact Results	water temperature 2°C to 3°C increase 	water temperature 0.4°C to 1.2°C increase 

Water Temperature Model

- Taller Vegetation = More Shade
- More Shade = Lower Water Temperature
- Validation
 - Model Predicted Lower Water Temperatures

40 to 85% lower than SEPA Draft EIS

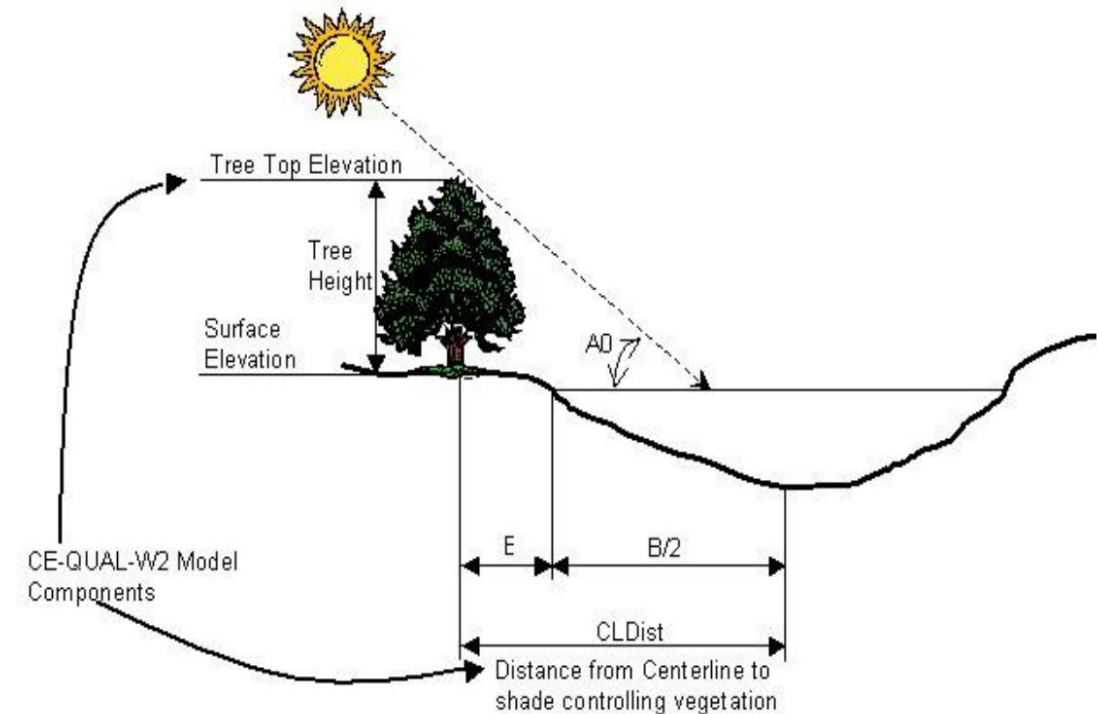


Figure 40. Tree top elevation and vegetation offset from a river.

Vegetation Management Plan

Draft SEPA:

1. Clear Cut, Burn Trees, No Future Trees
= + 2°C to 3°C in summer water temperature



New VMP Approach:

1. Focus tree removal in the lower reservoir (22% total)
2. Remove vegetation selectively to protect sensitive habitats.
3. Plant proactively to minimize temporal loss of vegetation.
4. Promote groundcover plants tolerant of flooding.
= + 0.4°C to 1.2°C in summer water temperature



Vegetation Management Plan

Misconceptions

Misconceptions – Vegetation Management Plan

No tree species can tolerate this level of flooding.

Misconceptions – Vegetation Management Plan



No tree species can tolerate this level of flooding.

Correction of Misconception

Mud Mountain and Howard Hanson Dam

- Black cottonwood and willows
- Upper portions are also vegetated with evergreen species including Sitka spruce

Floods during the winter when deciduous trees are dormant can tolerate flooding

Mud Mountain Example

- Located **70 miles** from FRE Facility
- Constructed in 1947
- The entire reservoir area was cleared of vegetation
- Vegetation seen today has developed since 1947

**Trees Established and
Survive in Reservoir Area**



US Army Corps
of Engineers.



Level II Habitat Survey & Wetland Identification: Howard Hanson Dam and Mud Mountain Dam, King and Pierce Counties, Washington

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July 2019

Misconceptions – Vegetation Management Plan

Inundation events year after year would have more effect than once every 7 years.

Misconceptions – Vegetation Management Plan

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Correction of Misconception

Vegetation can survive back-to-back years of inundation.

Misconceptions – Vegetation Management Plan

The VMP assumes the exact same conditions and characteristics that are present at Mud Mountain.

Misconceptions – Vegetation Management Plan

The VMP assumes the exact same conditions and characteristics that are present at Mud Mountain.



Correction of Misconception

The VMP used the Mud Mountain example to validate tree survivability.

Summary

SEPA Draft EIS



= + 2°C to 3°C in summer water temperature



District Study



= + 0.4°C to 1.2°C in summer water temperature



VMP = 40 to 85% reduction in SEPA temperature impact