WEYMOUTH AND WEIR RIVERS WATERSHED
2009 Fish Population Data

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Introduction

In late summer and early fall of 2009, fish population surveys were conducted in the Weymouth and Weir Rivers Watershed at seven 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). 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.

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 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 seven species were collected, including at four of the stations, reproducing brook or brown trout, both of which are intolerant fluvial species. Results of the habitat assessments can be found in Table 3.

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 may be 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.

Literature Cited

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Table 1. List of biomonitoring stations sampled for fish during the 2009 Weymouth and Weir Rivers 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	7-Day, 10-Year Low Flow (cfs)	Forest (%)	Urban (%)	Impervious Cover (%)
P0156	14.6	Weir River	approximately 190 meters upstream from Route 228 (East Street), Hingham (above footbridge)	17 Sept 09	0.54	45.6	38.8	11.2
P0158	0.63	Eel River	just upstream from Stagecoach Road, Hingham	17 Sept 09	0.03	24.6	59.8	11.6
P0157	0.56	Unnamed Tributary to Plymouth River	upstream and downstream from most northerly Cushing Street crossing, Hingham	17 Sept 09	0.02	58.2	37.4	16.2
P0161	3.7	Old Swamp River	Elm Street, Weymouth	22 Sept 09	0.03	30.1	59.9	25
P0160	3.4	Old Swamp River	Ralph Talbot Street, Weymouth	22 Sept 09	0.02	32.2	57.6	24
P0159	1.33	Old Swamp River	just downstream from Sharp Street, Hingham]	16 Sept 09	0.009	29.3	61.2	23.7
P0162	0.9	Mary Lee Brook	just downstream from footbridge crossing at western end of Joyce Circle, Randolph	16 Sept 09	0.006	43.1	46.7	17.9

Table 2. Species and counts for fish collected during the 2009 Weymouth and Weir Rivers Watershed biomonitoring survey. Refer to Table 1 for a listing and description of sampling stations. The number in parentheses indicates the number of young of the year.

Common name	Scientific name	Tolerance[1]	Macrohab. Class.[2]	Station (unique ID)						
				P0156	P0158	P0157	P0161	P0160	P0159	P0162
American eel	*Anguilla rostrata*	T	MHG	23(4)	7	2	2	1	1	3
redfin pickerel	*Esox americanus*	T	MHG	3	21(1)		5	16	38	3
brook trout	*Salvelinus fontinalis*	I	FS		2	12	2(1)			
brown trout	*Salmo trutta*	I	FS				4(1)		1	
bluegill	*Lepomis macrochirus*	T	MHG	1						
pumpkinseed	*Lepomis gibbosus*	T	MHG	1						
redbreast sunfish	*Lepomis auritus*	T	MHG			2				

[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 Weymouth and Weir Rivers 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	P0156	P0158	P0157	P0161	P0160	P0159	P0162
PARAMETERS (within reach)							
Instream Cover for Fish	7	13	14	16	15	18	17
Epifaunal Substrate (in sampled areas only)	5	10	16	16	13	10	18
Embeddedness (riffles and runs)	16	15	14	18	8	15	18
Channel Alteration	15	15	15	13	18	17	18
Sediment Deposition	18	10	16	19	9	7	18
Velocity Depth Combinations	8	15	15	15	10	17	15
Channel Flow Status	19	15	15	19	15	15	15
PARAMETERS (riparian)							
Bank Vegetative Protection-Left Bank	9	7	10	9	10	9	9
Bank Vegetative Protection-Right Bank	9	10	10	8	8	9	9
Bank Stability-Left Bank	9	8	9	9	10	9	9
Bank Stability-Right Bank	9	10	9	9	10	9	9
Riparian Vegetative Zone Width-Left Bank	10	4	10	9	8	9	10
Riparian Vegetative Zone Width-Right Bank	7	10	10	2	8	9	1
Total	**141**	**142**	**163**	**162**	**142**	**153**	**166**