

Focus Area: River & Stream Restoration

National Theme: Environmental
Restoration

30 % Research, 60 % Extension,
10% Education



Regional Review, October 2007

<http://www.usawaterquality.org/newengland>



Goals

- Research & development of tools and approaches for evaluating and prioritizing environmental restoration opportunities
- Establishing design standards and methodologies for river and stream restoration
- Tools, models, and BMPs for the design, review and permitting of development projects to avoid or minimizing impacts on rivers and streams
- Developing and communicating scientifically derived information to inform policy at the state, regional and national levels



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Focus Area Strengths

- Strong integration of research, education and extension
- Research and projects conducted throughout much of New England (MA, CT, RI, VT, NH, ME)
- Engagement of non-Extension faculty from land-grant Universities (MA, NH, CT)
- Strong stakeholder investment and involvement
- Highly leveraged with outside funding
- Impacts on policy



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Situation

- Water withdrawal and other hydrological alterations have had a profound impact on the ecological integrity of rivers and streams
- Projected increases in water demand throughout New England will add to these stresses
- Future competition for water resources to meet ecological and a variety of human needs may threaten availability of adequate water supplies for agriculture
- Very large numbers of dams and road-stream crossing result in highly fragmented river-stream networks, threatening long-term ecological viability



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Focus Area Participation

- Northeast Instream Habitat Program
 - Based at UMass Amherst
 - Involves faculty at UMass, UConn and UNH
 - Projects in MA, CT, NH, & PA
- River & Stream Continuity Project
 - Based at UMass Amherst
 - Projects in MA, CT, RI, VT, NH & ME
 - Potential for integration with Extension volunteer monitoring programs



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Partners

- US EPA
- USGS
- US Fish & Wildlife Service
- National Marine Fisheries Service
- US Army Corps of Engineers
- MA DEP & DCR, CT DEP, NH DES
- MA Riverways Program
- The Nature Conservancy
- American Rivers
- Various watershed associations



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Integration with Research & Education

- Northeast Instream Habitat Program
 - Multiple integrated research and watershed planning projects
 - USGS Water Institute grant
 - Graduate student research projects
 - Journal publications
 - Integrated into regular course curricula
 - Graduate summer course
- River & Stream Continuity Project
 - Regional database
 - Integrated with research projects
 - Graduate student projects
 - Integrated into regular course curricula



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Organizational Structure

- Northeast Instream Habitat Program
 - Based at UMass Amherst
 - Stakeholder Advisory Committee
 - Research & implementation teams developed on a project by project basis
- River & Stream Continuity Project
 - River & Stream Continuity Partnership (UMass, TNC, MA Riverways Program)
 - Coordinated by UMass Amherst



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Program Planning/Needs Assessment

- Northeast Instream Habitat Program
 - Stakeholder Advisory Committee
 - Planning workshops
 - White paper
- River & Stream Continuity Project
 - Partnership identifies needs and opportunities
 - Joint decision-making on standards, methodologies & algorithms
 - Steering committee
 - Technical Advisory Committee
 - Plans of work developed as part of Extension planning process



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Outputs

- Presentations & workshops
- University courses for students and professional
- Web sites
- Publications
- Research and modeling projects
- Development of an online database for road-stream crossings
- Development of standards for road-stream crossings
- Rivers & Stream throughout Massachusetts classified based on GIS analysis into three categories for priority setting
- Development of protocols and training materials for volunteer assessment of road-stream crossings
- Culvert replacement demonstration projects
- Volunteer training and coordination



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Case Studies/Examples

- Hatfield Dam Removal Feasibility Study
- River & Stream Continuity Database

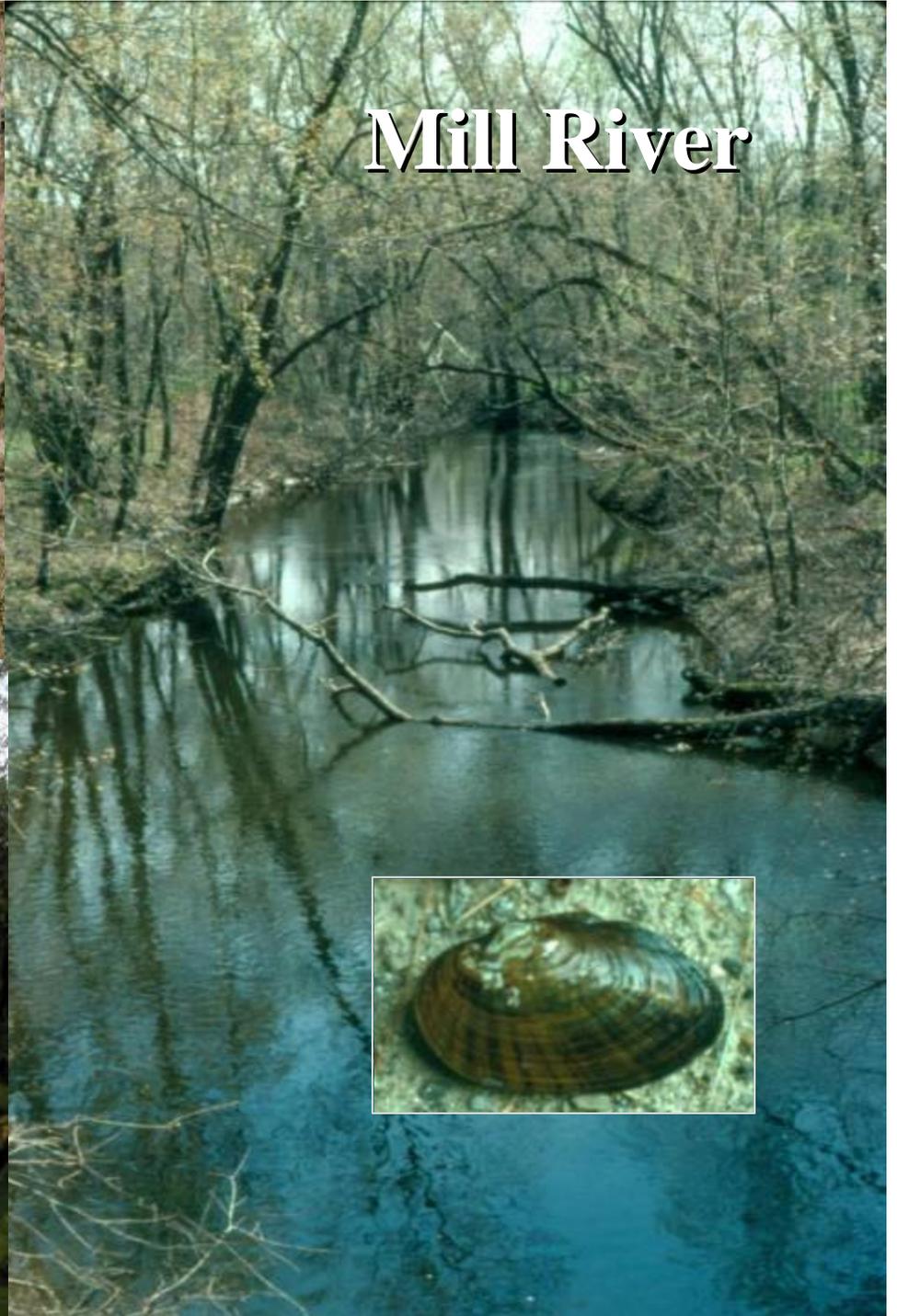


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Hatfield Dam Removal Feasibility Study

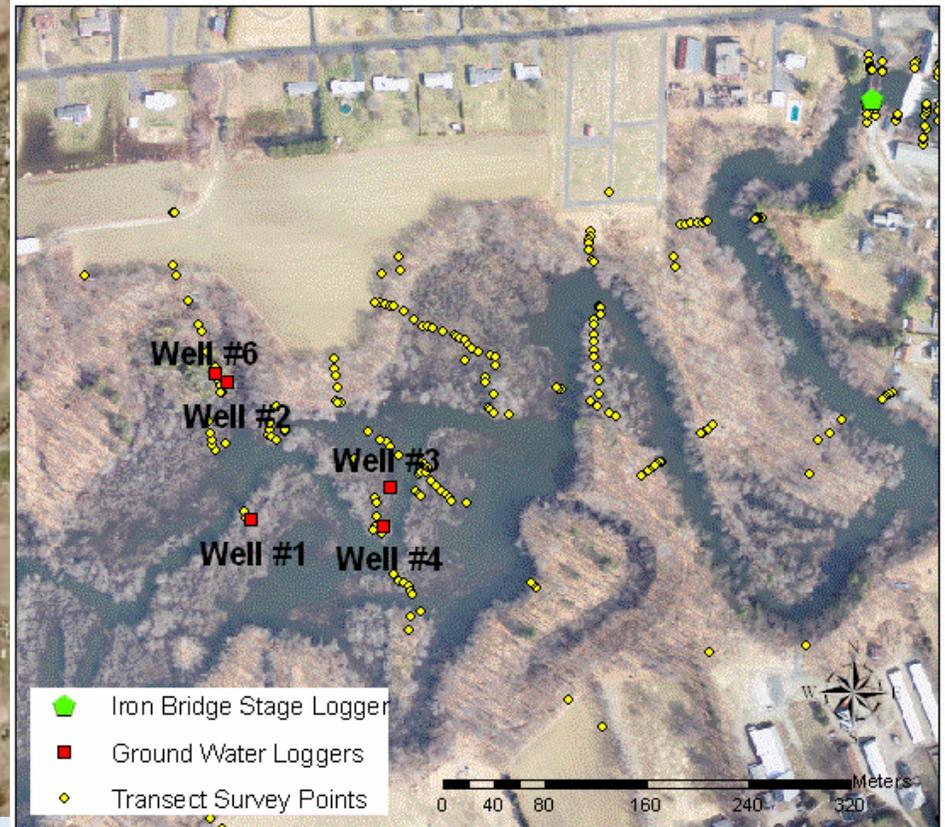


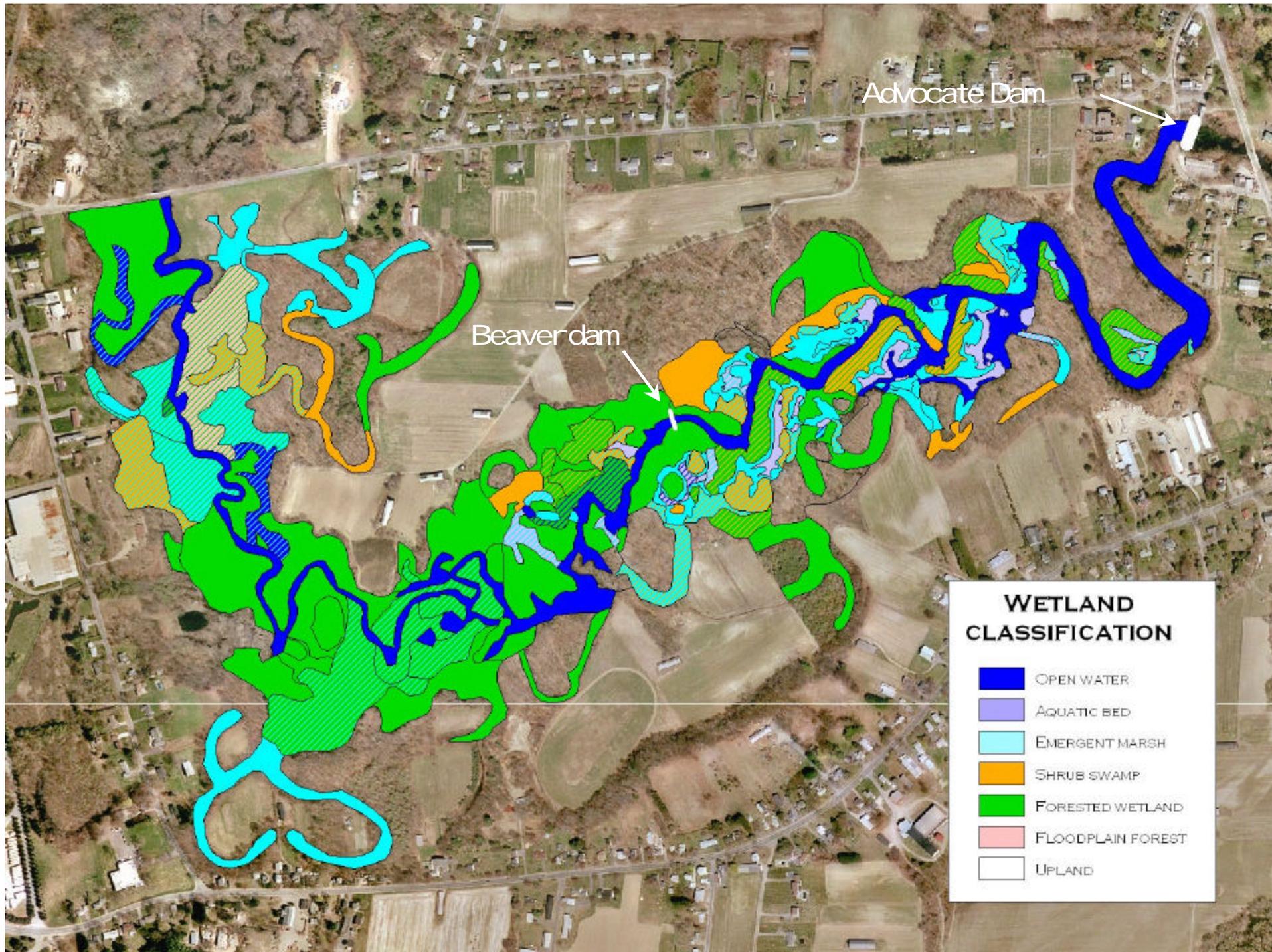


Mill River

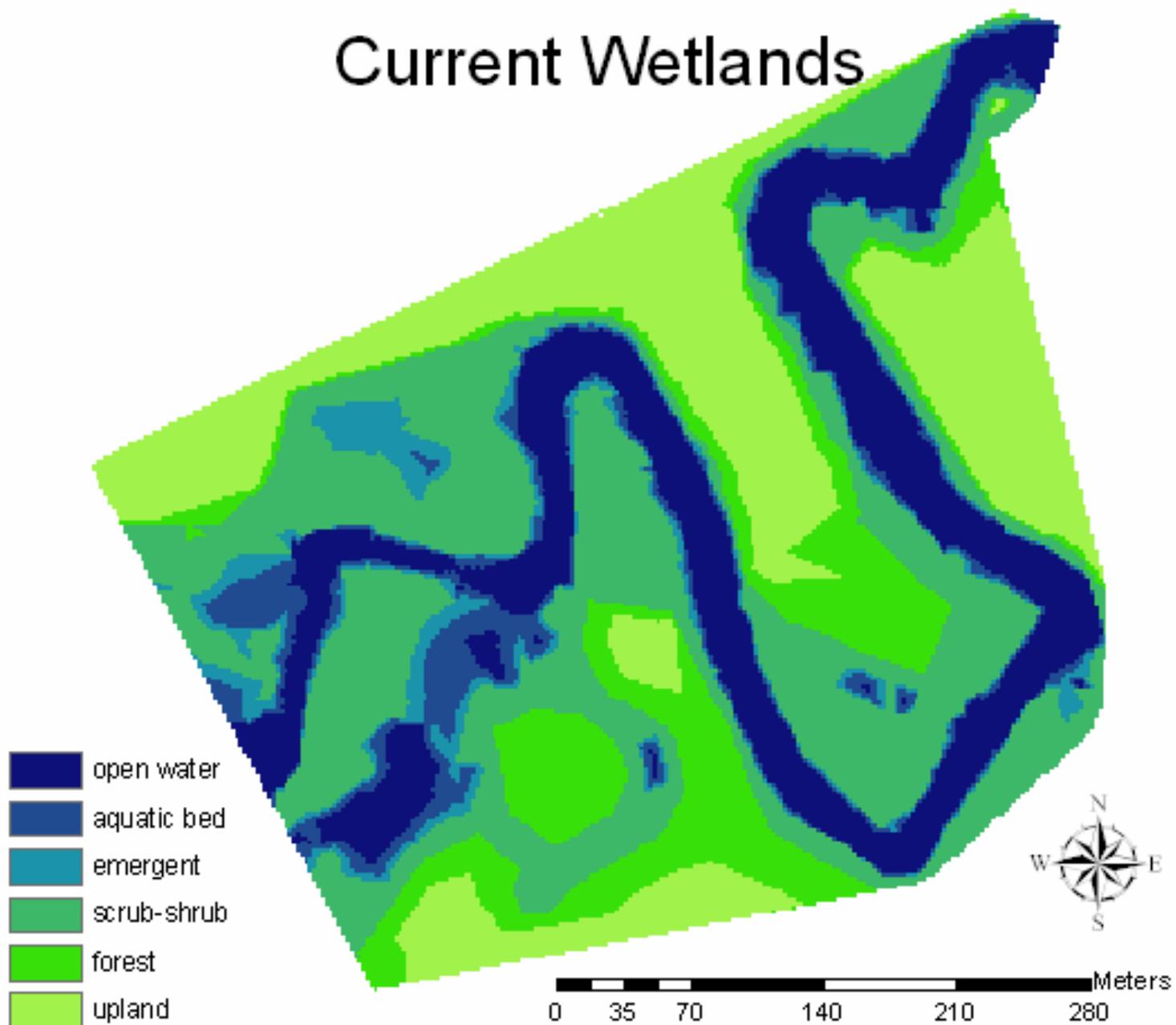


Surface and groundwater



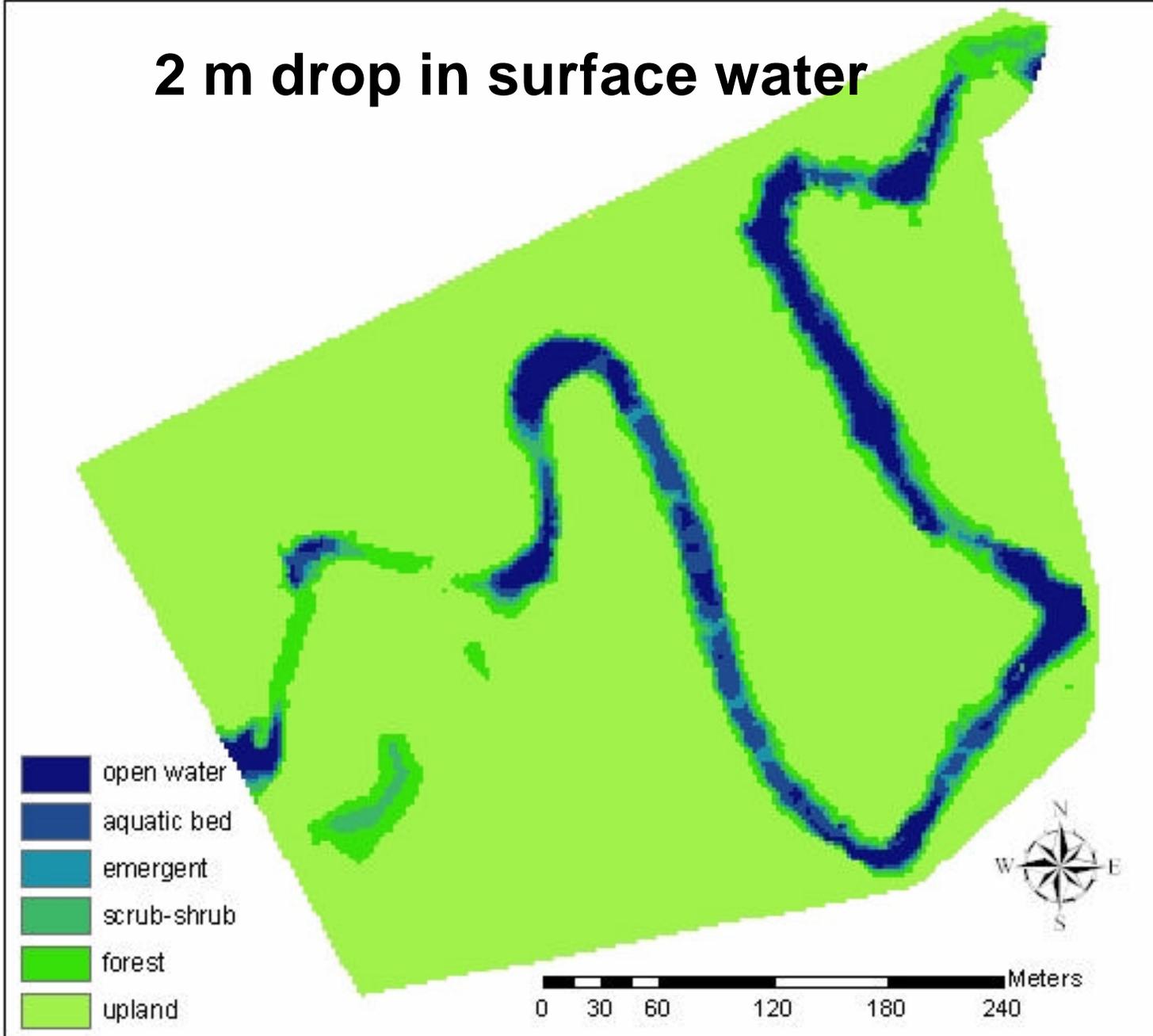


Current Wetlands



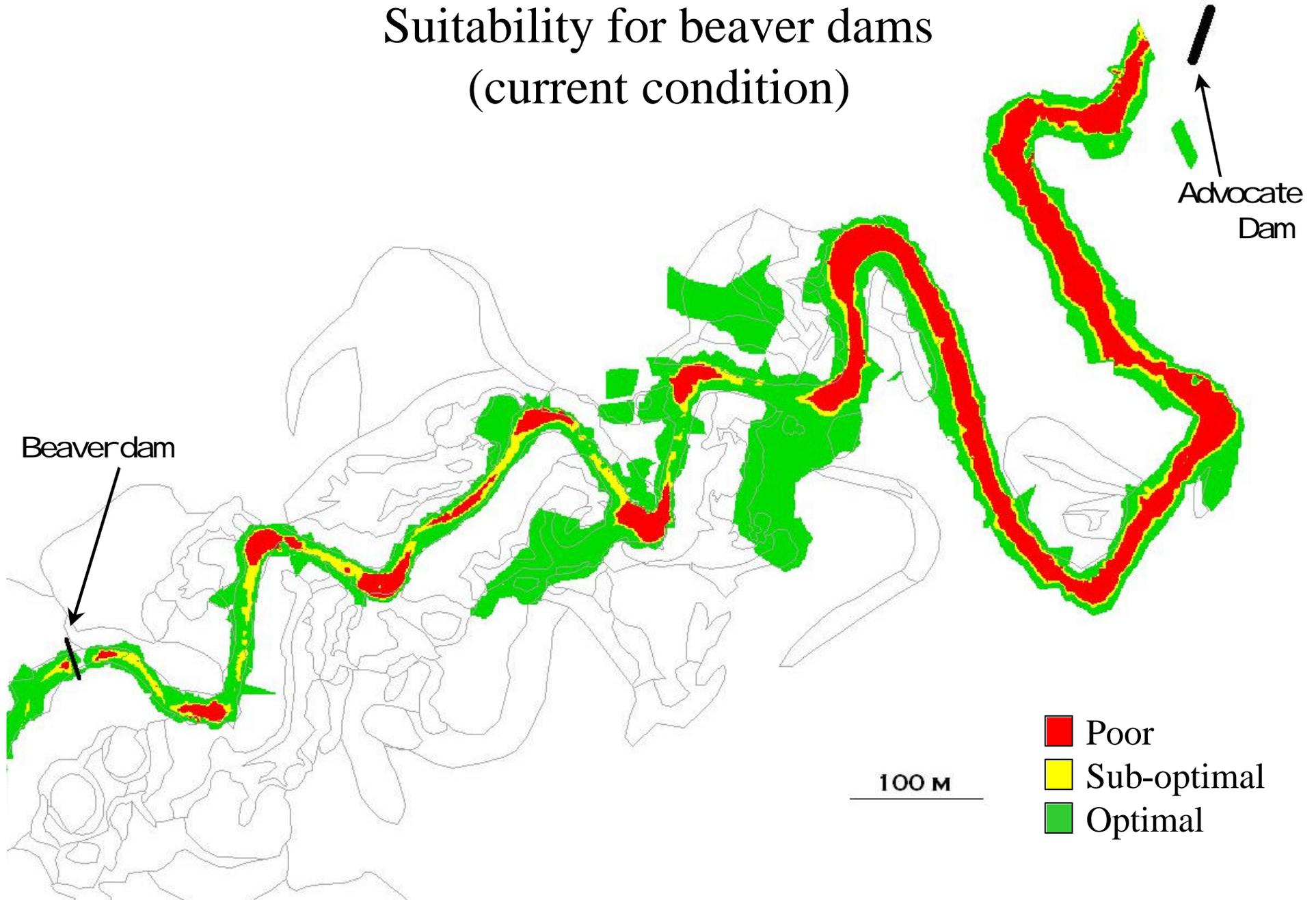
Wetland zones were defined based on the minimum and maximum elevations for each wetland type

2 m drop in surface water

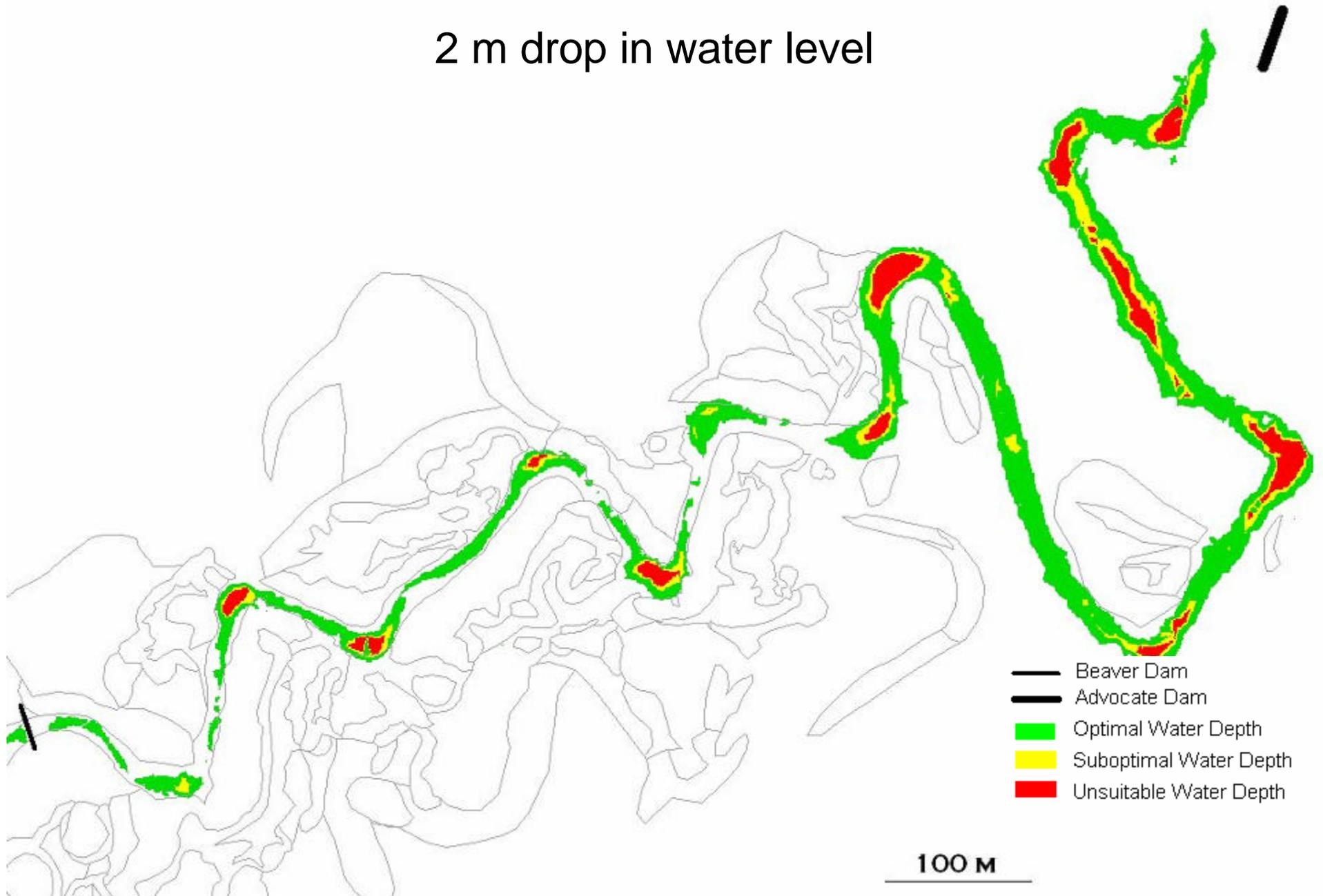


In the area of greatest impact, dam removal would result in an approximate 73% loss in wetland area

Suitability for beaver dams (current condition)



2 m drop in water level



Effective habitat for dwarf wedgemussel:

- Overlap of suitable habitat for dwarf wedge and tessellated darter
- Overlapped with unsuitable bass habitat

Effective habitat current: 18,871 m²

Effective habitat removal: 21,467 m²



-  suitable LM Bass
-  no overlap of suitable HMUs
-  overlap suitable dwarfwedge and tessellated darter

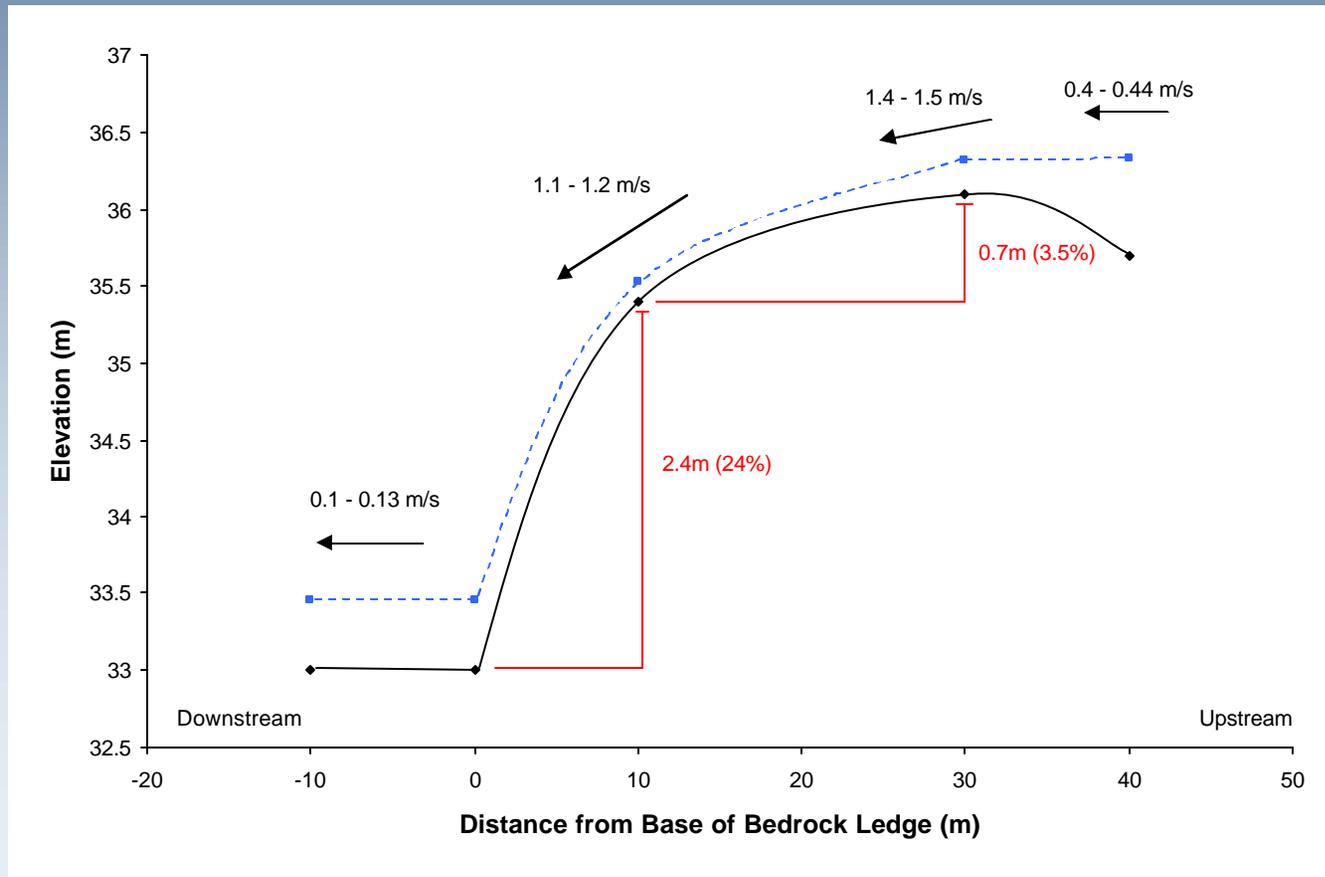


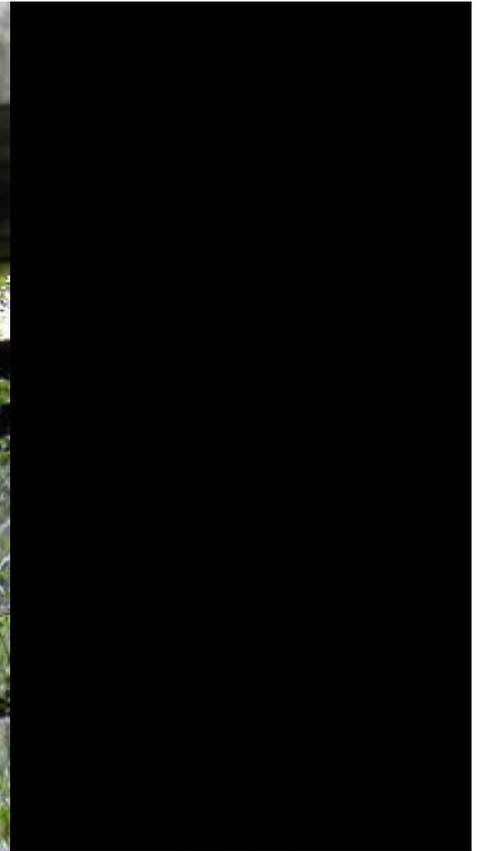
Potential Fish Passage Over Natural Bedrock Ledge Barrier



Removal will significantly benefit:
American eel, Atlantic salmon, and sea lamprey

Provide partial and periodic passage for:
American shad, Blueback herring, and White sucker

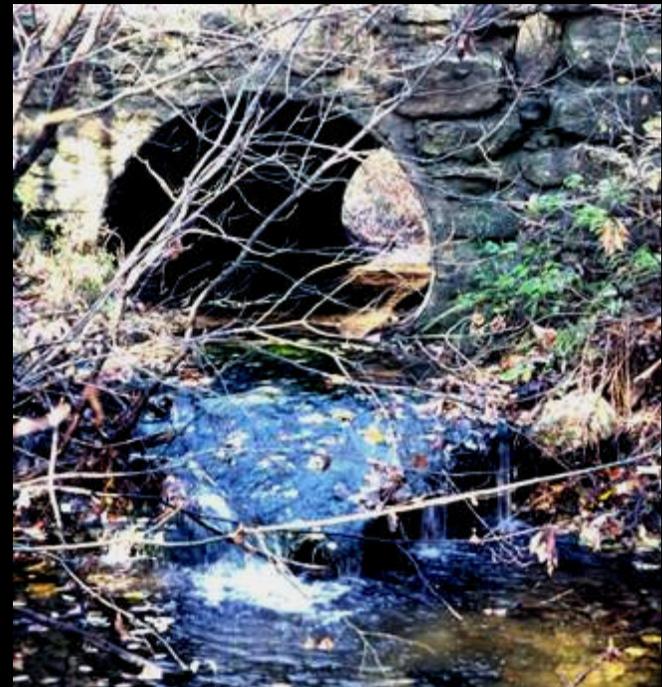




**River and Stream Continuity Project
On-line Database**

www.streamcontinuity.org/cdb

Sub-standard Culverts



Assessment Field Forms

Field Data Form: Road-Stream Crossing Inventory

8/30/05

Coordinator _____ Crossing ID# _____
 Date: _____ Stream/River: _____ Road: _____ Town: _____
 Location: _____ GPS Coordinates (lat/long): _____
 Observer: _____ Phone #: _____ Email address: _____
 Photo IDs: _____

Road/Railway Characteristics

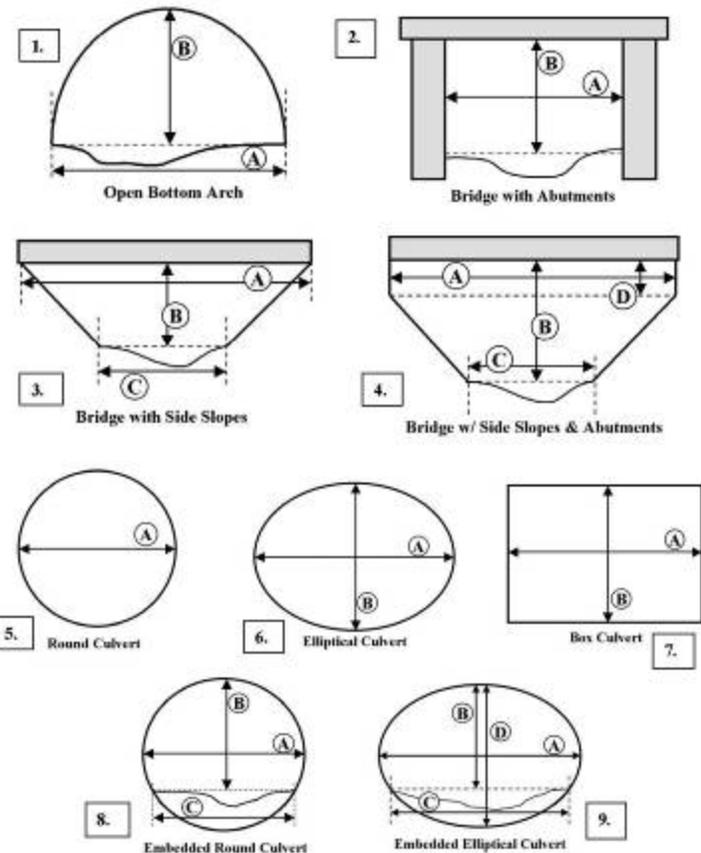
1. # of Travel Lanes: _____ Shoulder/ Breakdown lanes: Yes No Road Surface: Paved Unpaved ORR
2. Are any of the following conditions present that would significantly inhibit wildlife crossing over the road?
- | | | |
|--|------------------------------|-----------------------------|
| High traffic volume (> 50 cars per minute) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Steep embankments | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Retaining walls | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Jersey barriers | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Fencing | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Other (specify) _____ | | |

Crossing/Stream Characteristics (during generally low-flow conditions)

3. Crossing Type: Ford Bridge Open Bottom Arch Single Culvert Multiple culverts (# of culverts) _____
4. Condition of crossing: Good Fair Collapsing Eroding Rusted through Broken
5. Does the stream at the crossing contain fish? Yes No Don't know
6. Is the stream flowing (in the natural channel)? Yes No
7. Flow conditions during the survey are:
 unusually low typical low-flow average flow higher than average
8. Are any of the following problems present?
- | | | | |
|------------------|------------------------------|-------------------------------|-------------------------------|
| Inlet drop | <input type="checkbox"/> No | <input type="checkbox"/> < 6" | <input type="checkbox"/> ≥ 6" |
| Outlet perch | <input type="checkbox"/> No | <input type="checkbox"/> < 6" | <input type="checkbox"/> ≥ 6" |
| Flow contraction | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
9. Tailwater armoring: Extensive Not Extensive None
10. Tailwater scour pool: Large Small None
11. Physical barriers to fish and wildlife passage:
 Permanent Temporary None
 Describe any barriers: _____
12. Crossing Embedded? Not embedded Partially embedded Fully embedded < 1' Fully embedded > 1'
13. Crossing substrate: None Inappropriate (large rip rap, concrete) Contrasting Comparable
14. Water depth matches that of the stream? Yes (comparable) No (significantly different)
15. Water velocity matches that of the stream? Yes (comparable) No (significantly different)
16. Crossing span: Constricts channel Spans active channel Spans bankfull width Spans channel & banks
17. Minimum structure height at low water (from water level to the roof inside the structure) > 6 ft. 4-6 ft. < 4 ft.
18. Comments _____

CROSSING DIMENSIONS

8/30/05



Crossing Type (from above): 1. 2. 3. 4. 5. 6. 7. 8. 9. Ford

Upstream Dimensions (ft or m): A) _____ B) _____ C) _____ D) _____

Downstream Dimensions (ft or m): A) _____ B) _____ C) _____ D) _____

Length of stream through crossing (ft or m): _____



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Field Data Form: Road-Stream Crossing Inventory

Coordinator: Crossing ID:

Date: / / Stream: ID: Road:

Town: Location: GPS Coord: Lat: Long:

Observer(s): [Add Observer\(s\)](#)

Road/Railway Characteristics:

1. Number of Travel Lanes: Shoulder/ Breakdown lanes: Yes No Road Surface:

2. Are any of the following conditions present that would significantly inhibit wildlife crossing over the road?

High traffic volume (> 50 cars per minute) Yes No

Steep embankments Yes No

Retaining walls Yes No

Jersey barriers Yes No

Fencing Yes No

Other (specify):

Crossing/Stream Characteristics (during generally low-flow conditions)

3. Crossing Type:

4. Condition of crossing: Describe conditions:

5. Does the stream at the crossing contain fish? Yes No Don't know

6. Is the stream flowing (in the natural channel)? Yes No

7. Flow conditions during the survey are:

8. Are any of the following problems present?

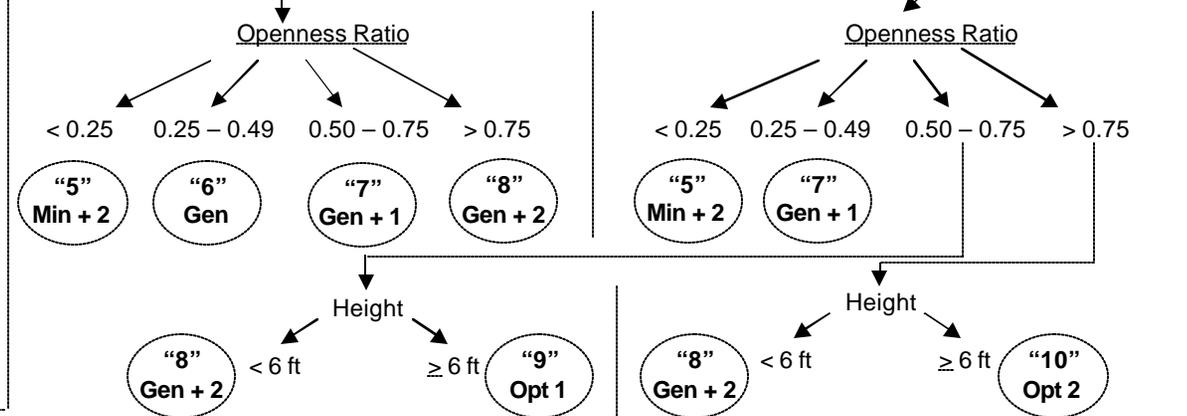
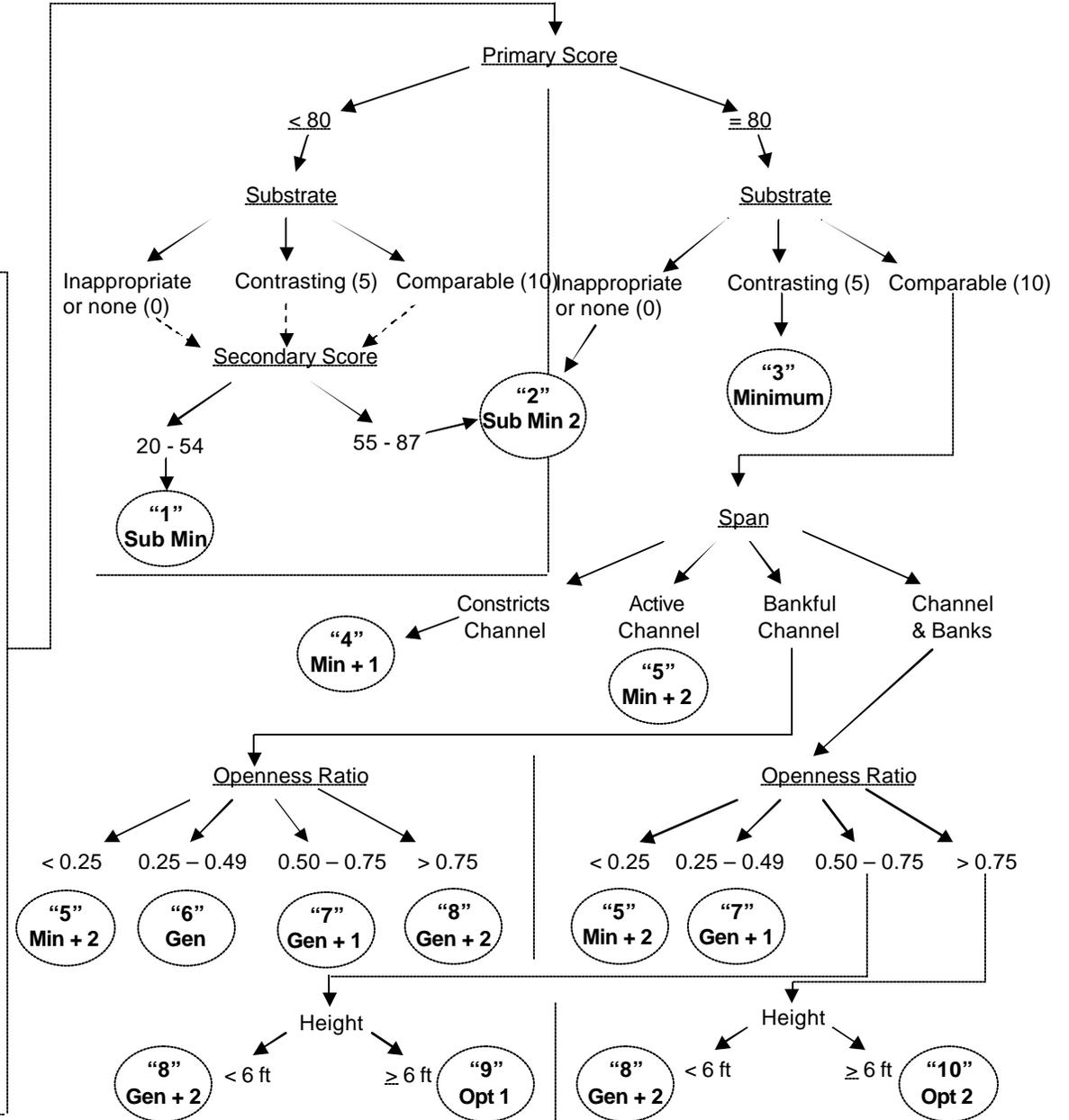
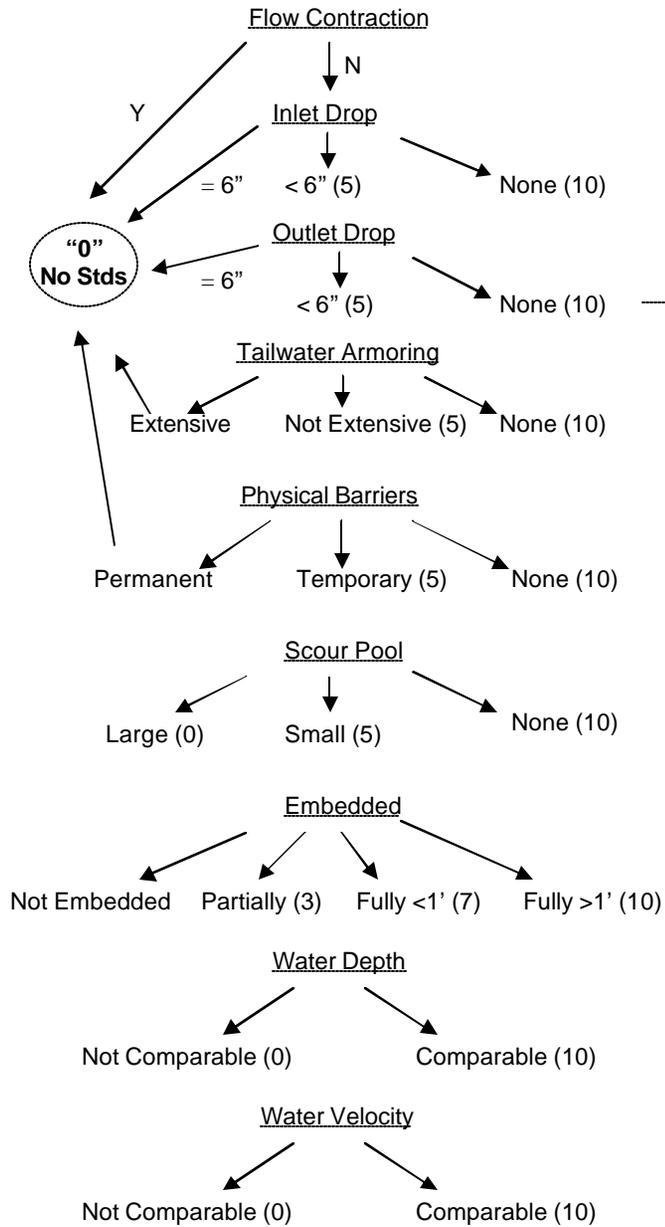
Inlet drop No (<6") (>6")

Outlet perch No (<6") (>6")

Flow contraction Yes No

9. Tailwater armoring:

MA Crossing Structures Scoring System





[Add Coordinator](#) | [Add Observer](#) | [Add New Crossing](#) | [LogOff](#)

List of Road Stream Crossings:

[Get This Page in Excel](#)

State:	Stream Name:	Standard:
-- All	-- All	-- All
Search		Show All

SB - Severe Barriers, **MDB** - Moderate Barriers, **MIB** - Minor Barriers, **MGS** - Meets General Standard, **MOS** - Meets Optimal Standard

[Next \[2643\]](#)

ID	Town	Stream	Road	Standard	Culverts	Openness
25875	Raynham MA	Bassett Brook	Pine Street	SB	2	0.013
25717	Raynham MA	Forge River	Gardiner Street	SB	1	0.930
26219	Lakeville MA	Poquoy Brook	Cross St	MDB	1	0.024
25714	Middleborough MA	Otis Pratt Brook	Plymouth Street	SB	1	0.005
21646	Sharon MA	Unknown Steam	Castle Drive	SB	1	0.003
21647	Sharon MA	Unknown Steam	Castle Drive	SB	1	0.005
21643	Sharon MA	Unknown Steam	Penny Brook	SB	1	0.003
21653	Sharon MA	Unknown Steam	Bay Road	SB	2	0.008
010900030202-C-188	Burrillville RI	no name	Court House Ln.	MDB	1	0.001
24170/3	Mansfield MA	Robinson Brook	Perkins Ave	MDB	1	0.033
24170/2	Mansfield MA	Robinson Brook	Central Street	MDB	1	0.010
224170	Mansfield MA	Robinson Brook	Copleland Drive	MDB	1	0.019
24709	Mansfield MA	Wading River	West Street	MDB	1	0.055
24942	Mansfield MA	Robinson Pond/ Wading River	Williams Street	MDB	1	0.014
24941	Mansfield MA	Wading River/Robinson Pond	Williams Street	SB	1	0.523
24916	Mansfield MA	Rumford River	Willow Street	MDB	1	0.015



[Add New Crossing](#) | [Update This Crossing](#) | [View All Crossings](#)

General Information for Road-Stream Crossing ID: 26219

No images uploaded for this crossing

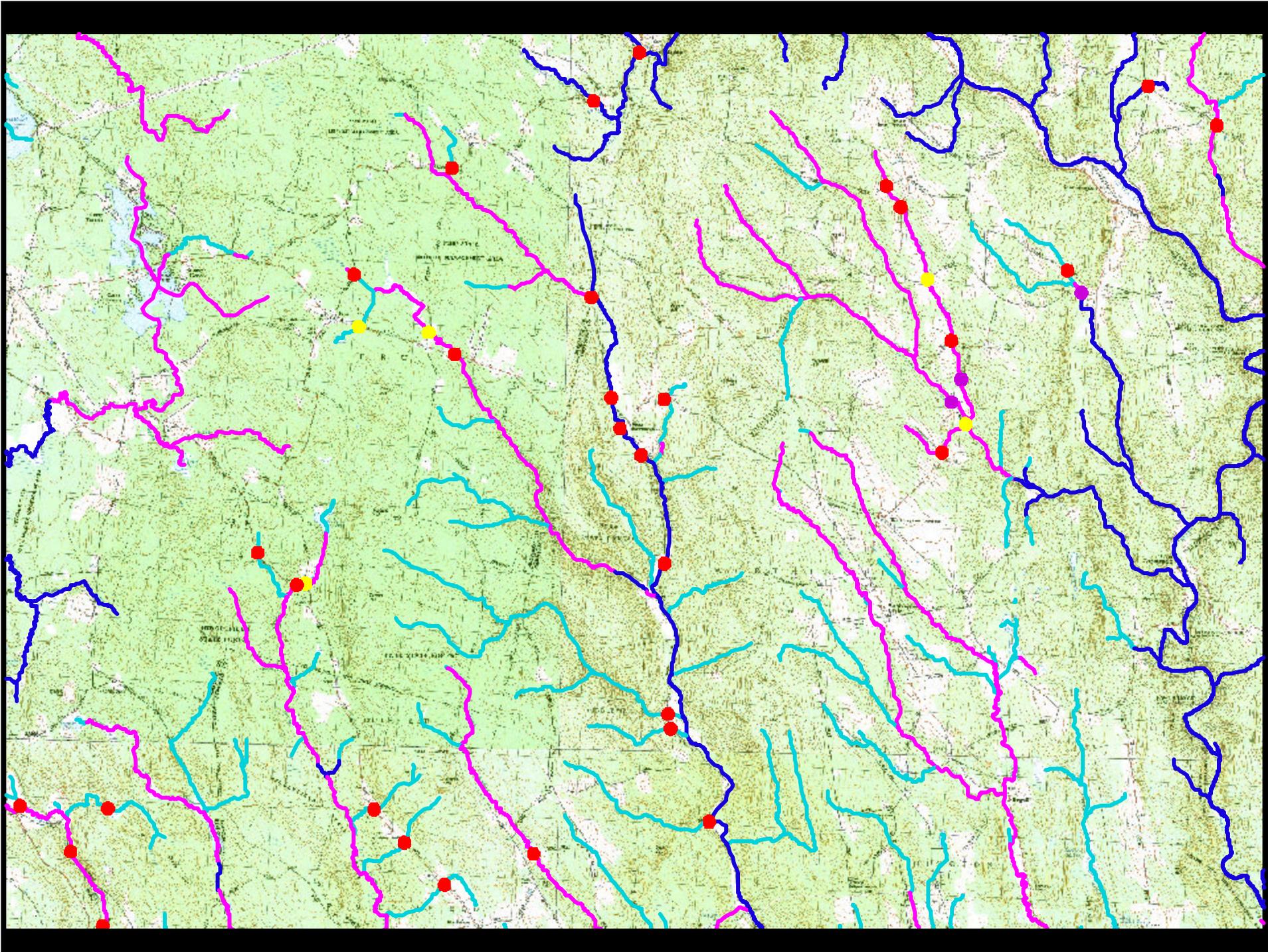
Coordinator: Alison Bowden	Crossing ID: 26219		
Date: 09-28-2007	Stream: Poquoy Brook	StreamID: 26219	Road: Cross St
Town: Lakeville, MA	Location: Near Rte. 44	GPS: Lat: 41.9016	Long: -70.9725
Observer: Jacqueline Schmidt	Phone: (508) 844-3661	Email: u_j1schmidt@umassd.edu	

Road/Railway Characteristics:

1. Number of Travel Lanes: 2	Shoulder/ Breakdown lanes: No	Road Surface: Paved
2. Are any of the following conditions present that would significantly inhibit wildlife crossing over the road?		
High traffic volume (> 50 cars per minute) :	No	
Steep embankments:	No	
Retaining walls:	Yes	
Jersey barriers :	No	
Fencing:	No	
Other (specify):	Guardrail, 1 ft high dirt barrier between roadway and street	

Crossing/Stream Characteristics (during generally low-flow conditions)

3. Crossing type:	Single Culvert
4. Condition of crossing:	Fair
	Comments:
5. Does the stream at the crossing contain fish?	Don't know
6. Is the stream flowing (in the natural channel)?	Yes
7. Flow conditions during the survey are:	Unusually low
8. Are any of the following problems present? (see attached glossary and illustrations)	
Inlet drop:	No
Outlet perch:	No
Flow contraction:	No
9. Tailwater armoring:	Not Extensive
10. Tailwater scour pool:	None
11. Physical barriers to fish and wildlife passage:	None
Describe any barriers:	N/A



Leveraging

- Northeast Instream Habitat Program
 - Research grants: \$50,000
 - Integrated Research/Extension grants: \$1,177,958
 - Non §406 Extension funding: \$80,000
- River & Stream Continuity Project
 - Integrated Research/Extension grants: \$11,000
 - Extension grants: \$123,000
 - Non §406 Extension funding: \$60,000



Outcomes

- Northeast Instream Habitat Program
 - MesoHABSIM software
 - Hydrological management plans completed for several rivers
 - Incorporation of MesoHABSIM concepts and methods into state instream flow policies (MA, CT, NH)
- River & Stream Continuity Project
 - Road-stream crossing standard adopted by federal and state agencies (USCOE, MA)
 - Volunteer road-stream crossing assessment protocols adopted by TNC, MA Riverways Program and USDA NRCS (RI)
 - 2600 road-stream crossings evaluated by volunteers in high-priority watersheds (MA, CT, RI, VT, NH & ME) and entered in the online database
 - River & stream restoration plan created by TNC for the Westfield River Watershed
 - Four culvert replacement demonstration projects either completed or under construction



What's Next

- Exploration of future relationship between UMass Extension and the Northeast Instream Habitat Program and Rushing Rivers Institute
- Explore potential for creation of a multi-institution field research and education site on the Fort River in Massachusetts
- Analysis, testing and continued refinement of crossing standards, volunteer assessment protocols, and database algorithm
- Data analysis of road-stream crossing structures in the online database and publication of results
- Develop of additional watershed restoration plans for high-priority watershed
- Explore possible integration with Extension volunteer monitoring programs



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