

**FLOODPLAIN FOREST REGENERATION AND  
FLUVIAL PROCESSES:  
Status of Cottonwood Forest  
on the Kittitas Reach and  
Restoration Implications**

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# OVERVIEW

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- Overview of cottonwood regeneration
- Status of forests on the Kittitas reach
- Implications for restoration

# COTTONWOOD REGENERATION

Cottonwood is foundation species in arid west floodplains.

- Bank stability and slowed erosion
- Roughness, slowing flood velocities
- Shade, cooling water temperatures
- Input nutrients for aquatic insects
- **Source of large wood**
  - **Create instream complexity**
  - **Facilitate channel movement**
  - **Aggrade sediments**



# COTTONWOOD REGENERATION

Vegetative reproduction = stand maintenance

Sexual reproduction = stand creation

- Annually, seed released early summer
- Seed is viable for short period



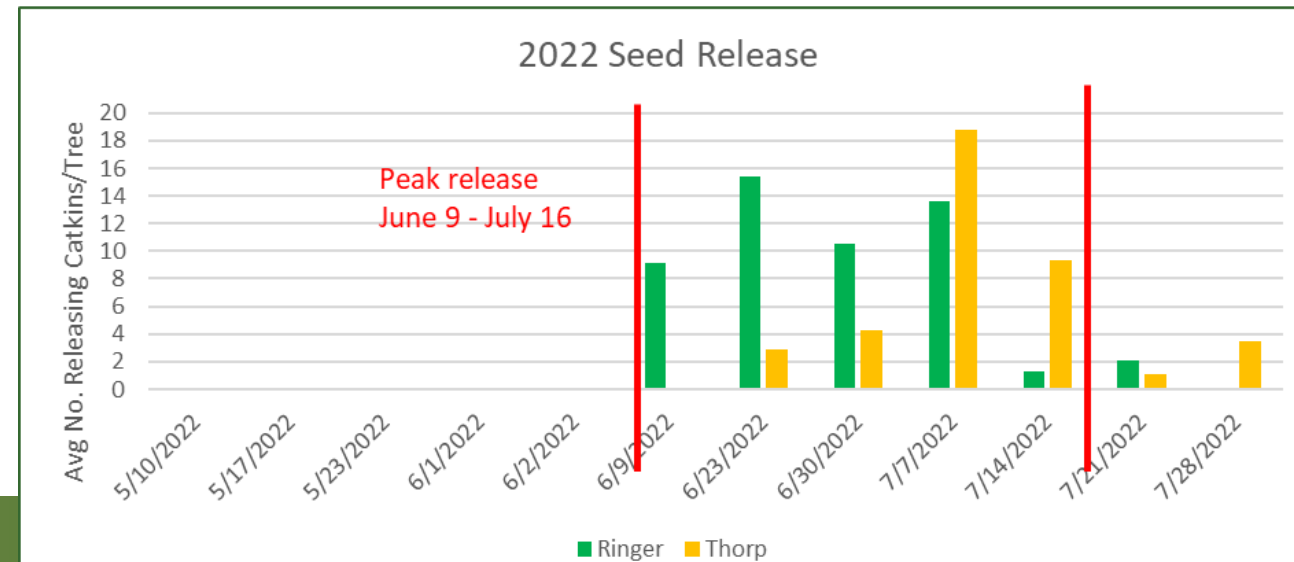
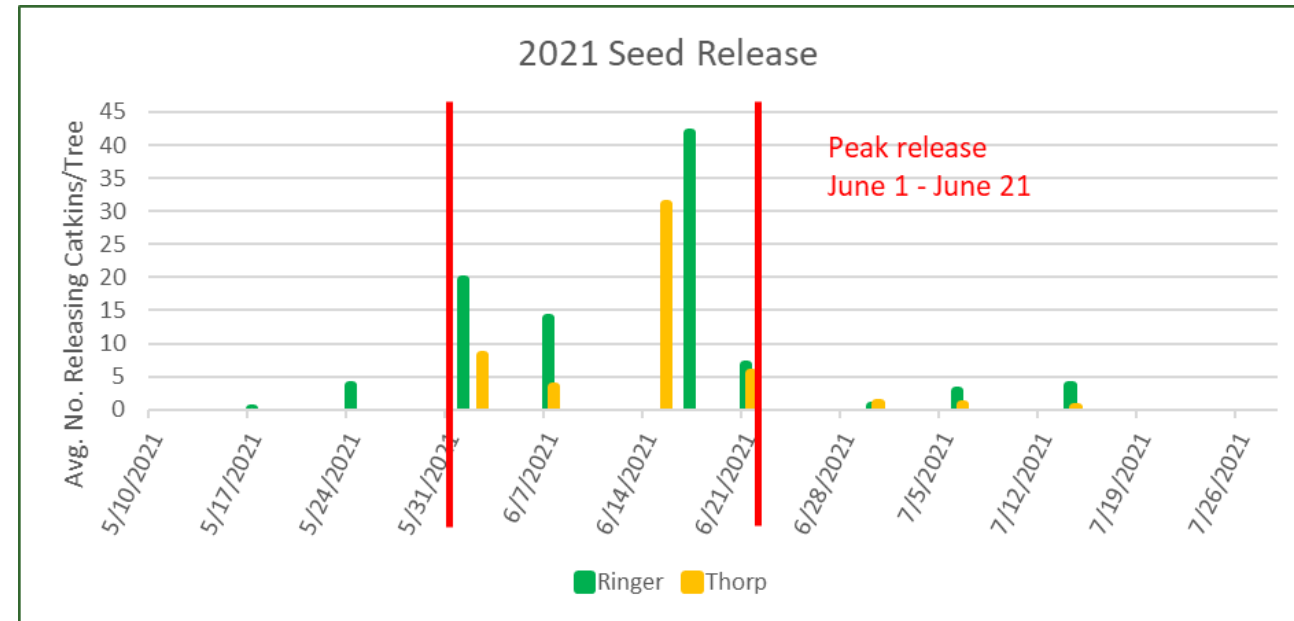
Photo by Spencer Creek Nursery

# COTTONWOOD REGENERATION

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# COTTONWOOD REGENERATION

## Conditions required for cottonwood regeneration

- Floodplains connected to river
- Significant habitat-forming flows
  - Create bare substrate
- Spring freshet
  - Moist soil at the time of seed release
- Flow recession rate that does not exceed the rate of root growth

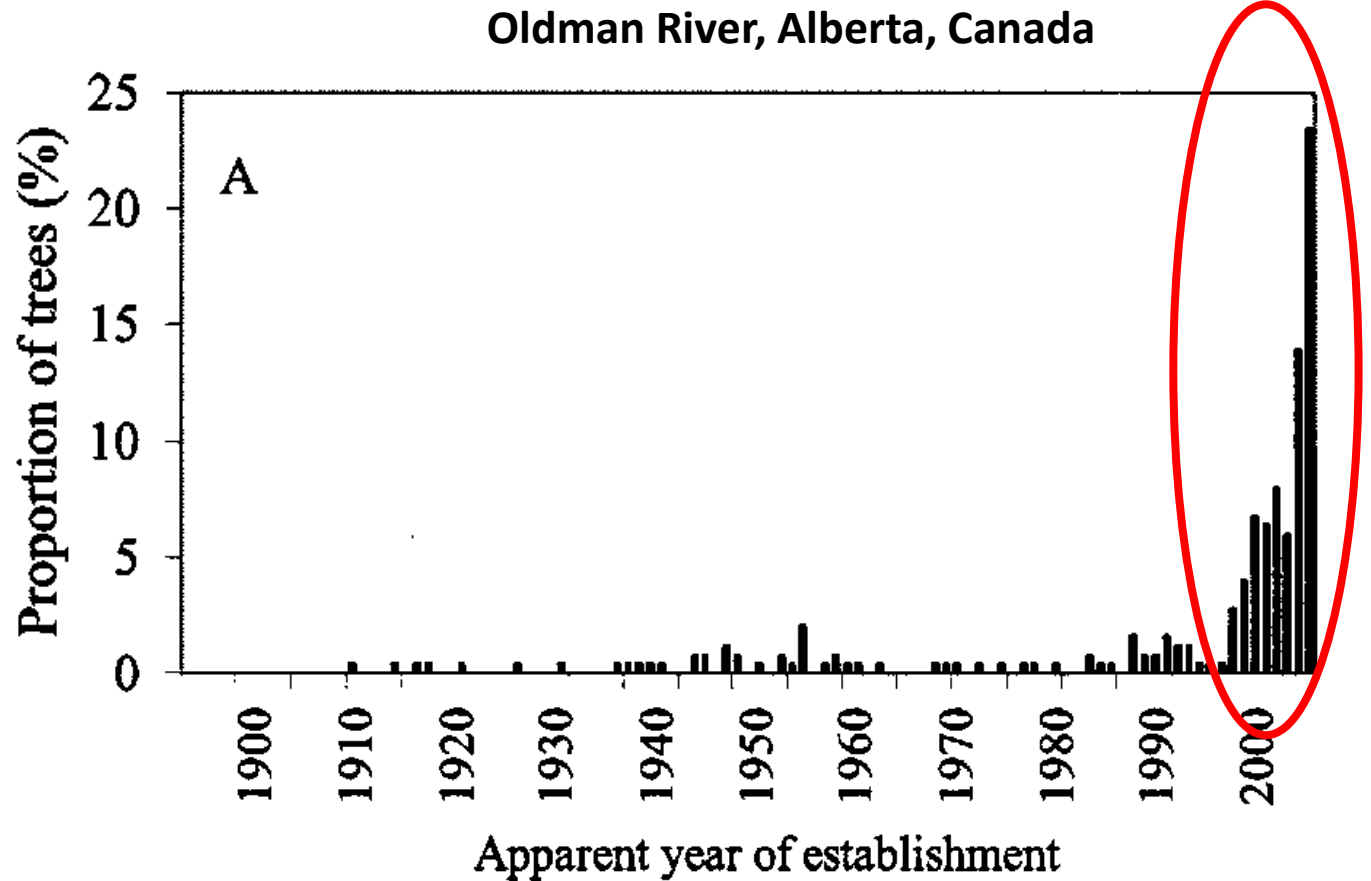
## Stochastic events result in episodic regeneration

- Less frequent floods, ice scour, drought

# COTTONWOOD REGENERATION

## Cottonwood age distribution

- On unregulated rivers, seedlings dominate age classes
- > 80% of trees are <12 yrs old

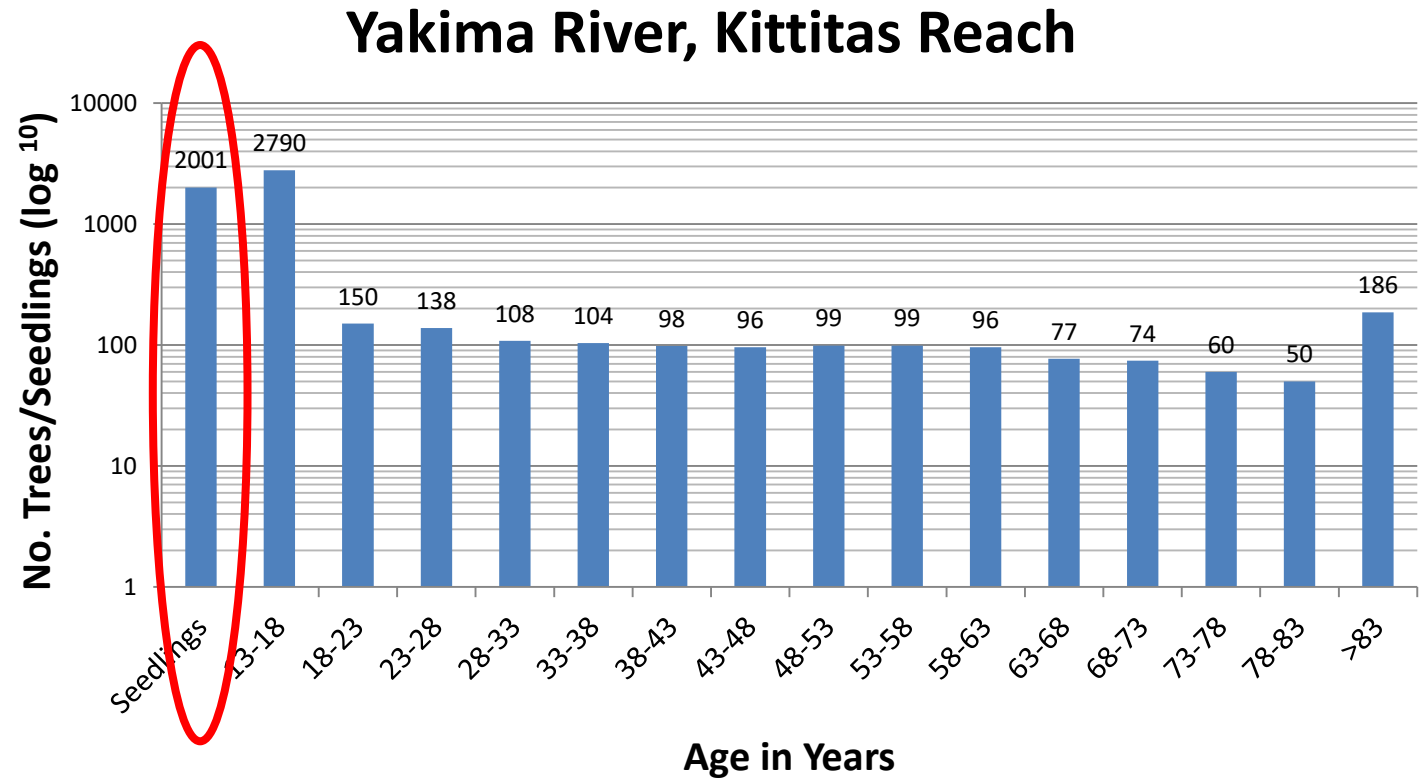


# ASSESSMENT: KITTITAS REACH FORESTS

## Regeneration Status

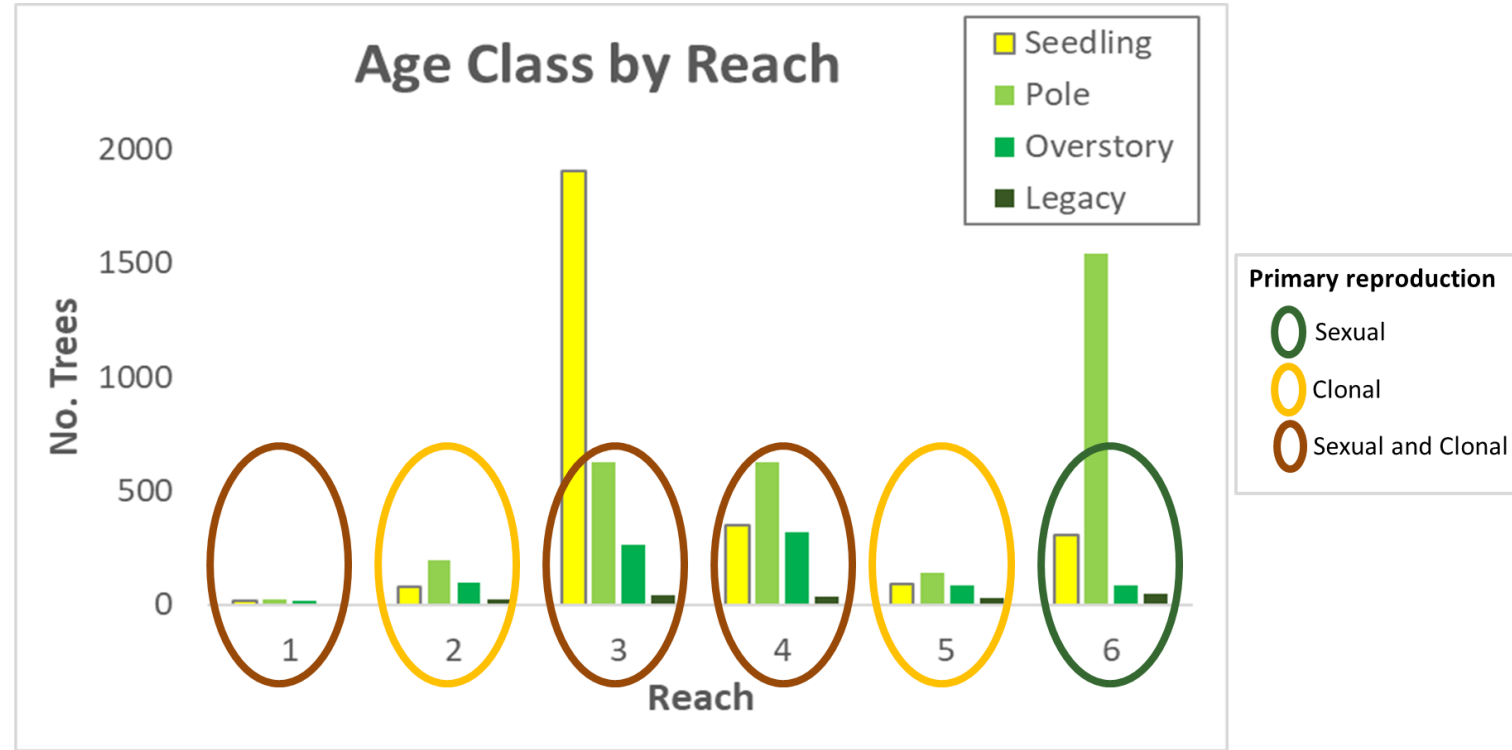
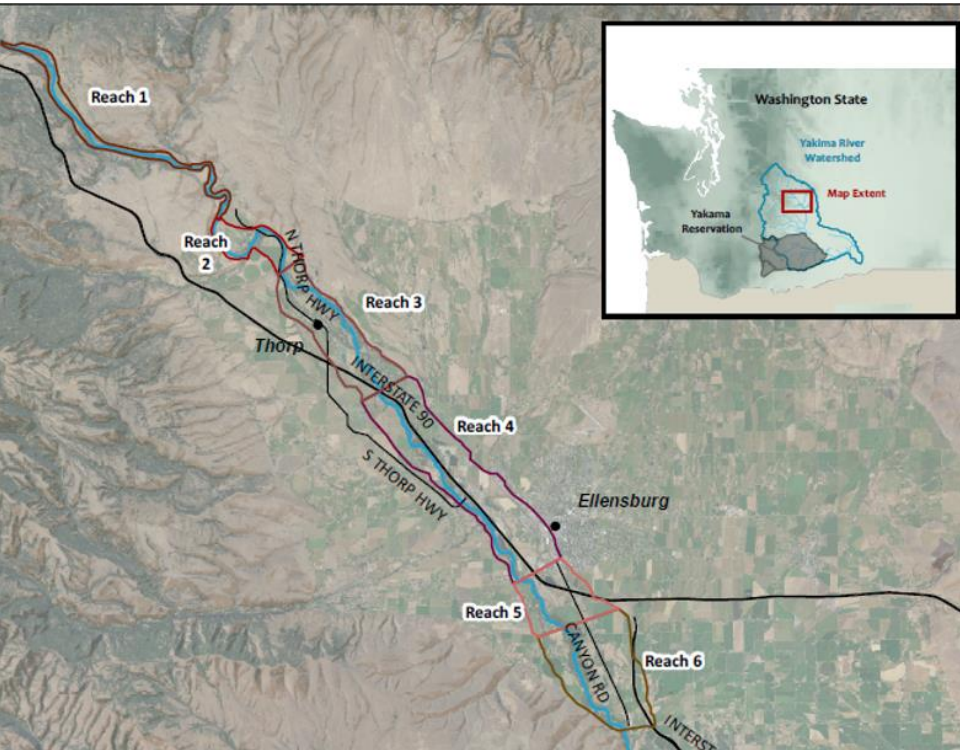
### Cottonwood age distribution

- 33% of trees are <12 yrs old



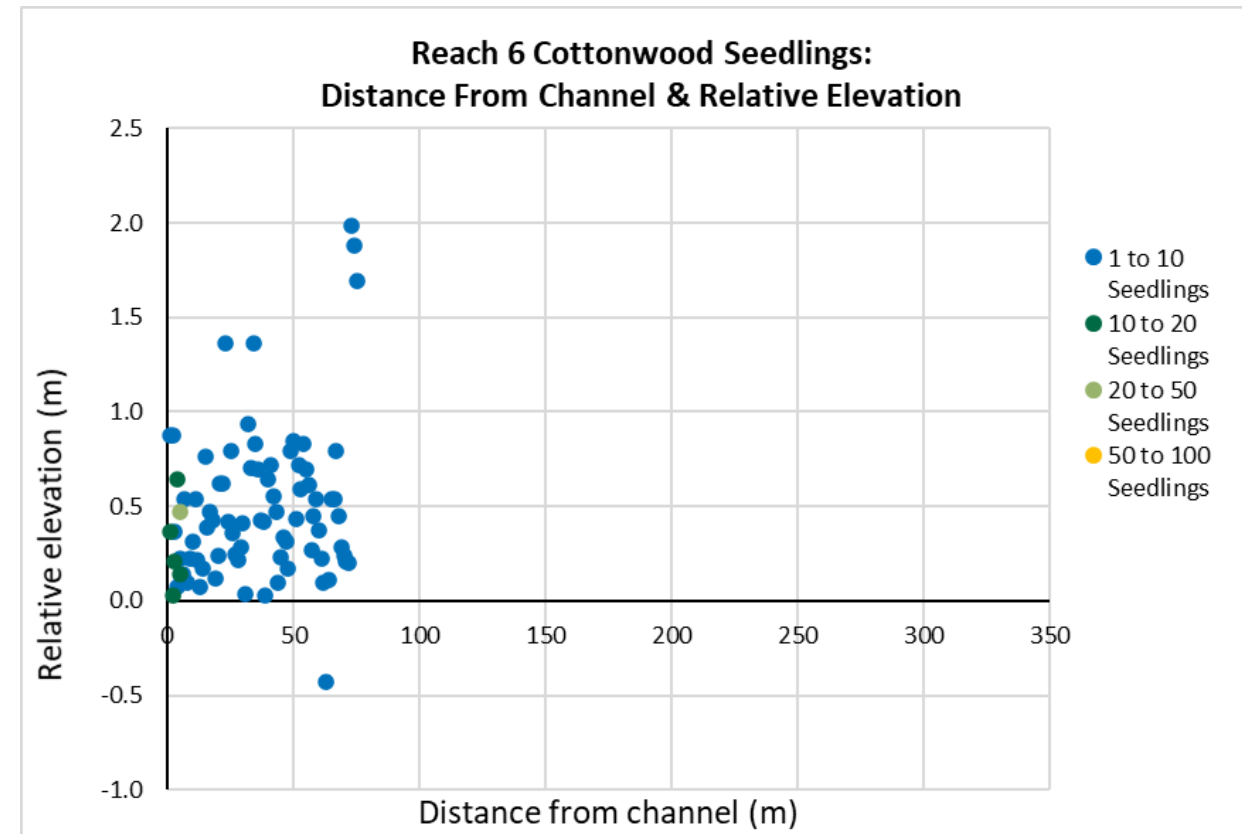
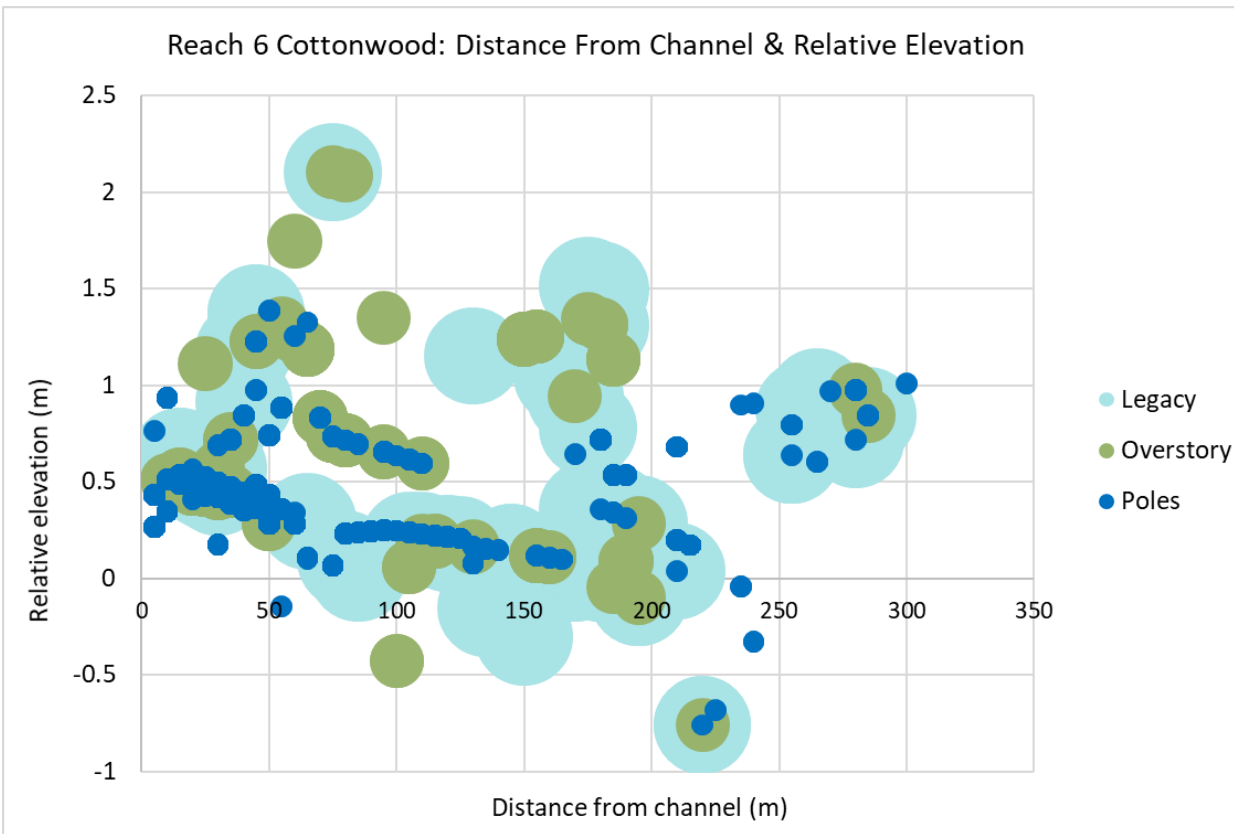


# ASSESSMENT: KITTITAS REACH FORESTS



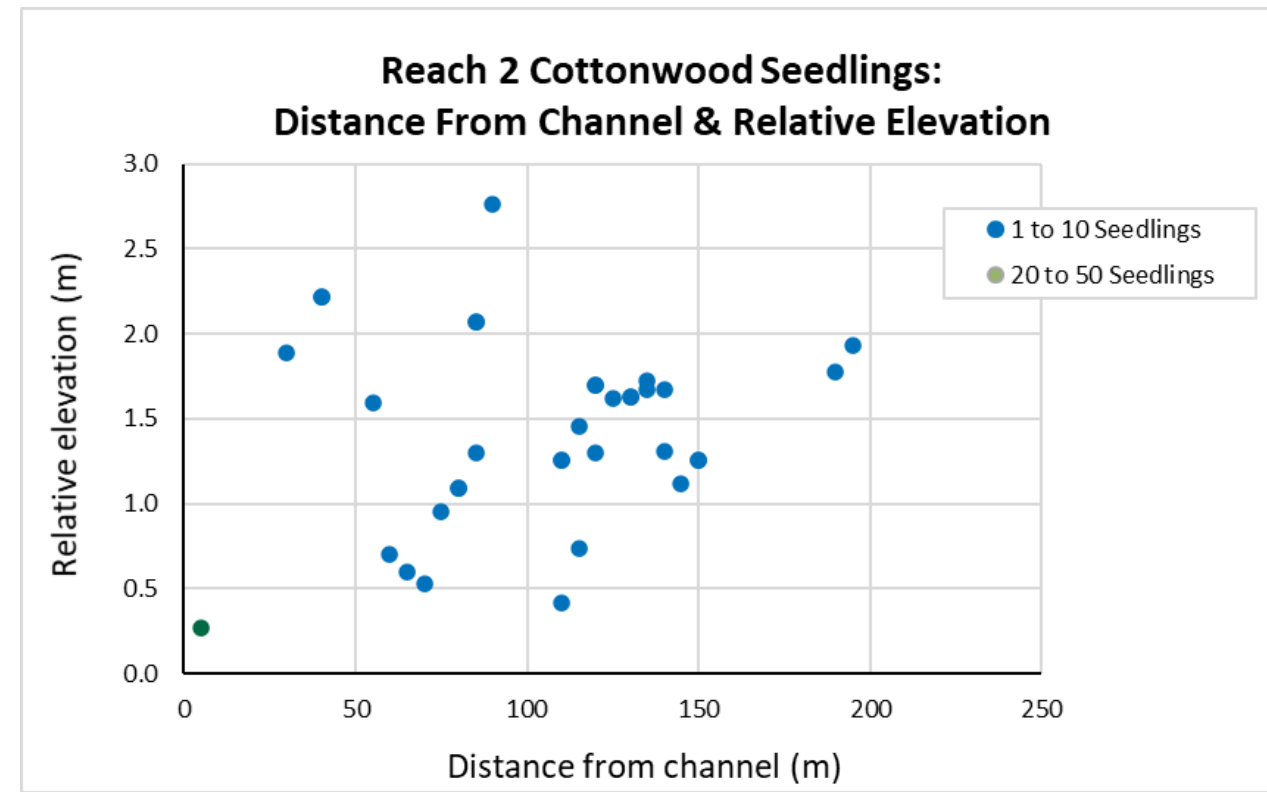
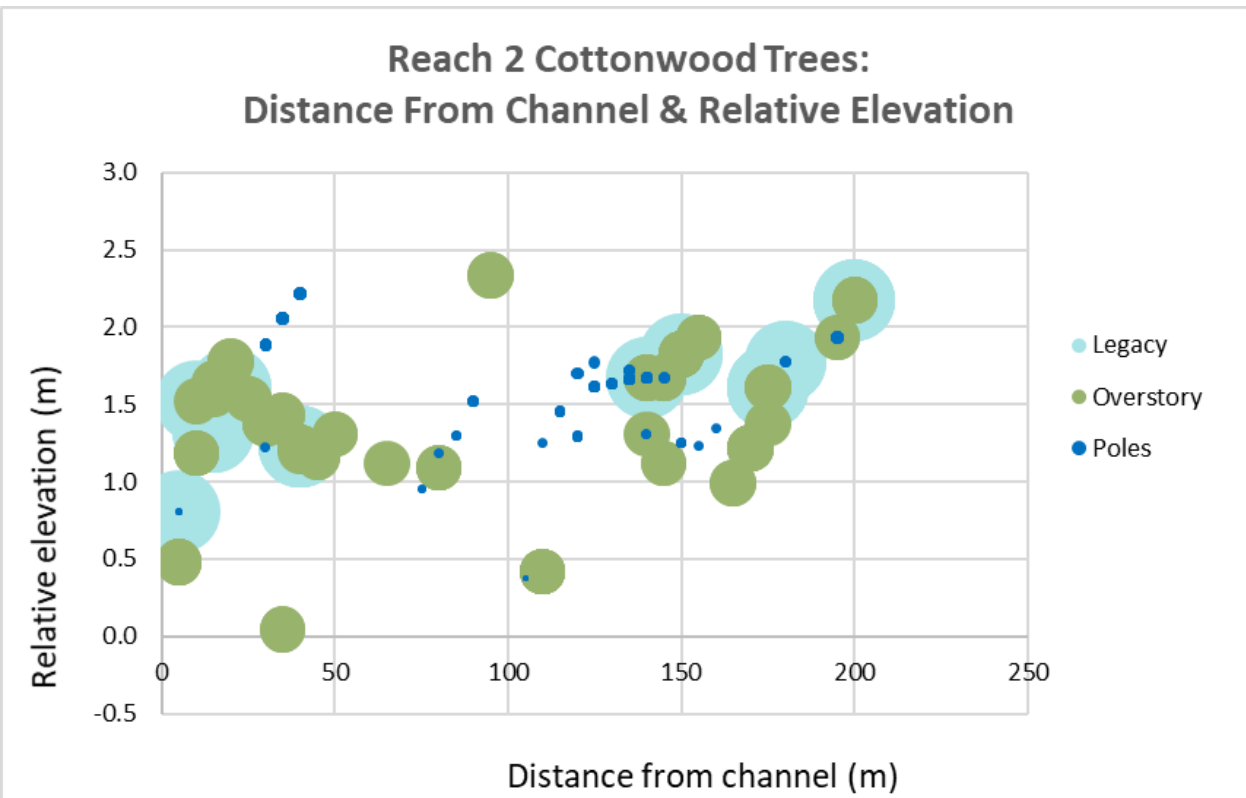
# ASSESSMENT: KITTITAS REACH FORESTS

## Reach 6 – Downstream dynamic reach



# ASSESSMENT: FOREST REGENERATION

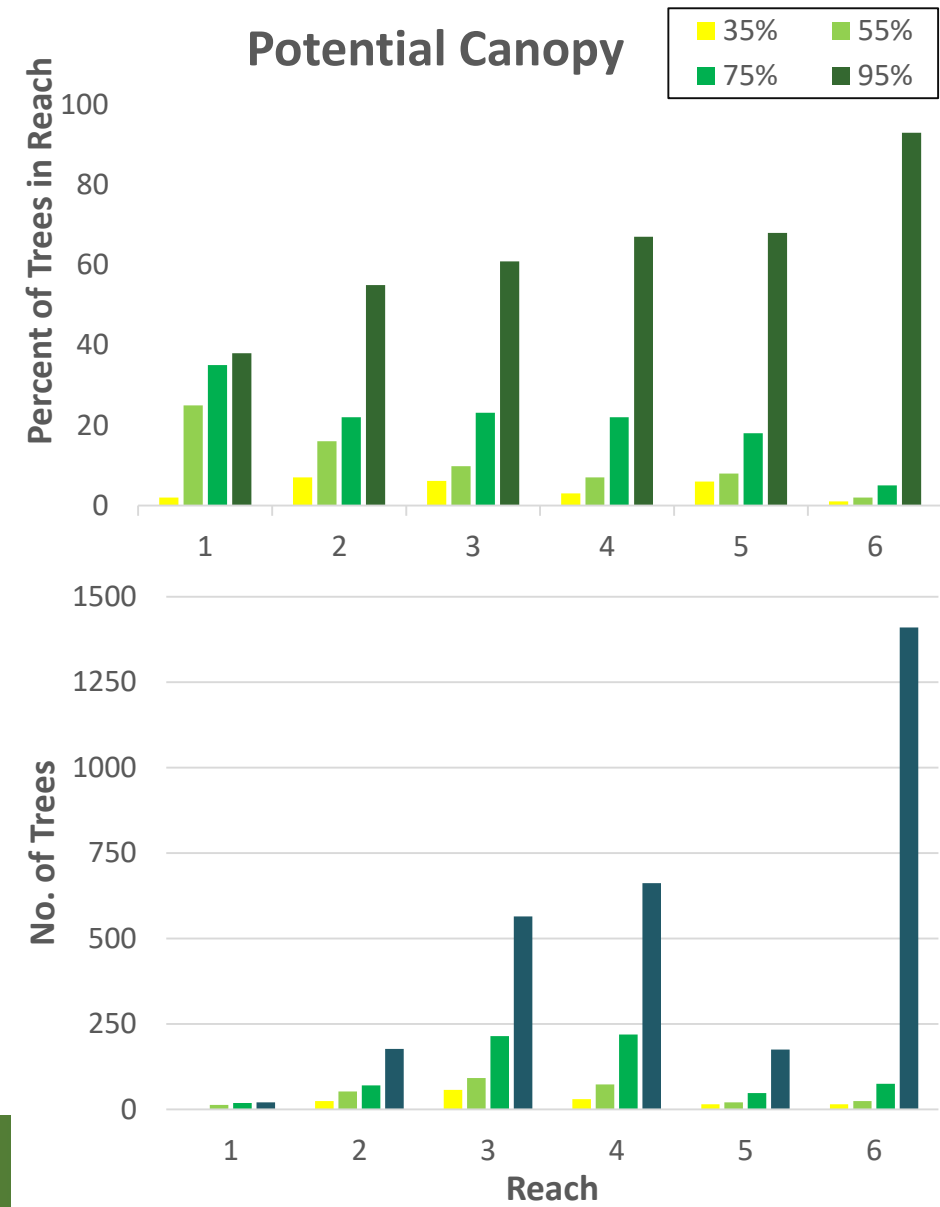
## Reach 2 – Confined



# ASSESSMENT: KITTITAS REACH FORESTS

## Forest Condition

- 27% of all trees are in moderate to extreme stress
- 10% of all trees in severe to extreme stress
- Condition varies by reach
  - Reaches 5, 6 contain fewest stressed trees

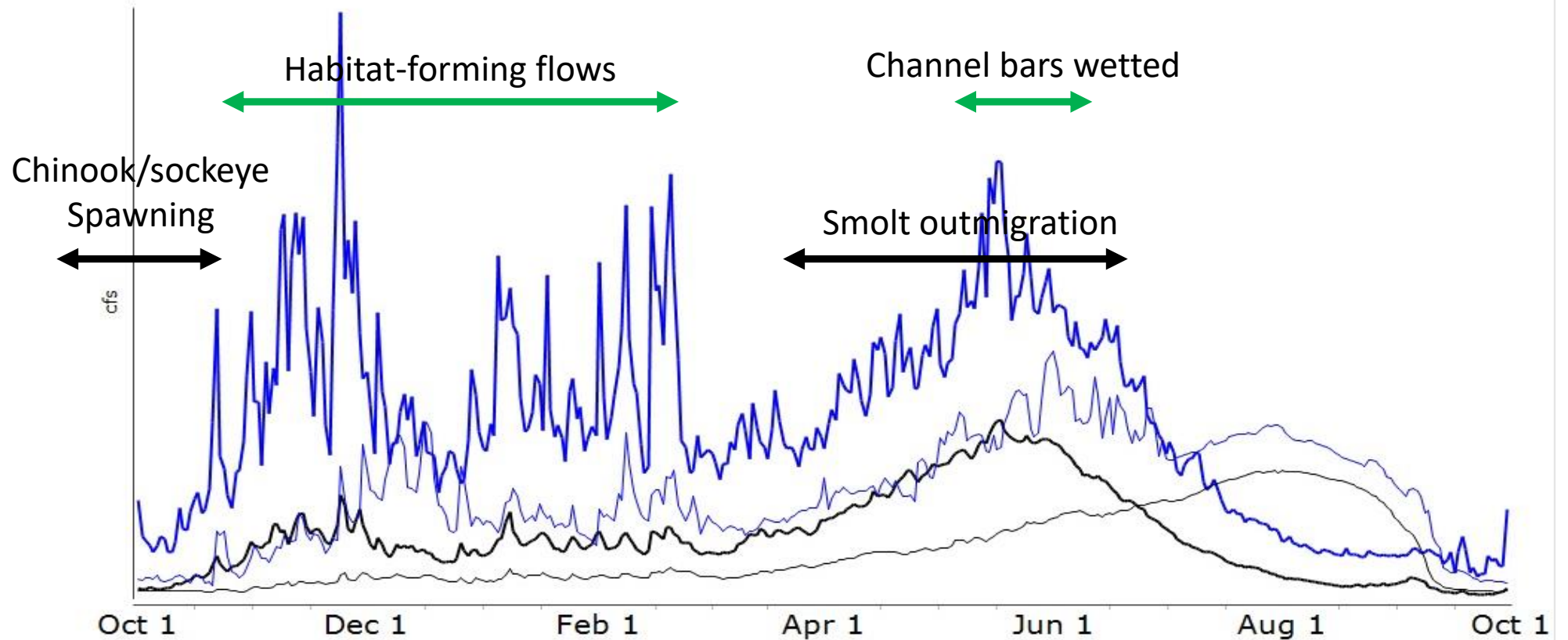


# IMPLICATIONS FOR RESTORATION

## Environmental Flows for Cottonwood Regeneration

— Yakima at Cle Elum QU 5%    — Yakima at Cle Elum QU avg    — Yakima at Cle Elum QD 5%  
— Yakima at Cle Elum QD avg

Upper  
Yakima  
River



# IMPLICATIONS FOR RESTORATION

## Incorporating Regeneration into Floodplain Restoration

### Replanting:

- Depth to groundwater < 6 ft during summer high ET

### Stand creation using regeneration conditions:

- Created seedbed surfaces → contouring
- Moist soil at seed release → elevations/irrigation
- Propagule source → assisted seeding
- Groundwater available during early root growth → elevations/irrigation



# MANAGING COTTONWOOD FORESTS

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Thank you to  
funders:

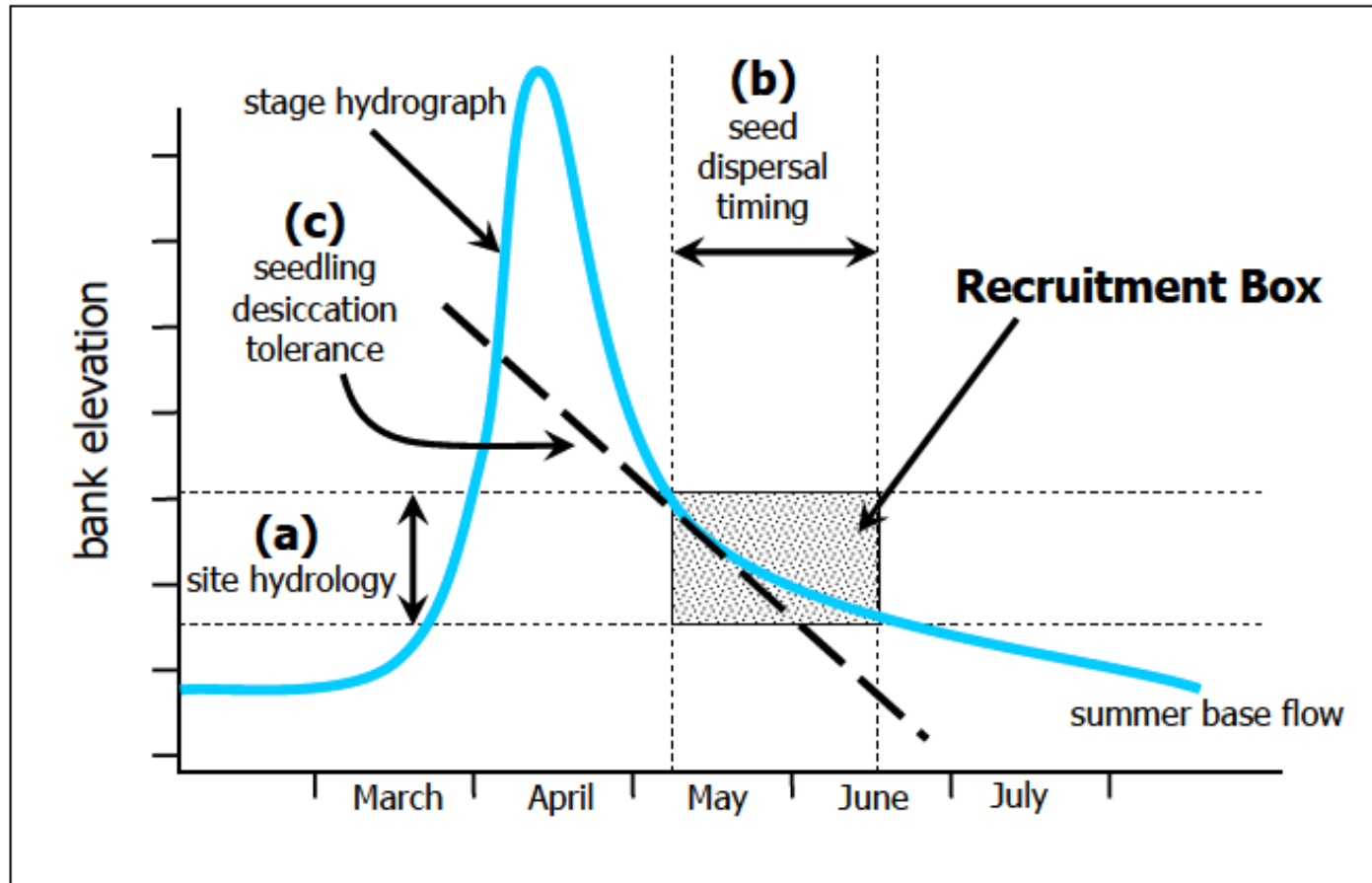
- SRFB
- Dept of Ecology







# COTTONWOOD REGENERATION



# THANK YOU TO OUR PARTNERS

- Many, many private landowners
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- Yakama Nation Dept of Natural Resources
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