NEPONSET RIVER WATERSHED
2009 Fish Population Data

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Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Matthew A. Beaton, Secretary
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Introduction

In late summer and early fall of 2009, fish population surveys were conducted in the Neponset River Watershed at eight 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).

A total of fifteen species were collected. Although five of the sampled waterbodies are designated as Coldwater Fisheries Resources (CFRs) by MassWildlife, reproducing trout (brook and brown) were collected at only two sampling locations (P0134 Traphole Brook and P0142 Germany Brook) (MassDFG 2015). A single young of the year brook trout was also observed at P0139 (Mill Brook) which although not designated as a CFR, is tributary to Tubwreck Brook, which is listed as a CFR. Additional fish including four larger brook trout were collected upstream from the sampled reach at P0139 (Mill Brook) as well. These are not included in Table 2. Overall other fluvial fish were scarce.

With regard to the habitat assessments, although all stations were scored using moderate to high gradient criteria it appears that at least a couple of stations (P0143 and P0135) may have been more suited to 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 Neponset River Watershed survey.

Unique ID	Waterbody Name	Site Description	Sampling Date
P0135	Beaver Brook	upstream from Maskwonicut Street, Sharon	3-Sept-2009
P0134	Traphole Brook	Cooney Street, Walpole	3-Sept-2009
P0142	Germany Brook	just upstream from Westover Parkway nearest Leyton Road, Norwood	4-Sept-2009
P0141	Mill Brook	just upstream from Tamarack Road crossing nearest Briar Lane, Westwood	4-Sept-2009
P0140	Bubbling Brook	just downstream from Trailside Drive, Walpole	4-Sept-2009
P0139	Mill Brook	just upstream from the Mill Brook Road crossing nearest Nebo Street, Medfield	28-Aug-2009
P0169	Tubwreck Brook	just Draper Road, Dover	28-Aug-2009
P0143	Purgatory Brook	Everett Street, Norwood	3-Sept-2009

Table 2. Species and counts for fish collected during the 2009 Neponset 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[3]							
				P0135	**P0134**	**P0142**	**P0141**	P0140	P0139	**P0169**	**P0143**
American eel	*Anguilla rostrata*	T	MHG		1						
golden shiner	*Notemigonus crysoleucas*	T	MHG								1
white sucker	*Catostomus commersonii*	T	FD		8(7)	26(2)	2(2)				3(2)
brown bullhead	*Ameiurus nebulosus*	T	MHG				1				3
yellow bullhead	*Ameiurus natalis*	T	MHG								2
redfin pickerel	*Esox americanus*	T	MHG				2	16	3(1)	4	
chain pickerel	*Esox niger*	T	MHG						5		
brook trout	*Salvelinus fontinalis*	I	FS		53(6)	9			(1)		
brown trout	*Salmo trutta*	I	FS		11(2)						
bluegill	*Lepomis macrochirus*	T	MHG			8(1)	30(8)				5
pumpkinseed	*Lepomis gibbosus*	T	MHG	4		3	14(1)			1	33
banded sunfish	*Enneacanthus obesus*	M	MHG						*		
largemouth bass	*Micropterus salmoides*	T	MHG						2		
tessellated darter	*Etheostoma olmstedi*	M	FS				3				
yellow perch	*Perca flavescens*	T	MHG				3(3)				

[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

***** banded sunfish observed just upstream from sampled reach

[3] Sampling stations which are MDFW CFRs designated by **bold** type

Table 3. Habitat assessment (moderate to high gradient) summary for fish stations sampled during the 2009 Neponset River Watershed survey. For within-reach parameters, scores ranging from 16-20 = optimal; 11-15 = suboptimal; 6-10 = marginal; 0-5 = poor. For riparian parameters, scores ranging from 9-10 = optimal; 6-8 = suboptimal; 3-5 = marginal; 0-2 = poor. Maximum habitat score for any site = 200. Refer to Table 1 for a listing and description of sampling stations.

Stations	**P0135**	P0134	P0142	P0141	P0140	P0139	P0169	**P0143**
PARAMETERS(within reach)								
Instream Cover for Fish	12	16	20	3	16	15	12	15
Epifaunal substrate (in sampled areas only)	11	18	19	8	16	17	n/a	17
Embeddedness (riffles and runs)	15	16	18	3	17	17	18	13
Channel Alteration	15	15	17	11	19	n/a	10	13
Sediment Deposition	11	17	15	8	18	18	n/a	14
Velocity Depth Combinations	12	18	19	2	16	15	12	18
Channel Flow Status	19	17	17	15	7	18	7	19
PARAMETERS (riparian)								
Bank Vegetative Protection-Left Bank	10	10	10	9	9	4	9	9
Bank Vegetative Protection-Right Bank	10	6	10	9	9	9	9	9
Bank Stability-Left Bank	10	8	8	7	9	8	9	4
Bank Stability-Right Bank	10	5	10	7	9	8	9	4
Riparian Vegetative Zone Width-Left Bank	10	10	10	2	7	8	10	0
Riparian Vegetative Zone Width-Right Bank	5	6	9	8	9	10	10	0
Total	**150**	**162**	**182**	**92**	**161**	**147[1]**	**115[2]**	**135**

[1] of a possible 180
[2] of a possible 160
n/a not applicable

sampling stations designated with **bold type** may have been more suited to low to moderate gradient criteria

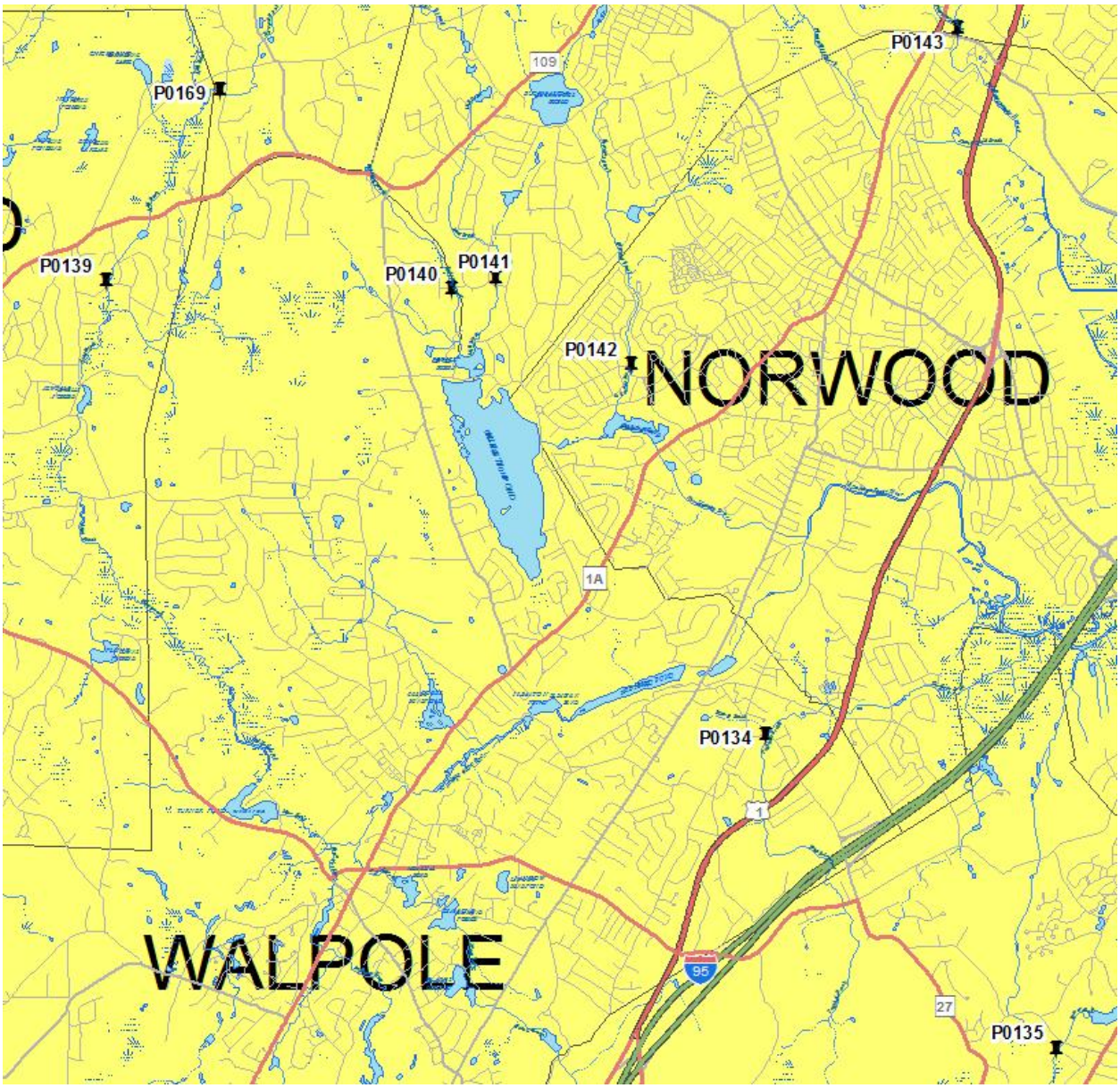

Figure 1. Location of Sampling Stations. Neponset River Watershed 2009 Fish Population Data