MYSTIC RIVER WATERSHED
2009 Fish Population Data

Robert J. Maietta
Watershed Planning Program
Division of Watershed Management
Worcester, MA

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Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Matthew A. Beaton, Secretary
Massachusetts Department of Environmental Protection
Martin Suuberg, Commissioner
Bureau of Water Resources
Douglas Fine, Assistant Commissioner

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Introduction

In late summer and early fall of 2009, fish population surveys were conducted in the Mystic River Watershed at six stations using techniques similar to Rapid Bioassessment Protocol V as described originally by Plafkin et al. (1989) and later by Barbour et al. (1999) (See Table 1 and Figure 1). Standard Operating Procedures are described in *Fish Collection Procedures for Evaluation of Resident Fish Populations* (MassDEP 2006). Fish surveys also included a habitat assessment component modified from that described in Barbour et al. (1999).

Methods

Fish Collections

Fish collections were conducted by electrofishing using a Smith Root Model 12 battery-powered backpack electrofisher. A reach of between 70m and 100m was sampled by passing a pole mounted anode ring side to side through the stream channel and in and around likely fish holding cover. All fish shocked were netted and held in buckets. Sampling proceeded from an obstruction or constriction, such as a waterfall or shallow riffle, upstream to an endpoint at another obstruction or constriction. Following completion of a sampling run, all fish were identified to species, and a sub-sample were measured and weighed, after which all fish were released.

The RBP V protocol (Plafkin et al. 1989 and Barbour et al. 1999) calls for the analysis of the data generated from fish collections using an established Index of Biotic Integrity (IBI) similar to that described by Karr et al. (1986). Since no formal IBI for Massachusetts currently exists, the data provided by this sampling were used to qualitatively assess the general condition of the resident fish population as a function of the overall abundance (number of species or richness, as well as individuals) and species composition (classifications listed below).

Tolerance Classification - Classification of tolerance to environmental stressors similar to that provided in Plafkin et al. (1989), Barbour et al. (1999), and Halliwell et al. (1999). Final tolerance classes are those provided by Halliwell et al. (1999).

Macrohabitat Classification – Classification by common macrohabitat use as presented by Bain and Meixler (2000) modified regionally following discussions between MassDEP and Massachusetts Department of Fish and Game (MA DFG) fishery biologists.

Habitat Assessment

An evaluation of physical habitat quality is critical to any assessment of ecological integrity (Karr et al. 1986; Barbour et al. 1999). Habitat assessment helps to support understanding of the relationship between physical habitat quality and biological conditions, identifies obvious constraints on the attainable potential of a site, assists in the selection of appropriate sampling stations, and provides basic information for interpreting biosurvey results (US EPA 1995).

Before leaving the sampled reach during the 2009 fish population surveys, habitat qualities were scored using a modification of the evaluation procedure in Barbour et al. (1999). The matrices used to assess habitat quality are based on stream flow, key physical characteristics of the water body, and riparian area. Most parameters evaluated are instream physical attributes often related to overall land use and are potential sources of limitation to the aquatic biota (Barbour et al. 1999). The ten habitat parameters for moderate to high gradient streams are as follows: instream cover for fish, epifaunal substrate, embeddedness, sediment deposition, channel alteration, velocity/depth combinations, channel flow status, right and left bank vegetative protection, right and left bank stability, and, right and left bank riparian vegetative zone width. For moderate to low gradient streams, instream cover for fish is replaced with bottom substrate/available cover, epifaunal substrate is replaced with pool substrate characterization, embeddedness is replaced with pool variability, and velocity-depth combinations is replaced with channel sinuosity. Habitat parameters are scored, totaled, and when appropriate compared to a reference station to provide relative habitat ranking.

Results

Results of the fish population surveys can be found in Table 2. It should be noted that young of the year (yoy) fish from most species (with the exception of salmonids) were not targeted for collection. Young of the year fishes that were collected, intentionally or not, are noted in Table 2. Scientific names of fishes are taken from American Fisheries Society Special Publication 29 (Nelson et.al. 2004).

With the exception of large numbers of white sucker and American eel at P0147 Lower Mill Brook, fish numbers were very low. A total of nine species were collected. White sucker was the only “fluvial” species observed. All fish collected or observed were classified as “tolerant” species. With regard to the habitat assessments, two stations were scored using moderate to high gradient criteria and four stations were scored using low to moderate gradient criteria. Results of the habitat assessments can be found in Table 3.

Literature Cited

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Table 1. List of biomonitoring stations sampled for fish during the 2009 Mystic River Watershed survey.

Unique ID	Waterbody Name	Site Description	Sampling Date
P0149	Aberjona River	adjacent to Bus Maintenance Facility off Olympia Ave. Woburn	25-Aug-2009
P0145	Aberjona River	from Washington Street upstream to low head dam, Winchester	25-Aug-2009
P0146	Aberjona River	from footbridge adjacent to Mystic Valley Parkway upstream to low head dam at USGS gage, Winchester	27-Aug-2009
P0148	Shaker Glen Brook	adjacent to Totman Drive beginning just upstream of confluence with Little Brook towards Lexington Street, Woburn	25-Aug-2009
P0150	Horn Pond Brook	Adjacent to Main Street, upstream from Wedge Pond , Winchester	27-Aug-2009
P0147	Lower Mill Brook	upstream from Mystic Valley Parkway adjacent to Mt. Pleasant Cemetery, Arlington	27-Aug-2009

Table 2. Species and counts for fish collected during the 2009 Mystic River Watershed biomonitoring survey. Refer to Table 1 for a listing and description of sampling stations. Numbers in parentheses indicate young-of-the-year fish as a subset of the total count.

Common name	Scientific name	Tolerance[1]	Macrohab. Class.[2]	Station					
				P0149	P0145	P0146	P0148	P0150	P0147
American eel	*Anguilla rostrata*	T	MHG	9	5	2	12	5	100-150*
golden shiner	*Notemigonus crysoleucas*	T	MHG		1(1)	3(1)	1		
white sucker	*Catostomus commersonii*	T	FD	5(3)		1	7	2	200-300**
brown bullhead	*Ameiurus nebulosus*	T	MHG	1		2		1(1)	
chain pickerel	*Esox niger*	T	MHG				3(3)		
bluegill	*Lepomis macrochirus*	T	MHG			4		6	1
pumpkinseed	*Lepomis gibbosus*	T	MHG	3	1	2		6	
largemouth bass	*Micropterus salmoides*	T	MHG	1(1)	1	3(3)		1	
yellow perch	*Perca flavescens*	T	MHG			8	1		

[1] Tolerance Classification from Halliwell et al. (1999).

T = tolerant, I = intolerant, M = moderately tolerant

[2] Macrohabitat Classification from Bain and Meixler (2000).

FD = fluvial dependant, MHG = macrohabitat generalist, FS = fluvial specialist

* sizes ranged from 100 mm to 350 mm

** approximate number of WS observed (not including YOY which numbered in the thousands)

Table 3. Habitat assessment summary for fish stations sampled during the 2009 Mystic River Watershed survey. For primary parameters, scores ranging from 16-20 = optimal; 11-15 = suboptimal; 6-10 = "marginal"; 0-5 = poor. For secondary parameters, scores ranging from 9-10 = optimal; 6-8 = suboptimal; 3-5 = "marginal"; 0-2 = poor. Refer to Table 1 for a listing and description of sampling stations.

Stations		P0149	P0145	P0146	P0148	P0150	P0147
Primary Habitat Parameters		**Score (0-20)**					
INSTREAM COVER (for Fish)					13	8	
BOTTOM SUBSTRATE/ AVAILABLE COVER[1]		9	10	10			12
EPIFAUNAL SUBSTRATE					18	18	
POOL SUBSTRATE CHARACTERIZATION[1]		8	13	11			15
EMBEDDEDNESS					13	18	
POOL VARIABILITY[1]		8	11	13			16
CHANNEL ALTERATION		11	15	14	14	1	20
SEDIMENT DEPOSITION		13	14	17	13	16	11
VELOCITY-DEPTH COMBINATIONS					15	6	
CHANNEL SINUOSITY[1]		1	7	8			16
CHANNEL FLOW STATUS		15	17	19	15	20	10
Secondary Habitat Parameters		**Score (0-10)**					
BANK VEGETATIVE PROTECTION	left	5	7	9	5	9	9
	right	9	8	9	7	9	9
BANK STABILITY	left	7	7	9	7	9	9
	right	7	7	7	7	9	9
RIPARIAN VEGETATIVE ZONE WIDTH	left	1	1	5	1	1	8
	right	9	3	2	1	1	6
Total Score		**103**	**120**	**133**	**129**	**125**	**150**

[1] low to moderate gradient habitat sheet

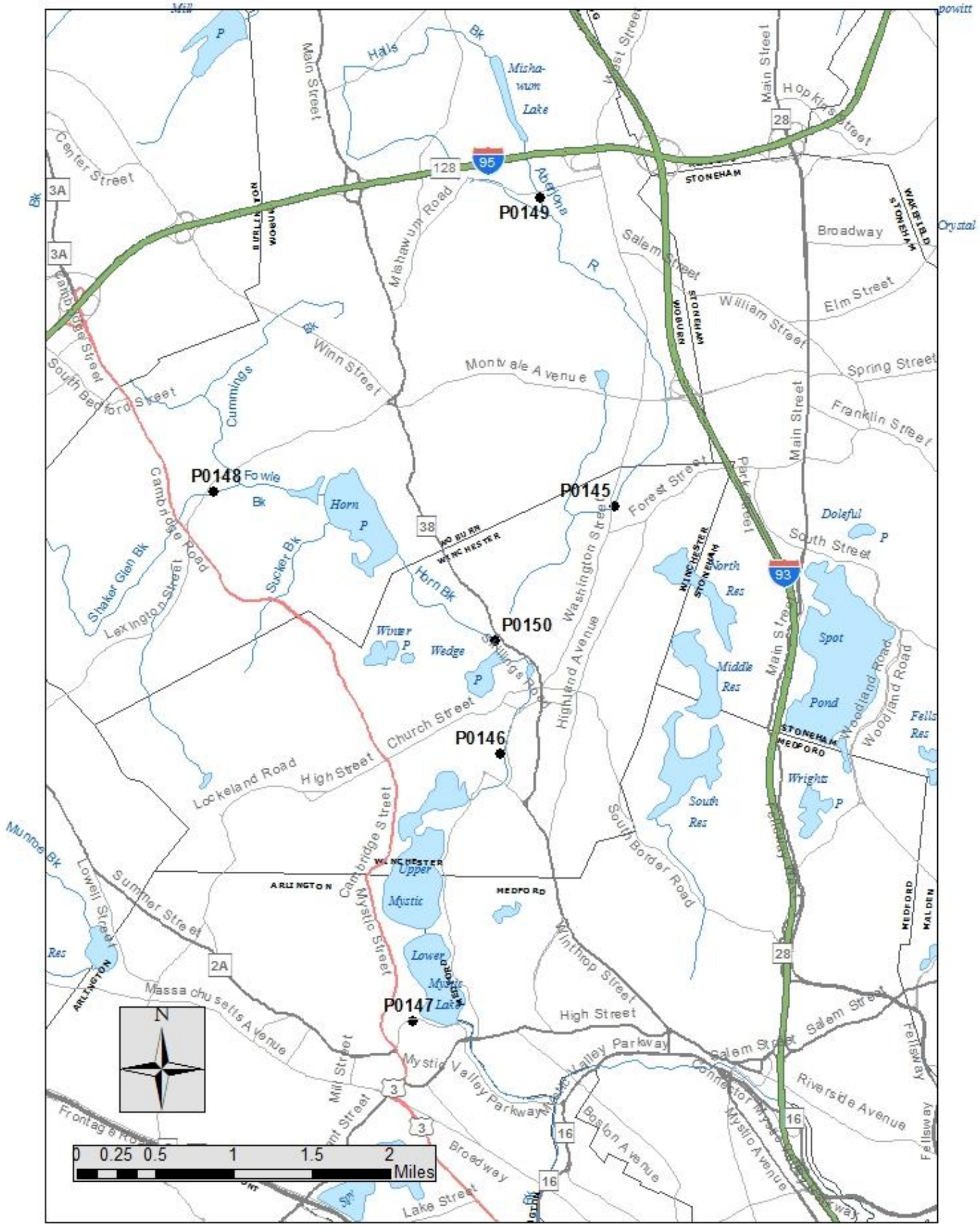

Figure 1. Location of Sampling Stations. Mystic River Watershed 2009 Fish Population Data.