



# Erosion & Deposition & Contamination OH MY!!

Our Water – Restoring the Longitudinal Connectivity of Romanian Rivers  
Conference: Bucharest, Romania





# Rivers Connect

Longitudinally

Laterally

Culturally/Spiritually





1. Rivers



2. Dams



3. Sediment



# Take Home Messages

- Rivers connect
- Rivers are naturally mobile
- Human intervention has impacts
- Impounded sediment is scary, but manageable





# Our Place, Our Time, Our Responsibility

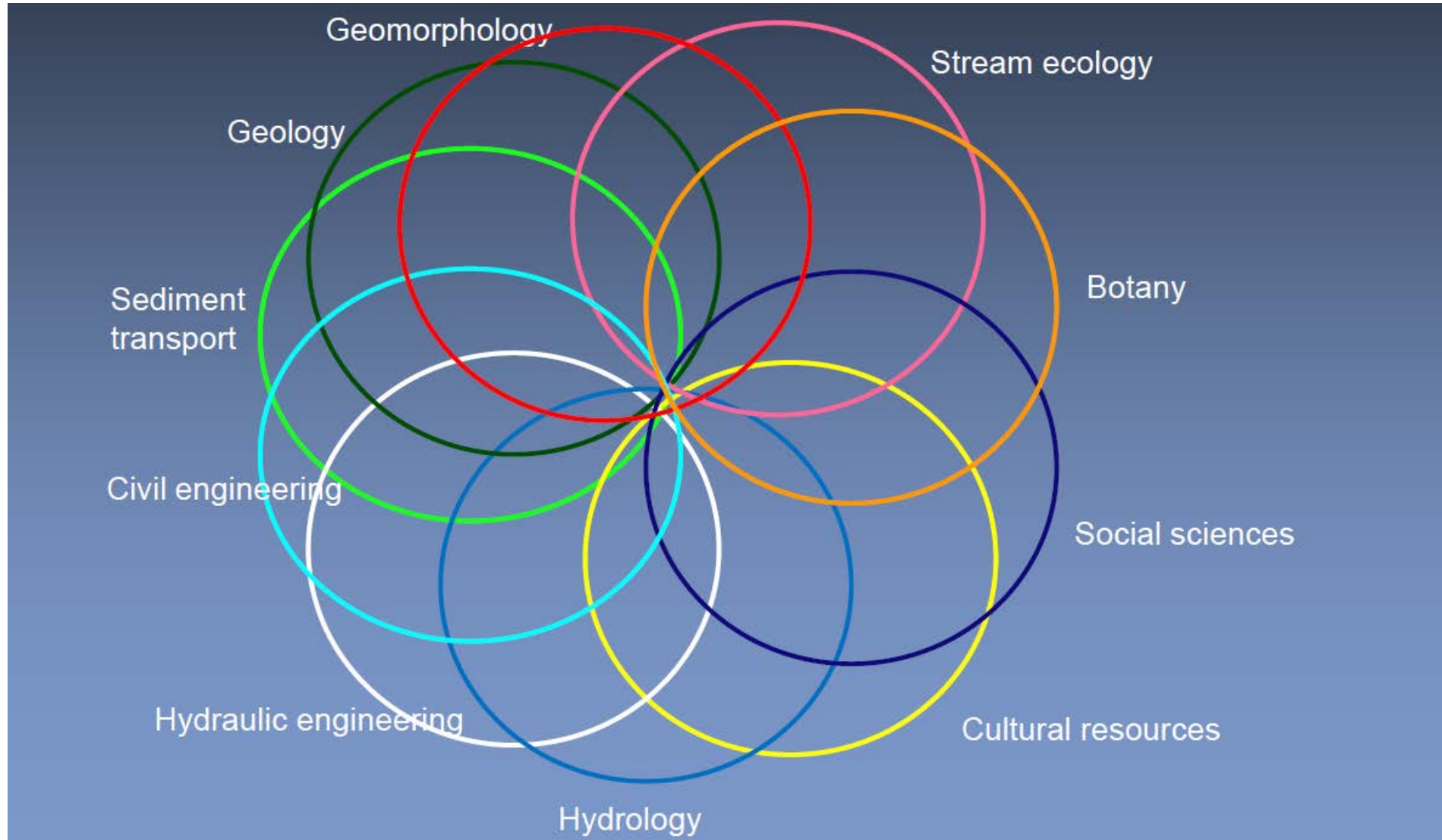
Enter the natural world with humility and awe.

-Ramona Peters, Mashpee Wampanoag





# Rivers are complex, requiring an understanding of many disciplines





# Rivers

Dâmbovița River

Dambovita River, Romania

527 ft

Image © 2023 Maxar Technologies

Google





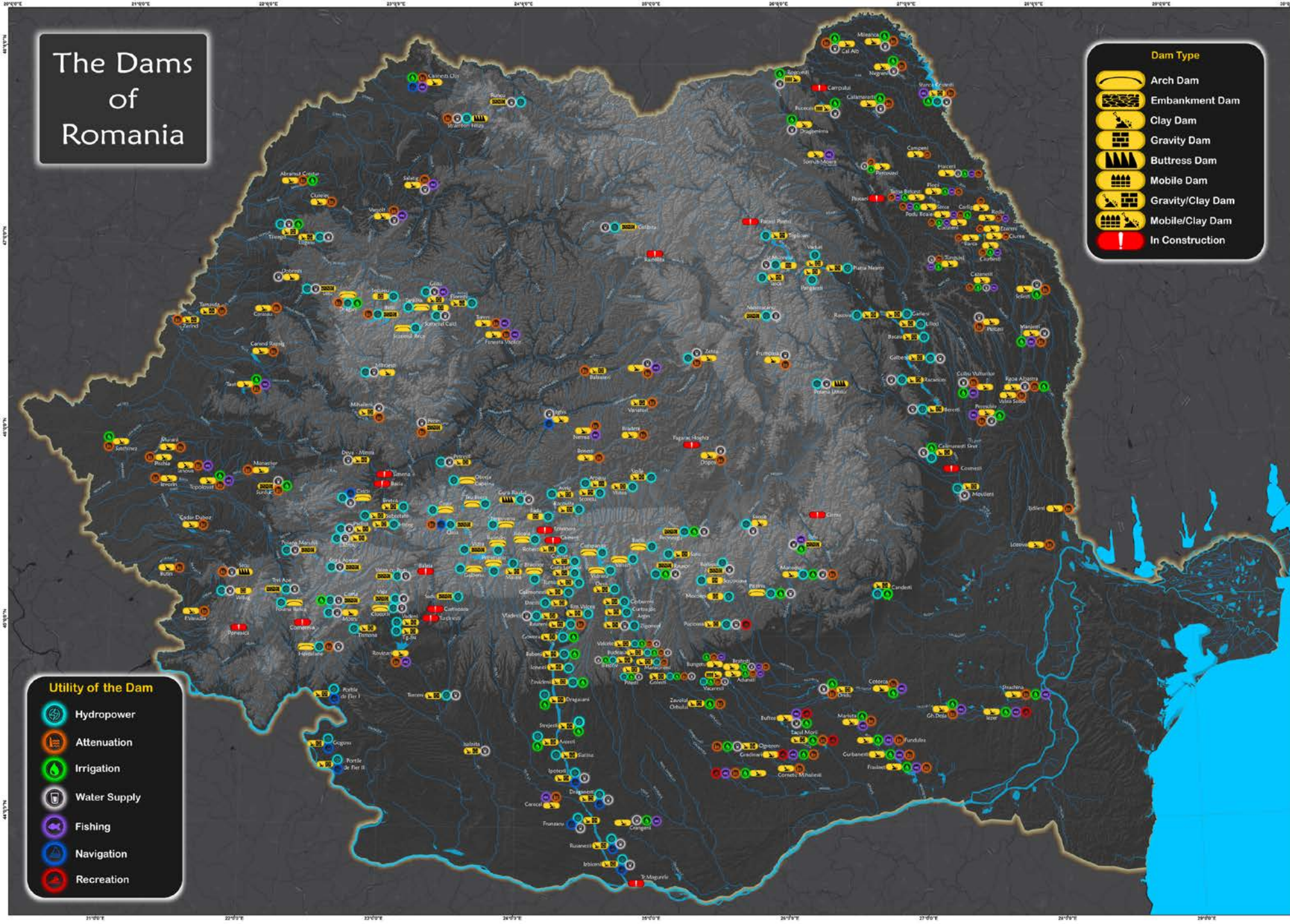


# Rivers are Mobile: Erosion and Deposition



# The Dams of Romania

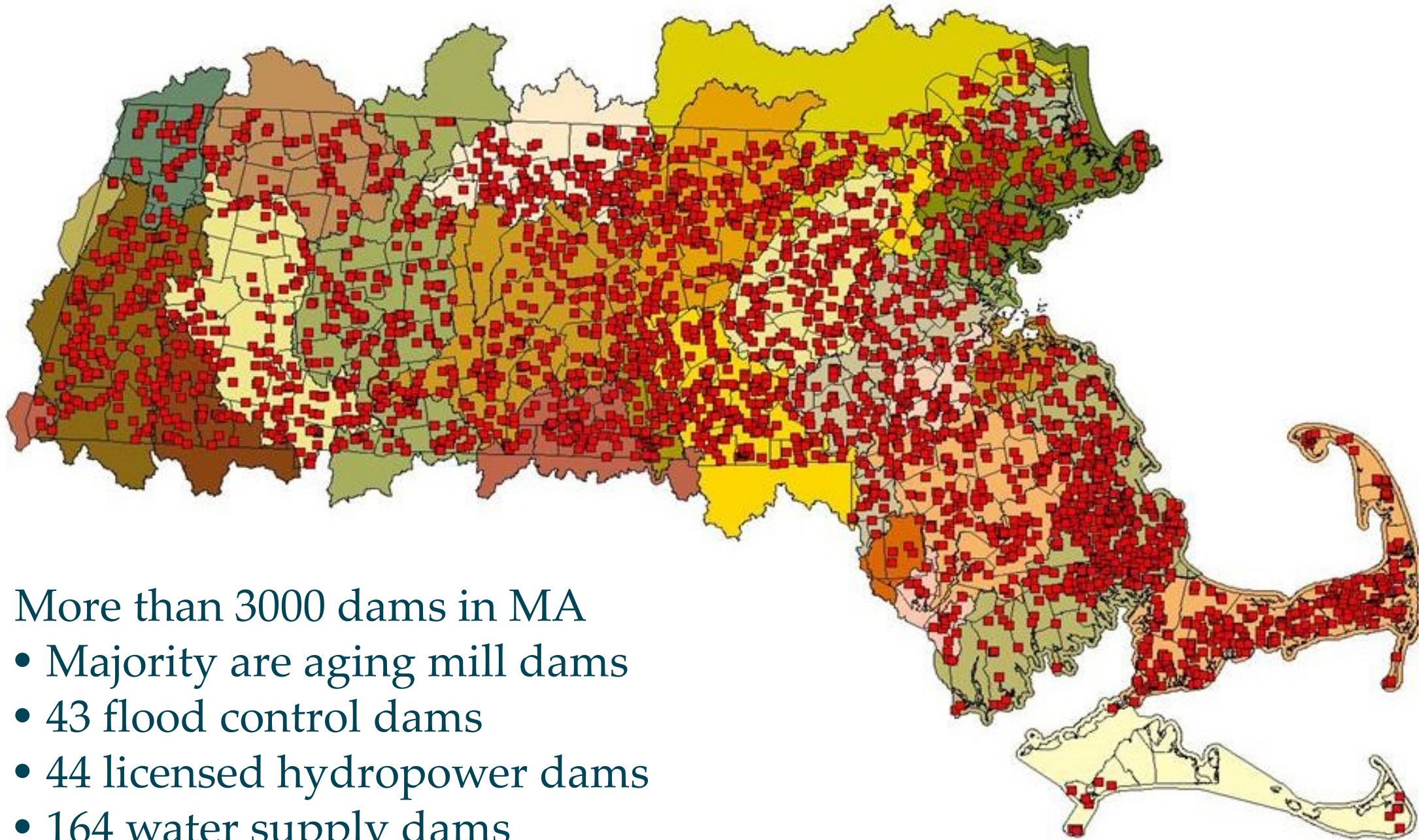
# Dams









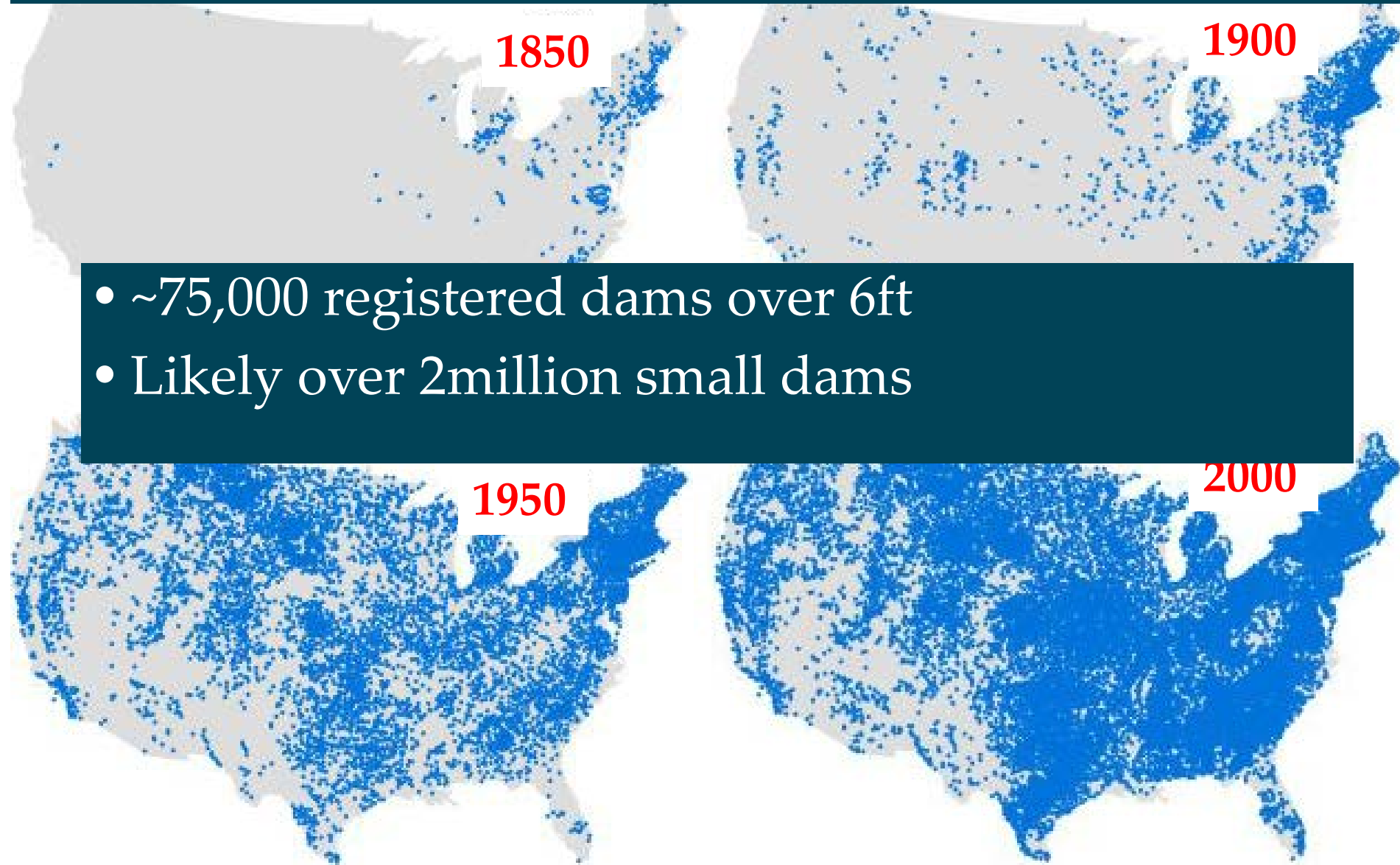


More than 3000 dams in MA

- Majority are aging mill dams
- 43 flood control dams
- 44 licensed hydropower dams
- 164 water supply dams



# Dams in the U.S.



SOURCE: JAMES P. M. SYVITSKI ET AL. PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A 369, (2011)

Dam Construction = Eventual Dam Removal



A photograph of the San Clemente Dam, a large concrete structure with multiple spillways. Water is cascading down the spillways, creating a series of small waterfalls. The dam is situated in a rocky, hilly area with some vegetation. A semi-transparent dark blue rectangular box is overlaid on the center of the image, containing white text.

# ~~Rivers Connect~~ Dams Disconnect

Longitudinally

Laterally

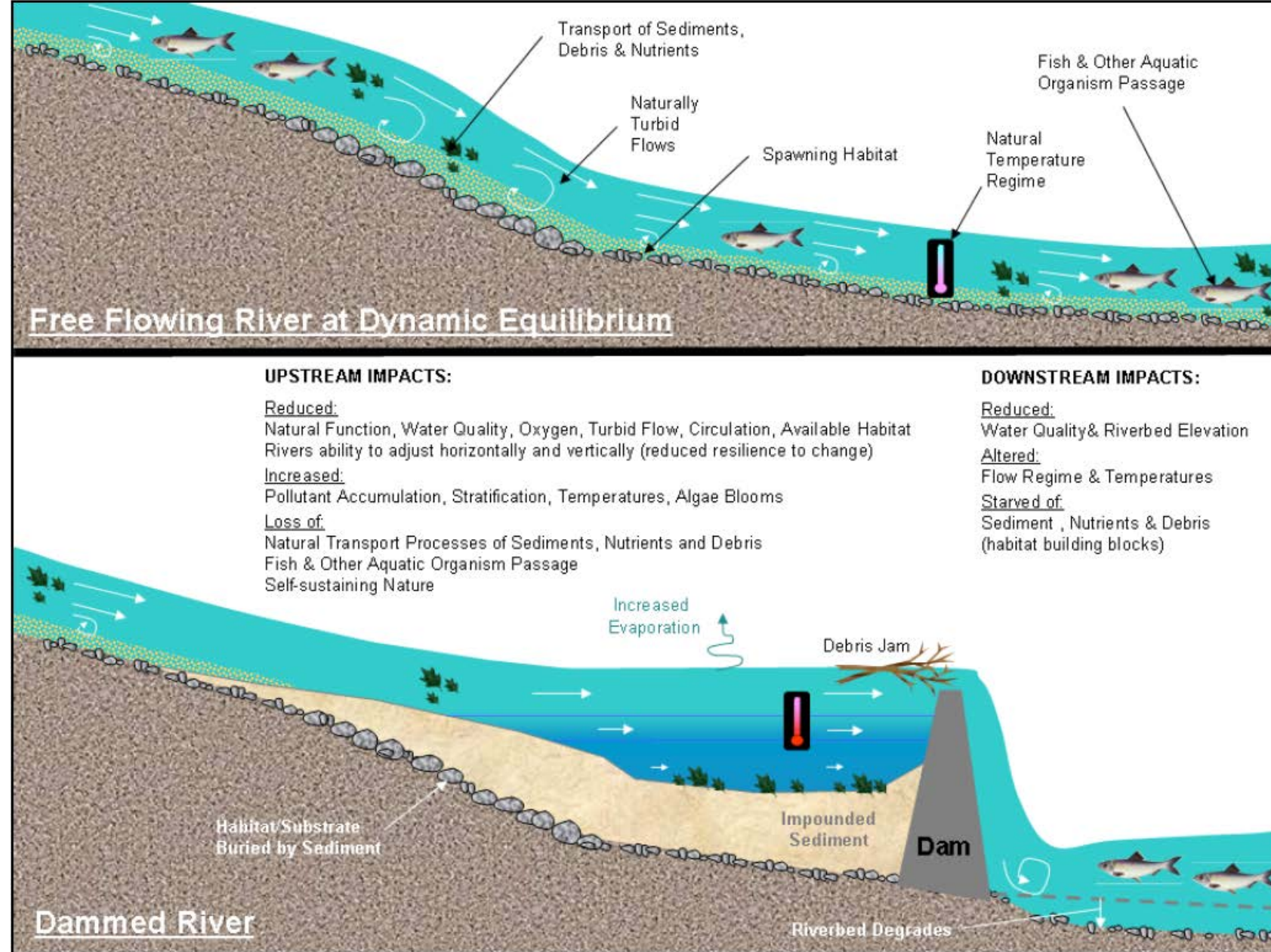
Culturally/Spiritually

San Clemente Dam, California



# Dam Construction = Eventual Dam Removal

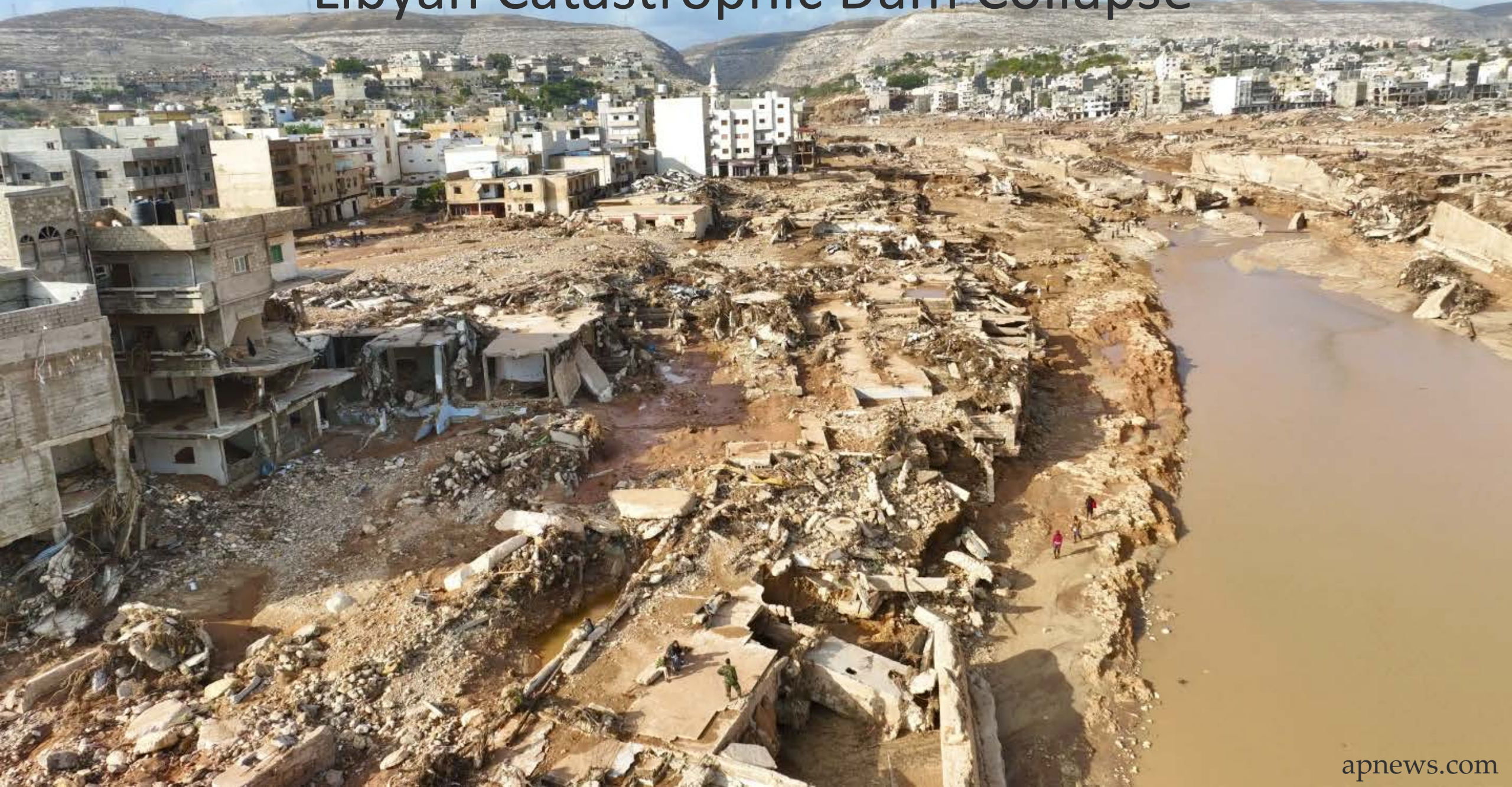
- Catastrophic failure
- Active sediment management
- Passive sediment management





2023

# Libyan Catastrophic Dam Collapse







June 2023

September 2023

Google





June 2023

September 2023







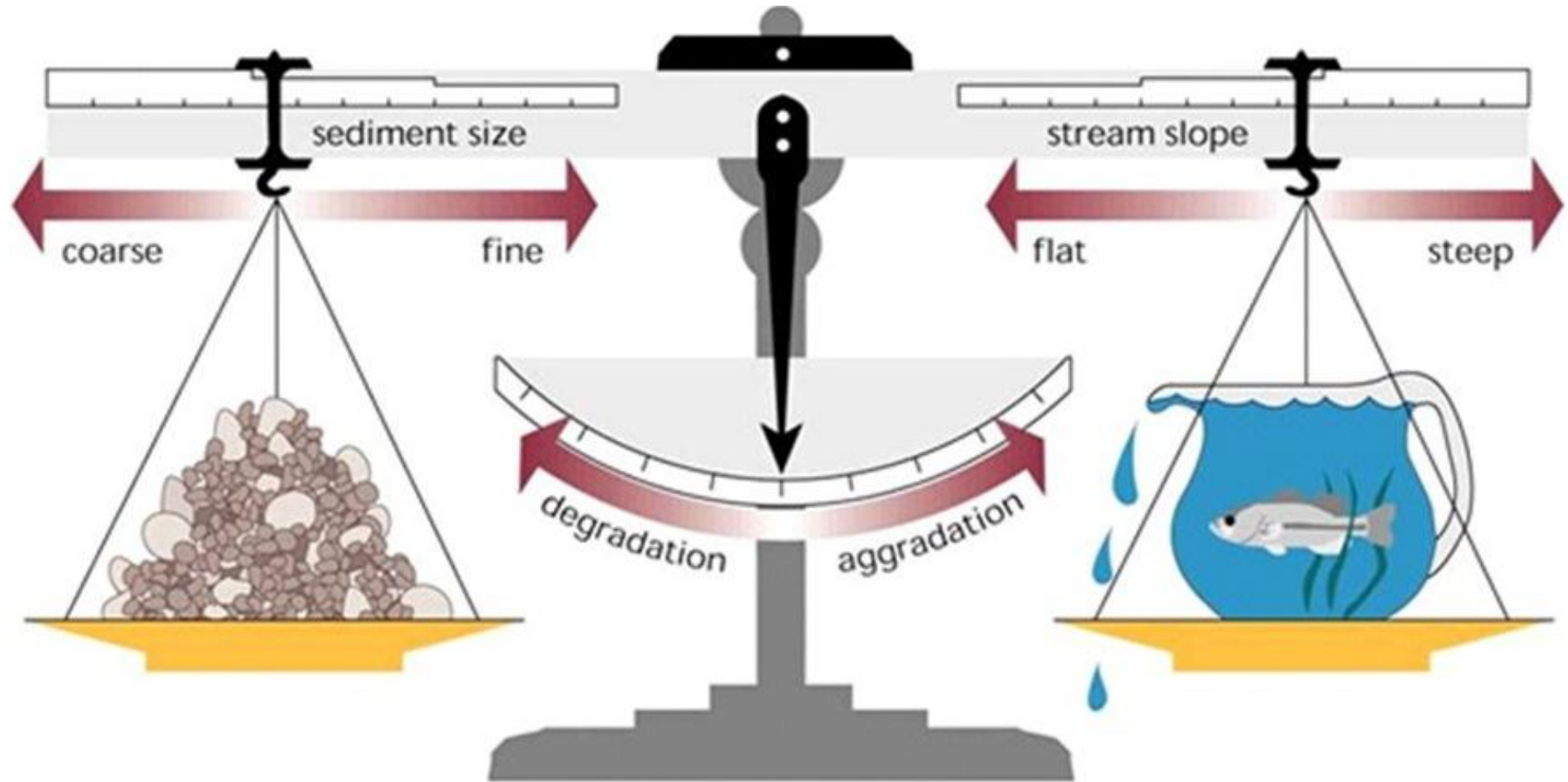
# Active or Passive Sediment Management/Restoration

## Considerations:

- Contamination
- Volume of sediment
- Grain size of sediment
- Upstream and downstream infrastructure
- Rare and endangered species



# Lane's Diagram (1955)



- Sediment deficit vs sediment surplus
- What is the balance at your dam?



# Active Sediment Management: physically remove impounded sediment

## Active

- Active construction
- Extensive design and bio-engineering
- Contaminated sediment
- Downstream infrastructure
- \$\$\$\$\$
- Immediate channel stability
- Immediate habitat creation







**Hopewell Mills Dam and Impoundment: ~11,000 cubic meters of impounded sediment**



# Active sediment removal and channel construction





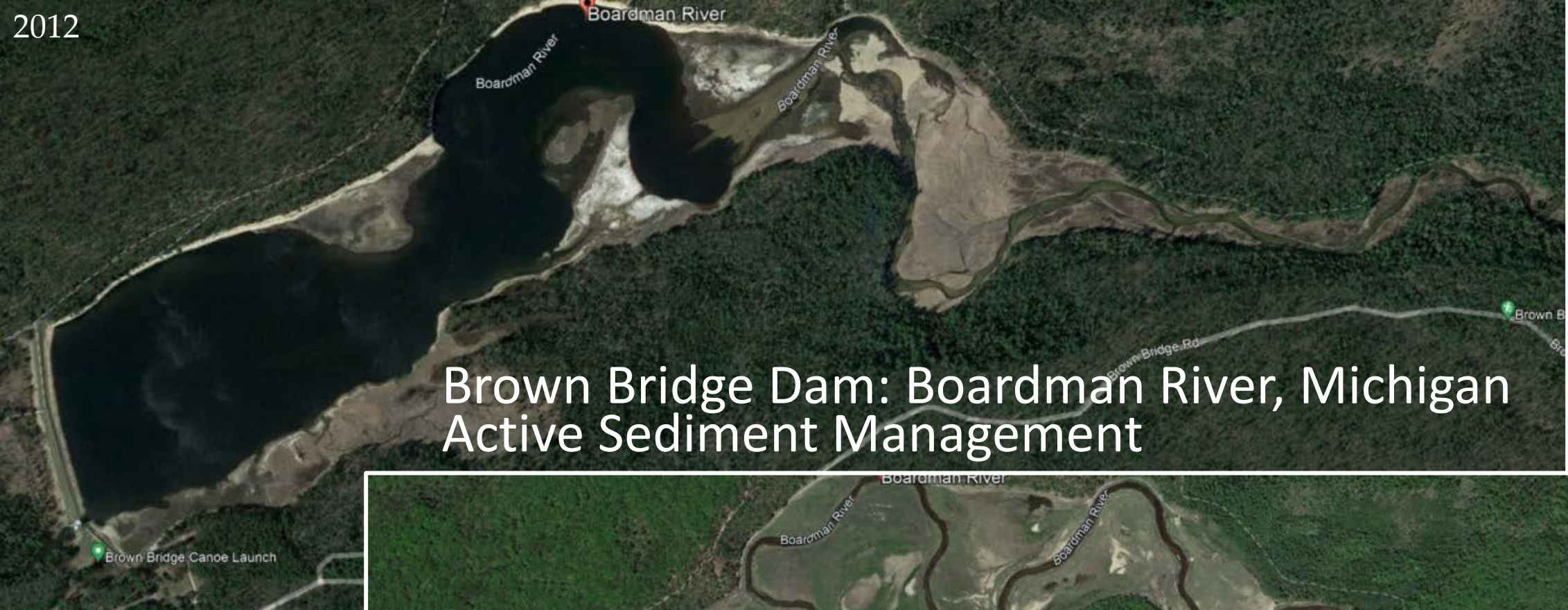
# Constructed geomorphology and habitat = ecosystem restoration



Photo: Mike Trainor, Mass. Division of Marine Fisheries



2012



## Brown Bridge Dam: Boardman River, Michigan Active Sediment Management



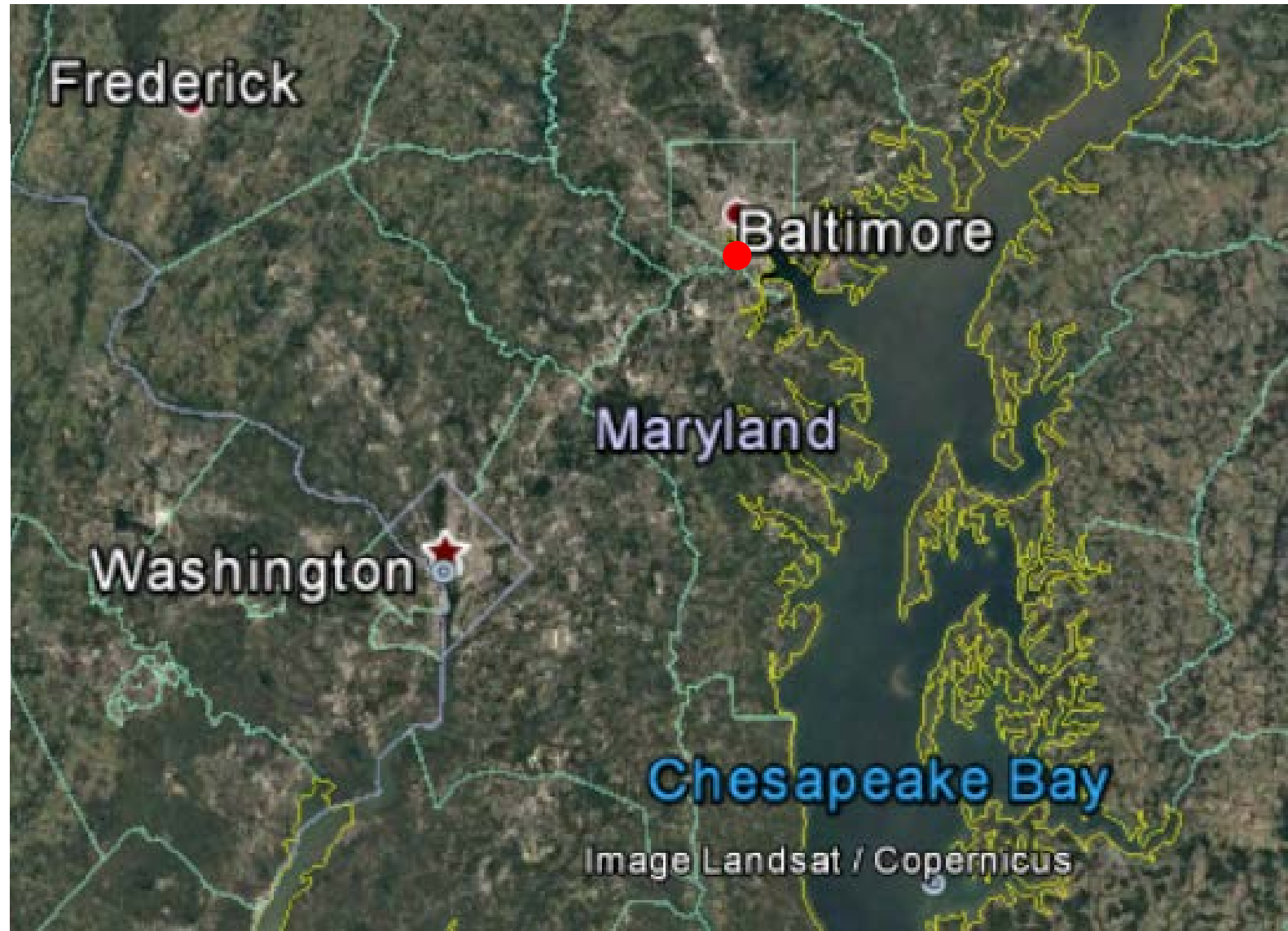
2015



# Passive Sediment Management: Patapsco River, Maryland – Simkins and Bloede Dams

## Passive Management

- Limited predictability
- Upstream/downstream infrastructure
- Less costly
- Self-forming habitat
- Benefits marsh restoration





# Patapsco River, Maryland





# Patapsco River, Maryland

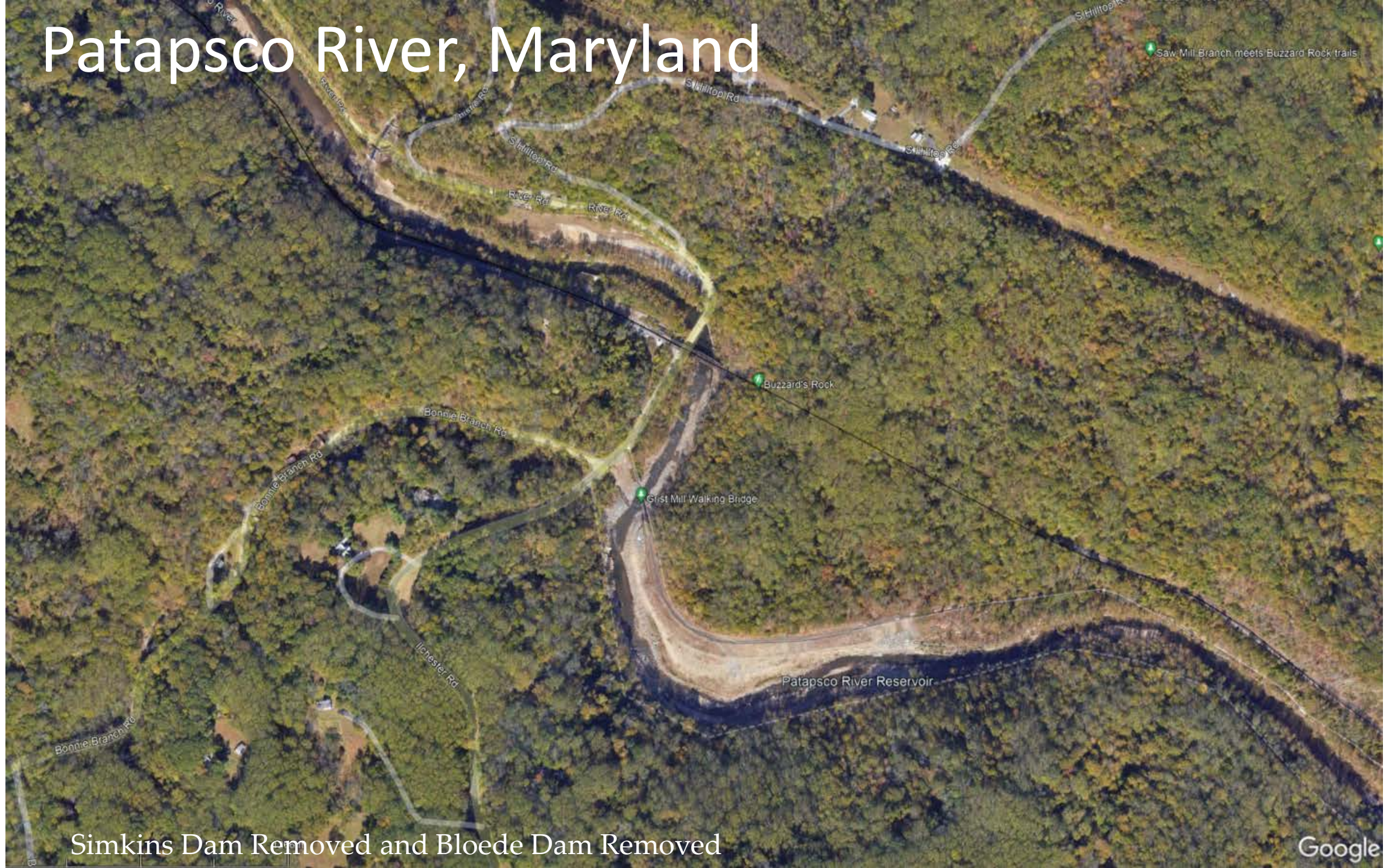


2011

Simkins Dam Removed and Bloede Dam



# Patapsco River, Maryland



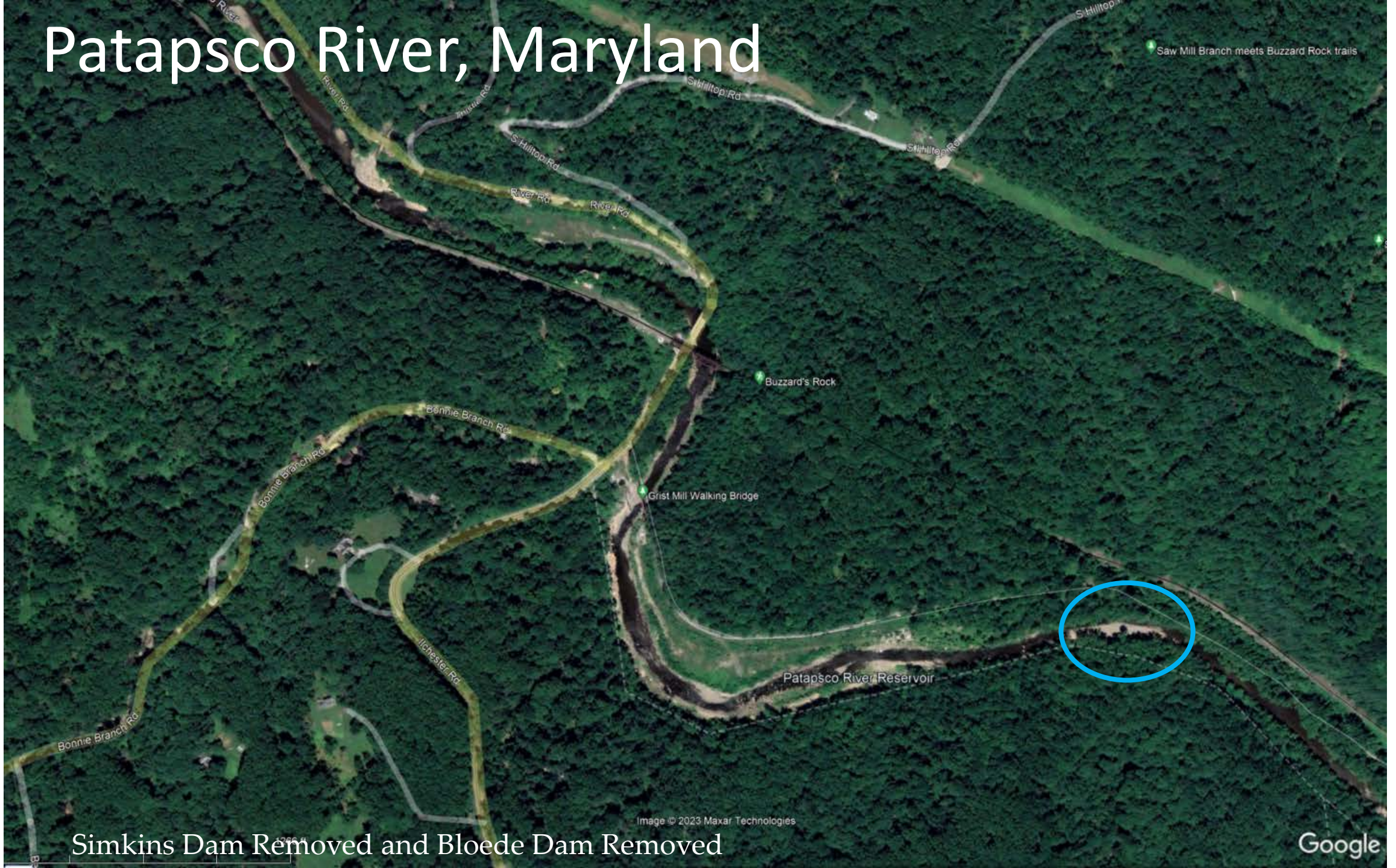
2019

Simkins Dam Removed and Bloede Dam Removed

Google



# Patapsco River, Maryland



2022

Simkins Dam Removed and Bloede Dam Removed



# Patapsco River, Maryland



Image © 2023 Maxar Technologies

2022 – Downstream of both dams

Google

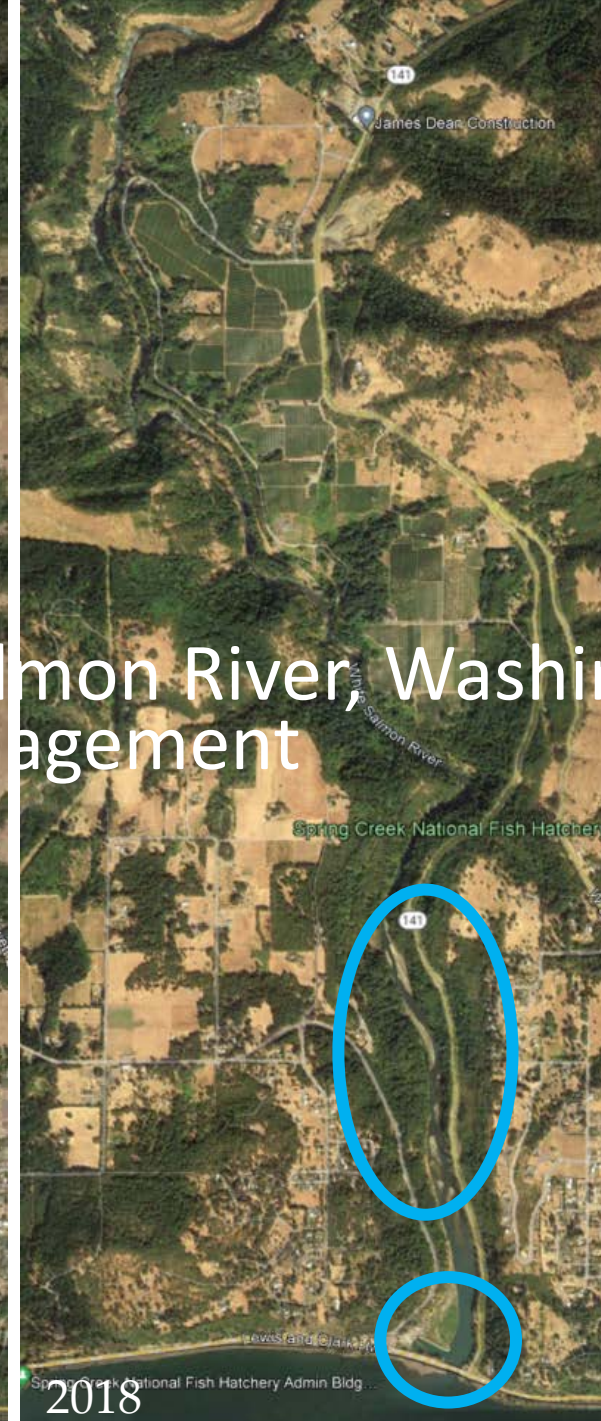


# Patapsco River, Maryland



2022 – Downstream of both dams





# Condit Dam: White Salmon River, Washington Passive Sediment Management



# Creative Solutions

San Clemente Dam

Image AMPAC

2007 – San Clemente Dam, California

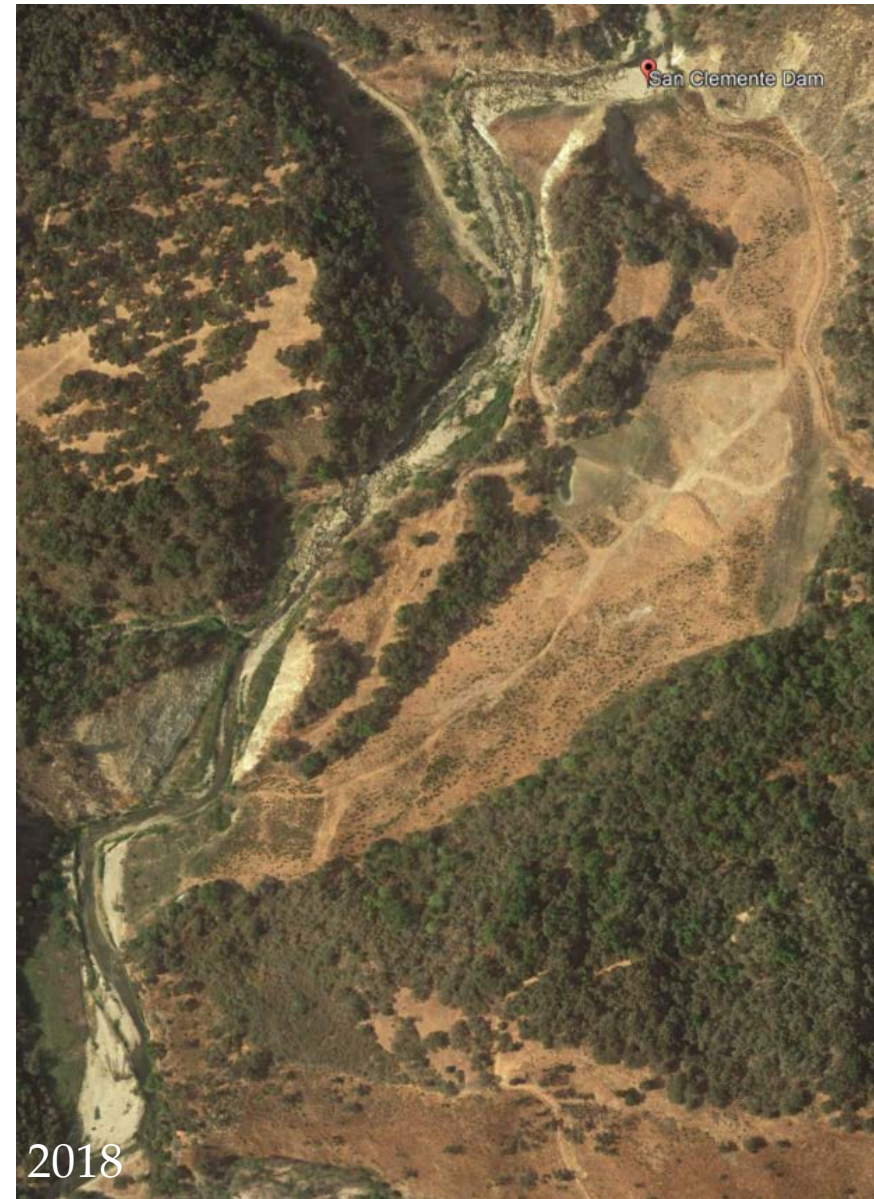
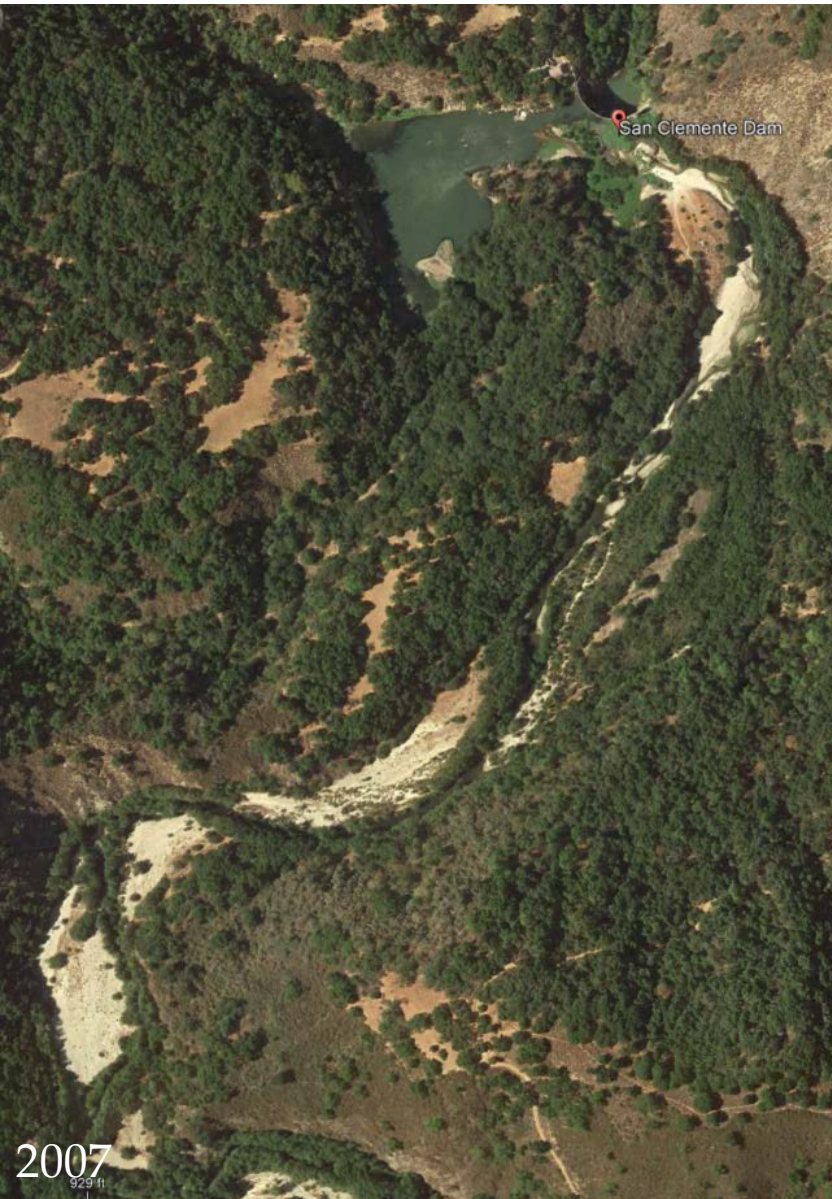
Google







# Creative Solutions





# Summary: managing sediment

- Many options
- Be creative
- Where there's a will, there's a way





Thank you

Nick Nelson

Fluvial Geomorphologist

(617) 852-7744

[nnelson@interfluve.com](mailto:nnelson@interfluve.com)





Bonus slides with pictures of habitat creation. It's not just barrier removal to consider but what's the habitat available after?

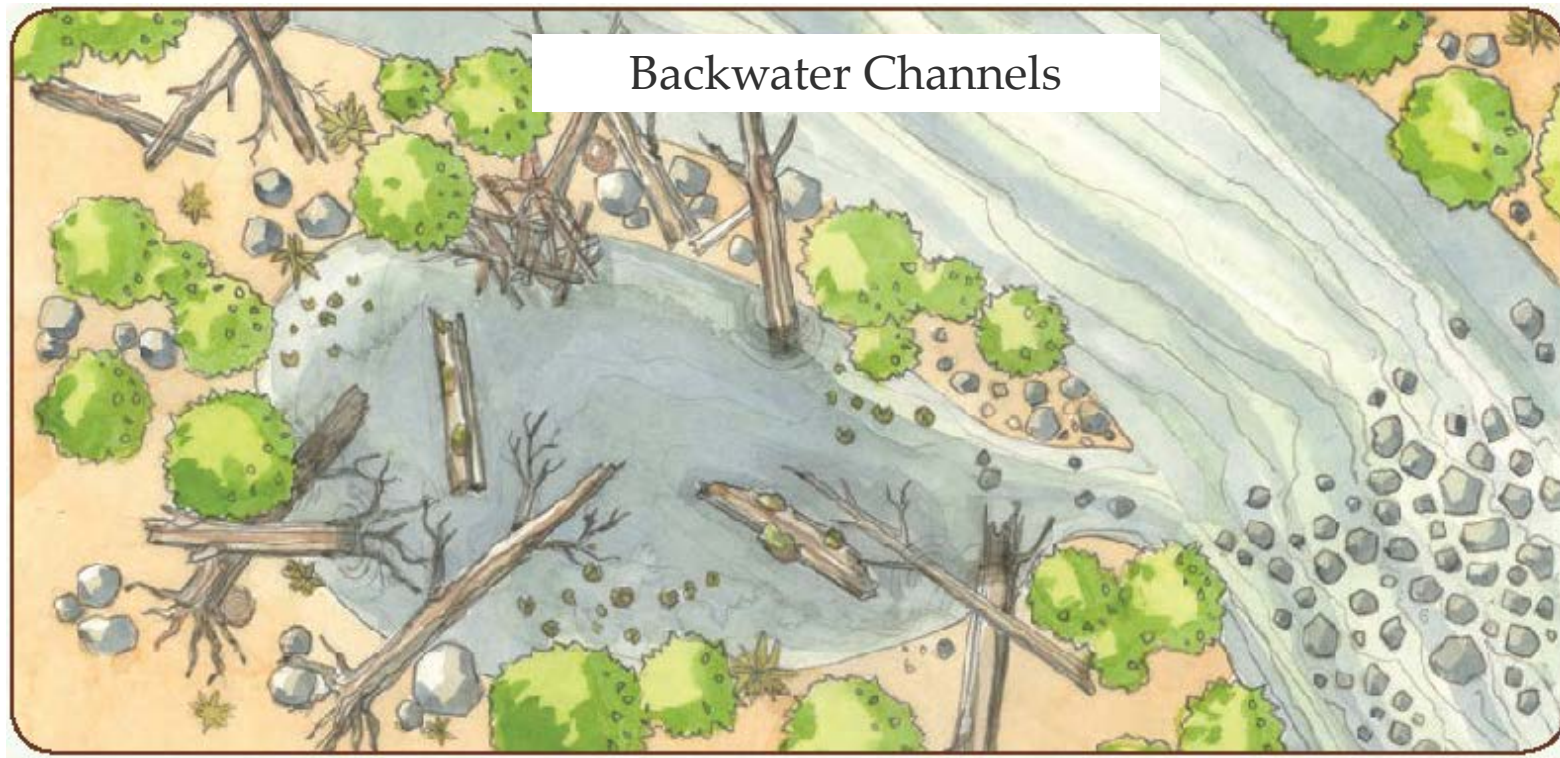


# Habitat Creation and Enhancement

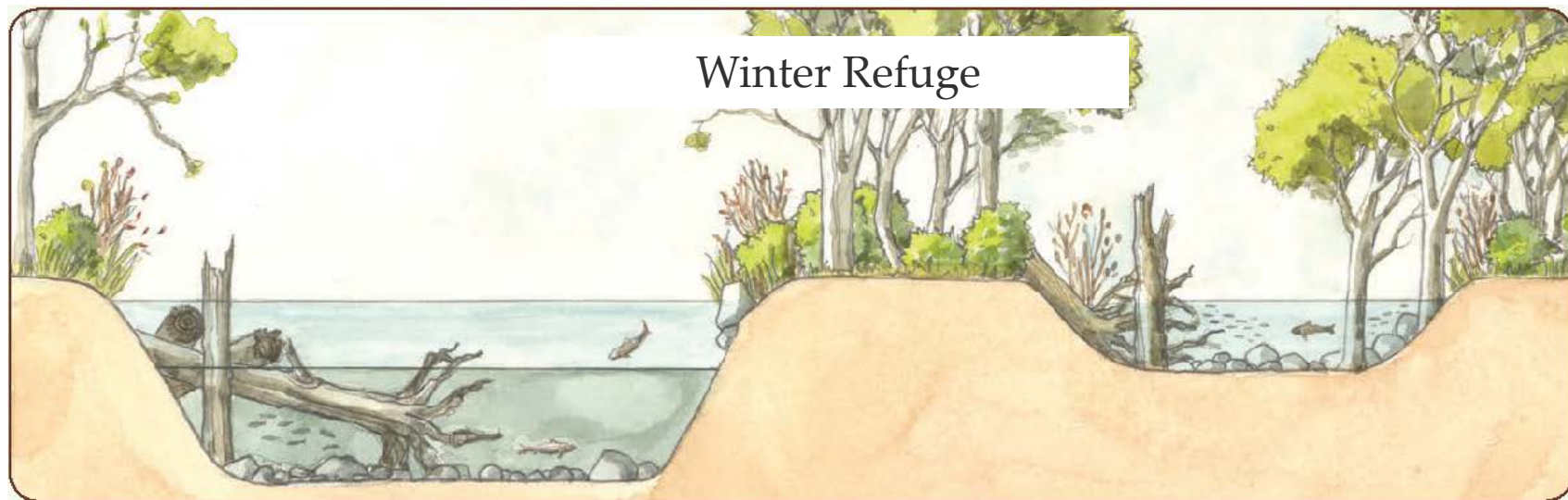
Side Channels



Backwater Channels



Winter Refuge





# Habitat Creation and Enhancement

