

# Fish passage barrier inventory, assessment and prioritization



Mark Fedora, [mfedora@fs.fed.us](mailto:mfedora@fs.fed.us)

# Inventory, assessment and prioritization



- How many crossings are out there?
- How many are bad?
- Where do we begin fixing problem sites?





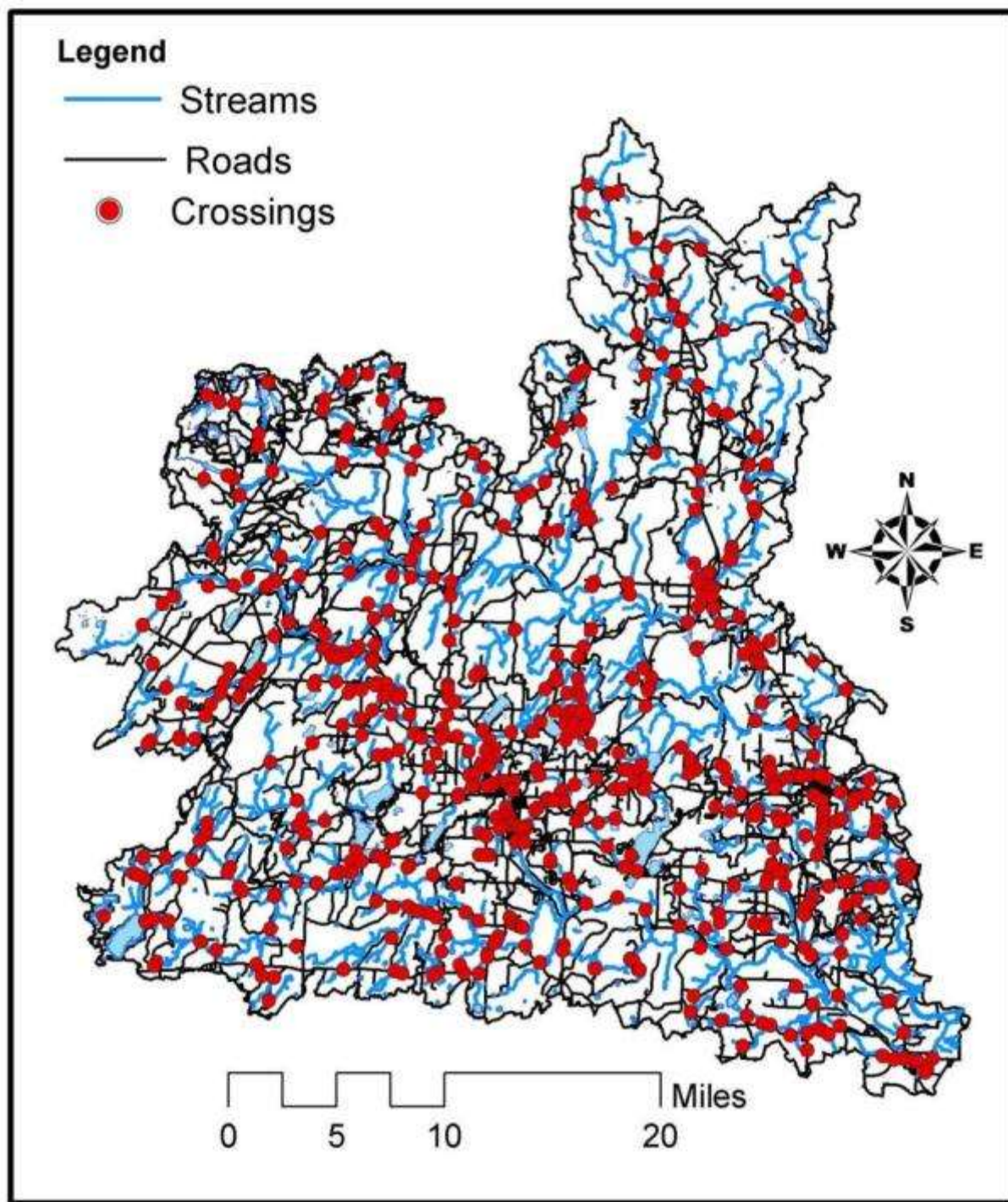
# How many road/stream crossings are out there?

(Velocity  
barrier)



# Upper Menominee Watershed

649  
Crossings!



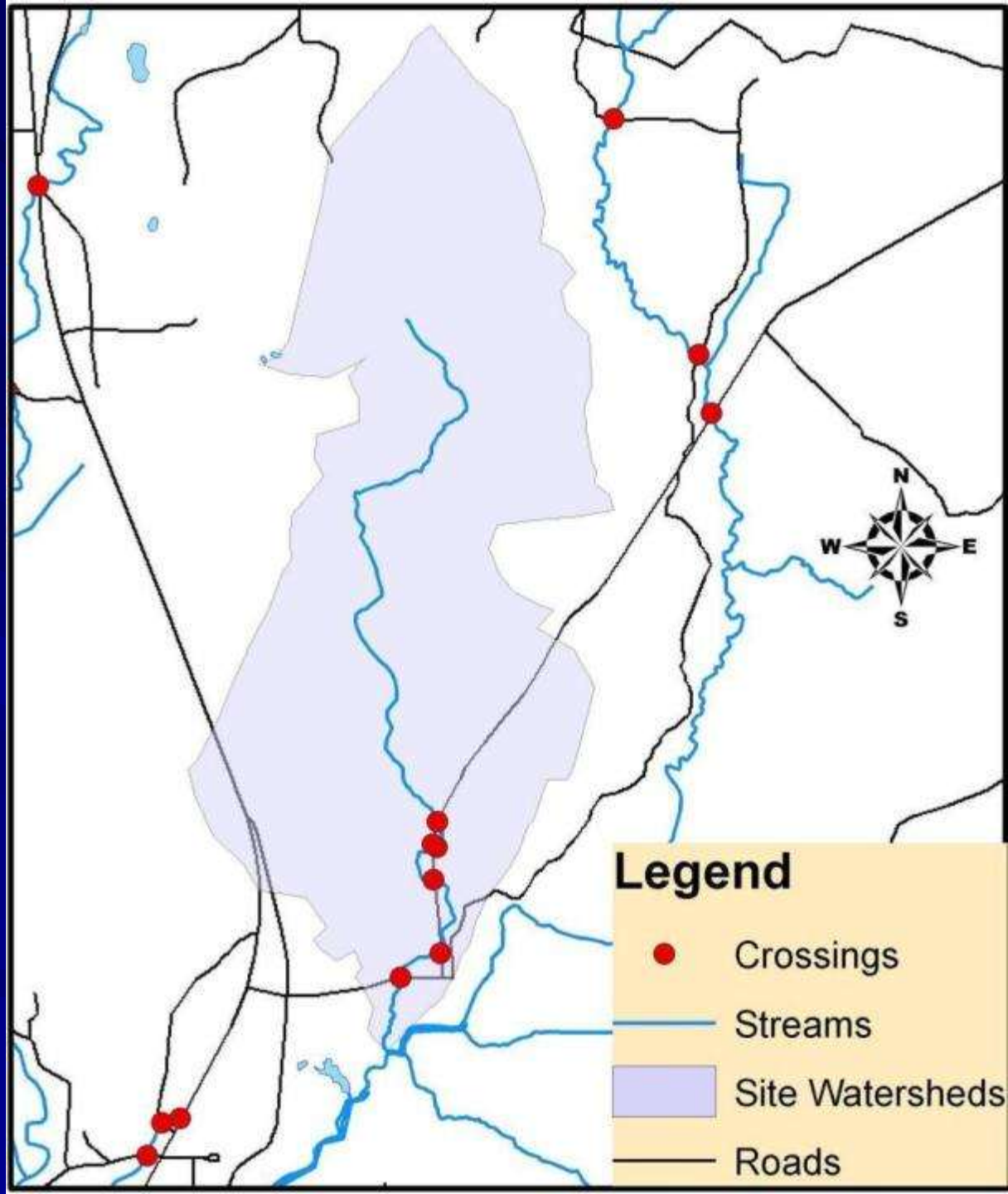
# A few cautions

- Scale matters
- Some streams are not streams
- Some roads are not roads
- Some crossings are not crossings
- Some crossings don't show up

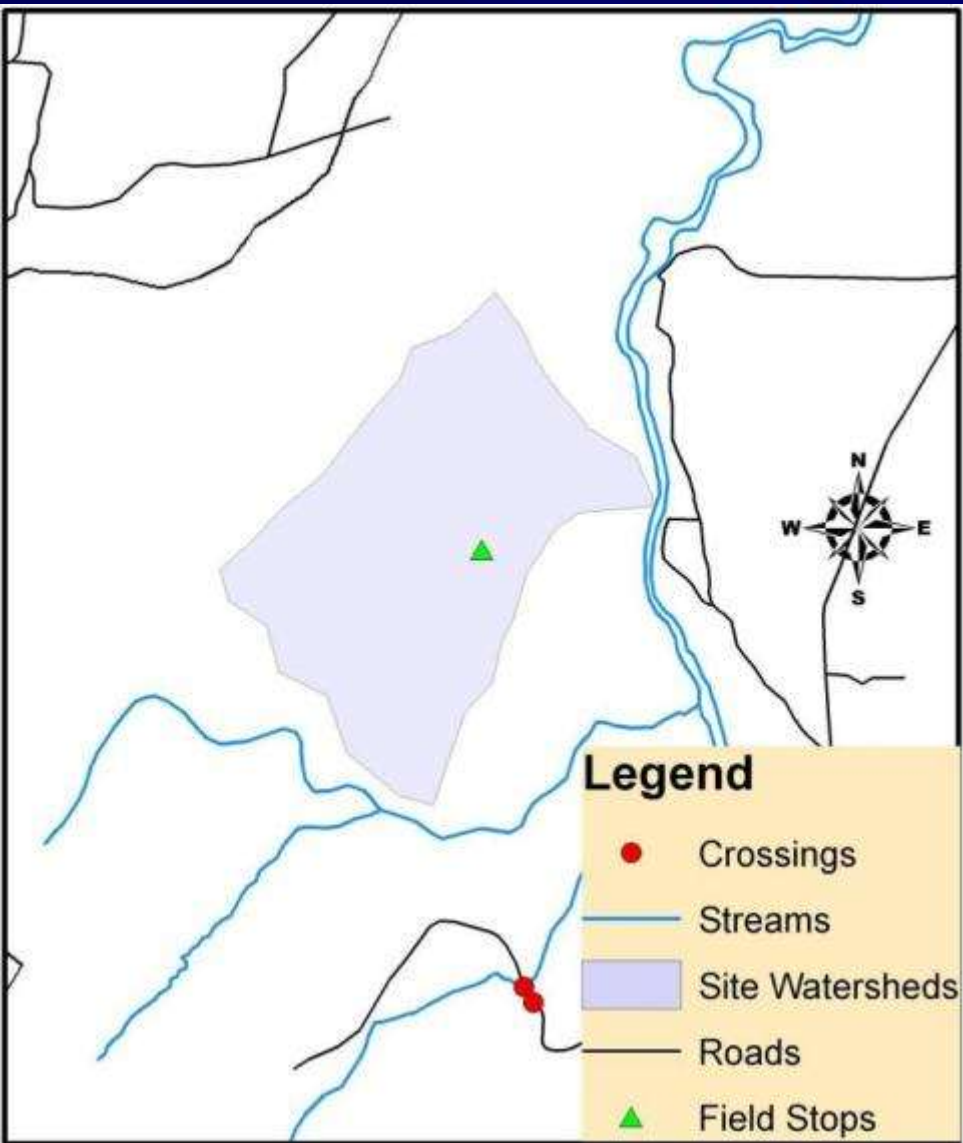


Zoom in to  
field sites

Looks good!



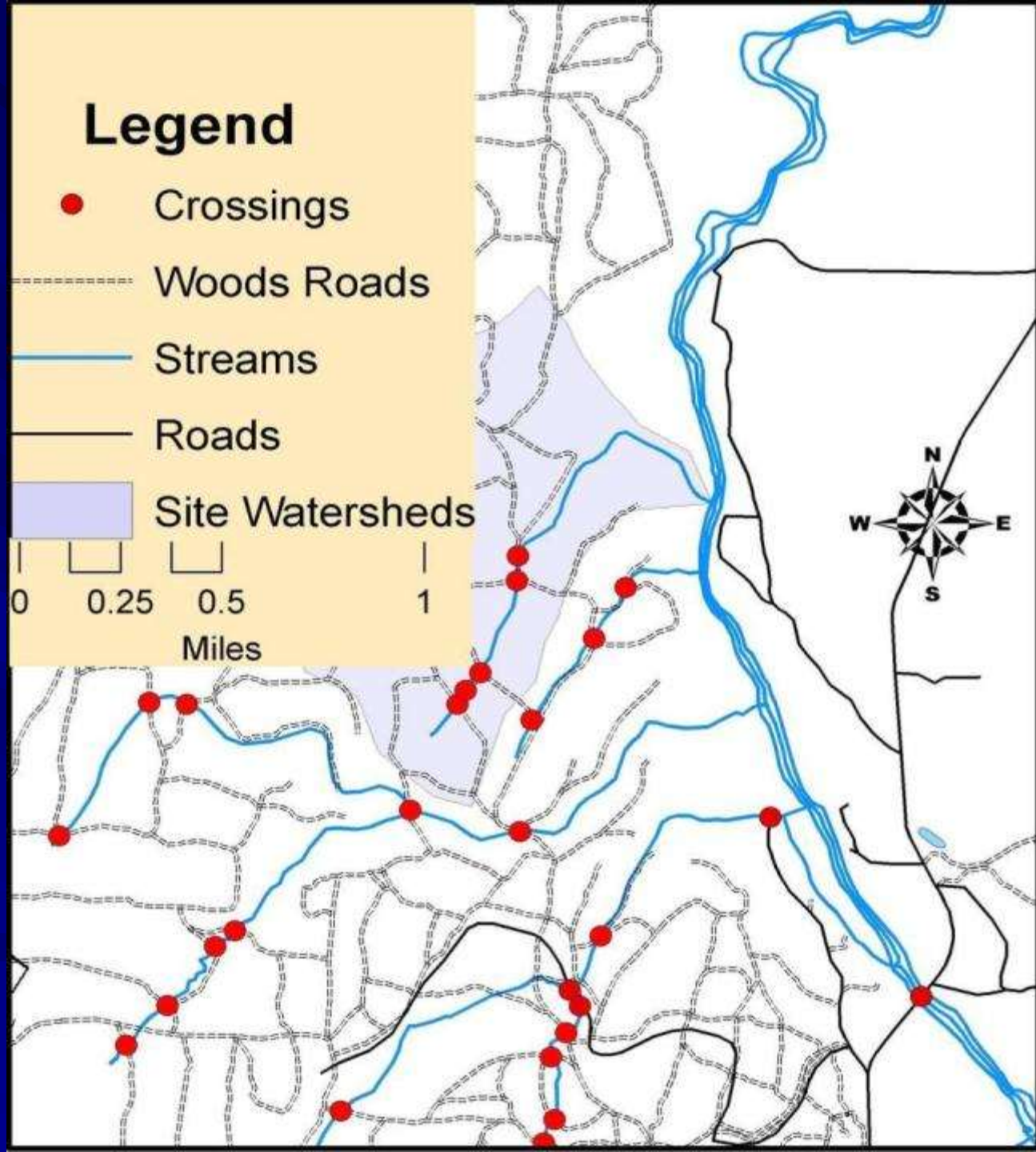
# What crossing?





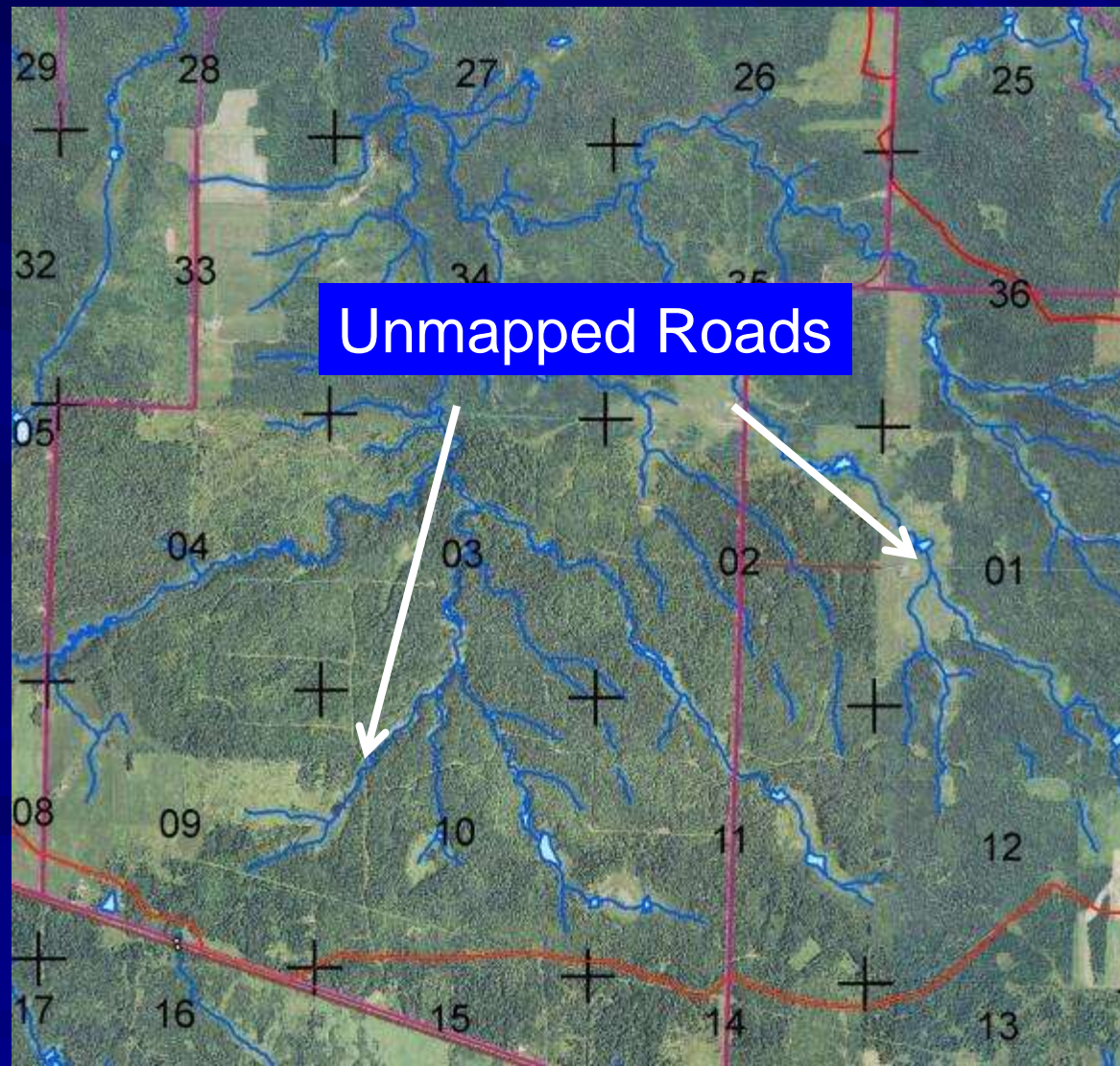
27  
Crossings  
in 4  
Square  
Miles

Scale Matters –  
Use the finest  
scale possible

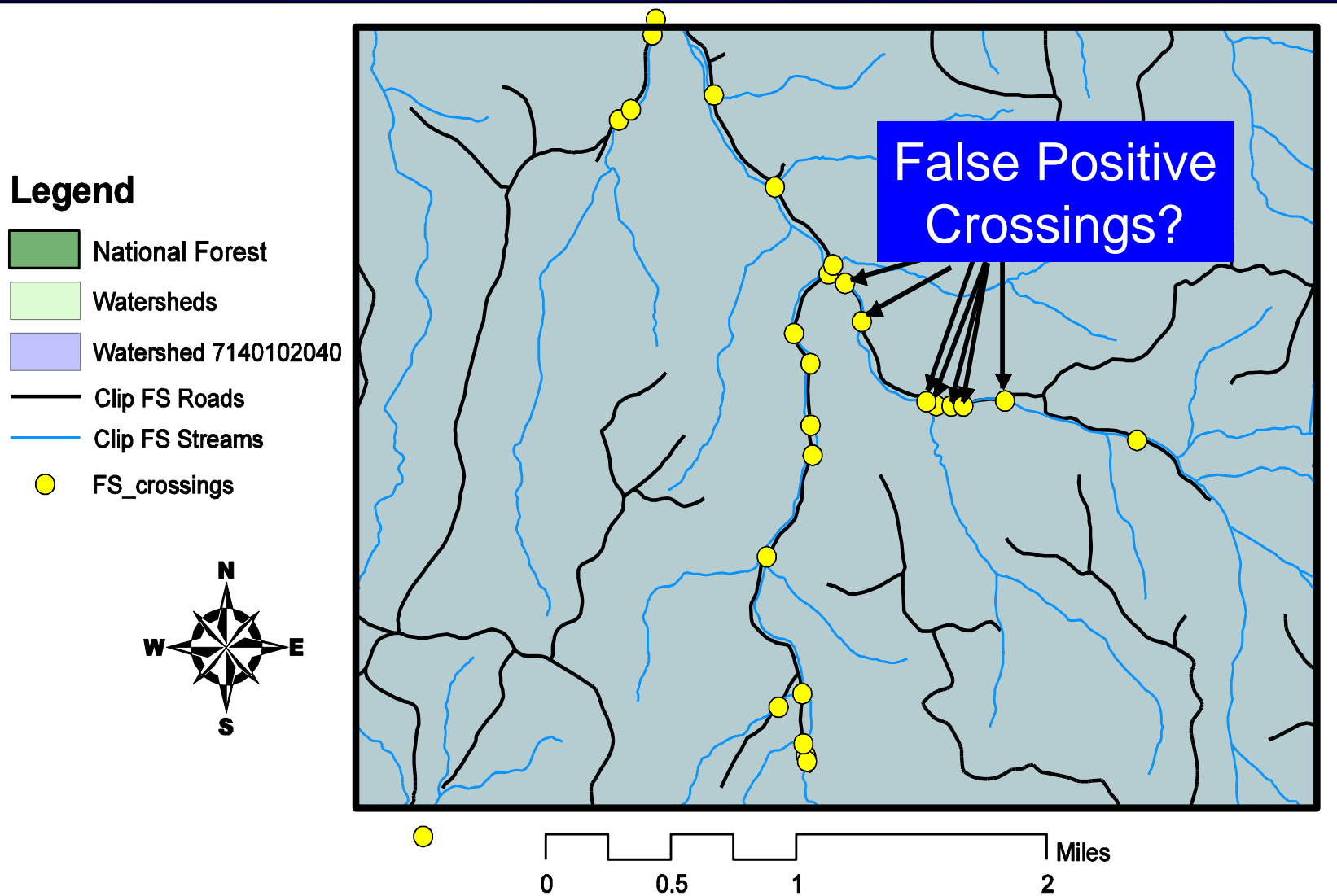




# There may be more roads than are mapped

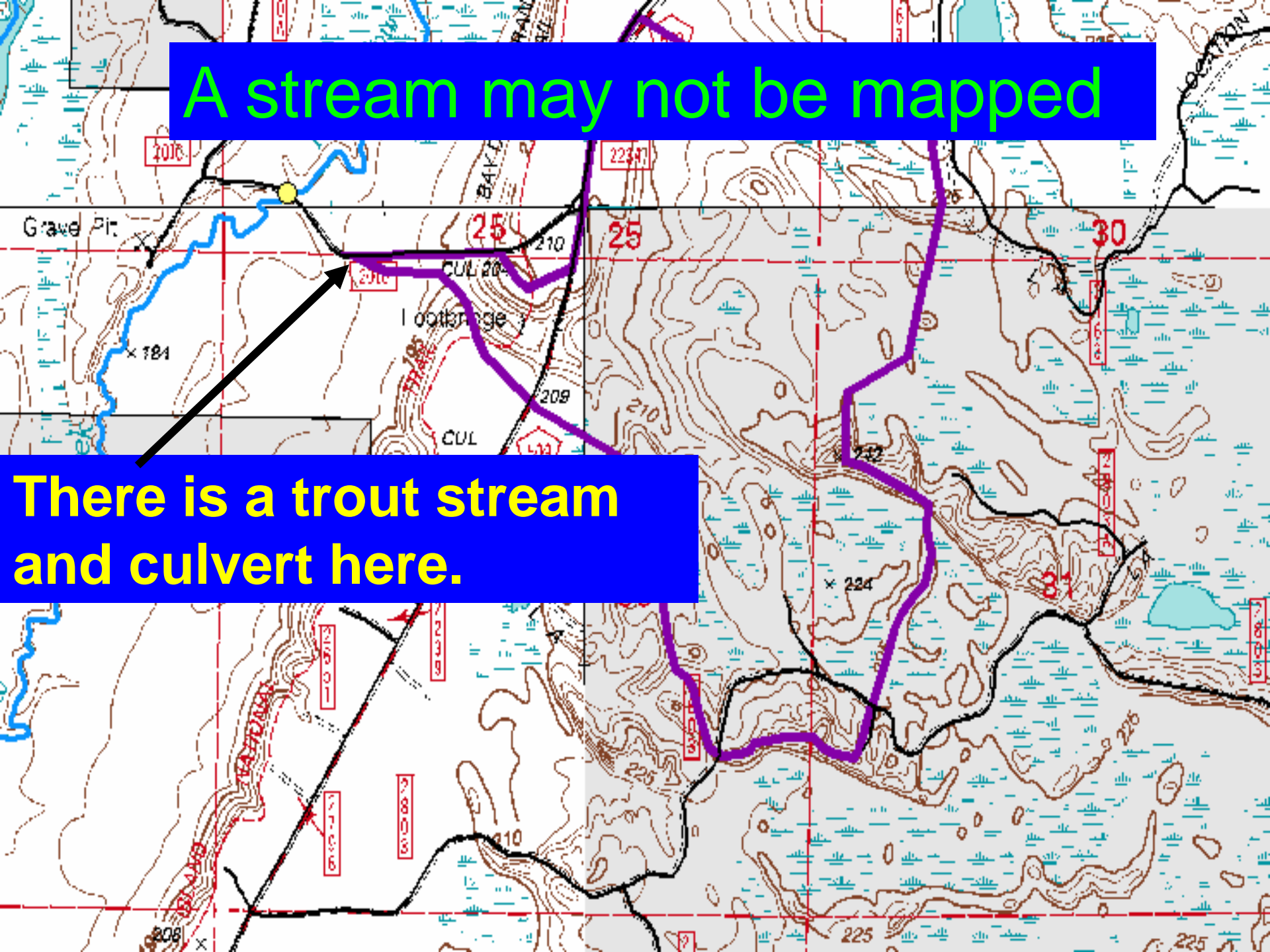


# Some crossings may not be crossings



A stream may not be mapped

There is a trout stream and culvert here.





# Inventory and assessment

## ■ Goals:

- What kinds of problems are out there?
- How bad are they?



# Two tier approach to inventory

- Tier 1– Rapid assessment (volunteers)
- Tier 2 – More in-depth (more equipment and skills required)







Communication plan, first aid kit,  
sunscreen, insect repellent, water,  
knowledge of safety hazards.



# Datasheet and instructions available

## Stream Crossing Data Sheet

Site ID: \_\_\_\_\_

### General Information

Stream Name: \_\_\_\_\_ Road Name: \_\_\_\_\_

Name of Observer(s): \_\_\_\_\_ Date: \_\_\_\_\_

GPS Waypoint: \_\_\_\_\_ GPS Lat/Long: \_\_\_\_\_

County: \_\_\_\_\_ Township: \_\_\_\_\_ Range: \_\_\_\_\_ Sec: \_\_\_\_\_

Adjacent Landowner Information: \_\_\_\_\_ Additional Comments: \_\_\_\_\_

# Site sketch



# Database

Site

**Stream Crossing Data Sheet**

Stream name  Road name  SiteID

Name of Observer(s)  Date

Latitude  Longitude

Location comments

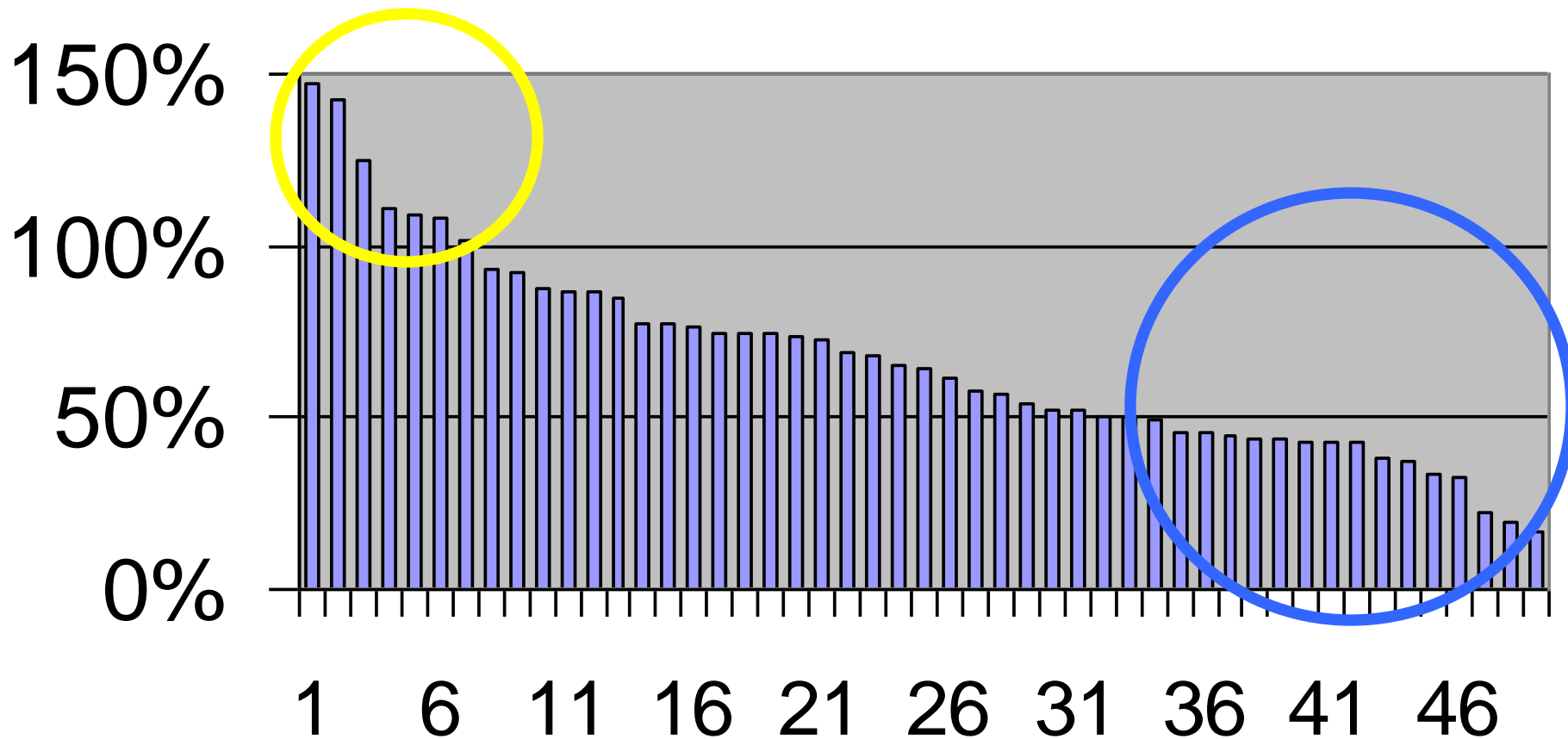


# Quick assessment metrics

- Constriction ratio
  - Structure width/bankfull width
- Outlet drop
- Outlet pool/bankfull ratio
- Culvert depth/stream depth
- Substrate?

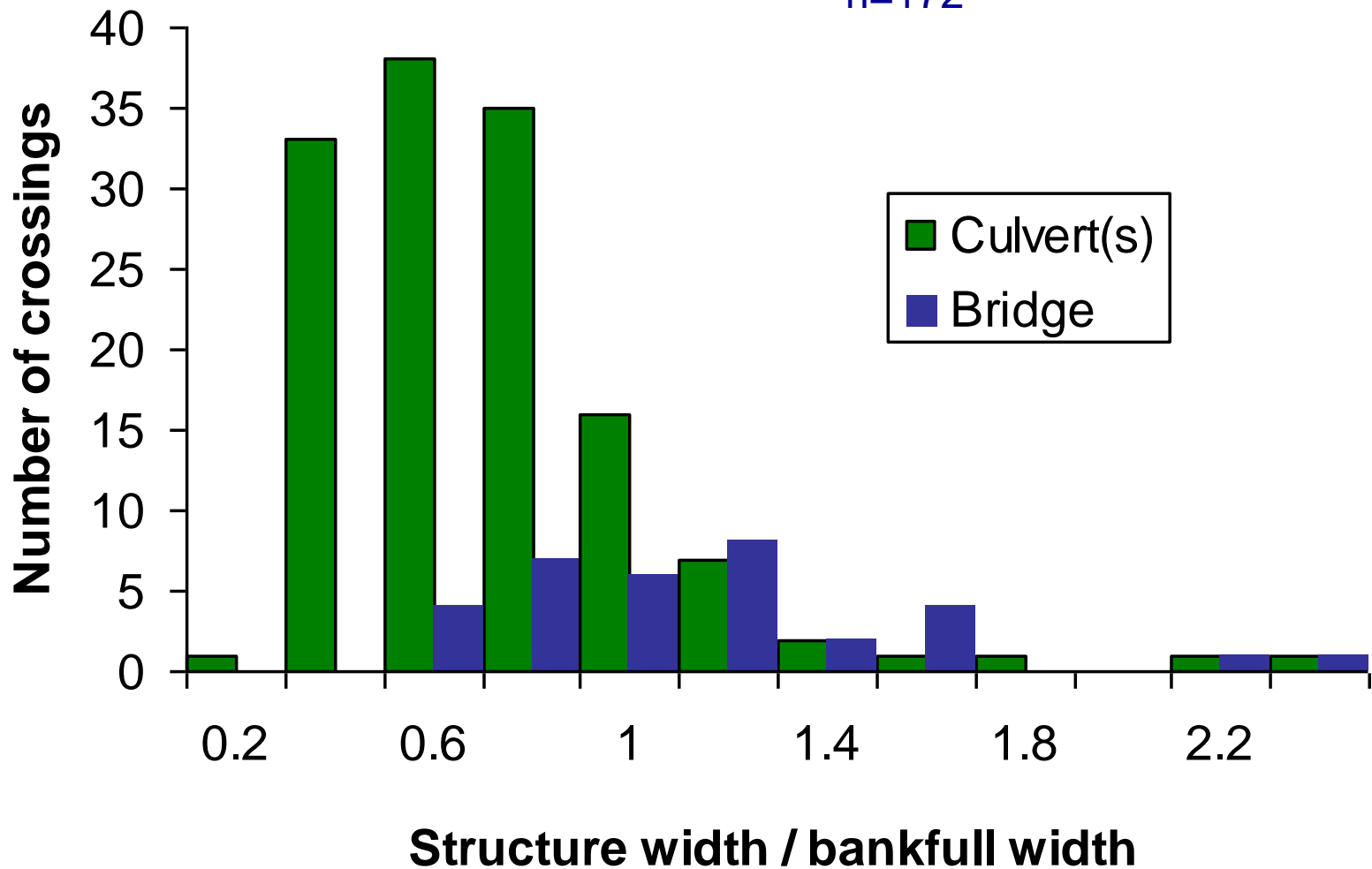
# Structure width / bankfull width

## Constriction Ratio



# Constriction Ratio

n=172





0

# Estimating passability

0.5

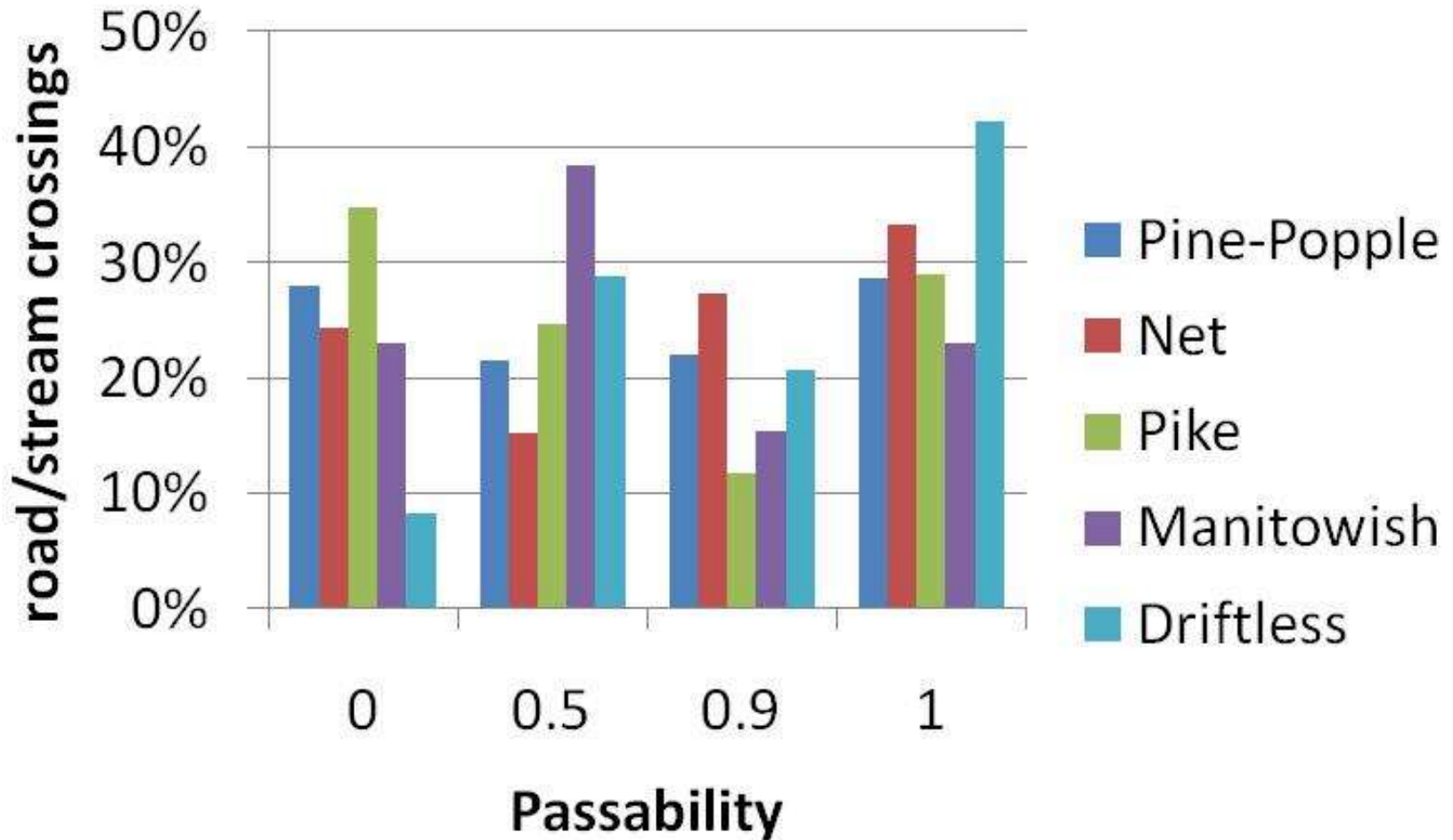


0.9

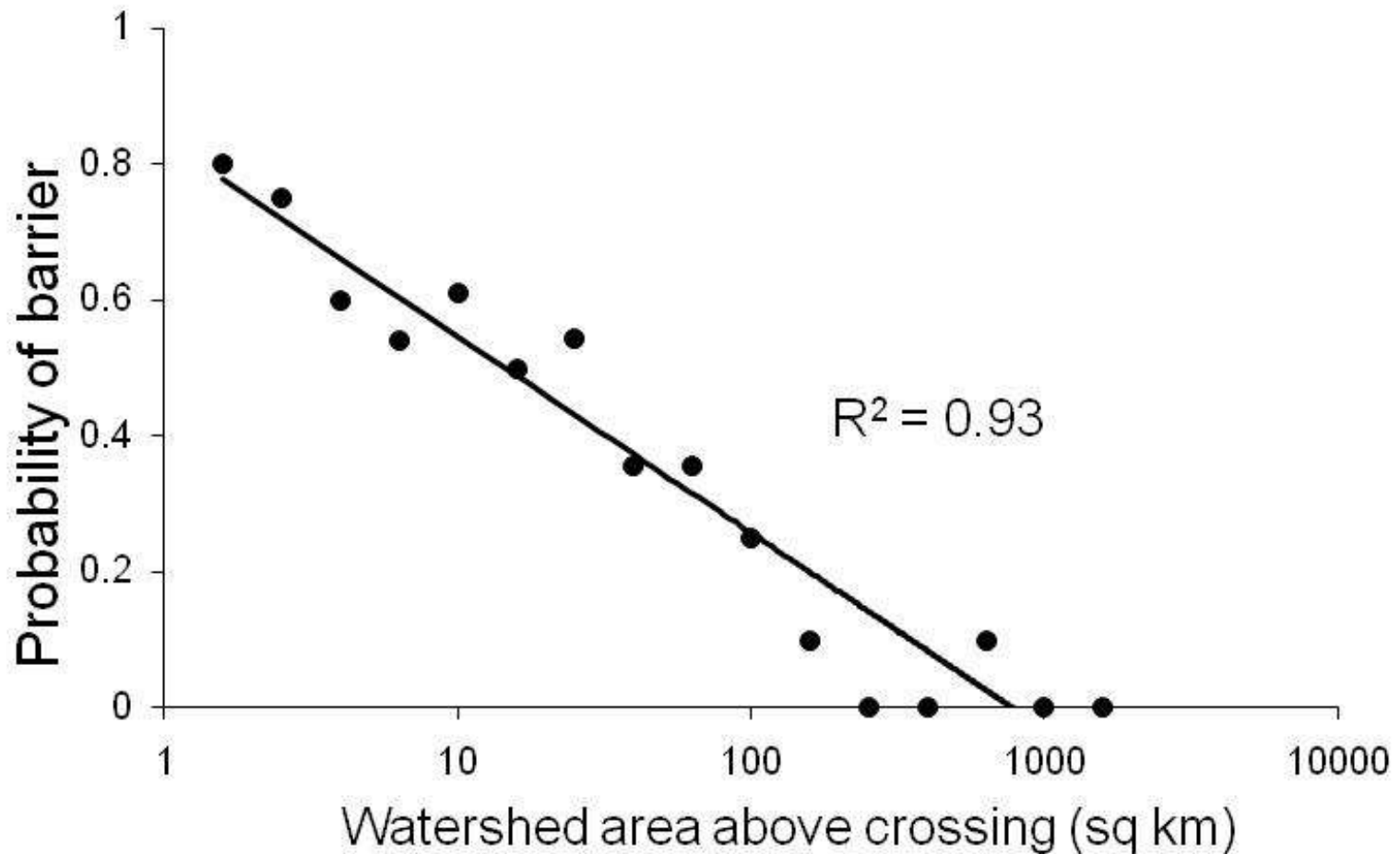
1



# Most crossings are at least partial barriers

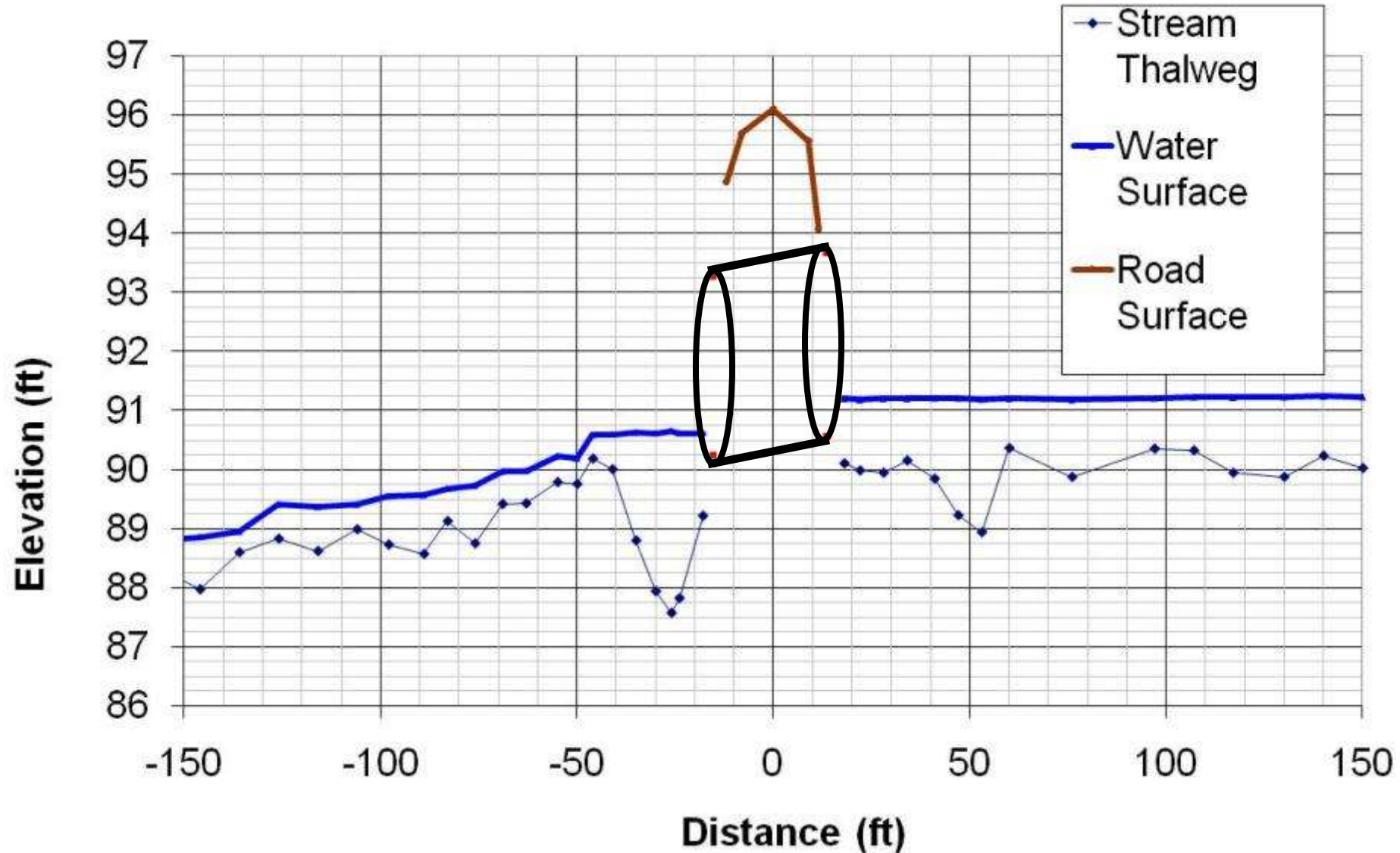


# “Barriarity” vs. watershed area

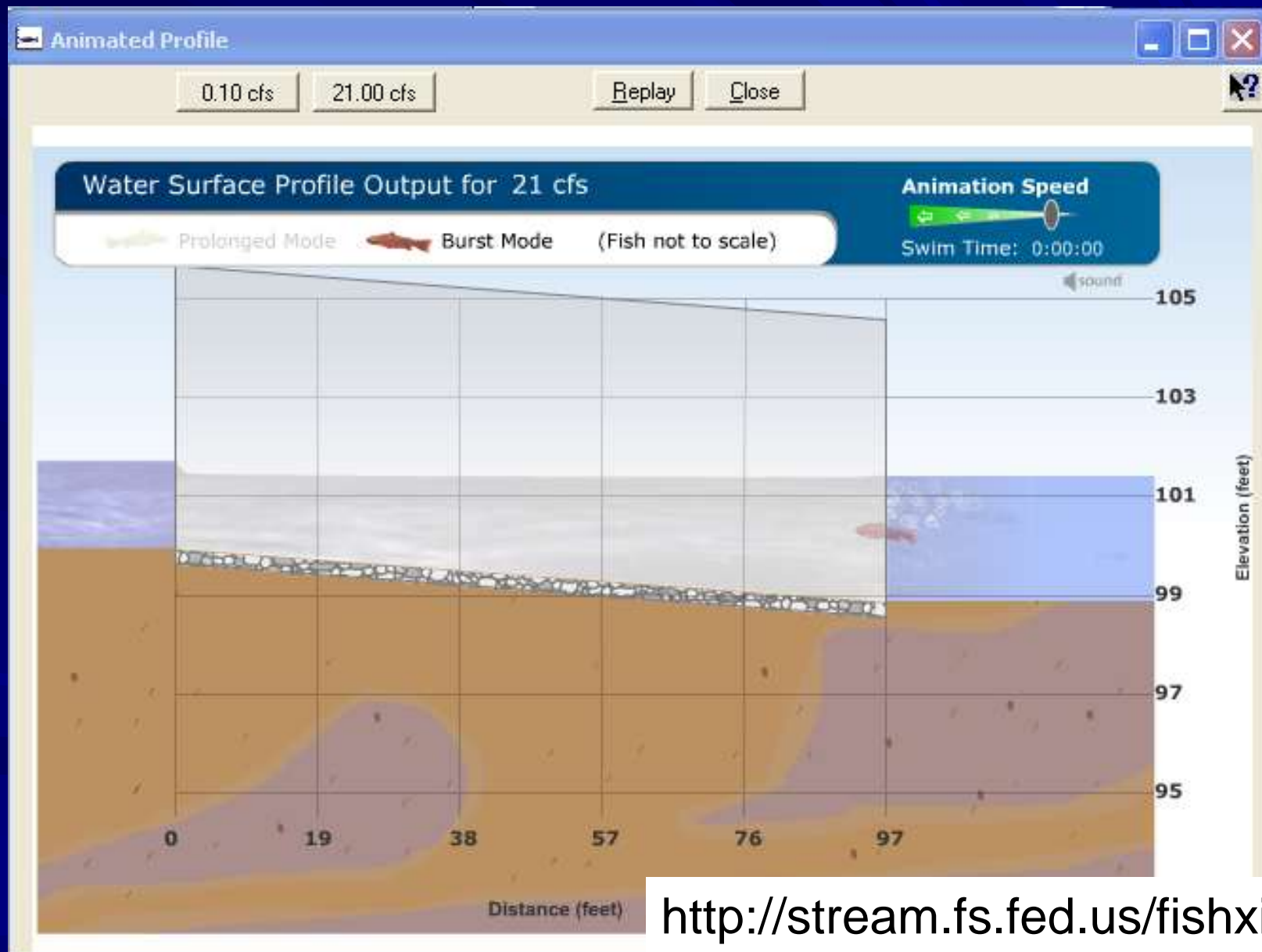




# Tier 2 assessment



# FishXing



<http://stream.fs.fed.us/fishxing/>

# Pike River Barriers



## Legend

### Passability

◆ <all other values>

### PASS

- 0
- 0.1
- 0.5
- 0.9
- 1

0 5,000 10,000 20,000 Meters

7/9/10



# Priorities, priorities

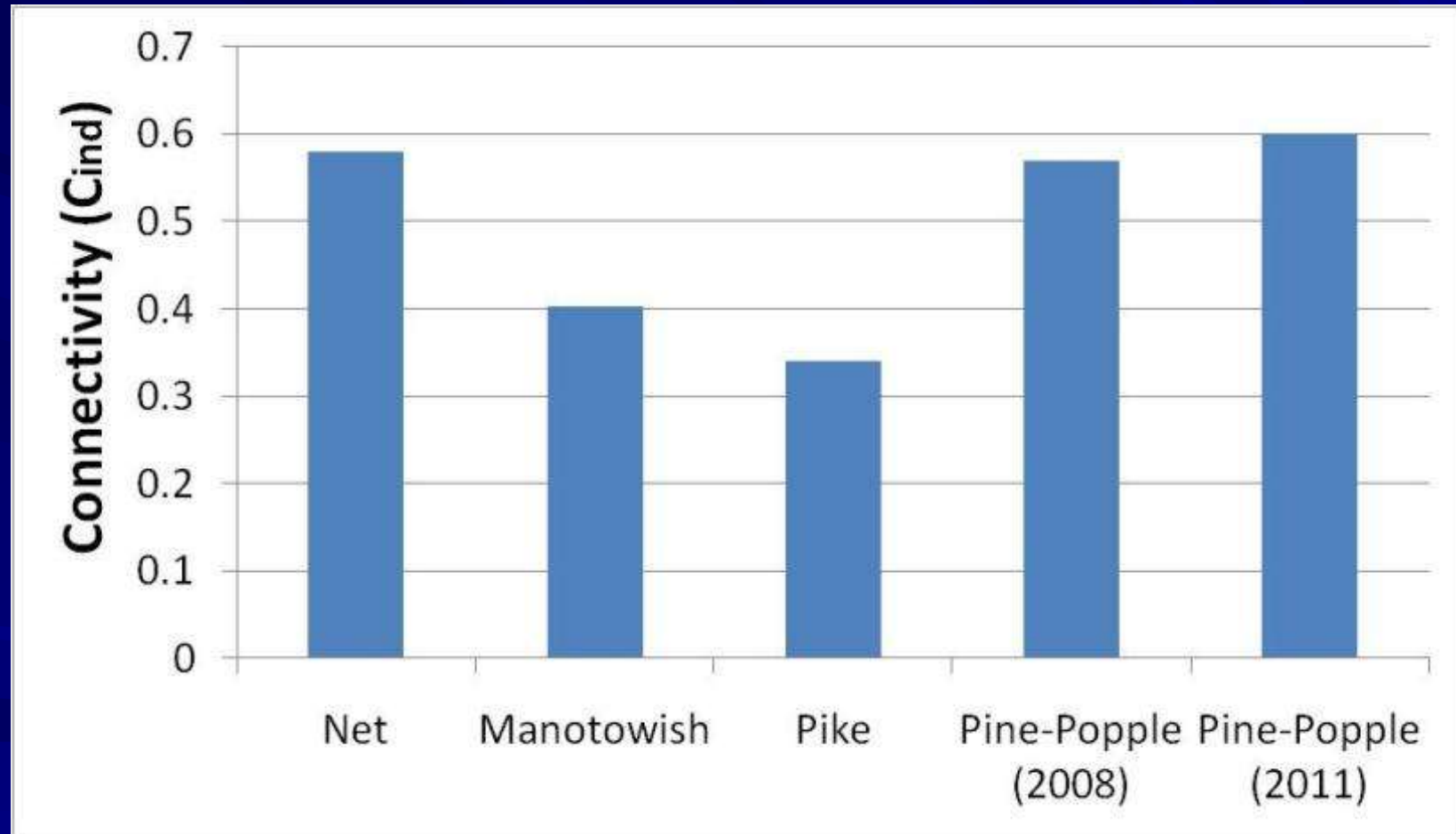
- Structure condition
- Risk/consequences of failure
- Water quality
- Cost (\$\$)
- Opportunity

- Ecology
  - Rare species
  - Invasive species
  - Game fish
  - Turtles/amphibians
  - Amount of habitat
  - Quality of habitat
  - Diversity of habitat

# Optimized rank

Rank	Site ID	Benefit	Cost	Ratio
1	87	1334	\$2,000	0.667
2	134	6615	\$9,800	0.675
3	216	6587	\$5,000	1.318
4	506	131766	\$100,000	1.318
5	141	10913	\$10,000	1.091
....	....	....	....	....
121	220	2	\$280,000	0.000

# Comparing connectivity of watersheds





# Next steps



# Summary

- How many crossings are out there?
  - Use GIS to get an estimate of road/stream crossing numbers and locations
- How many are bad?
  - Simple inventories can be conducted quickly
  - More detailed assessments require surveying skills
- Where do we begin?
  - Prioritization can lead to greater benefits
  - <http://conserveonline.org/workspaces/streamconnect>

# Stream Simulation





# Stream simulation

- A channel that will present no more of a challenge to organisms than the natural channel.



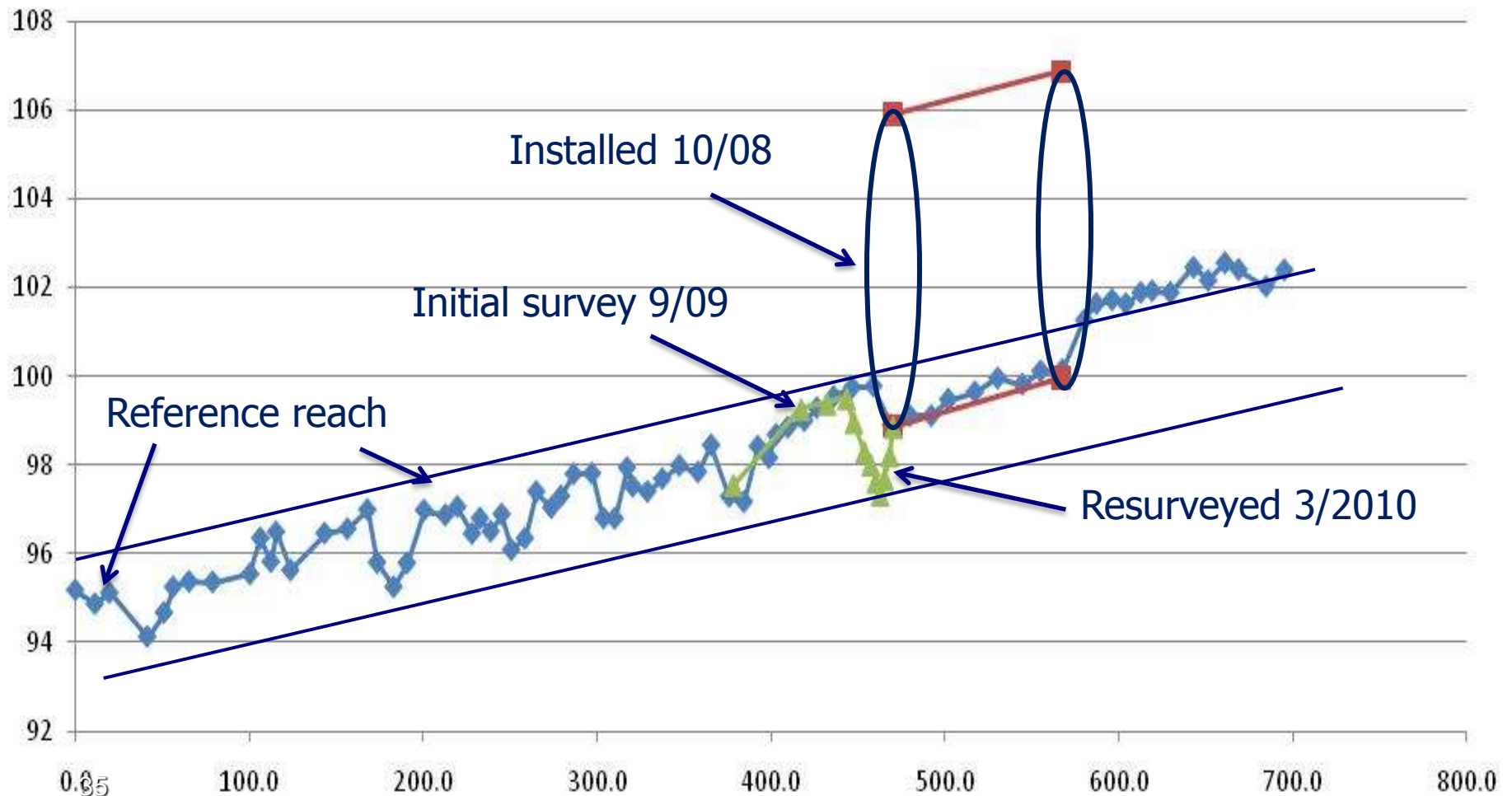
# Suitable for stream simulation – most sites





# Vertical adjustment potential

Trout Cr. Longitudinal Profile





# Bed material examples

- Walk-behind Bobcat to install materials
- Fan for air quality in confined space
- Sheet piling to divert water

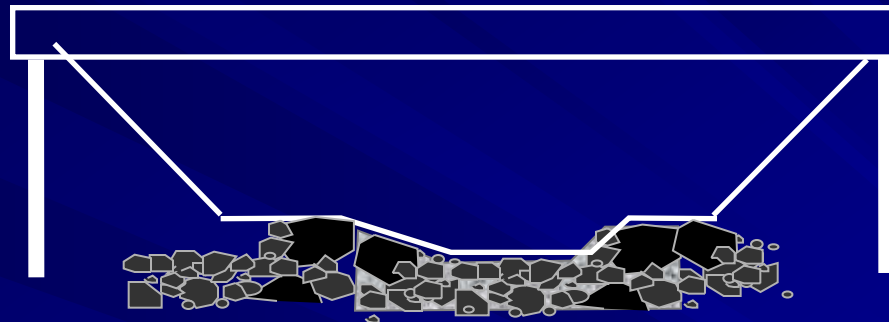




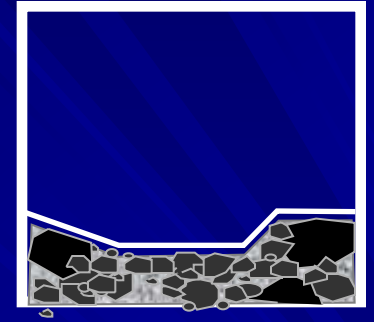
# Example, continued



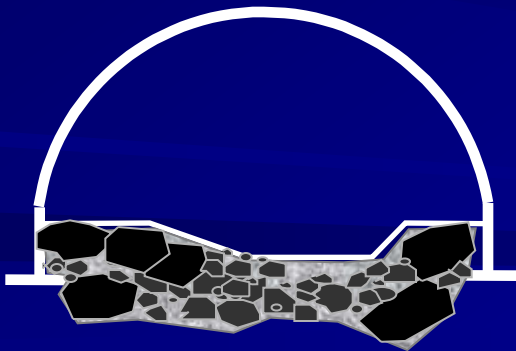
# Structure types



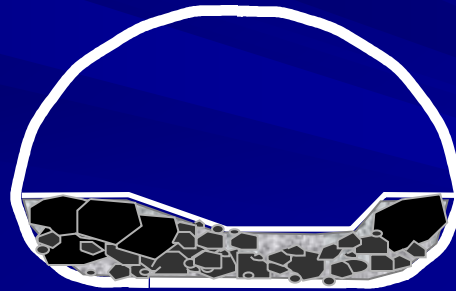
Bridge



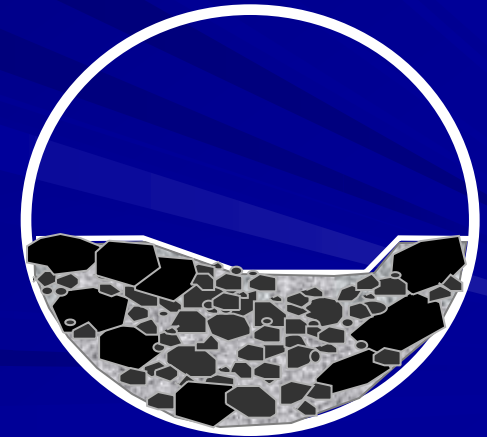
Box



Bottomless Arch



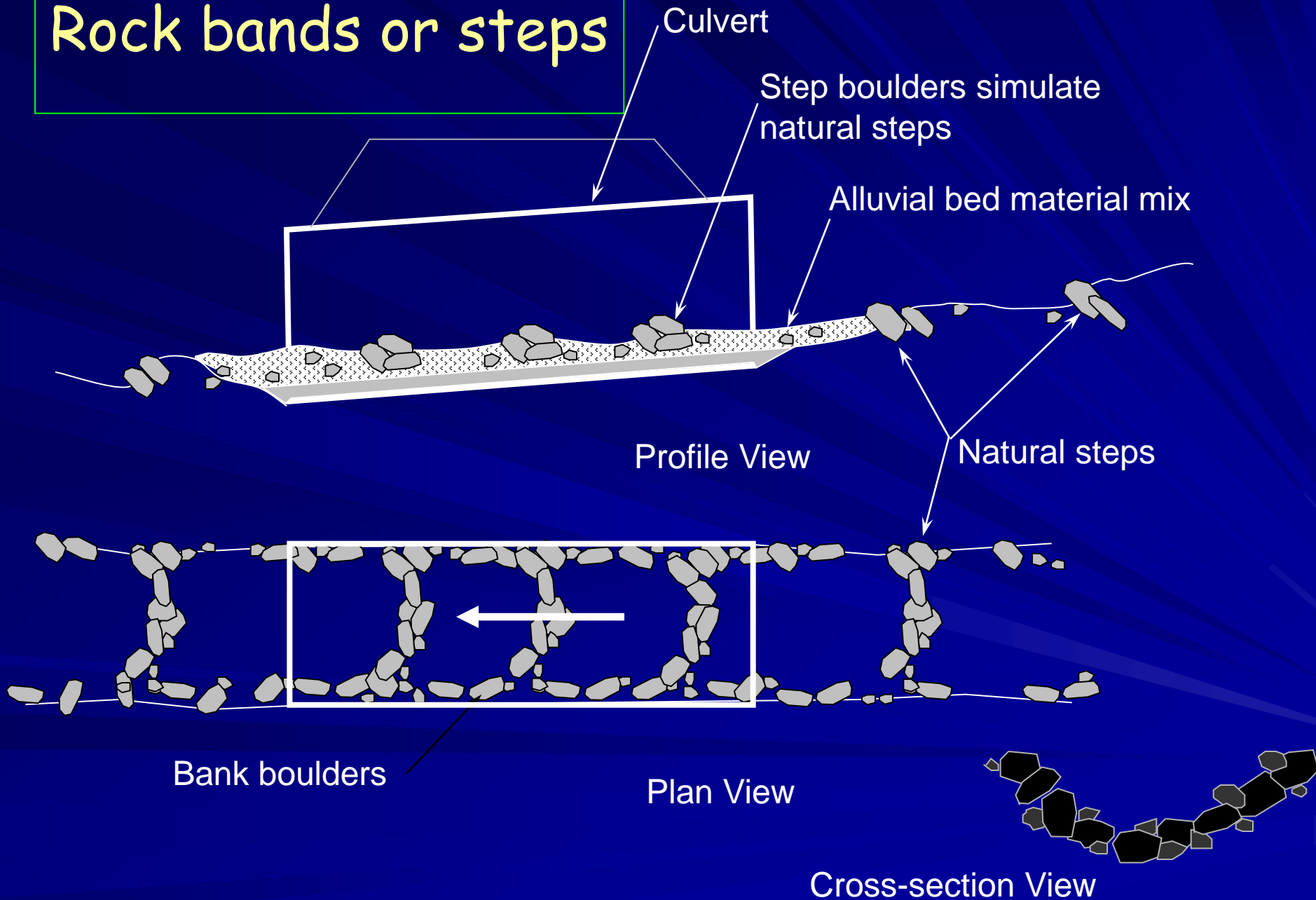
Pipe Arch



Embedded Round



# Rock bands or steps



# Green Mountain National Forest FR17A/Jenny Coolidge Brook Bottomless Arch Outlet

Completed Channel Construction  
2010

Post TS Irene September 2011



Lost largest boulders near outlet and roughness along stem walls. Structure and road undamaged.





# Green Mountain National Forest FR17A/Jenny Coolidge Brook Bottomless Arch Inlet

Completed Channel Construction  
2010

Post TS Irene September 2011



Storm flows did not top over the road. Minimal scour on left side of arch





# Green Mountain National Forest

FR54/ Sparks Brook Bottomless Arch Inlet and Outlet

Pre-Irene July 2011

Post TS Irene September 2011



# Green Mountain National Forest FR54/ Sparks Brook Bottomless Arch Step Structures

Pre-Irene July 2011



Post TS Irene September 2011



Storm flows did not top over the road.







Questions?

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