Assessment of Fish Passage through Road-stream Crossings on Southern National Forests

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Southern National Forests Unique

Of 200 million forested acres

- 20% industry  - 69% NIPF

<11% public
Southern National Forests unique –

Across 13 states,

> 660 species FW fish, 188 TES
269 Species FW mussels, 60% TES
Crayfishes, gastropods amphibians, reptiles, insects, etc.
Why be concerned with passage barriers?

**Legal responsibility:**
- Permitting under Section 404 of CWA
- FS Strategic Plan FY ’04 –’08

**Biological importance:**
- Fragmented habitat and populations
  - Disrupts
  - Gene flow
  - Recolonization dynamics following local extirpations

**Hydrological importance:**
- Failure to mimic natural stream = crossing failure
- Alters sediment and Large wood transport

**Fiscal Importance:**
- Funding available but limited and competitive
  - Projects must be cost effective
Scope of Problem

- Estimated 50,000 crossings in Eastern U.S.
  - 25,000 in Southern Region
  - 12,500 available to survey
    - Excludes natural fords, bridges, etc.

- ~2005 level of efficiency ~ 300 per yr
- Estimated completion = 2045 (40 years)
Design & Implement Survey

- **Management Need**
  - Region-wide

- **Research Technology**
  - Use National protocols

- **CATT products**
  - Customized survey
  - Hire, equip, train, & deploy field crews
  - Annual reports
  - >2500 crossings in 3 years
Southern Region Aquatic Organism Passage
2005 - 2010

Cumberland District, Ramey Creek / Rd 961, 2009
Methods

Modified from Clarkin et al. 2003
Coarse Filters

Filter A: Strong swimming/leaping abilities

Filter B: Moderate swimming/leaping abilities

Filter C: Weak swimming/leaping abilities
Filter A

Pipe fully backwatered or 100% of structure bottom covered by substrate

Yes

Drop

Pipe Slope

Slope x Length

No

< 7.0% ≥ 7.0%

< 24 in ≥ 24 in

≤ 50 > 50 & < 600 ≥ 600

PASSABLE

INDETERMINATE

IMPASSABLE
Southern Region Passage

Weak swimmers 2006

- Impassable: n=233
- Passable: n=105
- Indeterminate: n=93

Crossing Width / Channel Width

- ALL_NF
- GWJ
- CHRK
- SUM
- NFTX
- NFAL
- NFMS

Sample sizes: n=267, n=42, n=41, n=63, n=62, n=29, n=30
Southern Region Aquatic Organism Passage
2005 - 2009
Standard Products
(GIS/databases)
Data management

• Annual data analysis
  – Report
  – GIS

• What’s next?
  – Project database
  – Project GIS
  – NRIS
  – CADSS
Crossing Assessment Decision Support System (CADSS)

- Custom application
- Runs in ArcMap 9.2
  - Access thru toolbar
- Built in modules
  - Expandable
- Uses CATT field data
- Identifies data gaps
- Prioritizes replacements
Multiples
Blackside dace
(*Phoxinus cumberlandensis*)

Photo by: Dick Biggins

Creek chub
(*Semotilus atromaculatus*)

Photo by: Brian Gratwicke
Passage Easy

Dimensions: 12.5 x 7.5 ft
Backwatered: yes
Substrate in pipe: yes
Outlet drop: 0 in

Slope: 0.2%
Length: 39 ft
Passage Difficult

Dimension: 13.5 x 8.5 ft
Backwatered: no
Substrate in pipe: no
Outlet drop: 18.9 in
Slope: 1.5%
Length: 77 ft
Passage Moderate

Dimensions: 12 x 7.5 ft
Backwatered: no
Substrate in pipe: no
Outlet drop: 3.4 in

Slope: 1.2%
Length: 66 ft

**Genetics:** Fin clips preserved for genetic analysis.

**PIT antennas:** Implanted 12 mm PIT tags all fish >70 mm. Antennas ran continuously March – September 2010.
<table>
<thead>
<tr>
<th>Species</th>
<th>Passage</th>
<th>moved from A to B</th>
<th>moved from B to C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M-R</td>
<td>PIT</td>
</tr>
<tr>
<td>Creek chub</td>
<td>Easy</td>
<td>0% (0/150)</td>
<td>49% (24/49)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>2% (4/207)</td>
<td>46% (31/68)</td>
</tr>
<tr>
<td></td>
<td>Difficult</td>
<td>1% (1/112)</td>
<td>39% (13/33)</td>
</tr>
<tr>
<td>Blackside dace</td>
<td>Easy</td>
<td>0% (0/76)</td>
<td>no PITs</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>0% (0/42)</td>
<td>100% (2/2)</td>
</tr>
<tr>
<td></td>
<td>Difficult</td>
<td>7% (1/14)</td>
<td>100% (1/1)</td>
</tr>
</tbody>
</table>
• **Mark-recapture** attractive to biologists because it can be completed with standard equipment and moderate effort. However, mark-recapture can only detect fish movement that coincides w/recapture.

• **PIT antenna** results easy to interpret. Demonstrated fish movement undetected by mark-recapture. Installation of PIT antennas substantial investment, maintenance daunting.

• **Genetic sampling** requires relatively low effort ; processing time and ease of interpretation are biggest unknowns
Questions?

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