PARKER RIVER WATERSHED – RIVER AND ESTUARY SEGMENT ASSESSMENTS

The following segments in the Parker River Watershed are included in this report (Figure 6):

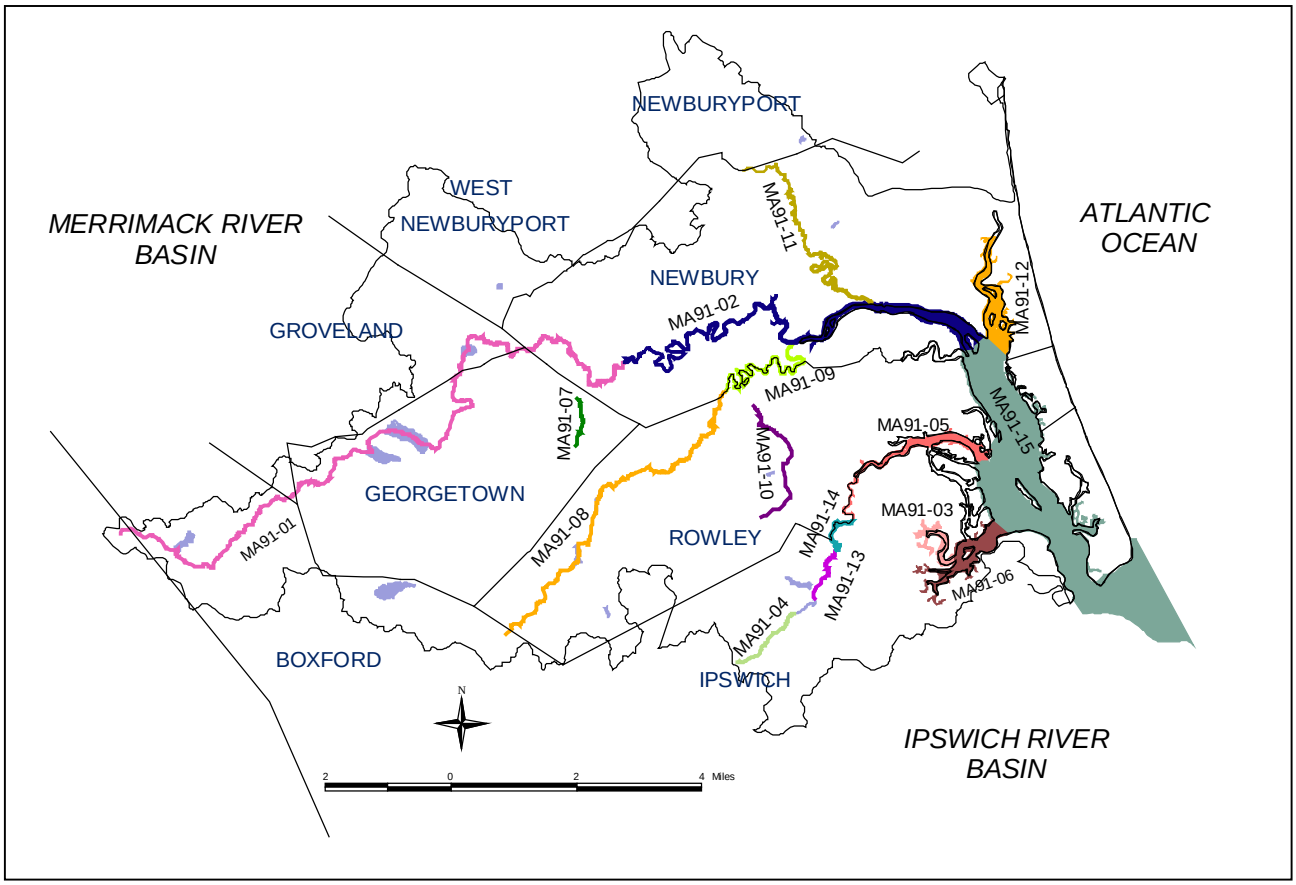
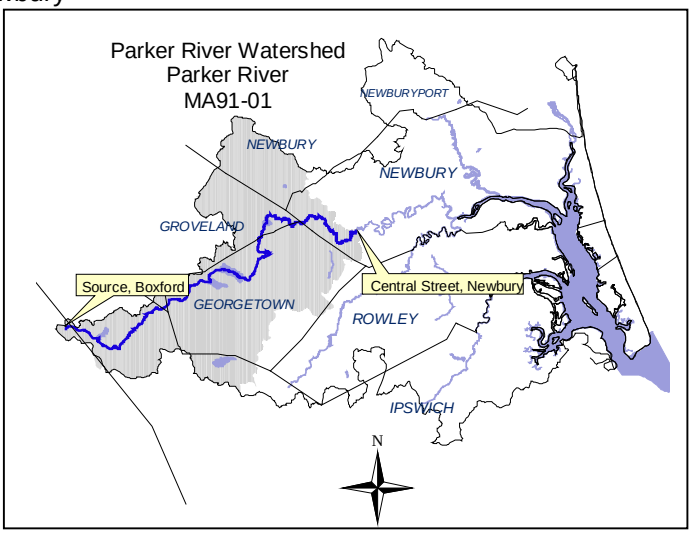


Figure 6. Assessed River and Estuary Segments in the Parker River Watershed

PARKER RIVER (SEGMENT MA91-01)

Location: Source in Boxford to Central Street, Newbury
Segment Length: 13 miles
Classification: Class B



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	55%
Residential	24%
Wetlands	6%

This segment is on the 1998 303(d) list of impaired waters, needing confirmation, for flow alteration (Table 3). The use assessments of Sperrys, Rock, Pentucket, and Crane ponds, which are located in the subwatershed are provided in the Ponds Assessment section of this report.

Downstream from Rock and Pentucket ponds, there are six dams on this segment of the Parker River all in the town of Newbury:

- two at River Street, due west of Main Street in the village of Byfield
- two near Main Street in the village of Byfield
- one northwest of Larkin Road (east of Interstate 95)
- one at Central Street (the end of this segment)

All six dams on this segment of the Parker River currently have provisions for fish passage.

WMA WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source G = ground	Authorized Withdrawal (MGD)	1999 Average Withdrawal (MGD)
The Village Store building, Boxford	3038010	NA	NA	01G	0.001	*Unknown
200 Washington St, Boxford	3038023	NA	NA	01G	Not assigned	*Unknown
Georgetown Water Department	3105000	9P31610501	31610501	01G (inactive) 02G (inactive) 03G 04G 05G	0.43** reg. 0.27** permit Total – 0.70	03G - 0.23 04G - 0.16 05G - 0.30 Total – 0.69
Byfield Water District	3205001	9P231620501	31620501	02G 03G (Emergency) 04G	0.17** reg.	02G – 0.03 04G – 0.19 Total – 0.22***
Georgetown Sand & Gravel Co., Inc.	NA	9P31610502	NA	Parker River	0.57	0.40
G-Town Produce	NA	NA	31610502	Rock Pond	0.1 (184 days)	Not reported

NA - not applicable; * Unknown - no metered withdrawal data available; ** indicates system-wide withdrawal, all sources are not necessarily within this segment; *** withdrawal did not exceed registration amount by more than 0.1 MGD (WMA threshold)

NPDES WASTEWATER DISCHARGE SUMMARY:

Georgetown Water Treatment Plant is authorized to discharge wastewater 1 MGD (6,000 gpd maximum and 2,000 gpd average) from its backwashing operation to this segment of the Parker River under a NPDES general permit (MAG640048).

The communities of Georgetown and Groveland are required to obtain Phase II general NPDES storm water permits. EPA is currently writing this general permit (with input from MA DEP) and a draft is scheduled to be available for internal review by the end of 2001. The final version of the Phase II storm

water permit will be issued by December 2002. Permit applications from the towns must be submitted to EPA by March 2003 and coverage under the permit begins with the application (Scarlet 2001).

USE ASSESSMENT:

AQUATIC LIFE

Biology

In August 1999 DWM conducted a Rapid Bioassessment Protocol III (RBP III) and qualitative benthic macroinvertebrate survey at three stations on this segment of the Parker River in August 1999 (Appendix C). The regional reference station for this survey was located on Fish Brook (FB00) in the Ipswich River Basin.

- PR01B, downstream from Route 133, Boxford (upstream of Rock Pond) - RBP III
- PR02, at Bailey Lane, Georgetown - Qualitative only (directly upstream of Rock Pond)
- PR00, upstream from Main Street, Byfield, Newbury - RBP III

The RBP III analysis indicated slight impairment at both PR01B and PR00 when compared to the regional reference station (FB00). However, when PR00 (the most downstream station) was compared to PR01B (the most upstream station) no impairment was identified (90% comparable).

Habitat and Flow

The reach of the river between the Georgetown wells and Rock Pond has been observed with little or no flow. It is not known if this is due to geologic conditions surrounding this section of the river, over-pumping of the wells, beaver activity or a combination of all factors (Tomczyk 2001a). It should be noted that 1999 was a drought year. Average monthly stream flows in June were lower than have been recorded in decades (USGS 2 August 2001).

A large beaver dam was identified at the upstream end of the PR01B benthic macroinvertebrate sampling reach. This dam was responsible for extensive flooding of the river upstream of the sampling reach and the slow flow in the reach. Also, beaver activity immediately upstream from Bailey Lane (PR02) restricted flow resulting in a primarily muddy bottom and flooded wetland margins with slow/deep, lentic habitat. Excellent habitat quality was documented at the downstream station PR00 (Appendix C).

Chemistry - water

As part of DWM's 1999 fish toxics monitoring of Rock Pond (an impoundment of the Parker River), a Hydrolab® profile was recorded (Station #FM-0007). Dissolved oxygen concentrations ranged from 9.7 mg/L at the surface to 3.2 mg/L in the bottom waters of Rock Pond (Appendix C).

Between the Georgetown wells and the inlet to Rock Pond (1.0 mile) the *Aquatic Life Use* is assessed as partial support based on best professional judgment and the low flow/no flow conditions. Although, the benthic macroinvertebrate community was slightly impaired at both stations in comparison to the regional reference station it is best professional judgment that the community was structured in response to the naturally productive wetland-system. Therefore, the 4.4-mile long reach from the source in Boxford to the Georgetown wells and the 7.6-mile reach from Rock Pond to the end of the segment at the Center Street Bridge, is assessed as support and is on "Alert Status" due to potential causes of impairment other than natural conditions (e.g., water withdrawals).

FISH CONSUMPTION

In 1994, fish toxics monitoring was conducted by MA DEP in Pentucket Pond, Georgetown. Data from this survey are presented in Table 4.

Table 4. 1994 Parker River Watershed fish toxics monitoring data (mg/kg wet wt.), Pentucket Pond.

Sample # and code	Species code	Collection date	Length (cm)	Weight (g)	% Lipids	Hg	As	Pb	Se	Cd	PCB (µg/g)	Pesticides (µg/g)
94-3611	BC[1]	8/23/94			0.18	1.03	<0.002	<0.03	0.14	<0.01	ND	ND
Ppf94-1			27.3	260								
Ppf94-2			27.0	300								
Ppf94-3			26.3	240								
Ppf94-4			25.5	240								
94-3613	B[2]	8/23/94			0.17	0.30	<0.002	<0.03	0.14	<0.01	ND	ND
Ppf94-5			18.8	100								
Ppf94-6			17.1	100								
Ppf94-7			16.6	90								
Ppf94-8			17.0	90								
Ppf94-9			15.4	80								
94-4228	LMB[3]	9/21/94			0.15	1.06	<0.040	<1.0	0.119	<0.20	ND	ND
Ppf94-10			33.4	470								
Ppf94-11			34.9	590								
94-4230	BB[4]	9/21/94			0.48	0.220	<0.040	<1.0	<0.040	<0.20	ND	ND
Ppf94-12			32.8	450								
Ppf94-13			33.7	530								
Ppf94-14			32.8	550								
Ppf94-15			33.9	580								
Ppf94-16			32.5	400								

[1]black crappie (BC) - *Pomoxis nigromaculatus*, [2]bluegill (B) - *Lepomis macrochirus*, [3]largemouth bass (LMB) - *Micropterus salmoides,* [4]brown bullhead (BB) - *Ameiurus nebulosus*

In 1999, MA DEP DWM collected fish from Rock Pond, Georgetown (Appendix B, Table B1) as part of both Year 2 of the watershed cycle and the mercury research study (MRS) being coordinated by MA DEP's Office of Research and Standards (Maietta 2000). The mean mercury concentrations in largemouth bass and yellow perch from Rock Pond were 1.6 and 0.86 ppm wet weight, respectively. Based on the 1994 and 1999 data, MDPH issued fish consumption advisories due to mercury contamination for Rock and Pentucket ponds (MDPH 2001a).

Rock Pond, Georgetown:

1. "The general public should not consume any fish from Rock Pond."

Pentucket Pond, Georgetown:

"Children under 12, pregnant women and nursing mothers should not consume any fish from Pentucket Pond."

1. "The general public should not consume large mouth bass and black crappie from Pentucket Pond."
2. "The general public should limit consumption of non-affected fish from Pentucket Pond to two meals per month."

Due to the MDPH fish consumption advisories, the *Fish Consumption Use* is assessed as non-support for the length of the Parker River that flows through both Rock and Pentucket ponds (1.1 miles). The remaining 11.9 miles are not assessed for the *Fish Consumption Use*.

PRIMARY AND SECONDARY CONTACT RECREATION

Although the PRCWA 1999 annual report indicated low counts of fecal coliform bacteria (geometric mean <150 cfu/100mL), too little information/data was available to assess this use.

AESTHETICS

No objectionable conditions were noted by DWM in 1999 during the benthic macroinvertebrate survey (MA DEP 1999c). Additionally regional information indicated high aesthetic quality in this segment of the Parker River (Tomczyk 2001b).

Based on field observations and best professional judgment, the *Aesthetics Use* is assessed as support.

Parker River (MA91-01) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life*		SUPPORT upper 4.4 miles* PARTIAL SUPPORT middle 1.0 miles SUPPORT lower 7.6 miles*	Flow alteration		Hydromodification	Water withdrawals
Fish Consumption		NON-SUPPORT 1.1 miles Rock and Pentucket ponds NOT ASSESSED 11.9 miles	Mercury		Unknown	
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		SUPPORT				

* "Alert Status" issues identified

RECOMMENDATIONS: PARKER RIVER (MA91-01)

- Conduct benthic macroinvertebrate surveys to address the potential impacts of groundwater withdrawals on the aquatic community in this portion of the Parker River. Develop macroinvertebrate sampling methodologies that accurately assess biological conditions in low gradient, wetland-dominated stream systems.

- Conduct diurnal dissolved oxygen monitoring, nutrient and periphyton sampling to determine if impairment to the benthic community is naturally occurring.

- Complete the WMA five-year reviews for permits in the Parker River Watershed and continue to evaluate compliance with WMA registration and/or permit limits. Determine potential impacts of withdrawals on streamflow/habitat.

- G-Town Produce is required to report their annual water use to MA DEP. Take the necessary actions to obtain and review these reports.

- The Massachusetts Drinking Water Regulations, 310 CMR 22.04(6), require all public water systems to install meters to record water use by 31 December 2001. When data are available from these meters review to determine the potential impacts on streamflow/habitat.

- Track the progress of the Fiscal Year 2002 MWI Round Table Grant to MA DEM that will assess the cause of low flow conditions.

- Work with PRCWA to conduct an investigation of land-use practices and a nonpoint source (NPS) pollution survey along the mainstem Parker River upstream from PR00 (especially in the vicinity of the impoundments in Byfield).

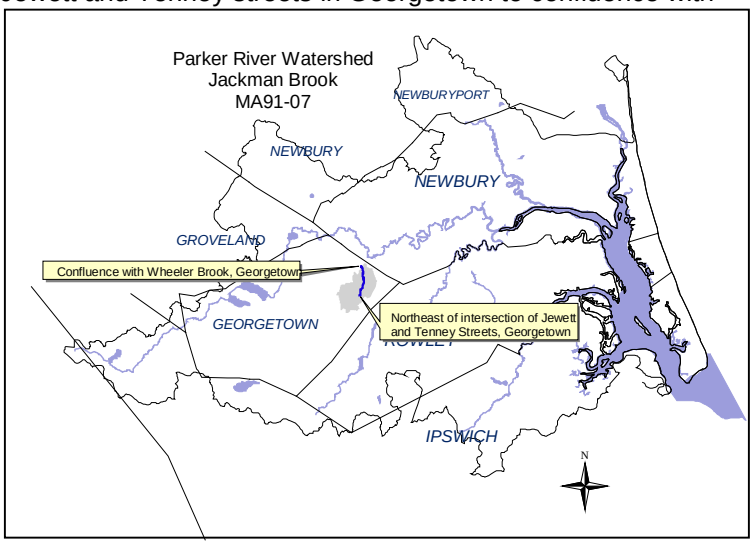
- Multiple fishways on the Parker River have recently been repaired (e.g., Main St., Byfield and Central St., Newbury). Determine the condition of the unimproved fishways and work with the Division of Marine Fisheries fish ladder maintenance program to repair/upgrade as necessary.

- Georgetown Sand & Gravel Co., Inc. is subject to a NPDES general storm water permit. Once the facility has applied for a permit, inspections should be conducted to determine if the facility complies with their storm water protection plan.

- Review the results from the USGS 1999 NECB Mercury Study when are available.

JACKMAN BROOK (SEGMENT MA91-07)

Location: Northeast of the intersection of Jewett and Tenney streets in Georgetown to confluence with Wheeler Brook, Georgetown
Segment Length: 0.8 miles
Classification: Class B



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	55 %
Residential	32 %
Transportation	3 %

WMA WATER WITHDRAWAL AND NPDES SURFACE DISCHARGE SUMMARY:

There are no regulated water withdrawals or surface discharges in Jackman Brook. However, Georgetown is required to obtain a Phase II general NPDES storm water permit. EPA is currently writing this general permit (with input from MA DEP) and a draft is scheduled to be available for internal review by the end of 2001. The final version of the Phase II storm water permit will be issued by December 2002. Permit applications from the towns must be submitted to EPA by March 2003 and coverage under the permit begins with the application (Scarlet 2001).

USE ASSESSMENT:

AQUATIC LIFE

Biology

In August 1999 DWM conducted a RBP III benthic macroinvertebrate survey at one station, JK01 (downstream from Jackman Street, Georgetown) on Jackman Brook (Appendix C). The regional reference station for this survey was located on Fish Brook (FB00) in the Ipswich River Watershed. The RBP III analysis indicated 100% comparability (non-impacted) to the regional reference station (FB00).

Habitat and Flow

During the benthic macroinvertebrate survey in Jackman Brook (JK01) seasonal low base-flow conditions were identified and both epifaunal and fish habitat were considered marginal. In addition, instream deposits of organic and inorganic materials resulted in shifting, unstable bars and substrate embeddedness that further compromised fish and macroinvertebrate habitat. Road runoff from Jackman Street was identified as the most likely source of sediment inputs to Jackman Brook. Other potential sources of NPS pollution included housing developments and agriculture (pasture) (Appendix C).

Although instream habitat quality was marginal, the benthic macroinvertebrate community was not impaired when compared to the regional reference station; it was dominated by pollution intolerant species. The *Aquatic Life Use* is, therefore, assessed as support.

AESTHETICS

No objectionable conditions were noted by DWM in 1999 during the benthic macroinvertebrate survey and there was no evidence of turbidity, odors or oil (MA DEP 1999c).

Based on this information, the *Aesthetics Use* is assessed as support.

Jackman Brook (MA91-07) Use Summary Table

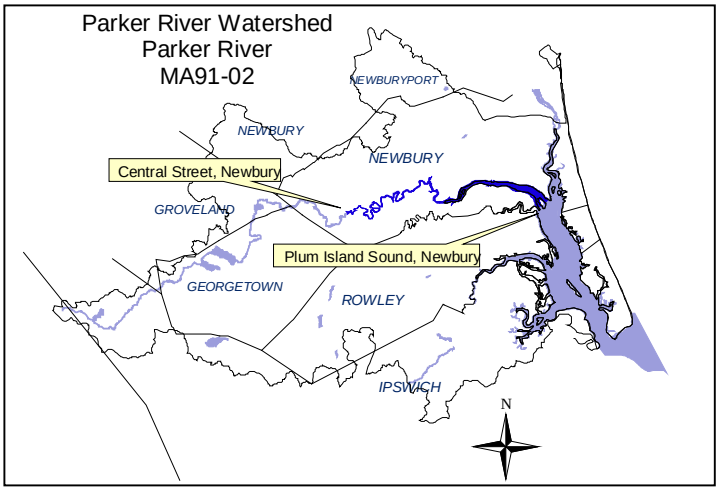
Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		SUPPORT				
Fish Consumption		NOT ASSESSED				
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		SUPPORT				

RECOMMENDATIONS: JACKMAN BROOK (MA91-07)

- Identify/reduce sources of sediment inputs to Jackman Brook from road runoff.
- Monitor Jackman Brook (macroinvertebrates and fish), in part to determine the long-term impacts from NPS pollution.

PARKER RIVER (SEGMENT MA91-02)

Location: Central Street, Newbury to mouth at Plum Island Sound, Newbury
Segment Area: 1.2 square miles.
Classification: Class SA, ORW



This segment of the Parker River begins at the Central Street dam in Newbury and is on the 1998 303(d) list of impaired waters for pathogens (Table 3). The Central Street dam currently has provisions for fish passage.

The PRCWA collects water quality and fecal coliform bacteria data from one station on this segment of the Parker River (Newbury Docks). A summary of their 1999 sampling season results can be found in their Parker River Watch Annual Report (PRCWA 1999).

WMA WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source G = ground	Authorized Withdrawal (MGD)	1998 Average Withdrawal (MGD)
Ould Newbury Golf Club	3205007	NA	NA	01G	Not assigned	* Unknown
Old Town Country Club	3205006	NA	NA	01G	Not assigned	* Unknown

NA-not applicable; * Unknown – no metered withdrawal data available

NPDES SURFACE DISCHARGE SUMMARY:

Based on the available information, there are no regulated surface discharges to this segment of the Parker River. However, there is a vessel sewage pump-out facility (operating between 8am and 6pm from May through September) at Riverfront Marina, High Street in Newbury.

USE ASSESSMENT:

Chemistry - water

Marine Biological Laboratory as part of the PIE-LTER study has collected surface water quality data (DO, % saturation, T, pH) from 26 stations within this segment of the Parker River (EST-PR-0 through EST-PR-26). Data are summarized below for the samples collected at both dawn and dusk between 1996 and 2000 (MBL 2001).

DO

The composite dissolved oxygen concentrations from all 26 stations ranged between 4.1 and 12.5 mg/L (n=1644). The majority of the concentrations below 6.0 mg/L were at stations EST-PR-16 through EST-PR-23, in the Kent Island and Mill Creek Wildlife Management areas. Percent saturation ranged from 51 to 143% (n=1477) and again the majority of the low saturations were in the Kent Island and Mill Creek Wildlife Management areas. Additionally, the majority of the low DO concentrations and saturations occurred during the summer months of 1996 and 1999; both years were relatively dry (drought). Dissolved oxygen measurements were collected pre-dawn and, therefore, represent a worse-case scenario.

Temperature

The maximum temperature measurement at all stations combined was 24.7°C (n=1644).

pH

The pH ranged between 6.7 and 8.3 SU (n=378).

In general, instream physicochemical measurements from this segment of the Parker River indicated high water quality. Based on these data the *Aquatic Life Use* is assessed as support. However, some dissolved oxygen measurements were low with evidence indicating that these conditions may be naturally occurring (i.e., salt marsh, mud flats, etc.); this segment is, therefore, on "Alert Status" for this use.

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that areas N4.3 and N4.4 (which include this segment of the Parker River) are prohibited (DFWELE 2000). Additionally, DMF shellfish surveys indicated few shellfish upstream of Cottage Road (some oysters), with greater numbers of softshell clams located downstream of Cottage Road (Tomczyk 2000).

Because of the DMF shellfish growing area closure, the *Shellfishing Use* for this segment of the Parker River is assessed as non-support.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and February 2001 DMF collected dry weather fecal coliform bacteria samples from five stations on this segment of the Parker River as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2 and 347 cfu/100mL with a total of 115 samples collected. Sixty-nine samples were collected during the primary contact recreation season (1 April through 15 October). PRCWA's 1999 annual report indicated low counts of fecal coliform bacteria (geometric mean <150 cfu/100mL) at their station at Newbury Docks (PRCWA 1999).

Based on the low bacteria counts, both the *Primary* and *Secondary Contact Recreation Uses* are assessed as support.

Parker River (MA91-02) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life*		SUPPORT*				
Fish Consumption		NOT ASSESSED				
Shellfishing		NON-SUPPORT. For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		SUPPORT				
Secondary Contact		SUPPORT				
Aesthetics		NOT ASSESSED				

* "Alert Status" issues identified

RECOMMENDATIONS: PARKER RIVER (MA91-02)

- The Massachusetts Drinking Water Regulations, 310 CMR 22.04(6), require all public water systems to install meters to record water use by 31 December 2001. When data are available from these meters review to determine the potential impacts on streamflow/habitat.

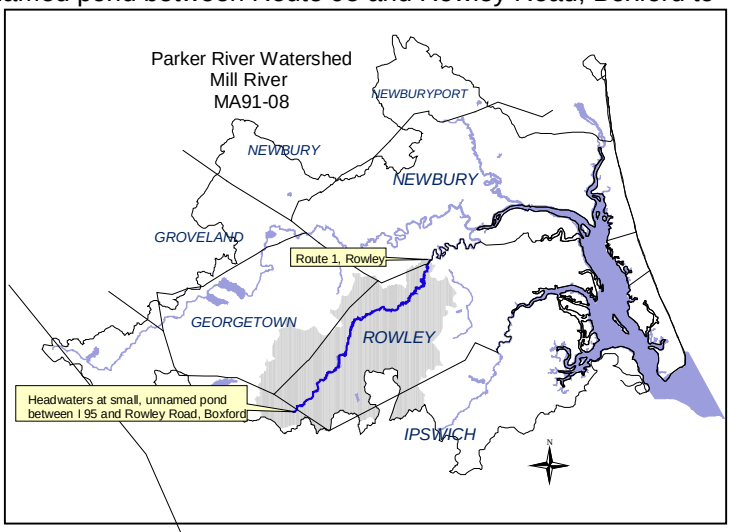
- The DMF shellfish closures in this segment of the Parker River are due to elevated levels of fecal coliform bacteria. The suspected sources of these contaminants include: failed septic systems, storm water, and improper waste disposal from marinas and boats (Tomczyk 2001a). Work with Division of Marine Fisheries, Coastal Zone Management and local communities to identify and reduce sources of contamination to the shellfish beds.

- When available, review the results and recommendations from the Marine Biological Laboratory's land use and nutrient input study of Plum Island Sound.

- The fishway on the Parker River at the Central Street dam has recently been repaired. Work with PRCWA to conduct anadromous fish counts to determine the effectiveness of these upgrades.

MILL RIVER (SEGMENT MA91-08)

Location: Headwaters, outlet of small unnamed pond between Route 95 and Rowley Road, Boxford to Route 1, Rowley
Segment Length: 7.0 miles
Classification: Class B, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	63 %
Residential	19 %
Agriculture	5%

There are three dams on this segment of the Mill River: Upper and Lower Millpond dams and the Jewel Mill Dam in Glen Mills. The Mill River once had an anadromous fishery (blueback herring and alewives), however, the lack of a fish passage facility at the Jewel Mill (Glen Mills dam) impedes the ability of these fish to move upstream. In 1997 PRCWA indicated that blueback herring were making a comeback in the Mill River and that the Mill River provides important spawning habitat for blueback herring and rainbow smelt (PRCWA 1997). In 2001, DFWELE stocked trout in the Mill River for the purpose of recreational fishing (DFWELE 26 April 2001).

The Massachusetts Audubon Society collected fecal coliform bacteria samples (wet and dry weather) from 16 stations in the Mill River subwatershed in 1995 and 1996 (Leahy 1998). The results from this study were combined with data collected (1992-1994) as part of the Plum Island Sound Minibay Project of the Massachusetts Bays Program (Buchsbaum *et al.* 1996).

WMA WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source G = ground	Authorized Withdrawal (MGD)	1999 Average Withdrawal (MGD)
Rowley Water Department	3254000	9P31625401	31625402	03G 02G	0.36* reg. 0.13* permit Total – 0.49	03G – 0.23 02G – 0.22 Total – 0.45
Spar and Spindle Girl Scout Council (TNC**)	3254007	NA	NA	01G	Not assigned	***Unknown
Rowley Country Club	NA	NA	V31625401	Pond #1 and Pond #2****	0.03 (180 days)	0.02

NA - not applicable; *indicates system-wide withdrawal, all sources are not necessarily within this segment; ** TNC= Transient Non Community source; *** Unknown - no metered withdrawal data reported; **** both east of Dodge Road on the country club property.

NPDES SURFACE DISCHARGE SUMMARY:

There are no known regulated discharges to this segment of the Mill River.

USE ASSESSMENT:

AQUATIC LIFE

Biology

In August 1999 DWM conducted a RBP III benthic macroinvertebrate survey at one station (MR03 upstream from Route 1, near Jewel Mill, Rowley) on the Mill River (Appendix C). The regional reference station for this survey was located on Fish Brook (FB00) in the Ipswich River Watershed. The benthic community had numerous filter-feeding caddisflies suggesting an abundance of fine particulate organic material. Much of this organic material (nutrients) probably originates from Upper and Lower Mill ponds

and impoundments upstream of the benthic sampling reach. The RBP III analysis indicated 74% comparability (slightly impacted) to the regional reference station.

Habitat and Flow

This portion of Mill River is extremely straight—the result of historical channelization probably related to the activities of the now-defunct Jewel Mill. The DWM habitat assessment also noted that the stream channel was approximately only 50% full. Additionally, fish habitat was limited (Appendix C) and inadequate provisions for fish passage have been identified. It should be noted that 1999 was a drought year. Average monthly stream flows in June were lower than have been recorded in decades (USGS 2 August 2001).

Based on the slightly impacted benthic macroinvertebrate community and best professional judgment (e.g., low flow, inadequate fish passage, etc.) the *Aquatic Life Use* is assessed as partial support.

PRIMARY AND SECONDARY CONTACT RECREATION

Although the Massachusetts Audubon Society studies (Buchsbaum *et al*. 1996 and Leahy 1998) indicated low fecal coliform bacteria concentrations during wet (200 and 1500 cfu/100mL) and dry (<100 cfu/100mL) weather conditions, too little current data were available to assess the recreational uses.

AESTHETICS

No objectionable conditions were noted by DWM in 1999 during the benthic macroinvertebrate survey and there was no evidence of turbidity, odors or oil (MA DEP 1999c).

Based on this information, the *Aesthetics Use* is assessed as support.

Mill River (MA91-08) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		PARTIAL SUPPORT	Unknown	Nutrients, low flow	Unknown	Upstream impoundments
Fish Consumption		NOT ASSESSED				
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		SUPPORT				

RECOMMENDATIONS: MILL RIVER (MA91-08)

- Complete the WMA five-year reviews for permits in the Parker River Watershed and continue to evaluate compliance with WMA registration and/or permit limits. Determine potential impacts of withdrawals on streamflow/habitat.

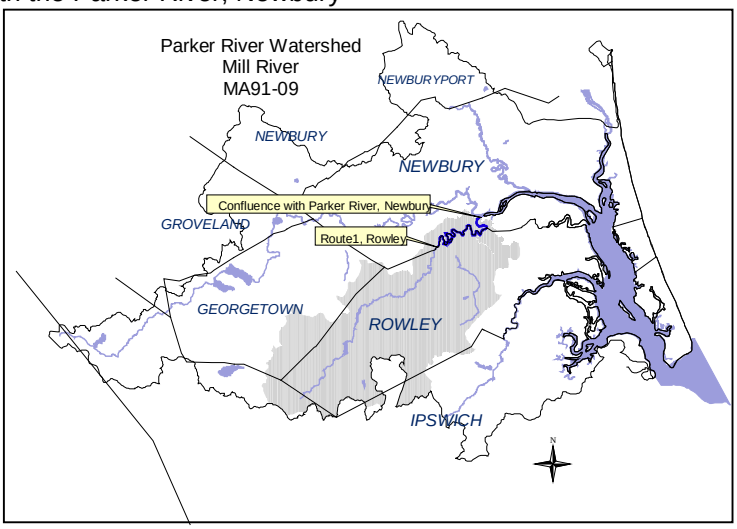
- Work with the Division of Marine Fisheries fish ladder maintenance program and the Great Marsh Summit Initiative to install and upgrade fishways at the dams (Upper and Lower Millpond dams and Jewel Mill Dam) on this segment of the Mill River.

- Work with local organizations (PRCWA) to conduct anadromous fish counts to determine the effectiveness of the fish passage upgrades/repairs.

- Work with Massachusetts Audubon Society to complete the five tasks identified in their nonpoint source implementation program: septic system management; roadway runoff; agricultural runoff-storm water management; public education; and bacteria monitoring.

MILL RIVER (SEGMENT MA91-09)

Location: Route 1, Rowley to confluence with the Parker River, Newbury
Segment Area: 0.08 square miles
Classification: Class SA, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	58 %
Residential	19 %
Wetlands	8 %

In 2001, DFWELE stocked trout in the Mill River for the purpose of recreational fishing (DFWELE 26 April 2001). Marine Biological Laboratory as part of their PIE-LTER study sampled nutrients from the Mill River just east of Route 1 in South Byfield near Governor Dummer Academy in 1994. These samples were collected to determine nutrient loadings to the Plum Island estuarine system (MBL 2001).

The Massachusetts Audubon Society collected fecal coliform bacteria samples (wet and dry weather) from 16 stations in the Mill River subwatershed in 1995 and 1996 (Leahy 1998). The results from this study were combined with data collected (1992-1994) as part of the Plum Island Sound Minibay Project of the Massachusetts Bays Program (Buchsbaum *et al*. 1996).

WMA WATER WITHDRAWAL SUMMARY:
There are no regulated water withdrawals in this segment of the Mill River.

NPDES SURFACE DISCHARGE SUMMARY:
Governor Dummer Academy (MA00303550) is permitted to discharge 0.05 MGD of treated sanitary wastewater via outfall 001 to a small unnamed freshwater tributary of the Mill River just upstream of Route 1 in the village of South Byfield. The permit limits for whole effluent toxicity are $LC_{50} \geq 100\%$ and chronic no observable effect concentration (CNOEC) = 100% effluent. Additionally the facility has limits for benthic oxygen demand (10 mg/L monthly average), total suspended solids (10 mg/L monthly average), ammonia-nitrogen (1.0 mg/L monthly average) and fecal coliform (14 MPN/100 mL maximum with no more than 10% greater than 43 MPN/ 100mL). The treatment facility consists of the following: equalization basin, aeration basin, clarification, ultra-violet disinfection, sand filtration, and sludge disposal: sand drying bed. The secondary treatment facility has recently been upgraded and includes application of membrane bioreactor technology, which went online in September 2000. The average flow from the facility is 13,000 gallons per day (gpd) while the design capacity is 30,000 gpd. The region has identified that the facility is still experiencing infiltration and inflow (INI) problems (Tomczyk 2001b). The permit was issued on 2 September 1996, will expire on 2 September 2001and will be re-issued in 2002. MA DEP will continue to monitor compliance with the Administrative Consent Order and permit.

Georgetown is also required to obtain a Phase II general NPDES storm water permit. EPA is currently writing this general permit (with input from MA DEP) and a draft is scheduled to be available for internal review by the end of 2001. The final version of the Phase II storm water permit will be issued by December 2002. Permit applications from the towns must be submitted to EPA by March 2003 and coverage under the permit begins with the application (Scarlet 2001).

USE ASSESSMENT:

AQUATIC LIFE

Toxicity

Effluent

Governor Dummer Academy conducted 10 effluent toxicity tests on *Ceriodaphnia dubia and Pimephales promelas* between April 1997 and July 2000. Acute toxicity was detected in two test events; *P. promelas* in September of 1997 (LC_{50} = 33%) and to *C. dubia* in July 2000 (LC_{50} = 70.7%) All other LC_{50} results were in compliance with the permit limit (>100% effluent). Chronic toxicity was detected in half of the *C. dubia* tests with CNOEC ranging from < 6.25% to 50% effluent. The CNOEC test results for *P. promelas* ranged between 6.25 and 100% with three below the permit limit (CNOEC < 100% effluent).

Because of limited current instream data, the *Aquatic Life Use* for this segment of the Mill River is not assessed. However, it should be noted that Governor Dummer Academy's discharge has occasionally been toxic to *C. dubia* and *P. promelas*. Although these toxicity results were seen prior to the upgrade of the facility, whole effluent toxicity is however a concern and therefore the *Aquatic Life Use* is on "Alert Status".

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that area N4.4 (which includes this entire segment of the Mill River) is prohibited (0.08 mi^2) (DFWELE 2000).

Because of the DMF shellfish growing area closure, the *Shellfishing Use* for this segment is assessed as non-support.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and February 2001 DMF collected dry weather fecal coliform bacteria samples from one station on this segment of the Mill River as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2.9 and 900 cfu/100mL with a total of 23 samples collected. Fifteen samples were collected during the primary contact recreation season (1 April through 15 October). During the primary contact recreation season, only two samples (13%) exceeded 400 cfu/100mL.

The Massachusetts Audubon Society nonpoint source study of the Mill River analyzed fecal coliform bacteria samples from two stations on this segment of the Mill River collected between 1992 and 1996. The dry weather geometric means of the bacteria samples ranged between 72 and 155 cfu/100mL, while the wet weather means ranged between 204 and 1632 cfu/100mL (Buchsbaum *et al*. 1996 and Leahy 1998).

Additionally, samples were analyzed from a tributary to the Mill River near Governor Dummer Academy. Counts at this station were often in excess of 10,000 cfu/100mL. The Massachusetts Audubon Society nonpoint source study identified no obvious correlation between elevated bacteria levels from the area around Governor Dummer Academy and bacteria levels in the Mill River (Leahy 1998).

Although slightly elevated fecal coliform bacteria counts have been identified in this segment of the Mill River, the Governor Dummer Academy WWTP has recently been upgraded. Based on best professional judgment, both the *Primary* and *Secondary Contact Recreation Uses* are assessed as support.

Mill River (MA91-09) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life*		NOT ASSESSED*				
Fish Consumption		NOT ASSESSED				
Shellfishing		NON-SUPPORT For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		SUPPORT				
Secondary Contact		SUPPORT				
Aesthetics		NOT ASSESSED				

* "Alert Status" issue identified

RECOMMENDATIONS: MILL RIVER (MA91-09)

- The Governor Dummer Academy NPDES permit needs to be reissued with appropriate limits/monitoring requirements. Conduct fecal coliform bacteria monitoring upstream and downstream from their discharge, during dry weather and low flow conditions to determine the effectiveness of the Governor Dummer Academy WWTP upgrades. If the facility continues to have problems meeting their LC_{50} and CNOEC limits, the need for a TIE /TRE should be determined. [Note: all toxicity test results were prior to facility upgrade] Additionally, although the plant has recently been upgraded, the facility is still experiencing INI problems. MA DEP will continue to monitor compliance with the Administrative Consent Order and permit. It is unknown if the school's treatment facility discharges during the summer months.

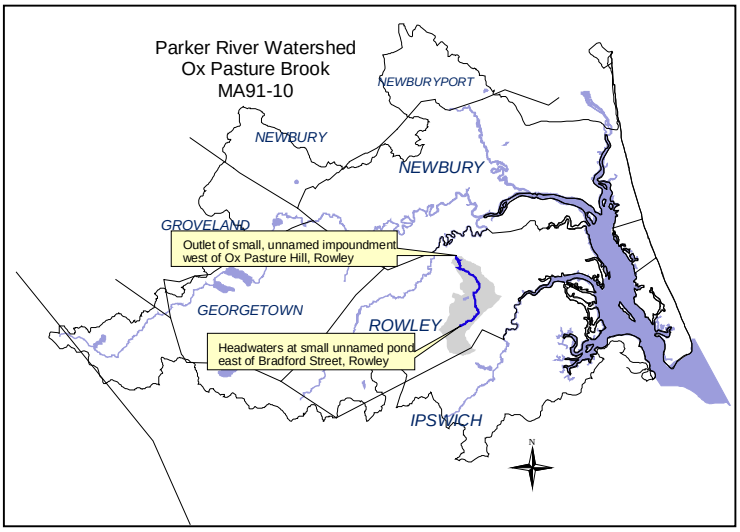
- Continue to review DMF's fecal coliform bacteria data collected from this segment of the Mill River to confirm the assessment of the *Primary Contact Recreation Use*.

- When available, review the results and recommendations from Marine Biological Laboratory land use and nutrient input study of Plum Island Sound.

- Work with Massachusetts Audubon Society to complete the five tasks identified in their nonpoint source implementation program: septic system management; roadway runoff; agricultural runoff-storm water management; public education; and bacteria monitoring.

OX PASTURE BROOK (SEGMENT MA91-10)

Location: Headwaters outlet of small unnamed impoundment east of Bradford Street in Rowley to the outlet of a small unnamed impoundment west of Ox Pasture Hill in Rowley
Segment Length: 2.5 miles
Classification: Class B, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	43 %
Residential	32 %
Agriculture	9 %

The use assessment of Central Street Pond is provided in the Ponds Assessment section of this report. The freshwater reach of Ox Pasture Brook is separated from tidal influence by a small dam (at the downstream end of this segment).

WMA WATER WITHDRAWAL AND NPDES SURFACE DISCHARGE SUMMARY:
There are no known regulated water withdrawals or surface discharges in this segment.

USE ASSESSMENT:

AQUATIC LIFE

Biology

In 1994 the DWM benthic macroinvertebrate survey of Ox Pasture Brook (OX02, at Fenno Road) identified impacts thought to be associated with storm water runoff from downtown Rowley (Appendix C). Subsequent to this survey a StormTreat™ system was installed near Rowley center (Leahy 1998). Due to habitat constraints (shallow, stagnant water and unproductive mucky substrates) at this station (OX02), in 1999 DWM sampled 0.7 miles downstream from Fenno Road in Rowley – station OX03 (Appendix C). The RBP III analysis indicated 79% comparability (non/slight-impacted) to the Fish Brook (FB00) regional reference station in the Ipswich River Watershed. Pollution intolerant species were the dominant taxa.

Habitat and Flow

Naturally occurring low base-flow (channel only 50% full) resulted in much-exposed substrate and unusable fish cover. As a result, epifaunal and fish habitat were considered marginal and poor, respectively. It should be noted that 1999 was a drought year. Average monthly stream flows in June were lower than have been recorded in decades (USGS 2 August 2001).

Although instream habitat quality was marginal it appeared to be the result of naturally occurring conditions. The benthic macroinvertebrate community was considered non/slightly impaired and therefore, based on best professional judgment, the *Aquatic Life Use* is assessed as support. However, it is identified with an “Alert Status” due to potential causes of impairment from storm water.

AESTHETICS

No objectionable conditions were noted by DWM in 1999 during the benthic macroinvertebrate survey and there was no evidence of turbidity, odors or oil in Ox Pasture Brook (MA DEP 1999c).

Based on this information, the *Aesthetics Use* is assessed as support.

Ox Pasture Brook (MA91-10) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life*		SUPPORT*				
Fish Consumption		NOT ASSESSED				
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		SUPPORT				

* "Alert Status" issues identified

RECOMMENDATIONS: OX PASTURE BROOK (MA91-10)

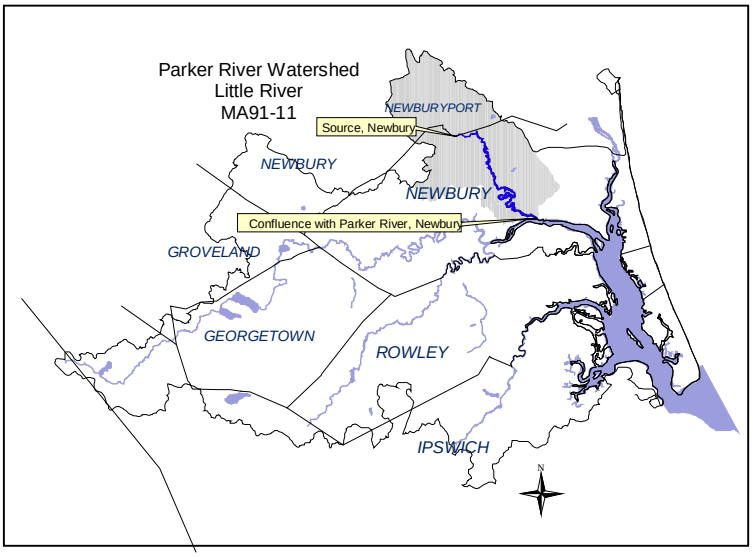
- Since Massachusetts Audubon Society's nonpoint source pollution study did not indicate any obvious reductions in fecal coliform bacteria concentrations downstream of the StormTreat™ system, future monitoring is necessary to determine the sources of bacteria contamination.

- The Town of Rowley is currently upgrading failing septic systems. Review the results of the Town of Rowley's Board of Health in tracking the progress of these activities.

- Determine if there is suitable habitat for anadromous fish and, if so, work with the Division of Marine Fisheries fish ladder maintenance program and the Great Marsh Summit Initiative to install and upgrade fishways.

LITTLE RIVER (SEGMENT MA91-11)

Location: Parker Street, Newbury/Newburyport to confluence with Parker River, Newbury
Segment Area: 0.09 square miles
Classification: Class SA, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	31 %
Residential	17 %
Agriculture	17%

In 2001, DFWELE stocked trout in Little River for the purpose of recreational fishing (DFWELE 26 April 2001).

There is a large beaver dam constricting the flow of the Little River at the upstream end of this segment (Tomczyk 2001b).

WMA WATER WITHDRAWAL SUMMARY:
There are no regulated water withdrawals from this segment Little River.

NPDES SURFACE DISCHARGE SUMMARY:
The Hero Coatings, Inc. Newburyport facility applied for an individual NPDES wastewater permit to discharge to a tributary to the Little River. An individual permit was not deemed necessary and the facility applied for the multi-sector storm water permit (MAR05B077). This permit has since expired and the facility has not applied for coverage under the new general permit.

There are seven additional multi-sector storm water permittees that discharge to the Little River:

- Newbury Auto, Newbury MAR05B735
- JRM Hauling and Recycling Services, Newbury MAR05B873
- Newburyport Layover, Newbury MAR05C013
- GI Plastek Limited Partnership, Newburyport MAR05B658
- Bixby International Corp, Newburyport MAR05C035
- Bixby International Corp, Newburyport MAR05C053
- MBTA, Newburyport MA05C013

USE ASSESSMENT:

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that area N4.3 (which includes this entire segment of the Little River) is prohibited (0.02 mi^2) (DFWELE 2000).

Based on the DMF shellfish closure, the *Shellfishing Use* is assessed as non-support for 0.02 mi^2 and is not assessed for the remaining 0.07 mi^2.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and November 2000 DMF collected dry weather fecal coliform bacteria samples from one station on this segment of the Little River as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2.9 and 900 cfu/100mL with a total of 43 samples collected. Twenty-seven samples were collected during the primary contact recreation season (1 April through 15 October). During the primary contact recreation season, only one sample (4%) exceeded 400 cfu/100mL.

Between April 1999 and April 2000 the Merrimack Valley Planning Commission sampled fecal coliform bacteria bi-weekly from 27 sites in the Little River subwatershed (9–Little River; 17–Little River tributaries; 1-Parker River). Table 5 summarizes the 127 fecal coliform bacteria samples from the nine stations on the Little River (upstream to downstream).

Table 5. Merrimack Valley Planning Commission fecal coliform bacteria summary – Little River (MVPC 2000a).

Station Number	Number of Samples		Range (cfu/100mL)		Geometric Mean (cfu per 100mL)	
	Dry	Wet	High	Low	Dry	Wet
LR-9 Hale St	11	1	30	3	5	30
LR-8 Colby Farm NW	10	2	2400*	5	152	379
LR-7 Colby Farm SE	12	2	625	10	179	68
LR-6 Scotland Rd	3	0	5	5	5	-
LR-5 Route 1	16	2	435	5	89	87
LR-4 Hanover St	16	2	520	5	91	81
LR-3 Boston Rd	18	2	900	5	76	36
LR-2 Hay St	15	2	390	5	57	192
LR-1 Newman Rd	11	2	347	5	48	250

* The only sample above 2,000 cfu/100mL

Within the primary contact recreation season (n=58) only five counts were greater than 400 cfu/100mL. Through the entire year of sampling (n=127) only one (2,400 cfu/100mL) exceeded the *Secondary Contact Recreation* guidance value.

Based on these data the *Primary* and *Secondary Contact Recreation Uses* are assessed as support. The *Primary Contact Recreation Use* is on "Alert Status", however, due to elevated coliform bacteria near MVPC's Colby Farm sampling station (LR8).

Little River (MA91-11) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Shellfishing		NON-SUPPORT 0.02 mi^2 NOT ASSESSED 0.07 mi^2 For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact*		SUPPORT*				
Secondary Contact		SUPPORT				
Aesthetics		NOT ASSESSED				

* "Alert Status" issues identified

RECOMMENDATIONS: LITTLE RIVER (MA91-11)

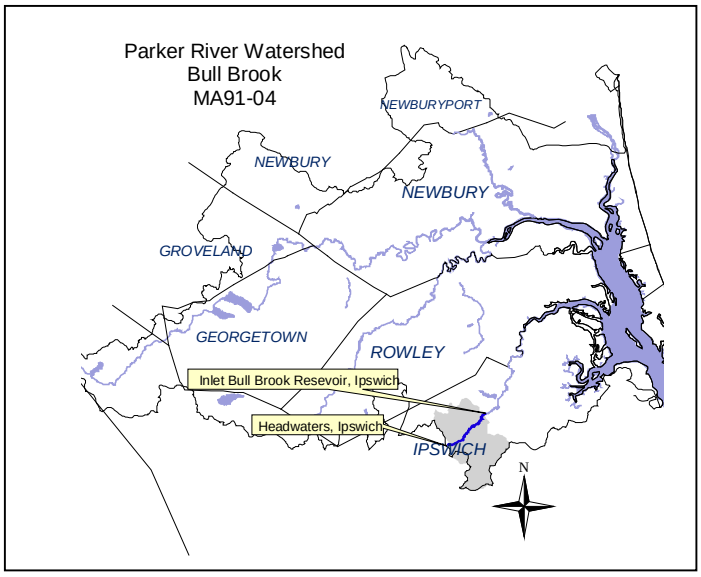
- In June 2001 a compliance inspection was conducted on the JRM Hauling and Recycling Services (MAR05B873) Newbury facility. No Storm Water Prevention Plan was in place at this time (O'Keefe 2001). Determine the current status of their Prevention Plan.

- Work with MVPC to implement their management recommendations from the NPS assessment of the Little River including:
  - Assist farm property owners with design, cost-sharing and implementation of BMPs
  - Investigate structural integrity of the City of Newburyport's municipal sewer lines, particularly in the industrial park.
  - Work with the City of Newburyport and the Town of Newbury to map their municipal storm drainage infrastructure.

- Determine if Hero Coatings, Inc. should apply for coverage under the new multi-sector general storm water permit or if they are eligible for a no-exposure certification.

BULL BROOK (SEGMENT MA91-04)

Location: Headwaters in Ipswich to inlet Bull Brook Reservoir, Ipswich
Segment Length: 2.2 miles
Classification: Class A, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	76 %
Agriculture	12 %
Residential	7%

Bull Brook is protected as an Outstanding Resource Water under the Massachusetts Surface Water Quality Standards.

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:

There are no known regulated water withdrawals or surface discharges in this segment. However, Bull Brook is a tributary to Bull Brook Reservoir, a public drinking water supply.

USE ASSESSMENT:

No current data/information were available, therefore, all uses for Bull Brook are currently not assessed. The MA DEP DWP and the public water supplier, however, maintain current drinking water supply data for Bull Brook Reservoir.

Bull Brook (MA91-04) Use Summary Table

Aquatic Life	Fish Consumption	Drinking Water	Primary Contact	Secondary Contact	Aesthetics
					
NOT ASSESSED					

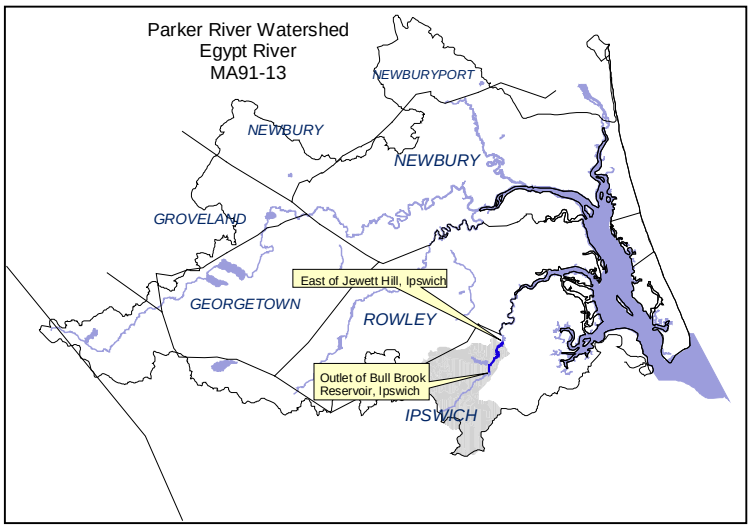
RECOMMENDATIONS: BULL BROOK (MA91-04)

- When the MA DEP DWP SWAP evaluations are completed, review, develop and implement recommendations to protect Bull Brook (a tributary to a drinking water supply).

- Conduct a preliminary analysis to prioritize the need for collecting quality assured data to fully assess all designated uses of Bull Brook. Review the USGS Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (USGS 2001).

EGYPT RIVER (SEGMENT MA91-13)

Location: Outlet of Bull Brook Reservoir, Ipswich to East of Jewett Hill (Lat 42'42"23.40 long 70'51"47.58) Ipswich
Segment Length/Area: 1.1 miles
Classification: Class B, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	71%
Open Land	9%
Residential	9%

Marine Biological Laboratory as part of the PIE-LTER study sampled nutrients from the Egypt River at the Route 1A/ 133 Bridge in Ipswich monthly since 1999. These samples were collected to determine nutrient loadings to the Plum Island estuarine system (MBL 2001).

WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source G = ground S = surface	Authorized Withdrawal (MGD)	1999 Average Withdrawal (MGD)
Ipswich Water Department*	3144000	Permit Application under review	31614401	01G – Mile Lane Well 02G – Brown's Well 01S – Dow Brook Reservoir 02S – Bull Brook Reservoir	0.64* reg. 0.20** reg.	01G – 0.05 02G – 0.28 01S – 0.57 02S – 0.0 Total 0.9*

* withdrawal in Parker River Watershed ** authorized withdrawal in Ipswich River Watershed

The Ipswich Water Department's withdrawal from the Parker River subwatershed is not subject to the IBT; the IBT applies when the withdrawals cross both a basin divide and town line. In this case the withdrawals are made in the Town of Ipswich and used in the Town of Ipswich. In 1999, the Water Department withdrew 0.26 MGD over their registered volume from their sources in the Parker River subwatershed alone (their actual withdrawal in 1999 was 1.30 MGD from both the Ipswich and Parker River Watershed sources). The Ipswich Water Department applied for a permit in 1995 but never completed their application. The Water Department has recently signed an ACO with MA DEP to complete the Water Management Permit process. Conditions included within the ACO require the Water Department to implement aggressive water conservation requirements prior to the permit issuance by MA DEP (LeVangie 2001 and O'Keefe 2001).

NPDES SURFACE DISCHARGE SUMMARY:
There are no known regulated discharges to this segment of the Egypt River.

USE ASSESSMENT:
Too little instream water quality data were available to assess all uses; they are currently not assessed. However, due to the large water withdrawals by the Ipswich Water Department from the Egypt River subwatershed (MA91-13), the *Aquatic Life Use* is on "Alert Status".

Egypt River (MA91-13) Use Summary Table

Aquatic Life*	Fish Consumption	Shellfishing	Primary Contact	Secondary Contact	Aesthetics
					
NOT ASSESSED					

* "Alert Status" issues identified

RECOMMENDATIONS: EGYPT RIVER (MA91-13)

- Complete the WMA permit process for the increased water withdrawal by Ipswich Water Department. Permit process should evaluate the potential impacts of withdrawals on streamflow/habitat.

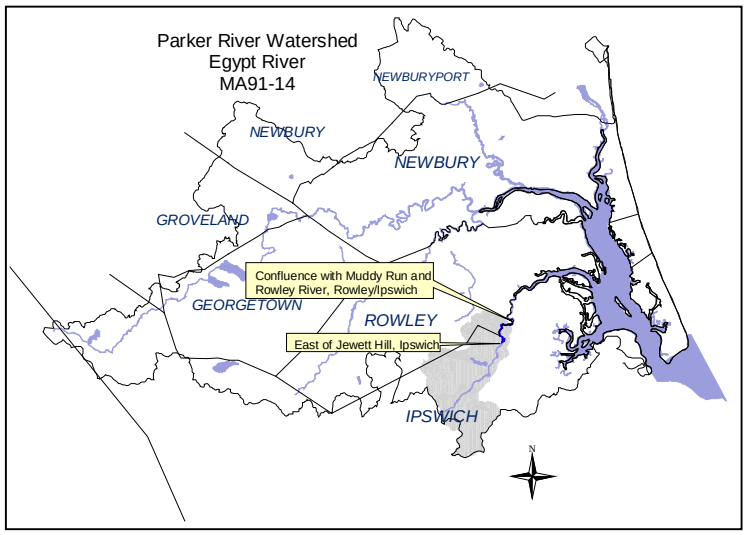
- Conduct instream biological monitoring to determine the effects of water withdrawals on habitat and aquatic life.

- When available, review the results and recommendations from the Marine Biological Laboratory's land use and nutrient input study of Plum Island Sound.

- Conduct a preliminary analysis to prioritize the need for collecting quality assured data to fully assess all designated uses of the Egypt River. Review the USGS Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (USGS 2001).

EGYPT RIVER (SEGMENT MA91-14)

Location: East of Jewett Hill (Lat 42’42’’23.40 long 70’51’’47.58) Ipswich to confluence with Muddy Run and Rowley River, Rowley/Ipswich
Segment Area: 0.014 square miles
Classification: Class SA, ORW



Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	67%
Residential	9%
Agriculture	9%

WMA WATER WITHDRAWAL AND NPDES SURFACE DISCHARGE SUMMARY:

There are no known regulated water withdrawals or surface discharges in this segment of the Egypt River. The Ipswich Water Department is, however, registered to withdraw 0.64 MGD from the upstream segment of the Egypt River (MA91-13) and is applying for a permit with an increase in volume.

USE ASSESSMENT:

AQUATIC LIFE

No instream water quality data were available to assess the *Aquatic Life Use;* this segment is currently not assessed. However, due to the large water withdrawals by the Ipswich Water Department from the upstream segment of the Egypt River (MA91-13), the *Aquatic Life Use* is on “Alert Status”.

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that area N4.2 (which includes this entire segment of the Egypt River) is classified as a conditionally approved shellfish bed (0.014 mi^2) (DFWELE 2000).

Based on the DMF shellfish status (conditionally approved) the *Shellfishing Use* for this segment is assessed as partial support.

Egypt River (MA91-14) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life*		NOT ASSESSED*				
Fish Consumption		NOT ASSESSED				
Shellfishing		PARTIAL SUPPORT For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		NOT ASSESSED				

* "Alert Status" issues identified

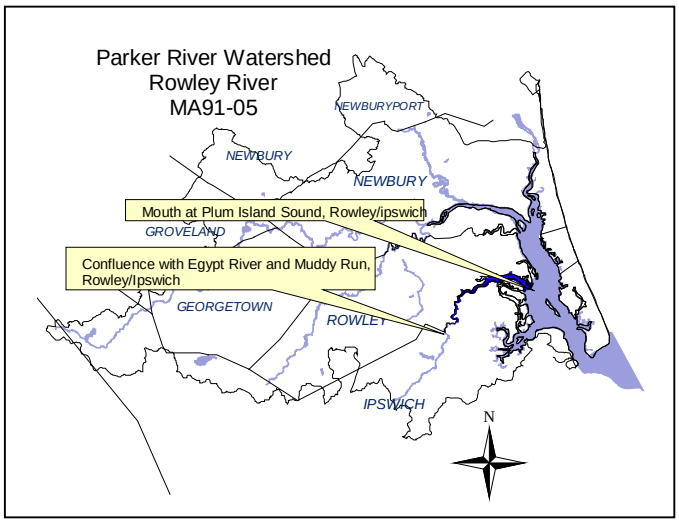
RECOMMENDATIONS: EGYPT RIVER (MA91-14)

- Conduct instream biological monitoring to determine the effects of water withdrawals on habitat and aquatic life.

- Conduct a preliminary analysis to prioritize the need for collecting quality assured data to fully assess all designated uses of the Egypt River. Review the USGS Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (USGS 2001).

ROWLEY RIVER (SEGMENT MA91-05)

Location: Confluence with Egypt River and Muddy Run Rowley/Ipswich to mouth at Plum Island Sound Rowley/Ipswich
Segment Area: 0.3 square miles
Classification: Class SA, ORW



This segment is on the 1998 303(d) list of impaired waters for pathogens (Table 3).

The Parker River Clean Water Association collects water quality and fecal coliform bacteria data from Rowley Town Docks. A summary of their 1999 sampling season results can be found in their Parker River Watch Annual Report (PRCWA 1999).

WMA WATER WITHDRAWAL AND NPDES SURFACE DISCHARGE SUMMARY:

There are no known regulated water withdrawals or surface discharges in this segment of the Rowley River. The Ipswich Water Department is however, registered to withdraw 0.64 MGD from a headwater tributary (Egypt River MA91-13) and has applied for a permit to increase withdrawal volume.

There is a vessel sewage pump-out facility (operating for 24-hours/day, closed winters), at Perley's Marina located on Warehouse Lane, Rowley. Additionally, there is a pump-out boat on the Rowley River operating Saturday and Sunday 10am – 6pm and on weekdays by appointment (closed winters).

USE ASSESSMENT

AQUATIC LIFE

Chemistry – water

Marine Biological Laboratory as part of the PIE-LTER study collected surface water quality data (DO, % saturation, temperature, pH) from one station EST-SO-28 Rowley on the Rowley River. Data are summarized below for the samples collected at both dawn and dusk between 1996 and 2000 (MBL 2001).

DO

Dissolved oxygen concentrations ranged between 6.7 and 13.1 mg/L (n=59). Percent saturation ranged from 79 to 111% (n=58) with only four samples greater than 110%. Dissolved oxygen measurements were collected pre-dawn and, therefore, represent a worse-case scenario.

Temperature

The maximum temperature measurement was 21.2°C (n=59).

pH

The pH ranged between 7.1 and 8.3 SU (n=16).

Instream physicochemical measurements from the Rowley River indicate high water quality. Based on these data the *Aquatic Life Use* is assessed as support. However, due to the water withdrawals by the Ipswich Water Department from the headwater tributaries of this segment (see segment MA91-13, Egypt River), the *Aquatic Life Use* is on "Alert Status".

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that areas N4.0 and N4.2 (which include this entire segment of the Rowley River) are classified as conditionally approved (0.30 mi^2) (DFWELE 2000).

Based on the DMF shellfish bed status (conditionally approved) the *Shellfishing Use* for this segment is assessed as partial support.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and February 2001 DMF collected dry weather fecal coliform bacteria samples from one station on this segment of the Rowley River as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2 and 46 cfu/100mL with a total of 46 samples collected. Twenty-seven samples were collected during the primary contact recreation season (1 April through 15 October).

Based on these data, both the *Primary* and *Secondary Contact Recreation Uses* are assessed as support.

Rowley River (MA91-04) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life*		SUPPORT*				
Fish Consumption		NOT ASSESSED				
Shellfishing		PARTIAL SUPPORT For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		SUPPORT				
Secondary Contact		SUPPORT				
Aesthetics		NOT ASSESSED				

* "Alert Status" issues identified

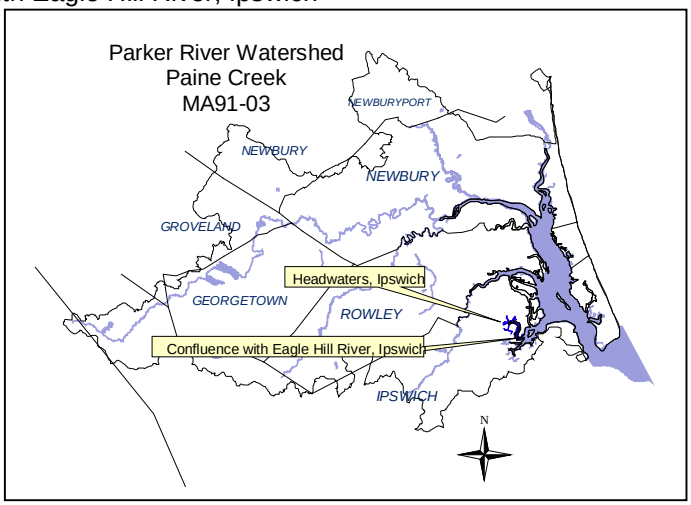
RECOMMENDATIONS: ROWLEY RIVER (MA91-05)

- Conduct a nonpoint source evaluation to determine if land-based sources of contamination are impacting the DMF shellfish growing areas.
- Conduct instream biological monitoring to determine the effects of water withdrawals on habitat and aquatic life in the Rowley River.
- When available, review the results and recommendations from the Marine Biological Laboratory's land use and nutrient input study of Plum Island Sound.
- Review the results of the ongoing surveys conducted by Parker River Clean Water Association. When available work with the PRCWA to implement their recommendations.

PAINE CREEK (SEGMENT MA91-03)

Location: Headwaters, Ipswich to confluence with Eagle Hill River, Ipswich
Segment Area: 0.08 square miles
Classification: Class SA, ORW

This segment is on the 1998 303(d) list of impaired waters for pathogens (Table 3).



WMA WATER WITHDRAWAL AND NPDES SURFACE DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that area N4.1 (which includes this entire segment of Paine Creek) is conditionally approved (0.08 mi^2)(DFWELE 2000).

Based on the DMF shellfish growing area status (conditionally approved), the *Shellfishing Use* for this segment is assessed as partial-support.

Paine Creek (MA91-03) Use Summary Table

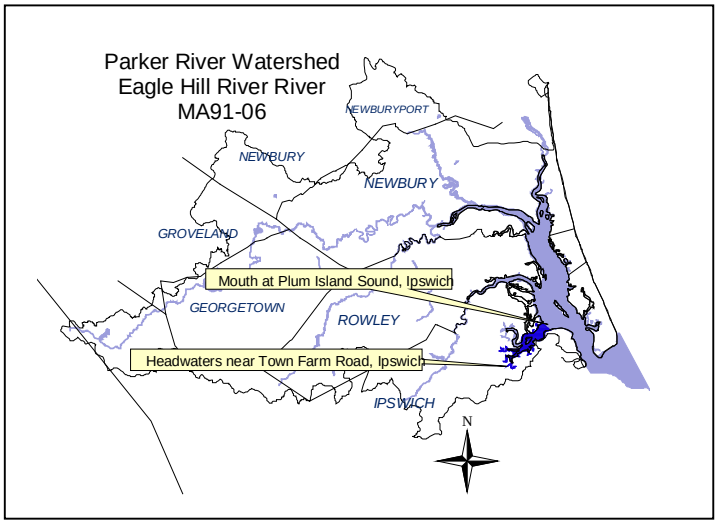
Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Shellfishing		PARTIAL SUPPORT For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		NOT ASSESSED				

RECOMMENDATIONS: PAINE CREEK (MA91-03)

- Conduct a preliminary analysis to prioritize the need for collecting quality assured data to fully assess all designated uses of Paine Creek. Review the USGS Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (USGS 2001).

EAGLE HILL RIVER (SEGMENT MA91-06)

Location: Headwaters near Town Farm Road, Ipswich to the mouth at Plum Island Sound, Ipswich
Segment Area: 0.4 square miles
Classification: Class SA, ORW



This segment is on the 1998 303(d) list of impaired waters for pathogens (Table 3).

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment. However, there is a vessel sewage pump-out boat (Ipswich town dock) operating from May through September.

USE ASSESSMENT

AQUATIC LIFE

Chemistry – water

Marine Biological Laboratory as part of the PIE-LTER study has collected surface water quality data (DO, % saturation, T, pH) from one station EST-SO-29 Eagle on the Eagle Hill River. Data are summarized below for the samples collected at both dawn and dusk between 1996 and 2000 (MBL 2001).

DO

Dissolved oxygen concentrations ranged between 6.4 and 13.4 mg/L (n=55). Percent saturation ranged from 79 to 114% (n=57) with five samples greater than 110%. Dissolved oxygen measurements were collected pre-dawn and, therefore, represent a worse-case scenario.

Temperature

The maximum temperature measurement was 21.3°C (n=57).

pH

The pH ranged between 7.2 and 8.32 SU (n=16).

Instream physicochemical measurements from this segment of the Eagle River indicate high water quality. Based on these data the *Aquatic Life Use* is assessed as support.

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that area N4.1 (which includes this entire segment of the Eagle River) is classified as conditionally approved (0.40 mi^2) (DFWELE 2000).

Based on the DMF shellfish growing area status (conditionally approved), *Shellfishing Use* for this segment is assessed as partial-support.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and February 2001 DMF collected dry weather fecal coliform bacteria samples from one station on this segment of the Eagle Hill River as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2 and 347 cfu/100mL with a total of 53 samples collected. Thirty-two samples were collected during the primary contact recreation season (1 April through 15 October).

Based on these data, both the *Primary* and *Secondary Contact Recreation Uses* are assessed as support.

Eagle Hill River (MA91-06) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		SUPPORT				
Fish Consumption		NOT ASSESSED				
Shellfishing		PARTIAL SUPPORT For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		SUPPORT				
Secondary Contact		SUPPORT				
Aesthetics		NOT ASSESSED				

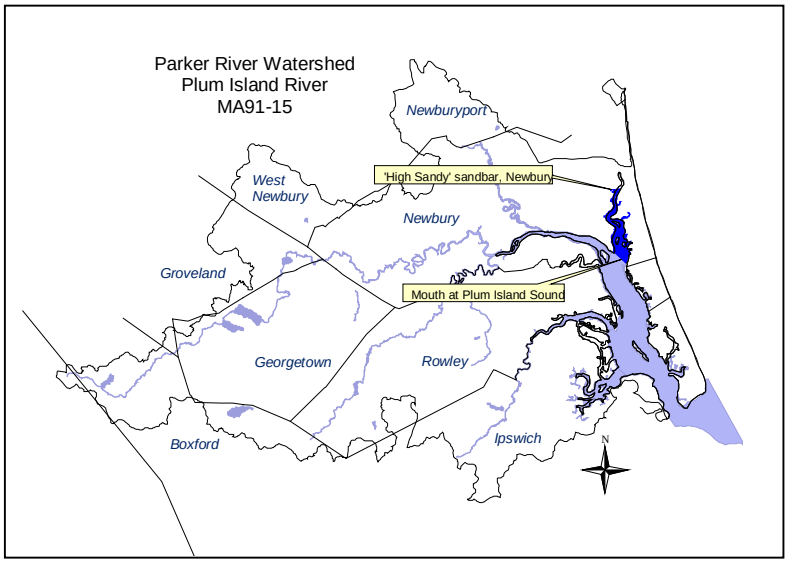
RECOMMENDATIONS: EAGLE HILL RIVER (MA91-06)

- Conduct a nonpoint source evaluation to determine if land based sources of contamination are impacting the DMF shellfish growing areas.

PLUM ISLAND RIVER (SEGMENT MA91-15)

Location: From "high sandy" sandbar just north of the confluence with Pine Island Creek, Newbury to confluence with Plum Island Sound, Newbury.
Segment Area: 0.41 square miles
Classification: Class SA, ORW

Note: Plum Island River was formerly listed as a waterbody in the Merrimack River Basin (MA84A-23). This segment is on the 1998 303(d) list of impaired waters for pathogens (Table 3).



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that area N4.0 (which includes this entire segment) is conditionally approved (DFWELE 2000).

Based on the DMF shellfish growing area status, the *Shellfishing Use* is assessed as partial support for this entire segment.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and February 2001 DMF collected dry weather fecal coliform bacteria samples from one station on this segment of the Plum Island River as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2 and 243 cfu/100mLs with a total of 89 samples collected. Fifty-two samples were collected during the primary contact recreational season (1 April through 15 October).

Based on these data, both the *Primary* and *Secondary Contact Recreation Uses* are assessed as support.

Plum Island River (MA91-15) Use Summary Table

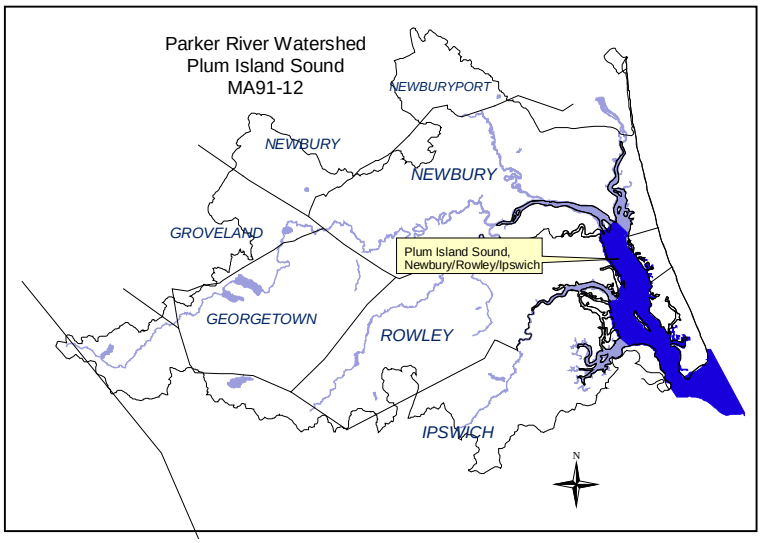
Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Shellfishing		PARTIAL SUPPORT For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		SUPPORT				
Secondary Contact		SUPPORT				
Aesthetics		NOT ASSESSED				

RECOMMENDATIONS: PLUM ISLAND RIVER (MA91-15)

- The Plum Island River drains south from ”High sandy” sandbar Newbury into the Plum Island Sound not north into the Merrimack River Basin. Therefore, in the next review of the SWQS, classify the Plum Island River as a waterbody in the Parker River Watershed, not the Merrimack River Basin.

PLUM ISLAND SOUND (SEGMENT MA91-12)

Location: From the mouth of both the Parker River and Plum Island River, Newbury to the Atlantic Ocean, Ipswich (includes Ipswich Bay)
Segment Area: 4.7 square miles
Classification: Class SA, ORW



Note: Plum Island Sound was formerly listed as a waterbody in the Merrimack River Basin (MA84A-24). This segment is on the 1998 303(d) list of impaired waters for pathogens (Table 3).

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment. There is as vessel sewage pump-out boat operating on demand seasonally 24 hours per day on this segment of Plum Island Sound.

USE ASSESSMENT

AQUATIC LIFE

Chemistry - water

Marine Biological Laboratory as part of the PIE-LTER study has collected surface water quality data (DO, % saturation, temperature, pH) from four stations within the Plum Island Sound:

EST-SO-26 Nelson	Lat. 42.74716149	Long. 70.82008701
EST-SO-27 Far Point	Lat. 42.73555086	Long. 70.80121718
EST-SO-30 IBYC	Lat. 42.70978014	Long. 70.79483658
EST-SO-31 Spindle	Lat. 42.697826	Long. 70.78356249

Data are summarized below for the samples collected at both dawn and dusk between 1996 and 2000 (MBL 2001).

DO

Dissolved oxygen concentrations at all four stations combined ranged between 5.7 and 13.1 mg/L (n=206) with only two samples less than 6.0 mg/L. Percent saturation ranged from 67 to 114% (n=207) with only two samples less than 75%. Dissolved oxygen measurements were collected pre-dawn and, therefore, represent a worse-case scenario.

Temperature

The maximum temperature measurement at all stations combined was 22.2°C (n=207).

pH

The pH ranged between 6.56 and 8.31 SU (n=56).

Instream physicochemical measurements collected from Plum Island Sound indicate high water quality. Based on these data the *Aquatic Life Use* is assessed as support.

SHELLFISHING

The DMF Shellfish Status Report of October 2000 indicates that areas N3.0 and N6.0 (which includes 1.19 mi^2 of this segment) are approved, area N4.0 (which includes 3.33 mi^2 of this segment) is conditionally approved and area N6.1 (which includes 0.18 mi^2 of this segment) is prohibited (DFWELE 2000).

Based on the DMF shellfish growing area status, the *Shellfishing Use* is assessed as support for 1.19 mi^2, partial support for 3.33 mi^2, and non-support for 0.18 mi^2.

PRIMARY AND SECONDARY CONTACT RECREATION

Between January 1997 and February 2001 DMF collected dry weather fecal coliform bacteria samples from three stations on Plum Island Sound as part of their shellfish growing area classification (Kennedy 2001). Counts ranged between 2 and 110 cfu/100mL with a total of 140 samples collected. Eighty-two samples were collected during the primary contact recreation season (1 April through 15 October). Additionally, the DMF Shellfish Status Report of October 2000 indicates that areas N3.0 and N6.0 (which includes 1.18 mi^2 of this segment) are approved (DFWELE 2000).

Based on the fecal coliform bacteria data and the shellfish status the *Primary* and *Secondary Contact Recreation Uses* are assessed as support.

AESTHETICS

Most of Plum Island Sound is surrounded by the Parker River National Wildlife Refuge and is also part of the Parker River/Essex Bay Area of Critical Environmental Concern. The Sound has long been recognized as one of the most pristine estuarine habitats in the northeast and is an area of regional and statewide significance. Plum Island Sound is in the center of the 20,000 acres of salt marsh that lies between Cape Ann and the New Hampshire border. This salt marsh is important as a migratory stop for birds, as an anadromous fish run, and as a spawning ground for finfish and other organisms (PRCWA 4 September 2000).

Based on the above information (e.g., pristine habitat, undisturbed, etc), the *Aesthetics Use* is assessed as support for the Plum Island Sound.

Plum Island Sound (MA91-12) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		SUPPORT				
Fish Consumption		NOT ASSESSED				
Shellfishing		SUPPORT 1.19 mi^2 PARTIAL SUPPORT 3.33 mi^2 NON-SUPPORT 0.18 mi^2 For watershed-wide shellfish growing area data see Appendix E.				
Primary Contact		SUPPORT				
Secondary Contact		SUPPORT				
Aesthetics		SUPPORT				

RECOMMENDATIONS: PLUM ISLAND SOUND (MA91-12)

- Support boat pump-out programs on Plum Island Sound and on two tributaries (Pine and Grape Island Creeks) to Plum Island Sound.

- When available, review the results and recommendations from the Marine Biological Laboratory's land use and nutrient input study of Plum Island Sound.

- Plum Island Sound receives the flow from the waters in the Parker River Watershed (e.g., Plum Island, Little, Parker, Mill, Rowley, Egypt, and Eagle Hill rivers). Therefore, in the next review of the SWQS, classify the Plum Island Sound as a waterbody in the Parker River Watershed, not the Merrimack River Basin.

PARKER RIVER WATERSHED – POND SEGMENT ASSESSMENTS

A total of 17 ponds/impoundments (the term "ponds" will hereafter be used to include both) have been identified and assigned Pond and Lake Information System (PALIS) code numbers in the Parker River Watershed (Ackerman 1989 and MA DEP 2001a). The total surface area of the Parker River Watershed ponds is 322.6 acres. Almost all of the ponds are relatively small. In fact, only two ponds have surface areas greater than 50 acres. This report presents information on 14 of these ponds that are in the DWM/EPA WBS database. The 14 ponds assessed in this report represent 94% of the acreage in the Parker River Watershed. They lie wholly or partly within eight of the watershed's nine communities (Figure 7). Three ponds (Georgetown, Warren Street, and Parker River ponds), which total 20 acres, are unassessed; they are not currently included as segments in the DWM/EPA WBS database.

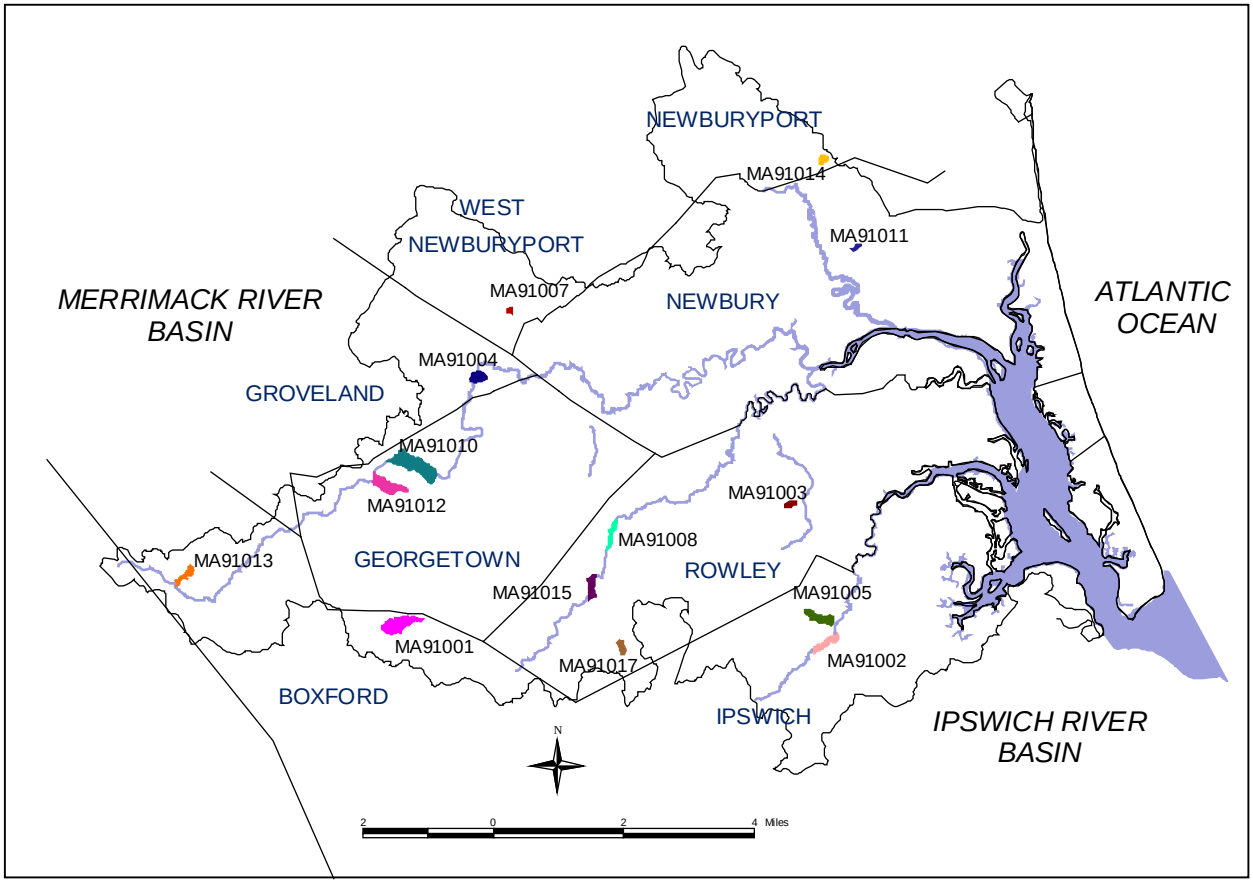


Figure 7. Assessed Ponds in the Parker River Watershed

TROPHIC STATUS EVALUATION

Ponds are dynamic ecosystems that over time undergo a process of succession from one trophic state to another. Under natural conditions most ponds move from a nutrient poor (oligotrophic) condition through an intermediate (mesotrophic) stage of nutrient availability and biological productivity to a nutrient-rich or highly productive (eutrophic) state. For the purposes of this report trophic status was estimated primarily using visual observations of macrophyte cover and phytoplankton populations observed in 1994 by MA DEP DWM. Occasionally, older data from more detailed diagnostic studies were utilized. A more definitive assessment of trophic status would require more extensive collection of water quality and biological data. The trophic status estimates for the ponds assessed in the Parker River Watershed are presented in Table 6; 63% of the acreage was mesotrophic, 15% was eutrophic, and 5% was hypereutrophic. The trophic status was undetermined for 18% of the pond acreage.

Table 6. Parker River Watershed Assessed Ponds (**Bold indicates 1998 303(d) listed**).

Pond	Waterbody Identification Code (WBID)	Class	Size (Acres)	Trophic Status Estimate
Baldpate Pond, Boxford	**MA91001**	B	55	mesotrophic
Bull Brook Reservoir*, Ipswich	MA91002	A	10	undetermined
Central Street Pond, Rowley	**MA91003**	B	5	eutrophic
Crane Pond, Groveland	**MA91004**	B	19	undetermined
Dow Brook Reservoir, Ipswich*	MA91005	A	17	undetermined
Little Crane Pond, West Newbury	MA91007	B	5	undetermined
Lower Mill Pond, Rowley	**MA91008**	B	14	hypereutrophic
Pentucket Pond, Georgetown	MA91010	B	85	mesotrophic
Quills Pond, Newbury	MA91011	B	4	undetermined
Rock Pond, Georgetown	MA91012	B	49.6	mesotrophic
Sperrys Pond, Boxford	**MA91013**	B	6	eutrophic
State Street Pond, Newburyport	**MA91014**	B	5	eutrophic
Upper Mill Pond, Rowley	**MA91015**	B	21	eutrophic
Wilson Pond, Rowley	**MA91017**	B	7	eutrophic

POND USE ASSESSMENTS

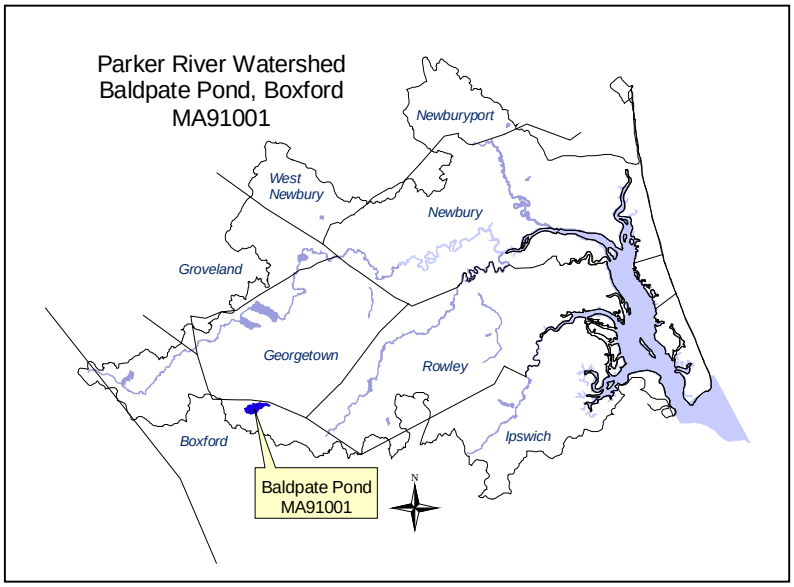
Pond assessments are based on information gathered during DWM 1994 synoptic pond surveys as well as pertinent information from other sources (e.g., abutters, herbicide applicators, diagnostic/feasibility studies, MDPH, etc.). The DWM pond surveys focused on observations of water quality and quantity (e.g., water level, sedimentation, etc.), the presence of native and non-native aquatic plants (both distribution and areal cover) and presence/severity of algal blooms (MA DEP 1994). In cases where it is best professional judgment that conditions have not changed since the 1994 surveys these data were used for assessment purposes. In-pond measurements of dissolved oxygen, pH, and temperature and sampling for nutrients, chlorophyll *a* and fecal coliform bacteria would have provided sufficient data to completely assess the status of the *Aquatic Life* and *Primary Contact Recreation Uses*, but were not readily available. When no visual impairment was identified during the synoptic surveys it could not be assumed that water quality conditions met standards and, therefore, neither the *Aquatic Life* nor *Primary Contact Recreation Uses* could be assessed as support – they were not assessed.

BALDPATE POND (SEGMENT MA91001)

[Also known as Perleys Pond]
Location: Boxford
Size: 55 acres
Classification: Class B
Estimated Trophic Status: Mesotrophic

This pond is on the 1998 303(d) list of impaired waters for noxious aquatic plants.

In 2001, DFWELE stocked trout in Baldpate Pond for the purpose of recreational fishing (DFWELE 19 March 2001).



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

AQUATIC LIFE

Chemistry - water

As part of DWM's 1999 fish toxics monitoring of Baldpate Pond, a Hydrolab® profile was recorded, on 12 May 1999 (Station #FM-0004). Dissolved oxygen concentrations ranged from 11.0 mg/L at the surface to 5.1 (42% saturation) in the bottom waters (Appendix B, Table B3).

Too little in-pond data were available to assess the *Aquatic Life Use*; it is not assessed.

FISH CONSUMPTION

MDPH issued a fish consumption advisory due to mercury contamination for Baldpate Pond (MDPH 2001a).

1. "Children under 12, pregnant women and nursing mothers should not consume any fish from Baldpate Pond."
2. "The general public should not consume large mouth bass from Baldpate Pond."
3. "The general public should limit consumption of non-affected fish from Baldpate Pond to two meals per month."

[Note: MDPH fish consumption advisories do not apply to stocked fish.]

Based on the MDPH fish consumption advisory, the *Fish Consumption Use* is non-support for the 55 acres of Baldpate Pond.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

In 1994, the perimeter of this pond was densely covered with floating leaf macrophytes (MA DEP 1994). Since this survey, the southern side of the pond has been developed while the northern side still remains within the state forest.

Based on the 1994, survey results (noxious aquatic plant growth), land-use changes and best professional judgment the *Recreation* and *Aesthetics Uses* are assessed as partial support because of the macrophyte cover.

Baldpate Pond (MA91001) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NON SUPPORT	Mercury		Unknown	
Primary Contact		PARTIAL SUPPORT 10 acres NOT ASSESSED 45 acres	Noxious aquatic plants		Unknown	Land use changes
Secondary Contact		PARTIAL SUPPORT 10 acres NOT ASSESSED 45 acres	Noxious aquatic plants		Unknown	Land use changes
Aesthetics		PARTIAL SUPPORT 10 acres NOT ASSESSED 45 acres	Noxious aquatic plants		Unknown	Land use changes

RECOMMENDATIONS: BALDPATE POND (MA91001)

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Determine if there are any bathing beaches on Baldpate Pond. If so, review data from "Beaches Bill" required water quality testing (bacteria sampling from all formal bathing beaches) to assess the status of the recreational uses.

- Implement recommendations identified in the Town of Boxford's Three Pond Study, Nutrient Modeling Results.

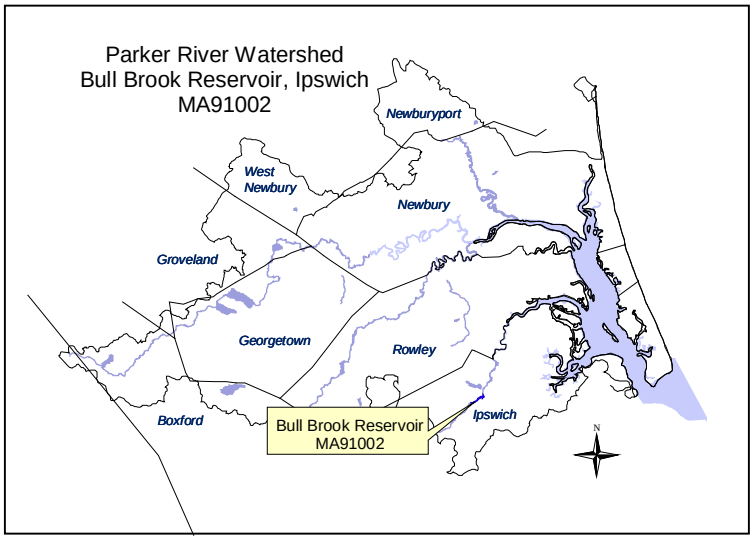
- Implement recommendations of the Baldpate TMDL currently in preparation.

- Control noxious plant populations:
  - To manage aquatic plant populations additional monitoring should be conducted to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control noxious aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site.
  - Another important component of a management plan is prevention of further spreading of certain invasive plant species. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.

BULL BROOK RESERVOIR (SEGMENT MA91002)

Location: Ipswich
Size: 10 acres
Classification: Class A, ORW
Estimated Trophic Status: Undetermined

Bull Brook Reservoir is protected as an Outstanding Resource Water under the Massachusetts Surface Water Quality Standards.



WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source S = surface	Authorized Withdrawal (MGD)	1999 Average Withdrawal (MGD)
Ipswich Water Department*	3144000	Permit Application under review	31614401	02S – Bull Brook Reservoir	0.64* reg. 0.20** reg.	02S – 0.0

* withdrawal in Parker River Watershed ** authorized withdrawal in Ipswich River Watershed

The Ipswich Water Department's withdrawal from the Parker River subwatershed is not subject to the IBT; the IBT applies when the withdrawals cross both a basin divide and town line. In this case the withdrawals are made in the Town of Ipswich and used in the Town of Ipswich. In 1999, the Water Department withdrew 0.26 MGD over their registered volume from their sources in the Parker River subwatershed alone (their actual withdrawal in 1999 was 1.30 MGD from both the Ipswich and Parker River Watershed sources). The Ipswich Water Department applied for a permit in 1995 but never completed their application. The Water Department has recently signed an ACO with MA DEP to complete the Water Management Permit process. Conditions included within the ACO require the Water Department to implement aggressive water conservation requirements prior to the permit issuance by MA DEP (LeVangie 2001 and O'Keefe 2001).

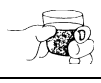
NPDES WASTEWATER DISCHARGE SUMMARY:

Based on the available information, there are no regulated surface wastewater discharges in this segment.

USE ASSESSMENT:

No current data/information were available, therefore, all uses are not assessed at this time. The MA DEP DWP and the public water supplier do, however, maintain current drinking water supply data.

Bull Brook Reservoir (Segment MA91002) Use Summary Table

Aquatic Life	Fish Consumption	Drinking Water	Primary Contact	Secondary Contact	Aesthetics
					
NOT ASSESSED					

RECOMMENDATIONS: BULL BROOK RESERVOIR (SEGMENT MA91002)

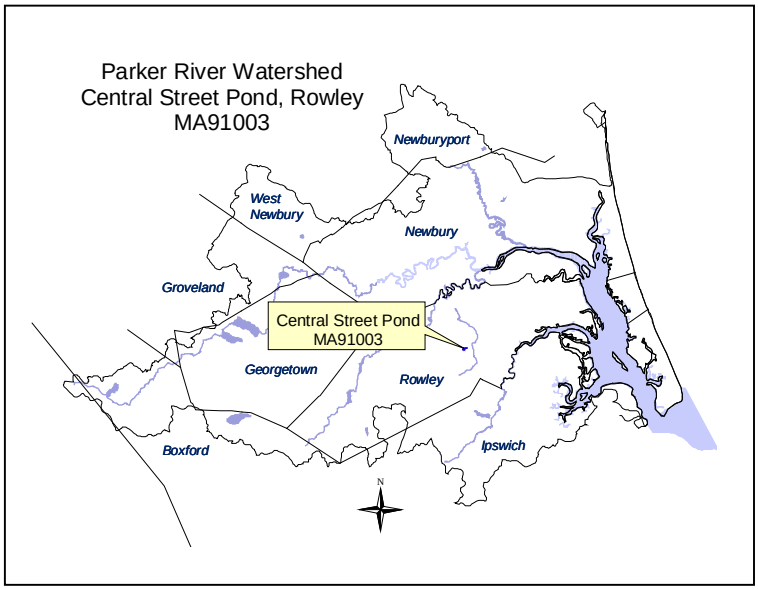
- When the MA DEP DWP SWAP evaluations are completed, review, develop and implement recommendations to protect the Bull Brook Reservoir drinking water supply.

- Complete the WMA permit process for the increased water withdrawal by Ipswich Water Department. Permit process should evaluate the potential impacts of withdrawals on streamflow/habitat

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

CENTRAL STREET POND (SEGMENT MA91003)

[Also known as Marr's Pond]
Location: Rowley
Size: 5 acres
Classification: Class B
Estimated Trophic Status: Eutrophic



This pond is on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a). There is a sand and gravel operation upstream of this pond.

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

In 1994, approximately two-thirds of the Waterbody was densely covered with floating leaf plants (MA DEP 1994). There have been no known changes to this waterbody since DWM's 1994 survey (Tomczyk 2001b).

Based on the noxious aquatic plant growth and best professional judgment, three acres of the pond are assessed as non-support for these uses and two acres are currently not assessed.

Central Street Pond (Segment MA91003) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Primary Contact		NON-SUPPORT 3 acres NOT ASSESSED 2 acres	Noxious aquatic plants		Unknown	
Secondary Contact		NON-SUPPORT 3 acres NOT ASSESSED 2 acres	Noxious aquatic plants		Unknown	
Aesthetics		NON-SUPPORT 3 acres NOT ASSESSED 2 acres	Noxious aquatic plants		Unknown	

RECOMMENDATIONS: CENTRAL STREET POND (SEGMENT MA91003)

- There is a sand and gravel operation upstream of this pond. Identify if this facility has any withdrawals and/or discharges and determine the needs for appropriate permits (WMA and or NPDES). Investigate the impacts from this facility on the Central Street Pond subwatershed.

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Work with the Town of Rowley to reduce the number of domestic ducks on this pond through sign posting and public education.

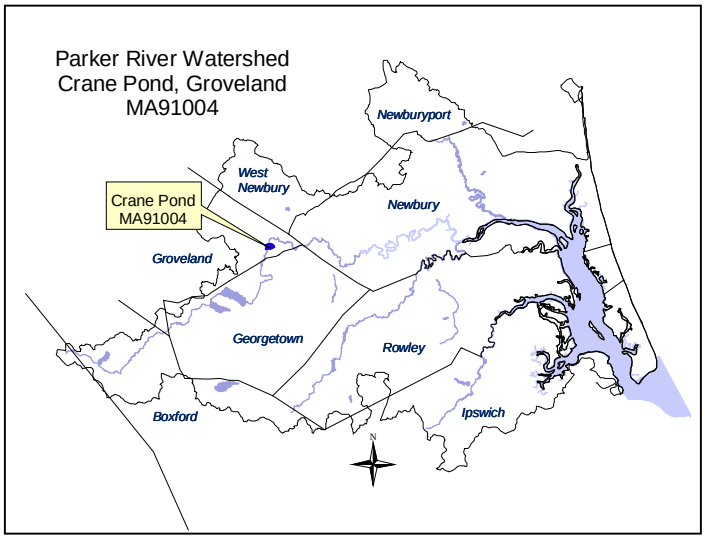
- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

- Control noxious plant populations:
  - To manage aquatic plant populations additional monitoring should be conducted to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control noxious aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site.
  - Another important component of a management plan is prevention of further spreading of certain invasive plant species. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.
  - Educate the public as to the proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth.

CRANE POND (SEGMENT MA91004)

Location: Groveland
Size: 19 acres
Classification: Class B
Estimated Trophic Status: Undetermined

This pond is on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a). This pond is located within the Crane Pond Wildlife Management Area. It is best professional judgment that the noxious aquatic plant growth is naturally occurring.



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:
No current data/information were available, therefore, all uses are not assessed at this time.

Crane Pond (Segment MA91004) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS: CRANE POND (SEGMENT MA91004)

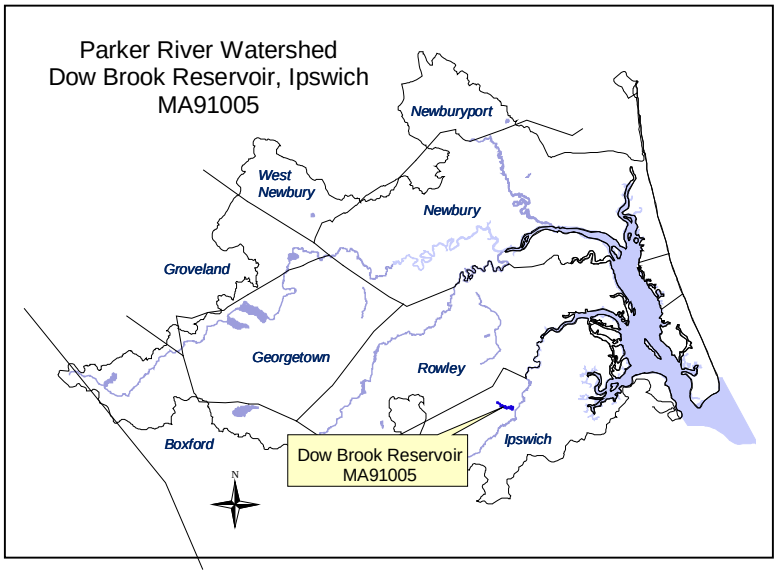
- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

DOW BROOK RESERVOIR (SEGMENT MA91005)

Location: Ipswich
Size: 17 acres
Classification: Class A, ORW
Estimated Trophic Status: Undetermined

Dow Brook Reservoir is protected as an Outstanding Resource Water under the Massachusetts Surface Water Quality Standards.



WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source S = surface	Authorized Withdrawal (MGD)	1999 Average Withdrawal (MGD)
Ipswich Water Department*	3144000	Permit Application under review	31614401	01S – Dow Brook Reservoir	0.64* reg. 0.20** reg.	01S – 0.57

* withdrawal in Parker River Watershed ** authorized withdrawal in Ipswich River Watershed

The Ipswich Water Department's withdrawal from the Parker River subwatershed is not subject to the IBT; the IBT applies when the withdrawals cross both a basin divide and town line. In this case the withdrawals are made in the Town of Ipswich and used in the Town of Ipswich. In 1999, the Water Department withdrew 0.26 MGD over their registered volume from their sources in the Parker River subwatershed alone (their actual withdrawal in 1999 was 1.30 MGD from both the Ipswich and Parker River Watershed sources). The Ipswich Water Department applied for a permit in 1995 but never completed their application. The Water Department has recently signed an ACO with MA DEP to complete the Water Management Permit process. Conditions included within the ACO require the Water Department to implement aggressive water conservation requirements prior to the permit issuance by MA DEP (LeVangie 2001, and O'Keefe 2001)

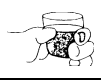
NPDES WASTEWATER DISCHARGE SUMMARY:

Based on the available information, there are no regulated surface wastewater discharges in this segment.

USE ASSESSMENT:

No current data/information were available, therefore, all uses are not assessed at this time. The MA DEP DWP and the public water supplier, however, maintain current drinking water supply data.

Dow Brook Reservoir (Segment MA91002) Use Summary Table

Aquatic Life	Fish Consumption	Drinking Water	Primary Contact	Secondary Contact	Aesthetics
					
NOT ASSESSED					

RECOMMENDATIONS: DOW BROOK RESERVOIR (SEGMENT MA91005)

- When the Drinking Water Program SWAP evaluations are completed, review, develop and implement recommendations to protect the Dow Brook Reservoir drinking water supply.

- Complete the WMA permit process for the increased water withdrawal by Ipswich Water Department. Permit process should evaluate the potential impacts of withdrawals on streamflow/habitat

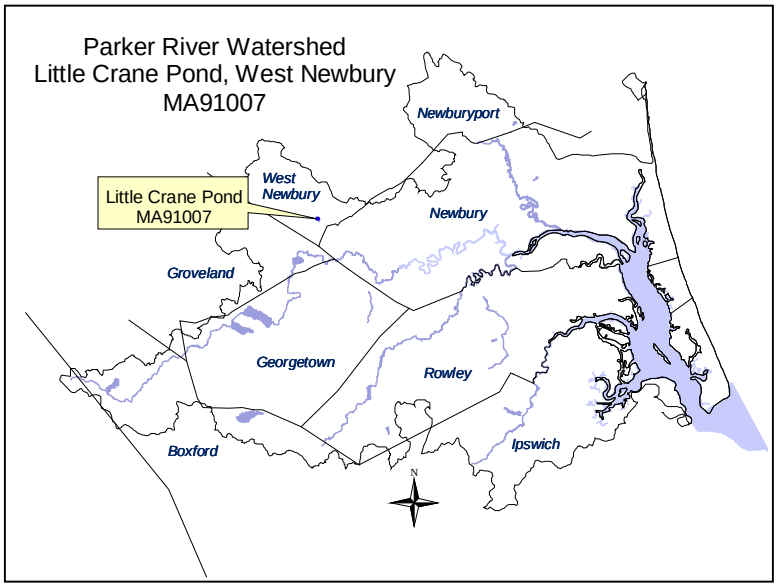
- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Conduct instream biological monitoring to determine the effects of water withdrawals on habitat and aquatic life.

LITTLE CRANE POND (SEGMENT MA91007)

Location: West Newbury
Size: 5 acres
Classification: Class B
Estimated Trophic Status: Undetermined

This pond is located within the Crane Pond Wildlife Management Area.



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:
No current data/information were available, therefore, all uses are not assessed at this time.

Little Crane Pond (Segment MA91007) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

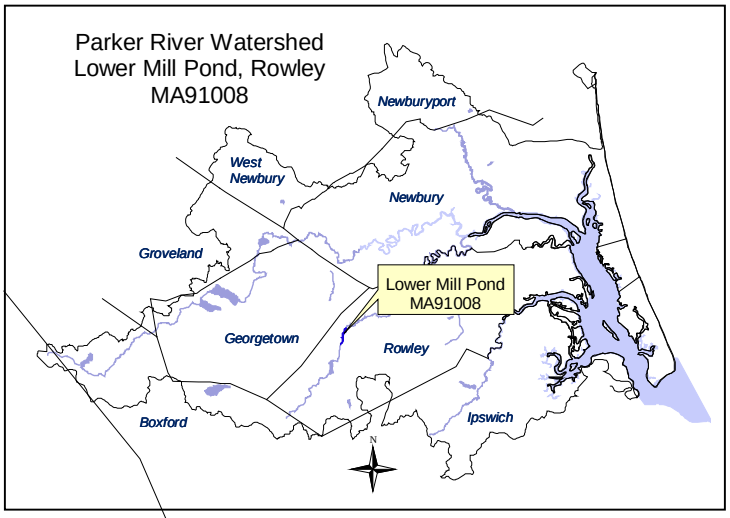
RECOMMENDATIONS: LITTLE CRANE POND (SEGMENT MA91007)

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Determine if there are any bathing beaches on Little Crane Pond. If so, review data from "Beaches Bill" required water quality testing (bacteria sampling from all formal bathing beaches) to assess the status of the recreational uses.

LOWER MILL POND (SEGMENT MA91008)

Location: Rowley
Size: 14 acres
Classification: Class B
Estimated Trophic Status: Hypereutrophic



This pond is on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a).

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

AQUATIC LIFE

A DWM survey in 1994 identified 100% cover of aquatic plants on Lower Mill Pond. The exotic aquatic plant species, *Trapa natans* (Water Chestnut) was also present (MA DEP 1994). Although *T. natans* was only identified in Lower Mill Pond, possible paths of downstream spreading from this pond include the Mill River through a small, unnamed impoundment to the Parker River.

Based on the presence of the exotic *T. natans*, the *Aquatic Life Use* is assessed as partial support.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

In 1994, the entire Waterbody was densely covered with aquatic plants and algae (MA DEP 1994). There have been no changes in the Lower Mill Pond subwatershed to improve the recreational and aesthetics uses since the 1994 survey.

Based on the noxious aquatic plant growth and best professional judgment, the *Recreation* and *Aesthetics Uses* are assessed as non-support.

Lower Mill Pond (Segment MA91008) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		PARTIAL SUPPORT	Exotic species		Unknown	
Fish Consumption		NOT ASSESSED				
Primary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Secondary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Aesthetics		NON-SUPPORT	Noxious aquatic plants		Unknown	

RECOMMENDATIONS: LOWER MILL POND (SEGMENT MA91008)

- Control *T. natans* infestation and investigate the downstream spread of this exotic species by:
  - For exotic aquatic plant species that are isolated to one or a few location(s), quick action is advisable to manage these populations in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from these recorded locations (Table 5), to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [MA DEP and DEM 1998] for advantages and disadvantages) should be undertaken to control populations at these sites before they spread further. These treatments may be in the form of carefully hand-pulling individual plants in small areas. In larger areas, other techniques such as selective herbicide application may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These cautions will minimize the spreading of the populations. This draft aquatic plant report (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control exotic aquatic plant species.
  - As with the isolated cases, a program to manage the more extensive plant infestations should include additional monitoring efforts to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control exotic aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for these plants to reproduce and spread vegetatively (from cuttings).
  - Another important component of a management plan is prevention of further spreading of these plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.

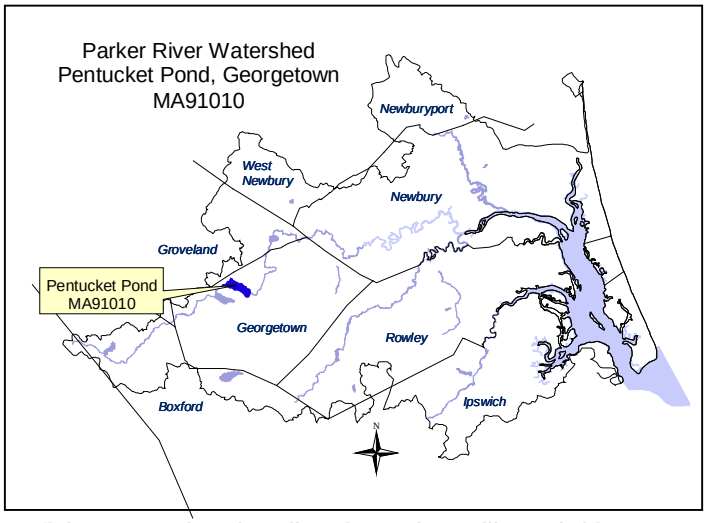
- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Educate the public as to the proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth.

- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

PENTUCKET POND (SEGMENT MA91010)

Location: Georgetown
Size: 85 acres
Classification: Class B
Estimated Trophic Status: Mesotrophic



In April 1997 members of the Essex County Sportsmans Association built and installed a wooden Denil style ladder at the Pentucket Pond Dam. This ladder was constructed utilizing plans provided by DMF (Iwanowicz 2000).

The Parker River Headwaters Stream Team conducts annual alewife fish counts at the Pentucket Pond dam in Georgetown, which is the last barrier to migration before the headwaters spawning ponds (PRCWA 2000). In 1999, the Stream Team identified that fish were swimming directly up the spillway (with difficulty), ignoring the temporary wooden fish ladder (DFWELE 25 August 1999).

Warmwater fish species present in this pond include largemouth bass, chain pickerel, brown bullhead, pumpkinseed, bluegill, black crappie and alewife (DFWELE 26 April 2001). Pentucket Pond is stocked every spring with rainbow trout, and sometimes brown trout and brook trout.

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or surface wastewater discharges in this segment.

USE ASSESSMENT:

AQUATIC LIFE

The invasive exotic aquatic plant fanwort (*Cabomba caroliniana)* was found in Pentucket Pond in 1997 (Tomczyk 2001a). Although *C. caroliniana* was identified in Pentucket Pond, it could possibly spread through Crane Pond, and several small, unnamed impoundments to the Parker River. The town of Georgetown has taken steps to control its spread. As a method of control, Pentucket Pond was treated in 1999 with the chemical SONAR, a fluoridone herbicide (MA DEP 1999b).

Based on the presence of this exotic aquatic plant (*C. caroliniana*), the *Aquatic Life Use* is assessed as partial support.

FISH CONSUMPTION

In 1994 fish toxics monitoring was conducted by MA DEP DWM in Pentucket Pond, Georgetown. Data from this survey are presented in Parker River segment MA91-01 (Table 4).

Based on elevated mercury concentrations, MDPH issued a fish consumption advisory for Pentucket Pond (MDPH 2001a).

1. "Children under 12, pregnant women and nursing mothers should not consume any fish from Pentucket Pond."
2. "The general public should not consume largemouth bass and black crappie from Pentucket Pond."
3. "The general public should limit consumption of non-affected fish from Pentucket Pond to two meals per month."

[Note: MDPH fish consumption advisories do not apply to stocked fish.]

The *Fish Consumption Use* is non-support for the 85 acres of Pentucket Pond, based on the MDPH fish consumption advisory.

PRIMARY AND SECONDARY CONTACT RECREATION

The Merrimack Valley Planning Commission prepared a Pentucket Pond storm water assessment summary for the Town of Georgetown. This report states that the American Legion beach (a.k.a. town beach) has been closed repeatedly due to violations of the bathing beach standard. Although data from this project did not identify high levels of fecal coliform bacteria in the pond itself, high concentrations of fecal coliform bacteria were identified in a drainage ditch, from discharge pipes, and in stream culverts on multiple occasions (MVPC 2000b). Specifically, in June 1998 Georgetown DPH closed the American Legion bathing beach due to elevated levels of fecal coliform bacteria. The MVPC will also conduct a watershed assessment for Pentucket and Rock ponds from funds secured through the Massachusetts Watershed Initiative – 00-03/MWI (Tomczyk 2001b).

Based on the bathing beach closure and best professional judgment (e.g., discharge pipes, waterfowl populations, etc.) the *Primary Contact Recreation Use* is assessed as partial support. The *Secondary Contact Recreation Use* is not assessed at this time due to limited in-pond data.

Pentucket Pond (Segment MA91010) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		PARTIAL SUPPORT	Exotic species		Unknown	
Fish Consumption		NON SUPPORT	Mercury		Unknown	
Primary Contact		PARTIAL SUPPORT	Pathogens		Urban Runoff/Storm Sewers	
Secondary Contact		NOT ASSESSED				
Aesthetics		NOT ASSESSED				

RECOMMENDATIONS: PENTUCKET POND (SEGMENT MA91010)

- Determine the effectiveness of the herbicide treatment on the *C. caroliniana* infestation. Prevent the further spread of *C. caroliniana* to unaffected areas (of this pond and to other ponds). Post boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading this exotic species.

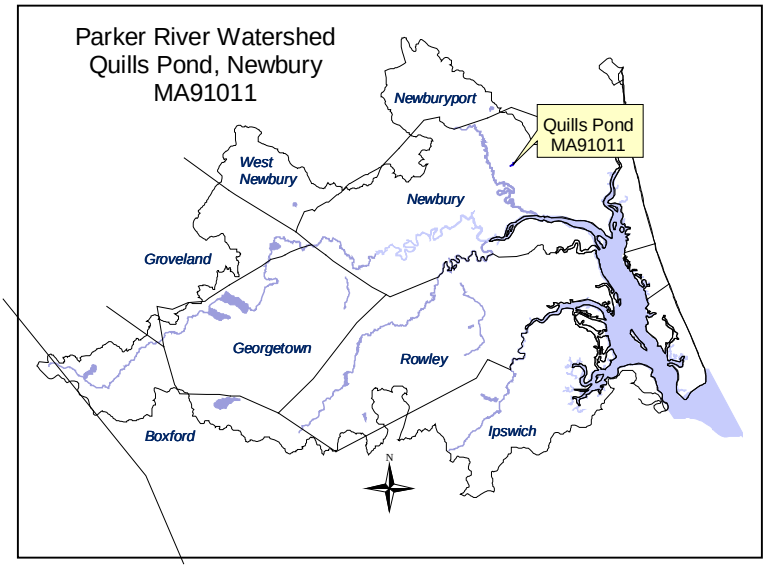
- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Work with the Parker River Stream Team to upgrade the current fishway at the Pentucket Pond dam to support an anadromous fish run.

- Review results of MVPC storm water assessment project, including (MVPC 2000b):
  - Encourage initiation of the Stormwater 104(b) project for Pentucket Pond. Storm water management practices are being implemented by the town to address some of the suspected sources of the bacterial contamination at Pentucket Pond.
  - Georgetown Housing Authority, a senior housing complex, installed a new on-site wastewater treatment system. Subsequently, they are discharging a cleaner effluent into the ground than their past systems and will no longer have to pump on almost a daily basis. Determine if the installation of the new system reduces fecal coliform bacteria levels and nutrient inputs to the Pentucket Pond subwatershed.
  - Track the progress of the new sewer system installation and additional landscaping at American Legion Park. Determine the effectiveness these improvements on water quality (i.e., lower fecal coliform bacteria levels, lower suspended solids).
  - Identify and remove any and all illicit household connections

QUILLS POND (SEGMENT MA91011)

Location: Newbury
Size: 4 acres
Classification: Class B
Estimated Trophic Status: Undetermined



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:
No current data/information was available, therefore, all uses are not assessed at this time.

Quills Pond (Segment MA91011) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

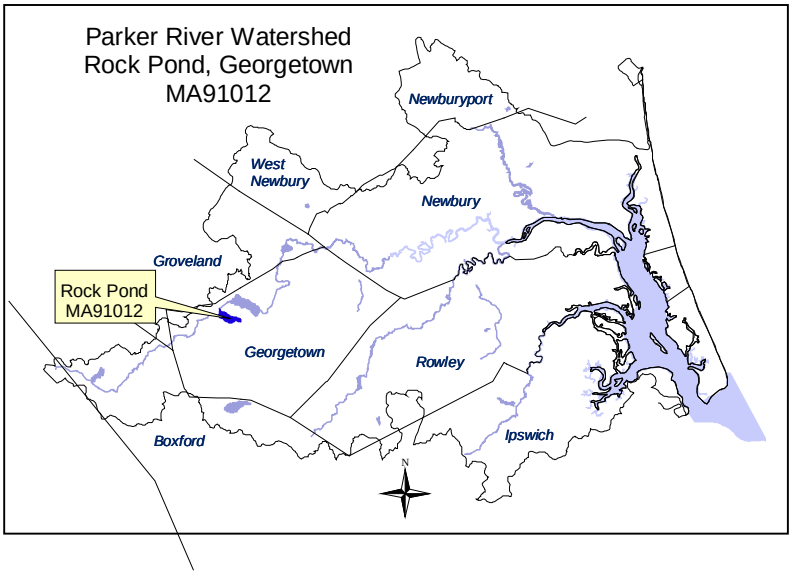
RECOMMENDATIONS: QUILLS POND (SEGMENT MA91011)

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

ROCK POND (SEGMENT MA91012)

Location: Georgetown
Size: 49.6 acres
Classification: Class B
Estimated Trophic Status: Mesotrophic

In 2001, DFWELE stocked trout in Rock Pond for the purpose of recreational fishing (DFWELE 19 March 2001).



WMA WATER WITHDRAWAL SUMMARY:

Facility	PWS ID#	WMA Permit #	WMA Registration #	Source	Authorized Withdrawal (MGD)	1999 Average Withdrawal (MGD)
G-Town Produce	NA	NA	31610502	Rock Pond	0.1 (184 days)	Not Reported

NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated wastewater discharges to this segment.

USE ASSESSMENT:

AQUATIC LIFE

Chemistry - water

As part of DWM's 1999 fish toxics monitoring of Rock Pond, a Hydrolab® profile was recorded (Station #FM-0007). Dissolved oxygen concentrations below 6.0mg/L at 3.5 and 4.6 meters (Appendix B, Table B3).

Too little in-pond data were available to assess the *Aquatic Life Use*; it is not assessed.

FISH CONSUMPTION

In 1999, MA DEP DWM collected fish from Rock Pond, Georgetown as part of both Year 2 of the watershed cycle and the MRS being coordinated by MA DEP's Office of Research and Standards (Maietta 2000). The mean mercury concentrations in largemouth bass and yellow perch were 1.6 and 0.86 ppm wet weight, respectively.

Due to elevated mercury concentrations, MDPH issued the following fish consumption advisory for Rock Pond, Georgetown (MDPH 2001a): The general public should not consume any fish from Rock Pond. [Note: MDPH fish consumption advisories do not apply to stocked fish.]

Based on the MDPH fish consumption advisory the *Fish Consumption Use* is non-support for the 49.6 acres of Rock Pond.

Rock Pond (Segment MA91012) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NON-SUPPORT	Mercury		Unknown	
Primary Contact		NOT ASSESSED				
Secondary Contact		NOT ASSESSED				
Aesthetics		NOT ASSESSED				

RECOMMENDATIONS: ROCK POND (SEGMENT MA91012)

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Determine if there are any bathing beaches on Rock Pond. If so review data from "Beaches Bill" required water quality testing (bacteria sampling from all formal bathing beaches) to assess the status of the recreational uses.

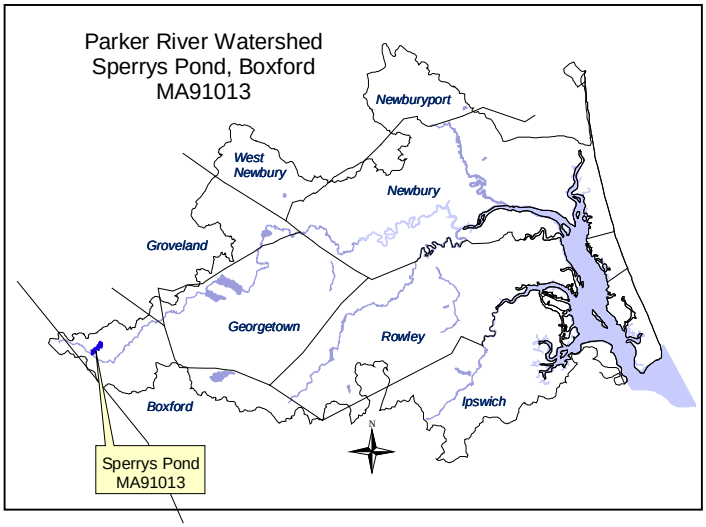
- Request and review G-Town Produce's average annual withdrawals of water from Rock Pond.

- Work with local groups to conduct storm drain stenciling around Rock Pond.

SPERRYS POND (SEGMENT MA91013)

Location: Boxford
Size: 6 acres
Classification: Class B
Estimated Trophic Status: Eutrophic

This pond is on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a).



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

A 1994 DWM synoptic survey identified very dense aquatic plant coverage on Sperrys Pond (MA DEP 1994). Since the time of the survey no actions have been taken to reduce/impede the plant growth.

Based on best professional judgment and noxious plant growth, the *Recreation and Aesthetics Uses* are assessed as non-support for Sperrys Pond.

Sperrys Pond (Segment MA91013) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Primary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Secondary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Aesthetics		NON-SUPPORT	Noxious aquatic plants		Unknown	

RECOMMENDATIONS: SPERRYS POND (SEGMENT MA91013)

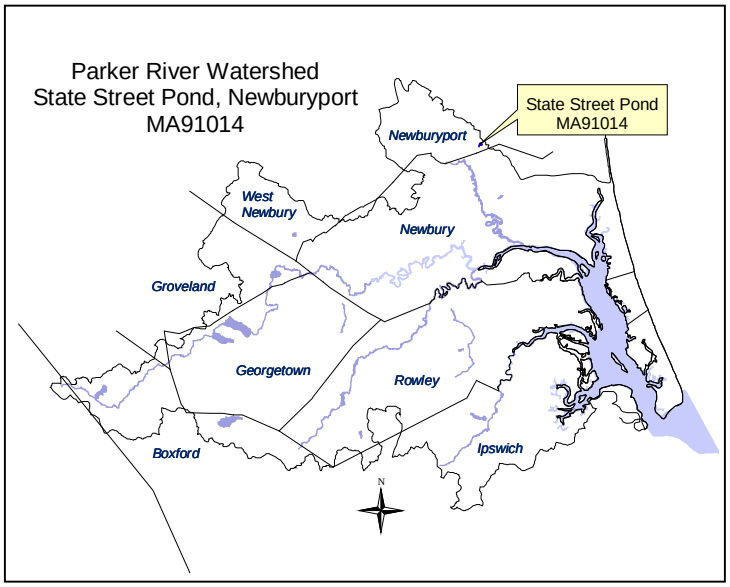
- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources

- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

- Control noxious plant populations:
  - To manage aquatic plant populations additional monitoring should be conducted to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control noxious aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site.
  - Another important component of a management plan is prevention of further spreading of certain invasive plant species. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.

STATE STREET POND (SEGMENT MA91014)

Location: Newburyport
Size: 5 acres
Classification: Class B
Estimated Trophic Status: Eutrophic



This pond is listed on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a). This pond is in a heavily developed residential area of Newburyport and is also bordered by Oak Hill Cemetery.

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

AQUATIC LIFE

A 1994 DWM synoptic pond survey indicated that the pond was mostly filled by the encroachment of plants from the shoreline (MA DEP 1994). Additionally, the exotic aquatic plant, *Cabomba caroliniana,* (fanwort) was present. Although *C. caroliniana* was identified in State Street Pond, it could possibly spread from here to a small, unnamed impoundment through an unnamed tributary to the Little River. From the Little River this exotic species could spread to the Parker River. Since the time of the survey, no actions have been taken to reduce/impede the plant growth.

Based on best professional judgment, noxious plant growth and the presence of an exotic aquatic plant, the *Aquatic Life Use* is assessed as partial support for State Street Pond.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

A 1994 DWM synoptic pond survey indicated that the pond was almost entirely covered with dense weeds (MA DEP 1994). Since the time of the survey, no actions have been taken to reduce/impede the plant growth.

Based on best professional judgment and noxious plant growth, the *Recreation* and *Aesthetic Uses* are assessed as non-support for four acres of State Street Pond. The remaining acre is not assessed for these uses.

State Street Pond (Segment MA91014) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		PARTIAL SUPPORT	Exotic species		Unknown	
Fish Consumption		NOT ASSESSED				
Primary Contact		NON-SUPPORT 4 acres NOT ASSESSED 1 acre	Noxious aquatic plants		Unknown	
Secondary Contact		NON-SUPPORT 4 acres NOT ASSESSED 1 acre	Noxious aquatic plants		Unknown	
Aesthetics		NON-SUPPORT 4 acres NOT ASSESSED 1 acre	Noxious aquatic plants		Unknown	

RECOMMENDATIONS: STATE STREET POND (SEGMENT MA91014)

- Control *C. caroliniana* and investigate the downstream spread of these species by:
  - For exotic aquatic plant species that are isolated to one or a few location(s), quick action is advisable to manage these populations in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from these recorded locations (Table 5), to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [MA DEP and DEM 1998] for advantages and disadvantages) should be undertaken to control populations at these sites before they spread further. These treatments may be in the form of carefully hand-pulling individual plants in small areas. In larger areas, other techniques such as selective herbicide application may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These cautions will minimize the spreading of the populations. This draft aquatic plant report (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control exotic aquatic plant species.
  - As with the isolated cases, a program to manage the more extensive plant infestations should include additional monitoring efforts to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control exotic aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for these plants to reproduce and spread vegetatively (from cuttings).
  - Another important component of a management plan is prevention of further spreading of these plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.

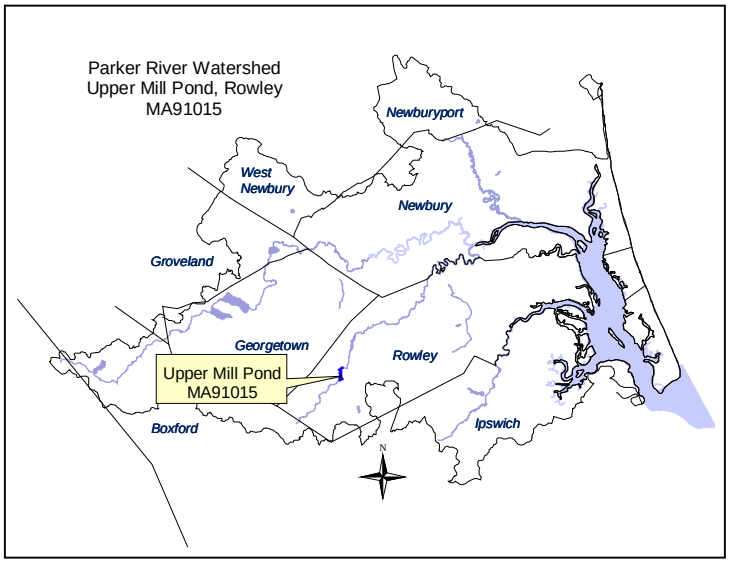
- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources

- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

- Educate the public as to the proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth.

UPPER MILL POND (SEGMENT MA91015)

[Also known as Mill Pond, Stewards Pond]
Location: Rowley
Size: 21 acres
Classification: Class B
Estimated Trophic Status: Eutrophic



This pond is listed on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a).

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

A 1994 DWM synoptic pond survey indicated that the pond was almost entirely covered with dense weeds (MA DEP 1994). Since the time of the survey, no actions have been taken to reduce/impede the plant growth.

Based on best professional judgment and the noxious plant growth, the *Recreation* and *Aesthetics Uses* are assessed as non-support for Upper Mill Pond.

Upper Mill Pond (Segment MA91015) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Primary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Secondary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Aesthetics		NON-SUPPORT	Noxious aquatic plants		Unknown	

RECOMMENDATIONS: UPPER MILL POND (SEGMENT MA91015)

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

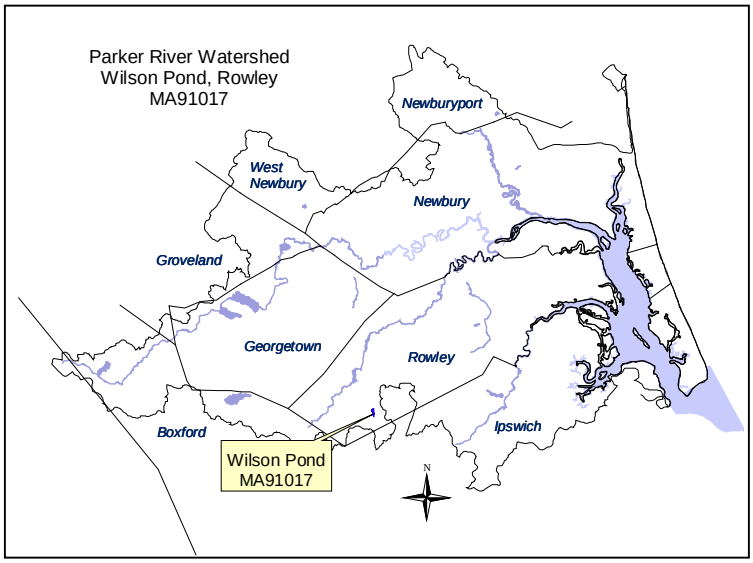
- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

- Control noxious plant populations:
  - To manage aquatic plant populations additional monitoring should be conducted to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control noxious aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site.
  - Another important component of a management plan is prevention of further spreading of certain invasive plant species. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.
  - Educate the public as to the proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth.

WILSON POND (SEGMENT MA91017)

Location: Rowley
Size: 7 acres
Classification: Class B
Estimated Trophic Status: Eutrophic

This pond is on the 1998 303(d) list of impaired waters for noxious aquatic plants (MA DEP 1999a).



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY:
There are no regulated water withdrawals or wastewater discharges in this segment.

USE ASSESSMENT:

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

A 1994 DWM synoptic pond survey indicated that the pond was almost entirely covered with dense weeds (MA DEP 1994). Since the time of the survey, no actions have been taken to reduce/impede the plant growth.

Based on best professional judgment and the noxious plant growth, the *Recreation* and *Aesthetics Uses* are assessed as non-support for Wilson Pond.

Wilson Pond (Segment MA91017) Use Summary Table

Designated Uses		Status	Causes		Sources	
			Known	Suspected	Known	Suspected
Aquatic Life		NOT ASSESSED				
Fish Consumption		NOT ASSESSED				
Primary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Secondary Contact		NON-SUPPORT	Noxious aquatic plants		Unknown	
Aesthetics		NON-SUPPORT	Noxious aquatic plants		Unknown	

RECOMMENDATIONS: WILSON POND (SEGMENT MA91017)

- Coordinate with MA DEM and/or other groups conducting pond surveys to collect quality assured water chemistry/biological data including watershed surveys to identify NPS pollution sources.

- Determine if there are any bathing beaches on Wilson Pond. If so review data from "Beaches Bill" required water quality testing (bacteria sampling from all formal bathing beaches) to assess the status of the recreational uses.

- Implement recommendations of the Total Phosphorus TMDL currently in preparation.

- Control noxious plant populations:
  - To manage aquatic plant populations additional monitoring should be conducted to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (MA DEP and DEM 1998) should be consulted prior to the development of any pond management plan to control noxious aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site.
  - Another important component of a management plan is prevention of further spreading of certain invasive plant species. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations occurring in unaffected areas (of this pond and to other ponds) and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert pond-users to the problem and responsibility of spreading these species.
  - Educate the public as to the proper use of fertilizers, methods of yard waste disposal, etc. to minimize nutrient inputs that may contribute to excessive plant growth.