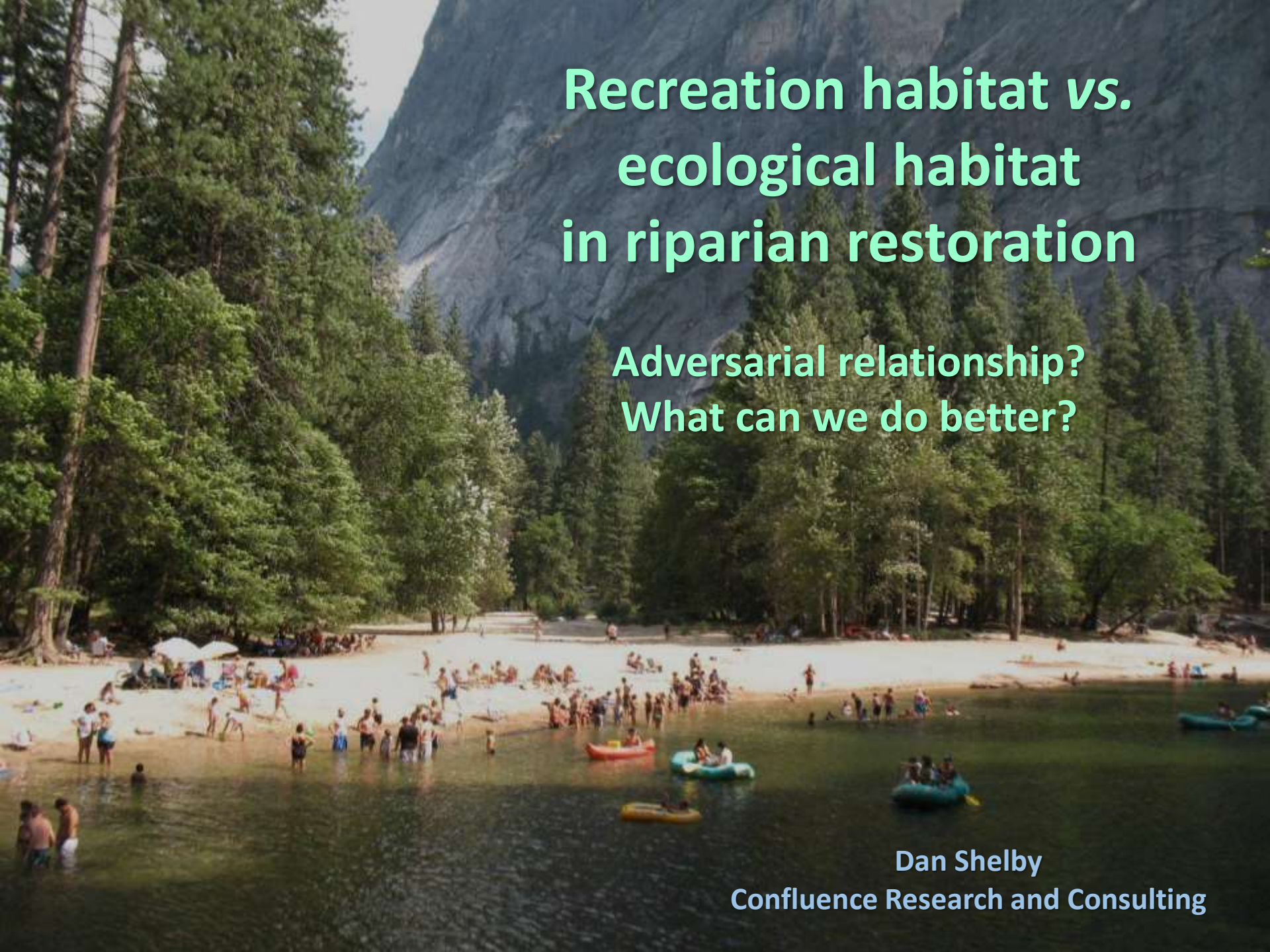


A scenic view of a river with people swimming and standing on rocks, surrounded by dense green trees. The water is clear and greenish, and the rocks are large and light-colored. The scene is set in a lush, forested area.

# Riparian restoration

## Balancing ecologic habitat and recreation habitat

Dan Shelby, Bo Shelby, and Doug Whittaker  
Confluence Research and Consulting



# Recreation habitat vs. ecological habitat in riparian restoration

Adversarial relationship?  
What can we do better?

Dan Shelby

Confluence Research and Consulting







# Recreation vs. ecological habitat

How are they different?

Do visitors support restoration goals?

Can we manage for both?



# Merced River in Yosemite Valley



# YOSEMITE NATIONAL PARK VIRTUAL TOUR



Click below or on any  
for a 360° Panorama.

- 01. Tunnel View
- 02. Wawona Hotel
- 03. Yosemite Lodge
- 04. Cook's Meadow
- 05. Housekeeping
- 06. River View
- 07. Camp Curry
- 08. Ahwahnee Hotel
- 09. Stables
- 10. Glacier Point

**eMARKETING**360  
INTERACTIVE MARKETING

2 To Wawona 18 mi



# Development



>1,000+ hotel units  
>700 campsites

7,000 vehicles and 20,000 people per day

Many facilities within  
quarter-mile of river





# Swinging Bridge

Highest use area on river







**Recreation habitat:**  
**Close to river**  
**Good beach**  
**Sun and/or shade**  
**Good wading/swimming**



# Methods

- On-site survey n = 806 (92% response rate)
- Roving stratified sampling
- Integrated with NPS use monitoring



**What do visitors think about riparian conditions?**



# Evaluating riparian impacts



. The “river bank” photo shows an area used by park visitors along the Merced. National Park Service scientists evaluate river banks from an ecological perspective, but we are interested in how visitors perceive them. Please rate the acceptability of this river bank from your perspective.

Very unacceptable

Marginal

Very acceptable

- 4

- 3

- 2

- 1

0

+ 1

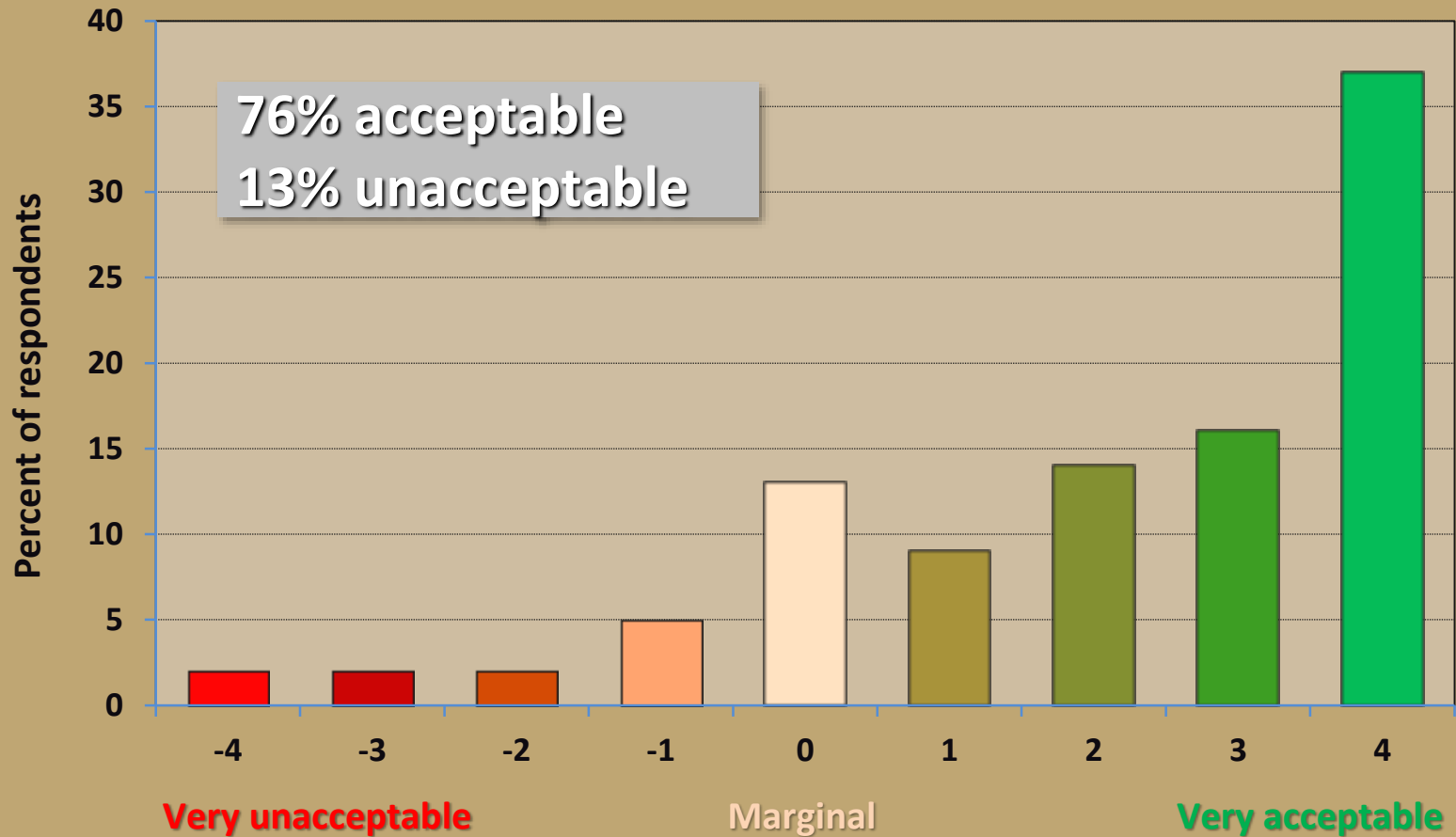
+ 2

+ 3

+ 4



# Evaluating riparian impacts



# Evaluating riparian impacts



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Very unacceptable

Marginal

Very acceptable

- 4

- 3

- 2

- 1

0

+ 1

+ 2

+ 3

+ 4



What about possible solutions?





Give Plants a Chance!  
Please Stay Off

NO launching  
of  
Boats, floats,  
tubes, rafts  
from this area!

Put in allowed at Stoneman  
Bridge, located at the Curry  
4-way intersection!!!!

Thank you! N.P.S.-P.S.A.R.-Preventative  
Search and Rescue

A wooden fence runs across the foreground, with a sign attached to it. The sign features the Yosemite National Park logo and text indicating a closed area for regeneration. The background is filled with a dense network of tree roots and a large tree trunk on the right side.

Yosemite National Park  
**AREA CLOSED**  
REGENERATION IN PROGRESS

River Access





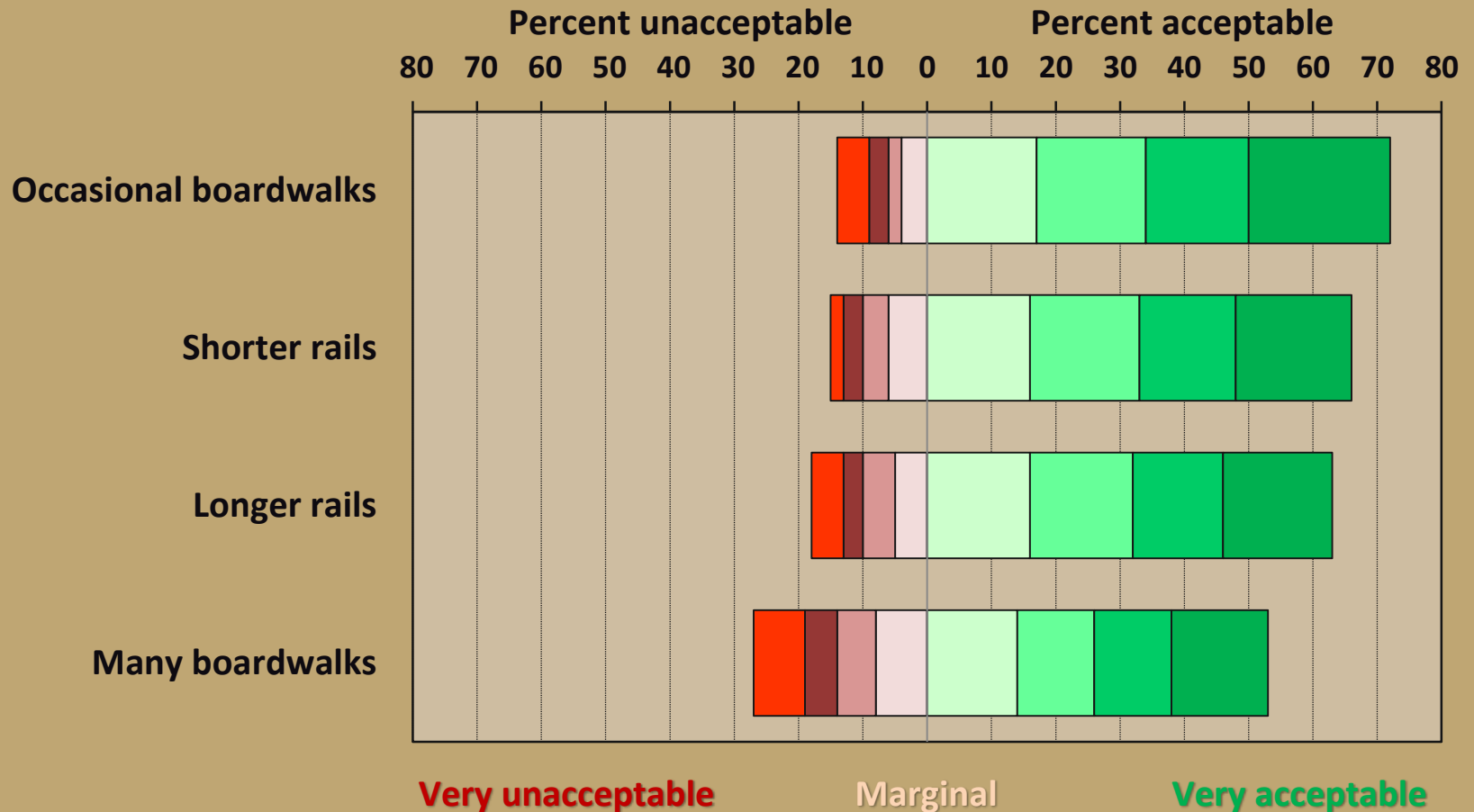
# Evaluating fences and boardwalks



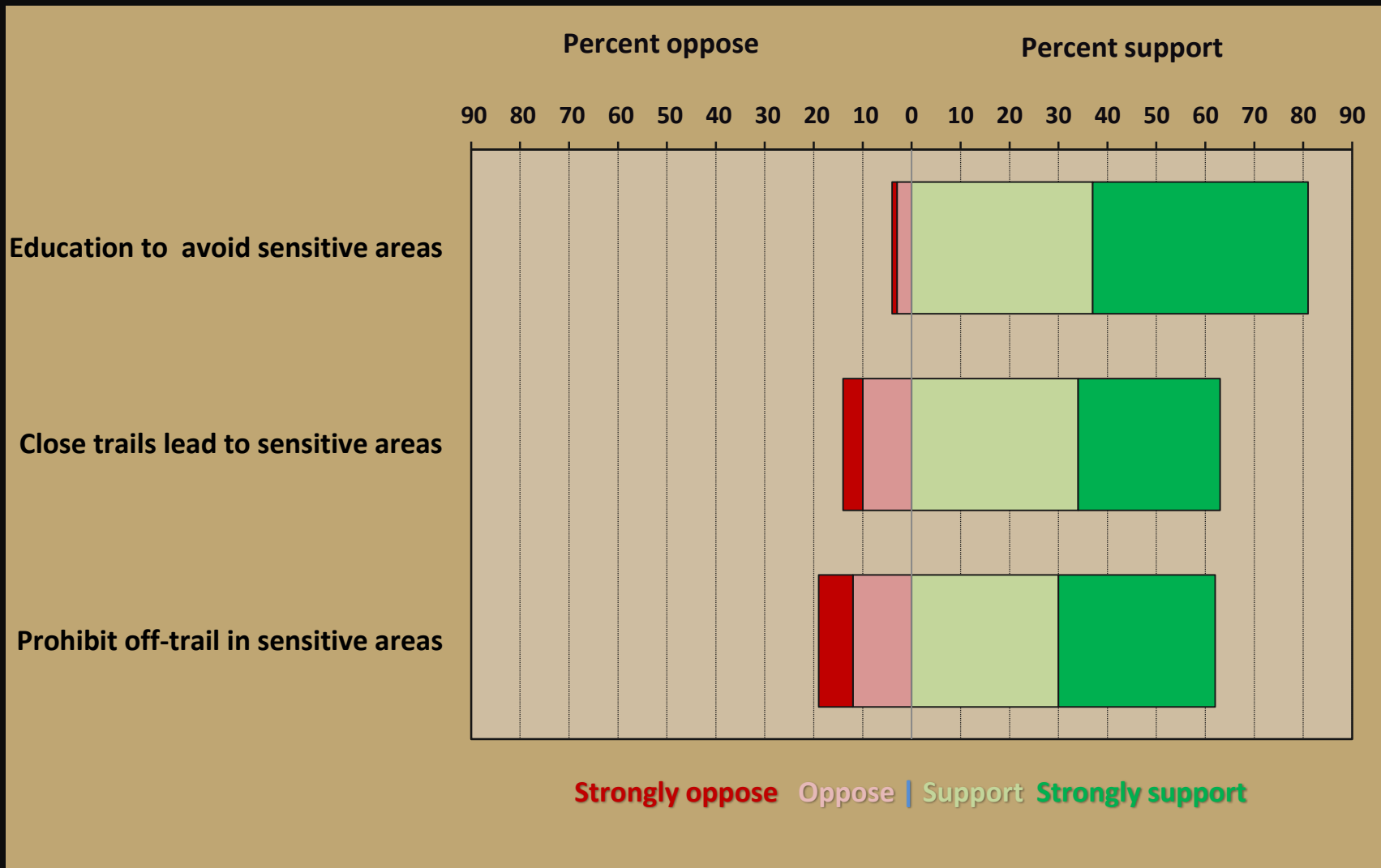
18. To reduce bank and meadow trampling along the river, the Park Service could close sensitive areas (see “split rail fencing” photo) and direct people toward areas that can withstand use (see “boardwalk and stairs” photo). However, these actions may decrease “naturalness,” prevent access to some areas, or lead to congestion in other areas. Please rate the acceptability of the following actions.

	Very unacceptable			Marginal				Very acceptable	
<b>Longer split rail fences</b> (over 200 feet) to protect <b>large areas</b> from trampling, with short openings for river access.	-4	-3	-2	-1	0	+1	+2	+3	+4
<b>Shorter split rail fences</b> (under 50 feet) to restore <b>small sites</b> with heavy trampling.	-4	-3	-2	-1	0	+1	+2	+3	+4
<b>Occasional boardwalks and stairs</b> through meadows and sensitive areas to provide access to areas like beaches.	-4	-3	-2	-1	0	+1	+2	+3	+4
Trail networks with <b>many boardwalks &amp; stairs</b> directing use to less sensitive areas and discouraging off-trail use.	-4	-3	-2	-1	0	+1	+2	+3	+4

# Evaluating fences and boardwalks



# Managing use in sensitive areas















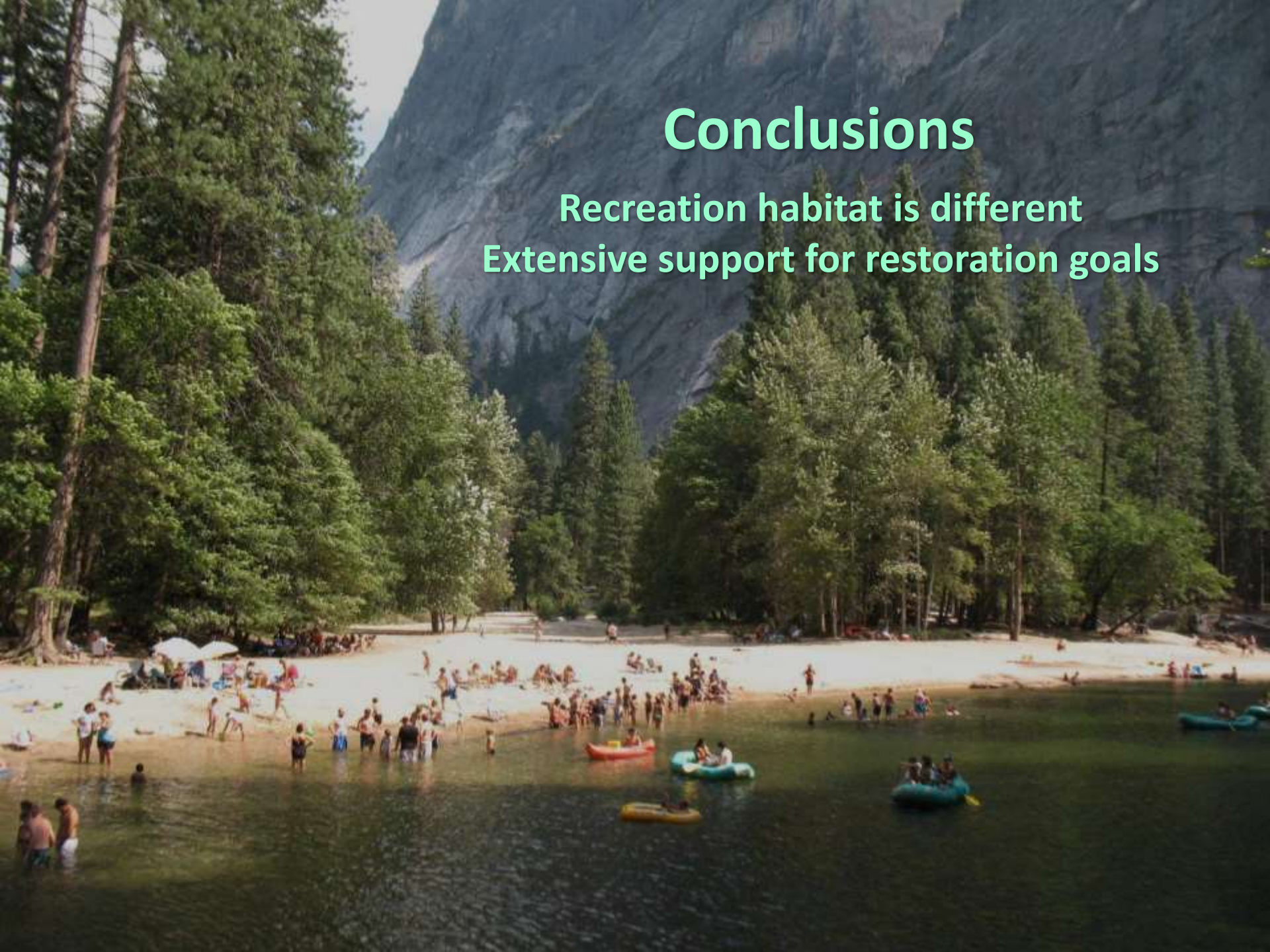






# Conclusions

Recreation habitat is different  
Extensive support for restoration goals





**Manage use to protect riparian or restored areas?  
Provide high-quality recreation habitat?  
Leaving Yosemite, look at Green-Colorado System**

# Restorations need to accommodate use

Deer Creek





Little Nankoweap

## Funnel use, harden site

- river to camp
- camp to hikes





## Site engineering

- cues for camping
- keep use in post-dam areas

Crystal Camp





## Site engineering

- increase capacity
- suspend 1-party norm
- resource protection
- multiple groups



Cremation Camp



## Engineered trails

- "hiking habitat"
- routes to destinations

Upper Deer Creek



**Identify trails,  
Keep people on them,  
Minimize impacts**



**Nankoweap, Carbon Creek**



Nankoweap

## Larger scales

- extensive shoreline
- user-created trails
- established networks



Stillwater Canyon, Green River

## Tamarisk can eliminate camp habitat

- pre-beetle
- post-beetle, no better?



## Removing beetle-killed tamarisk

- labor intensive
- what about slash?



## Green/Colorado confluence





Three Canyon Camp, Green River



## Slash piles

- stumps, uneven ground
- new willows, invasives?
- camp habitat in upland oaks



**Spanish Bottom  
Cataract Canyon**



**Restoration timeline**

- tamarisk removal
- planting cottonwoods
- camping in dead tamarisk





Granite Camp

## “Tamarisk camp”

- shade, shelter, screening
- beetle-kill, removal
- new planting, cultivation
- interpretation, assistance



## Dying tamarisk, shade/shelter

- no engineering
- regeneration by invasives, natives?



Carbon Creek Camp



## Channel and bank restoration

- whitewater features
- foot and bike paths
- seating
- shops/restaurants



Arkansas River  
Salida Whitewater Park



## Conclusions

- **Recreation & ecological habitat are different**
- **Public supports restoration**
- **Protect riparian/restoration areas from people**
- **Create high quality recreation habitat**
- **By design, not by default**



# Modern river bank restoration

## Rip rap or wrapped rafts?

Doug Whittaker

# Old paradigm: Cut and clear



Elwha River dam removal revealed stumps

...and stabilize banks with rip rap

The Shoreline You've Always Wanted

Let us help make it possible

THE TOUGHEST, CLASSIEST SHORELINE YOU CAN GET.

*Creators of the Armored Shoreline™*



SHORELINE  
EROSION!



...a catastrophe for salmonids





...and for some people too



Skagit River in Feb 2018

New paradigm: Just add wood  
Increase complexity and dynamism



Upper McKenzie River, OR

# Policy solution: No permits for you (without wood)



**US Army Corps  
of Engineers®**



# Enter the ELJ



Nooksack River WA • Natural Systems Design Engineered Log Jam



APRIL 11 - 15th, 2016 | 5 DAY WORKSHOP  
**LARGE WOOD HABITAT  
 DESIGN COURSE**

Sleeping Lady Resort, Leavenworth, WA

**Workshop Highlights:**

- ▶ Defining large wood
- ▶ Historic forest & river conditions
- ▶ Fish habitat needs & response
- ▶ Geomorphic influence of wood
- ▶ Hydrology / Hydraulics
- ▶ Site assessments
- ▶ Design & construction
- ▶ Risk assessment
- ▶ Project examples
- ▶ Effectiveness monitoring



**Register Now!**  
 (Space Limited to  
 30 Participants)

April 11 - 15th, 2016  
 5 Day Workshop



Sleeping Lady Resort  
 Leavenworth, WA



Learn from scientists  
 and engineers who  
 specialize in  
 Large Wood Habitat  
 Design



Collaborate and  
 share with other  
 professionals



Upper Columbia  
 project site visits

PRESENTED BY:  
**Natural Systems Design**

CONTACT:  
**Molly Fay**  
 (360) 656.5207 x101  
 molly@naturalsdes.com  
 for  
 Registration, Questions  
 and Comments

\*Cost \$1,500  
 (Excludes tax and lodging)

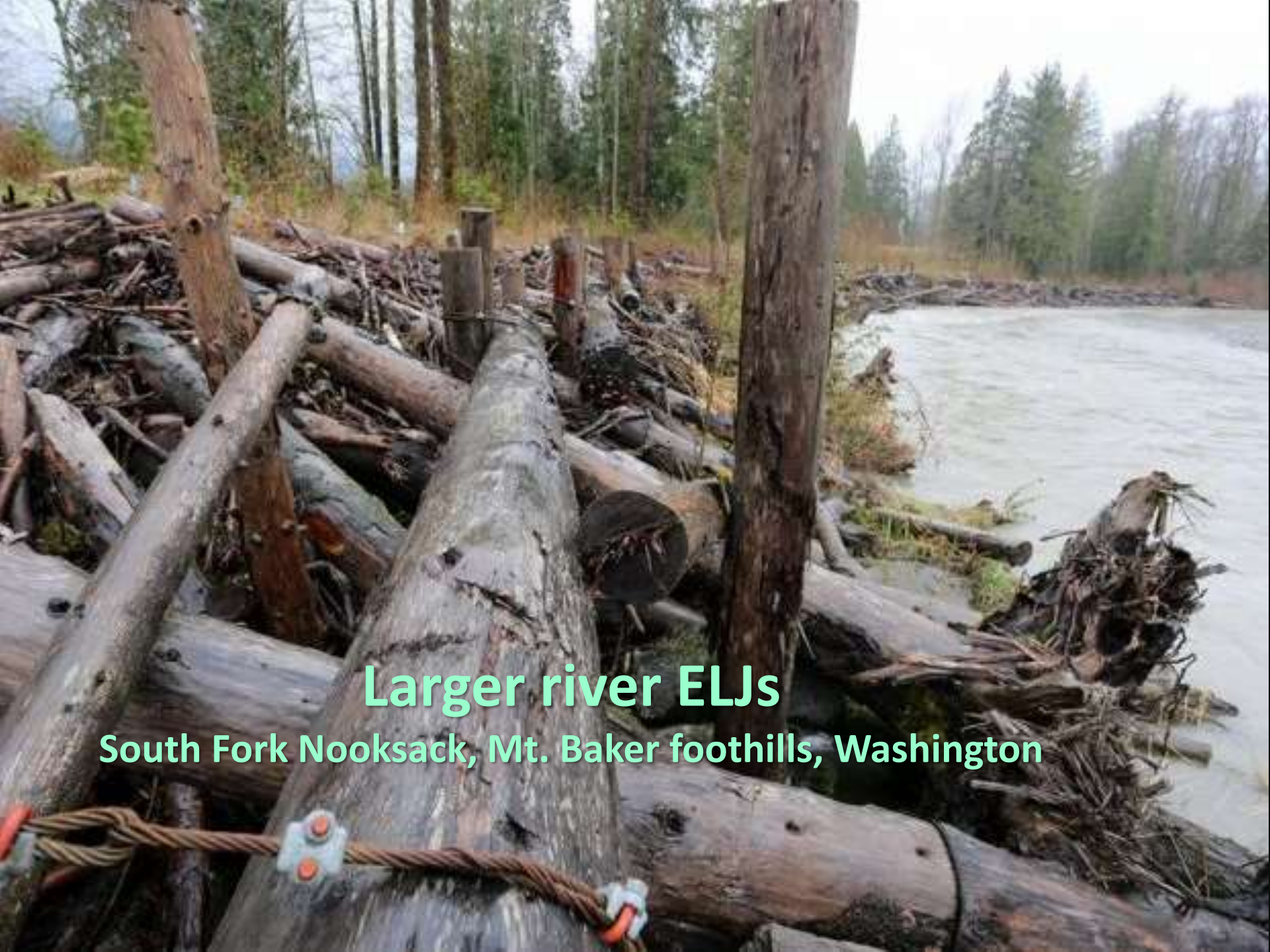
# A revolution





**Small creek ELJs**

**Thornton Creek Seattle**



## Larger river ELJs

South Fork Nooksack, Mt. Baker foothills, Washington

**Some designs recruit new wood**





Others just protect the bank (road)



Cedar River , King County, WA

Some fail





**Compare to natural wood accumulation**

**Chulitna River, Alaska**

All of them could affect  
recreation habitat



Attractive  
nuisance?



Just a nuisance?  
Portaging log jam  
Upper McKenzie River, OR





Aesthetics?

One strategy: Make them safer  
“bumper logs”



Herzman Levee Repair Project  
Cedar River, WA ~160 cfs

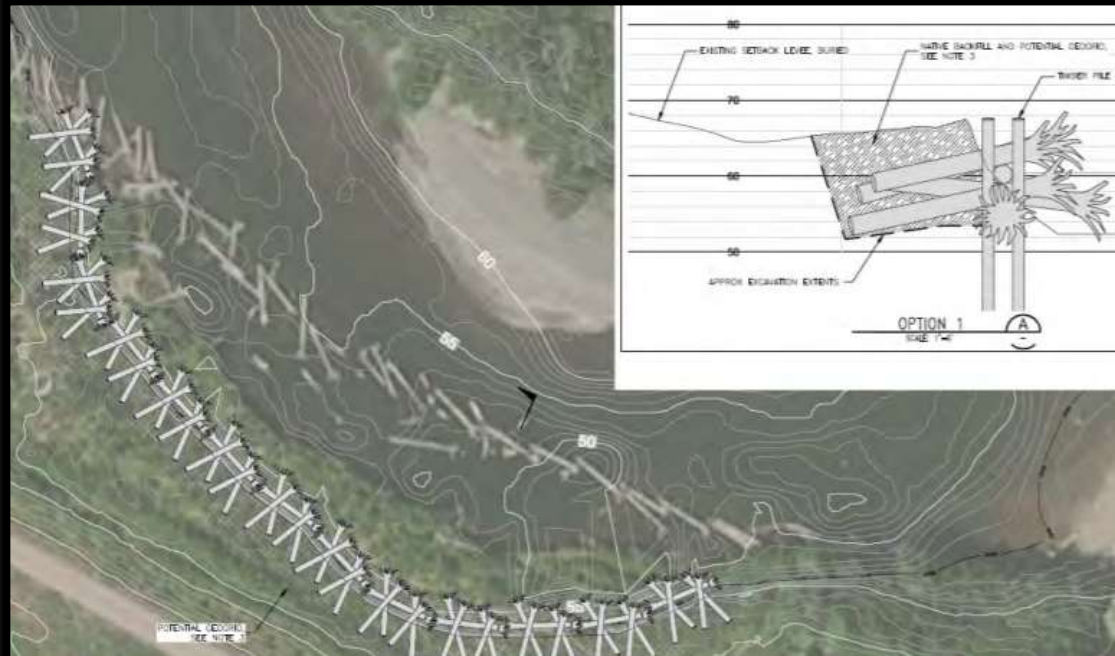


# Green River ELJ modifications

Study assessed

Sheriff recommended

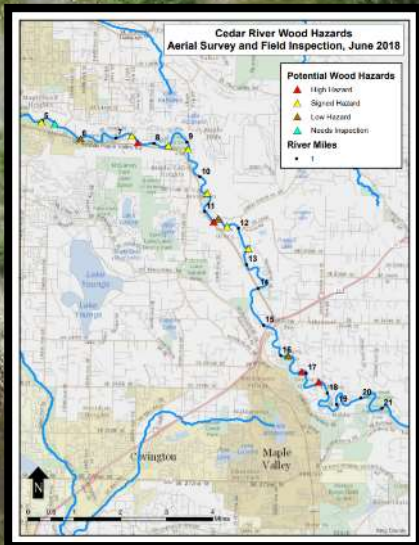
County considering...



# Hazard removal considerations



Campground Rapids, Eagle River, AK



A screenshot of the King County website. The header includes the King County logo and navigation links: "Home", "How do I...", "Services", "About King County", and "Agencies". A search bar is visible in the top right. The main content area features a "Boating" section with a "Known hazards in King County rivers" heading. Below this, there is a "Notice of river closure: Green River west of Highway 18" section with a map and a photograph of a river with a logjam.

A notice of river closure for the Green River west of Highway 18 in King County, Washington. It includes a map showing the location of the closure and a photograph of a river with a large logjam. The text provides information about the closure, including the date and time, and offers contact information for more details.



A poster titled "HAVE FUN. BE SAFE!". It features a map of the Upper Carson Project area, a photograph of a person in a kayak, and a warning sign. Below the map, there are five circular icons with text: "Always wear your life jacket", "Use proper boating techniques", "Plan your trip carefully", "Avoid alcohol and drugs", and "Don't drink and drive". The poster is provided by King County.

Other strategy:  
Just warn 'em





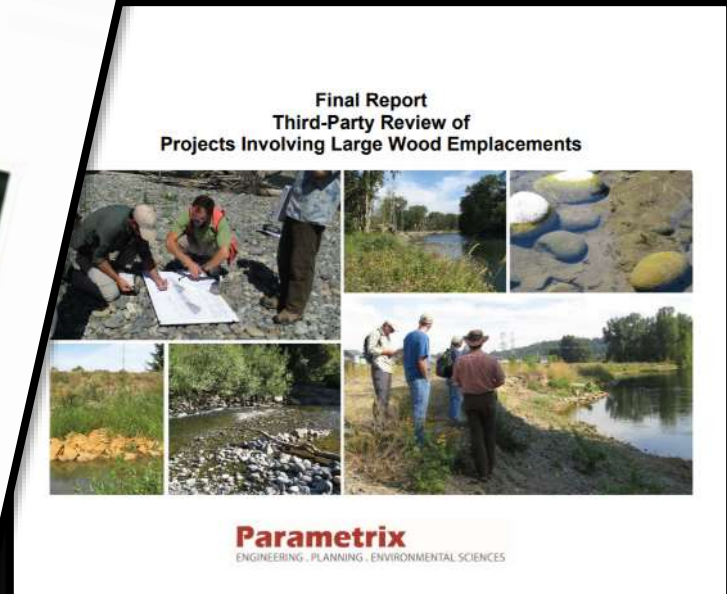
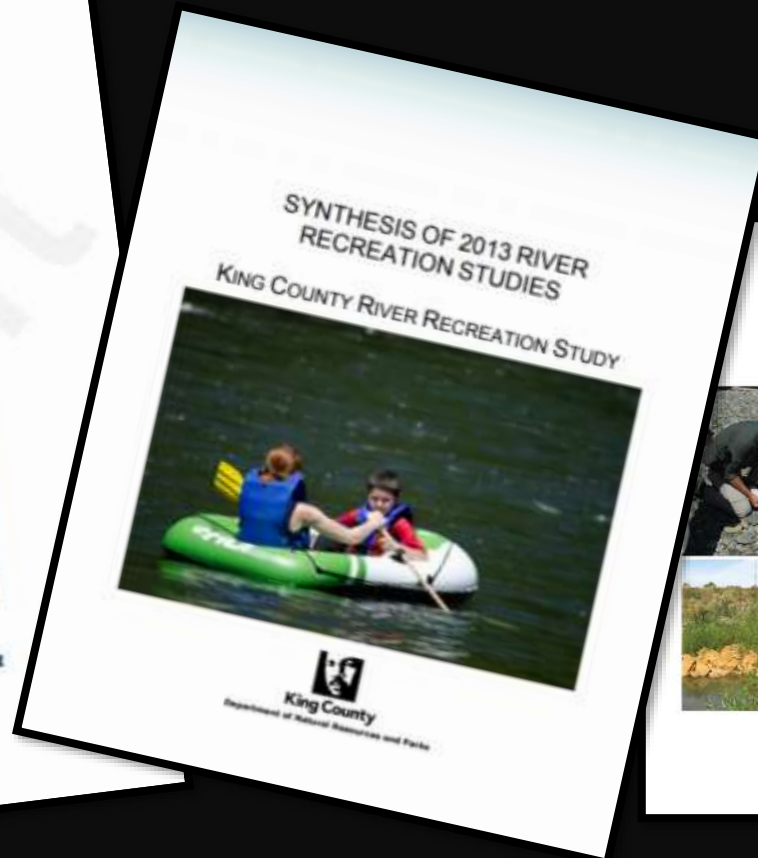
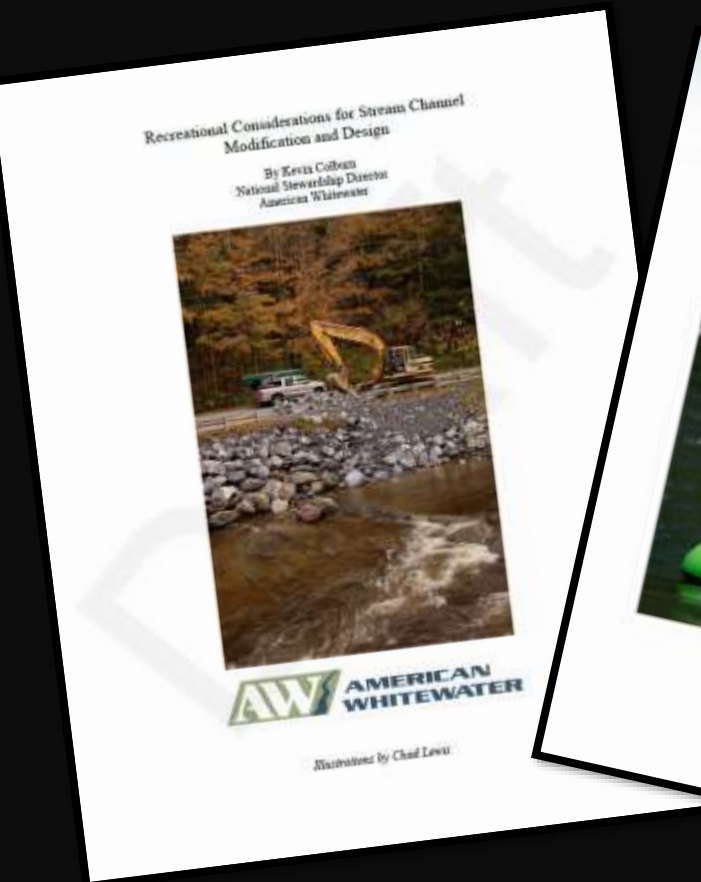
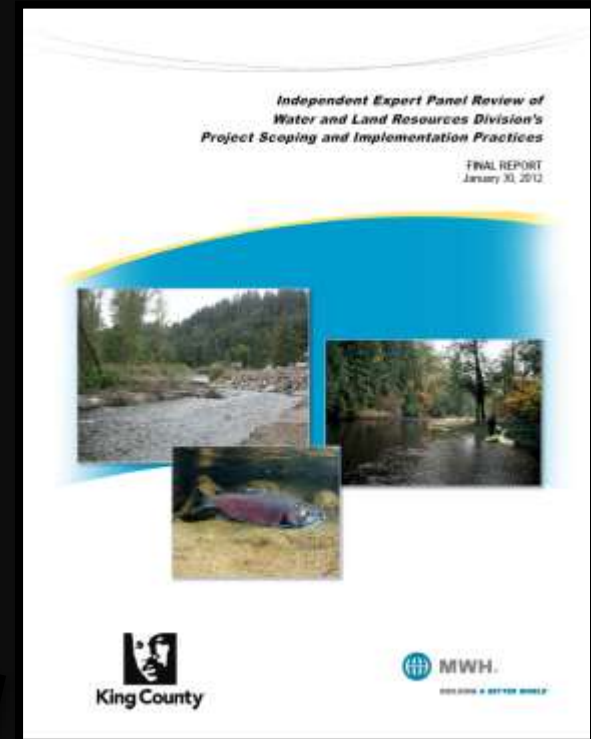
**Last resort: Close the river reach?**


# Cedar River closures



**Nine mile reach  
12 blockages in 2017  
King County Sheriff's Office**

# Emerging literature

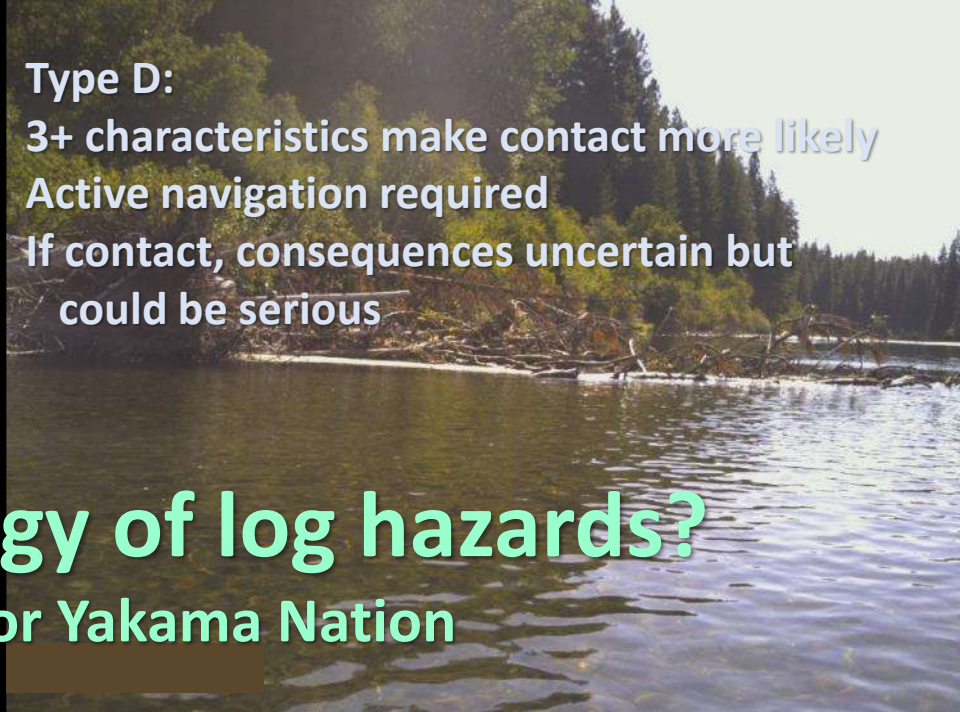




**Type A**

Projects < 5 feet from bank

Takes active navigation to contact



**Type D:**


3+ characteristics make contact more likely

Active navigation required

If contact, consequences uncertain but could be serious

**Toward a typology of log hazards?**  
**MIG projects for Yakama Nation**

08:55 05-09-2012



**Type E:**

Multiple characteristics; contact more likely

Active and accurate navigation required

If contact, consequences uncertain but likely to be serious



**Type F**

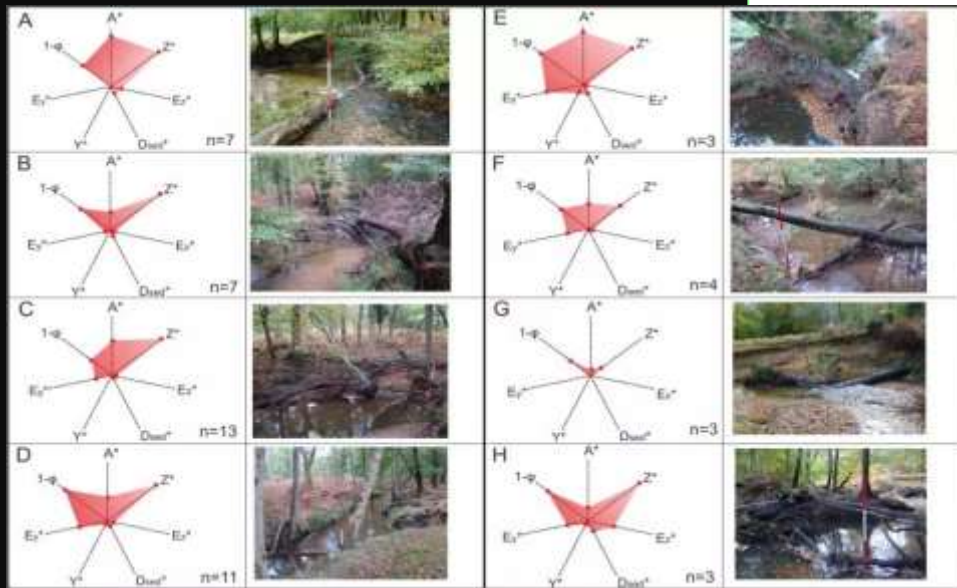
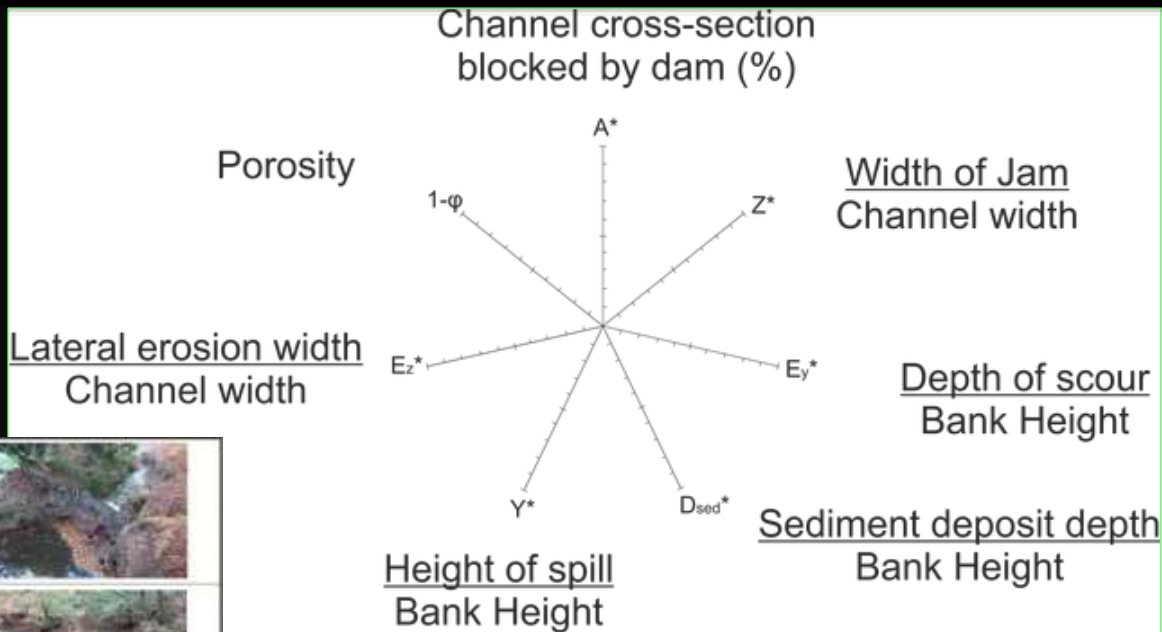
Channel spanning, portage likely required

If contact, severe consequences

# The River Management Blog



UK-based geomorphology professors





Seeking  
middle  
ground



# **Interactive discussion**

**Ecological and recreation values of  
example restoration projects**



Merced River, Yosemite NP

# Merced River, Yosemite NP



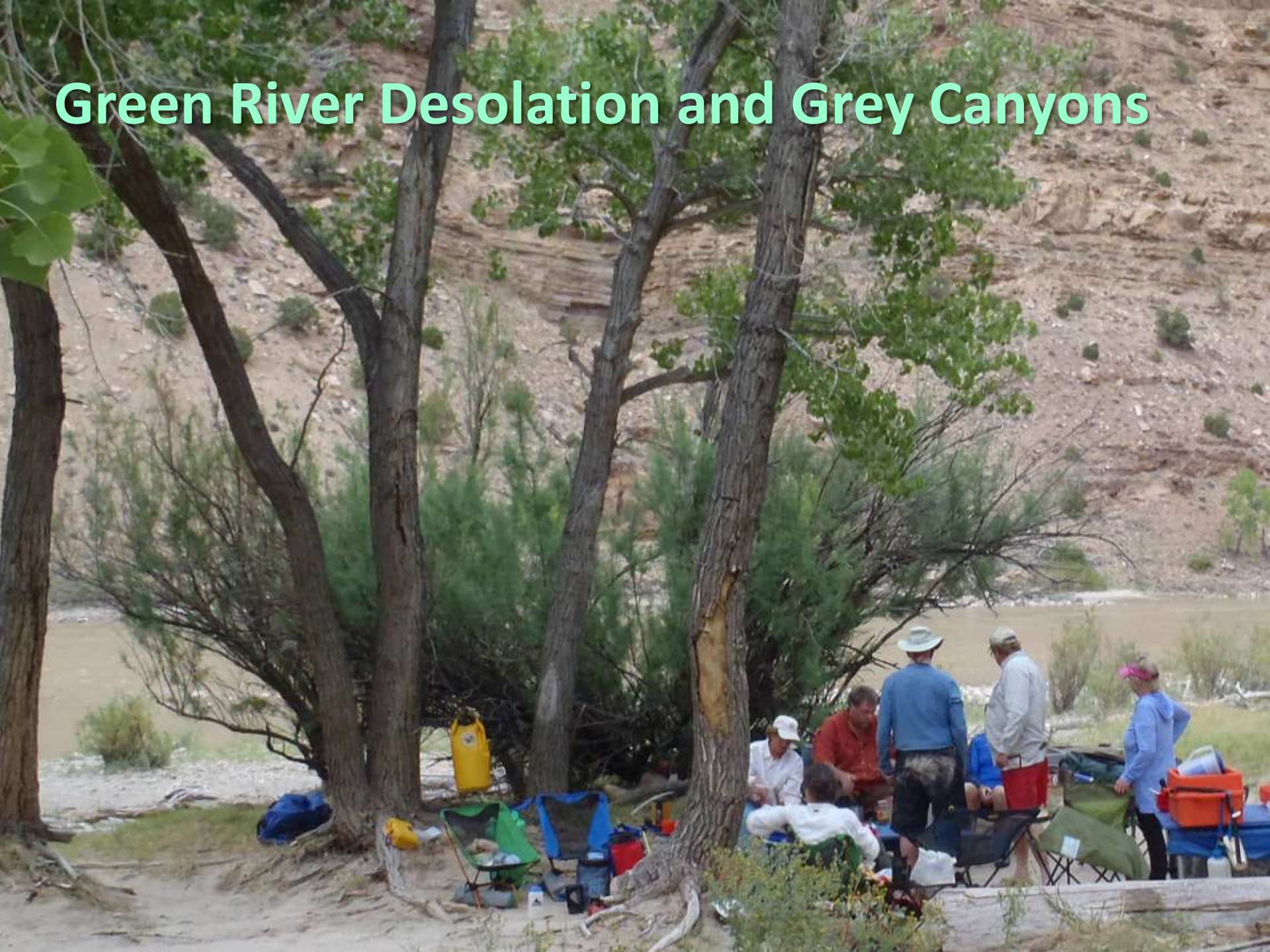
# Merced River, Yosemite NP

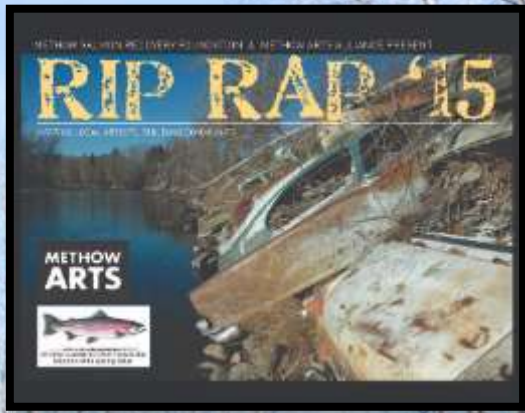


# Lower Dolores River, UT



# Green River Desolation and Grey Canyons





# Detroit rip rap on the Methow River

## East Slope Cascades in Central Washington





# Dolosse Project on Skagit River

## Western Washington



**Rootwad rip rap with willow revetment**  
Kenai River, Alaska



**Channel spanning ELJ forms  
upstream pool & reconnects side channel  
South Fork Nooksack, Washington**

# Rock, rootwad, and log revetment

Cedar River, King County, Washington



# Cedar River, Washington





**Questions and comments**