

PNW Regional Perspective

At the

National Stream
Restoration Conference

August 1, 2022
Nashville, TN

Gardner Johnston, Inter-Fluve, Hood River, OR

Themes

Geography

Salmon

Tribal leadership in restoration

Evolving use of large wood

Innovations in floodplain restoration

Geography

“Leading edge of the tectonic plate”



Geography

A wide-angle landscape photograph showing a massive, rugged mountain range with significant snow cover. The mountains are set against a clear blue sky with a few wispy clouds. In the foreground, a river valley is visible, with a river winding through a valley floor covered in green vegetation and some rocky outcrops. The overall scene is a high-altitude, mountainous region.

Rivers are young
and dynamic

High fluctuation in
flow and sediment
transport

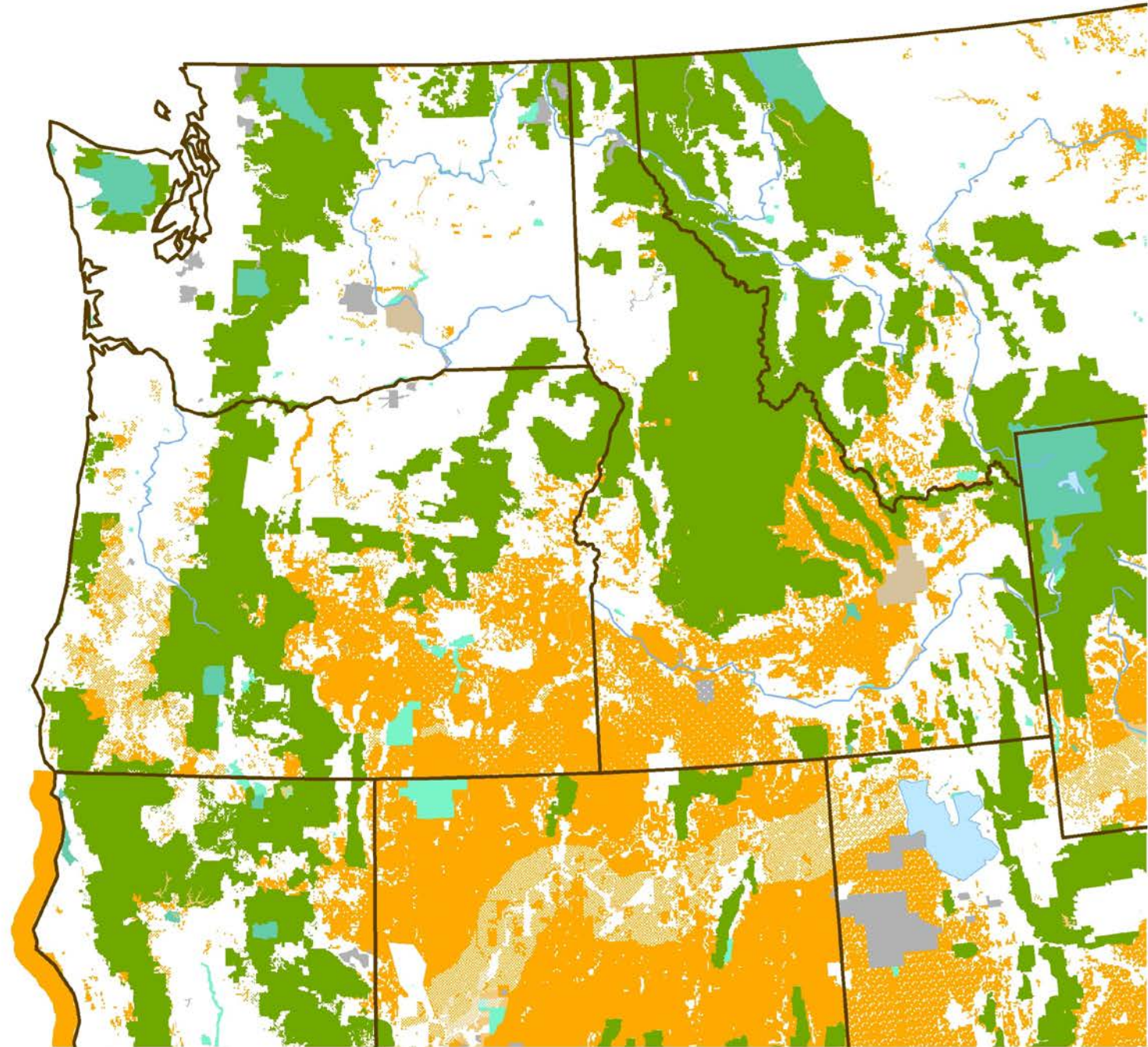
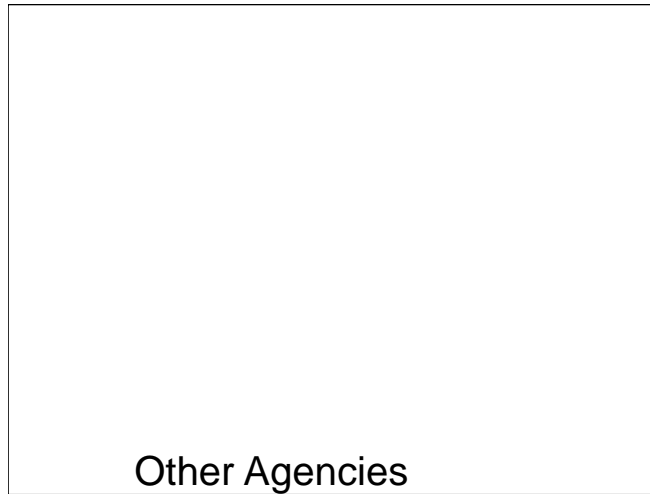
Geography

“Productive Dynamism”

Large wood plays a dominant role in channel form and function

Geography

Large amount of public land



Geography

Experimentation

Creative
approaches

Risk taking



Large wood
supplementation,
Green River, WA

Scott Pozarycki, US Army Corps of Engineers

Salmon



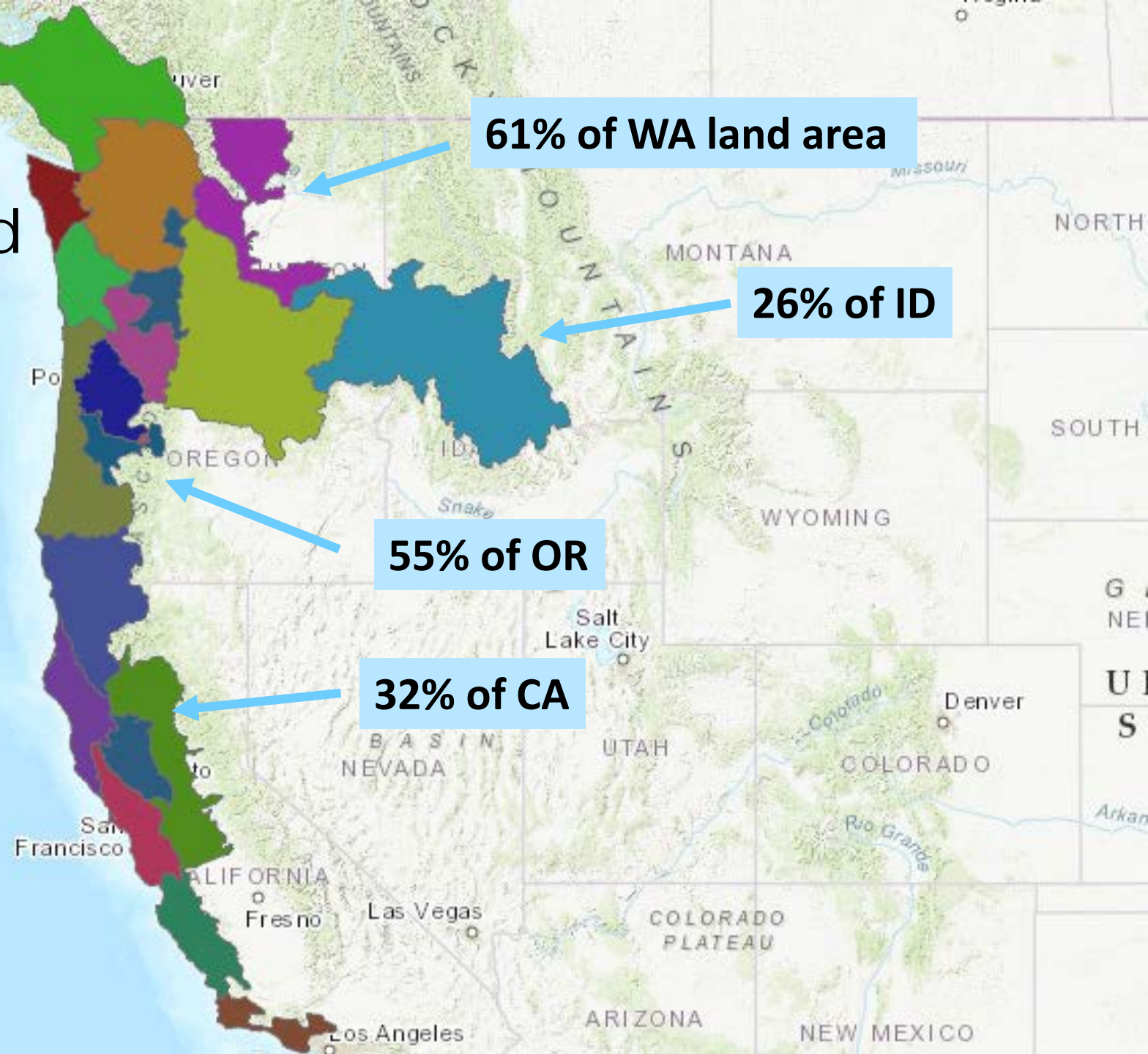
Salmon

Salmon & Steelhead Endangered Species Act Listings

Began in the late 1990s

28 distinct population segments

5 Endangered
23 Threatened

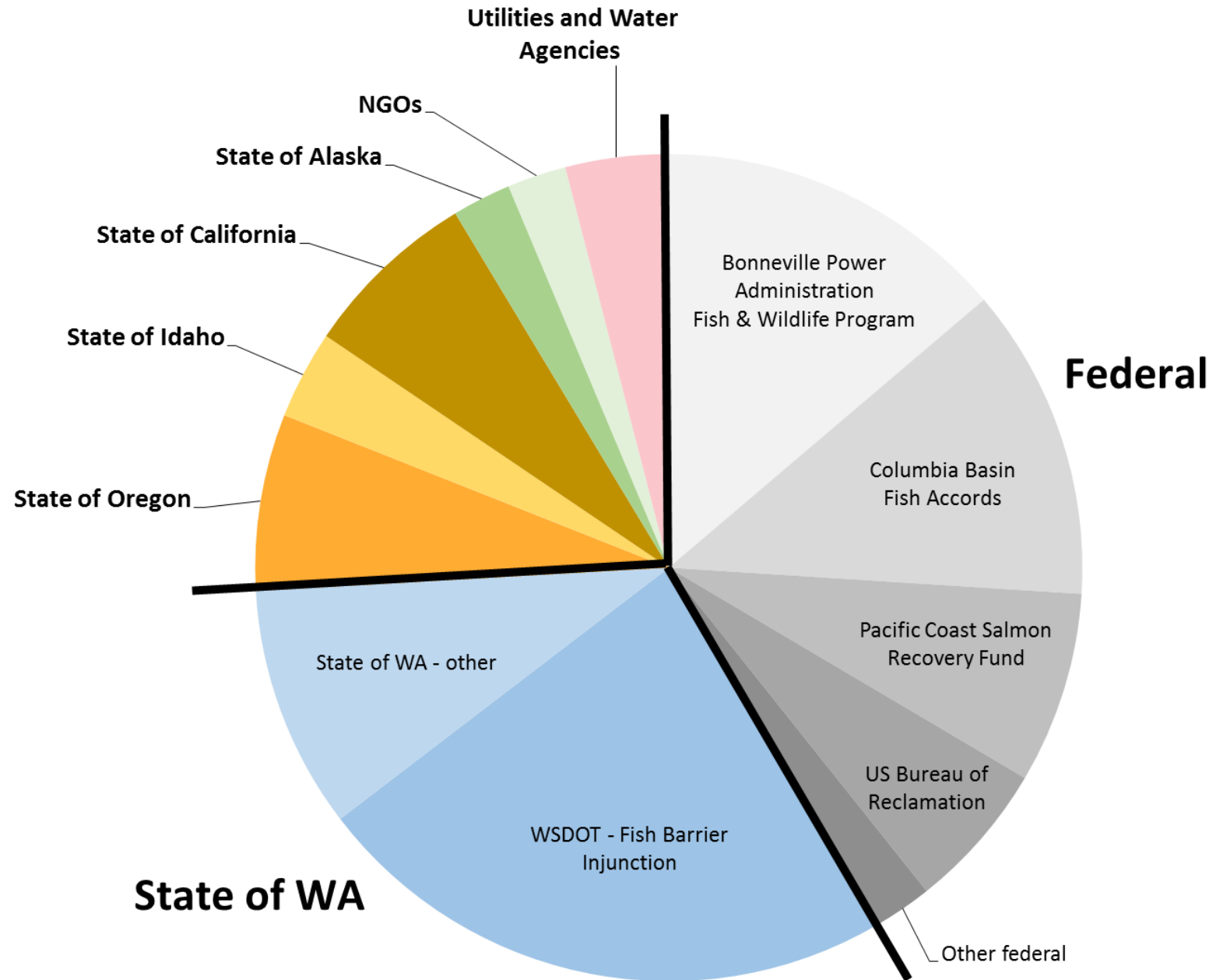


Salmon

Annual Funding for Salmon Habitat Restoration

>\$2 billion for Salmon Recovery overall

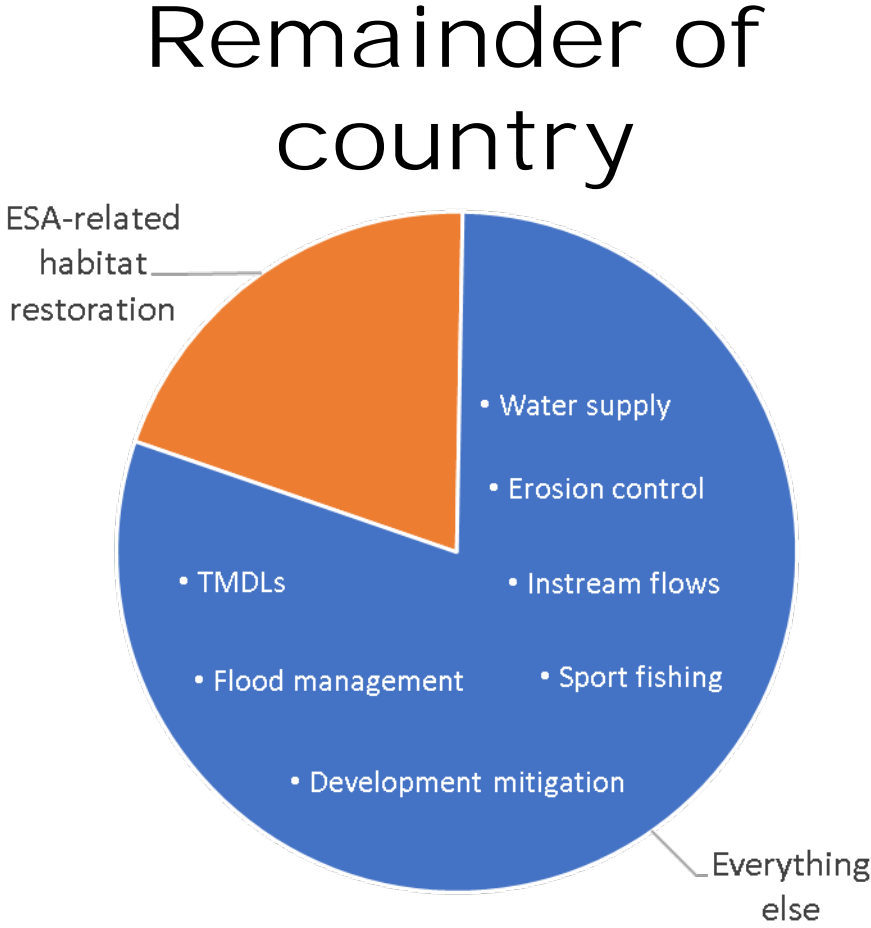
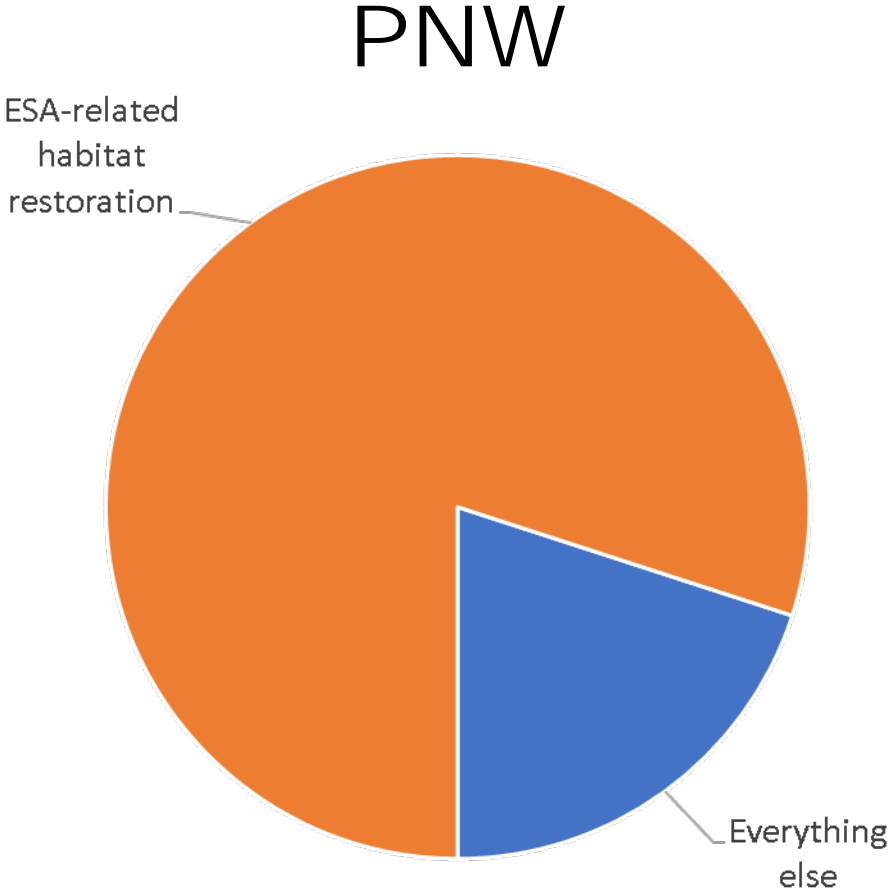
...safe to assume on the order of \$500 million for habitat restoration-related actions alone



*Data compiled from numerous sources. Should be considered rough approximations.

Salmon

ESA salmon-related projects overwhelm the other restoration work in the PNW



*Conceptual

Salmon

An underwater photograph showing a group of salmon swimming in a river channel. The fish are silvery with some darker spots, and they are moving towards the left side of the frame. The water is clear, and the riverbed is visible, covered with small pebbles and some green algae. The lighting is natural, coming from above, creating some shadows on the riverbed.

Indicator species – inherent need to focus on the whole system

Not beholden to short-term or site-specific targets

Follow coordinated restoration strategies

Allows for long-term process restoration

Tribal Leadership

1855 Treaties

(and subsequent federal court decisions)

Ceded land for reservations

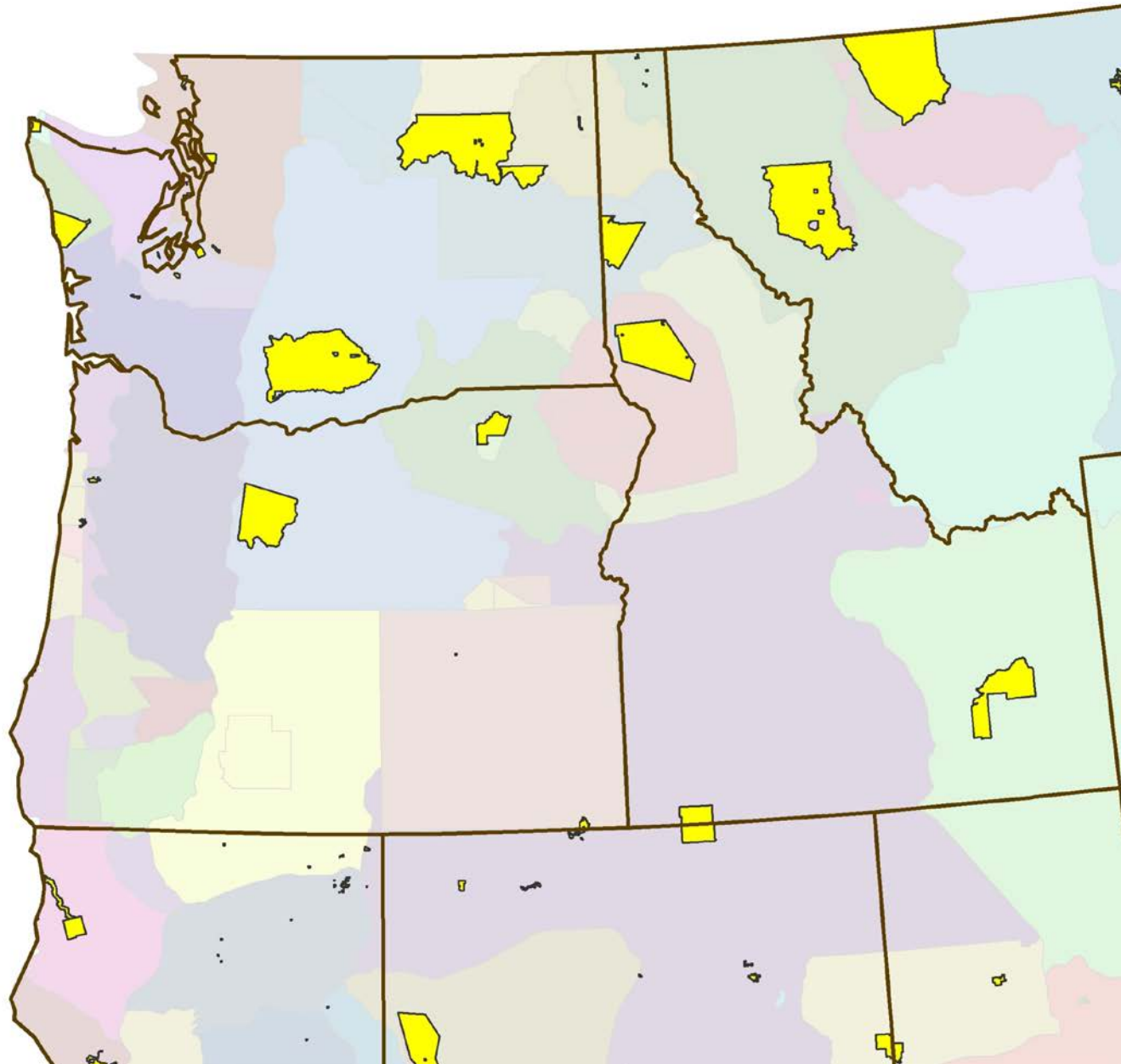
Retained hunting and fishing rights

Tribes are entitled to 50% of salmon

Co-managers of salmon

Well-established restoration programs

 Reservations  Ceded lands



Tribal Leadership

Columbia Basin Fish Accords

2008 – Present

Agreements to halt litigation over the Columbia hydrosystem in exchange for salmon recovery funding

>\$1.3 billion for salmon recovery projects



Yakama Nation
Umatilla Tribes
Warm Springs Tribes
Colville Tribe
Shoshone Bannock Tribes
Kalispel Tribe
Columbia River Intertribal Fish Commission

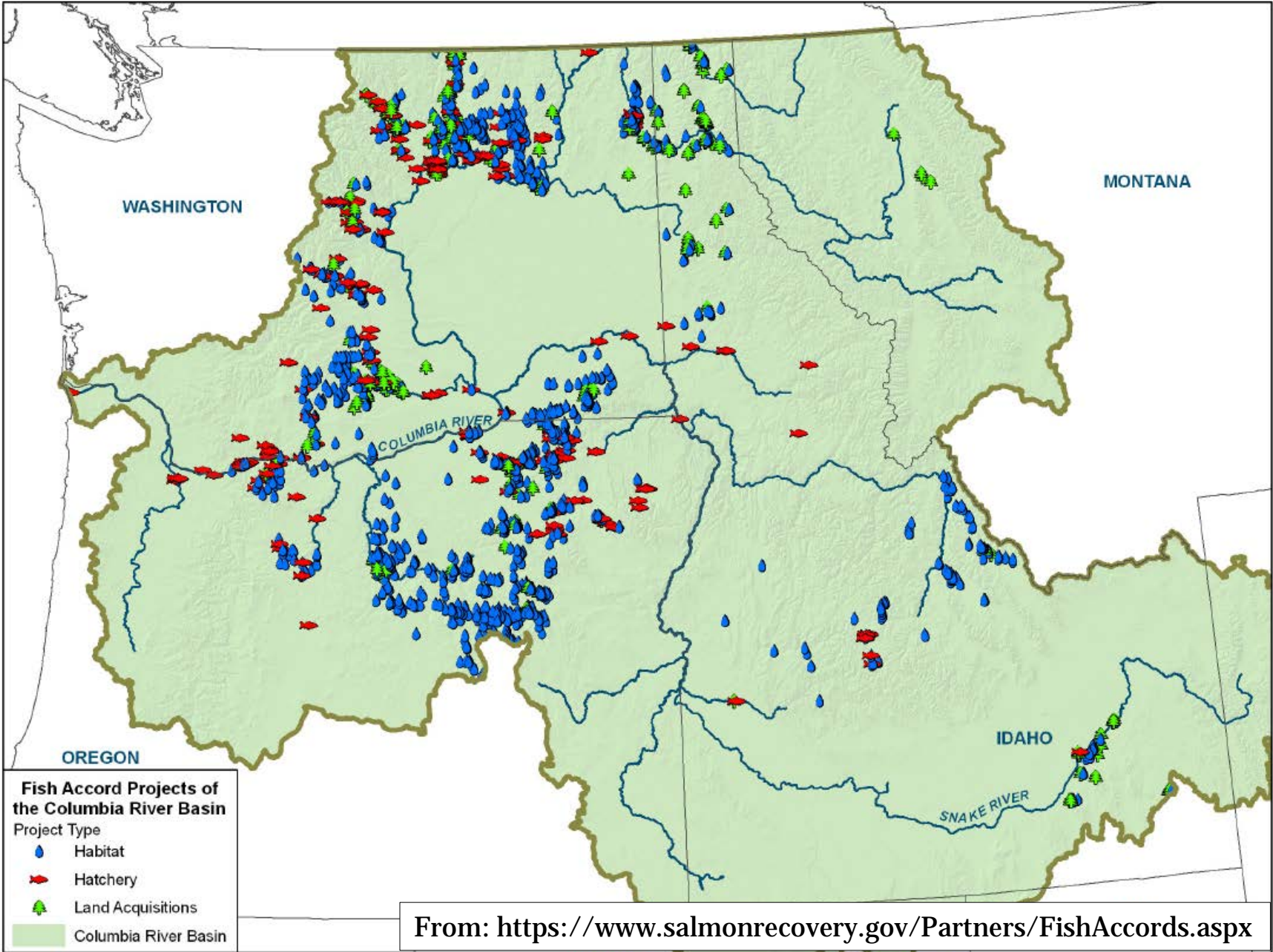
State of Washington
State of Montana
State of Idaho



Bonneville Power Administration
US Army Corps of Engineers
Bureau of Reclamation

Tribal Leadership

Accord-funded Projects



Evolving Use of Large Wood

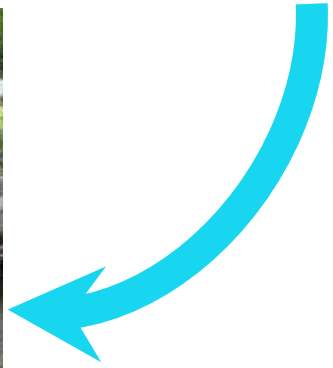
“Debris and log jams pose a major threat to migration of anadromous salmonids.”

-1982 USFS Fish Habitat Manual

...can happen, but very rare



Evolving Use of Large Wood





Evolving Use of Large Wood

Side-Channel
Activation

Entiat River, Yakama Nation

Evolving Use of Large Wood

Reach-scale bed
aggradation and
floodplain
reconnection

Evolving Use of Large Wood

Bedload capture
following barrier
removal

Evolving Use of Large Wood

Floodplain
roughness

Nason Creek Upper White Pine Project, WA
Chelan County and US Bureau of Reclamation



Evolving Use of Large Wood



Yakama Nation Fisheries

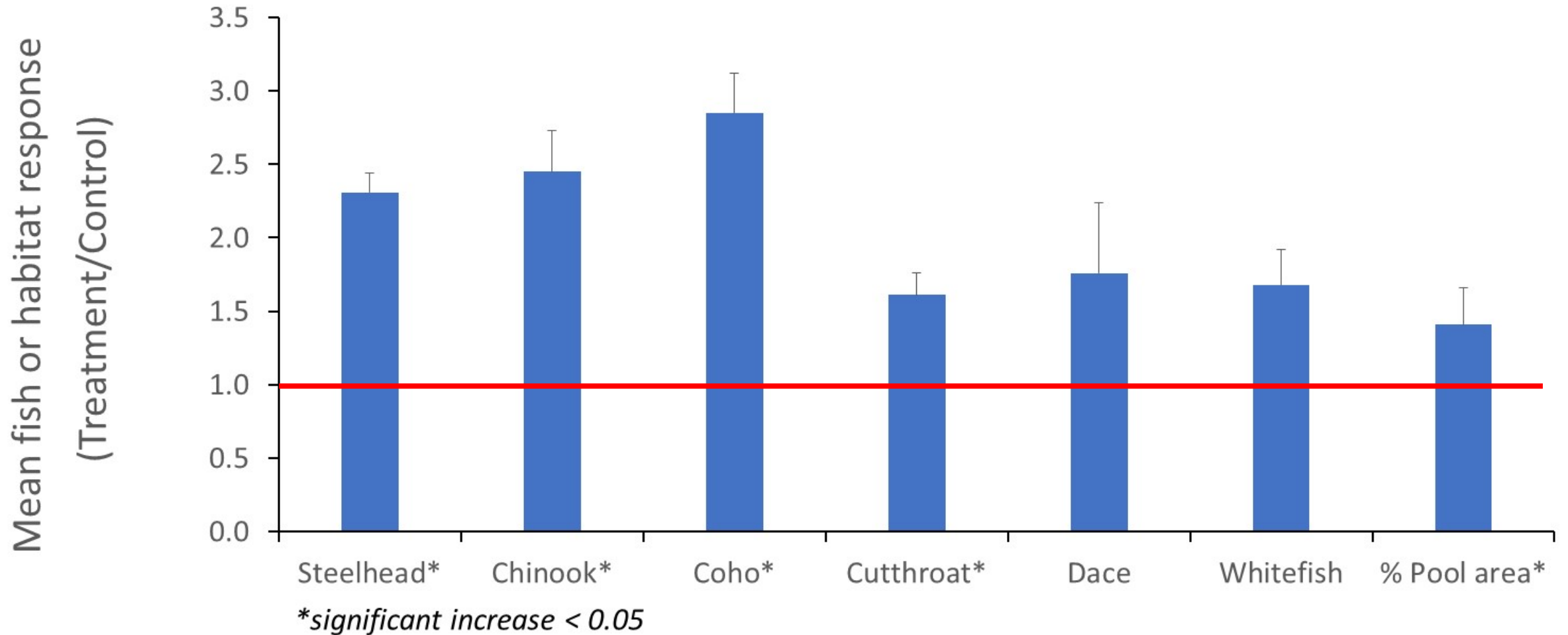
Multi-thread
channel creation



Little Wind River, WA
Underwood Conservation District

Evolving Use of Large Wood

Meta-Analysis – Evaluation of 29 Projects in Columbia Basin



Floodplains

An aerial photograph of a braided river system flowing through a valley. The river consists of multiple channels of varying widths and depths, separated by sandbars and gravel bars. The surrounding landscape is a mix of green agricultural fields, some with stone walls, and areas with trees showing autumn foliage in shades of yellow and orange. In the background, there are rolling hills and mountains under a clear sky.

1992

“In any improvement project, top priority should generally be given to consolidating braided channels”

-Stream Habitat Improvement Handbook. USFS Southern Region, 1992

2022

“Instead of designing channels with floodplains we are designing floodplains with channels”

-Marjorie Wolfe, RRNW 2022 talk

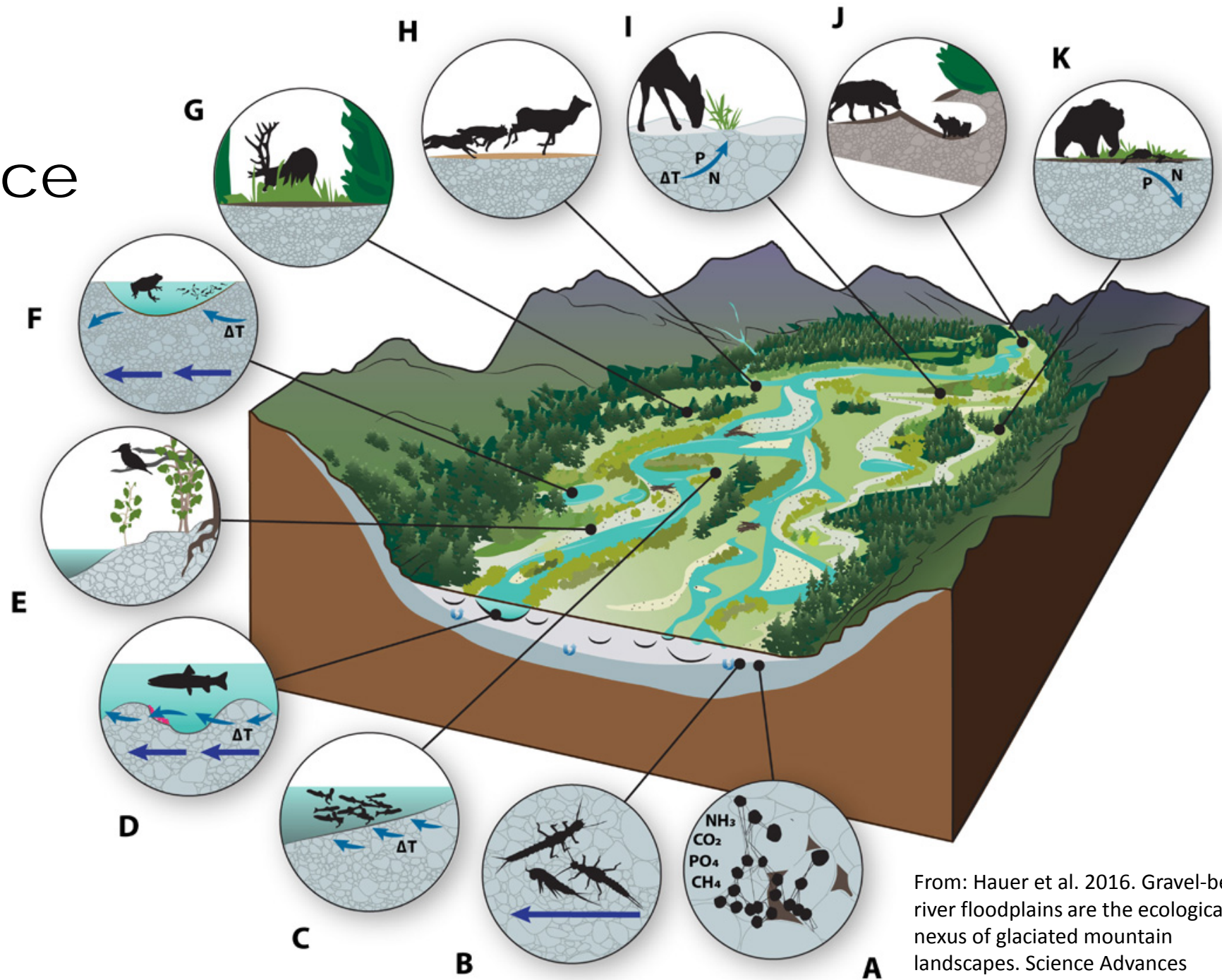
Floodplains

Emerging science

Greater fish growth

Food/benthos production

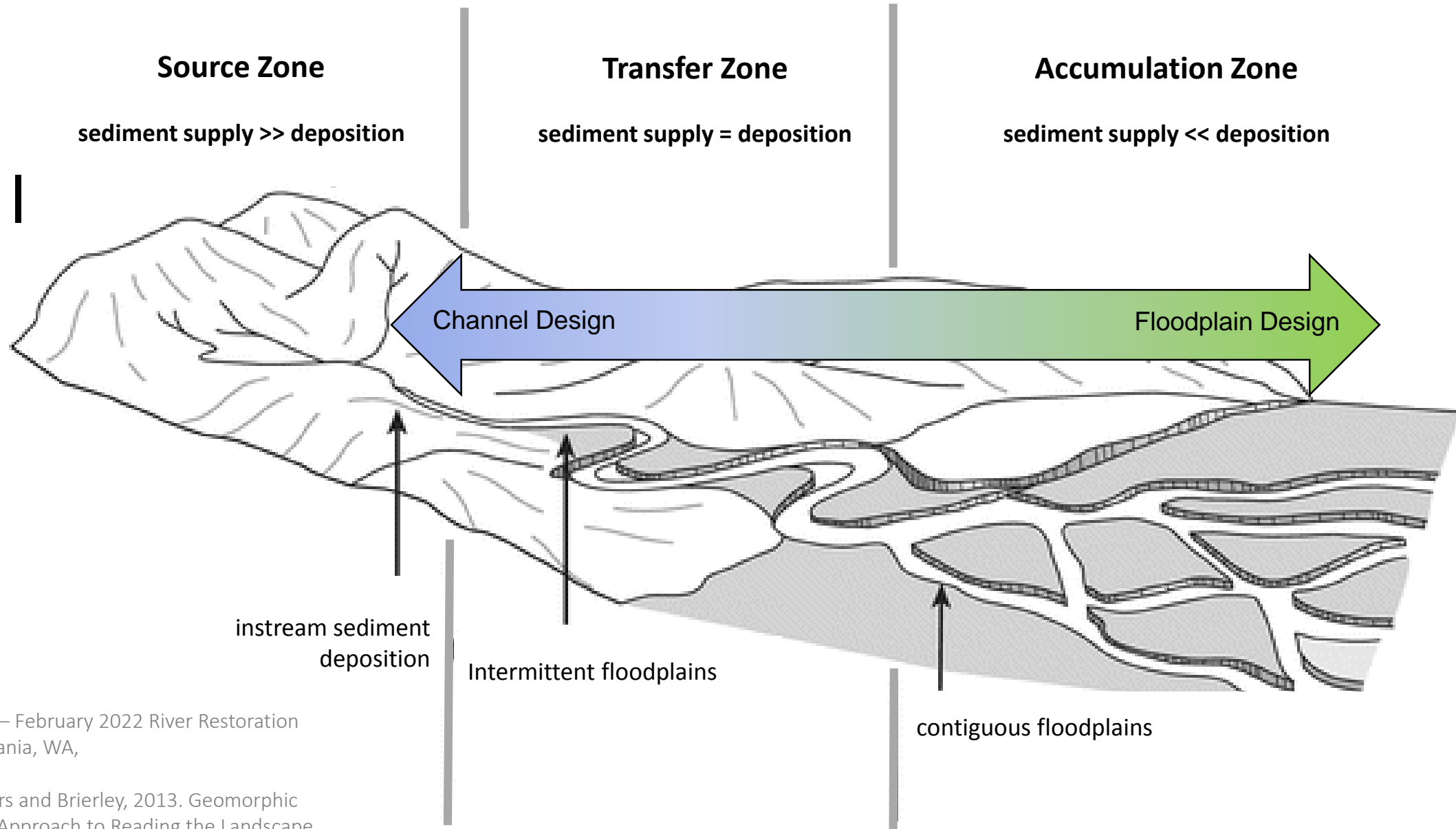
Carbon sequestration



From: Hauer et al. 2016. Gravel-bed river floodplains are the ecological nexus of glaciated mountain landscapes. Science Advances

Floodplains

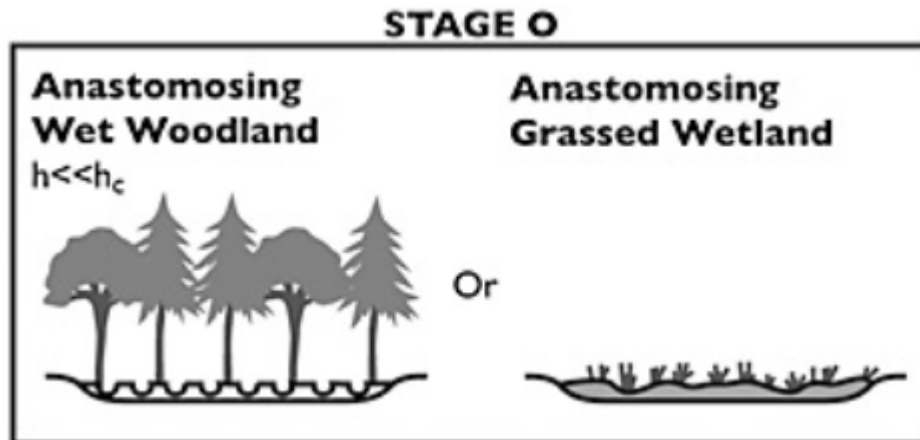
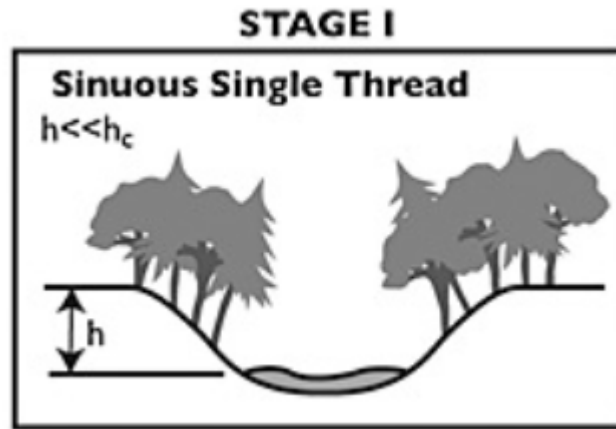
Beyond Bankfull



Modified from: Janine Castro – February 2022 River Restoration Northwest Symposium, Skamania, WA,

Schematic modified from Fryirs and Brierley, 2013. Geomorphic Analysis of River Systems: An Approach to Reading the Landscape.

Floodplains

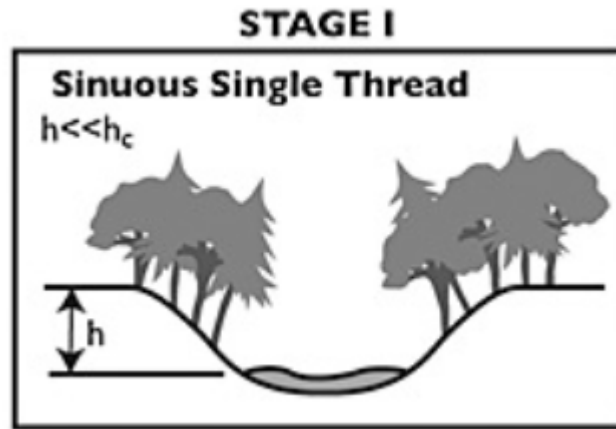


Original
Channel Evolution Model
Pre-disturbance phase

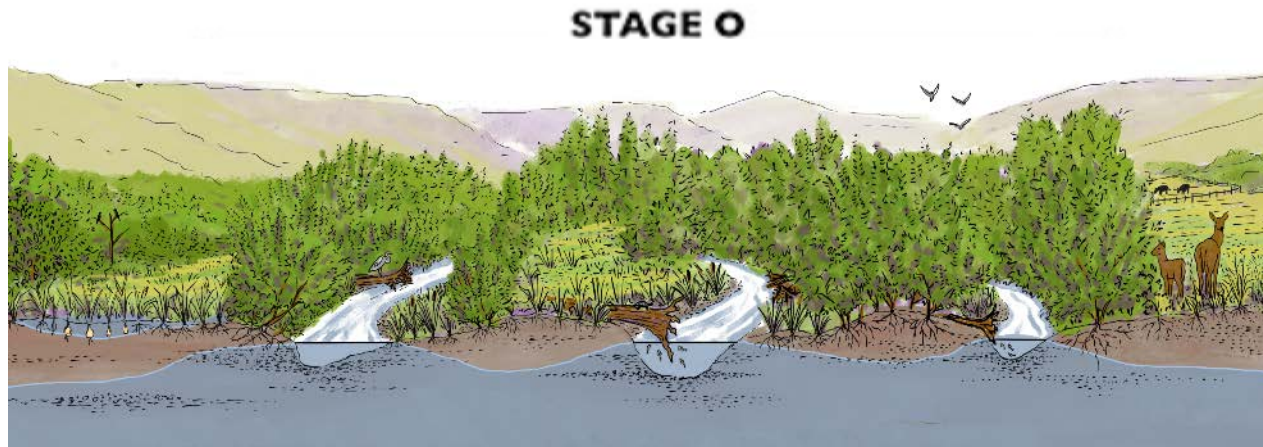
New
Stream Evolution Model¹
Pre-disturbance phase

¹Cluer and Thorne. 2013. A stream evolution model integrating habitat and ecosystem benefits

Floodplains



Original
Channel Evolution Model
Pre-disturbance phase



New
Stream Evolution Model¹
Pre-disturbance phase

Depositional valley
well-connected floodplains

multiple channels
extensive floodplain wetlands

¹Cluer and Thorne. 2013. A stream evolution model integrating habitat and ecosystem benefits

Floodplains

Designing to Stage 0

Existing condition

Illustration by: Maisie Richards



Floodplains

Designing to Stage 0

Restored condition

Illustration by: Maisie Richards



An aerial photograph of a river system. The river flows from the top right towards the bottom left, forming a large meander loop. In the center of the loop is a large, irregularly shaped island. The riverbanks are lined with what appears to be brush or small trees. In the upper left corner, there is a ranch with several buildings, including a large barn with a grey roof and smaller structures with red roofs. The surrounding landscape is a mix of green grass and brown, possibly eroded or silted, soil. The overall scene depicts a natural river channel with a floodplain area.

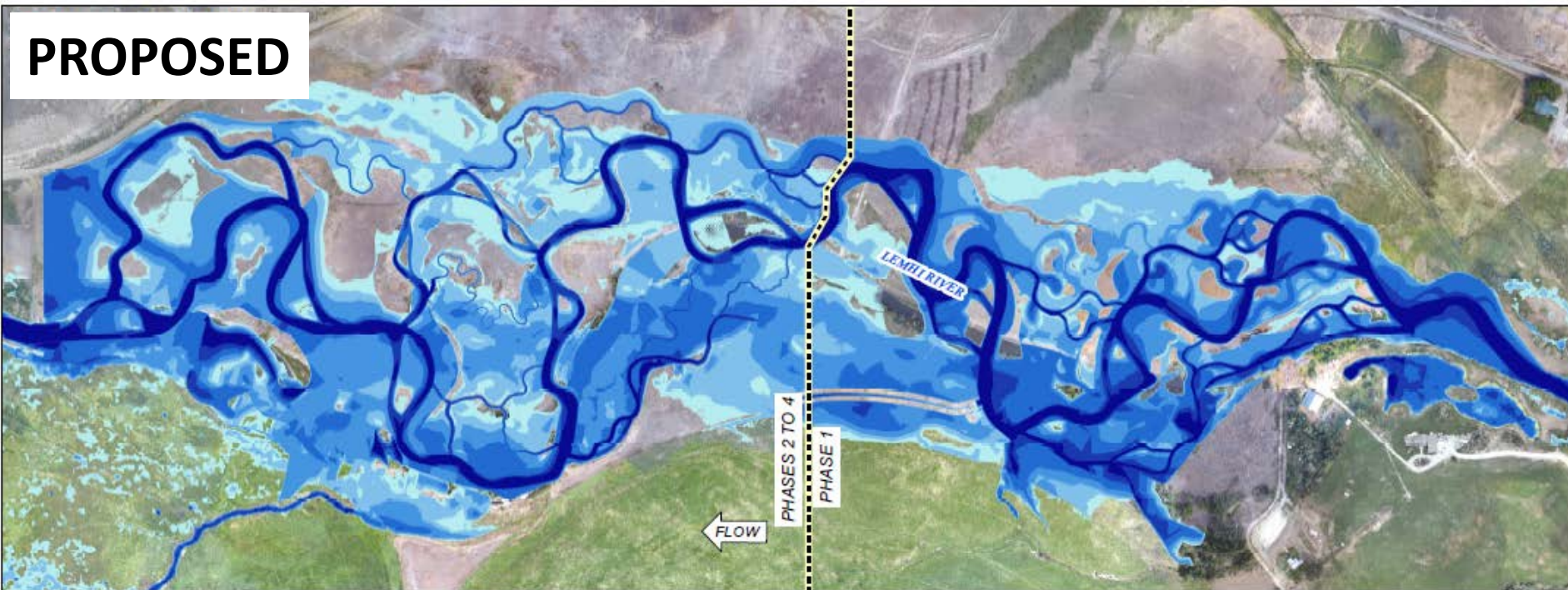
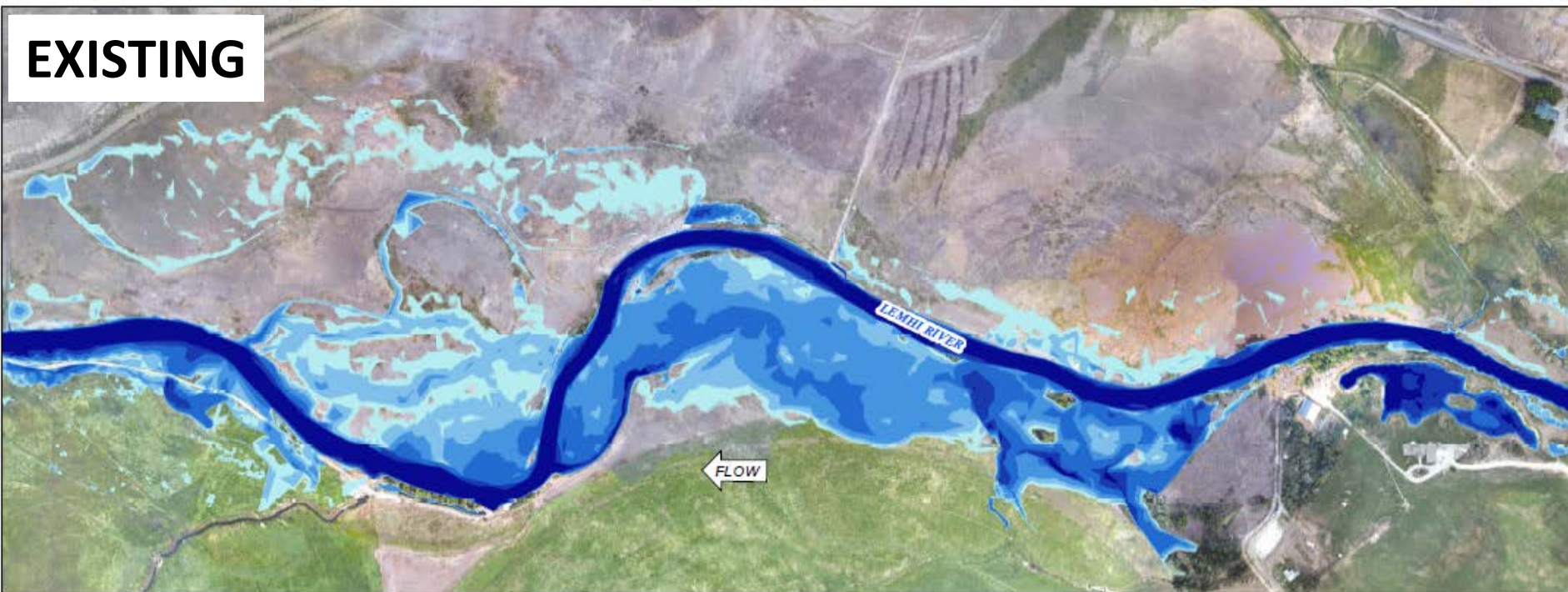
Floodplains

Designing to Stage 0

Eagle Valley Ranch Project, Lemhi River, ID
Idaho Fish & Game, US Bureau of Reclamation
RioASE photo

Floodplains

Designing to
Stage 0



Eagle Valley Ranch Project,
Lemhi River, ID
Idaho Fish & Game, US
Bureau of Reclamation
RioASE modeling figures

Floodplains

Designing to Stage 0

“Valley Reset”
approach

Stage 0 Projects:

- ✓ Increased fish use
- ✓ Improved habitat
- ✓ Fire resilience!

Floodplains

An aerial photograph showing a vast, flooded wetland area. The water is a murky, brownish-grey color, covering a large portion of the landscape. In the foreground, a paved road with a white dashed line runs along the left side. To the right of the road, there are green grassy areas and some trees. In the background, there are rolling hills and mountains under a cloudy sky. The overall scene depicts a natural floodplain that has been inundated with water.

Floodplains by Design

Grant program in WA State

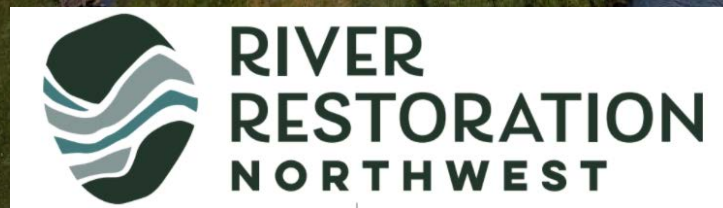
Public-private partnership

Integrates flood risk and habitat restoration

Model for other agencies? e.g. FEMA

Thank You!

And thanks to the River Restoration Northwest community



River Island Floodplain Restoration
Inter-Fluve photo