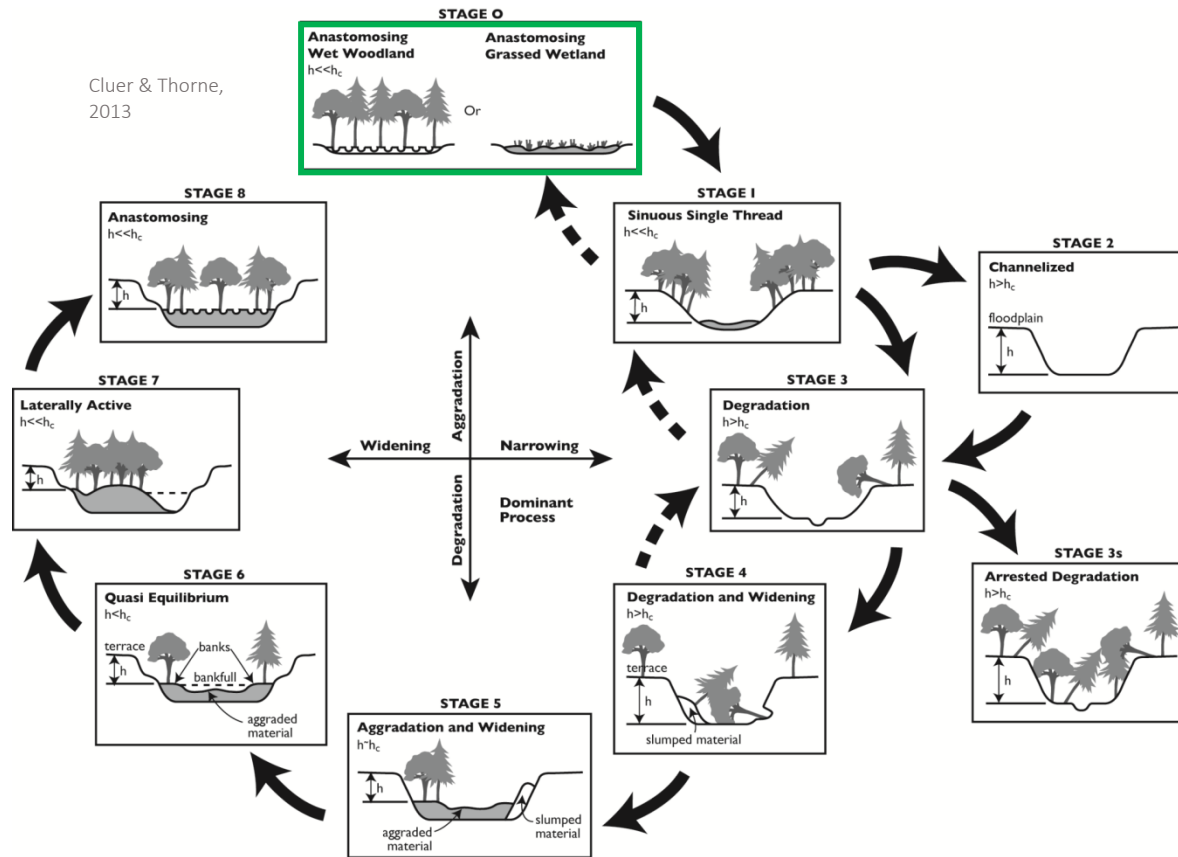


# How We Got to Stage 0: A 10-minute History



Johan Hogervorst

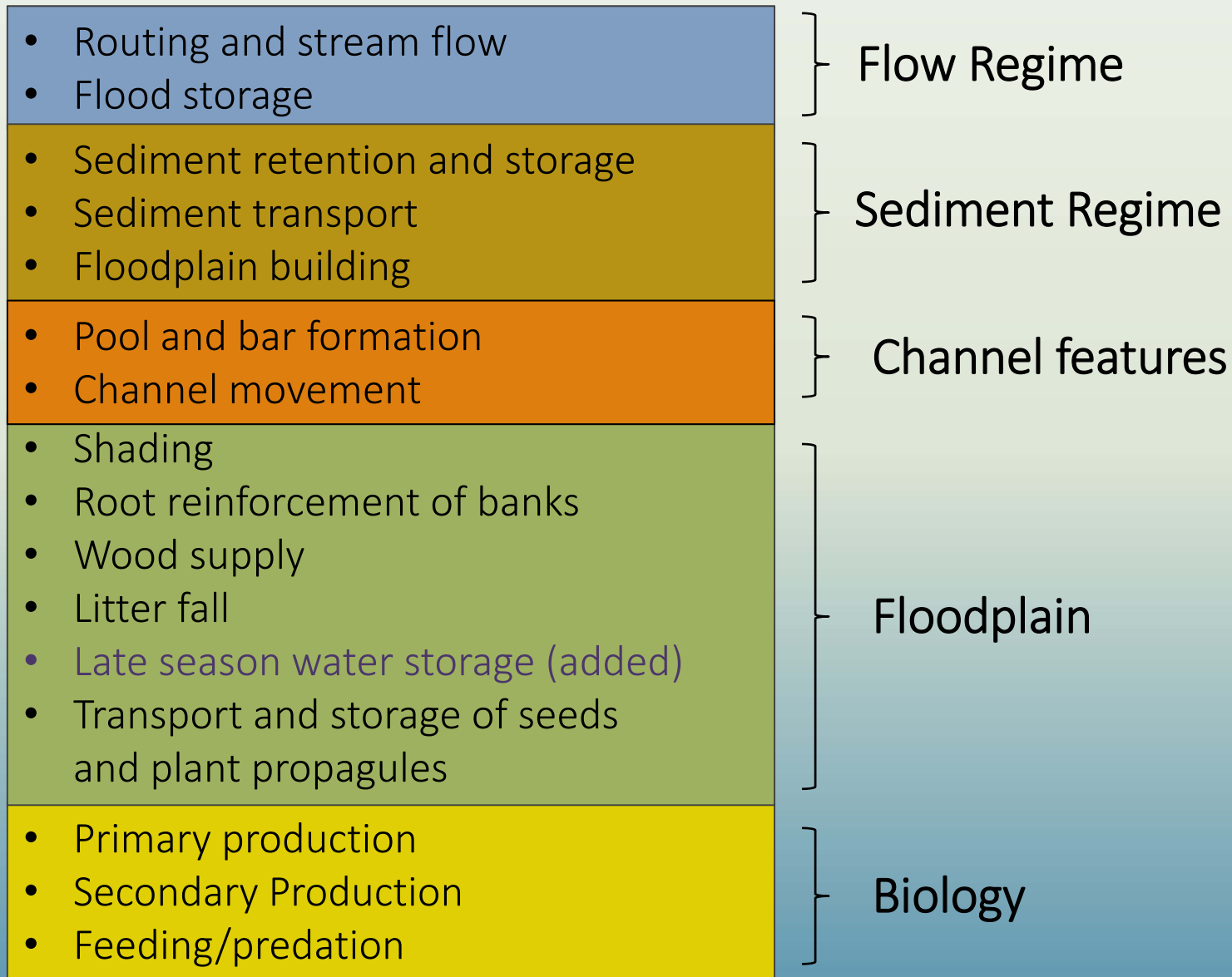
Forest Hydrologist, Willamette National Forest

# Historic Floodplain Condition in Depositional Environments

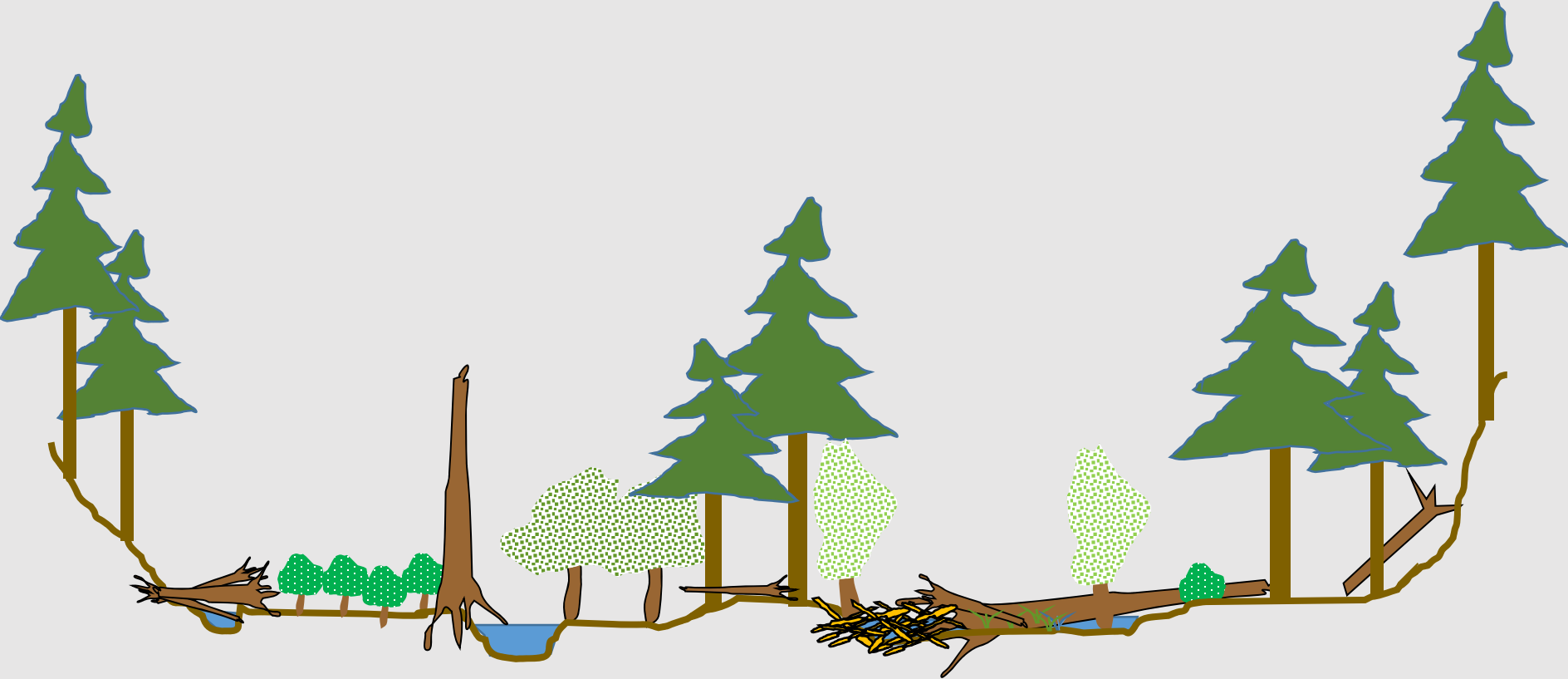
- Vegetation diversity
- Elevational diversity
- Multiple flow paths
- Downed wood
- Future wood supply
- High water table
- Beaver dams
- Frequent floodplain wetting
- Maximum patch complexity



# Reach-scale processes from Roni and Beechie, 2013



# Changed Condition in Depositional Environments



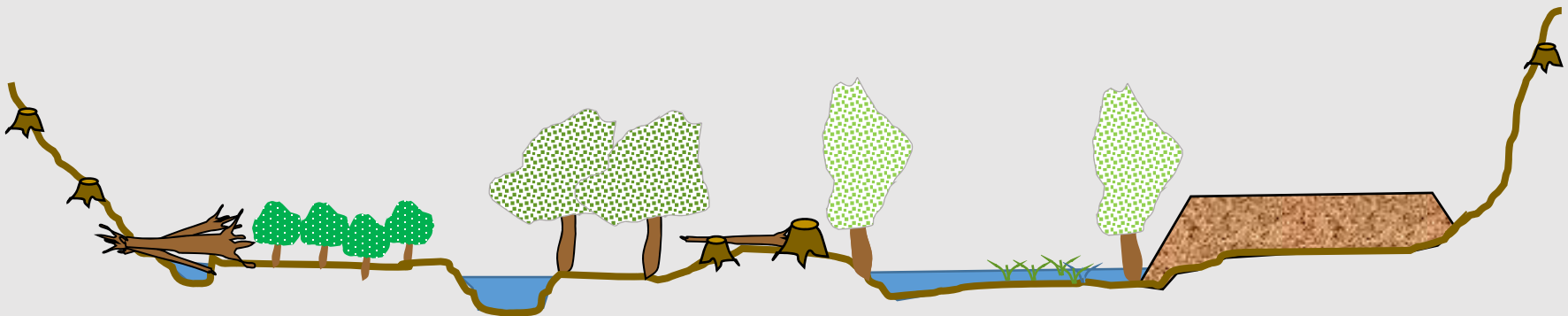
# Changed Condition in Depositional Environments

- Road building



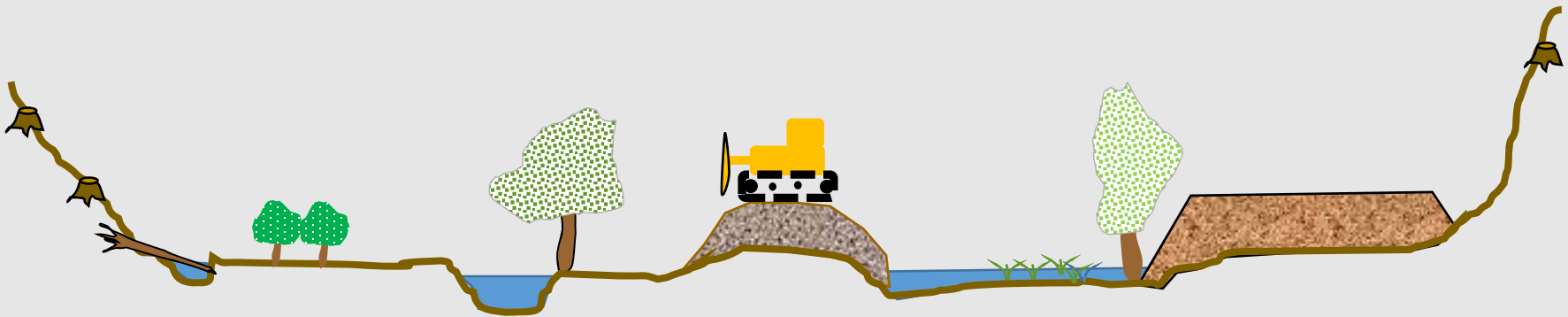
# Changed Condition in Depositional Environments

- Road building
- Conifer harvest



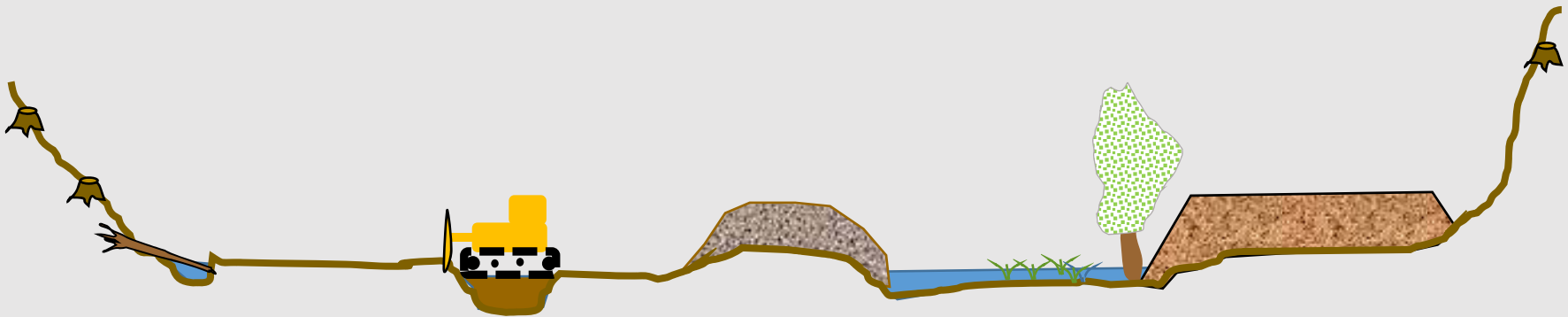
# Changed Condition in Depositional Environments

- Road building
- Conifer harvest
- Diking and channelization



# Changed Condition in Depositional Environments

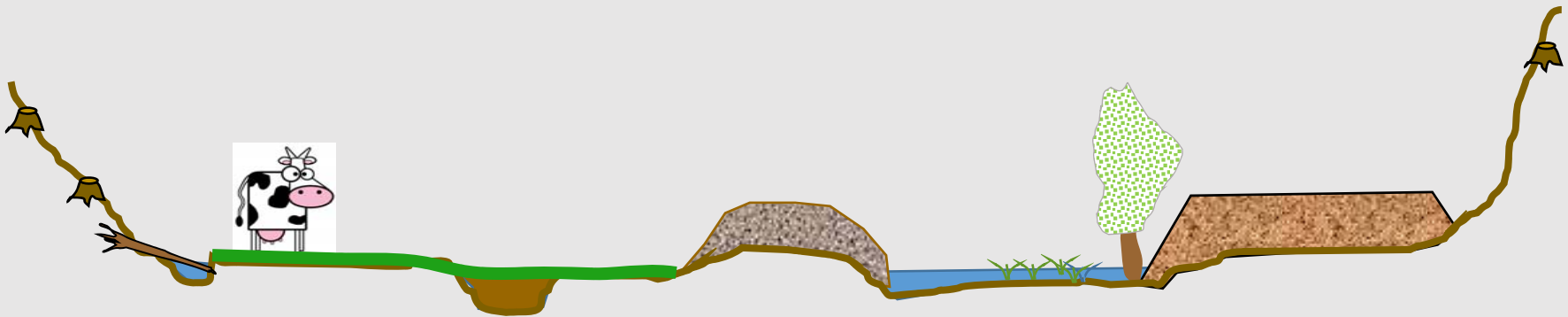
- Road building
- Conifer harvest
- Diking and channelization
- Blocking or filling side channels





# Changed Condition in Depositional Environments

- Road building
- Conifer harvest
- Diking and channelization
- Blocking or filling side channels
- Grazing and farming



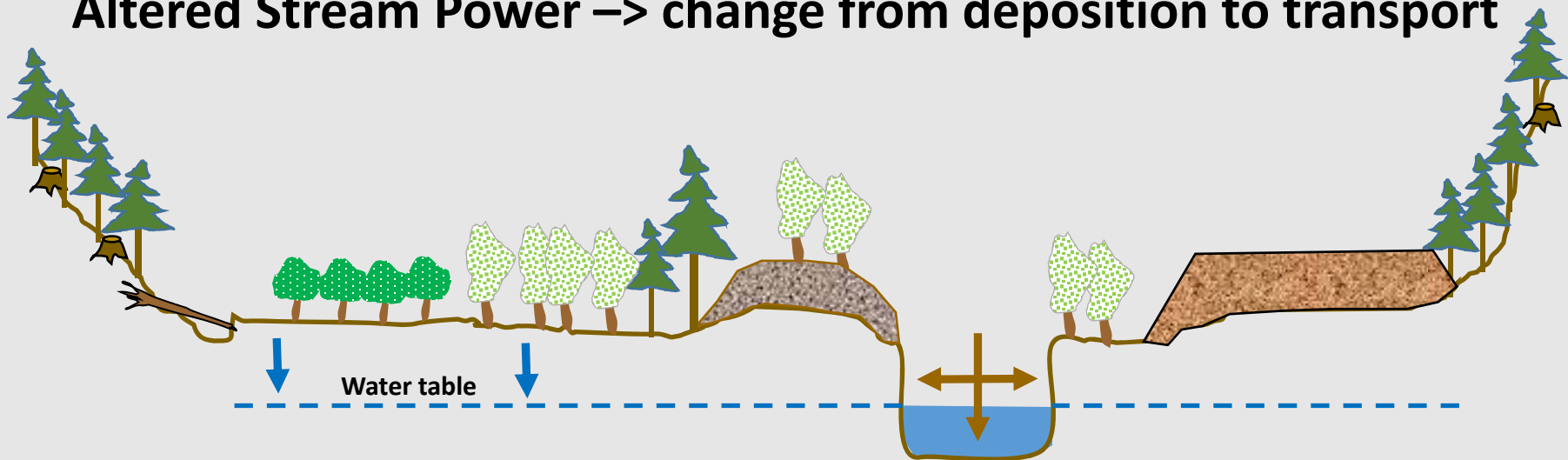
## Changed Condition in Depositional Environments

- Road building
- Conifer harvest
- Diking and channelization
- Blocking or filling side channels
- Grazing and farming

### Leads to:

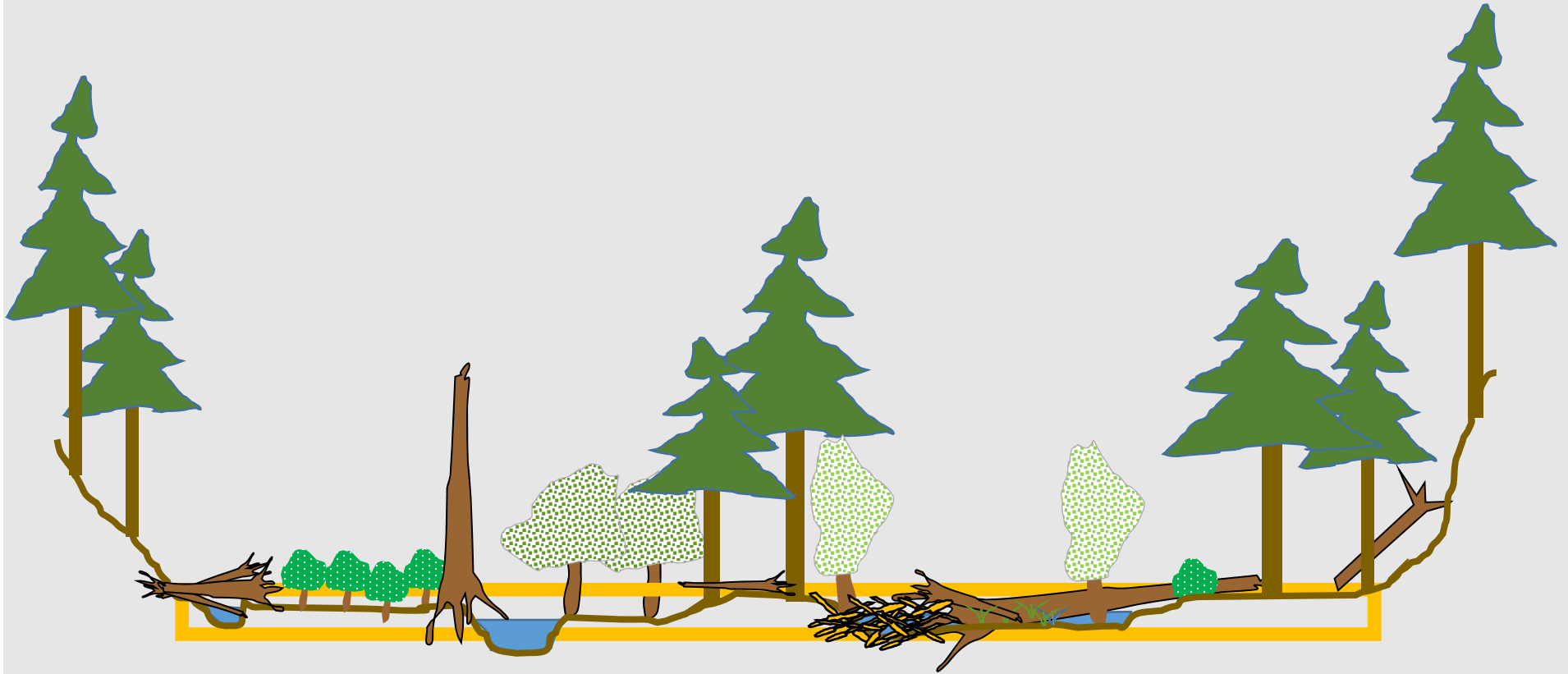
- Single incised channel
- Loss of water table/wetlands
- Altered vegetation types
- Minimal large wood

### Altered Stream Power → change from deposition to transport



Stream Evolution Model, Stages 2-4  
Cluer and Thorne, 2013

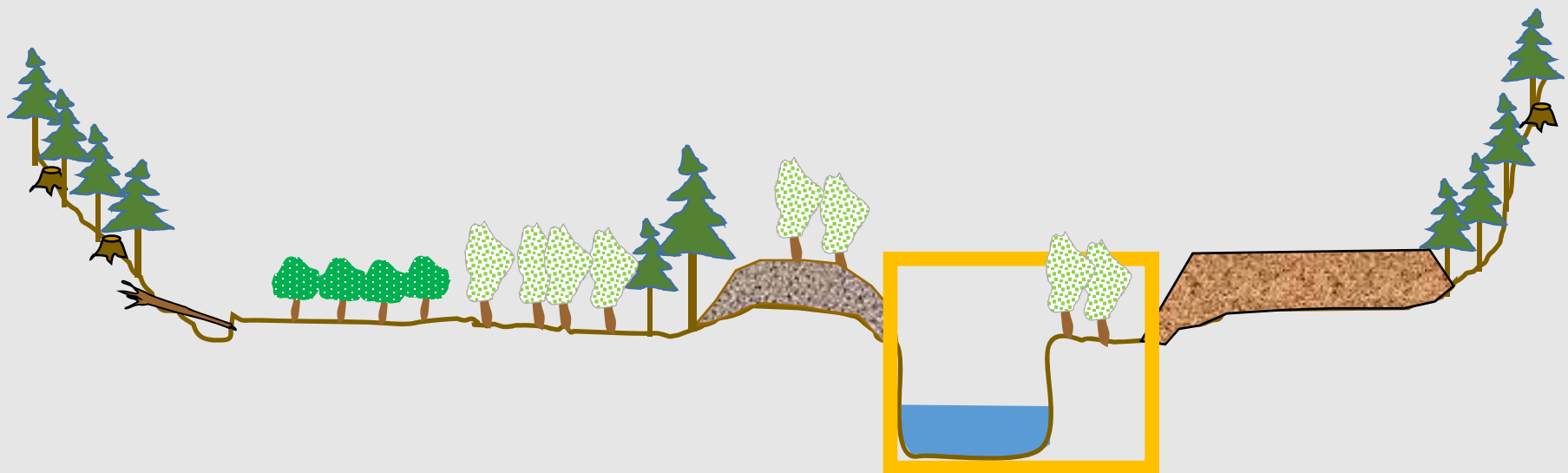
# Historic Floodplain Condition in Depositional Environments



## Stream Power Per Unit Width - Low

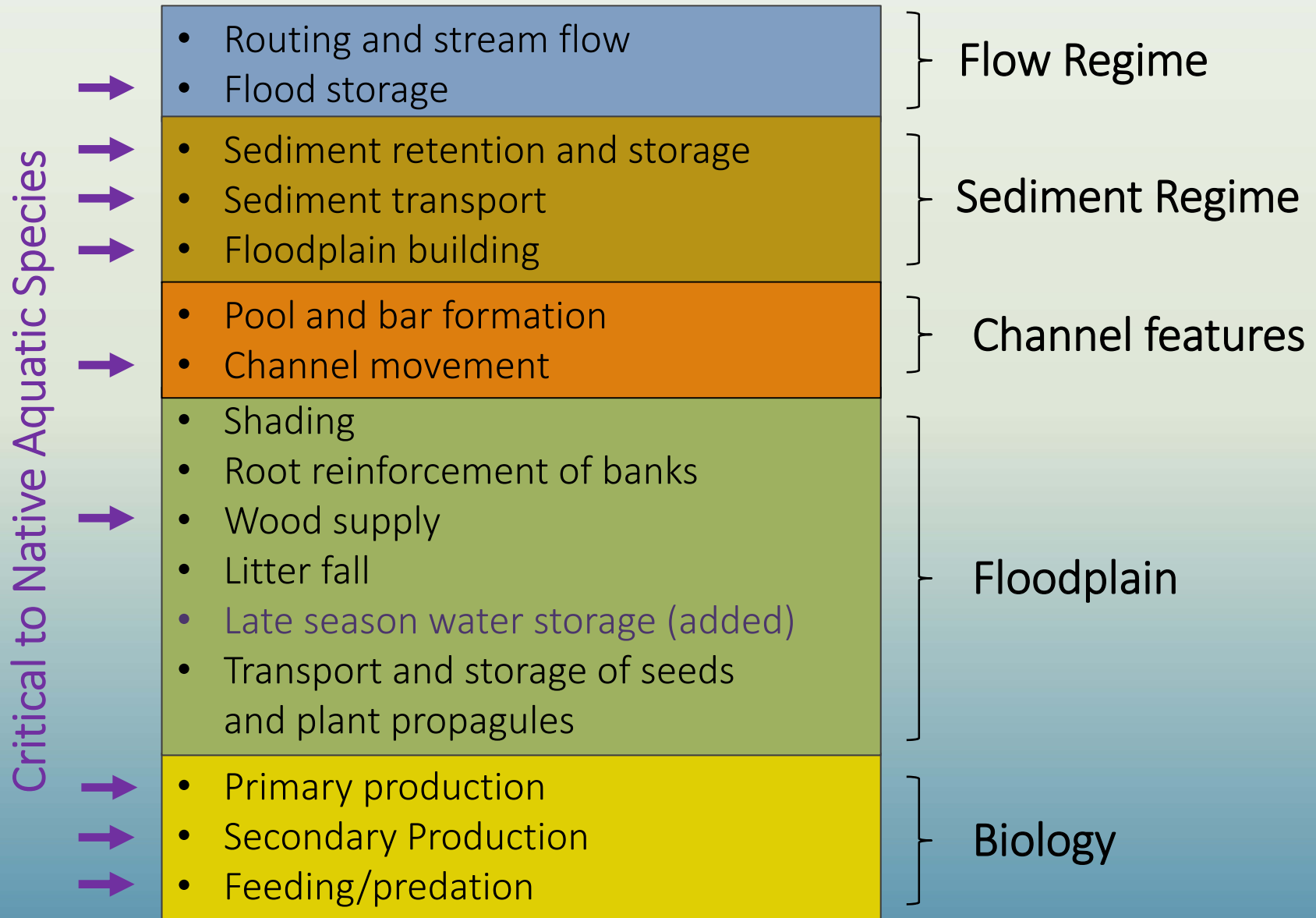
- Flow distributed throughout a roughened surface

# Changed Condition from Depositional to Transport Environments



**Stream Power Per Unit Width - High**  
“fire hose effect”

# Reach-scale processes from Roni and Beechie, 2013



# Restoration Solutions:

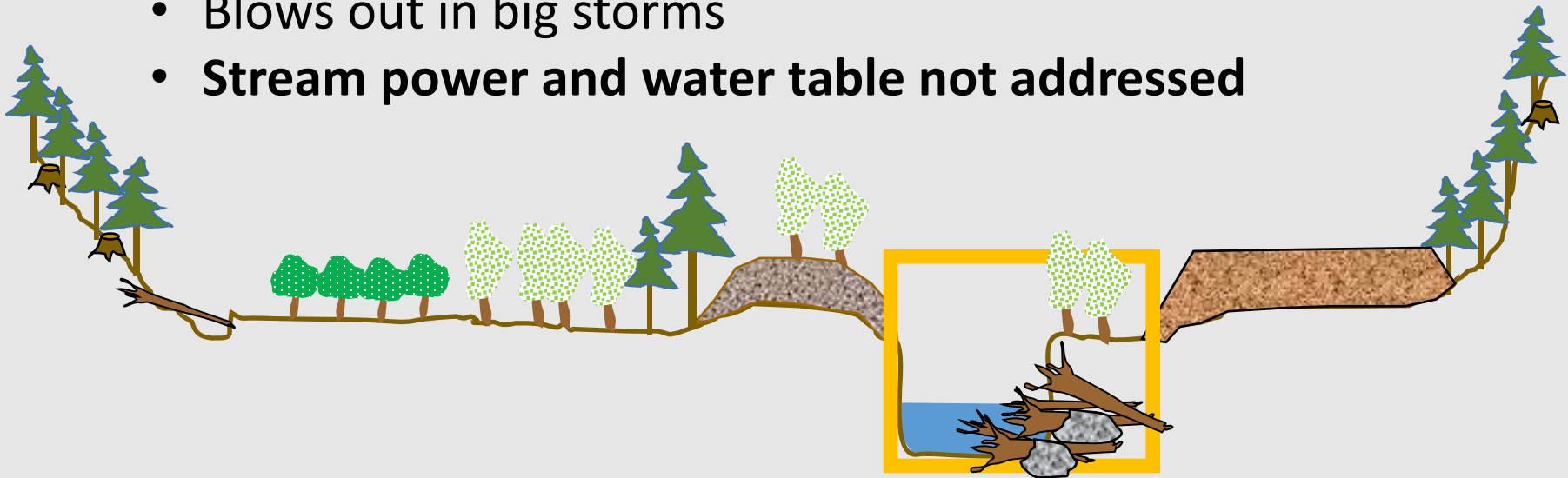
## Channel-centric, form-based restoration (1980s to present)

### Advantages:

- Easy to count # of structures, pools created and miles treated
- Focused treatment that's relatively inexpensive per site

### Disadvantages:

- Process and function minimally addressed
- Unnatural materials and engineering in stream
- Blows out in big storms
- **Stream power and water table not addressed**



Stream Power Per Unit Width

# Restoration Solutions:

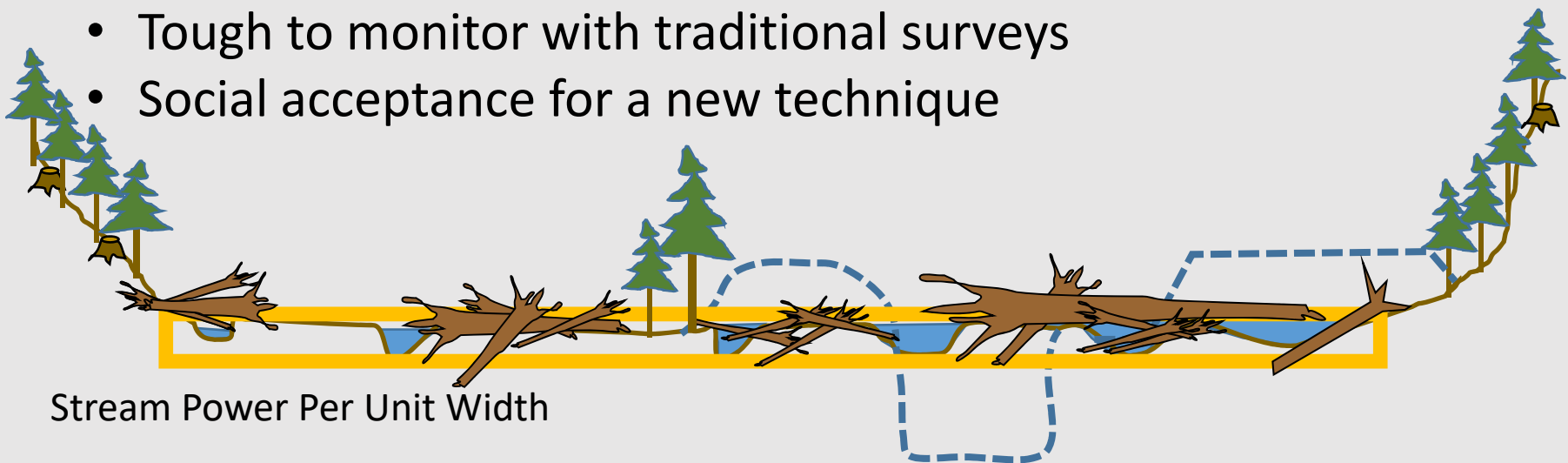
## Stage 0, process-based restoration (2005 to present)

### Advantages:

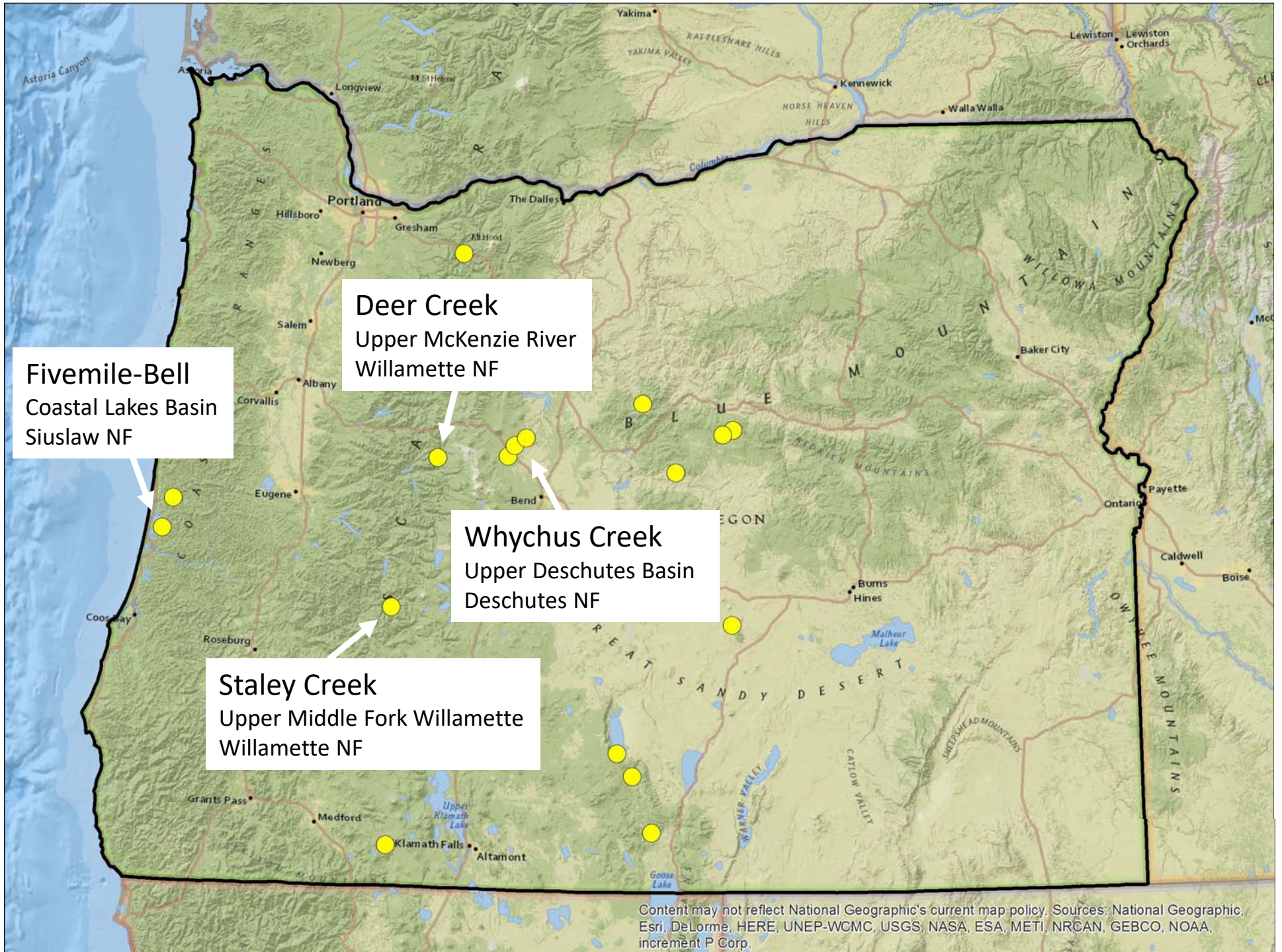
- Process and function fully addressed for entire floodplain
- Water table restored
- Template created for native vegetation recovery
- Patch complexity maximized & change anticipated over time
- Large storms welcome (stream energy addressed)

### Disadvantages:

- High level of disturbance initially – turbidity during construction
- Tough to monitor with traditional surveys
- Social acceptance for a new technique

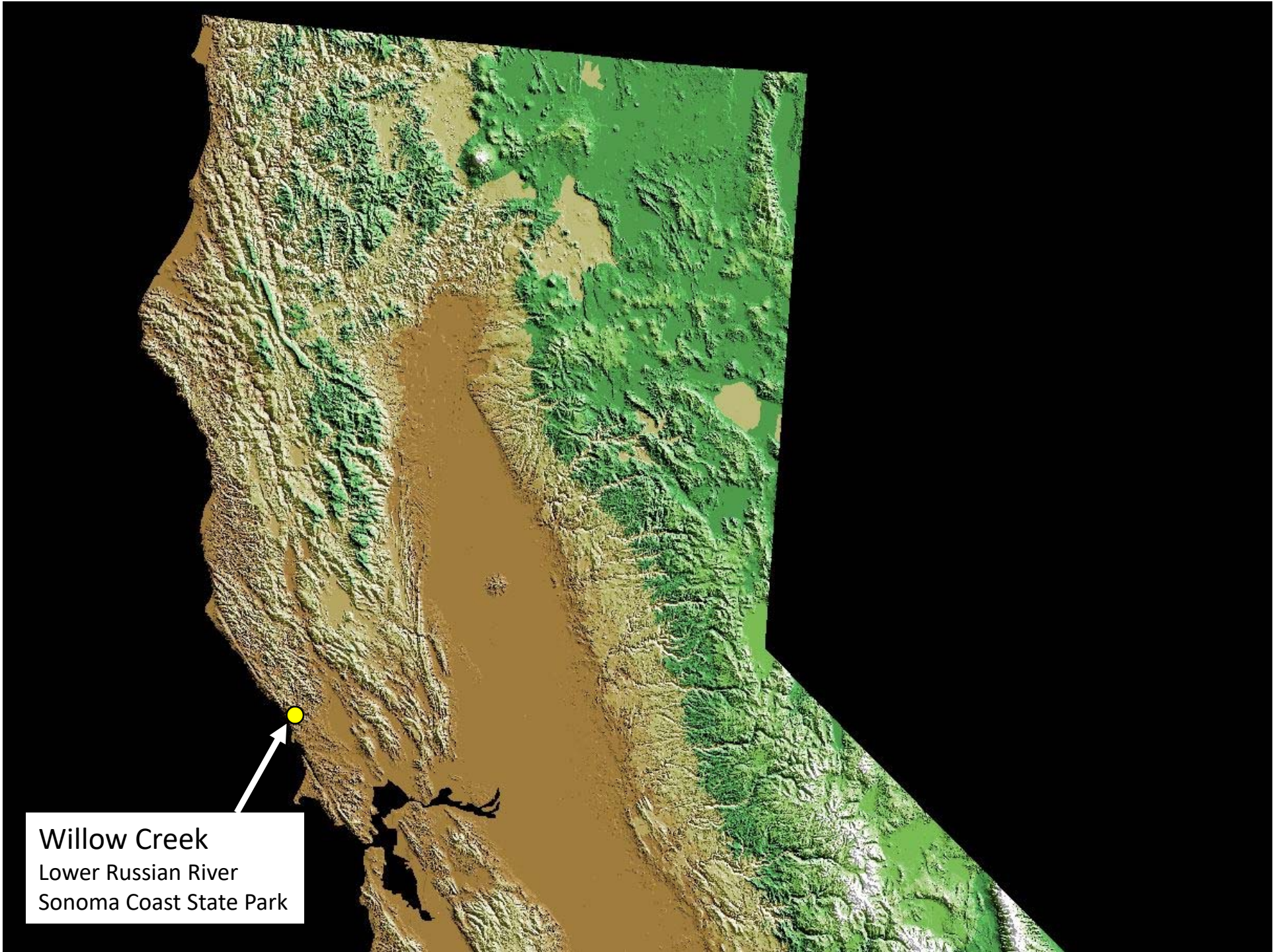






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Willow Creek  
Lower Russian River  
Sonoma Coast State Park



# Floodplains are good!



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