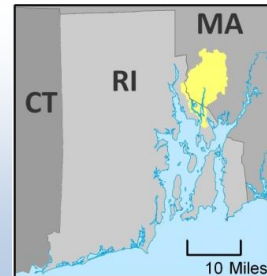




Water Quality Summary: Barrington-Palmer-Warren River (WPA 2)

Watershed Planning Area (WPA) Facts:

- **Direct Watershed Area:** 67.8 miles² (85% in MA, 15% in RI)
- **MA Towns:** Rehoboth, Seekonk, and Swansea
- **RI Municipalities:** East Providence, Barrington, Warren, and Bristol
- **Major Rivers:** Runnins, Palmer, Barrington, and Warren



Watershed Description

Runnins River

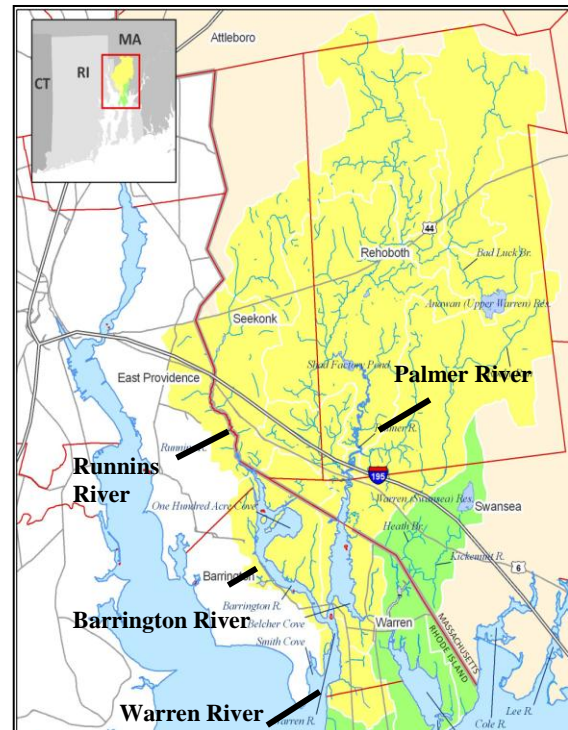
- Headwaters begin in Rehoboth, MA
- The lower portion of the river forms the border between East Providence, RI and Seekonk, MA
- At its mouth, the Runnins River flows over the Mobil Dam to form the Barrington River

Barrington River

- Continues southeast from the Mobil Dam
- Joins the Palmer River at Tyler Point in Barrington, RI to form the Warren River
- Tidally influenced from its mouth to the Mobil Dam

Palmer River

- Freshwater headwaters begin in Rehoboth, MA, with smaller reaches (East and West Branches) extending into Seekonk and Swansea, MA
- The saltwater portion of the Palmer River begins at the outlet of the Shad Factory Pond Dam and continues into RI
- Water from the Shad Factory Pond Dam is piped into the Kickemuit Reservoir in WPA 3 for drinking water for the residents of Barrington, Bristol, and Warren, RI



Warren River

- Begins at the confluence of the Barrington and Palmer Rivers
- Flows south past Barrington, Warren, and Bristol, RI and discharges directly to Upper Narragansett Bay

Runnins River

Impairment: Fecal coliform

Waterbody Class and Designated Uses:

MA-portion: Class B

Designated uses include habitat for fish, aquatic life, and wildlife, and for primary and secondary contact recreation.

RI-portion: Class B

Designated uses include primary and secondary contact recreational activities and fish and wildlife habitat.

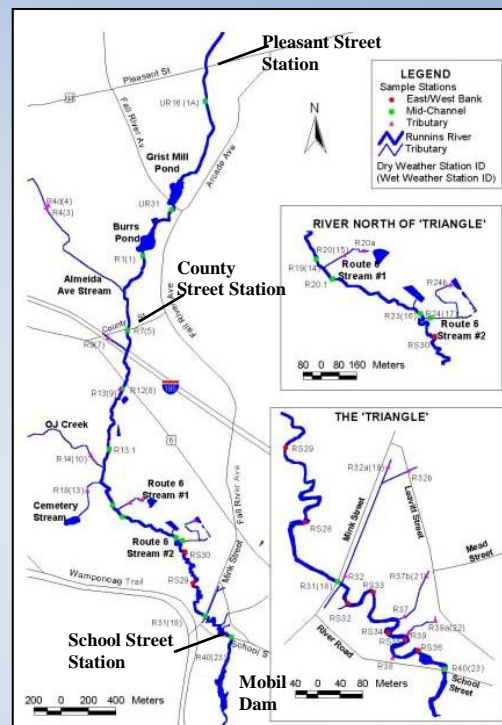
Existing TMDLs:

- MADEP Final Pathogen TMDL for the Narragansett Bay Watershed (2010)
- RIDEM Fecal Coliform TMDLs for the Runnins River, RI (2002)

Pollutant Load Reductions Required to Meet Water Quality

Standards: Based on Class SA standards to protect the downstream Barrington River

- MA portion: 99.2%
- RI portion: 99.6%



Runnins River Impairment

Most of the Class B Runnins River is impaired for bacteria, and is unsuitable for its designated uses of primary and secondary contact activities. A small section of the river from Burrs Pond to County Street in Seekonk, MA was considered unimpaired based on data used in the TMDLs. However, more recent data from Burrs Pond show higher concentrations of fecal coliform, indicating this section may now be impaired (Table 1).

Primary Sources of Bacteria Identified in the Existing TMDLs

Most residents of the Runnins River watershed rely on onsite wastewater treatment systems (OWTS) such as septic systems and cesspools. Malfunctioning or failing OWTS are the likely the largest source of bacteria to the Runnins River, particularly in the area upstream of Pleasant Street, downstream from the Route 6 bridge, and in the “Triangle” area between Mink Street and School Street in Seekonk, MA, and in East Providence, RI. OWTS in the “Triangle” area, particularly near School Street, are thought to be the largest source of bacteria to the Runnins River.

Other primary sources of bacteria to the Runnins River are stormwater runoff from the developed areas in Seekonk, MA, and large mats of phragmites and unidentified storm drains in the Triangle area of Seekonk, MA.

Other Sources of Bacteria Identified in Existing TMDLs

Other potential sources of bacteria to the Runnins River as identified in the TMDLs include the Wannamoisett Pump Station in East Providence, RI which has periodically discharged untreated sewage to Orange Juice Creek (corrected in the late 1990s), waterfowl in Grist Mill Pond, and pigeons roosting under the overpass at Route 195.

Barrington River

Impairment: Fecal coliform

Waterbody Class and Designated Uses:

Class SA (Mobil Dam in East Providence to the Bike path in Barrington)

Designated uses include shellfishing, primary and secondary contact recreation, and fish and wildlife habitat.

Class SB1 (from Bike path to confluence with the Palmer River)

Designated uses include primary and secondary contact recreation, and fish and wildlife habitat. Primary contact recreation activities may be impacted due to pathogens from approved wastewater discharges. All Class SB criteria must be met.

Existing TMDL:

- RIDEM Fecal Coliform TMDL for the Barrington River, Rhode Island (2002)

Pollutant Load Reductions Required to Meet Water Quality Standards: 74%-93%

Shellfish Closures: Growing Area 2-1 (entire river) (prohibited)



Barrington River Impairment

The entire Class SA portion of the Barrington River is impaired for bacteria, and is unsuitable for its designated uses of shellfishing and primary and secondary contact activities. A small section of the Barrington River (Class SB1), from the bike path in Barrington, RI to the confluence with the Palmer River at Tyler Point is not considered impaired.

Primary Sources of Bacteria Identified in the Existing TMDL

The largest source of bacteria to the Barrington River is thought to be bacteria from the Runnins River. The upstream reaches of the Barrington River are therefore an area of concern (Table 2).

Other Bacteria Sources Identified in Existing TMDL

Other potential sources of bacteria to the Barrington River as identified in the TMDL include stormwater runoff below White Church Bridge adjacent to the commercial section of Barrington, the Palmer River at the downstream reaches of the Barrington River, and the Warren Wastewater Treatment Facility (WWTF) and Blount's Seafood. The WWTF and Blount's Seafood are regulated point sources that discharge to the Warren River. Pathogen input from these sources is thought to enter the Barrington River through tidal flows.

Palmer River

Impairment: Fecal coliform

Waterbody Class and Designated Uses:

MA-portion: Class B (headwaters to Shad Factory Pond Dam)

Designated uses include habitat for fish, aquatic life, and wildlife, and for primary and secondary contact recreation.

RI and MA-portions: Class SA (below Shad Factory Pond Dam)

Designated uses include shellfishing, primary and secondary contact recreational activities and fish and wildlife habitat.

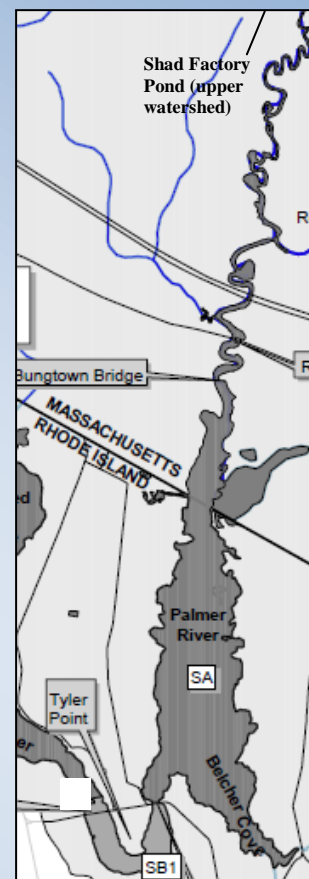
Existing TMDL:

- MADEP Fecal Coliform TMDL for the Palmer River (2004)
- RIDEM Fecal Coliform TMDL for the Palmer River, Rhode Island (2002)

Pollutant Load Reductions Required to Meet Water Quality Standards:

- MA portion: 0-100%
- RI portion: 67-99%

Shellfish Closures: Growing Area 2-1 (entire saltwater portion) (prohibited)



Palmer River Impairment

The entire Class SA section of the Palmer River in MA and RI is impaired for bacteria, and is unsuitable for its designated uses of shellfishing and primary and secondary contact activities (Table 3). Most of the Class B tributaries to the main stem of the Palmer River are also impaired for bacteria (Table 4). However, the main stem of the Palmer River upstream of the Shad Factory Pond Dam is not considered impaired.

Primary Sources of Bacteria Identified in the Existing TMDL

The largest sources of bacteria to the Palmer River are thought to be concentrated along the more developed reaches of the river near the MA-RI border. These sources include bacteria in stormwater runoff, agriculture runoff, failing OWTS, and animal waste. Balcher Cove is also thought to receive high concentrations of bacteria from animal waste and stormwater runoff.

Other Sources of Bacteria Identified in Existing TMDL

Other potential sources of bacteria to the Palmer River as identified in the TMDL include pathogen input from multiple tributaries to the MA-portion of the Palmer River and the Warren Wastewater Treatment Facility (WWTF) and Blount's Seafood. The WWTF and Blount's Seafood are regulated point sources that discharge to the Warren River. Pathogen input from these sources is thought to enter the Palmer River through tidal flows.

Warren River

Impairment: Unimpaired

Waterbody Class and Designated Uses:

Class SB1

Designated uses include primary and secondary contact recreational activities and fish and wildlife habitat; primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges (all Class SB criteria must be met)

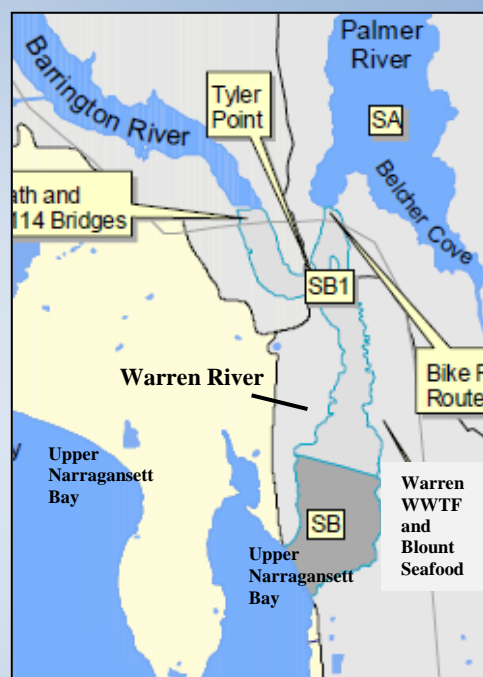
Class SB

Designated uses include primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat.

Existing TMDLs: No existing TMDLs

Shellfish Closures: Growing Area 2-1 (entire river) (prohibited)

Beach Closures: Warren Town Beach (multiple seasonal closings in the last ten years)



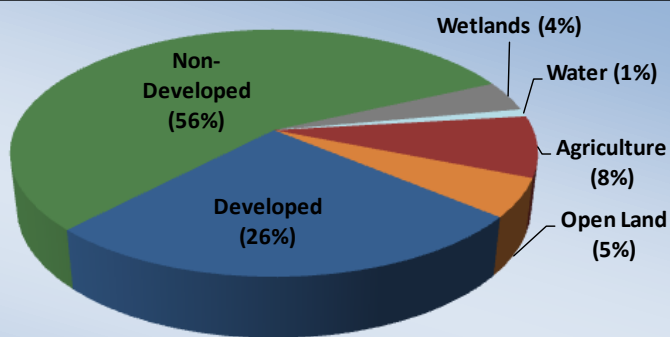
Areas of Potential Concern Identified in Other TMDLs

Currently, the entire length of the Warren River is closed to shellfishing. Though the Warren River does not exceed the water quality criteria for bacteria (Table 5), the Barrington and Palmer Rivers, which form the Warren River, are impaired for bacteria. TMDLs have been completed for both rivers. Future monitoring should focus on the upstream reaches of the Warren River as bacteria from the Barrington and Palmer Rivers may contaminate this section of the river.

Other sources in this portion of the Warren River include two point sources, the Warren WWTF and Blount's Seafood, that discharge directly to the river. Other potential sources of pollution to the Warren River include stormwater runoff from the developed areas in Warren, RI.

Land Use in WPA 2

- MA-portion of WPA 2:
 - 61% non-developed
 - 20% developed
 - 9% agriculture
- RI-portion of WPA 2:
 - 56% developed
 - 24% non-developed
 - 10% wetlands



Overall Land Use in WPA 2

Other Pollutants of Concern

Portions of the waterbodies in WPA 2 have been sampled for fecal coliform, *E.coli*, ammonia, total phosphorus, dissolved oxygen, temperature, specific conductivity, and total suspended sediments. Based on land use data in WPA 2, other pollutants of concern include:

Enterococci

Like fecal coliform, enterococci are indicators of pollution from bacteria. Bacteria can enter waterbodies from sources such as leaking septic systems, stormwater and agricultural runoff, and domestic and wild animal waste. As RI is in the process of switching to using enterococci as an indicator of bacterial contamination in fresh and salt water to assess primary contact recreation/swimming criteria, it is recommended that the Runnins and Warren Rivers, and both the fresh and salt water portions of the Barrington and Palmer Rivers also be sampled for enterococci.

Nitrogen

Excess nutrients, such as nitrogen and phosphorus, have been shown to cause algal blooms in fresh (phosphorus) and salt (nitrogen) water. Nutrients can enter waterbodies from sources such as leaking septic systems and stormwater and agricultural runoff. It is recommended that at a minimum, the salt water portions of the Barrington, Palmer, and Warren Rivers be sampled for nitrogen, as land use in this part of the watershed includes both agriculture and residential developments.

Chloride

Chloride can enter surface waters from runoff from agricultural practices and stormwater. Large amounts of chloride have been shown to enter surface and ground waters during snowmelt, as the salts used in snow removal practices throughout New England accumulate in snow banks throughout the winter. Chloride has the potential to negatively affect aquatic biota and as well as threaten drinking water supplies. High levels of chloride in streams can occur year round when adjacent groundwater is contaminated. It is recommended that the freshwater Runnins, Barrington, and Palmer Rivers be sampled for chloride, as the watershed is 26% developed.

Data Summary

Data Available from Ongoing Data Monitoring Programs/Existing TMDLs

Runnins River

- MADEP Water Quality Assessment Report Program: *E.coli*, total nitrogen, ammonia, total phosphorus, temperature, specific conductivity, total dissolved sediments, and dissolved oxygen (2009 DRAFT data only)
- MADEP Bacteria Source Tracking Data: Enterococci, *E.coli*, detergent, ammonia, and potassium (2007-2009)
- Pokanoket Watershed Alliance Data: Fecal coliform, enterococci, *E.coli*, temperature, pH, dissolved oxygen, and salinity (2003-2004; 2006)

Barrington River

- RIDEM Shellfish Monitoring Program: Fecal coliform (2005-2010)

Palmer River

- MADEP Water Quality Assessment Report Program: *E.coli*, total nitrogen, ammonia, total phosphorus, temperature, specific conductivity, total dissolved sediments, and dissolved oxygen (2009 DRAFT data only)
- RIDEM Shellfish Monitoring Program: Fecal coliform (2005-2010)

Warren River

- RIDEM Shellfish Monitoring Program: Fecal coliform (2005-2010)

Relevant Water Quality Standards

Fecal Coliform

- MA Freshwater Class B (Primary/Secondary Contact Recreation): Geometric Mean 200 MPN/100 mL
- RI Freshwater Class B (Primary/Secondary Contact Recreation): Geometric Mean 200 MPN/100 mL
- MA Saltwater Class SA (Shellfish Criteria): Geometric Mean 14 MPN/100 mL
- RI Saltwater Class SA (Shellfish Criteria): Geometric Mean 14 MPN/100 mL
- RI Saltwater Class SA, SB, SB1 (Primary/Secondary Contact Recreation): Geometric Mean 50 MPN/100 mL

E.coli

- USEPA Freshwater: Geometric Mean 126 colonies/100 mL

Runnins River

Table 1: Available bacteria data for the Runnins River. This data was collected by the Pokanoket Watershed Alliance and by MADEP as part of a bacteria source tracking study. Shaded cells indicate an exceedance of water quality standards.

Pokanoket Watershed Alliance (from Runnins River TMDLs)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Range	Geometric Mean
School Street (dry weather)	1990 - 1998	2 - 9000	300
School Street (wet weather)	1990 - 1998	2 - 83,000	1054
School Street (wet weather)	1998	20 - 12,000	298
Pokanoket Watershed Alliance (2003-2004; 2006)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Range	Geometric Mean
Burrs Pond	2003-2004; 2006	< 1 - 2400	297
Mink Street	2003-2004; 2006	120 - 2400	1318
School Street	2003-2004; 2006	380 - 23,000	2575
MADEP Bacteria Source Tracking Data (2007-2009)			
Station	Years	<i>E. coli</i> (colonies/100 mL)	
		Range	Geometric Mean
Pleasant Street	2007 - 2009	185 - 921	340
County Street	2007 - 2009	108 - 921	380
Mink Street	2007 - 2009	579 - 1793	1049
School Street	2007 - 2009	670 - 12,033	2694

Barrington River

Table 2: Summary of available bacteria data for the Barrington River. This data was modeled for the Barrington River TMDL and collected by the RIDEM Shellfish Monitoring Program. Shaded cells indicate an exceedance of water quality standards. Stations are organized from upstream to downstream reaches.

RIDEM Computer Model (from Barrington River TMDL)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Dry Weather Geometric Mean	Wet Weather Event Maximum
Tongue (GA2-1)	--	93.1	155.1
100 Acre Cove (GA2-2)	--	40.6	50.9
White Church Bridge (GA2-3)	--	23.9	65.8
Bike Path Bridge (GA2-5)	--	6.9	43.4
RIDEM Shellfish Monitoring Data (2005-2010)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Range	Geometric Mean
Tongue (GA2-1)	2005 - 2010	2 - 1100	36
100 Acre Cove (GA2-2)	2005 - 2010	2 - 2400	15
White Church Bridge (GA2-3)	2005 - 2010	2 - 2400	14
Bike Path Bridge (GA2-5)	2005 - 2010	2 - 460	10

Palmer River

Table 3: Available bacteria data for the lower reaches of the Palmer River. This data was collected by RIDEM for the Palmer River TMDL (2002) and by the RIDEM Shellfish Monitoring Program. Shaded cells indicate an exceedance of water quality standards. Stations are organized from upstream to downstream reaches.

RIDEM Dry Weather Sampling (1996 - 1997; from Palmer River TMDL)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Low Tide Geometric Mean	High Tide Geometric Mean
Upper Palmer River (RI)	1996 - 1997	550	8
Lower Palmer River	1996 - 1997	9.4	3.8
Belcher Cove	1996 - 1997	3.1	2.4
Mouth of the Palmer River	1996 - 1997	4.5	5.9
RIDEM Shellfish Monitoring Data (1996 - 1999; from Palmer River TMDL)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Dry Weather Geometric Mean	
Upper Palmer River (MA)	1996 - 1999	62	
Upper Palmer River (RI)	1996 - 1999	18	
Lower Palmer River	1996 - 1999	10	
Belcher Cove	1996 - 1999	14	
Mouth of the Palmer River	1996 - 1999	10	
RIDEM Shellfish Monitoring Data (2005 - 2010)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Range	Geometric Mean
Upper Palmer River (MA)	2005 - 2010	4 - 11,000	176
Upper Palmer River (RI)	2005 - 2010	2 - 4,600	55
Lower Palmer River	2005 - 2010	2 - 2,400	14
Belcher Cove	2005 - 2010	2 - 4,600	19
Mouth of the Palmer River	2005 - 2010	2 - 930	16

Table 4: Available bacteria data for the upper reaches of the Palmer River. This data was collected by multiple sources for the MA Palmer River TMDL (2004). Stations are organized from upstream to downstream reaches. Shaded cells indicate an exceedance of water quality standards.

Data used in the MADEP Palmer River TMDL (2004)		
Station	Years	Fecal Coliform (MPN/100 mL)
		Geometric Mean
Palmer (West Branch)	1997 - 2002	335
Palmer (East Branch)	1997 - 2002	390
Main Stem (Class B)	1997 - 2002	92
Upstream of the Shad Factory Pond Dam Outlet	1997 - 2002	164
Downstream of the Shad Factory Pond Dam Outlet (Class SA)	1997 - 2002	278
Main Stem (Class SA)	1997 - 2002	173

Warren River

Table 5: Available bacteria data for the Warren River. This data was collected as part of RIDEM's Shellfish Monitoring Program. Stations are organized from upstream to downstream reaches.

RIDEM Shellfish Monitoring Data (2005-2010)			
Station	Years	Fecal Coliform (MPN/100 mL)	
		Range	Geometric Mean
Station 9	2005 - 2010	2 - 240	10
Station 10	2005 - 2010	2 - 240	8
Station 13	2005 - 2010	2 - 2400	9