Why Wood Restoration Matters: Changes in Wood Loading in Olympic Peninsula Streams

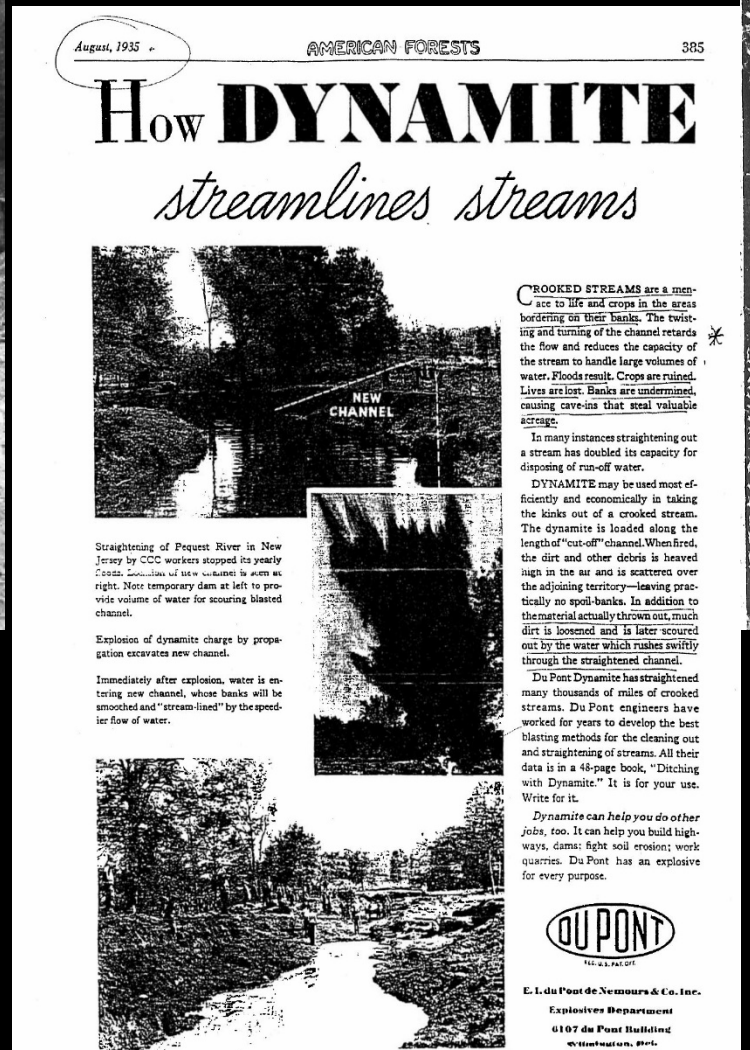
Mike McHenry, Martin Lehrman, George Pess, Bob Conrad and Glenn Grette

Bockman Creek, Sol Duc Watershed

150 years of Intensive Forestry Practices

- Railroad Logging
  - Limited Scope
  - Selective
- Truck Logging
  - Increasing Watershed Access
- Stream Protection Rules
  - Forest Practice Act (1974)
  - TFW (1987)
  - Forest and Fish Agreement (2000)

Complementary Historic Practices



How DYNAMITE streamlines streams

Straightening of Pequest River in New Jersey by CCC workers stopped its yearly floods. Formation of new channel is seen at right. Note temporary dam at left to provide volume of water for scouring blasted channel.

Explosion of dynamite charge by propagation excavates new channel.

Immediately after explosion, water is entering new channel, whose banks will be smoothed and "stream-lined" by the speedier flow of water.

CROOKED STREAMS are a menace to life and crops in the areas bordering on their banks. The twisting and turning of the channel retards the flow and reduces the capacity of the stream to handle large volumes of water. Floods result. Crops are ruined. Lives are lost. Banks are undermined, causing cave-ins that steal valuable acreage.

In many instances straightening out a stream has doubled its capacity for disposing of run-off water.

DYNAMITE may be used most efficiently and economically in taking the kinks out of a crooked stream. The dynamite is loaded along the length of "cut-off" channel. When fired, the dirt and other debris is heaved high in the air and is scattered over the adjoining territory—leaving practically no spoil-banks. In addition to the material actually thrown out, much dirt is loosened and is later scoured out by the water which rushes swiftly through the straightened channel.

Du Pont Dynamite has straightened many thousands of miles of crooked streams. Du Pont engineers have worked for years to develop the best blasting methods for the cleaning out and straightening of streams. All their data is in a 48-page book, "Ditching with Dynamite." It is for your use. Write for it.

Dynamite can help you do other jobs, too. It can help you build highways, dams; fight soil erosion; work quarries. Du Pont has an explosive for every purpose.

DU PONT

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E. I. du Pont de Nemours & Co. Inc.
Explosives Department
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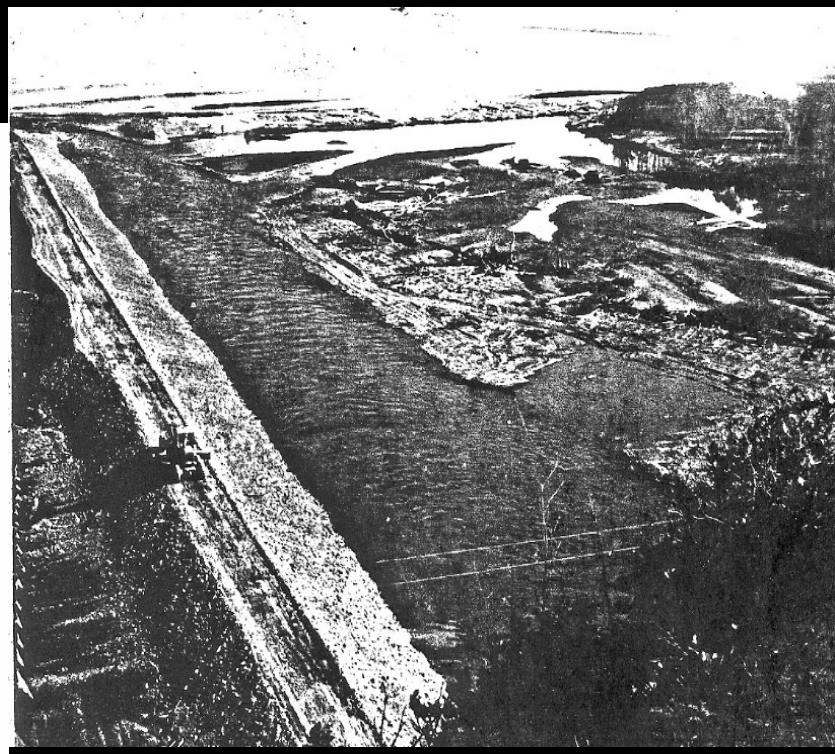


OZETTE & BIG
Removed log Jams
Existing log Jams
Falls
LAKE
OZETTE
UMBRELLA BAY
SWAN BAY
UMBRELLA
Creek
Trout
County
Road
Bridge
Falls 50'
BIG
Coal
Cr.
Crooked
Cr.
LAKE
E INDIAN
RVATION

Stream Cleaning Era Continues into 1980's

Hoh River Olympic National Park, August 1978

Nooksack River Deming 1971

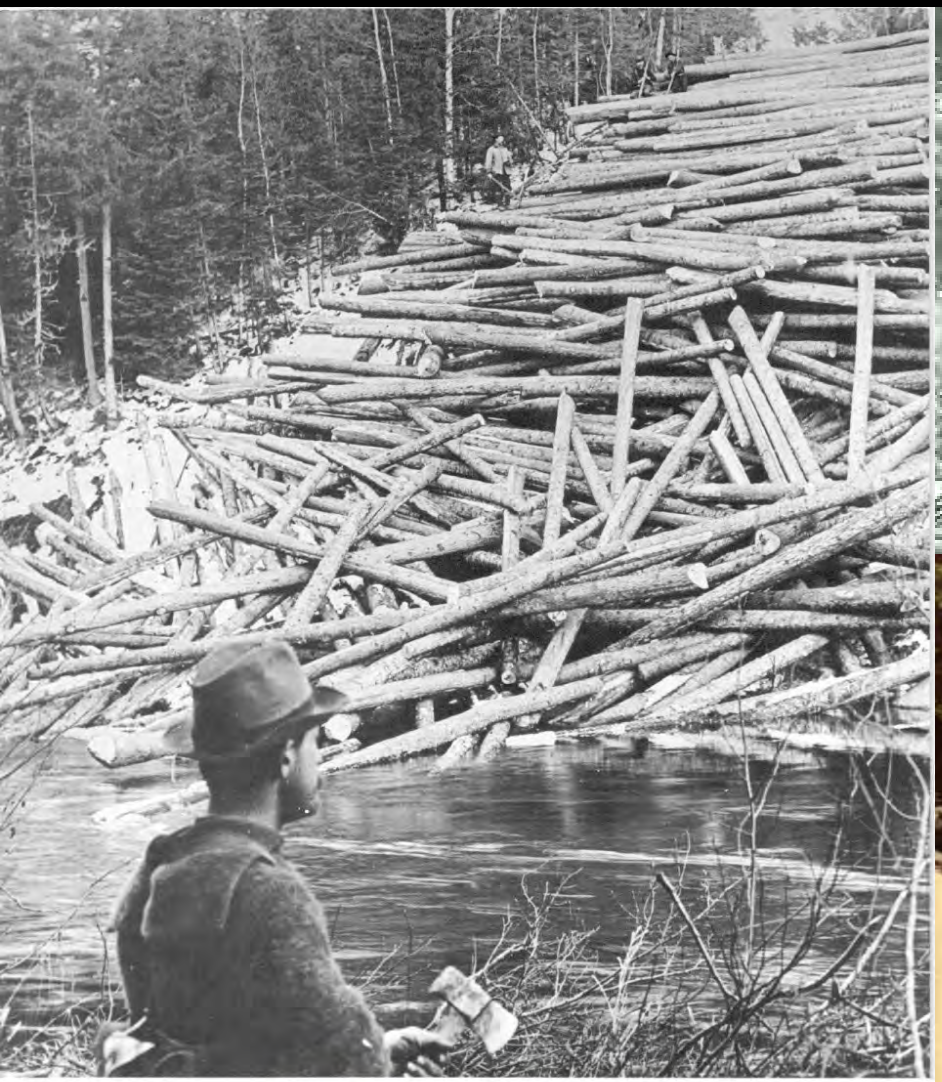
Widespread Impacts on Olympic Peninsula…and Beyond

- Geomorphic Response
  - Reduced roughness
  - Increased velocity
  - Increased scour
  - Channel downcuts
  - Conversion to plane bed
  - Reduced floodplain connectivity
- Salmon Habitat Impacts
  - Loss of spawning gravel
  - Reduction in pools
  - Reduced cover
  - Reduced summer flow
    - Increased stream temperature
  - Loss of off-channel areas

Channel Response to Wood Loss

Little River, Elwha River Tributary

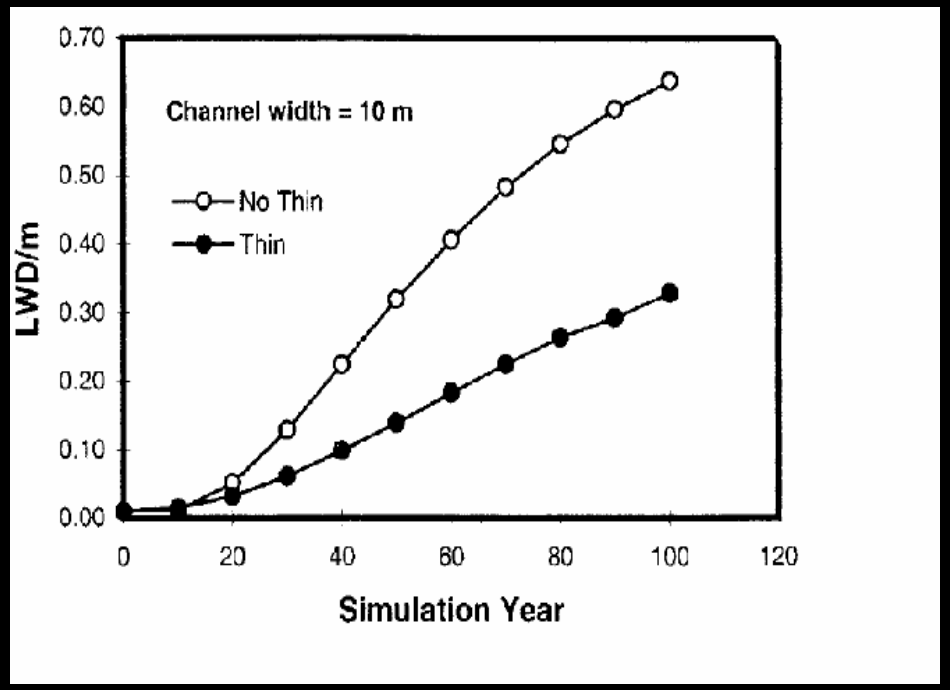
These Practices Have Largely Ceased and….



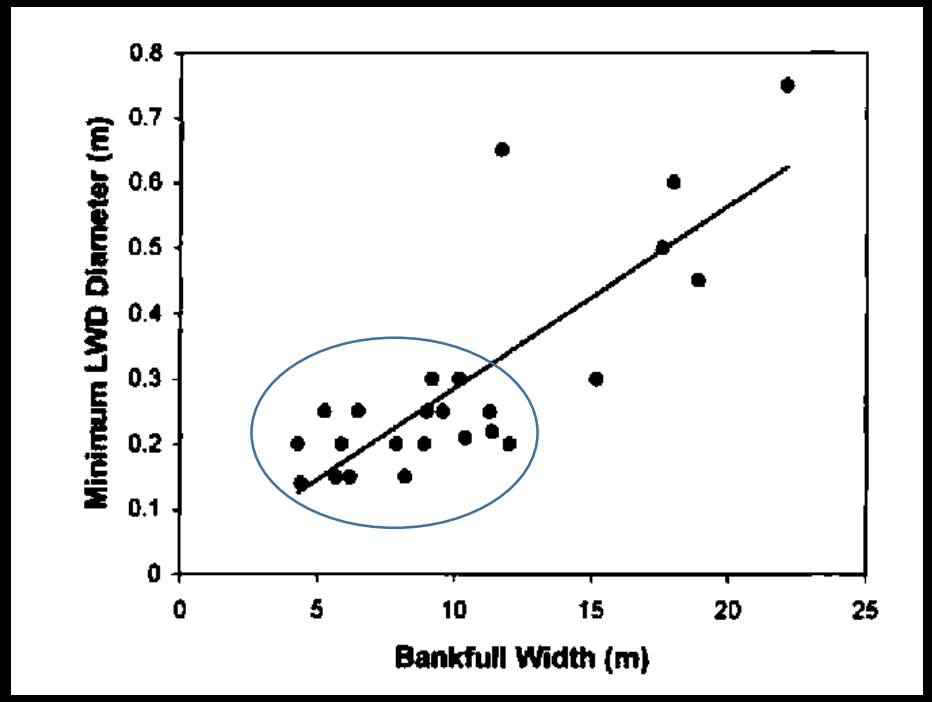
ROLLING LOGS INTO THE RIVER

The cut logs were piled the bank all winter waiting for spring and the thawing of the river

Literature Suggests Wood Recovery



Beechie, T.J., Pess, G., Kennard, P., Bilby, R.E. and Bolton, S., 2000. Modeling recovery rates and pathways for woody debris recruitment in northwestern Washington streams. North American Journal of Fisheries Management, 20(2), pp.436-452.



Beechie, T.J. and Sibley, T.H., 1997. Relationships between channel characteristics, woody debris, and fish habitat in northwestern Washington streams. Transactions of the American Fisheries Society, 126(2), pp.217-229.

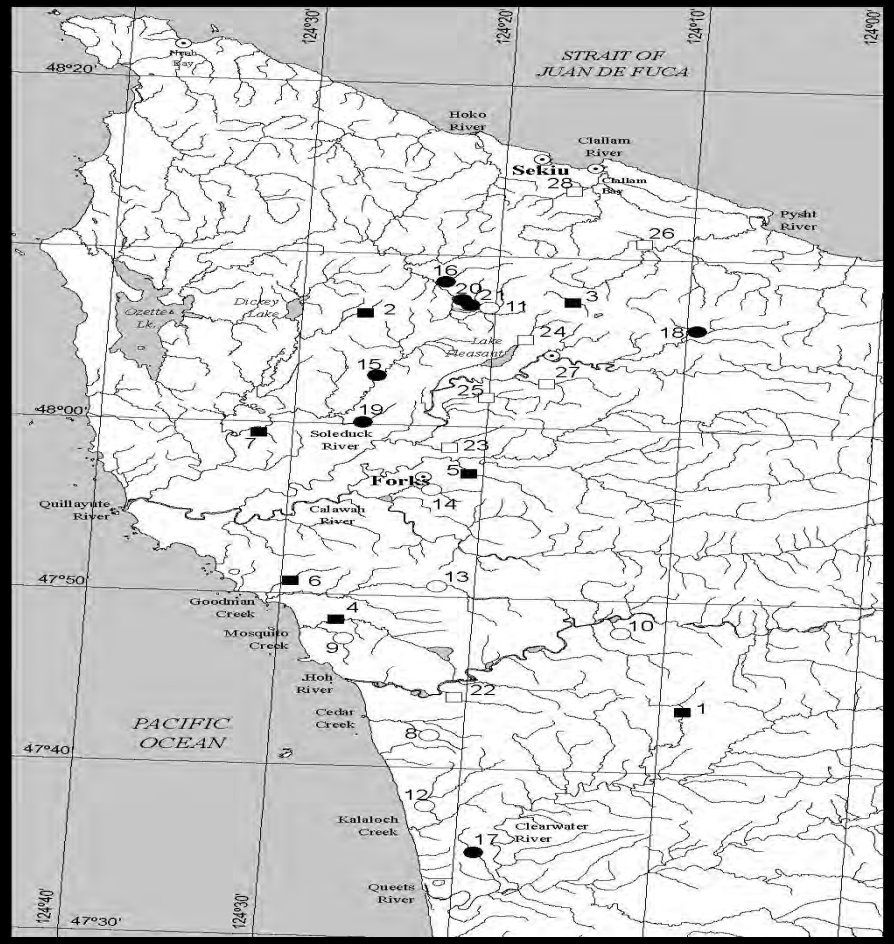
Widespread Impacts on Olympic Peninsula and Beyond

Upper Chehalis

Cedar Creek

“The Role of Large Organic Debris in Juvenile Salmonid Rearing Habitat in Small Streams”

- State, Private, Federal (USFS) ownerships
- Multiple Watersheds
  - Pysht
  - Hoko
  - Sol Duc
  - Dickey
  - Hoh
  - Clearwater
  - Queets



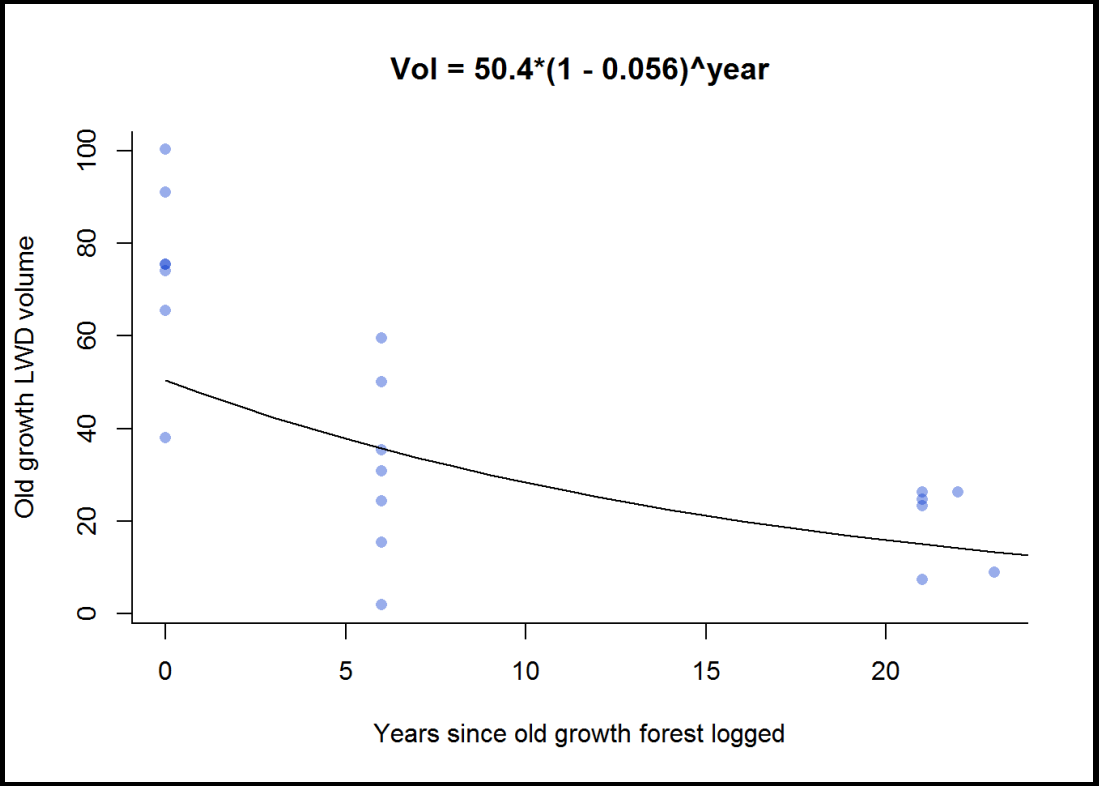
The Role of Large Organic Debris in Juvenile Salmonid Rearing Habitat in Small Streams

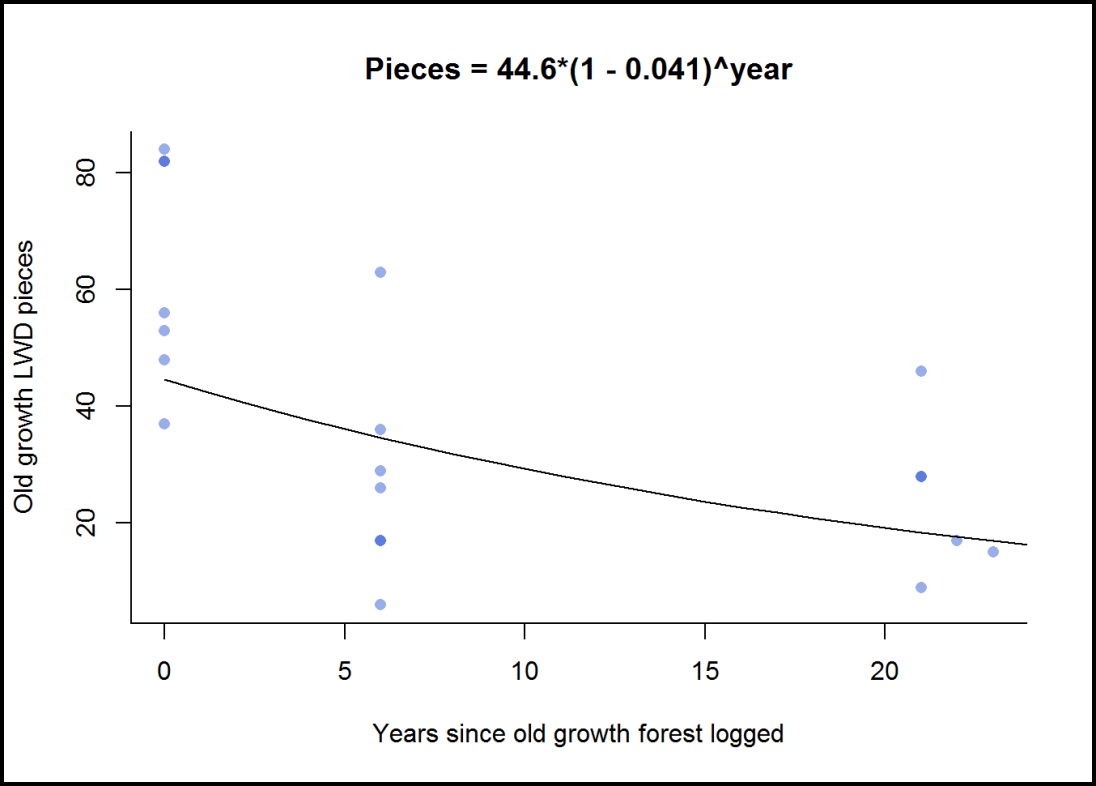
- Glenn Grette (1983)
  - UW School of Fisheries
- 28 third order streams
- Low gradient streams (0.5-2.0%)
- 4 Riparian Treatment Groups
  - Unlogged
  - Old, Middle and Young Second Growth
- <u>Conclusions</u>
  - Old growth derived wood accounted for the majority of pieces at all sites.
  - Old growth sites had highest piece counts (59.9/100 m) and volumes (78.1 m^3/100 m).
  - Second growth recruitment not significant until 50-60 years after logging.
  - Recruitment of second growth is insufficient to offset the loss of old growth.

Changes in the Quantity and Characteristics of Large Woody Debris in Streams of the Olympic Peninsula (1982-1993)

- McHenry et al. (1998)
  - Found and resurveyed all 28 sites
    - 11 years after original survey
  - 6 of 7 Old growth sites logged since last survey
    - Remaining site Impacted
- Conclusions
  - Number of pieces identical between years (~50/100m)
  - Volume of old-growth declined by 26% (51.7 to 38.2 m^3/100m)
  - Old growth sites that were logged had 58% reduction in wood volume
  - Volume of second-growth increased by 67% (3.6 to 10.9 m^3/100m)
    - Riparian Age 11-72 years
    - Indication of Recovery?

Initial Logging of Old Growth is Catastrophic
5.6% loss/year



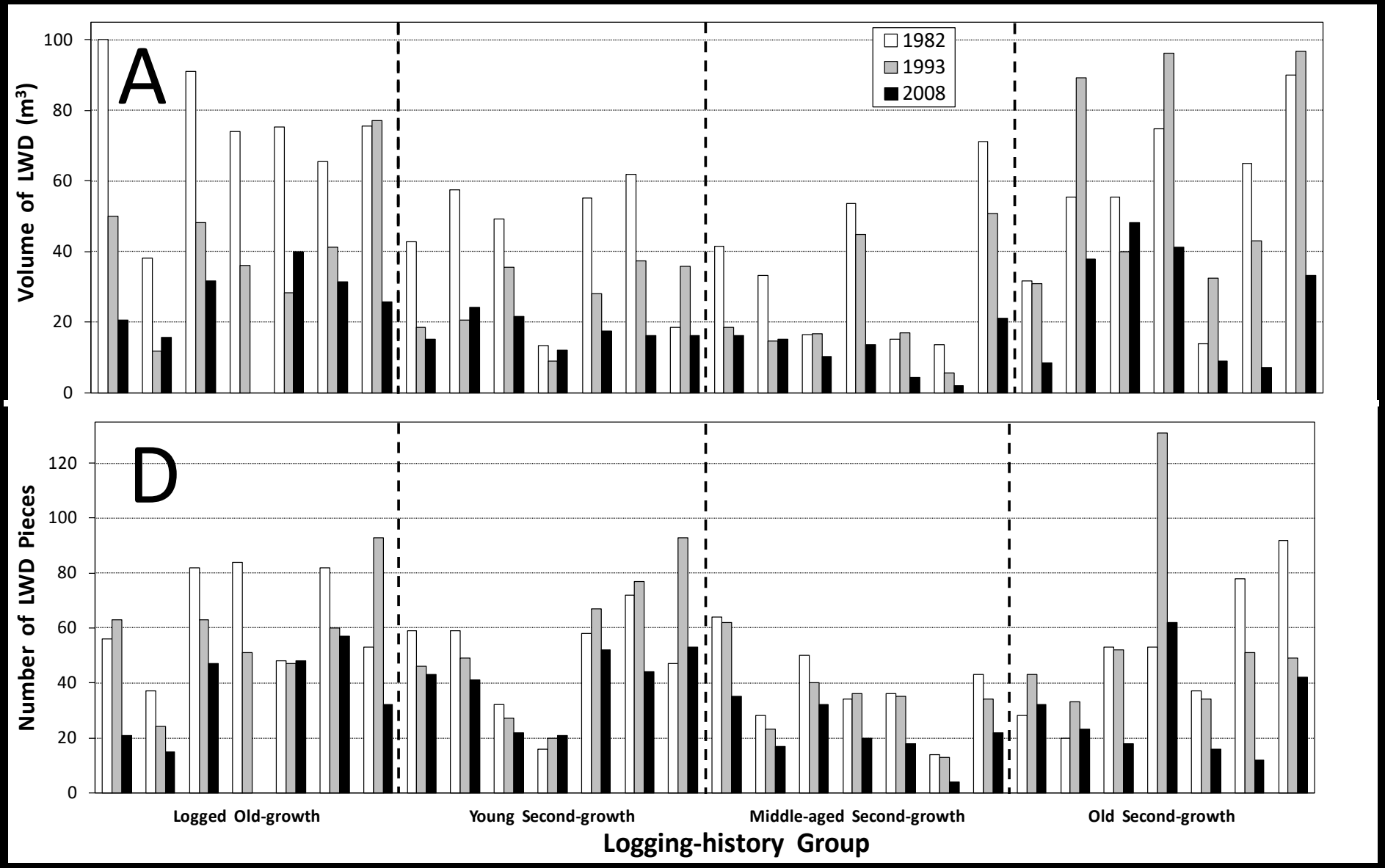


Sites Resurveyed in 2008

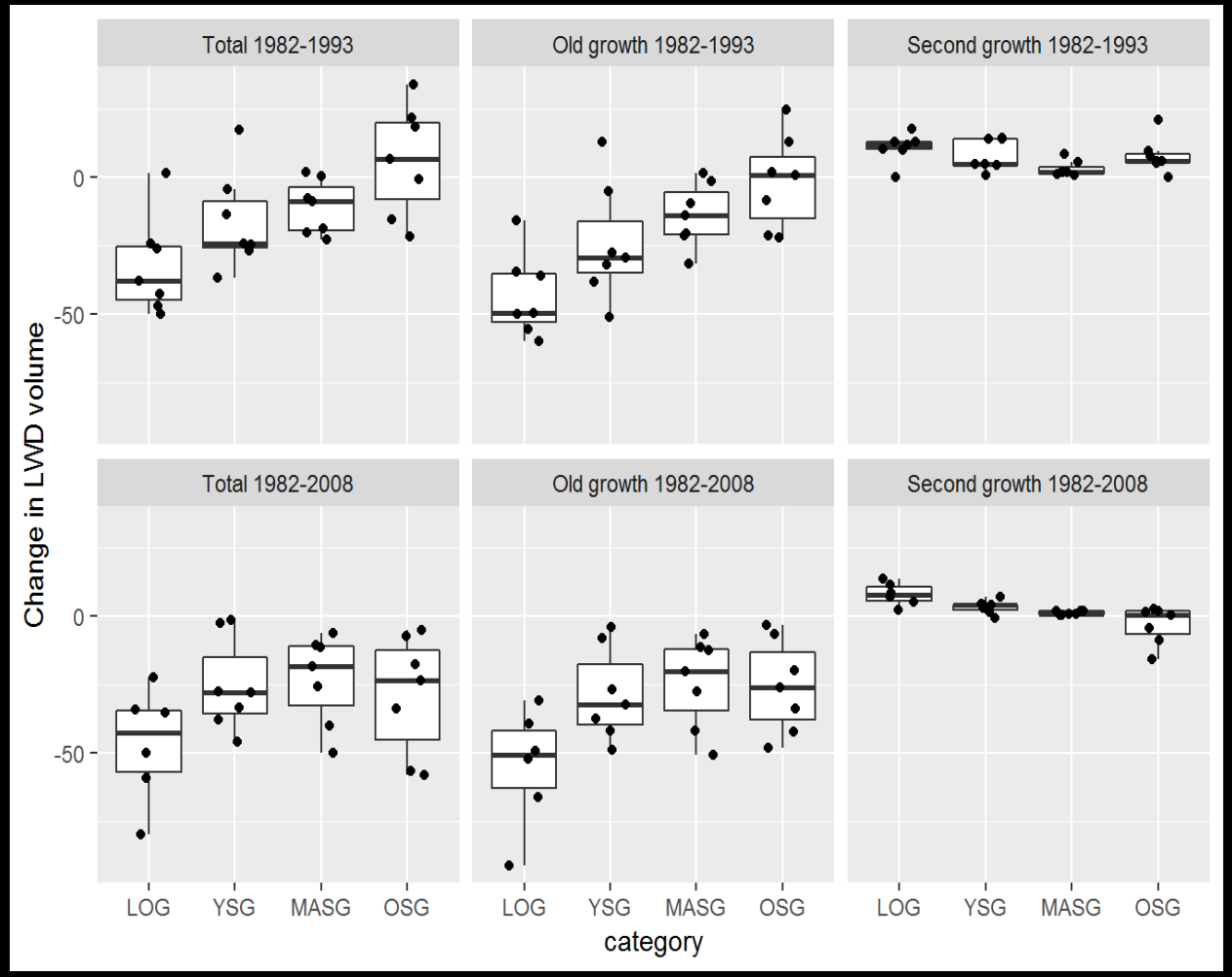
- McHenry et al. (In Preparation)
  - 27 of 28 sites relocated
  - 25 years after original survey
  - GPS located

Shuwah Creek, Sol Duc Watershed

25 Year Results



Summary 25 Year Results



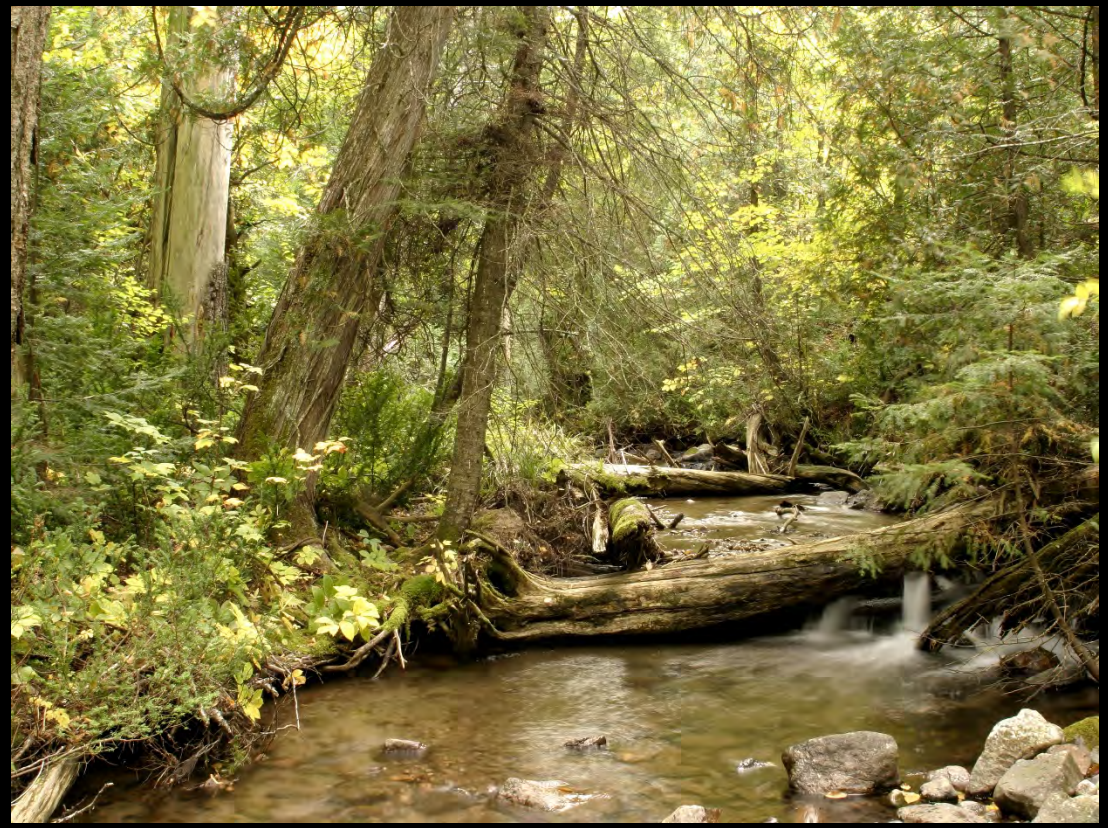
Snahapish River, Clearwater Watershed

diameter
1.0
0.3
0.1
1.0
0.3
0.1
0

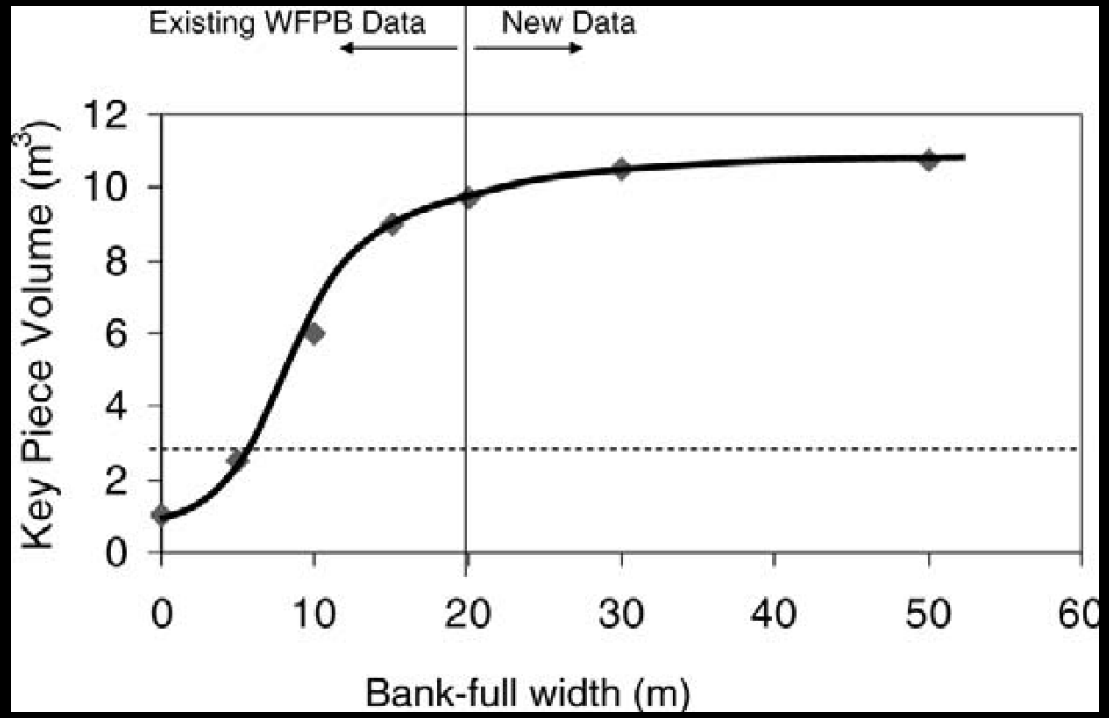
No Appreciable Wood Recovery from second growth forests up to 86 years old

h stands
0.7

Desired Future Condition



How do we get There?



Fox, M. and Bolton, S.. 2007. A regional and geomorphic reference for quantities and volumes of instream wood in unmanaged forested basins of Washington State. North American Journal of Fisheries Management, 27(1), pp.342-359.

Two of Original OP Wood Have Had Wood Restoration

Ellis Creek 2010

Upper Hoko 2014

Challenge is to Increase Spatial Scale

Long term Solutions May Require Thinking Outside of Box

“Rackinsphere”