MOUNT HOPE AND NARRAGANSETT BAY WATERSHED
2009 Fish Population Data

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Introduction

In September 2009, fish population surveys were conducted in the Mount Hope and Narragansett Bay Watershed at five 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 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 is 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 biological survey results (US EPA 1995). Before leaving the sample reach during the 2007 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 eleven species were collected. Unfortunately, collection efficiencies were noted as only being fair to poor at stations P0151, P0152, and P0153. This was mostly due to highly colored water and an abundance of moss. Although the West Branch Palmer River (P0155) is listed as a Coldwater Fishery Resource by MassWildlife (and two trout were noted as being observed), no trout were collected (MassDFG 2015). Brook trout and/or brown trout were observed or collected at two other stations; however, these fish appeared to be stocked. 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 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 Mount Hope and Narragansett Bay Watershed survey including selected watershed and flow characteristics determined from USGS StreamStats (USGS 2013).

Unique ID	Drainage Area (mi^2)	Waterbody Name	Site Description	Sampling Date	Estimated 7-Day, 10-Year Low Flow (cfs)	Forest (%)	Urban (%)	Impervious Surface (%)
P0152	7.76	Cole River	just upstream from Hortonville Road, Swansea	10 Sept 09	0.32	72.2	6.5	1.4
P0151	5.37	Rocky Run	just upstream from Martin Street, Rehoboth	10 Sept 09	0.12	70.6	5.8	1.2
P0154	4.7	Badluck Brook	upstream and downstream from Elm Street, Rehoboth	10 Sept 09	0.049	65.8	6.9	1.5
P0153	12.4	East Branch Palmer River	just downstream from Route 118 (near County Street), Rehoboth	11 Sept 09	0.32	76.0	7.3	1.8
P0155	6.79	West Branch Palmer River	Downstream Danforth Street, Rehoboth	11 Sept 09	0.13	79.0	10.7	2.2

Table 2. Species and counts for fish collected during the 2009 Mount Hope and Narragansett Bay Watershed biomonitoring survey. Refer to Table 1 for a listing and description of sampling stations.

Common name	Scientific name	Tolerance[1]	Macrohabitat. Classification.[2]	Station (unique ID)				
				P0152	P0151	P0154	P0153	P0155
sea lamprey	*Petromyzon marinus*	T	FS				2	
American eel	*Anguilla rostrata*	T	MHG	19(1)	10(1)	24(2)	>22(2)	>13
white sucker	*Catostomus commersoni*	T	FD					8
brown bullhead	*Ameiurus nebulosus*	T	MHG		1	2		
redfin pickerel	*Esox americanus*	T	MHG	14(1)			4(2)	1
chain pickerel	*Esox niger*	T	MHG		5(1)	4(1)	5	1
brook trout	*Salvelinus fontinalis*	I	FS	1				*
brown trout	*Salmo trutta*	I	FS	2			2	*
banded sunfish	*Enneacanthus obesus*	T	MHG				1	
bluegill	*Lepomis macrochirus*	T	MHG					1(1)
tessellated darter	*Etheostoma olmstedi*	M	FS	*			>30	>25(2)

*****observed but not collected

[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

Table 3. Habitat assessment summary for fish stations sampled during the 2009 Mount Hope and Narragansett Bay 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	P0152	P0151	P0154	P0153	P0155
PARAMETERS (within reach)					
Instream Cover for Fish	18	17	15	19	18
Epifaunal Substrate (in sampled areas only)	14	13	10	13	15
Embeddedness (riffles and runs)	18	16	17	17	18
Channel Alteration	19	16	13	15	20
Sediment Deposition	18	18	17	18	18
Velocity Depth Combinations	13	12	12	17	17
Channel Flow Status	18	16	18	15	17
PARAMETERS (riparian)					
Bank Vegetative Protection-Left Bank	10	10	10	9	10
Bank Vegetative Protection-Right Bank	10	10	5	10	10
Bank Stability-Left Bank	9	9	10	9	10
Bank Stability-Right Bank	9	9	10	9	10
Riparian Vegetative Zone Width-Left Bank	10	7	10	6	10
Riparian Vegetative Zone Width-Right Bank	6	10	2	9	10
Total	**172**	**163**	**149**	**166**	**183**

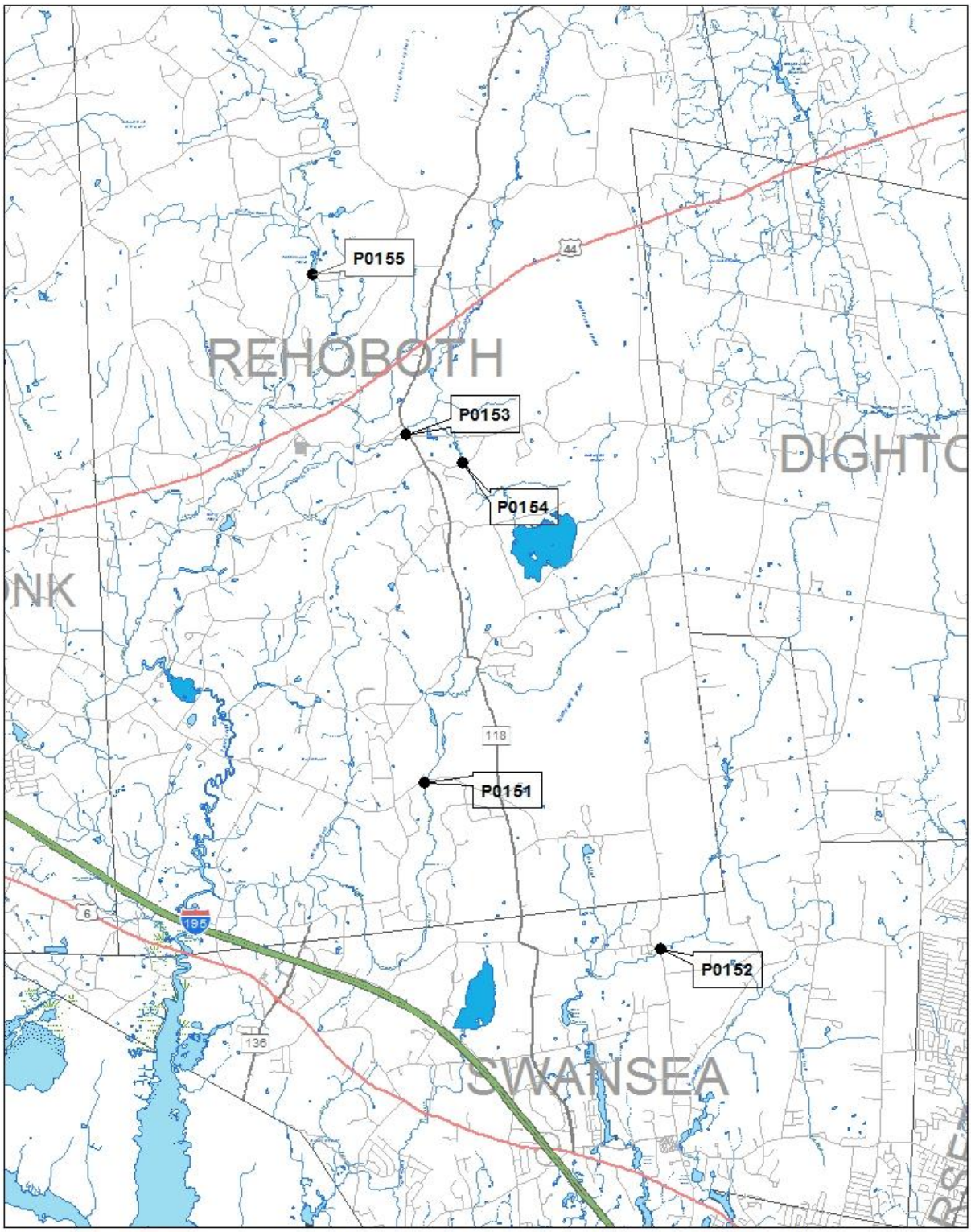

Figure 1. Location of Sampling Stations Mt Hope and Narragansett Bay Watershed 2009 Fish Population Data