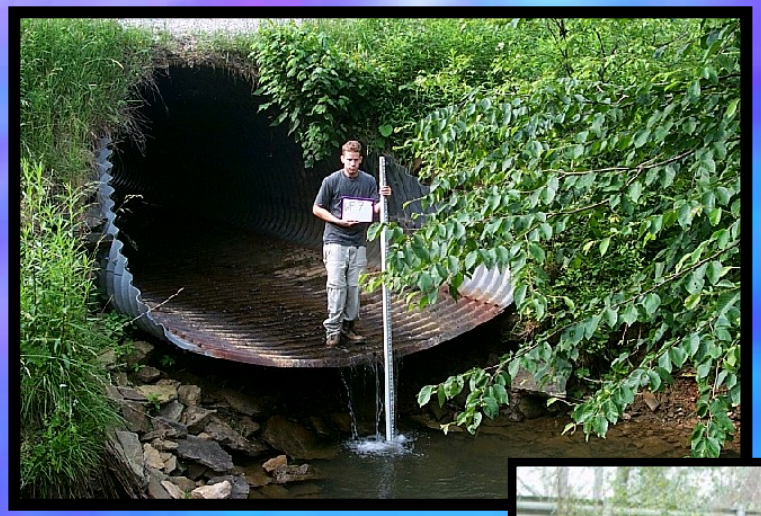
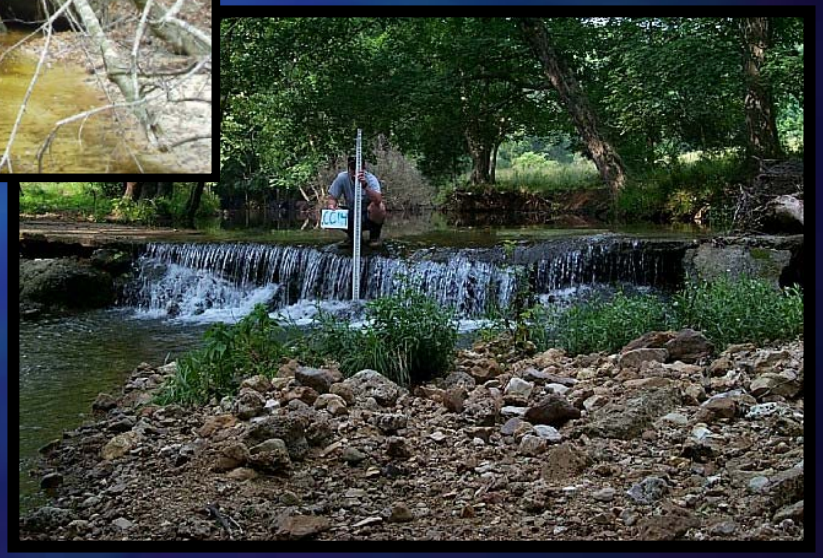
Ten things, I think, I think: Aquatic organism passage in the southeast, Lessons learned that don't need to be repeated.

Mark Hudy
(Acting Transportation Ecology Program Leader)
National Aquatic Ecologist-East
USDA Forest Service
Fish and Aquatic Ecology Unit
James Madison University
Harrisonburg, VA
hudymx@csm.jmu.edu

EF2





1. I think, I think

- The issue is not new but the problem and questions are evolving

Fish Passage it's not just dams & salmon anymore !

Fish passage , it is just not migration and spawning needs anymore!

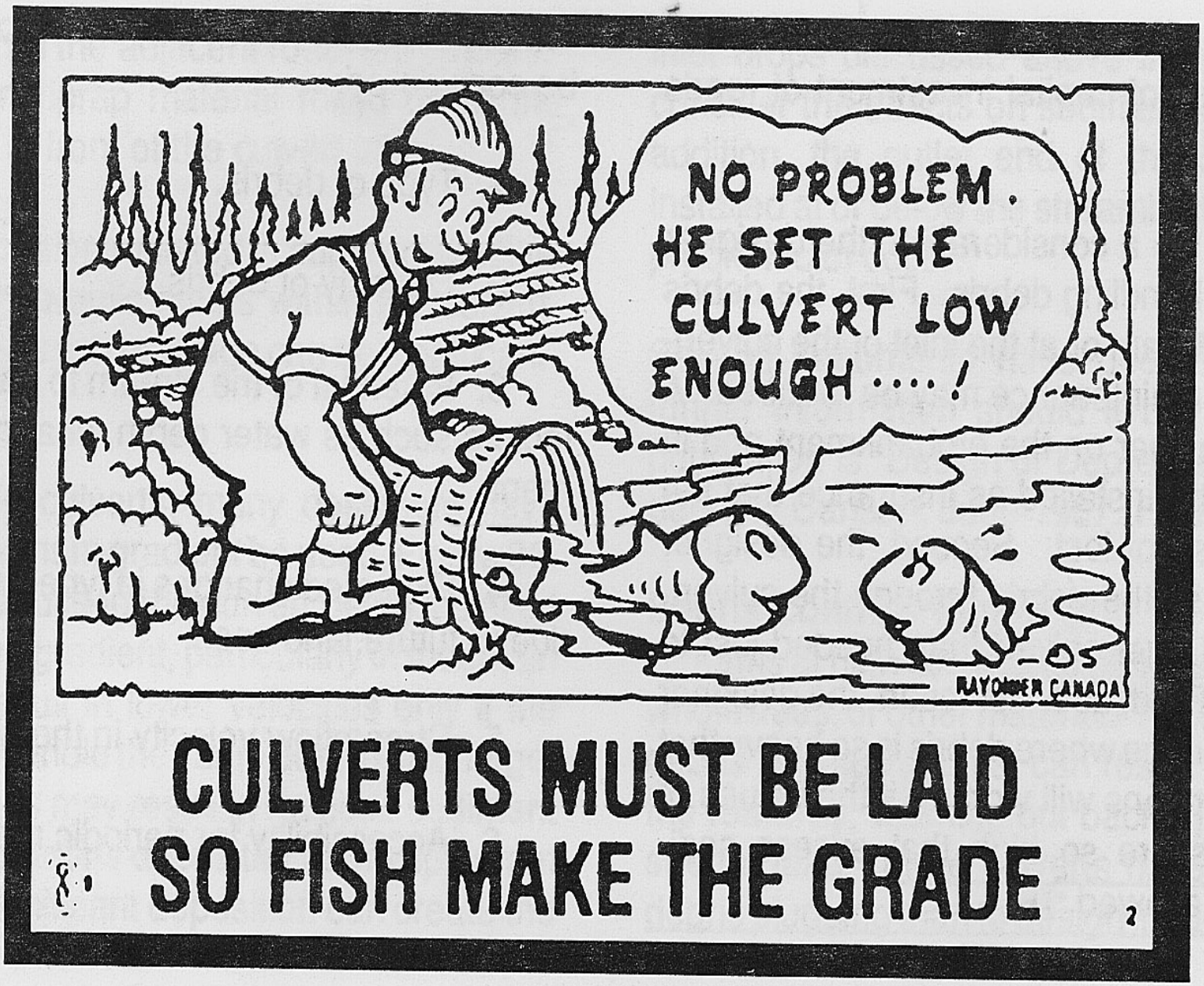

NO PROBLEM. HE SET THE CULVERT LOW ENOUGH ....!
RAYONIER CANADA
CULVERTS MUST BE LAID SO FISH MAKE THE GRADE
2

Figure 33.

What about the >800 non-migratory fishes and other aquatic species?

Aquatic organism passage (AOP), it is just not fish anymore!

Think AOP!

2. I think, I think

- The issue is big and will get bigger.

National Meetings last two years

- Research needs assessment –Amherst, MA
- National Culvert Summit- Development of HEC –26: Design for fish passage at Bridges at Culverts Denver, CO
- AFS special symposiums at annual meetings
- National Hydraulic Engineers Symposium-San Diego, CA
- Federal Voluntary Fish Passage Delivery National Coordination Workshop- Silver Springs, MD

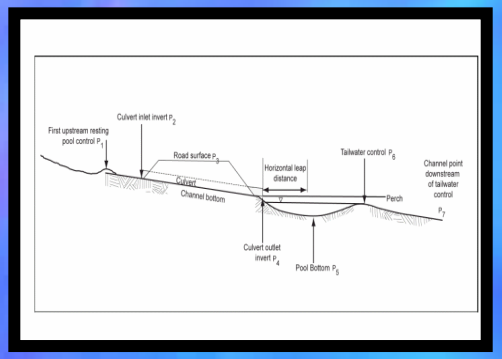
New Regulations Common to the west, relatively new to the east

- USDA Forest Plans- S & G's
- State BMP's from
  - State DOT's
  - State DOF's
  - State G&F

3. I think, I think

- Aquatic organism passage is complex.

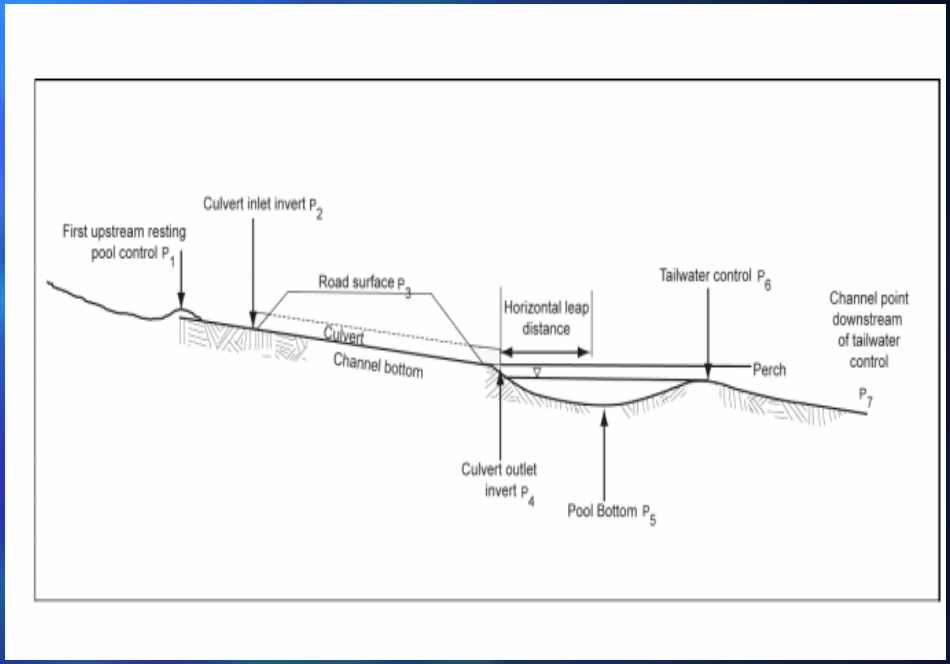
Aquatic organism passage is complex !



- Stream flow
- Aquatic species
- Life stage of species
- Barrier type

Culvert design issues for aquatic organism passage

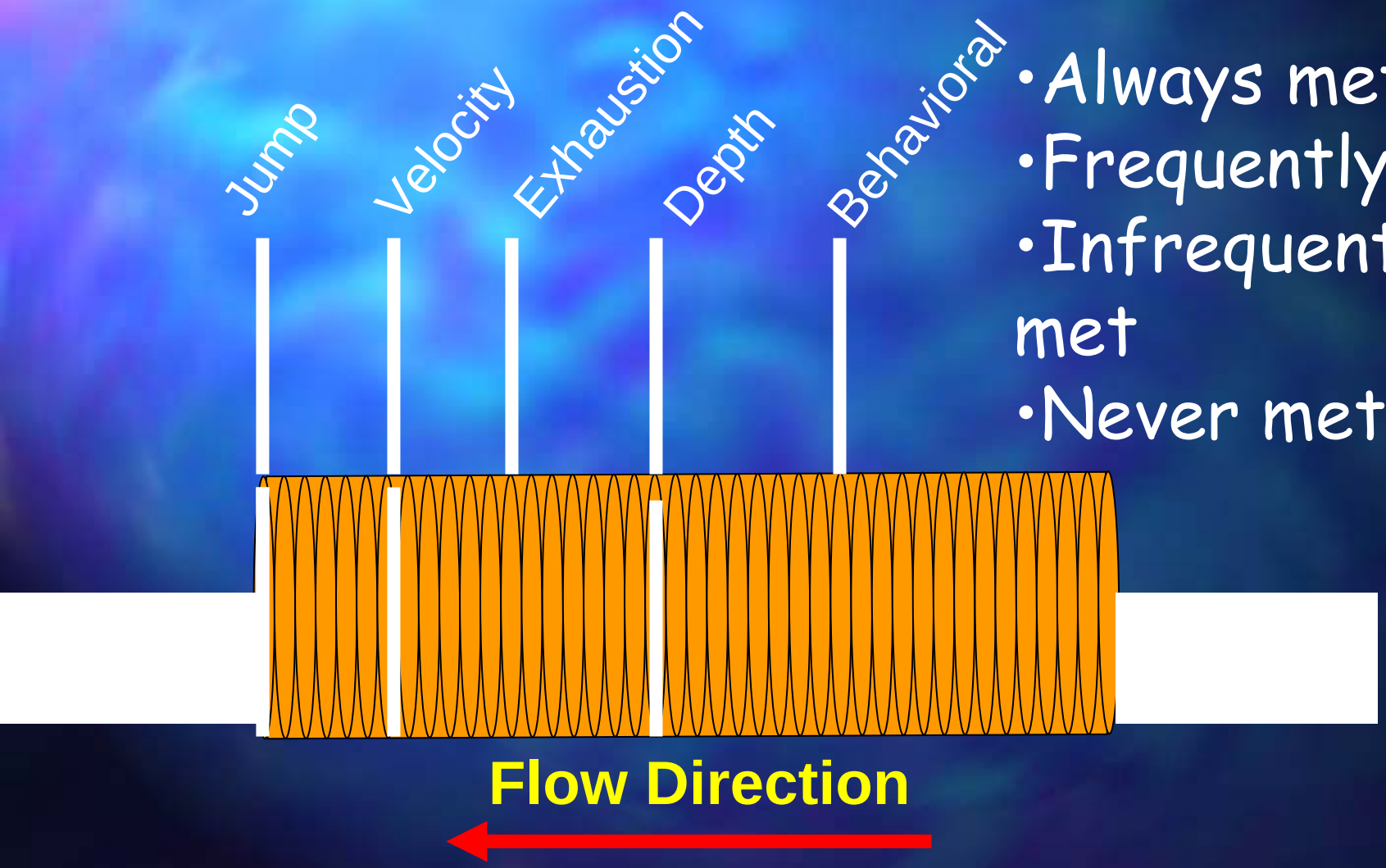
- Jump barrier
- Velocity barrier
- Exhaustion barrier
- Depth barrier
- Behavioral barrier



Passage Gates

Passage requirements are:

- Always met
- Frequently met
- Infrequently met
- Never met



4. I think, I think

- Aquatic organism passage is best done with inter-disciplinary teams.
  - Fish biologists, aquatic ecologists
  - Hydrologists
  - Engineers
  - Wildlife biologists

5. I think, I think

- Good assessment tools already exist

NATIONAL INVENTORY AND ASSESSMENT PROCEDURE For Identifying Barriers to Aquatic Organism Passage at Road-Stream Crossings

USFS SAN DIMAS TECHNOLOGY AND DEVELOPMENT CENTER

Kim Clarkin[1], Anne Connor[2], Michael J. Furniss[3], Bob Gubernick[4],Michael Love[5], Kathi Moynan[6], Sandra Wilson Musser[7]

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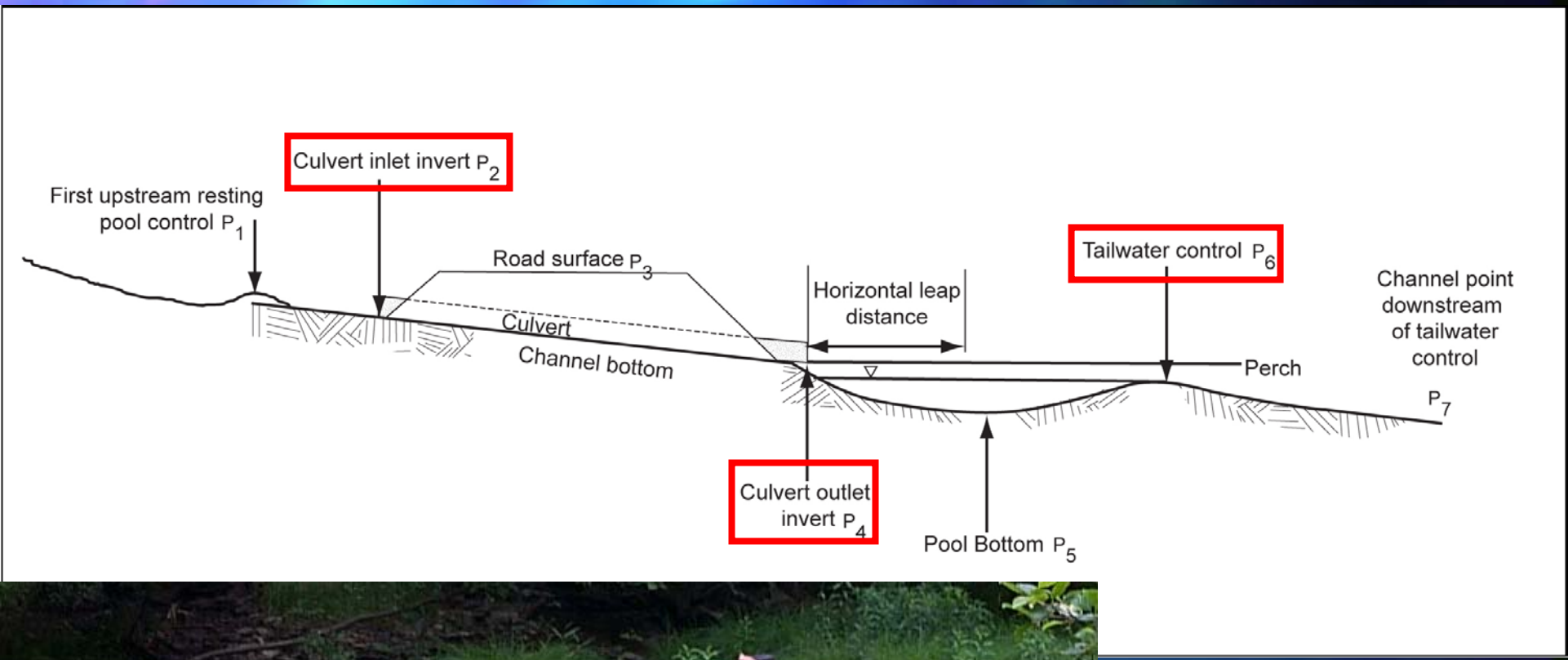
1 Kim Clarkin, Project Manager, USDA-Forest Service, San Dimas Technology and Development Center, San Dimas, CA.
Send comments and questions to kclarkin@fs.fed.us, telephone 909-599-1267 x209
2 Anne Connor. USDA-Forest Service, Clearwater National Forest, Orofino, ID
3 Michael J. Furniss USFS, Pacific Northwest Research Station, Corvallis, OR
4 Bob Gubernick. USDA-Forest Service, Tongass National Forest, Petersburg, AK
5 Michael Love, Michael Love and Associates, Eureka, CA
6 Kathi Moynan. US Fish and Wildlife Service, Region 1, Portland, OR
7 Sandra WilsonMusser. USDA-Forest Service, Region 6, Portland, OR

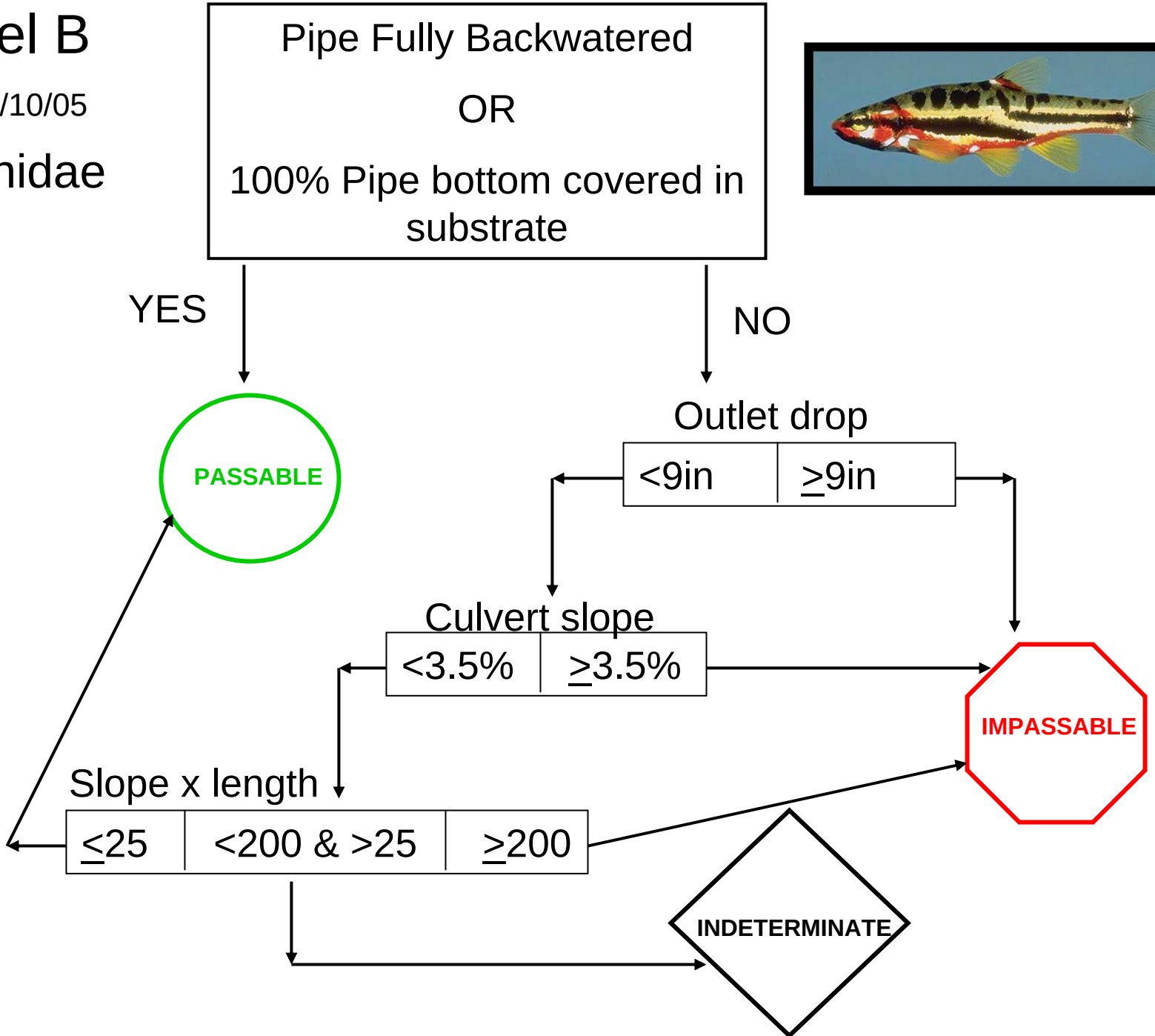
Field Measurements (Clarkin et al 2005)



Model B

V1.2 01/10/05

Cyprinidae



FishXing

6. I think, I think

- The questions from passage impacts are evolving.
  - No species
  - Species differences
  - Population viability
  - Genetics
  - Balancing isolation/fragmentation with invasives/exotics

Is there really, really a problem out there ?

The Good !

Aquatic Assemblages

- Upstream
  - Mottled sculpin
  - Blacknose dace
  - Fantail darter
  - Creek chub
  - Brook trout
- Downstream
  - Mottled sculpin
  - Blacknose dace
  - Fantail darter
  - Creek chub
  - Brook trout

The Bad !

Aquatic Assemblages

- Upstream
  - Fantail darter
  - Brook trout
- Downstream
  - Fantail darter
  - Brook trout
  - Mountain redbelly dace
  - Mottled sculpin
  - Blacknose dace
  - Creek chub

The Ugly !

Aquatic Assemblages

- Upstream
  - None
- Downstream
  - Brook trout
  - Mottled sculpin
  - Fantail darter

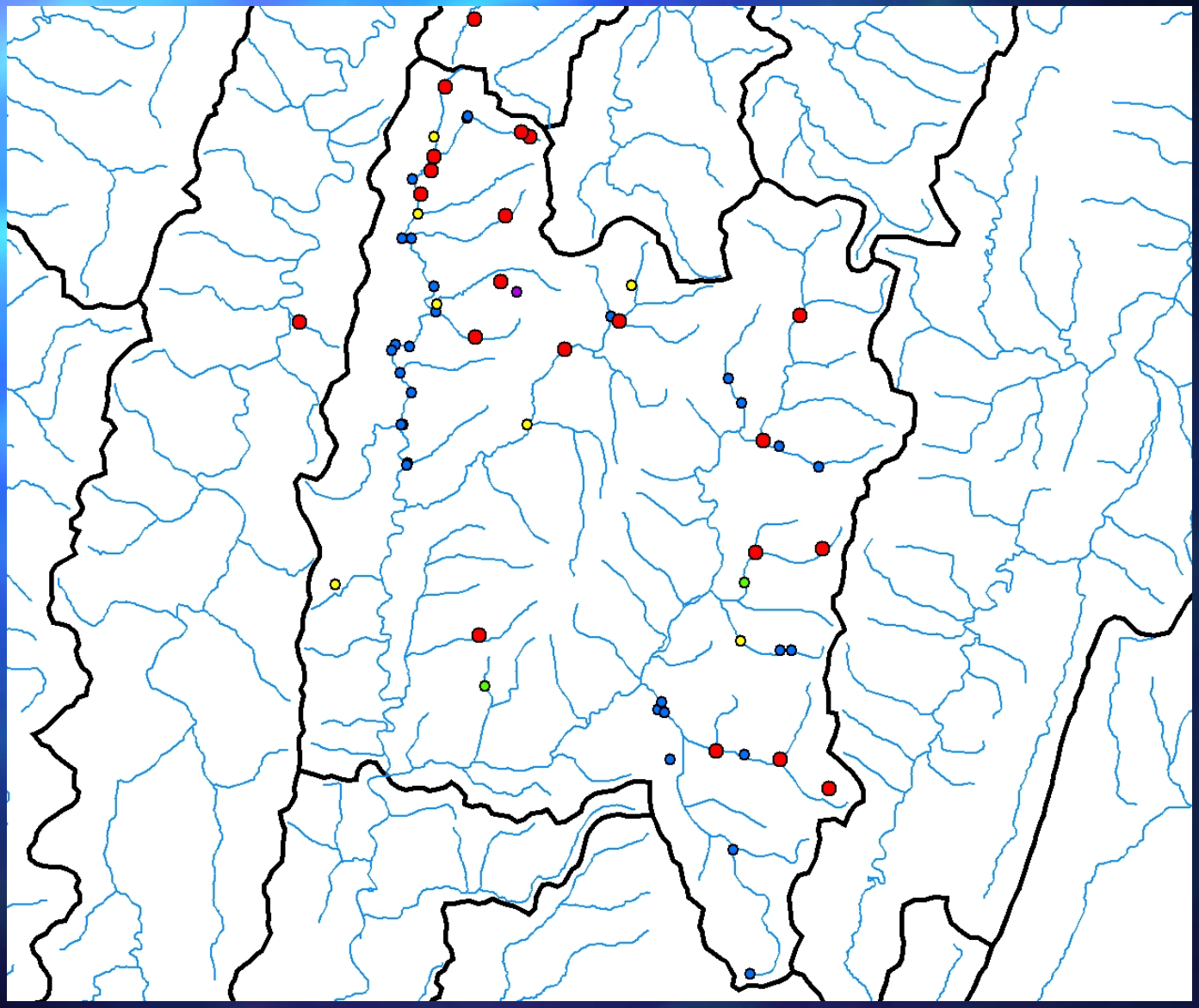
The Unkown !

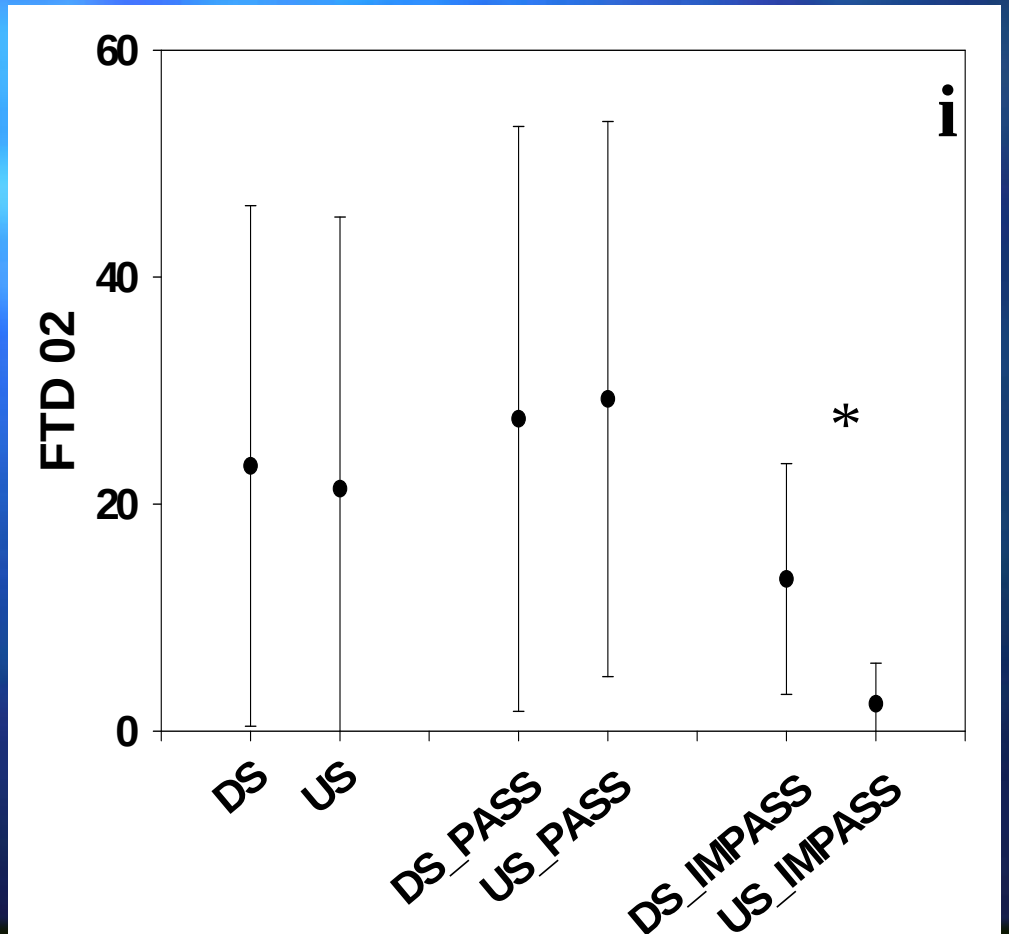
Aquatic Assemblages

- Upstream
  - Mottled sculpin
  - Blacknose dace
  - Fantail darter
  - Creek chub
  - Brook trout
- Downstream
  - Mottled sculpin
  - Blacknose dace
  - Fantail darter
  - Creek chub
  - Brook trout

Similar assemblages above and below culverts/dams does not necessarily mean there is not a problem.

Fragmented Habitats




60
40
20
0
FTD 02
i
*
DS
US
DS_PASS
US_PASS
DS_IMPASS
US_IMPASS

Conclusions-Specific

1. Fewer fish species were found upstream of culverts.

2. Total abundance of all fishes was not decreased upstream of culverts.

3. We found differences between upstream & downstream locations on streams classified as having impassable culverts. Fewer species, total fish, brook trout, & fantail darters upstream.

4. We found no differences between upstream & downstream locations on streams classified as having passable culverts.

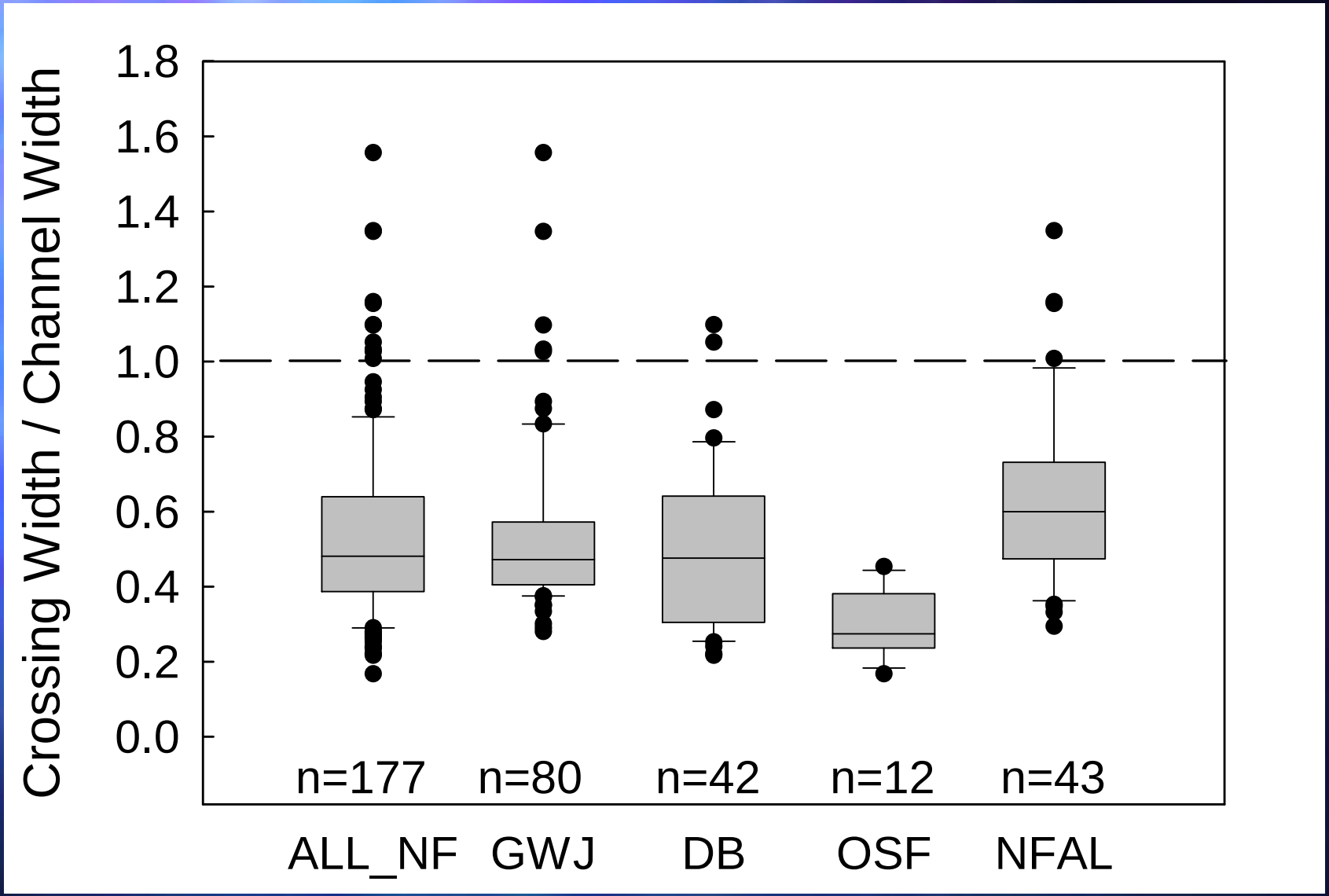
5. There was interaction between location (upstream/downstream) and culvert type (passable/impassable). Differences in abundance between locations were greater in impassable culverts than passable culverts for brook trout, creek chub, fantail darter, total fish and blacknose dace.

7. I think, I think

- Regardless of location we found on average 75% (+/- 15%) of culverts will not pass fish.
  - May or may not have biological impact

8. I think, I think

- Hydraulic design is ok, but stream simulation is better


Crossing Width / Channel Width
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
n=177
n=80
n=42
n=12
n=43
ALL_NF
GWJ
DB
OSF
NFAL

Unknown life history and swimming abilities?

Why Stream Simulation

1. $$ Less maintenance
2. $$ Reduced overall long-term costs
3. Regulatory- Clean Water Act
4. Regulatory – Endangered Species Act
5. Regulatory – National Forest Management Act
6. Ecological – long-term ecological integrity "Right thing to do"

9. I think, I think

- Some existing regulations don't support hydraulic design

Clean Water Act: Nationwide Roads Exemption BMP 40CFR 232.3 c(6)

- *The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body.*

10. I think, I think

- Exotics and invasives complicate manners
  - Highlights importance of inter-disciplinary assessments
  - Balance isolation/fragmentation long term viability with threats from exotics/invasives
  - Don't rely on "bad" culverts to keep out exotics/invasives

Conclusions-General

1. Culvert installations at road crossings number in the 100,000's in the eastern U.S.
2. Culvert design & installation typically do not address the needs & abilities of aquatic organisms to freely move along stream corridors.
3. Culverts change small scale stream habitat (>95%)
4. Culverts change large scale stream habitat (<15%)
5. Pipe culverts did not simulate stream environment (>95%)

Think AOP!
Think Ecological Connectivity!
Think Stream Simulation!

WHENEVER YOU TALK, I THINK ABOUT MY FISHING LURES UNTIL THE NOISE STOPS.