

Jun 6th, 10:30 AM - 10:50 AM

Session C4 - If You Remove It, They Will Come...The Maxwell Pond Dam Removal / Black Brook Restoration Success Story

Stephen Landry
Merrimack Watershed Supervisor - NHDES

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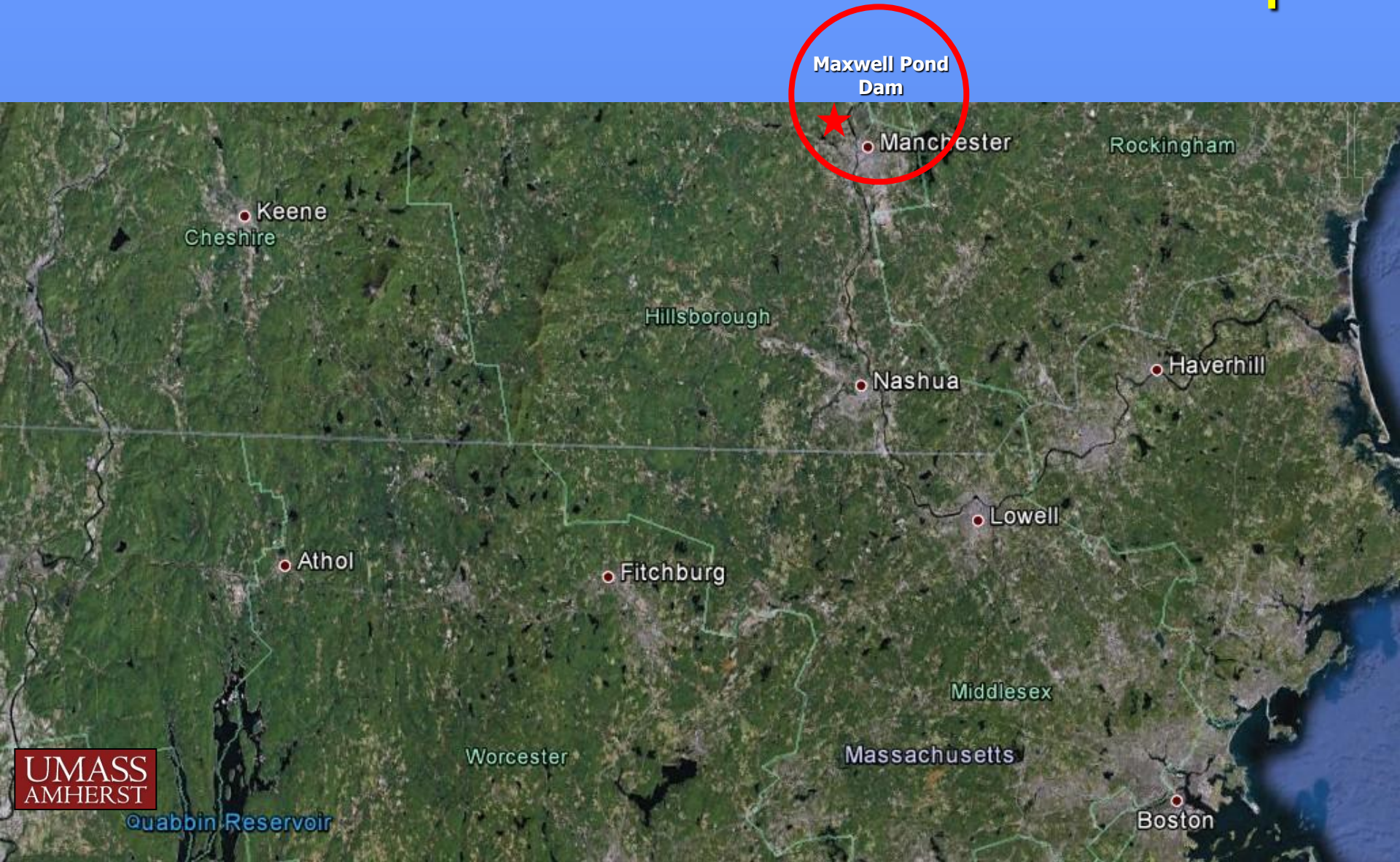
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"If you remove it, they will come..." – The Maxwell Pond Dam removal/Black Brook restoration success story



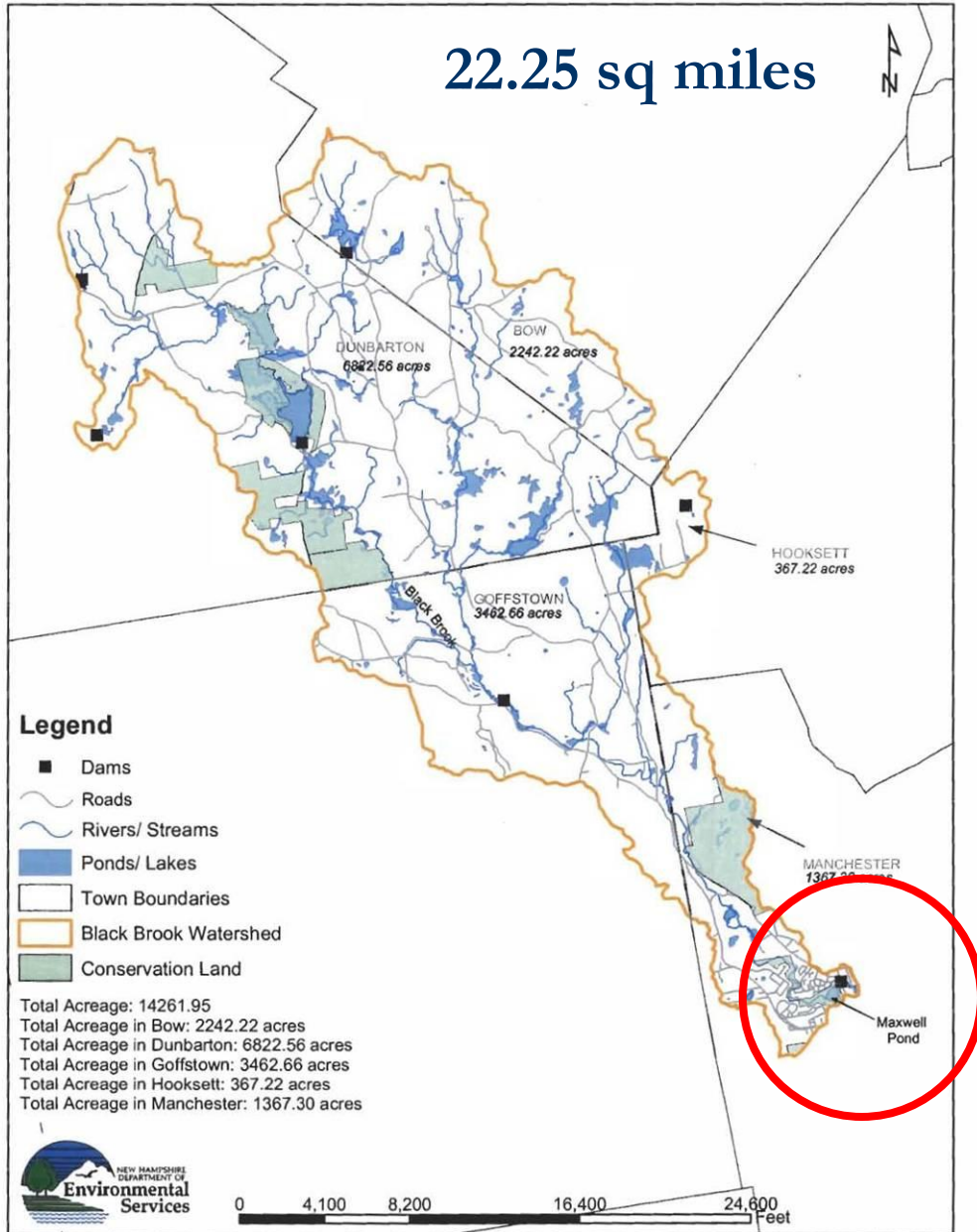
Presented by:
Stephen C. Landry – NHDES

Gulf of Maine Watershed Locus Map



Black Brook Corridor Watershed

22.25 sq miles



Maxwell Pond Dam

Grade Control

Grade Control



Maxwell Pond Dam - 1900



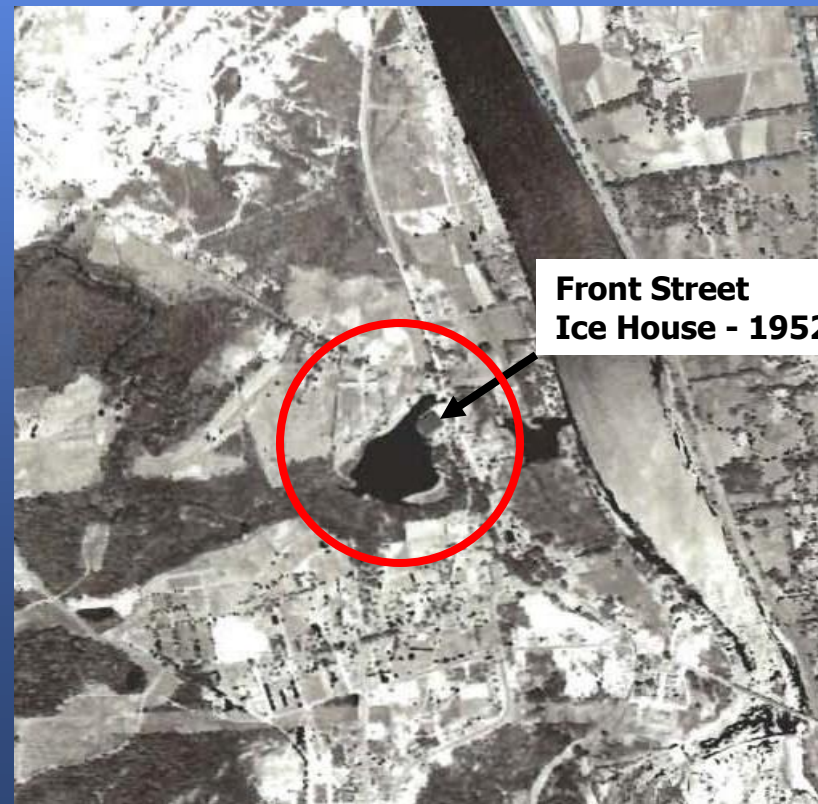
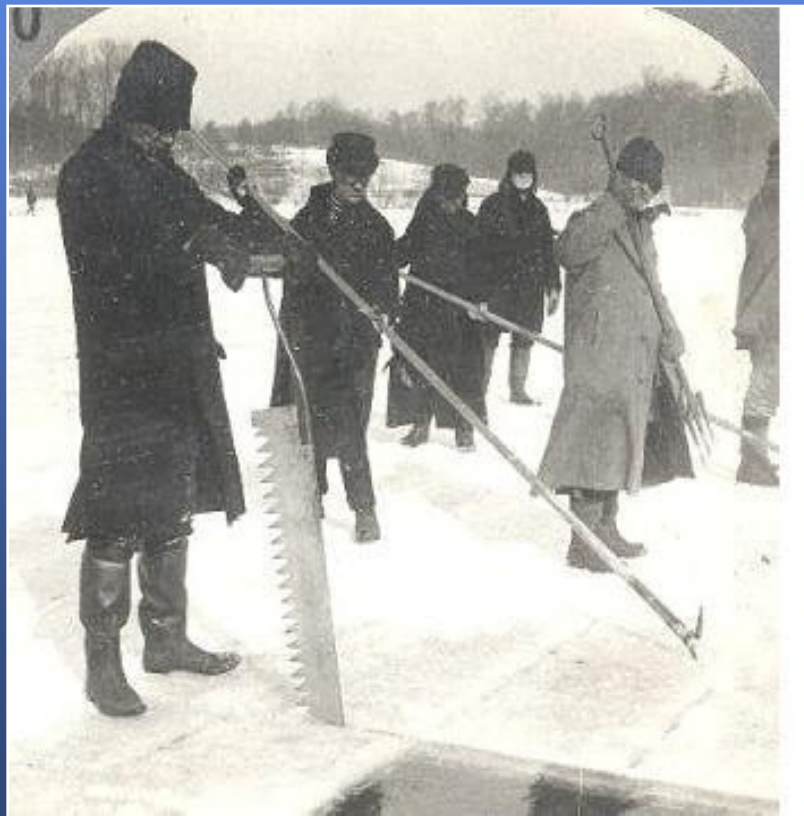
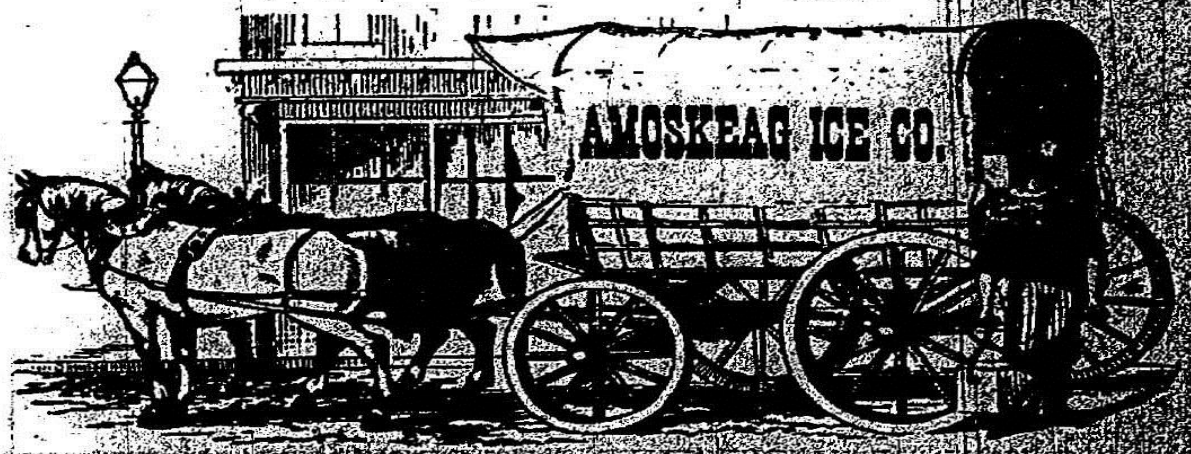
AMOSKEAG ICE CO.

A. D. MAXWELL, PROD.

ICE

1308 ELM STREET,
MANCHESTER.

ICE HOUSES,
FRONT ST., AMOSKEAG.



Front Street
Ice House - 1952

Safety – Administrative Order from DES Dam Bureau.

Economics – About \$1 million to dredge and repair or \$40K to remove and restore Black Brook.

Flooding – Front street was destroyed and local businesses were Evacuated in 2006 and 2007. Utility infrastructure was compromised.

Restoration of impaired waters – Maxwell Pond was on the 303(d) list of impaired waters since 2004 for failure to support aquatic life use due to insufficient dissolved oxygen.

22.10.2001

To the Board of Mayor and Aldermen of the City of Manchester:

The Committee on Community Improvement respectfully recommends, after due and careful consideration, that:

the Black Brook Dam (a.k.a. Maxwell Pond Dam) be removed.

The Committee advises that it has requested staff to pursue State, In-Kind services, and other funding sources to meet the estimated cost of \$115,000 for removal.

(Aldermen Garrity, Osborne, Gatsas and Duval voted yea; Alderman O'Neil was absent.)

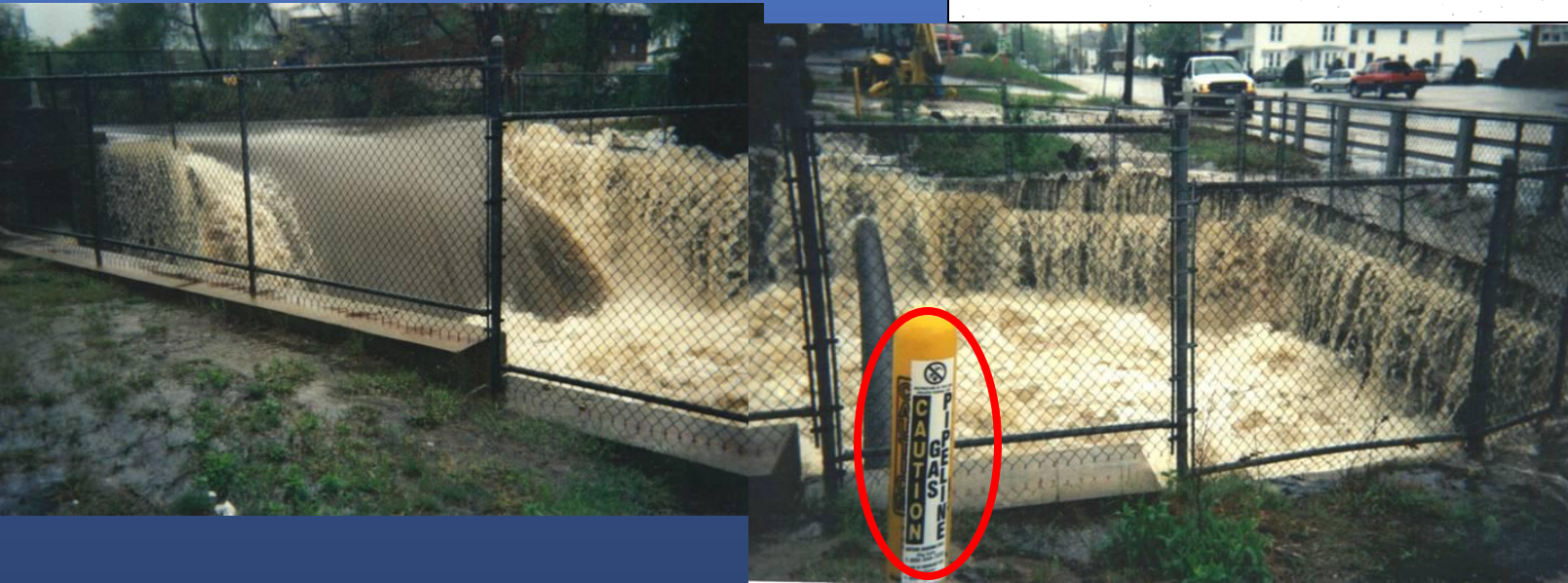
Respectfully submitted,

At a meeting of the Board of Mayor and Aldermen
held Aug. 1, 2006 on a motion of Ald. Duval
duty seconded by Ald. Osborne the report
of the Committee was accepted and its recommendations
(adopted) ~~(denied)~~

L. N. Berman

Clerk of Committee

L. N. Berman
City Clerk





The State of New Hampshire
Department of Environmental Services



Michael P. Nolin
Commissioner

October 25, 2006

Conditions required for NEPA & Section 106 of the NHPA have been met.

No Known Historic Resources

No Resources Present

No Adverse Effect

If plans change or resources are discovered in the course of this project, you must contact the Division of Historical Resources as required by federal law and regulation.

10/25/06 *James McInnes*
NH State Historic Preservation Officer

OCT 27 2006
Edna Feighner

Ms. Edna Feighner
Review and Compliance Coordinator
NH Division of Historic Resources
Department of Cultural Resources
19 Pillsbury Street
Concord, NH 03301

RE: Maxwell Pond Dam (aka Black Brook Dam) #150.07 - Manchester, NH

Dear Ms. Feighner:

This is a follow-up to the bi-monthly Cultural Resource Agency meeting October 5, 2006 at the NH Department of Transportation. As a result of the subject project, it was determined that the removal of the subject dam, gate walls and affiliated channel work would not have an effect on historical resources. A "Historic Properties Affected" determination was made. For your reference, a copy of the October 5, 2006 meeting minutes specific to this project. In addition, a handout that included the following information:

- Historic and current photos of the dam and adjacent area
- Aerial photography from 2003 noting the project location
- Aerial photography of the project area from 1952, 1962, 1992 and 2003
- Historical maps of the project area from 1892 and 1915
- Amoskeag Village Area Map from 1991





STATE OF NEW HAMPSHIRE

Inter-Department Communication

Date: March 17, 2008
At (Office) Water Division

From: Lori S. Siegel, Ph.D., P.E.
Ecological Risk Assessor
Watershed Management Bureau

Subject: **Bioaccumulation Potential and Sediment Bioassays at the Maxwell Pond Dam, Manchester, NH**

To: Steve Landry and Deborah S. Loiselle
Dam Bureau, Water Division

The attached spreadsheet evaluates the sediment data as reported according to detection limits versus the reporting limits as was done in the previous laboratory report. The detection limits are closer to the thresholds than the reporting limits were but still not always below the thresholds. Therefore, it is not yet clear whether or not certain pesticides pose benthic risk. The spreadsheet calculates the screening level value (SLV), i.e., the theoretical concentration in biological tissue, using conservative assumptions. Specifically, the calculations use the greatest of available biota-sediment bioaccumulation factor (BSAF), except for when the median was much lower than a single high value in which case the median is used. Additionally, the calculations use the least of the tissue thresholds, a conservative lipid concentration (0.08), and the sediment concentration as though it were detected at the detection limit. This last item is extremely conservative considering non-detects are usually incorporated into analyses by assuming the concentration equals half the detection limit. The calculated tissue thresholds divided by the thresholds are all less than 1, i.e., the tissue threshold is not exceeded, except for 3 contaminants. However, the ratios for these are 1.15, 1.06, and 1.07, indicating the exceedance is very slight. Using slightly less conservative assumptions brings these ratios to well below 1. **In conclusion, I do not recommend further investigating the bioaccumulation risk.**

Regardless, as indicated in the memo dated 1/1/08, known threshold exceedances, which suggest risk to benthic organisms warrant sediment bioassays to be performed. I suggest four samples be collected, one near each of the chemistry samples, but to first analyze only the one near MP-



Sweet!!

Yea!



STATE OF NEW HAMPSHIRE

Inter-Department Communication

Date: September 11, 2008
At (Office) Water Division

From: Lori S. Siegel, Ph.D., P.E.
Ecological Risk Assessor
Watershed Management Bureau

Subject: **Sediment Bioassay Results at the Maxwell Pond Dam (#150.07), Manchester, NH**

To: Steve Landry, Watershed Management Bureau - Water Division
Deborah S. Loiselle, Dam Bureau - Water Division

I have reviewed the two reports summarizing the toxicological evaluations of Maxwell Pond sediment samples. Both are dated July 11, 2008 and are prepared by EnviroSystems, Inc. for Dubois & King, Inc. and submitted to NHDES in August 2008. These reports are "Hyalella azteca Survival, Growth and Reproduction Sediment Toxicity Test: Black Brook/Maxwell Pond Site, Manchester NH" and "Chironomus dilutus Survival and Growth Sediment Toxicity Test: Black Brook/Maxwell Pond Dam".

Although four samples were collected for bioassays, only the sediment from the location with the greatest risk according to chemistry screening, i.e., MP-S4, was evaluated. In accordance with the Guidance Document for the Evaluation of Sediment Quality (NHDES, WD-04-9, 2004), the bioassays tested both acute and chronic toxicity for survival and growth for both the amphipod H. azteca and the insect C. dilutus. Survival and growth of the Maxwell Pond sediment were statistically similar to those of the laboratory controls. These results indicate that neither survival nor growth is compromised, i.e. benthic organisms are not subject to unacceptable levels of risk. As such, the other samples that were collected do not warrant toxicological evaluation. Coupled with the lack of risk to higher trophic organisms due to bioaccumulation (Siegel memo dated March 17, 2008), sediments are not compromising the ecological integrity of the aquatic environment. Consistently, the down-gradient environment is not at risk of being compromised upon dam removal.

In conclusion, sediment evaluation for dam removal purposes is complete and has shown that remedial measures are not necessary.

If you "un-build" it, they will come...



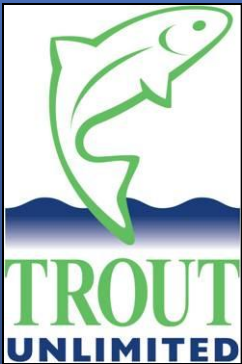
**Gulf of Maine
Council on the
Marine Environment**



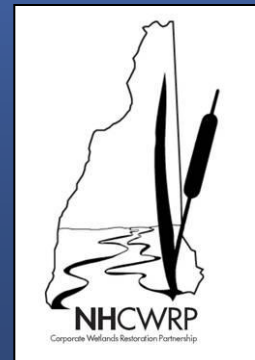
American Rivers
Thriving By Nature



FairPoint
communications™



**DuBois
& King** inc.





Summer 2008



Drawdown – September 2008



February 24th 2009 Morning



March 9th 2009



March 10th 2009 - Morning



March 24th 2009



June 29th 2009



July 27 , 2010



September 29, 2011



March 6, 2012

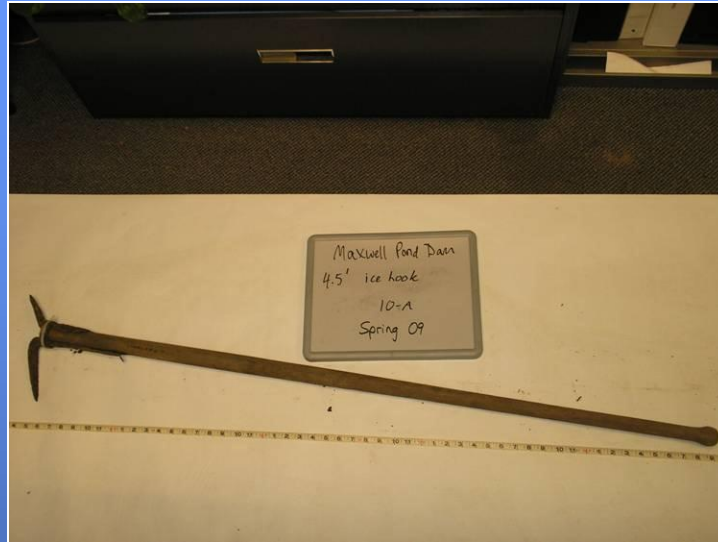
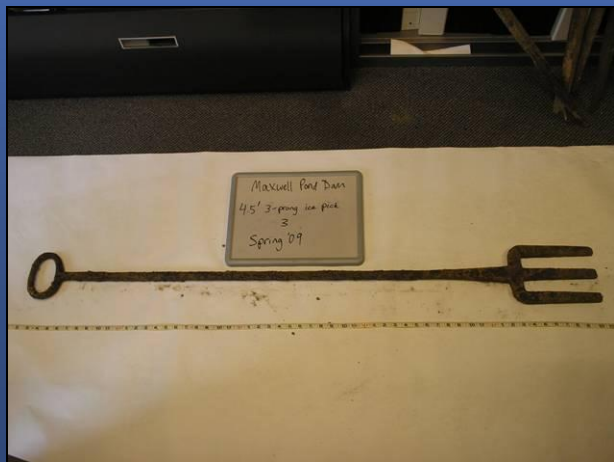
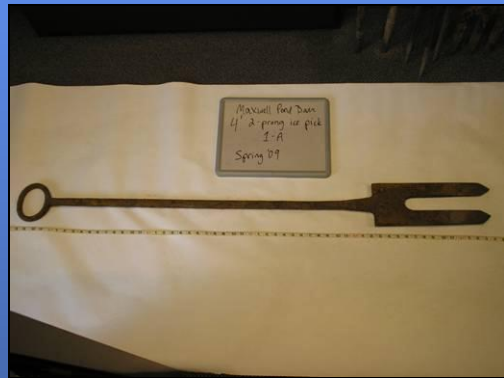
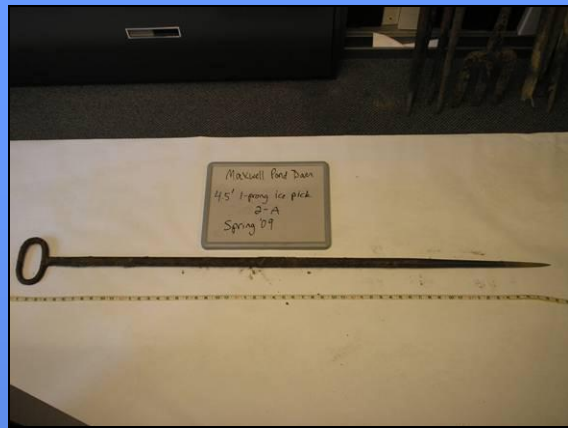


April 13, 2012



May 31, 2012

Lost & Found





The Manchester Historic Association

presents this

Historic Preservation Award

to
*New Hampshire Department of
Environmental Services
Preservation of Historic Artifacts Award
for preserving ice harvesting artifacts from the
former Maxwell Pond*

for Dedication and Commitment
to the Preservation of
The History of
Manchester, New Hampshire

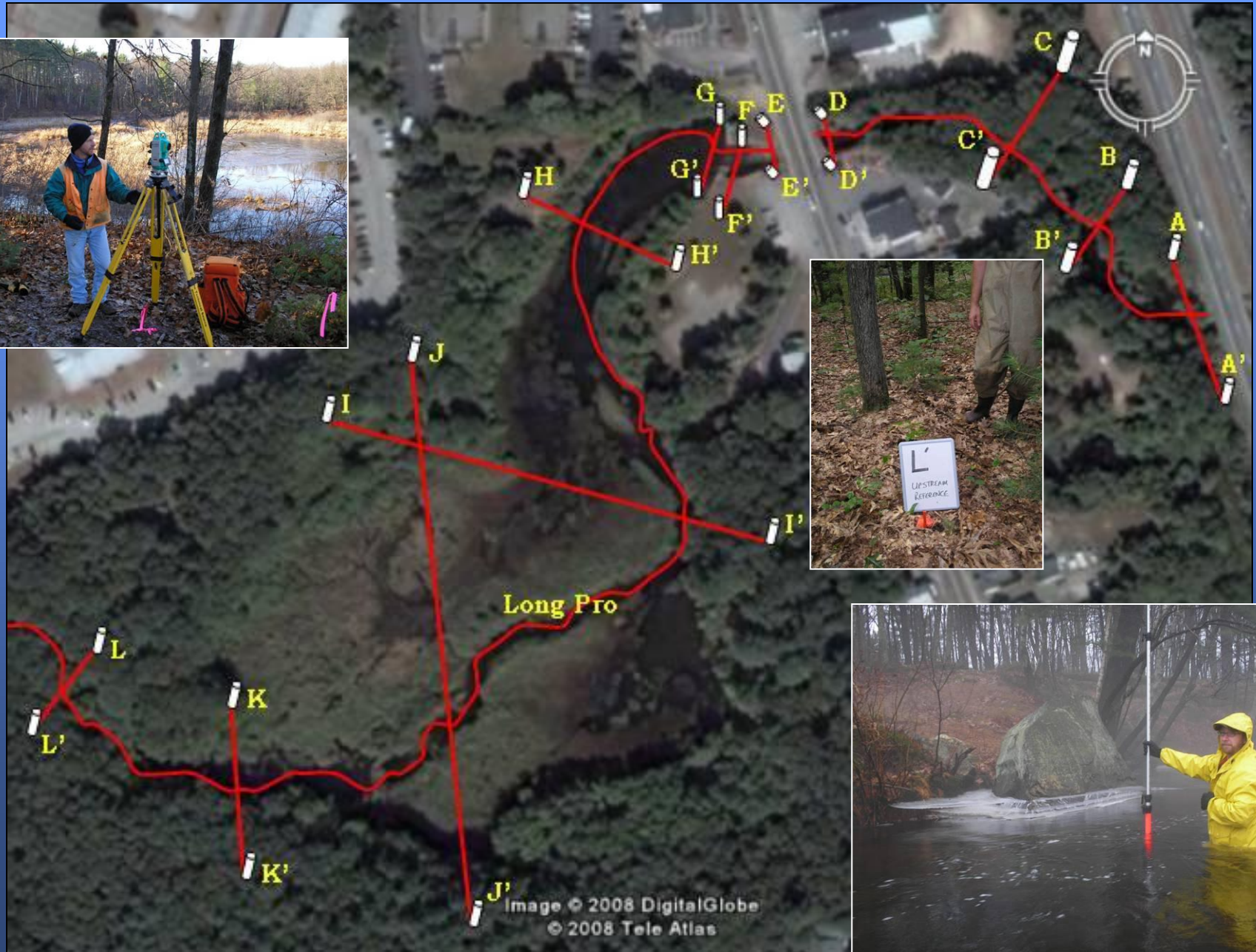
2010

Elizabeth J. Garrison
President, Board of Trustees

Anne Egan
Executive Director



Pre- and Post- Monitoring at MPD



Pre- and Post- Monitoring at MPD

The cover of a guide titled "STREAM BARRIER REMOVAL MONITORING GUIDE". The background image shows a stone dam or barrier across a stream. The text is overlaid on the right side of the cover. Below the title is a 2x2 grid of small images showing various stages of stream barrier removal and monitoring. At the bottom right, there is a logo for the "Gulf of Maine Council on the Marine Environment" and the date "December 2007".

STREAM BARRIER
REMOVAL
MONITORING
GUIDE

Gulf of Maine
Council on the
Marine Environment
December 2007



Monumented Photo Points

H-1



E-1



H-2



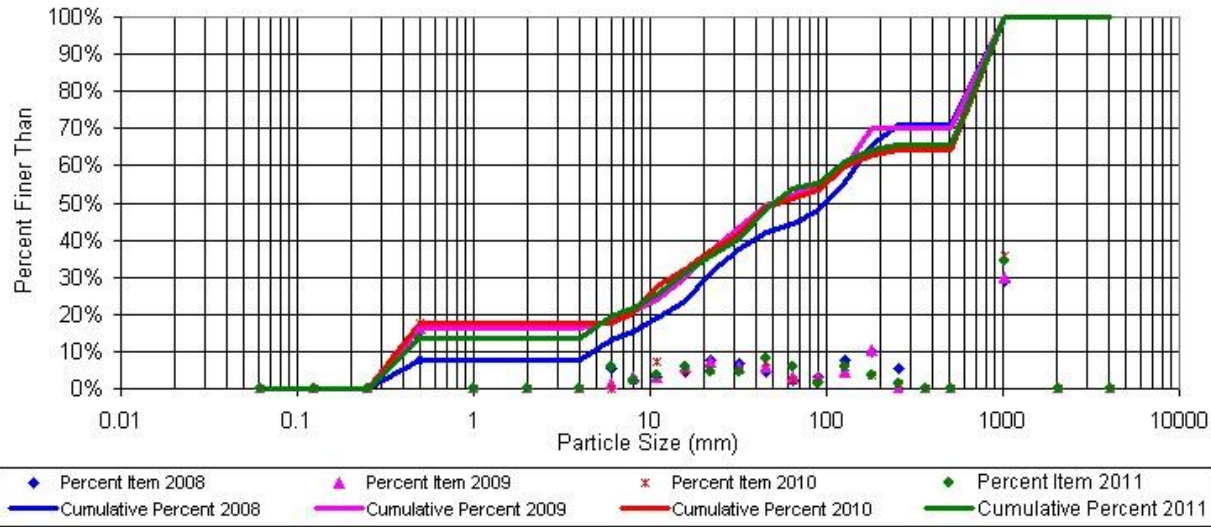
Streambed Particle Size Analyses



Stream Name: Black Brook
 Reach #: L

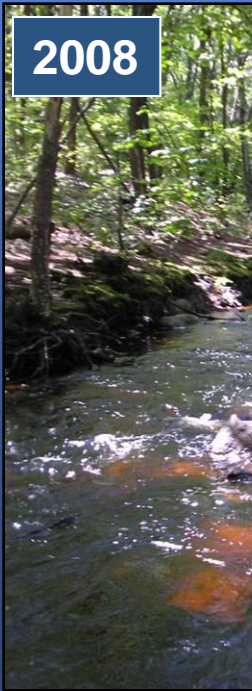
Date: 2008-2011
 Town: Manchester

Riffle/Step Pebble Count

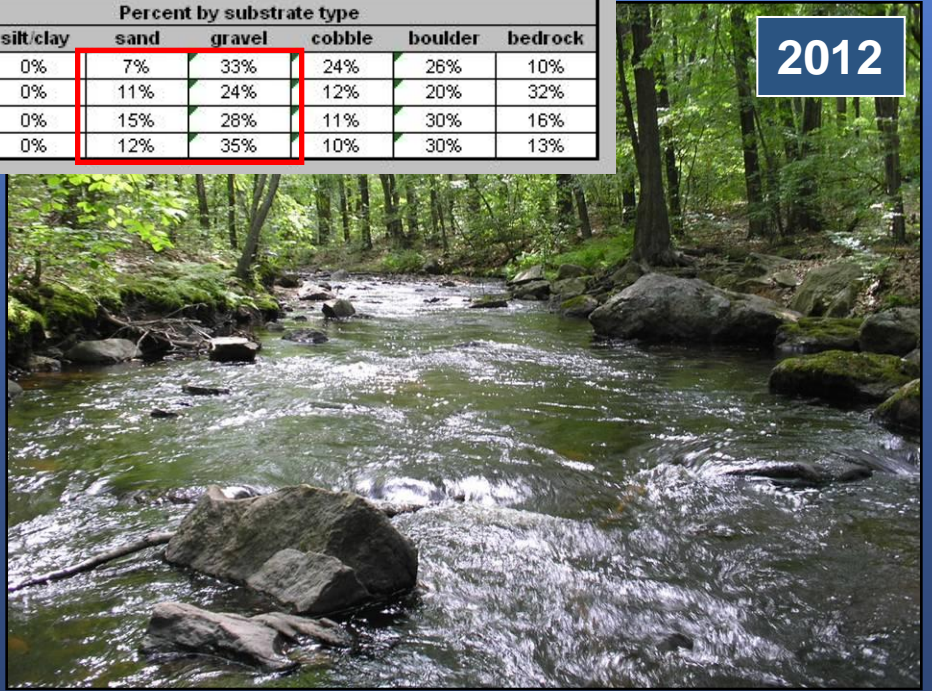


Upstream
 Reference
 X-Section "L"

	Size percent less than (mm)					Percent by substrate type					
	D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
2008	8.347	27.375	99.529	697.550	908.236	0%	7%	33%	24%	26%	10%
2009	0.491	19.932	49.142	706.233	911.753	0%	11%	24%	12%	20%	32%
2010	0.465	19.369	53.666	750.652	929.300	0%	15%	28%	11%	30%	16%
2011						0%	12%	35%	10%	30%	13%



2008

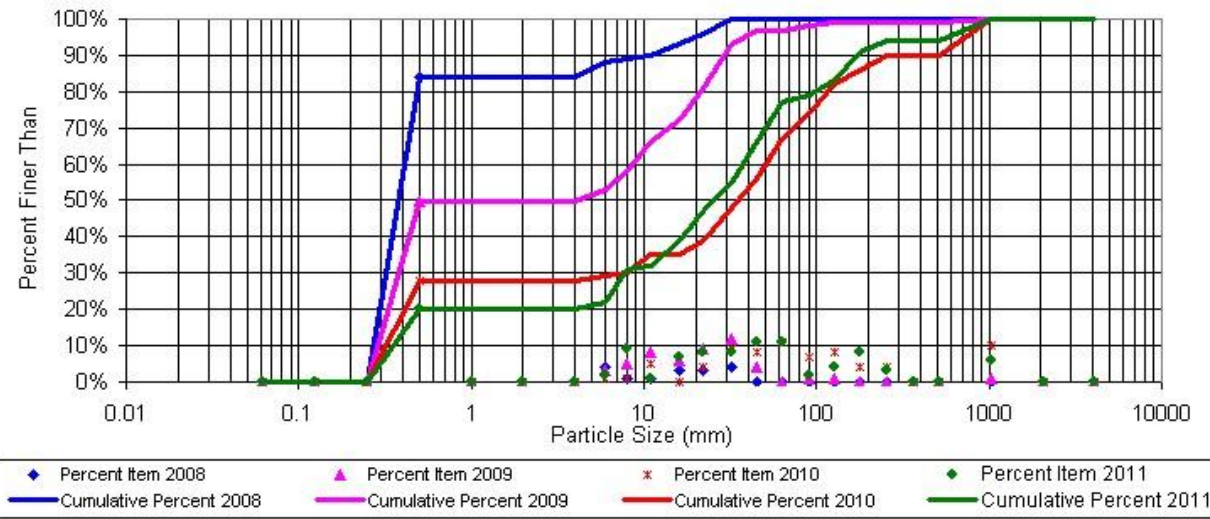


2012

Stream Name: Black Brook
 Reach #: H

Date: 2008-2011
 Town: Manchester

Riffle/Step Pebble Count



X-Section "H"
 (Maxwell Pond)

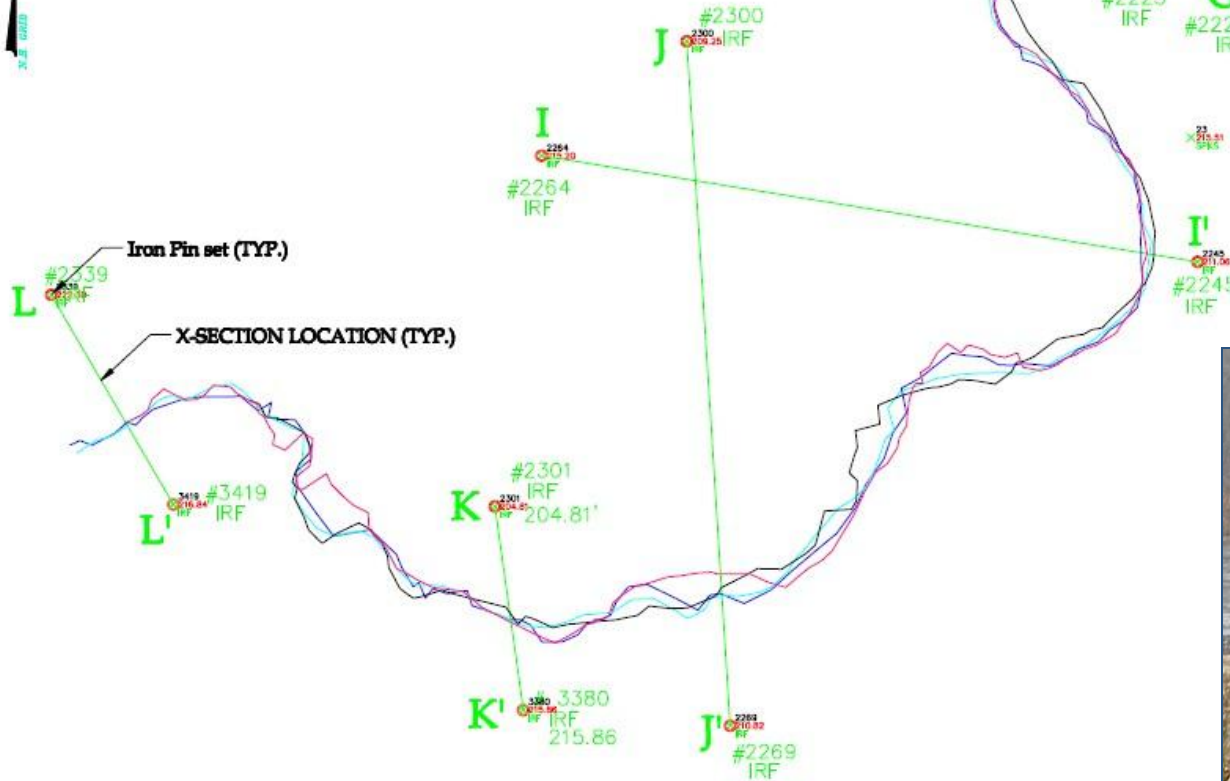
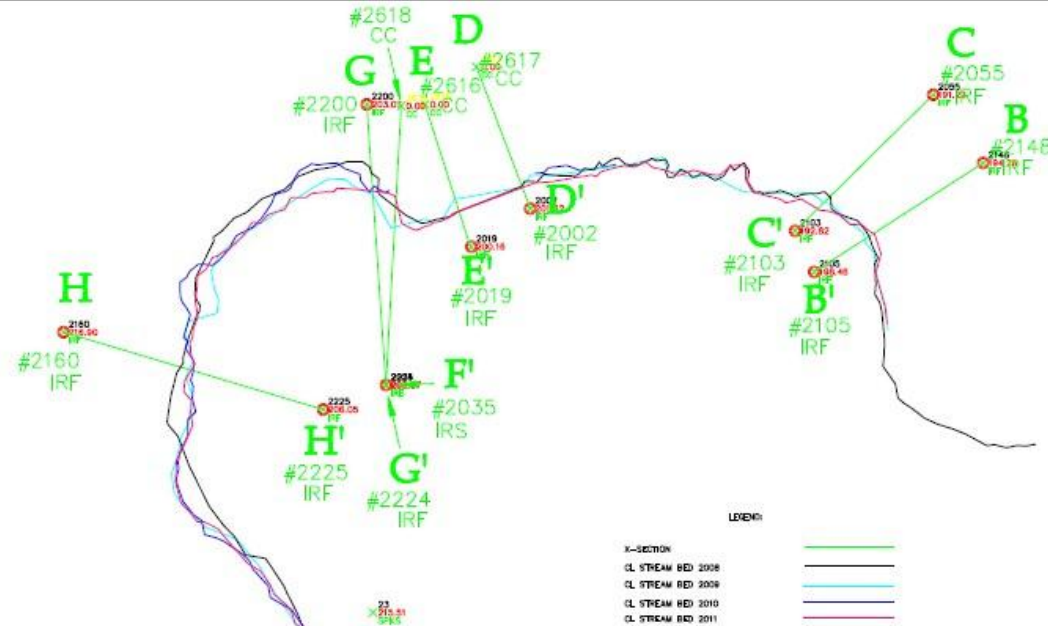
2008

2012

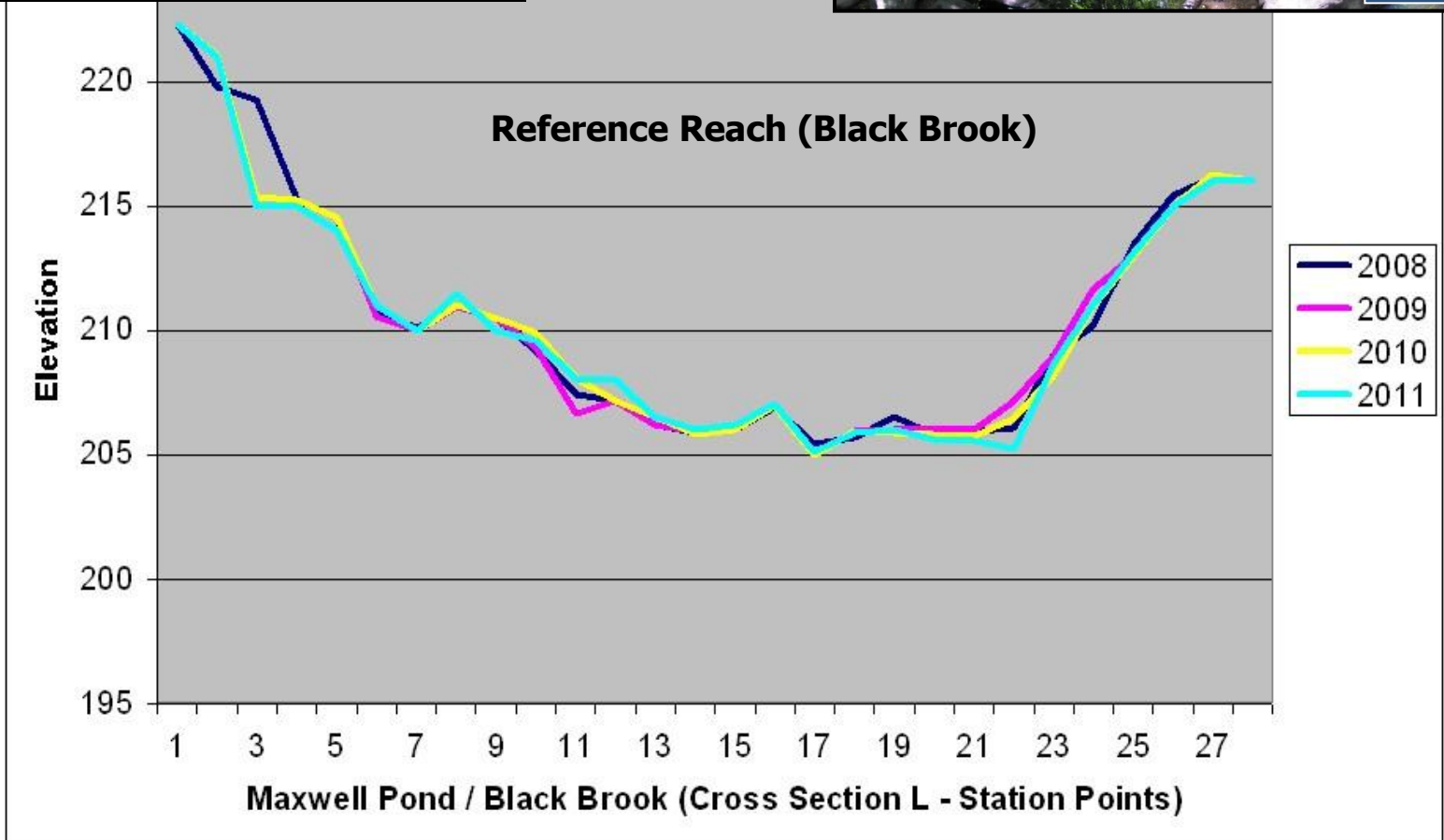
	Size percent less than (mm)					Percent by substrate type					
	D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
2008	0.285	0.334	0.377	0.499	19.680	0%	84%	16%	0%	0%	0%
2009	0.312	0.406	0.500	24.160	37.947	0%	50%	47%	2%	1%	0%
2010	0.371	11.000	34.847	151.789	724.077	0%	28%	39%	23%	10%	0%
2011						0%	20%	57%	17%	6%	0%

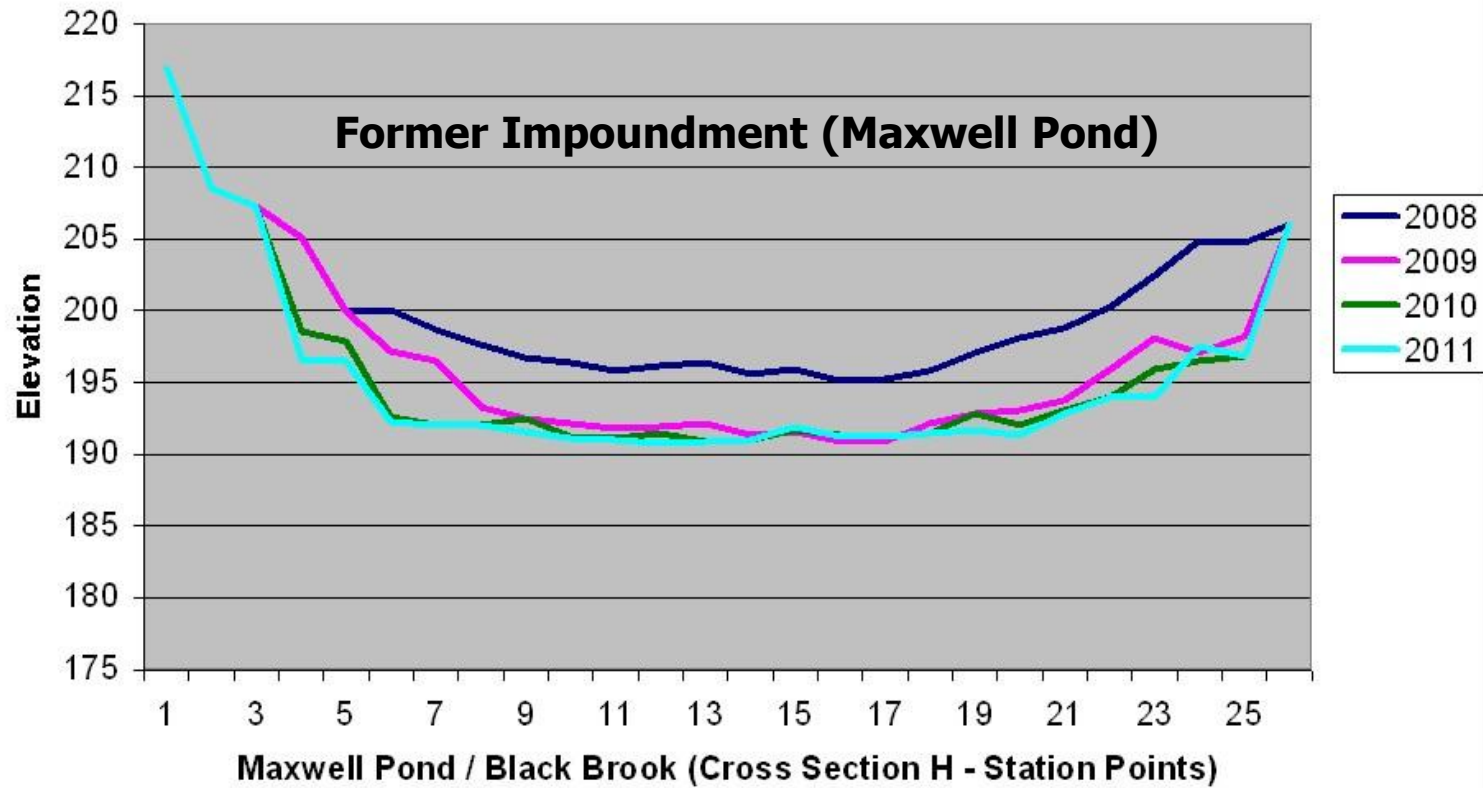


Pre-removal slope = 0.43%

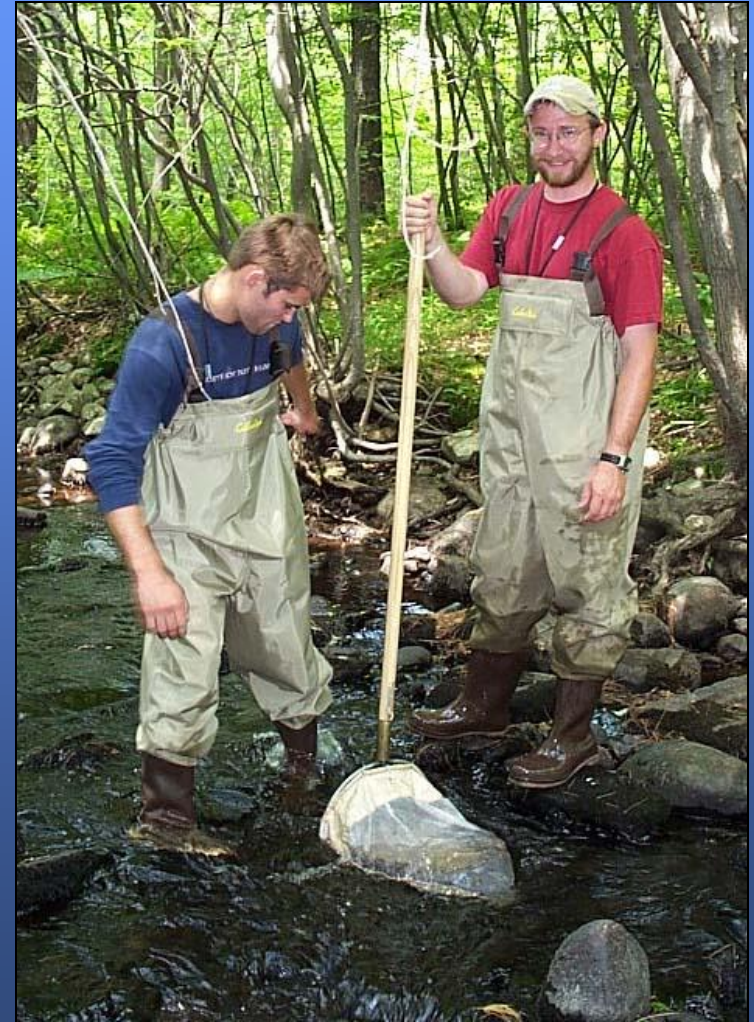


Post-removal slope = 1.03%



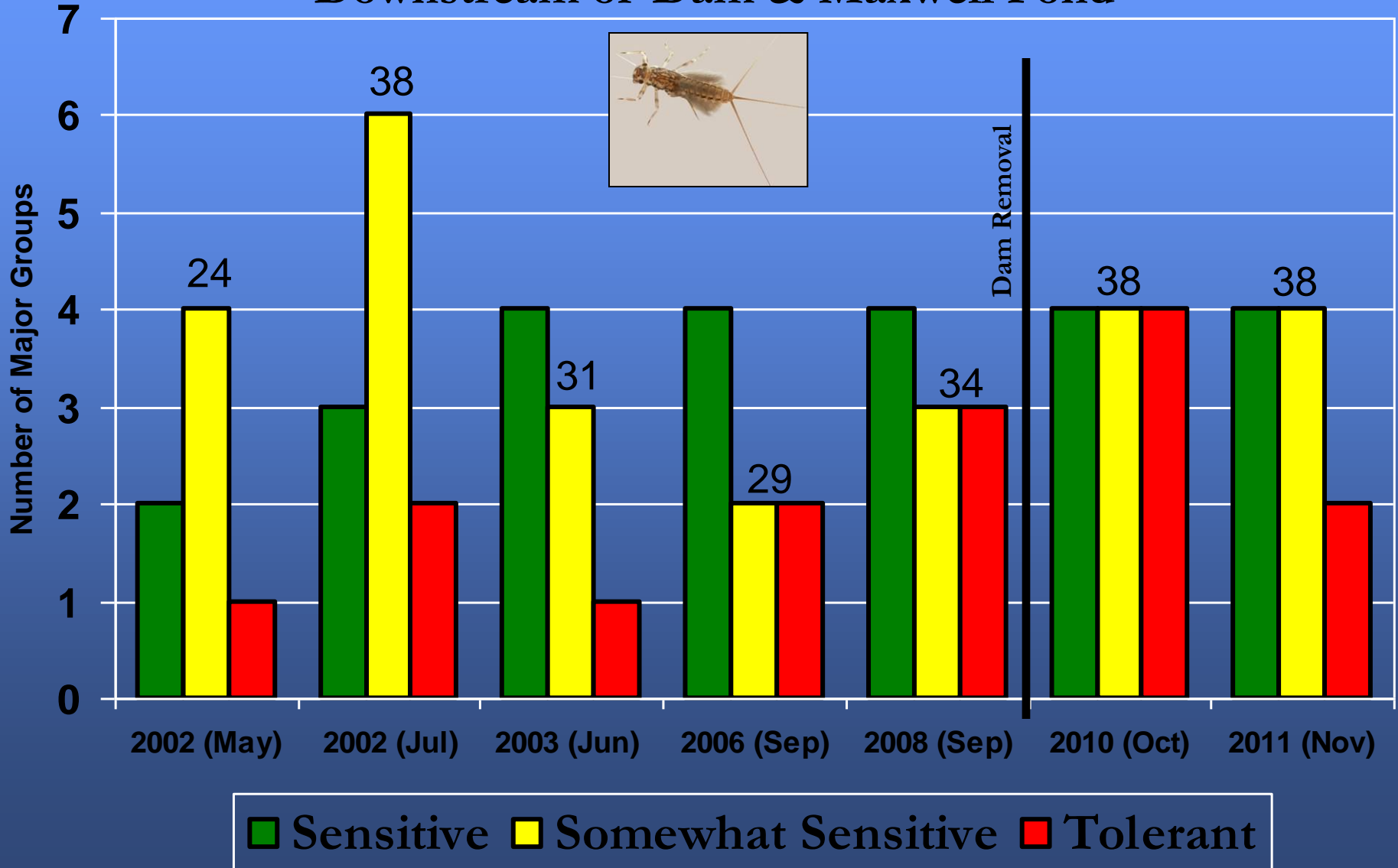


Rapid Bioassessment Aquatic Macroinvertebrate Surveys



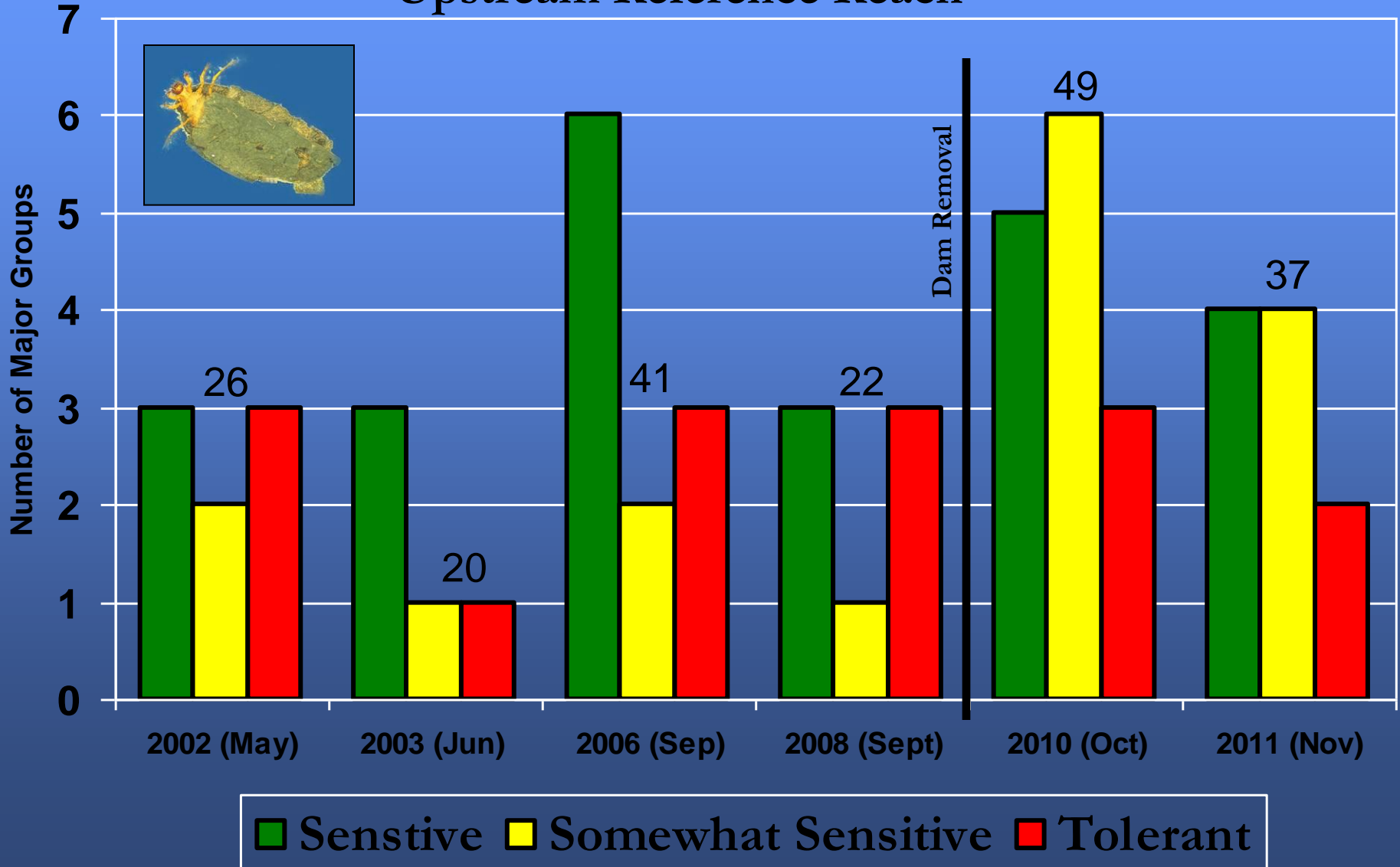
Black Brook Rapid Bioassessment Aquatic Macroinvertebrate Surveys 2002 – 2011

Downstream of Dam & Maxwell Pond



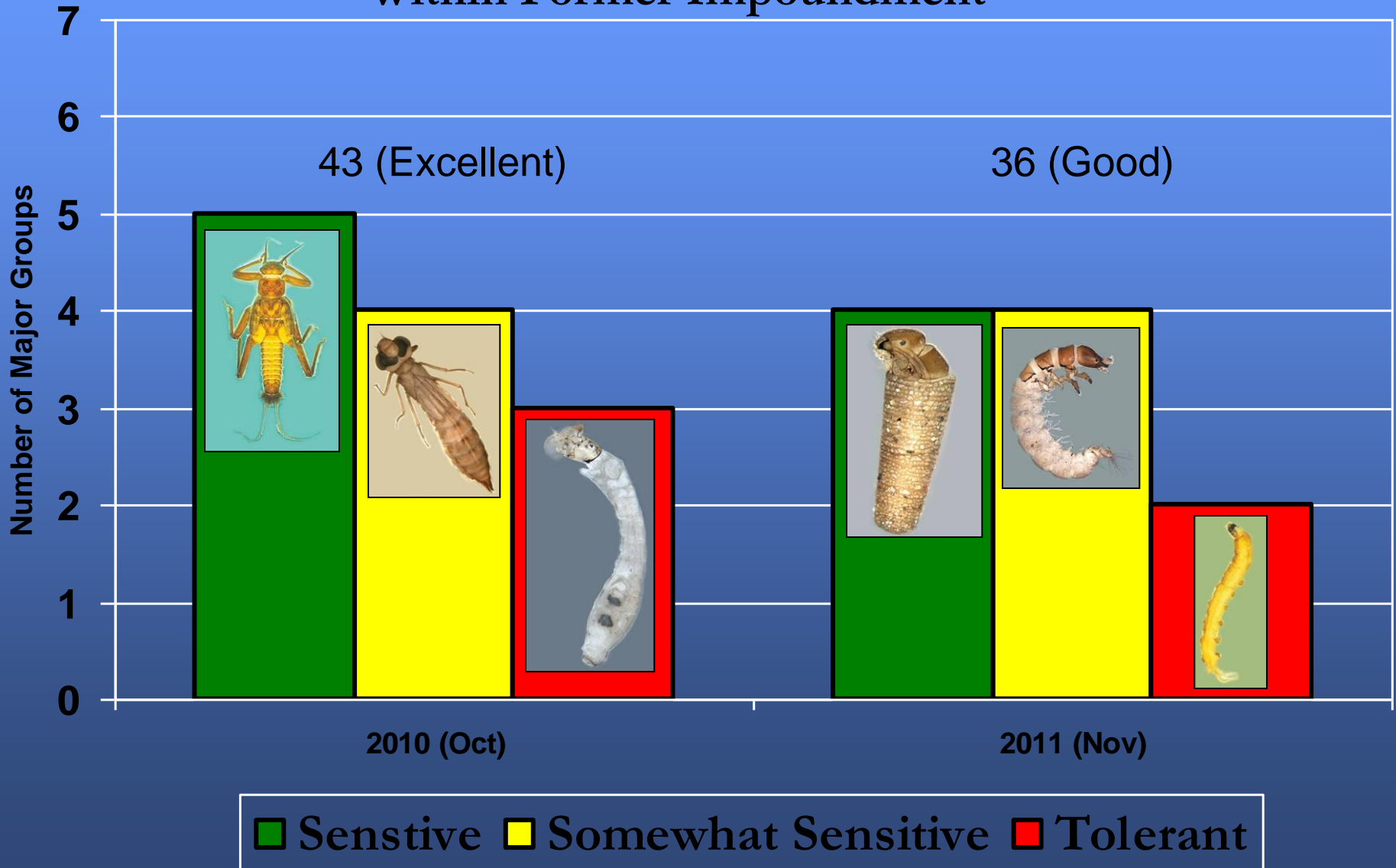
Black Brook Rapid Bioassessment Aquatic Macroinvertebrate Surveys 2002 – 2011

Upstream Reference Reach



Black Brook Rapid Bioassessment Aquatic Macroinvertebrate Surveys 2002 – 2011

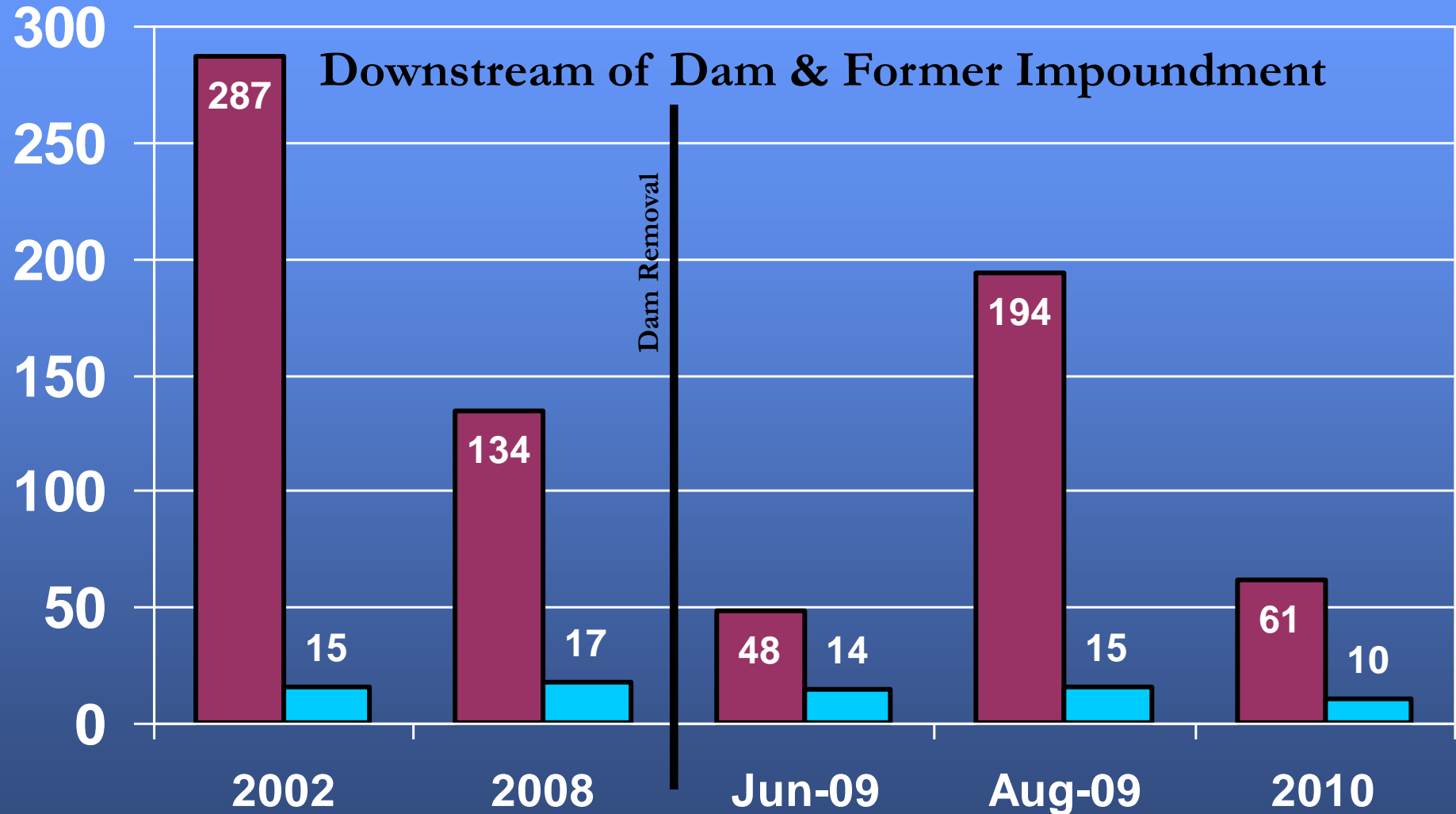
Within Former Impoundment



Fish Population Surveys



Black Brook Fish Population Surveys 2002 – 2010

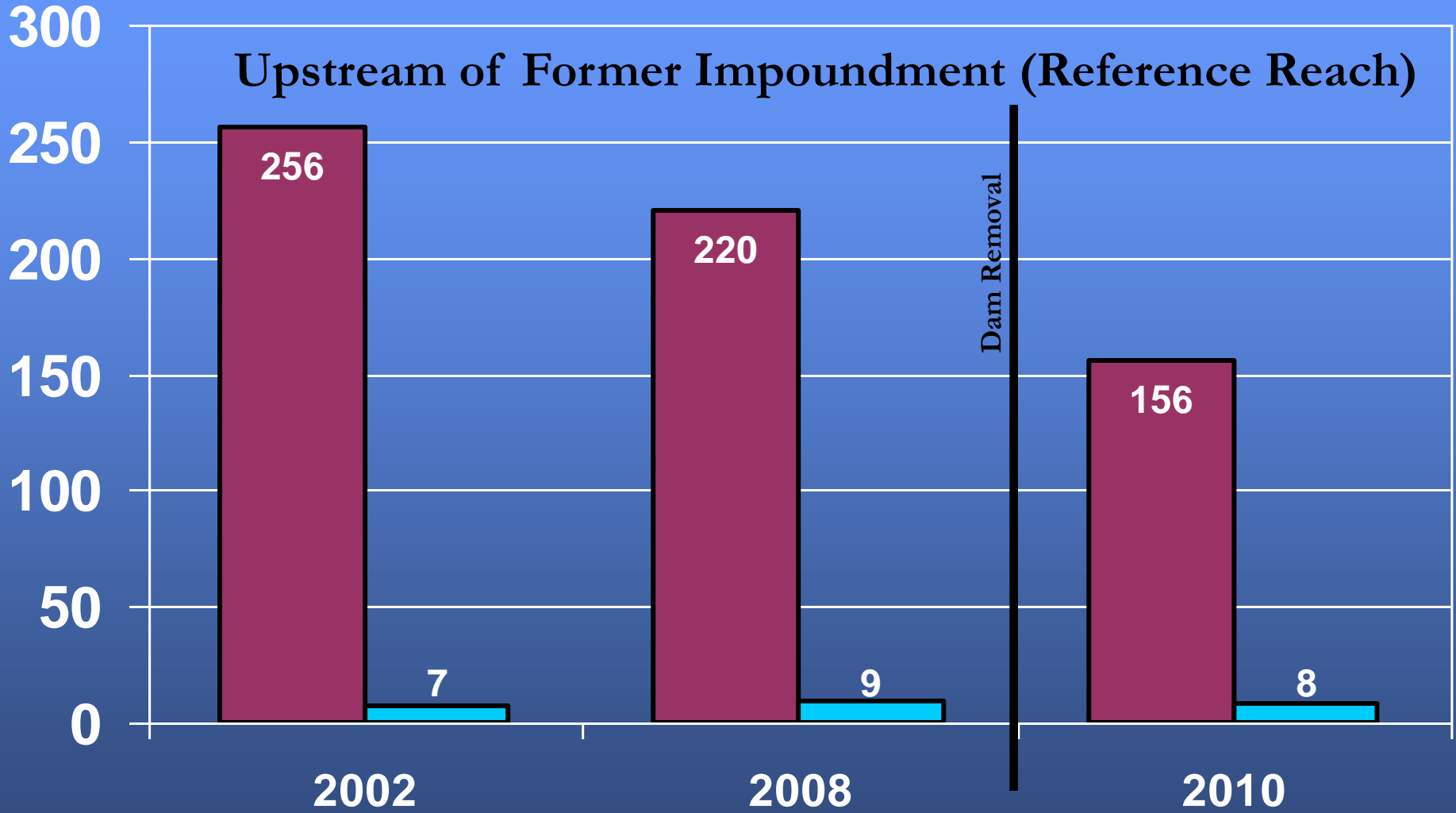


Dam Removal

■ Total Fish ■ Total Species

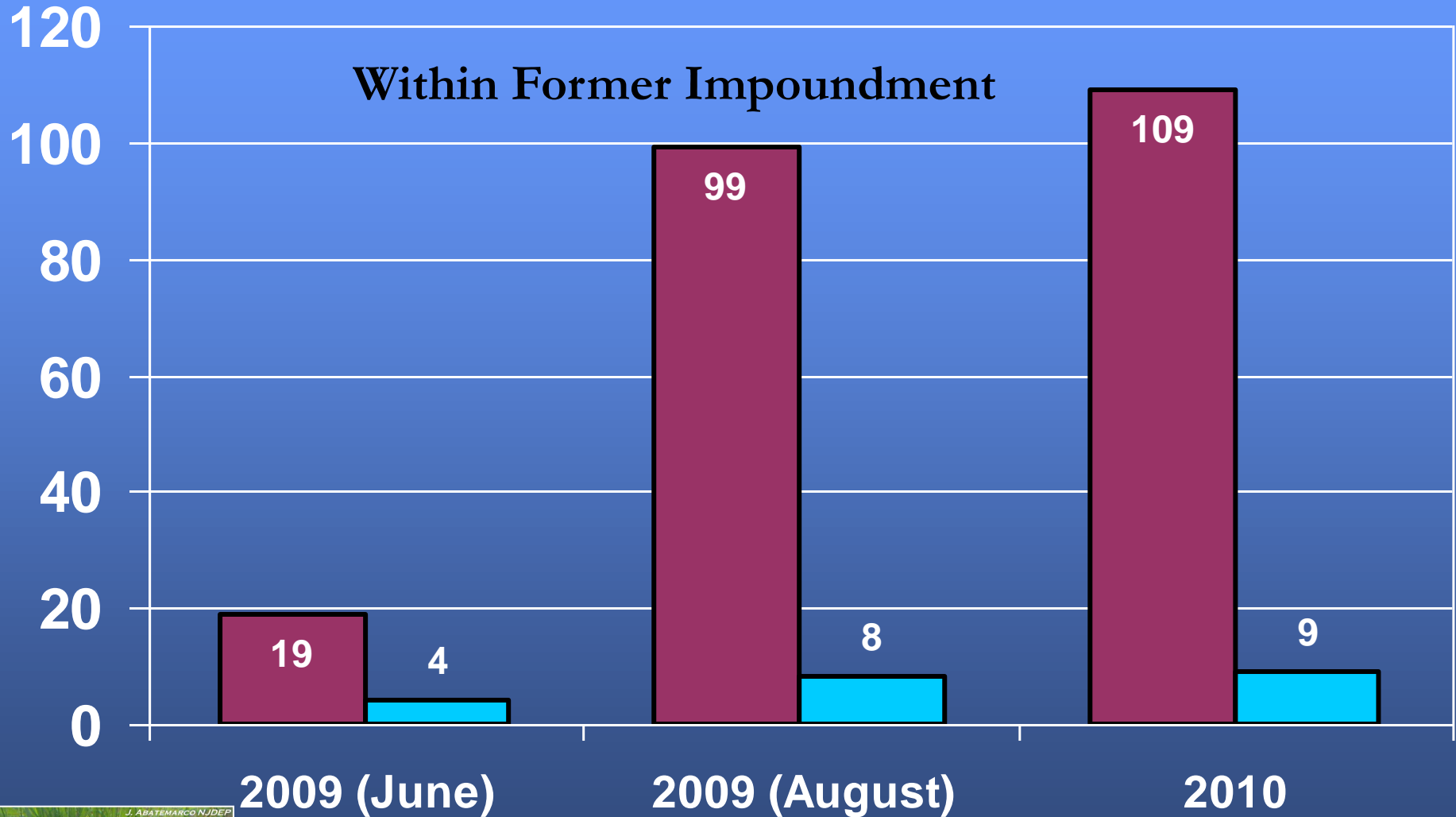


Black Brook Fish Population Surveys 2002 – 2010



■ Total Fish ■ Total Species

Black Brook Fish Population Surveys 2002 – 2010



Total Fish **Total Species**

Fresh and Free Fish

I'm a species of concern in New England

Black Brook is the farthest upstream in the entire Merrimack River basin that I have been found!



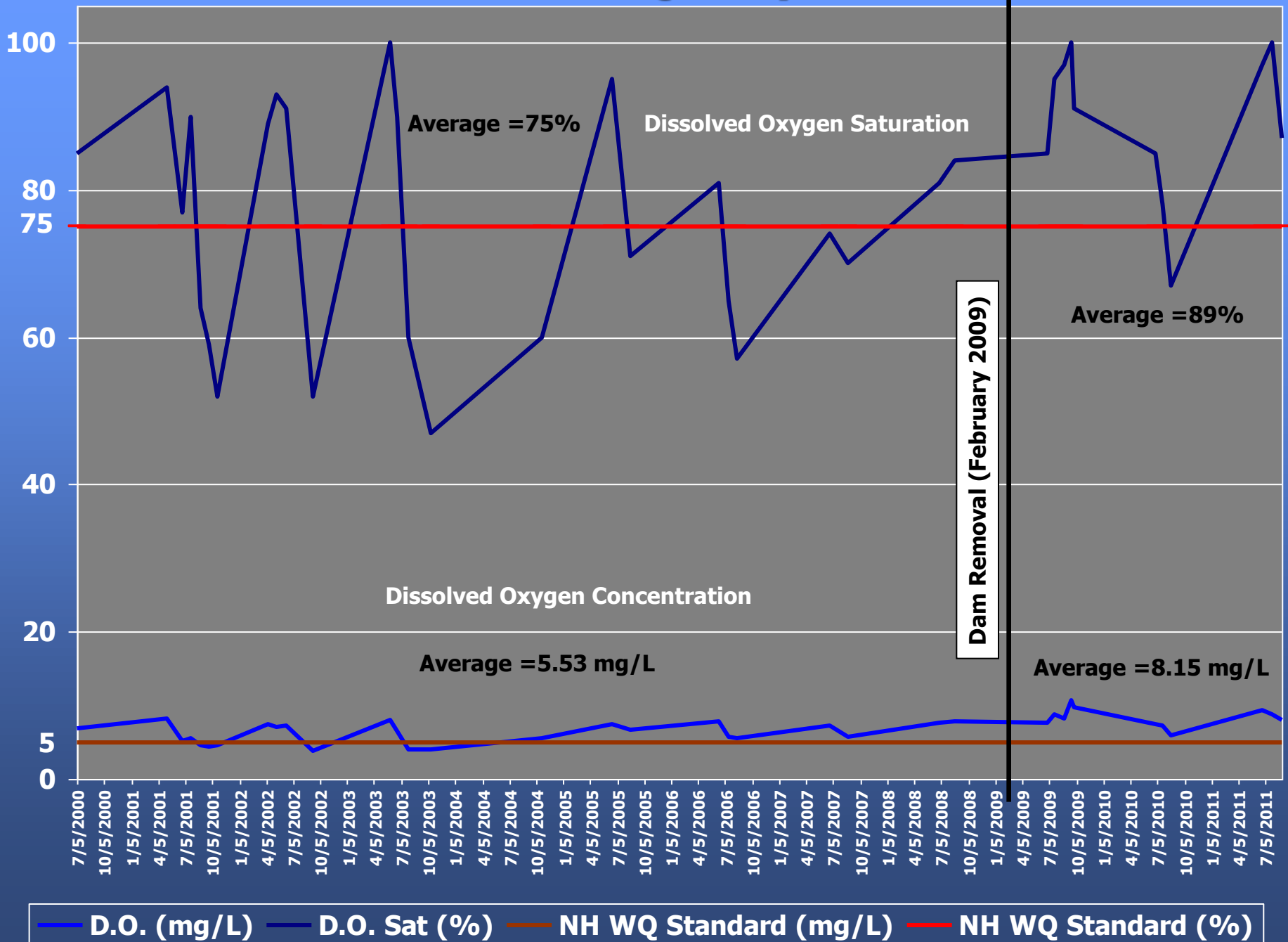
J. ABATEMARCO NJDEP

J. ABATEMARCO NJDEP

J. ABATEMARCO NJDEP

J. ABATEMARCO NJDEP

Water Quality





Section 319

NONPOINT SOURCE PROGRAM

New Hampshire

Stakeholders Cooperate to Remove Dam and Restore

Waterbody Improved

A century-old dam across Black Brook created Maxwell Pond, which was a site for swimming and other recreation. Over time, sediment from poorly managed land in the pond, which became stagnant and shallow. As a result, the New Hampshire Environmental Services (NHDES) added Maxwell Pond to the 2002 Clean Water Act 303(d) list of impaired waters. Stakeholders restored the pond's water quality by removing sediment sources and removing the dam. Once Black Brook returned to its natural flow, Maxwell Pond ceased to exist and was reclaimed as a segment of Black Brook. Water level rebounded and the brook could once again support its aquatic life. Due to the improvements, in 2010 NHDES removed the former Maxwell Pond portion of the state's CWA section 303(d) list of impaired waters for dissolved oxygen.

Problem

New Hampshire's Black Brook flows approximately seven miles from its headwaters in the town of Dunbarton to the city of Manchester, where it empties into the Merrimack River. More than 100 years ago (circa 1900), Maxwell Pond Dam was constructed across Black Brook in northwest Manchester to create an ice-harvesting pond (Figure 1). When first created, Maxwell Pond included 5.5 acres of open water and had a maximum depth of 12 feet.

In the late 1950s, a cement processing plant/sand and gravel company began operating in the Black Brook watershed upstream of Maxwell Pond. Historically, the company stockpiled materials next to the brook, had poor on-site stormwater controls, and built undersized culverts at road crossings, which caused flooding and exacerbated erosion during storm events. The excessive sediment load from within the watershed was transported in the swift flow of Black Brook and then deposited in Maxwell Pond as the flow decreased within the impoundment.

By 2002 the pond that had once hosted ice harvesting, skating, swimming, fishing and other uses had become severely impaired by sediment accumulation. The maximum water depth had diminished to three feet. Maxwell Pond was warm, supported excessive aquatic plant growth, and had low dissolved oxygen levels. The applicable New Hampshire water quality standard for dissolved oxygen requires that Class B waters achieve a 75 percent minimum



Figure 1. Maxwell Pond Dam on Black Brook in September 2008.

daily average dissolved oxygen concentration of 5 mg/L. Maxwell Pond data from 2002 to 2008 showed that dissolved oxygen levels violated both the dissolved oxygen standard (in 10 of 19 samples) and the temperature standard (in 6 of 19 samples). The waterbody did not support its natural flow. In 2002, NHDES added Maxwell Pond to the state's 303(d) list of impaired waters. Concerns about water quality, sediment concentration and dissolved oxygen levels, along with concerns about recent flooding, and the city of Manchester was committed to removing the dam.

Project Highlights

Multiple partners began work to restore Black Brook in 2002. Using EPA CWA section 319 funds, Trout Unlimited managed a project that studied the causes of the impairments and considered strategies for watershed restoration (including dam removal). The owner of Aggregate Industries implemented sediment control practices and removed perched, undersized culverts to reduce erosion upstream of the project site.

In 2006 the city of Manchester administered a second CWA section 319-funded project to design and implement the restoration project. The NHDES Dam Maintenance Section began removing the dam in February 2009. By mid-March, Black Brook flowed freely to the Merrimack River for the first time in more than 100 years. Project partners stabilized and replanted slopes in spring 2009 (Figure 2). Additional water quality, vegetation, fish population and physical/hydrological monitoring are ongoing. Partners plan to complete more riparian plantings and additional streambank stabilization activities during 2010.



Figure 2. Same location as Figure 1, showing Black Brook in June 2009 after the dam was removed and natural gas line relocated.

Results

Removing the dam in 2009 drained Maxwell Pond and reestablished the free-flowing condition of Black Brook. Participants in the NHDES Volunteer Lake Assessment Program and Volunteer River Assessment Program monitored dissolved oxygen levels before and after NHDES removed the dam. The data show that the Black Brook riverine assessment unit (NHRIV700060801-05-02) that runs through the former Maxwell Pond site now meets water quality standards for dissolved oxygen (Table 1). If the data had shown continued dissolved oxygen problems at the former Maxwell Pond site, NHDES would have transferred the impairment to Black Brook. However, because the assessment unit now meets water quality standards, NHDES has

Table 1. Maxwell Pond Data for 2009¹

Sample date	Former Impoundment Site (01A-BKB)	
	DO (mg/L)	DO Saturation (%)
28 Jun 09	7.60	84.5
23 Jul 09	8.18	87.9
23 Aug 09	7.62	90.2
18 Sep 09	10.55	101.9
26 Sep 09	9.01	84.0

¹ To meet the water quality standards, the dissolved oxygen (DO) concentration must be at least 5 mg/L and the DO saturation must be at least 75 percent.

removed the former Maxwell Pond portion of Black Brook from the state's 2010 CWA section 303(d) list of impaired waters for dissolved oxygen. Black Brook assessment unit NHRIV700060801-05-02 remains on the impaired waters list for mercury, benthic macroinvertebrate bioassessments and pH.

Partners and Funding

Numerous partners cooperated on the project, including the city of Manchester, local residents, local companies, NHDES and EPA. EPA CWA section 319 funds provided \$13,350 for the initial study and \$105,000 to administer, plan, document and implement the project. The city of Manchester, in close cooperation with NHDES staff, provided project coordination. The city contributed \$40,000. In addition to the CWA section 319 grants, federal support came from a \$50,000 American Rivers/National Oceanic and Atmospheric Administration (NOAA) grant, \$10,000 from Trout Unlimited/NOAA funds, and \$64,000 from Gulf of Maine Council/NOAA funds. State project funding included a \$6,000 New Hampshire Corporate Wetlands Restoration Partnership grant and \$25,000 from the New Hampshire State Conservation Committee. Fairpoint Communications provided \$48,450, and National Grid provided \$149,539 in services to relocate natural gas and telephone lines affected by removal of the dam structure. Aggregate Industries provided \$150,000 in services to correct upstream sediment contribution and fish passage obstructions. Many others, including local residents, representatives from New Hampshire Fish and Game, Dubois & King Inc., Amoskeag Fishways, and state-funded NHDES staff, provided in-kind services (worth \$26,000).



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-10-001W
September 2010

For additional information contact:

Barbara McMillan
Watershed Outreach Coordinator
New Hampshire Department
of Environmental Services
603-271-7889 • Barbara.mcmillan@des.nh.gov

OUR WORK

RIVERS AND GLOBAL WARMING

PROTECTING RIVERS

RESTORING RIVERS

Home > Our Work > Restoring Rivers > Dams and Dam Removal

DVD -- Restoring America's Rivers: Preparing For The Future

Communities across the nation are facing increasingly extreme storms that bring damaging floods. These events can strain outdated infrastructure and endanger public safety. Restoring America's Rivers tells the story of how community leaders around the country are solving these problems by working with nature, not against it. Dams are being removed and levees are being set back in an effort to restore floodplains and give our rivers room to spread out, while making communities safer and more resilient to weather extremes, and restoring vital habitat for fish and wildlife. [Watch the film's trailer here.](#)

Watch the film



Restoring America's Rivers: Preparing for the Future from American Rivers on Vimeo.



DEB LOISELLE, River Restoration Coordinator
NH Dept. of Environmental Services



CHUCK DEPRIMA, Director
Manchester Parks, Recreation & Cemetery Dept.

Sign-Up For News And Alerts



JENNIFER WENTZ, Owner
E.W. Poore Inc.



PAUL SHEA
Senior Supervisor, National Grid



JIM GALLAGHER, Chief Engineer
Dam Bureau, NH Dept. of Environmental Services



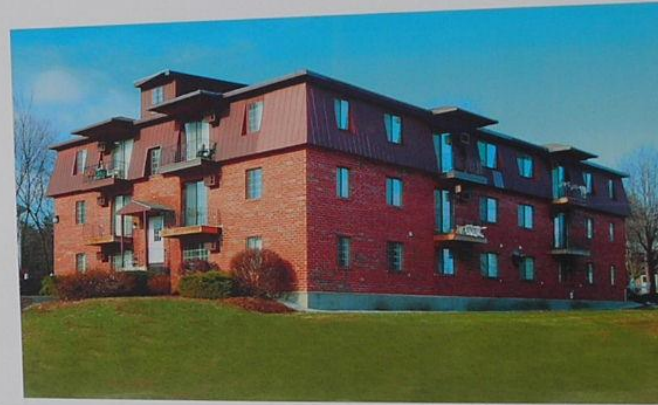
STEVE LANDRY, Supervisor
Merrimack Watershed, NH Dept. of Environmental Services

BRADY SULLIVAN
PROPERTIES
-Develops-

Black Brook

CONDOMINIUM

1 & 2 Bedroom Condominiums
Onsite Laundry & Parking
Upgrades Available
Fish Friendly



Special Financing Provided by



Jason Sculos
603-579-9612
www.wfhm.com/jason-sculos

For Further Information, Contact:
Brady Sullivan Properties, LLC
(603) 622-6223
Or Visit Us at www.BradySullivan.com

This is now...





**Thanks for the
fish passage!**



**Thanks for
the snacks!**



**Thanks for the
oxygen!**



**Stephen C. Landry, Merrimack Watershed
Supervisor
NHDES – Watershed Assistance Section
(603) 271-2969
stephen.landry@des.nh.gov**