UMASS EXTENSION

Protecting and Enhancing River and Stream Continuity

Dams

Sub-standard Culverts

Excessive Velocities

Inlet Drop

Outlet Drop (Perching)

Insufficient Water Depth

Flow Contraction

Impacts of River & Stream Crossings

- Habitat loss and degradation
- Roadkill leading to loss of populations
- Alteration of Ecological Processes
- Reduced access to vital habitats
- Population fragmentation & isolation
- Disruption of processes that maintain regional populations


Micrographia


Scott Jackson


Scott Jackson


Radu Guiasu


Micrographia

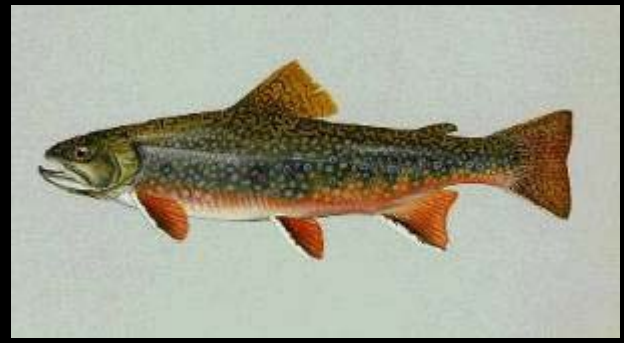

© 1999 Joyce Gross


Barry Wicklow


Kenneth Catania


Robert Jenkins & Noel Burkhead


Micrographia




Alan Richmond


Micrographia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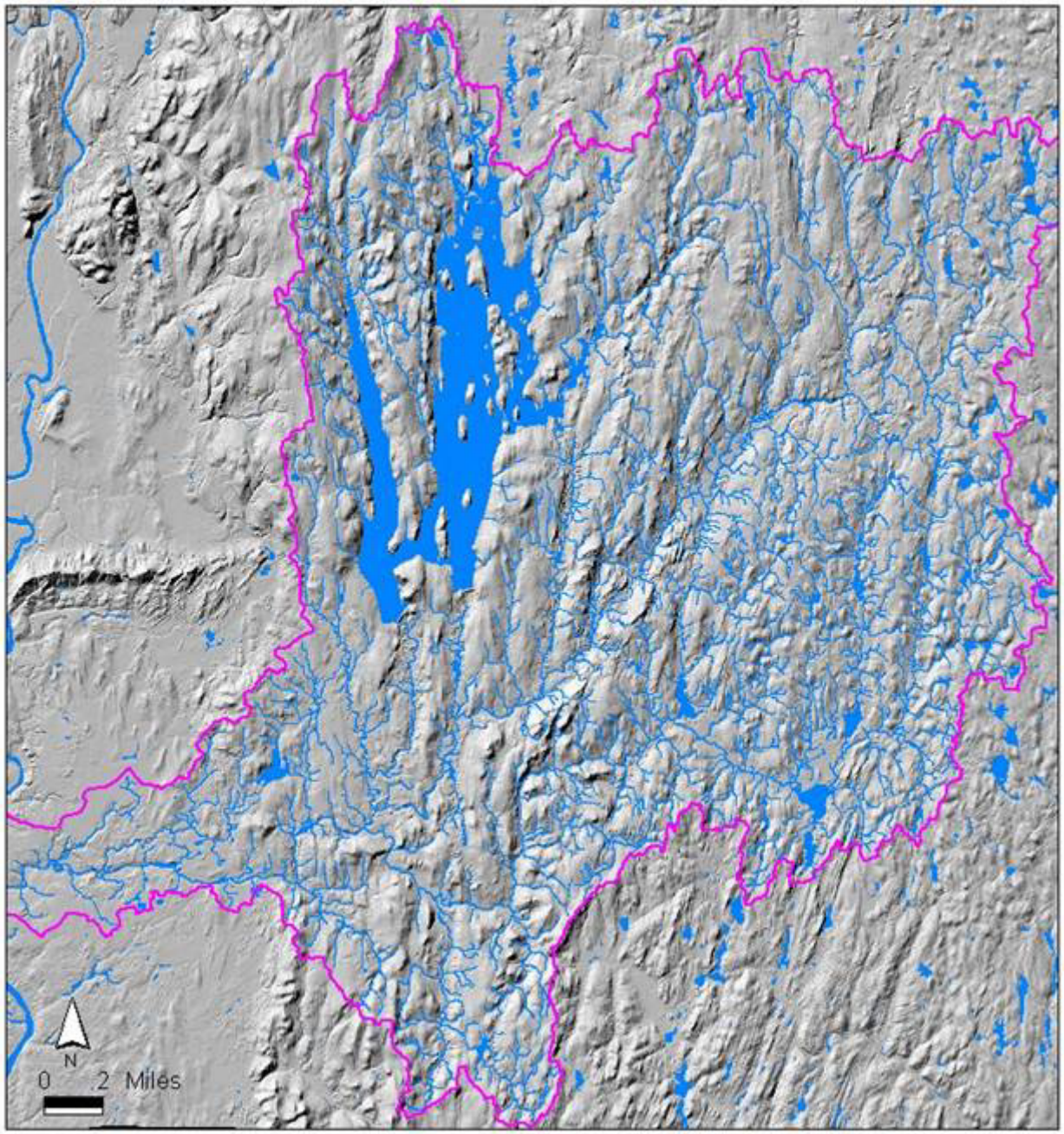
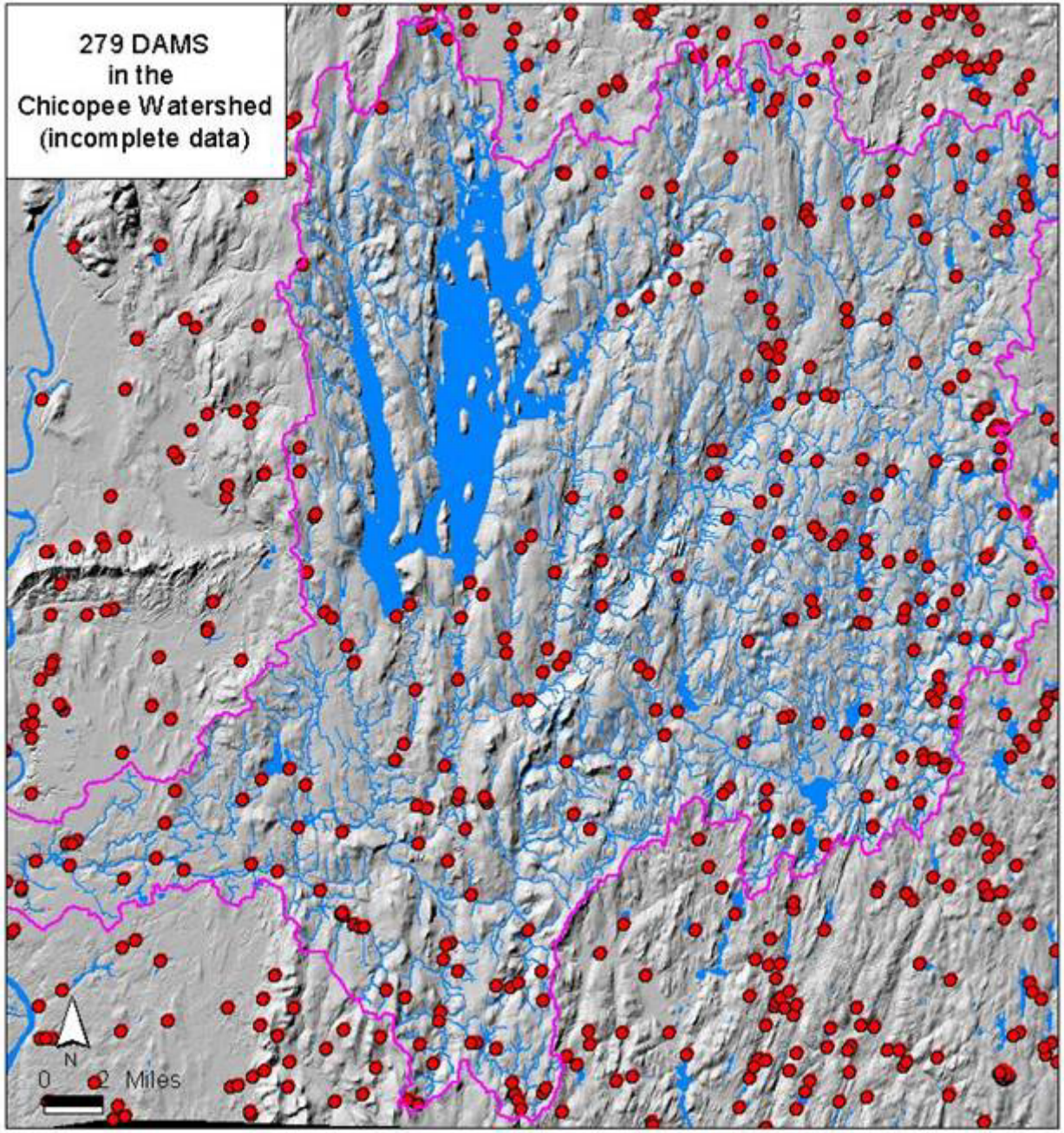
CHICOPEE WATERSHED



721 sq.mi.

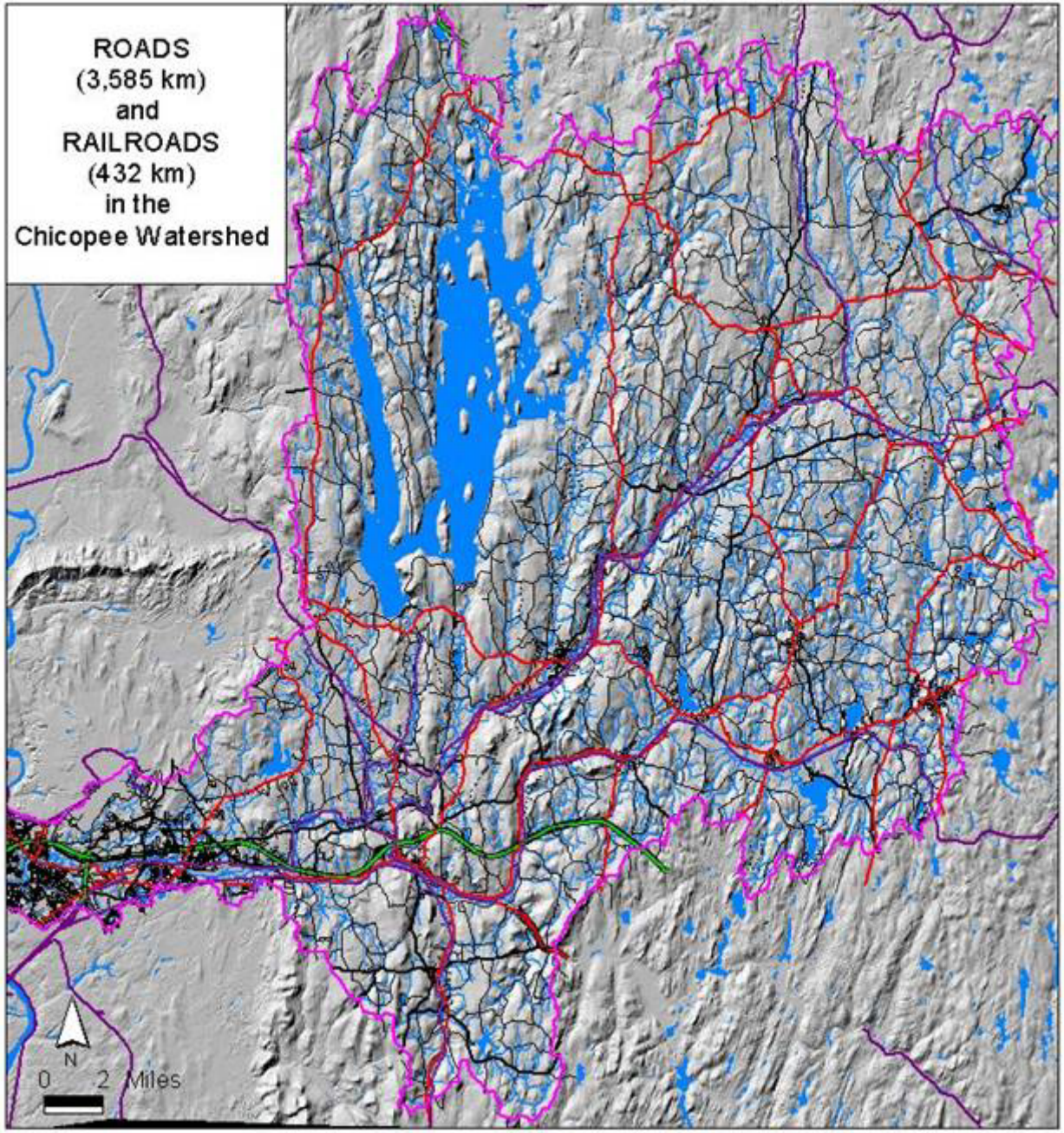
Source:
MA Riverways Program

CHICOPEE WATERSHED



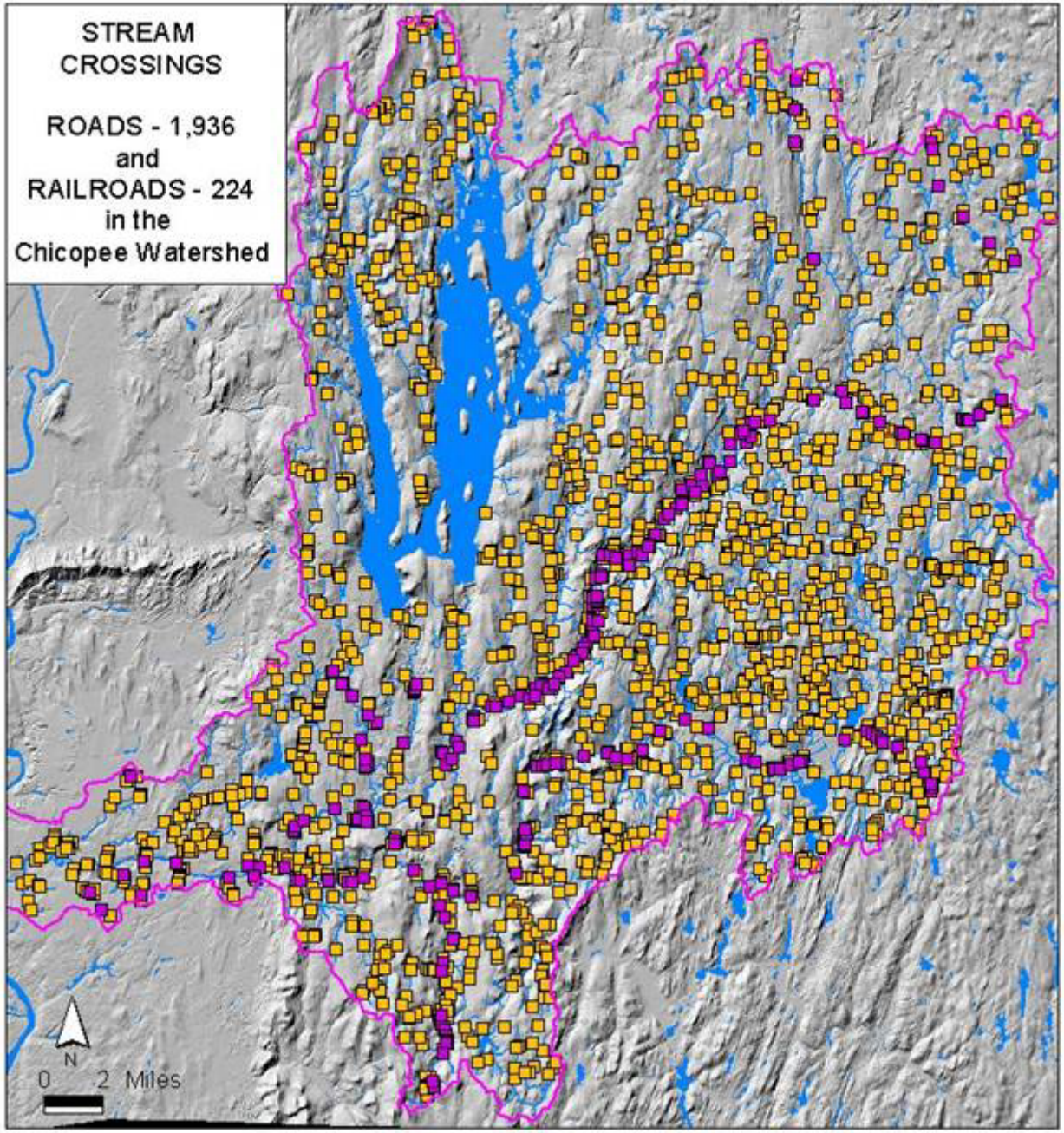
Source:
MA Riverways
Program

CHICOPEE WATERSHED



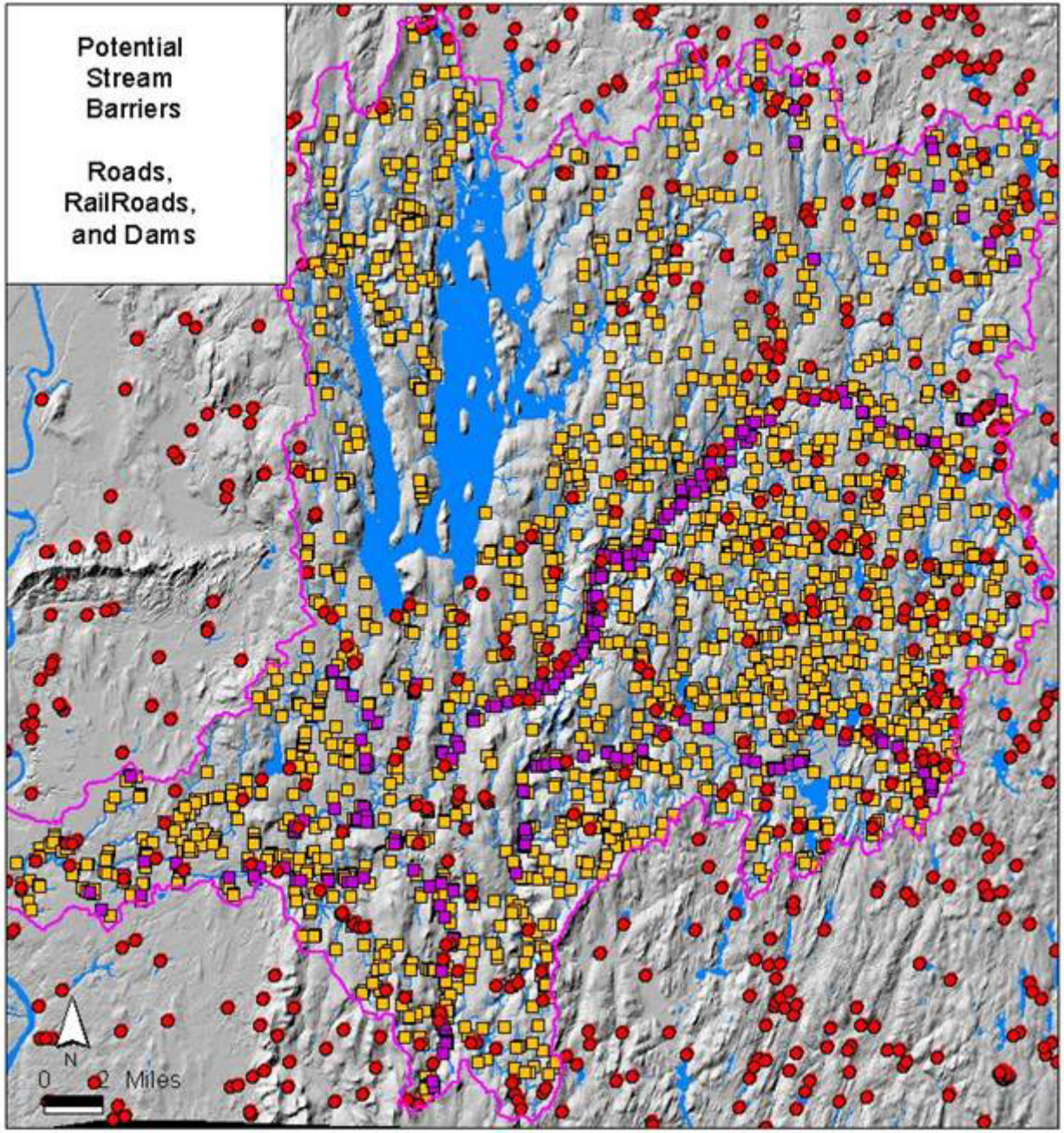
Source:
MA Riverways
Program

CHICOPEE WATERSHED



Source:
MA Riverways
Program

CHICOPEE WATERSHED



Source:
MA Riverways
Program

River and Stream Continuity Partnership

- University of Massachusetts Amherst
- MA Riverways Program
- The Nature Conservancy

River & Stream Continuity Project

Objectives of the River/Stream Continuity Project

- Technical guidance and standards for river/stream crossings
- Volunteer program to inventory and evaluate dams, culverts and other stream crossing structures
- System for prioritizing crossing structures for upgrade or replacement

Standards for River and Stream Crossings

Goals

- Fish passage
- Stream continuity
- Wildlife passage

Standards for River & Stream Crossings

Two Levels

- General
- Optimum

General Standards

Where:

- **Fish bearing streams and rivers**

Goals:

- **Fish passage**
- **River/stream continuity**
- **Some wildlife passage**

General Standards

- Bridge span preferred
- If a culvert then embedded $\geq$ 2 foot; $\geq$ 1 foot and 25% for corrugated round culverts
- Natural bottom substrate within culvert (matching upstream and downstream substrates)
- Spans channel (1.2 x bankful width)
- Designed to provide water depths and velocities at a variety of flows that are comparable to those found in upstream and downstream natural stream segments (e.g. low flow channel)
- Openness ratio $\geq$ 0.25 (calculated in meters)

MA Programmatic General Permit (PGP)

- New permanent crossings shall conform with the General Standards contained in the March 1, 2006 “Massachusetts River and Stream Crossing Standards”


Bridge

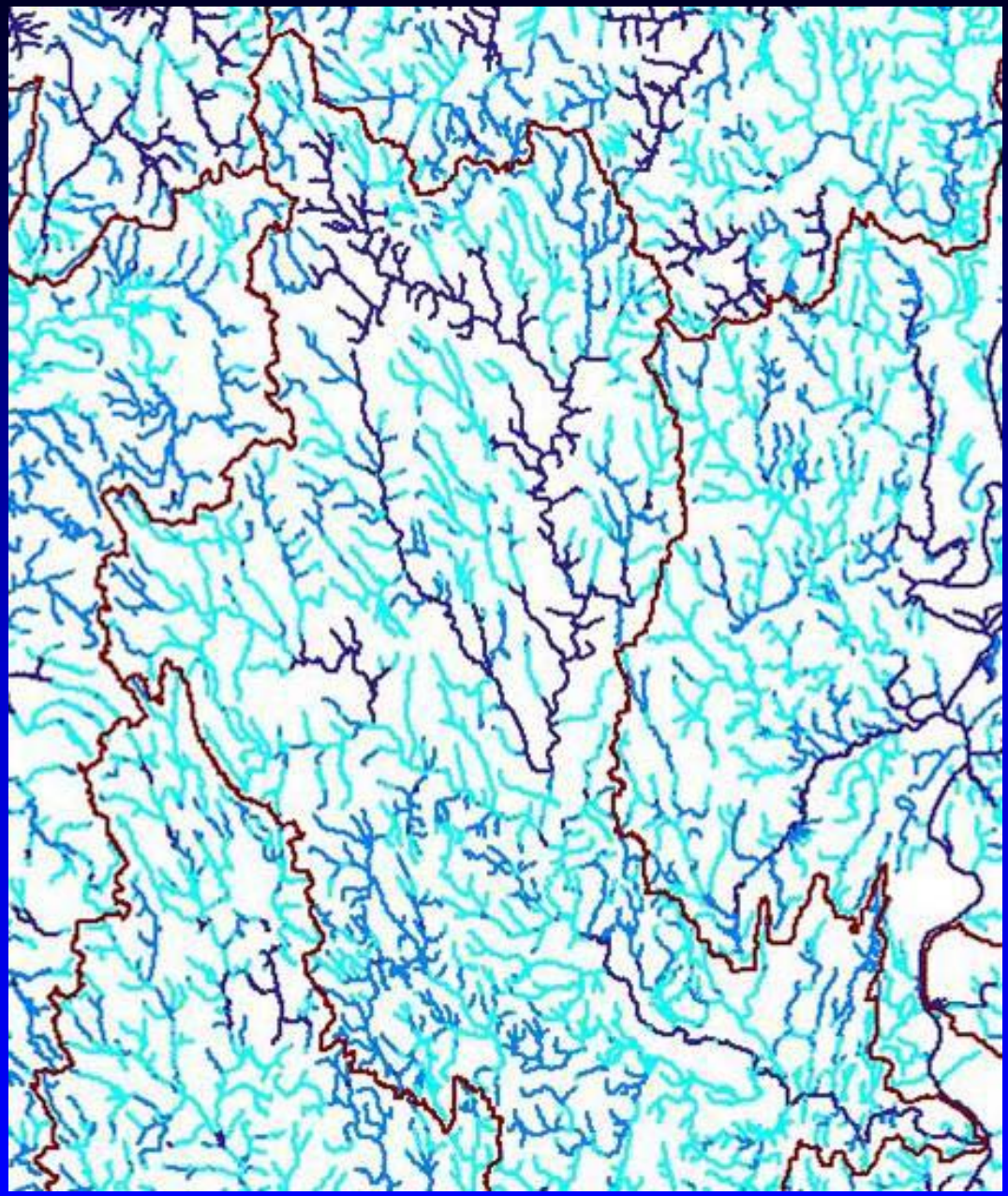

Open-bottom Box


Open-Bottom
Arch


Stream Simulation
Culvert

Ecosystem Restoration Via Crossing Upgrades

- Systematic evaluation of river and stream crossings
- Evaluation of habitat quality and landscape considerations
- Establish priorities for upgrades
- Careful design and construction
- Permitting



Designating Stream Standards

Highest Quality

High Quality

General

Highest Quality

- Living Waters Core
- Select Biomap Core

High Quality

- Biomap Core
- Coldwater Fisheries
- Anadromous Fish Runs
- Wild & Scenic Rivers
- MA Scenic Rivers
- Areas of Critical Environmental Concern

Assessment Field Forms

6/30/05

Field Data Form: Road-Stream Crossing Inventory

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

High traffic volume (> 60 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)

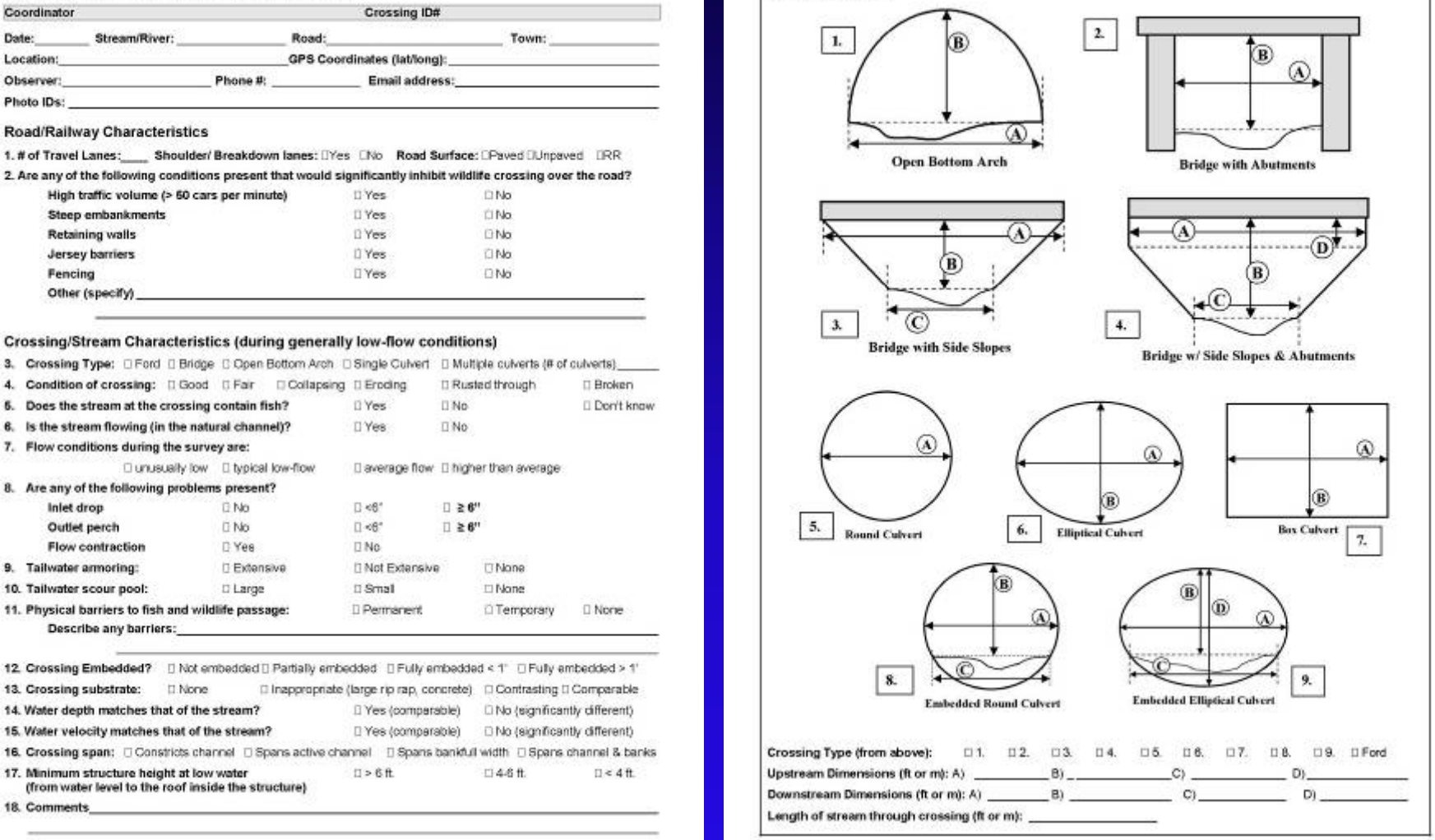
3. Crossing Type: ☐ Ford ☐ Bridge ☐ Open Bottom Arch ☐ Single Culvert ☐ Multiple culverts (# of culverts)_____
4. Condition of crossing: ☐ Good ☐ Fair ☐ Collapsing ☐ Eroding ☐ Rusted through ☐ Broken
5. Does the stream at the crossing contain fish? ☐ Yes ☐ No ☐ Don't know
6. Is the stream flowing (in 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	☐ No	☐ <6"	☐ ≥ 6"
Outlet perch	☐ No	☐ <6"	☐ ≥ 6"
Flow contraction	☐ Yes	☐ 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_____

6/30/05

Crossing Dimensions



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): _____

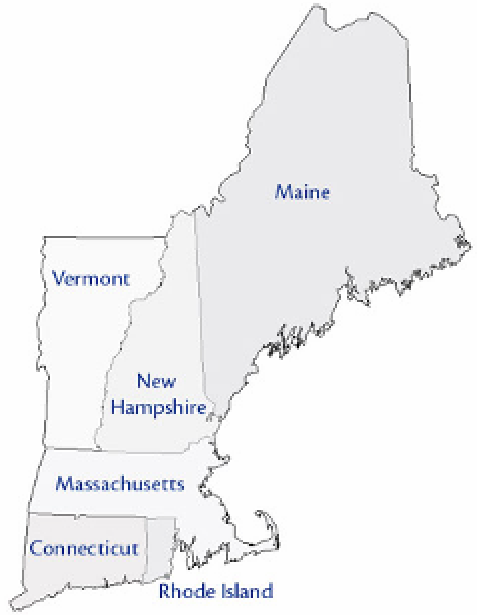
Road Stream Crossing Inventory - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

MASSACHUSETTS ROAD STREAM CROSSING
online inventory

Home

Please click on the map or on the link below to select your state:



Massachusetts | Vermont | New Hampshire | Connecticut | Rhode Island | Maine

Done

Start | Land Use | Microsoft Word | Microsoft PowerPoint - [Pr... | Road Stream Crossin... | 5:22 PM

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)

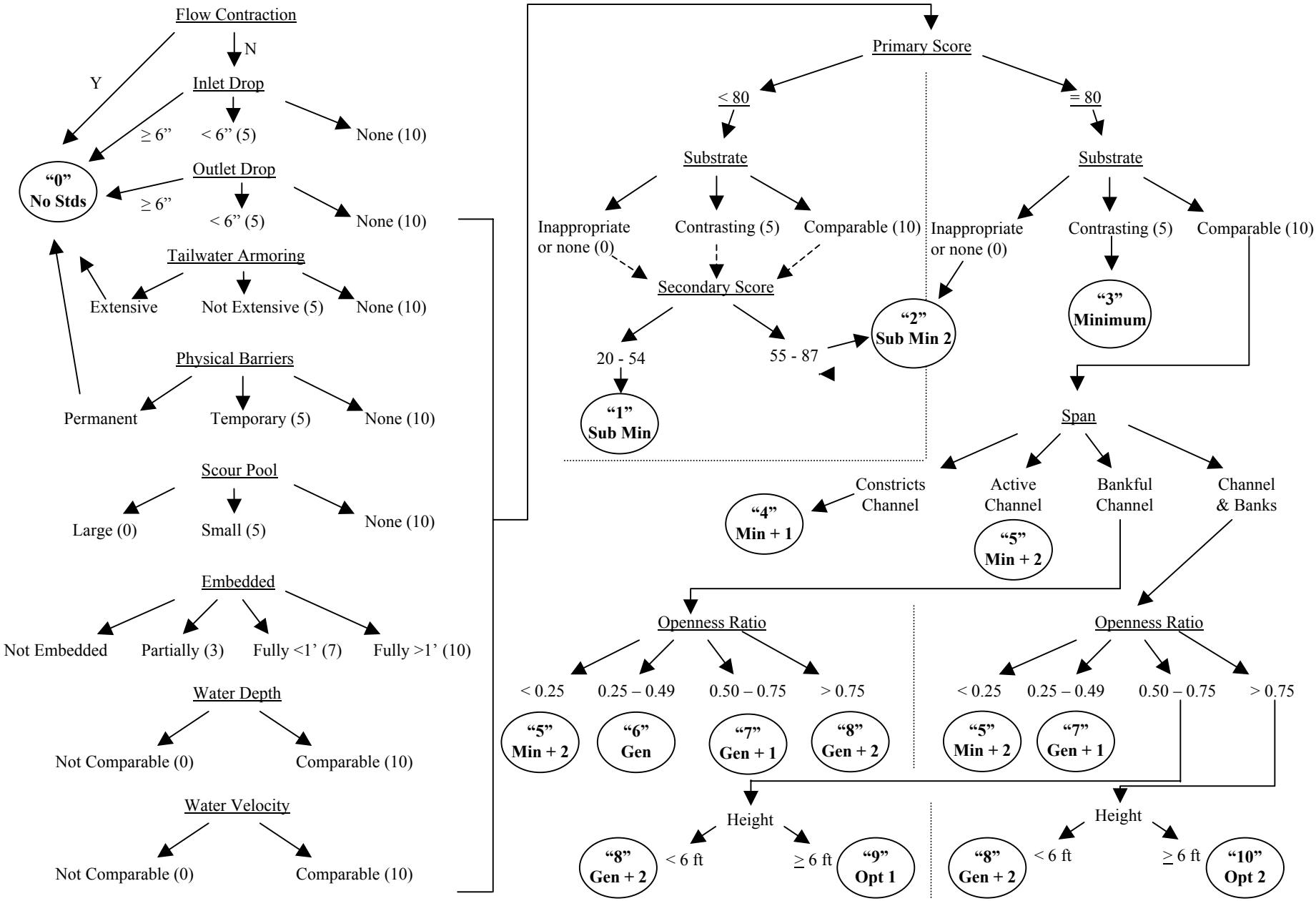
Road/Railway Characteristics:

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:** --
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:** --
10. **Tailwater scour pool:** --
11. **Physical barriers to fish and wildlife passage:** --

MA Crossing Structures Scoring System



MASSACHUSETTS ROAD STREAM CROSSING
online inventory

List of Road Stream Crossings:

Get This Page in Excel

State: Massachusetts | Stream Name: -- All | Standard: -- All
Watershed: -- All | Town: -- All | Search | Show All

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

Next [767]

ID	Town	Stream	Watershed	Road	Standard	Culverts	Openness
330010000-C-x1	Ashfield MA	Unnamed	Deerfield	Rte 116	SB	1	0.059
330010000-C-x-2	Ashfield MA	Unnamed	Deerfield	Emmets Rd	SB	1	0.004
330010249-C-10	Ashfield MA	Unnamed	Deerfield	Brier Hill Rd	SB	1	1.448
330010162-C-10	Conway MA	Unnamed	Deerfield	Rte 116	MIB	1	9.692
330010121-C-10	Conway MA	South River	Deerfield	Reeds Bridge Rd	MIB	1	28.000
330010127-C-10	Conway MA	Unnamed	Deerfield	Shelburne Falls Rd	SB	1	0.321
330010064-C-10	Conway MA	South River	Deerfield	Bardwell Ferry Rd	MGS	1	42.894
330010121-C-110	Ashfield MA	South River	Deerfield	Rte 116	MGS	1	7.111
330010223-C-10	Ashfield MA	Unnamed	Deerfield	Rte 116	SB	1	0.392
330010240-C-20	Ashfield MA	Unnamed	Deerfield	Bird Hill Rd	SB	1	0.168
330010221-C-10	Ashfield MA	Unnamed	Deerfield	Rte 116	SB	1	0.239
330010121-C-130	Ashfield MA	South River	Deerfield	Rte 116	MIB	1	6.182
330010221-C-20	Ashfield MA	Unnamed	Deerfield	Murray Rd	SB	1	0.175
330010121-C-140	Ashfield MA	South River	Deerfield	Driveway	MIB	1	7.897
330010121-C-150	Ashfield MA	South River	Deerfield	Rte 116	MOS	1	3.720
330010121-C-160	Ashfield MA	South River	Deerfield	Emmets Rd	MGS	1	6.118
330010263-C-10	Ashfield MA	Unnamed	Deerfield	Rte 116	SB	1	0.157
330010121-C-120	Ashfield MA	South River	Deerfield	Burton Hill Rd	MOS	1	8.842
330010121-C-190	Ashfield MA	South River	Deerfield	Buckland Rd	SB	1	1.295
330010121-C-200	Ashfield MA	South River	Deerfield	Rte 112	SB	1	0.199
330010124-C-10	Conway MA	Unnamed	Deerfield	Shelburne Falls Rd	SB	1	0.012

MASSACHUSETTS ROAD STREAM CROSSING
online inventory

Add New Crossing | Update This Crossing | View All Crossings

General Information for Road-Stream Crossing ID: 330010162-C-10

No images uploaded for this crossing

Coordinator: Marie-Françoise Walk **Crossing ID:** 330010162-C-10

Date: 07-22-2004 **Stream:** Unnamed **StreamID:** 330010162 **Road:** Rte 116

Town: Conway, MA **Location:** INT. Rte 116 and Eldridge Rd **GPS:** Lat: N/A Long: N/A

Observer: Weeks/Snow **Phone:** 413-545-2685 **Email:** eweeks@umext.umass.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?**

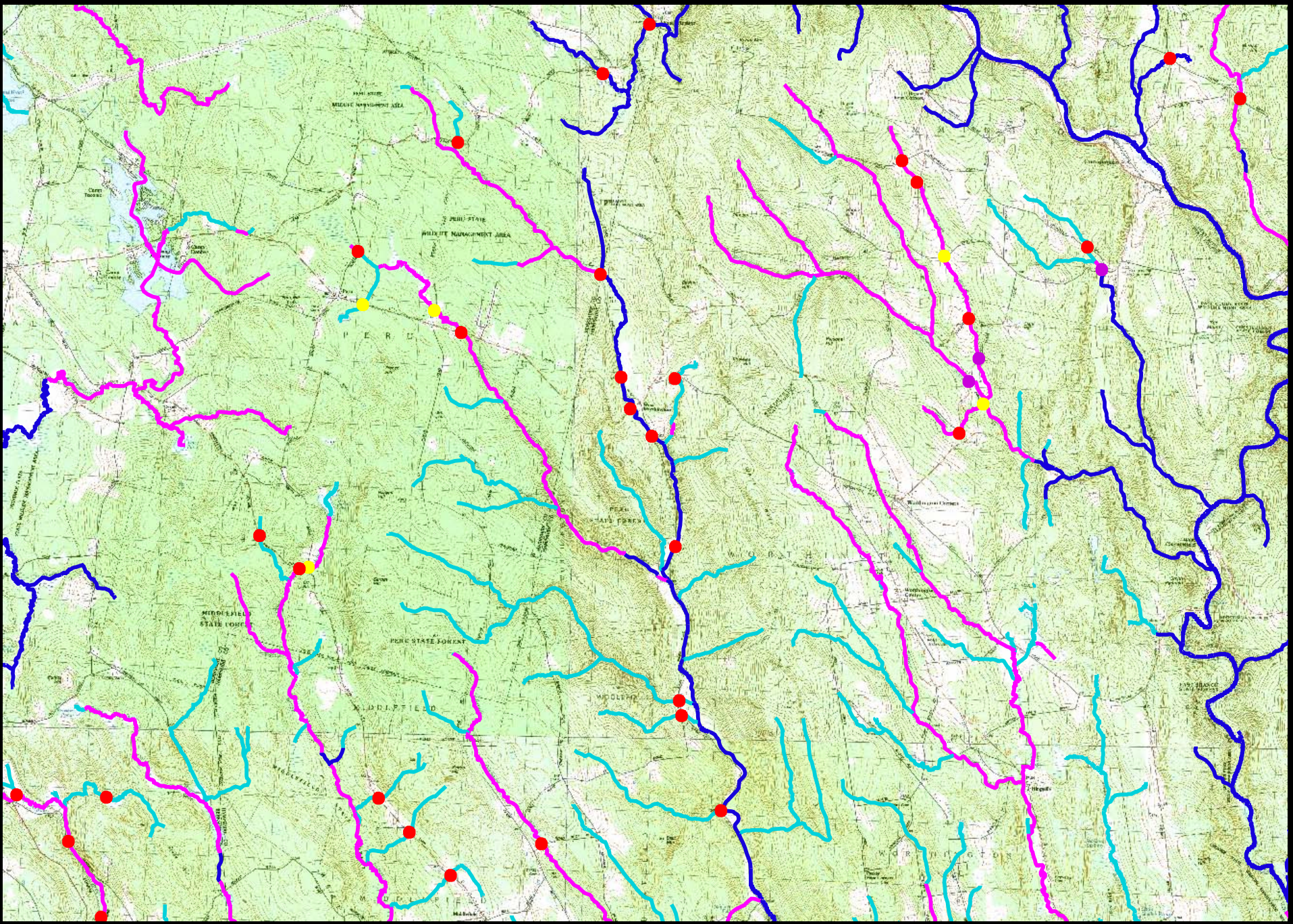
High traffic volume (> 50 cars per minute) :	No
Steep embankments:	No
Retaining walls:	No
Jersey barriers :	No
Fencing:	No
Other (specify):	N/A

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

3. **Crossing type:** Bridge
4. **Condition of crossing:** Good
5. **Does the stream at the crossing contain fish?** Yes
6. **Is the stream flowing (in the natural channel)?** Yes
7. **Flow conditions during the survey are:** Average flow
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:** None
10. **Tailwater scour pool:** None
11. **Physical barriers to fish and wildlife passage:** None


PERU STATE
WILDLIFE MANAGEMENT AREA
PERU STATE FOREST
MIDDLEFIELD

Westfield River Continuity Project
Final Report

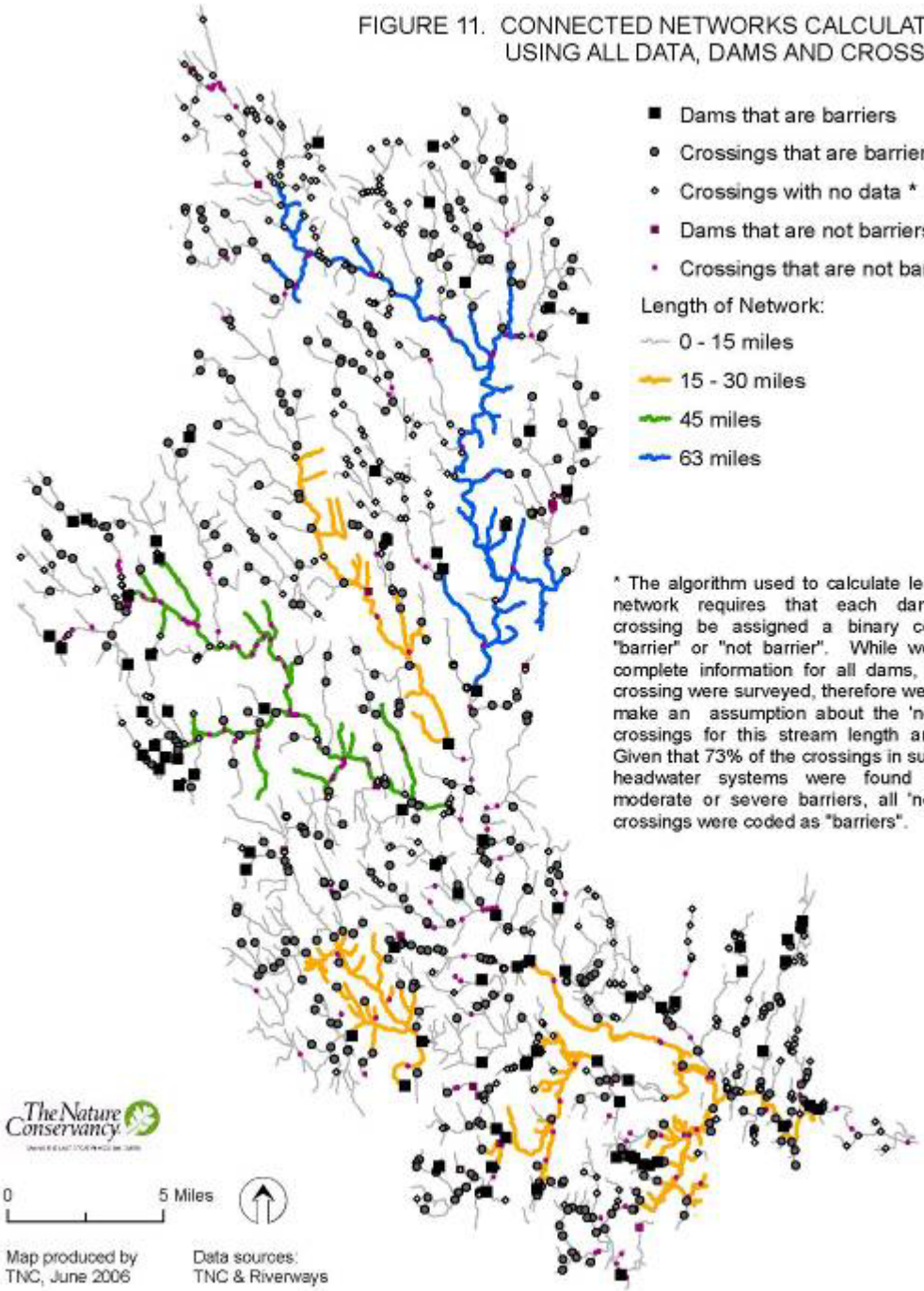
The Nature Conservancy
Massachusetts Field Office
June 2006

Prepared by Alison Bowden
abowden@tnc.org

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

MASSACHUSETTS ENVIRONMENTAL TRUST

FIGURE 11. CONNECTED NETWORKS CALCULATED USING ALL DATA, DAMS AND CROSSINGS



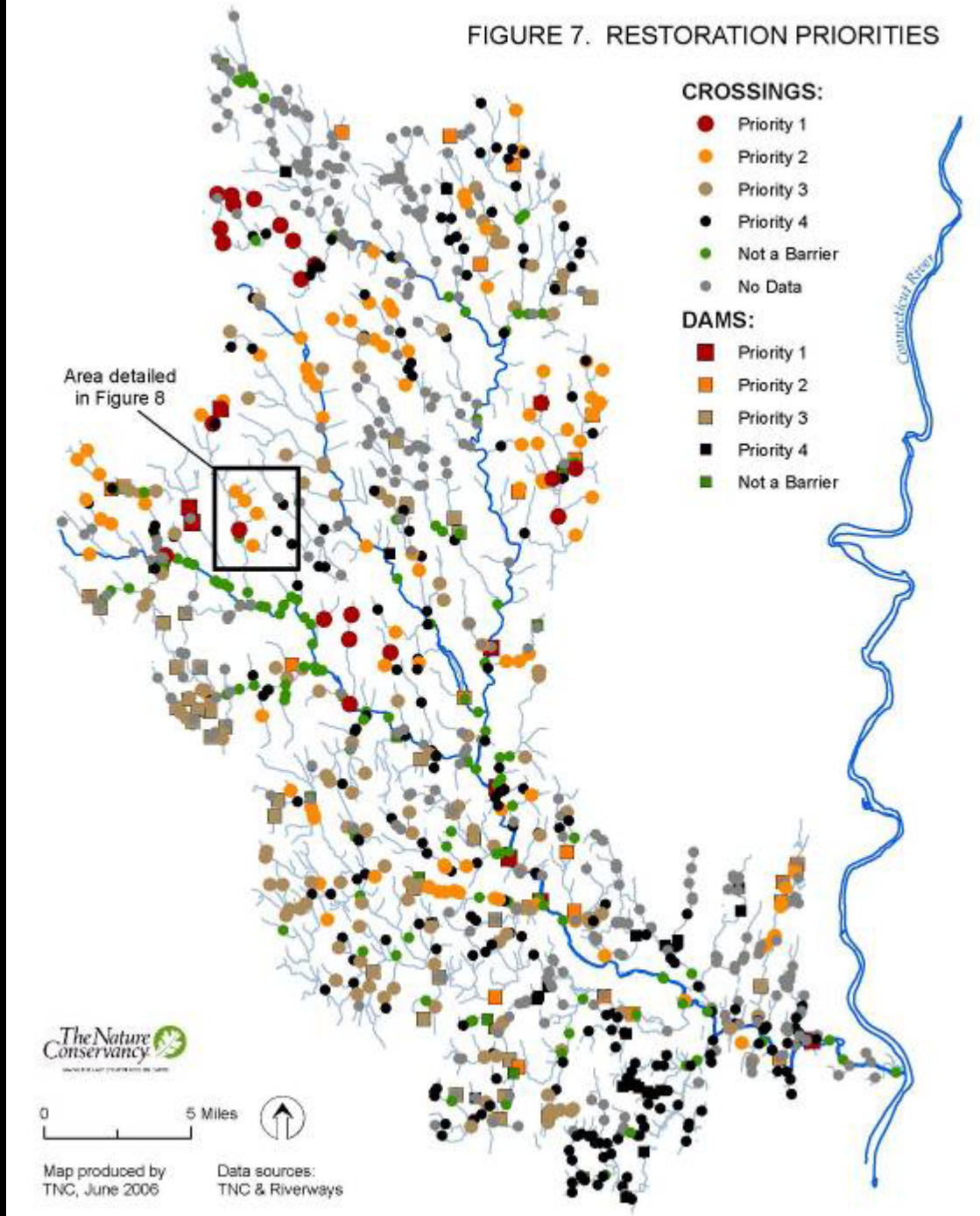


FIGURE 7. RESTORATION PRIORITIES
CROSSINGS:
Priority 1
Priority 2
Priority 3
Priority 4
Not a Barrier
No Data
DAMS:
Priority 1
Priority 2
Priority 3
Priority 4
Not a Barrier
Area detailed in Figure 8
Connecticut River
The Nature Conservancy
0
5 Miles
Map produced by TNC, June 2006
Data sources: TNC & Riverways

Commonwealth of Massachusetts

RIVERWAYS PROGRAM

Building Partnerships, Protecting Rivers

Funding and other support for the River and Stream Continuity Project has been provided by:

Massachusetts Watershed Initiative
Massachusetts Riverways Program
The Nature Conservancy
USDA-NRCS
CSREES New England Regional Water Program

"This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2004-51130-03108."