Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors

Meghan.ruta@.ct.gov

CTDEEP

Bureau of Water Protection and Land Reuse
Planning and Standards Division

Volunteer Monitoring Coordinator

SCHEDULE FOR TODAY

A.M.

WATER QUALITY MONITIORING 101

YOU WANT US TO DO WHAT????

BREAK INTO TEAMS/RECEIVE EQUIPMENT

P.M.

SAMPLE YOUR SITE

RETURN WITH EQUIPMENT AND DATA

1.) DEEP'S WATER QUALITY MONITORING & ASSESSMENTS

2.) NEED FOR VOLUNTEERS

3.) THE PRIMARY WATER QUALITY TOOL

4.) ABOUT RBV

DEEP Ambient Monitoring

Requirement of Clean Water Act (305b)

Water Quality Standards

Meet Designated Uses

(Fishable & Swimmable)

ACQUIRE DATA

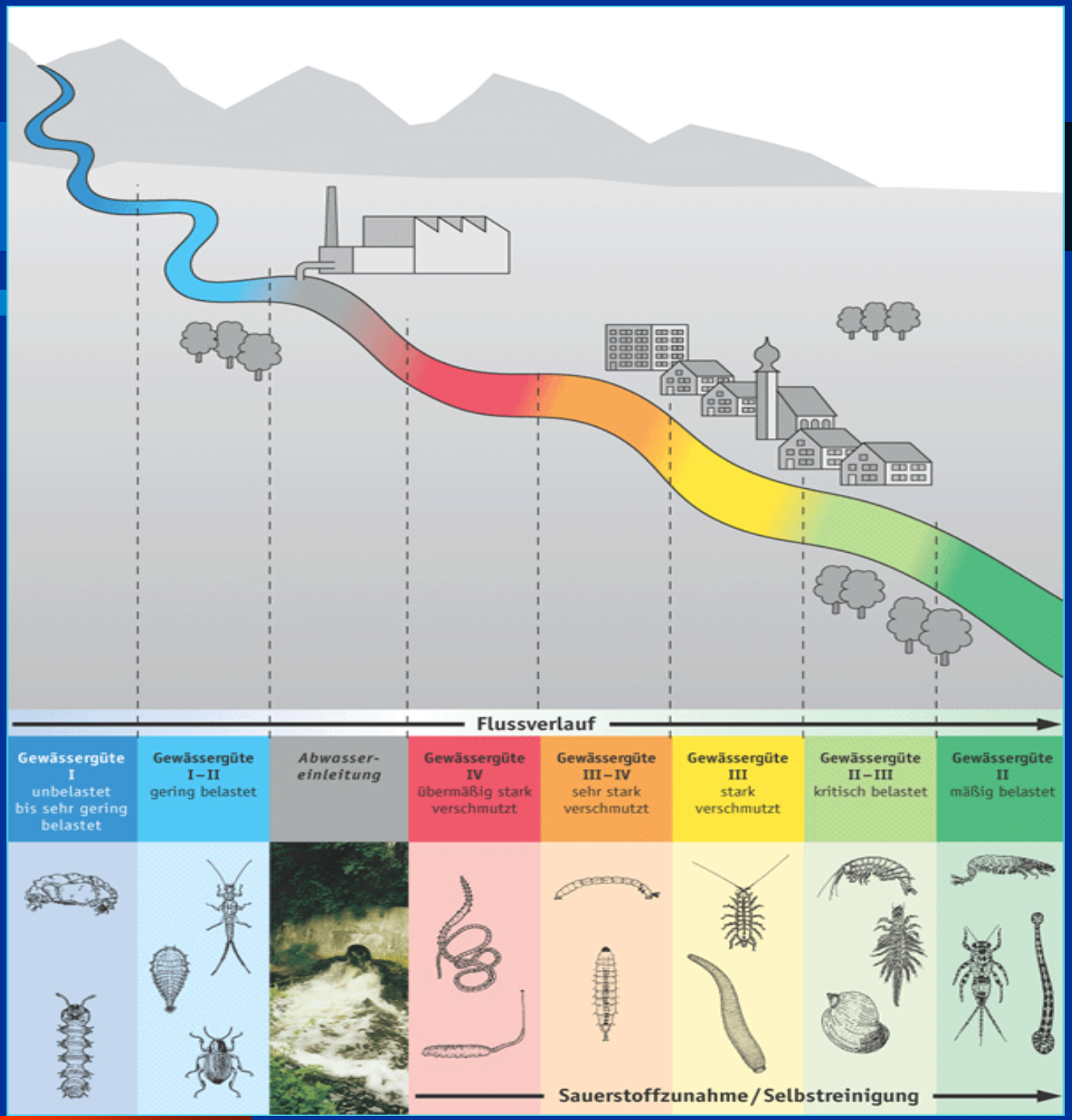
ASSESS DATA

ANALYZE DATA


IT'S GETTING DARK... COLD... GOODBYE CRUEL WORLD...
worst-jobs.com

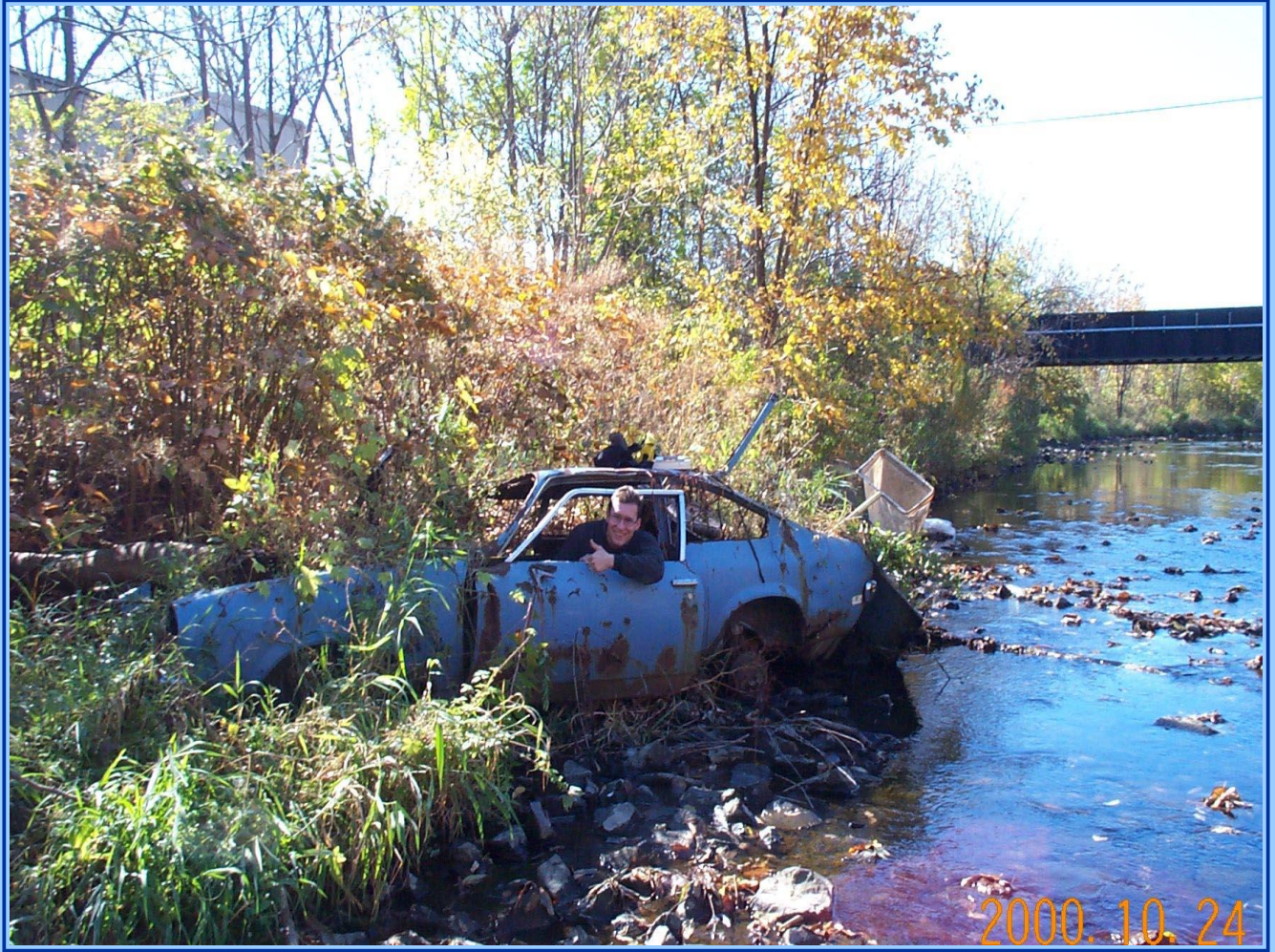
Saprobein system

Kolkwitz & Marsson 1909

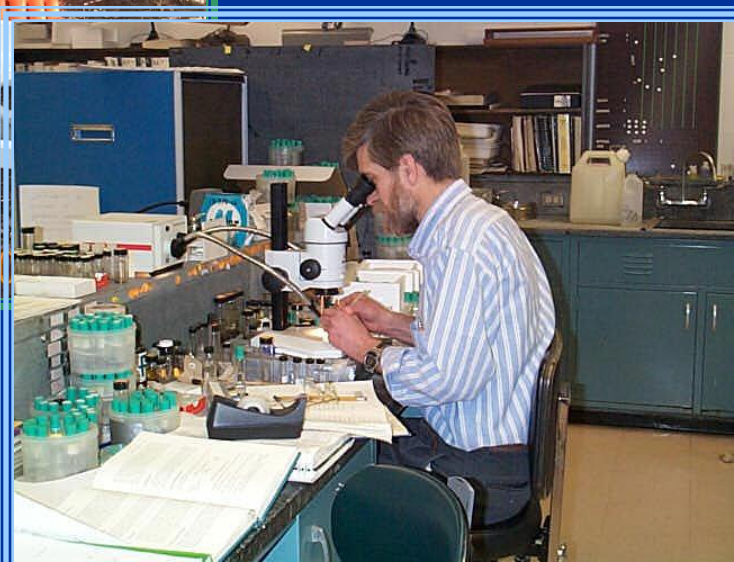


DEEP Ambient Monitoring

Physical, Chemical, Indicator Bacteria



DEEP Ambient Monitoring



Benthic Macroinvertebrates

Physical, Chemical, Indicator Bacteria

DEEP Ambient Monitoring

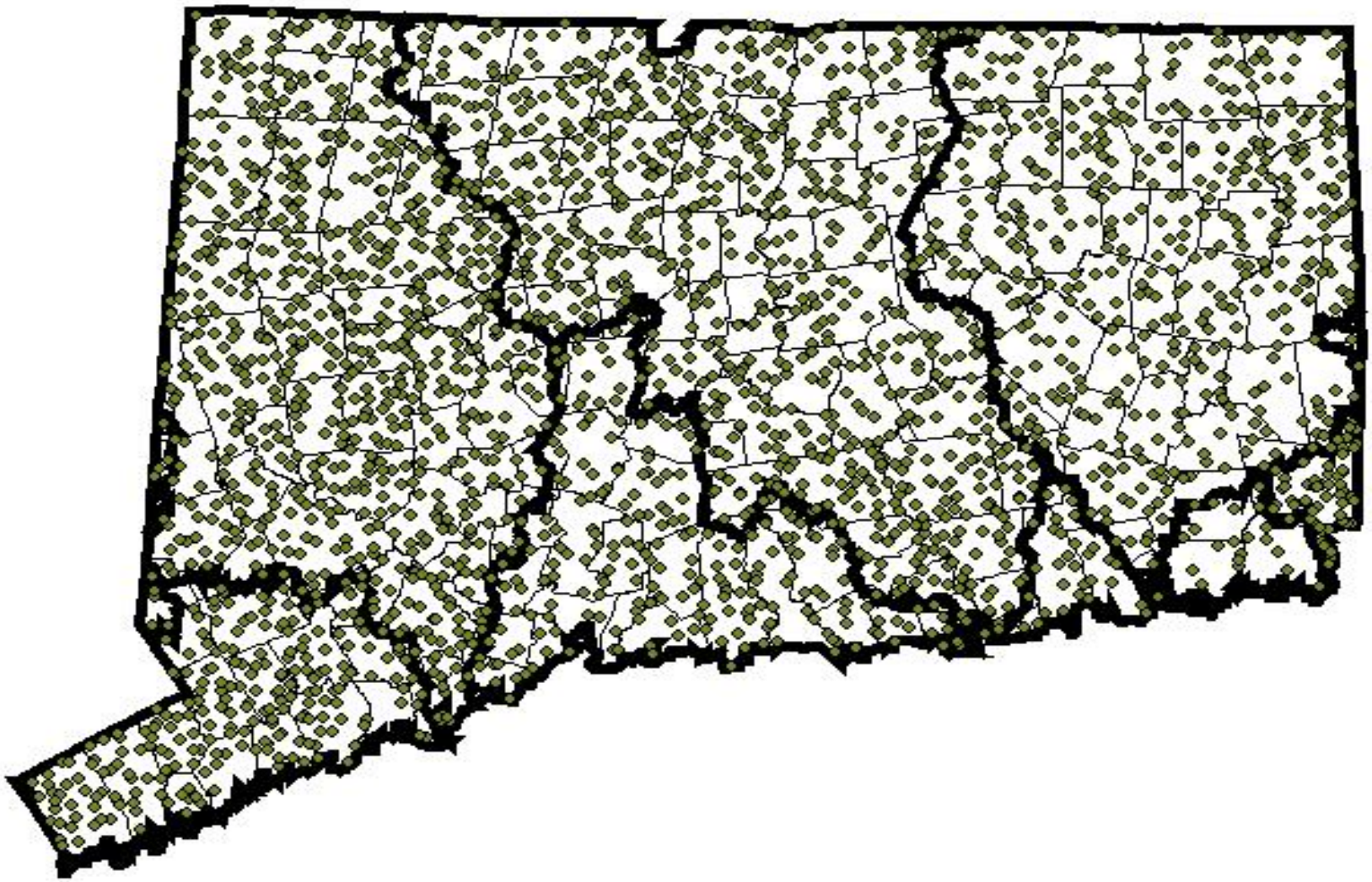
Fish Community & Tissue Contaminants

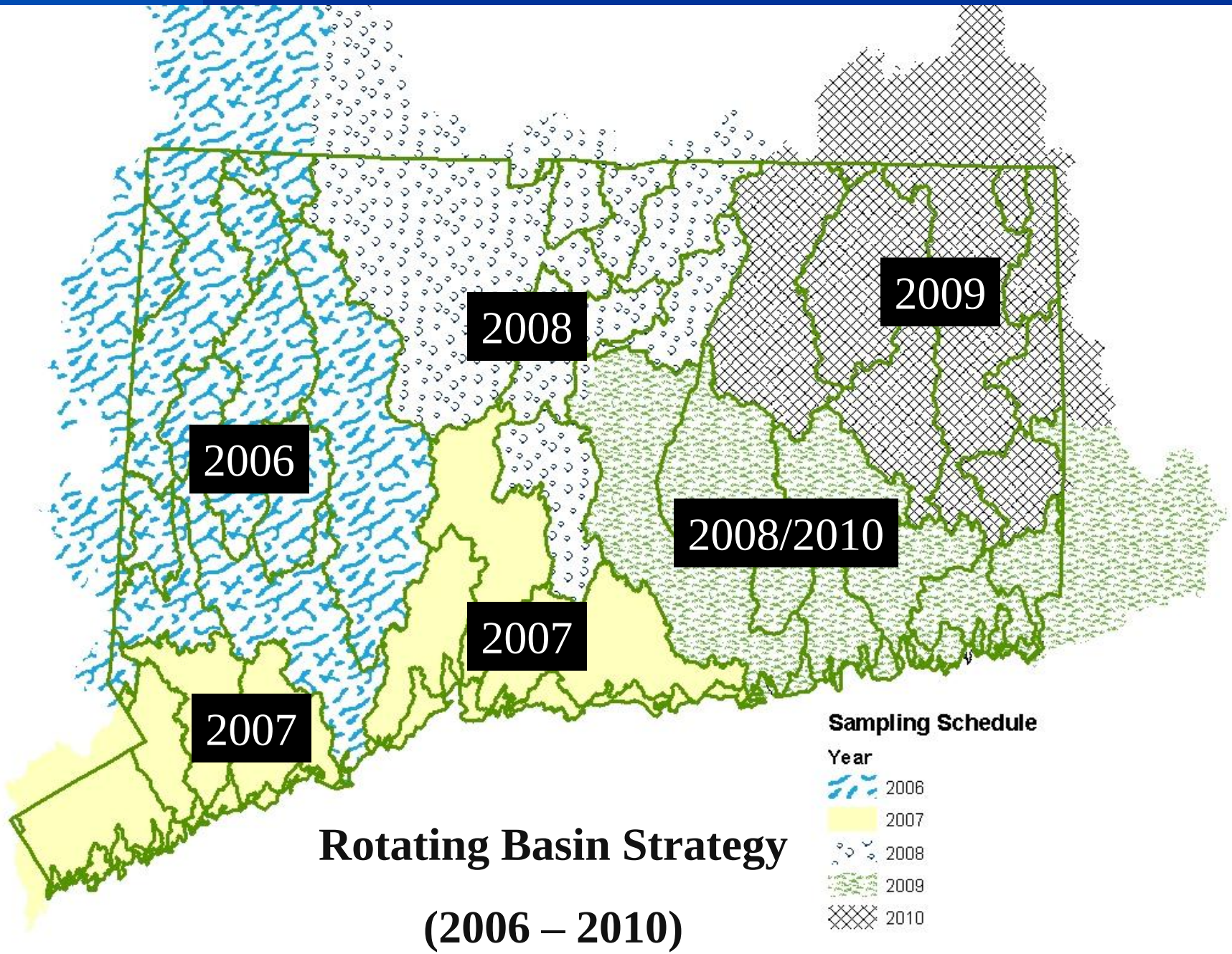
Physical, Chemical, Indicator Bacteria

Benthic Macroinvertebrates

DEEP Ambient Monitoring

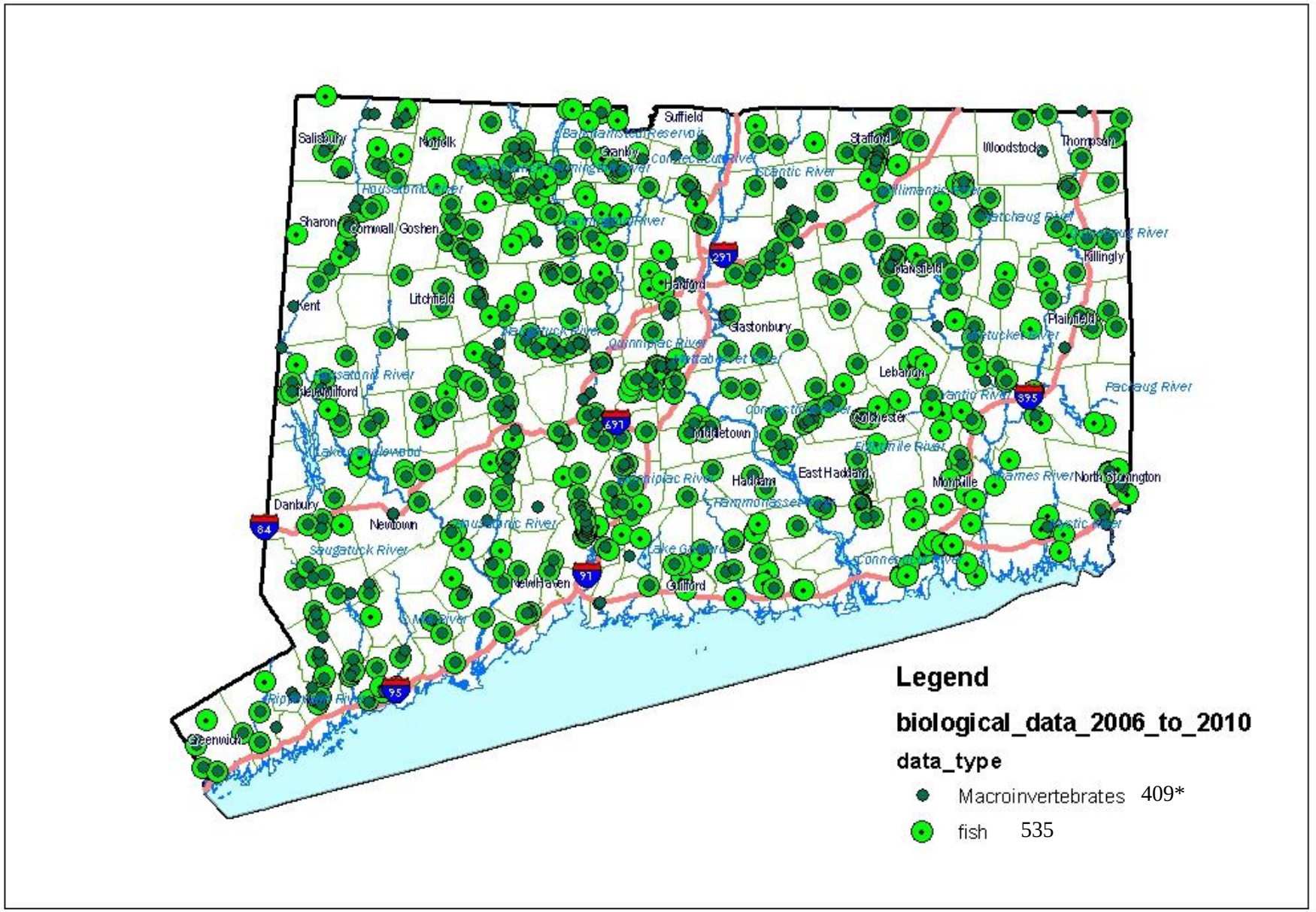
- **Random Sampling Approach**
  - **Probabilistic design (60 stations)**
- **Targeted Monitoring Approach**
  - **Rotating Basin Strategy**
    - **50 stations**
    - **Focus on Major Basin for 1 year**
    - **Quarterly Physical/Chemical/Bacteria**
    - **Fall Macroinvertebrate**
  - **USGS Cooperative Network**
    - **35 stations statewide phys/chemical/bacteria data 8 times year**



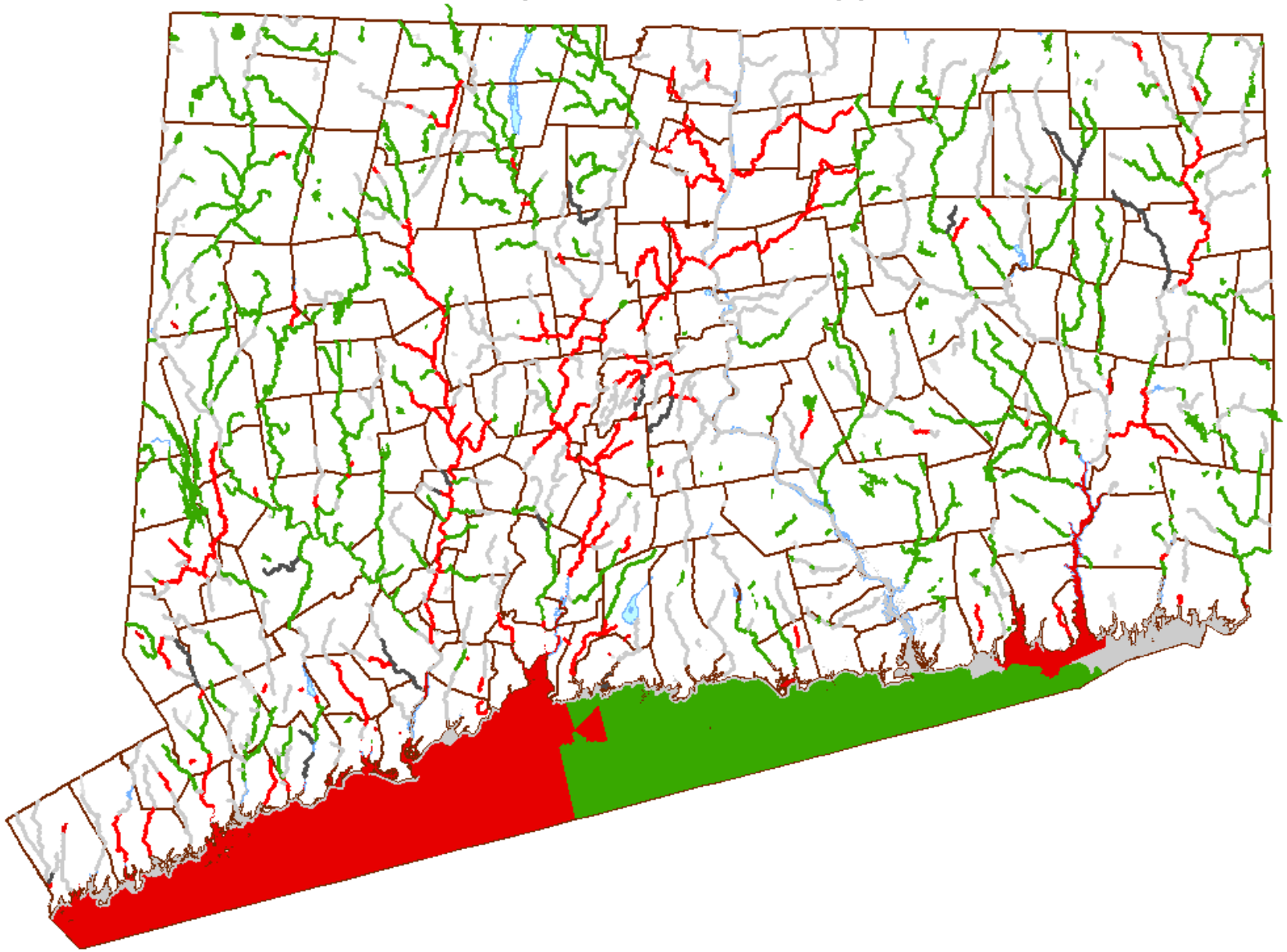


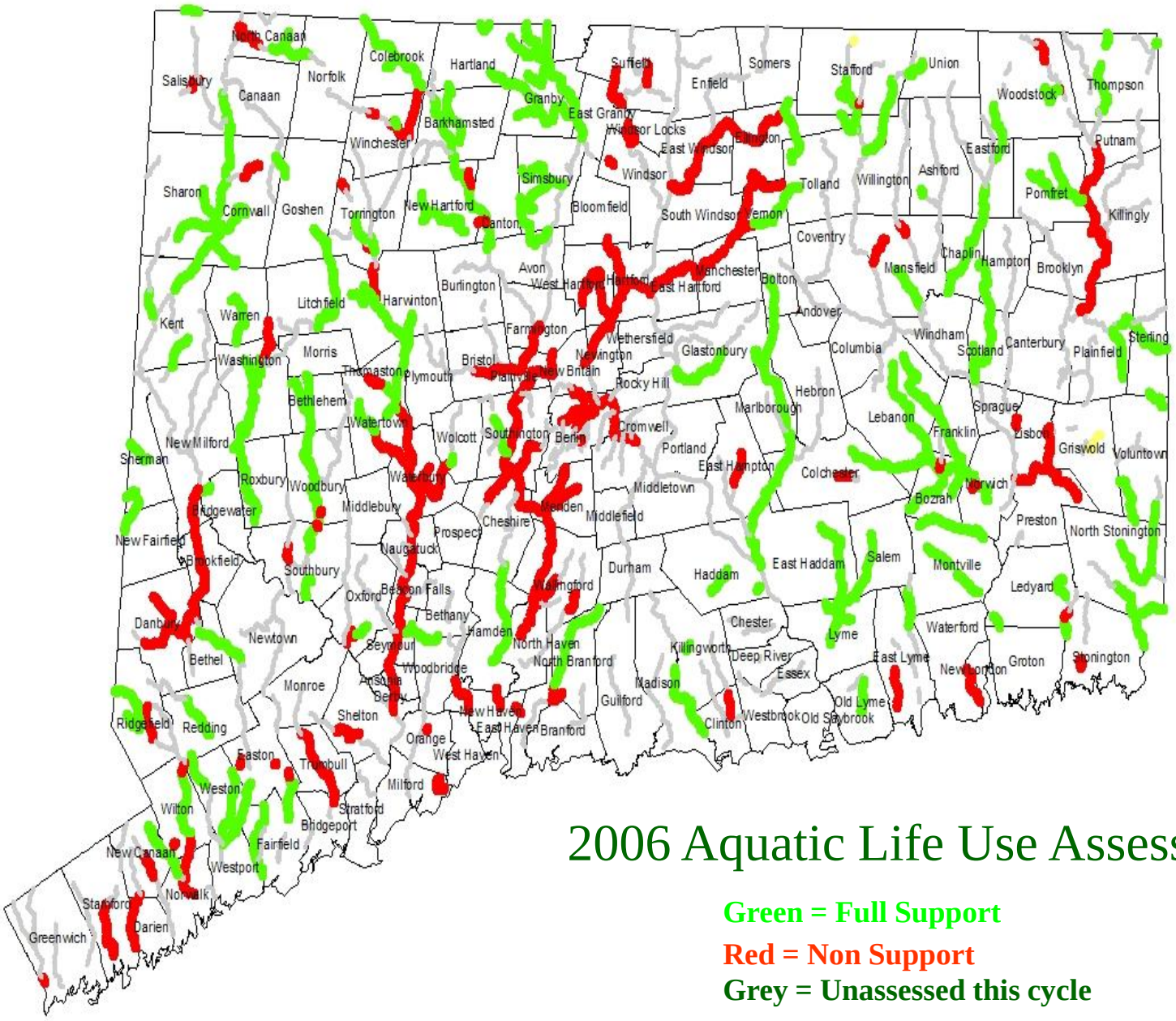
Rotating Basin Strategy

(2006 – 2010)


Suffield
Salisbury
Norfolk
Granby
Stafford
Woodstock
Thompson
Sharon
Cornwall
Goshen
Killingly
Litchfield
Kent
Hartford
Glastonbury
Plainfield
Lebanon
Colchester
Middletown
Danbury
Newtown
East Haddam
Haddam
Montville
North Stonington
New Haven
Guilford
Greenwich
Legend
biological_data_2006_to_2010
data_type
Macroinvertebrates 409*
fish 535

2008 Connecticut Aquatic Life Use Support Assessment



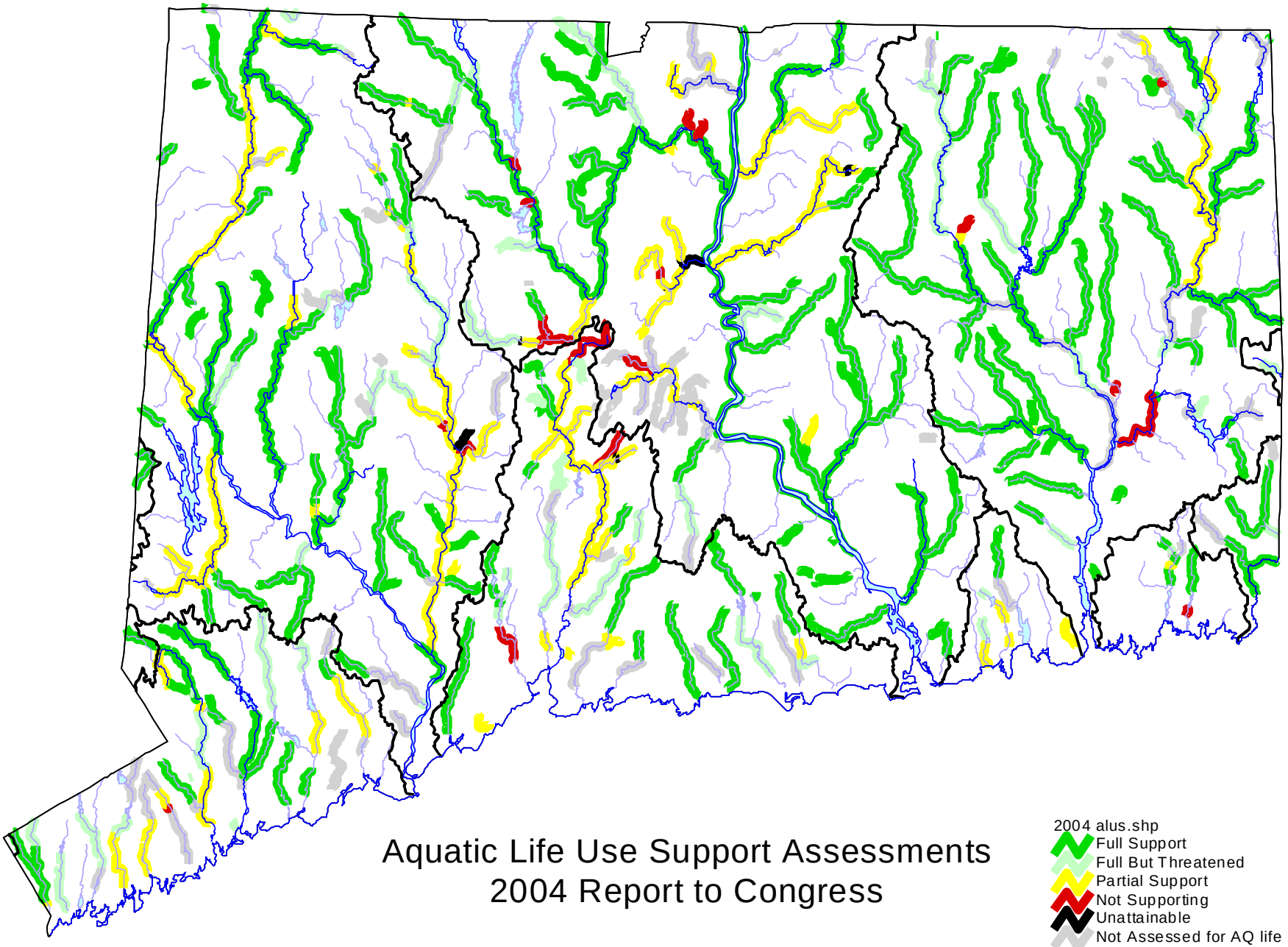


2006 Aquatic Life Use Assessments

Green = Full Support

Red = Non Support

Grey = Unassessed this cycle


Aquatic Life Use Support Assessments
2004 Report to Congress
2004 alus.shp
Full Support
Full But Threatened
Partial Support
Not Supporting
Unattainable
Not Assessed for AQ life

1.) DEEP'S WATER QUALITY MONITORING & ASSESSMENTS

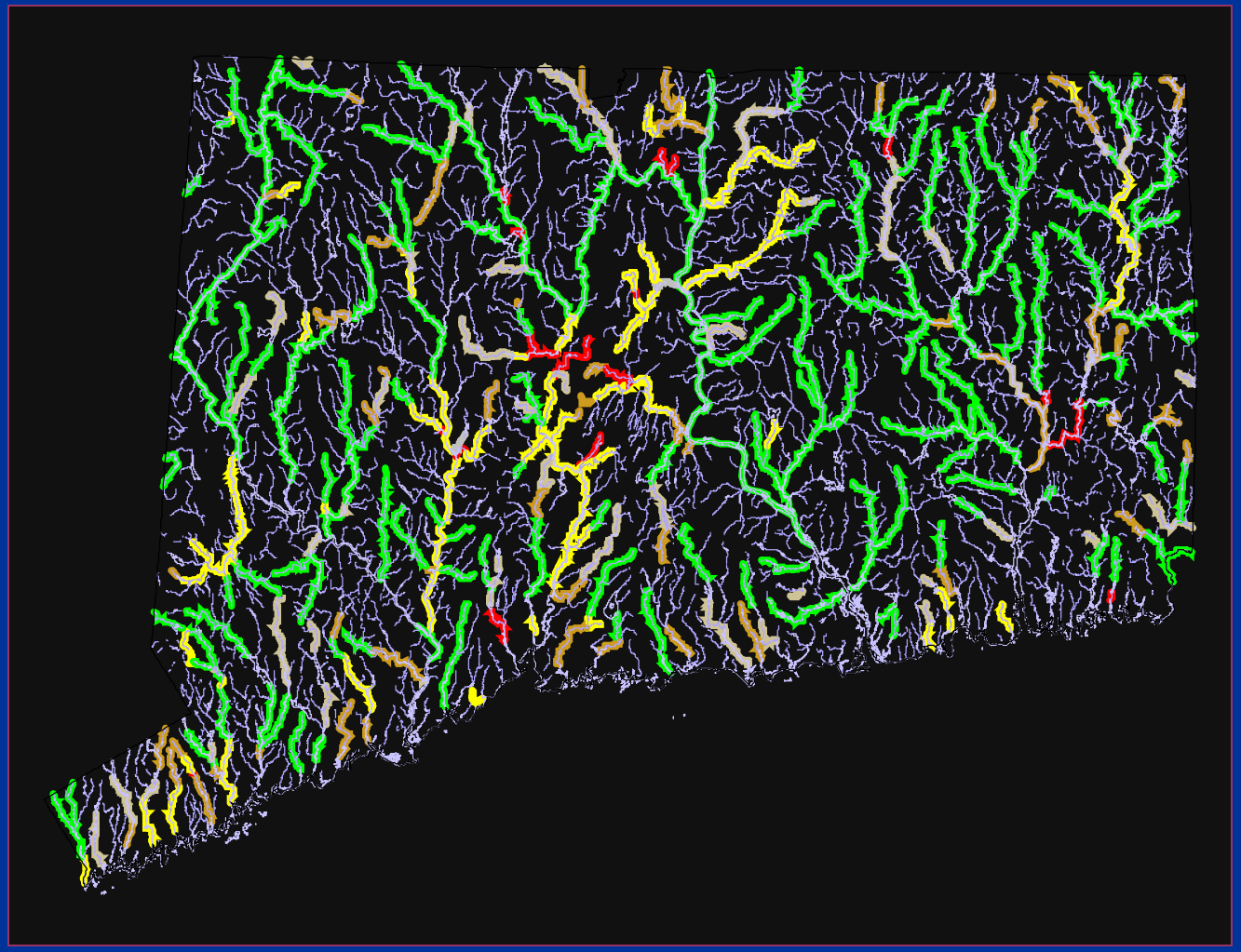
2.) NEED FOR VOLUNTEERS

3.) THE PRIMARY WATER QUALITY TOOL

4.) ABOUT RBV

NEED FOR VOLUNTEERS

- **Many areas without Water quality information.**
  - **Limited staff resources.**
  - **In-touch with local conditions and issues**



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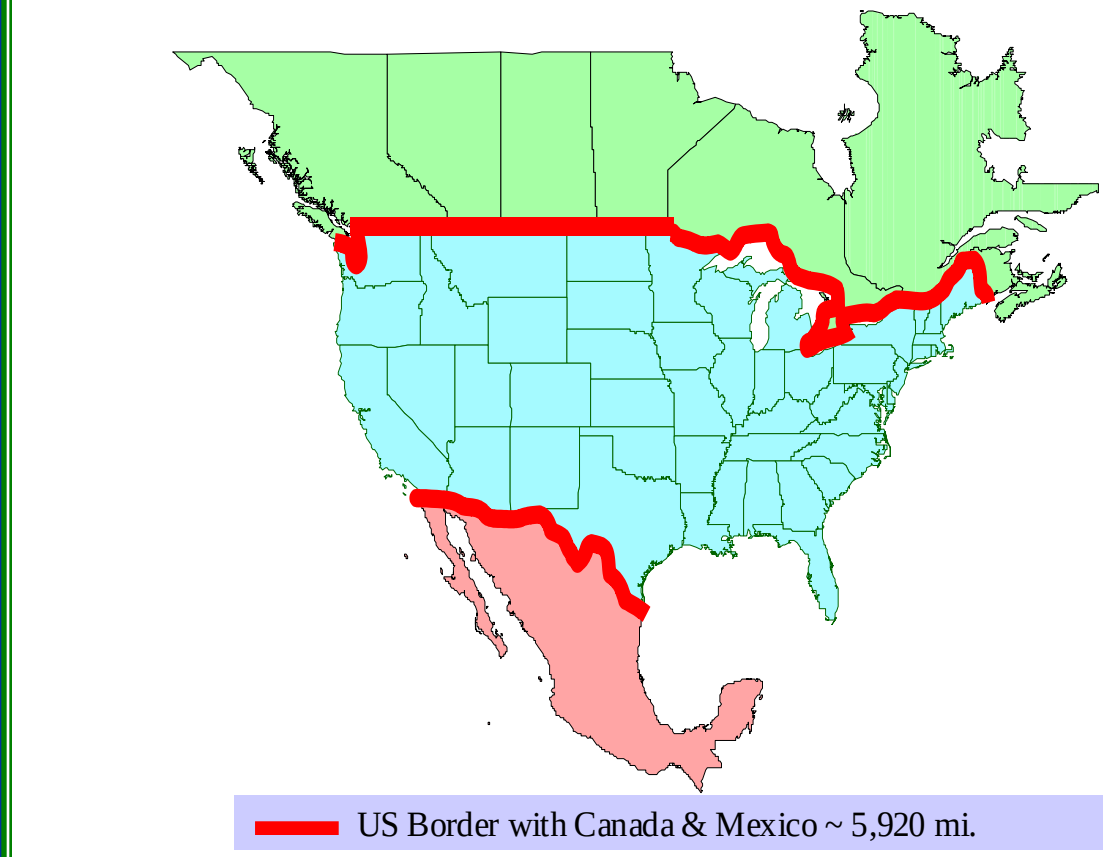

NEED FOR VOLUNTEERS

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- Limited staff resources.
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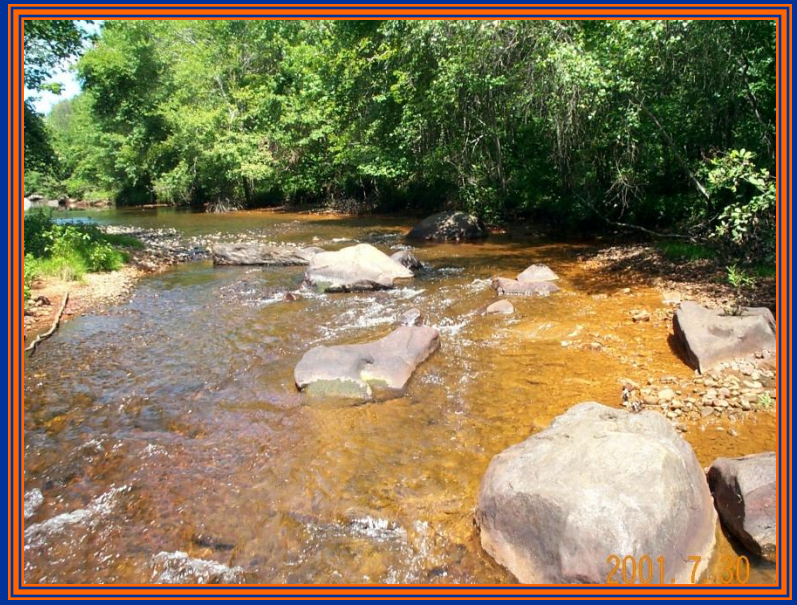
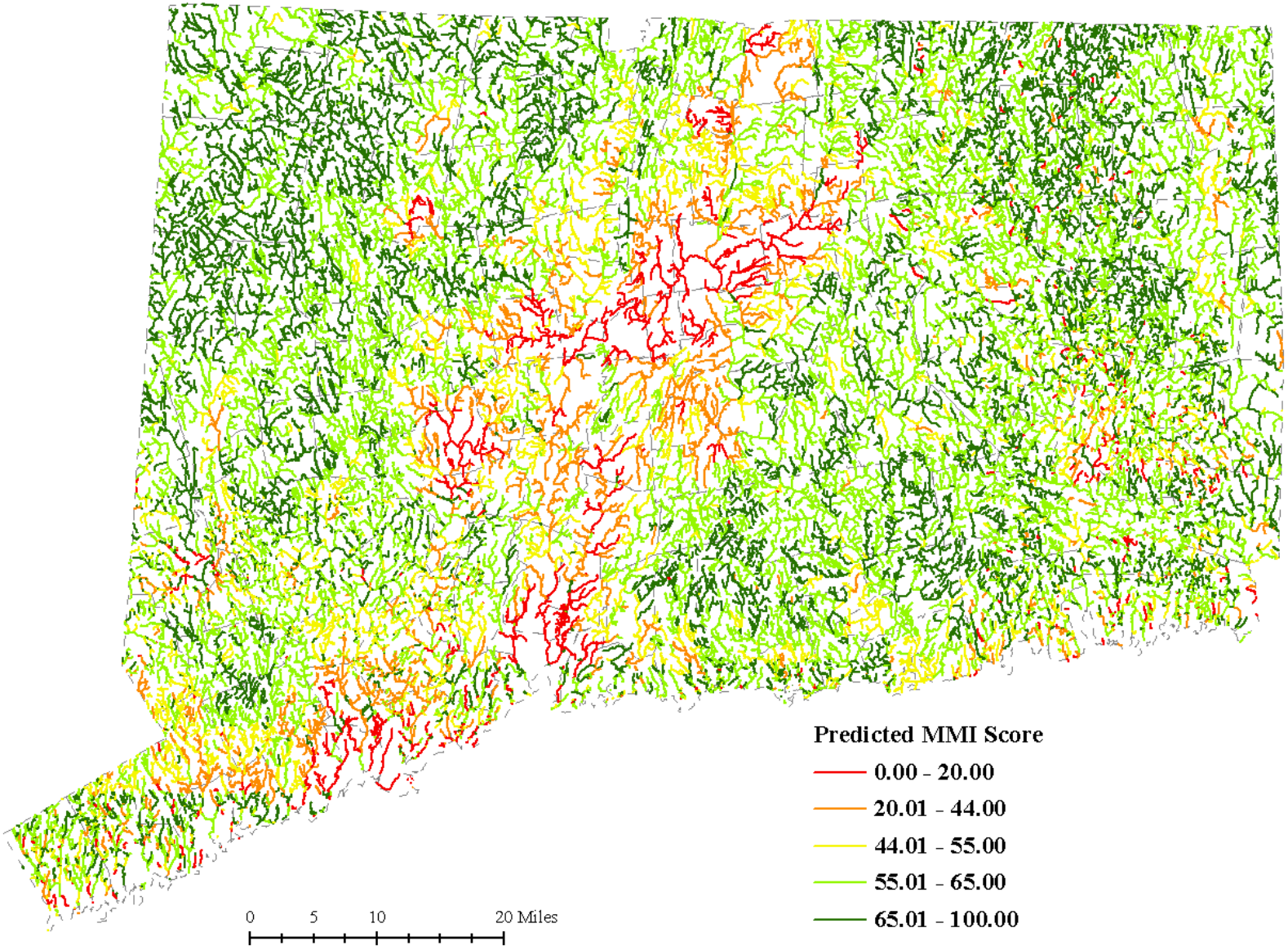
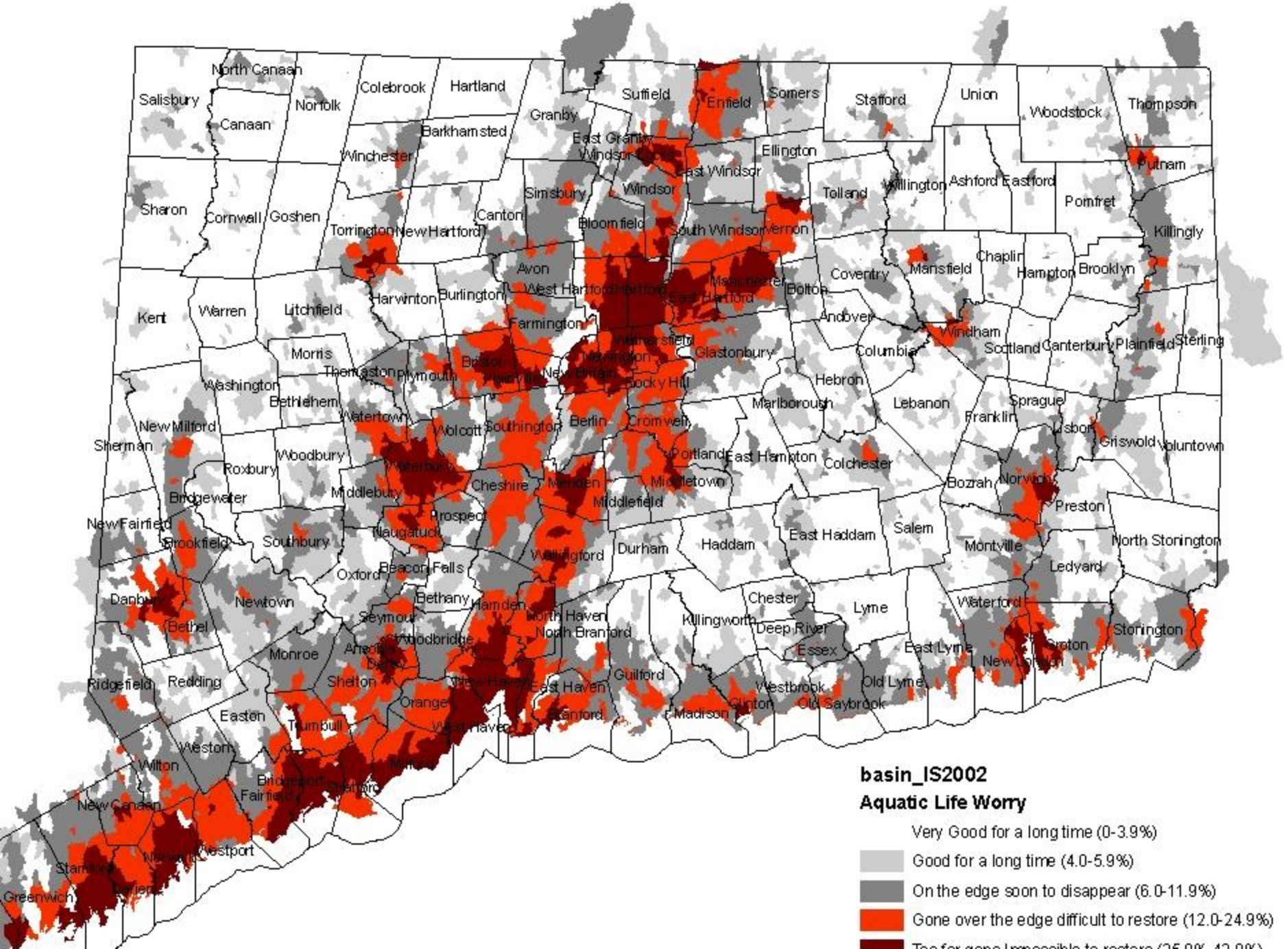



Predicted MMI Score
0.00 - 20.00
20.01 - 44.00
44.01 - 55.00
55.01 - 65.00
65.01 - 100.00
0
5
10
20 Miles


basin_IS2002
Aquatic Life Worry
Very Good for a long time (0-3.9%)
Good for a long time (4.0-5.9%)
On the edge soon to disappear (6.0-11.9%)
Gone over the edge difficult to restore (12.0-24.9%)
North Canaan
Salisbury
Canaan
Norfolk
Colebrook
Hartland
Barkhamsted
Winchester
Granby
Suffield
Enfield
Somers
Stafford
Union
Woodstock
Thompson
East Granby
Windsor
East Windsor
Ellington
Putnam
Willington
Ashford
Eastford
Pomfret
Killingly
Tolland
Sharon
Cornwall
Goshen
Torrington
New Hartford
Canton
Simsbury
Bloomfield
Windsor
South Windsor
Vernon
Chaplin
Hampton
Brooklyn
Coverntry
Mansfield
Avon
West Hartford
Manchester
East Hartford
Bolton
Harwinton
Burlington
Kent
Warren
Litchfield
Farmington
Andover
Windham
Scotland
Canterbury
Plainfield
Sterling
Columbia
Glastonbury
Morris
Thomaston
Plymouth
Bristol
New Britain
Rocky Hill
Hebron
Washington
Bethlehem
Watertown
Marlborough
Lebanon
Sprague
Franklin
Lisbon
Griswold
Voluntown
New Milford
Sherman
Wolcott
Southington
Berlin
Cromwell
Woodbury
Roxbury
Waterbury
Portland
East Hampton
Colchester
Bozrah
Norwich
Bridgewater
Middlebury
Cheshire
Meriden
Middletown
Middlefield
Preston
New Fairfield
Brookfield
Prospect
Naugatuck
Southbury
Durham
Haddam
East Haddam
Salem
Montville
North Stonington
Wallingford
Beacon Falls
Oxford
Ledyard
Danbury
Newtown
Bethany
Hamden
North Haven
Seymour
Chester
Lyme
Waterford
Bethel
Woodbridge
North Branford
Killingworth
Deep River
Storington
Monroe
Ansonia
Derby
Essex
East Lyme
Ridgefield
Redding
Shelton
New Haven
East Haven
Guilford
Westbrook
Old Lyme
Orange
Clinton
Old Saybrook
Easton
Trumbull
West Haven
Branford
Madison
Weston
Wilton
Bridgeport
Fairfield
Milford
New Canaan
Westport
Norwalk
Stamford
Darien
Greenwich

1.) DEEP'S WATER QUALITY MONITORING

2.) NEED FOR VOLUNTEERS

3.) THE PRIMARY WATER QUALITY TOOL

4.) ABOUT RBV

Riffle-Dwelling

Benthic

Macroinvertebrates

Primary indicator of water quality

- **Riffle-Dwelling Benthic Macroinvertebrates**
- **Rapid Bioassessment Protocol #3**
- **Very technical & extensive time commitment**

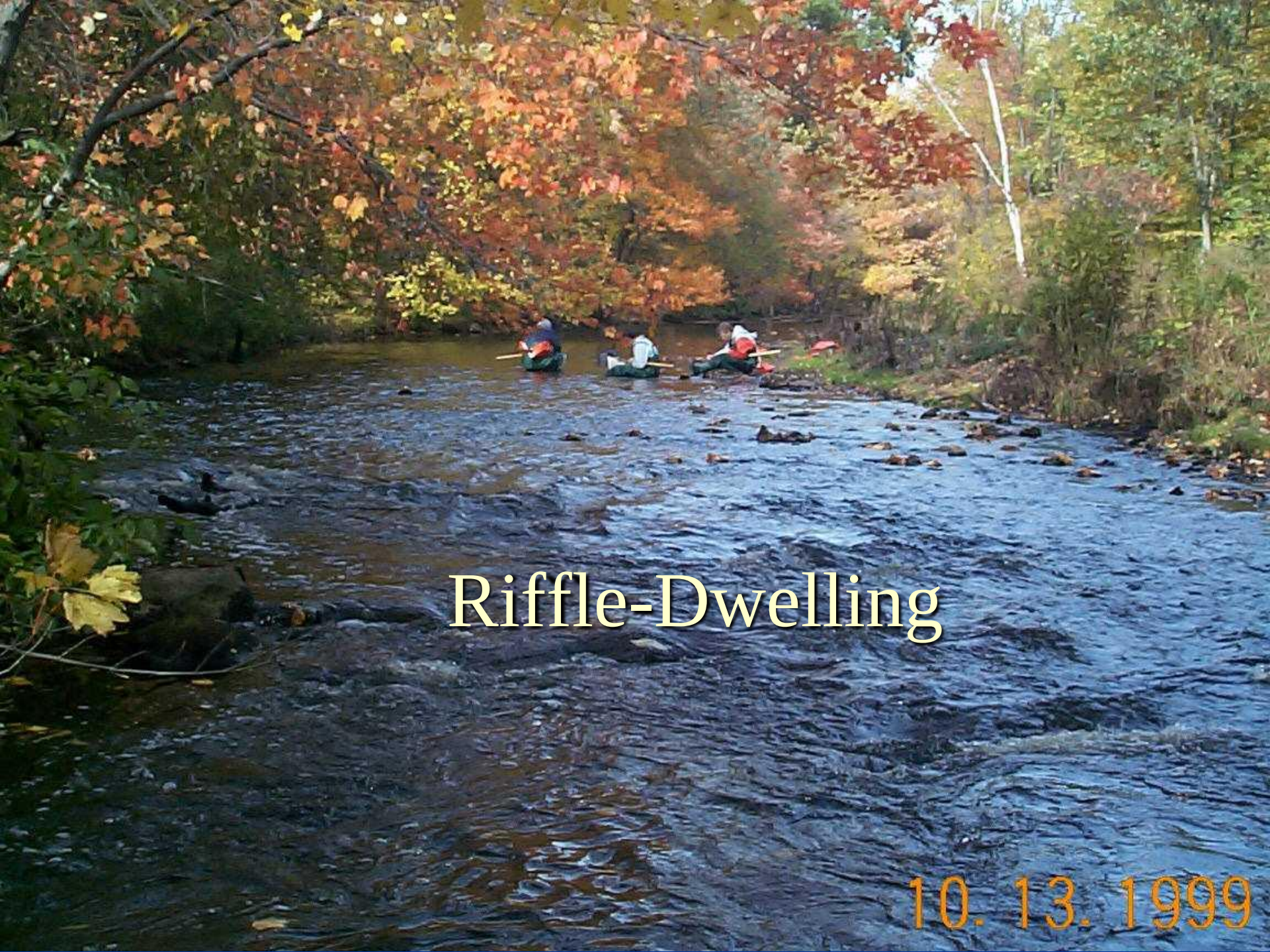
For More Information About Rapid Bioassessment Protocols...

http://www.epa.gov/OWOW/monitoring/

Riffle-Dwelling

Benthic

Macroinvertebrates


Riffle-Dwelling
10. 13. 1999

Riffle-Dwelling

Benthic

Macroinvertebrates

Benthic

Riffle-Dwelling

Benthic

Macroinvertebrates

Macroinvertebrate

Riffle-Dwelling Benthic Macroinvertebrates

RIFFLE-DWELLING: A *riffle* is a section of a stream or river characterized by rapid turbulent flow, has a stable rocky substrate, and is wadeable most of the time. Other major stream habitats are pools and runs/glides.

Dwelling means living at least part of their life cycle within the riffle habitat.

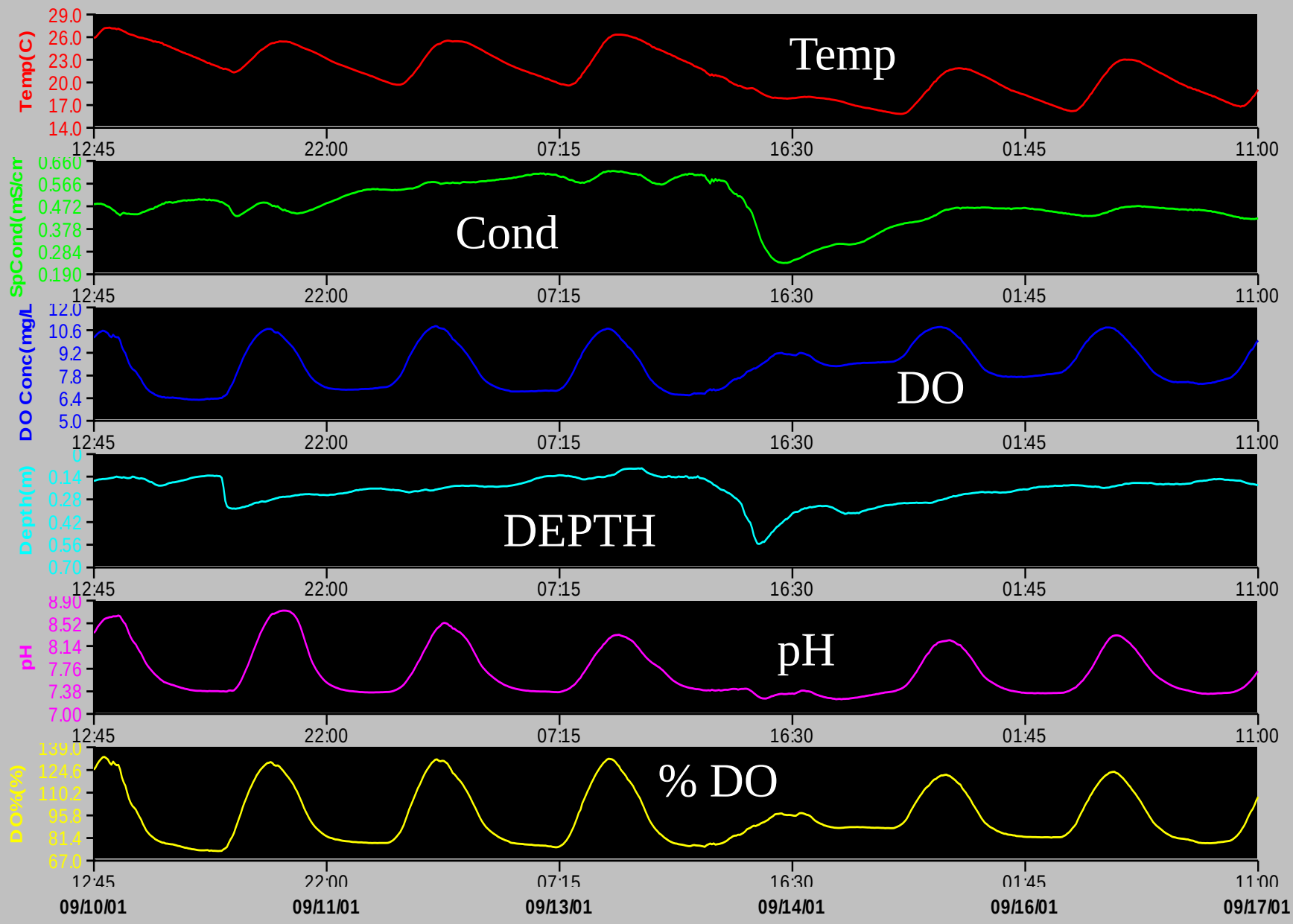
BENTHIC: Living in or on the substrate (bottom) of an aquatic environment.

MACRO: Large enough to be seen with the unaided eye. The US EPA further defines a macro-organism as one retained by a US Standard Number 30-mesh sieve (0.595-mm openings).

INVERTEBRATE: An animal without a backbone.

Macroinvertebrates and Water Quality

- Live in wide range of water quality.
- Characteristic responses to environmental stresses.
- Established methodologies.
- Ease of capture.
- Rapid recovery from repeat sampling.
- Life history/Limited mobility.


NR3910.DAT
Temp(C)
29.0
26.0
23.0
20.0
17.0
14.0
Temp
SpCond(mS/cm
0.660
0.566
0.472
0.378
0.284
0.190
Cond
DO Conc(mg/L
12.0
10.6
9.2
7.8
6.4
5.0
DO
Depth(m)
0
0.14
0.28
0.42
0.56
0.70
DEPTH
pH
8.90
8.52
8.14
7.76
7.38
7.00
pH
DO%(%)
139.0
124.6
110.2
95.8
81.4
67.0
% DO
12:45
22:00
07:15
16:30
01:45
11:00
09/10/01
09/11/01
09/13/01
09/14/01
09/16/01
09/17/01
DateTime(M/D/Y)

Day 1

Day 7

1.) DEEP’S WATER QUALITY MONITORING

2.) NEED FOR VOLUNTEERS

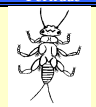
3.) THE PRIMARY WATER QUALITY TOOL

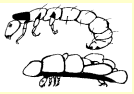
4.) ABOUT RBV

Purpose of the RBV Program

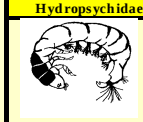
- **To ENCOURAGE volunteer monitoring of wadeable streams.**
- **To have an EASY, QUICK, & EFFICIENT method.**
- **CONFIDENCE in the data for use by BOTH the participant and the DEEP.**

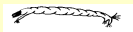
WATERBODY NAME:		COLLECTION DATE:	COLLECTION TIME:
LOCATION DESCRIPTION:		COLLECTORS NAMES:	
TOWN:		NOTES/COMMENTS:	

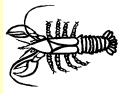
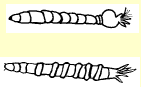
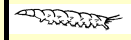
	1	2	3	4	5A	5 B	5 C
MOST	Body builder mayfly	Minnow mayfly	2-tailed flat head mayfly	Roach-like stonefly	Common stonefly	Giant stonefly	Misc
	Drunella	Isonychia	Epeorus	Peltoperlidae	Perlidae	Pteronarcys	Stonefly
							
Locs 1&2							
Locs 3&4							
Locs 5&6							

	6A	6 B	7	8A	8 B
MOST	Saddle-Case caddis	Cornucopia Case caddis	Michelin Man caddis	Mid-size plant case caddis	
	Glossosoma	Apatania	Rhyacophila	Brachycentrus	Lepidostoma
					
Locs 1&2					
Locs 3&4					
Locs 5&6					

DATA INTERPRETATION	
# OF TYPES OF THE "MOST"	WATER QUALITY
5 OR MORE	EXCEPTIONAL
3 TO 4	EXCELLENT
1 TO 3	VERY GOOD
0	MORE INFO NEEDED TO ASSESS

	9	10	11	12	13 A	13 B	14
MODERATE	Common net-spinner	Fingernet Caddis	Flat Head mayfly	Water Penny	Dobsonfly	Fishfly	Dragonfly & Damselfly
	Hydropsychidae	Chimarra	Stenonema	Psephenus	Corydalus	Nigronia	Odonata
							 
Locs 1&2							
Locs 3&4							
Locs 5&6							

	15 A	15 B	15 C	15 D	15 E	15 F	15 G
LEAST	Amphipod	Isopod	Leech	Midge	Black fly	Snail	Worm
							
Locs 1&2							
Locs 3&4							
Locs 5&6							

	OTHER COMMONLY COLLECTED RIFFLE-DWELLING MACROINVERTEBRATES						
OTHERS	Crayfish	Crane fly larvae	Riffle Beetle adult/larva	Small minnow mayfly	Water snipe fly	Planaria	Fingernail clam/ mussel
			 				
Present							

ALL RBV MATERIALS ARE AVAILABLE AT: http://dep.state.ct.us/wtr/volunmon/volopp.htm

To Make the List

1.) Statewide Distribution

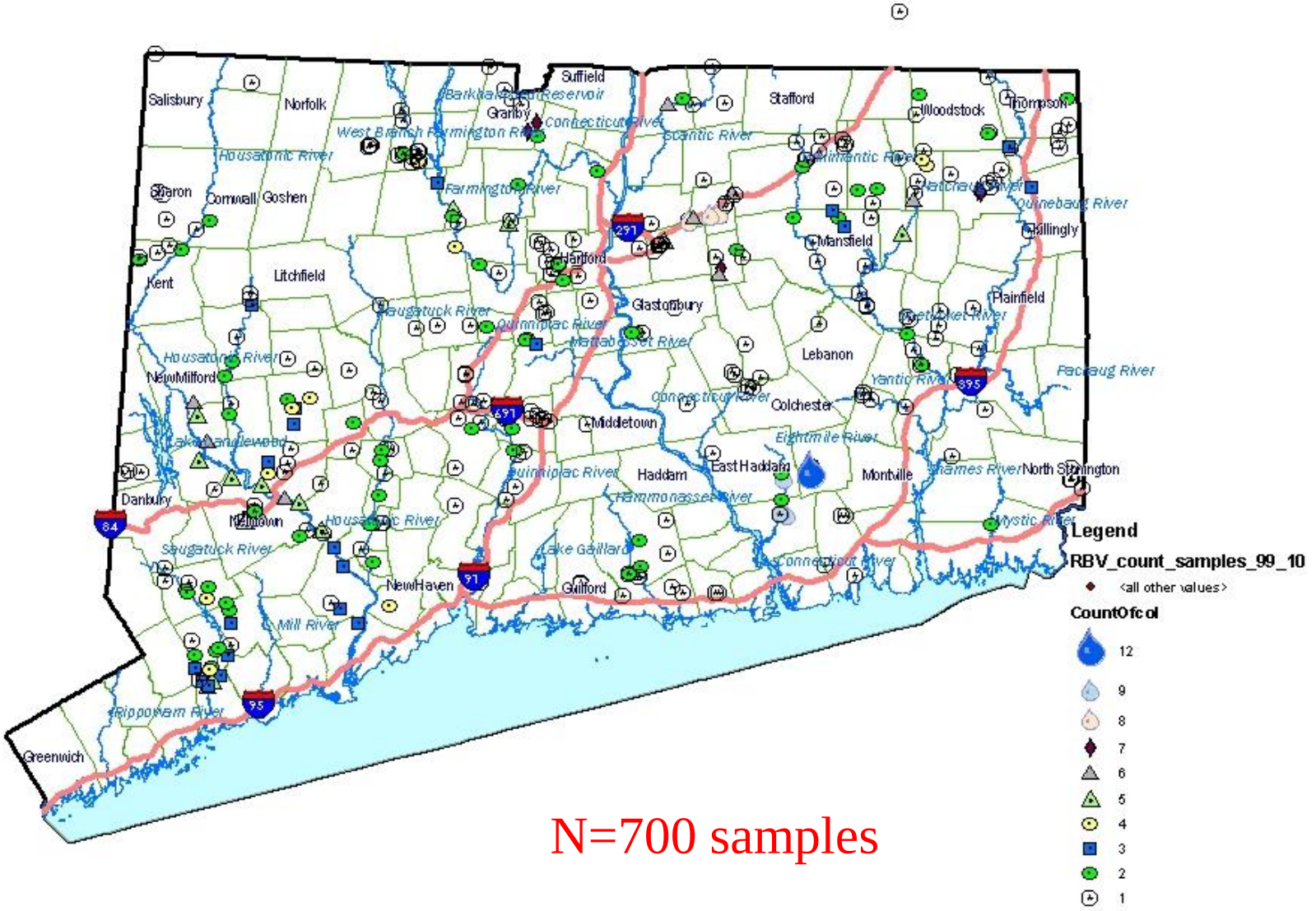
2.) Fun

3.)Key Ecological Indicator

How can the data be used?

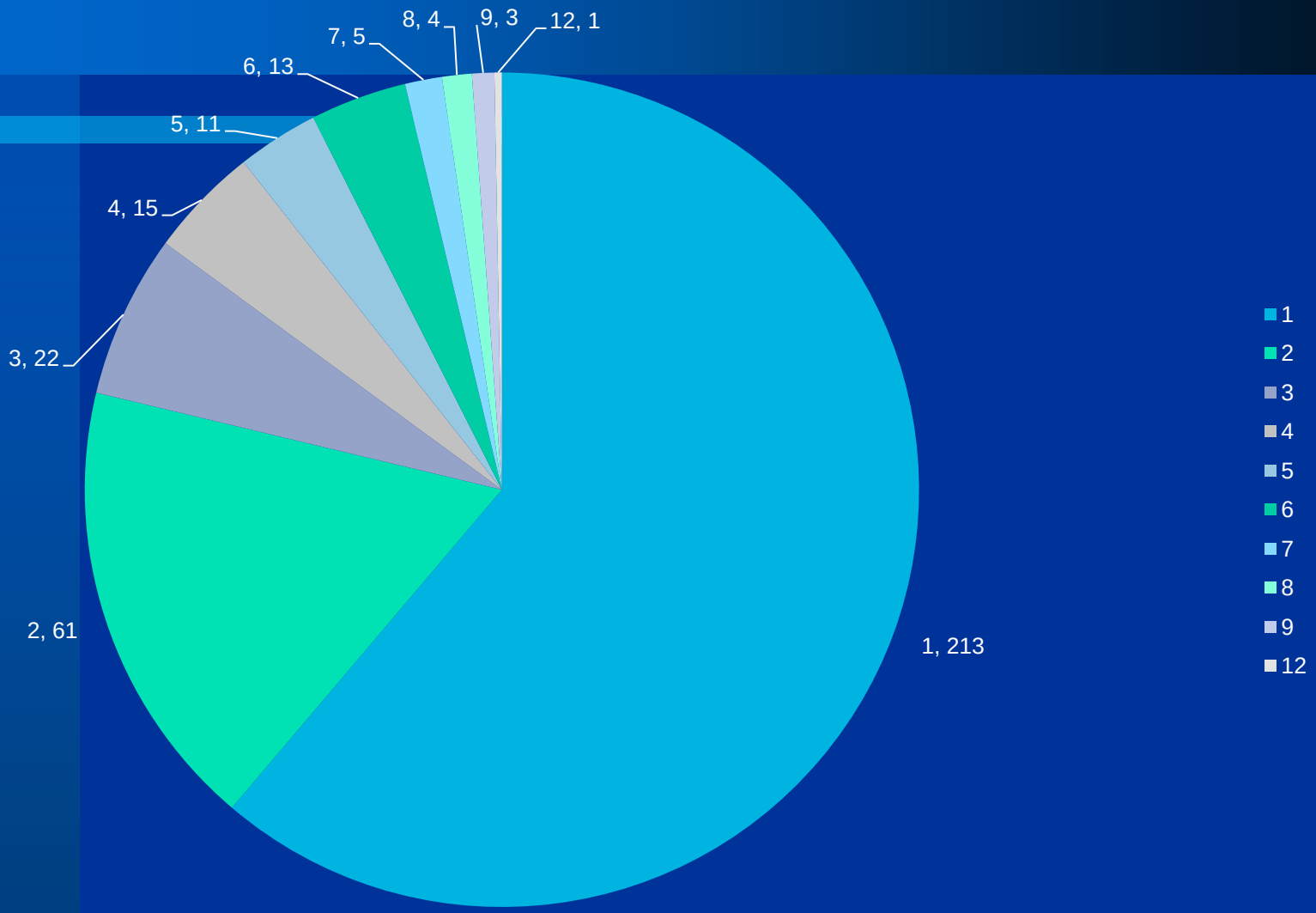
- **Screen for Very High or Very Low Water Quality.**
- **Document Baseline Conditions.**
- **Provide Additional Information.**
- **Compare Stream Reaches.**
- **Evaluate Potential Water Quality Concern.**

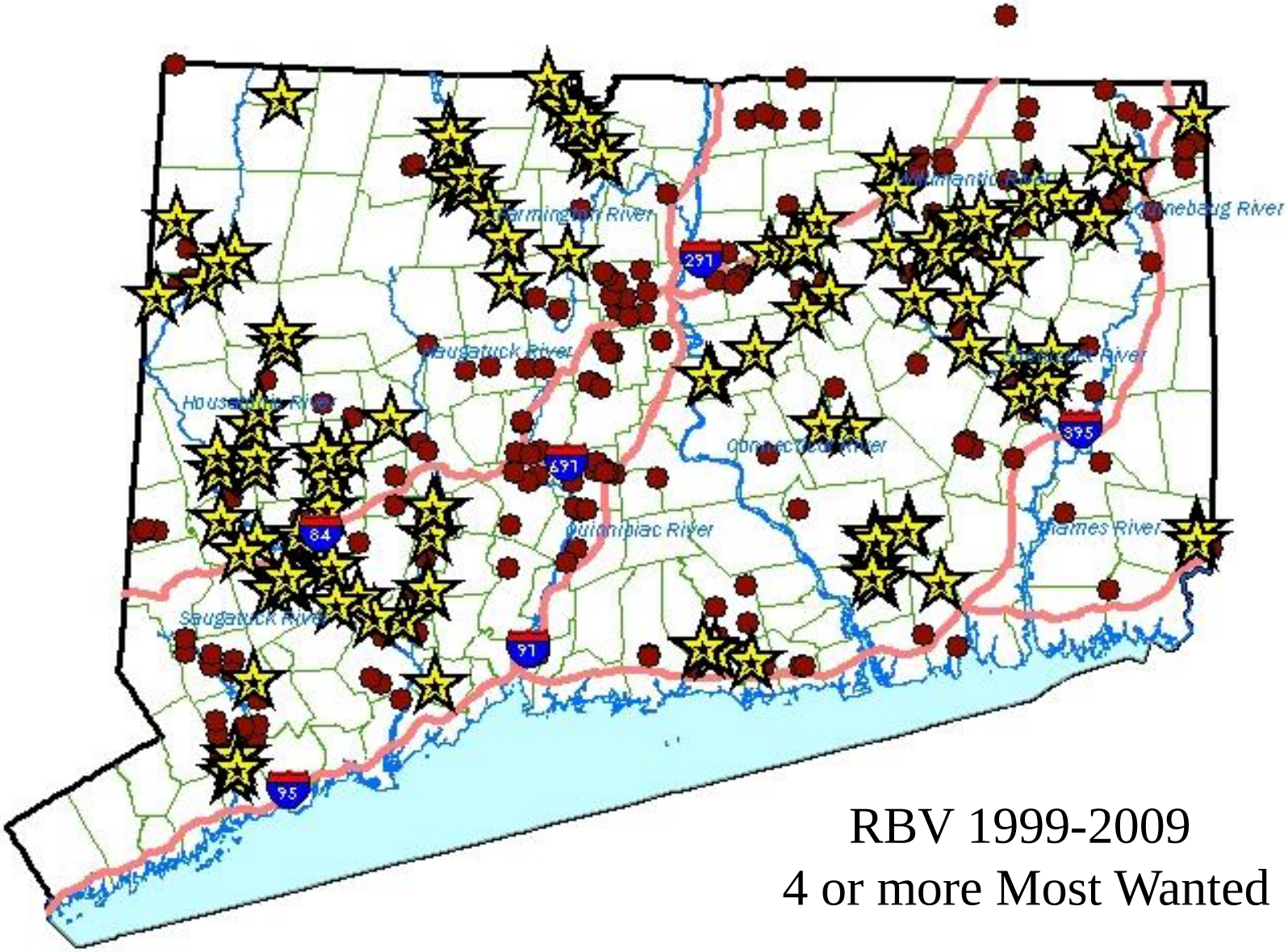
RBV samples to date (1999-2009)



N=700 samples

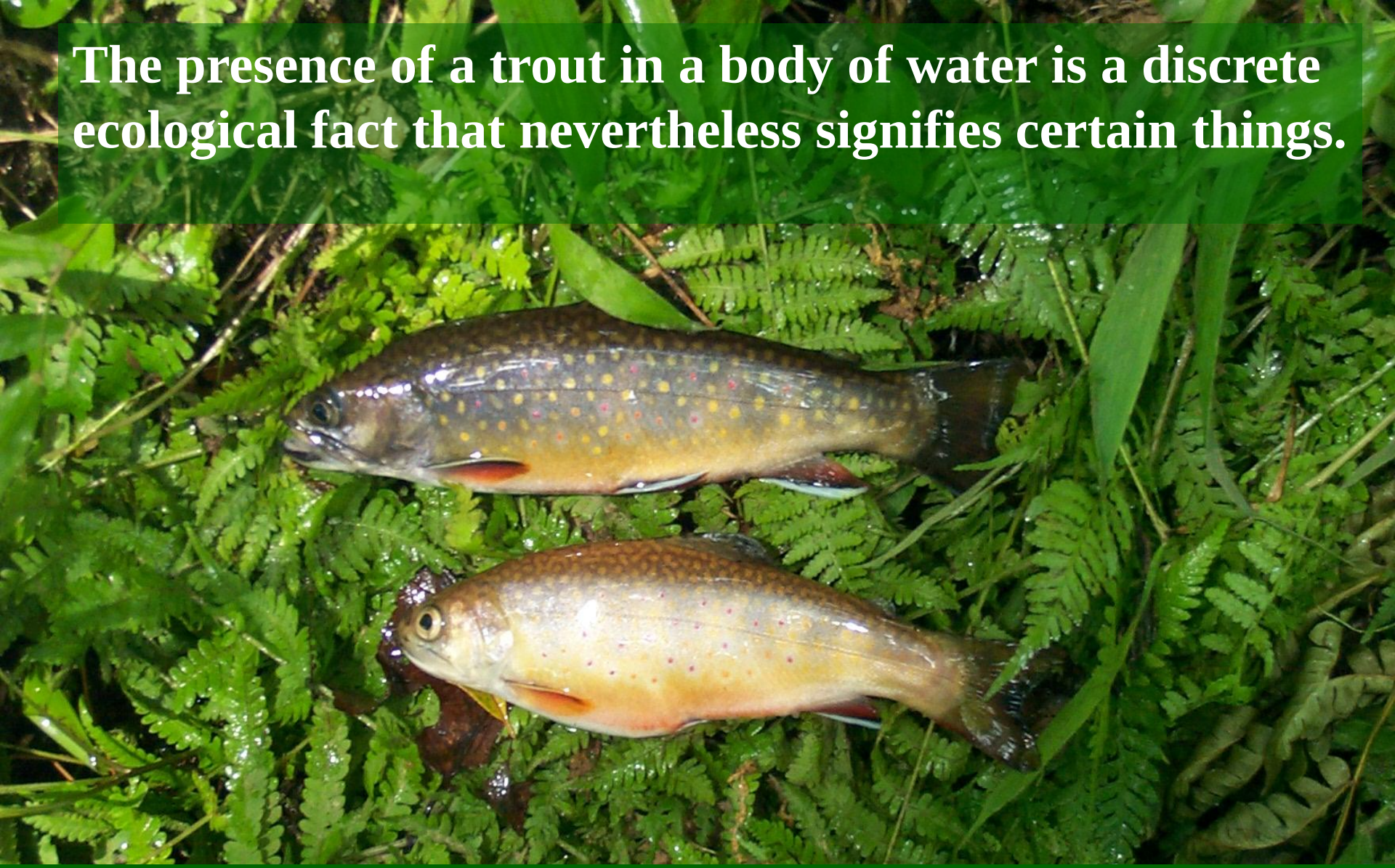
Number of samples per site location (348 sites and 700 samples)





RBV 1999-2009
4 or more Most Wanted

187/383 or 48% of sites had 4+ most wanted



The presence of a trout in a body of water is a discrete ecological fact that nevertheless signifies certain things.

…a particular complex of biotic and chemical and physical factors
a standard of richness and purity, without which that troutly presence
is impossible….David Quammen

Meghan.ruta@ct.gov

(860) 424-3061

www.ct.gov/deep/rbv