MAINSTEM TAUNTON RIVER

The Taunton River is formed by the confluence of the Matfield and Town rivers in Bridgewater and follows an approximately 40-mile course to Mount Hope Bay. The Mainstem Taunton River flows through the communities of Bridgewater, Raynham, Taunton, Dighton, Berkley, Fall River, Freetown and Somerset and includes the following four segments (Figure 8):

Taunton River (Segment MA62-01)
Taunton River (Segment MA62-02)
Taunton River (Segment MA62-03)
Taunton River (Segment MA62-04)

Land along the Mainstem Taunton River is mostly undeveloped with approximately 50% of the land in forest and 25% in residential use. The impervious cover is all less than 10% indicating that there is a low potential for adverse water quality impacts from impervious surface water runoff. Because the watershed topography is flat to low hilly, the Taunton River has one of the flattest courses in Massachusetts. Streamflow fluctuates slowly due to the low gradient; extensive wetland areas and underlying stratified drift. There are only a few short sections of rapids along the river. The absence of dams make it an important anadromous fish run by allowing fish species to reach their native spawning grounds (Nemasket River Stream Team 2003).

The Taunton River Stewardship Program, established in 1996 to promote the preservation of the upper Taunton River corridor and its major tributaries as an intact resource, has been instrumental in helping to facilitate land protection efforts along the corridor over the past six years. Thanks to the combined efforts of the Stewardship Program's partners, including the Towns of Bridgewater, Halifax, Middleborough, and Raynham, the City of Taunton, the Massachusetts Division of Fisheries and Wildlife, The Wildlands Trust of Southeastern Massachusetts, the Natural Resources Trust of Bridgewater, SRPEDD, and other contributors (notably the Massachusetts Department of Environmental Management), 695 acres have been protected in the towns of Bridgewater, Halifax, Middleborough, and Raynham.

The Taunton River has been proposed for a Wild and Scenic designation under the National Parks Service and the Department of the Interior. A study team comprised of representatives from local and state governments, river conservation groups, regional planning agencies and other concerned citizens has been formed. Through this process a conservation plan to protect the river's free-flowing character and significant resources will be developed.

Segment MA62-01 of the Taunton River is classified in the Surface Water Quality Standards as a Class B, Warm Water Fishery. The lower downstream portions are classified as Class SB and are identified as impacted by the discharge of CSOs. All three downstream segments of the Taunton River have been placed on the Massachusetts Year 2002 Integrated List of Waters – Category 5 as not meeting Water Quality Standards for pollutants such as pathogens and organic enrichment/low dissolved oxygen. The DMF Shellfish Status Report of 2003 indicates that shellfish harvesting is prohibited in all growing areas within these downstream segments of the Taunton River.

Three facilities have WMA permits with authorized surface and groundwater withdrawals totaling 3.27 million gallons per day (MGD). Of these three facilities, the largest withdrawal at 3.03 MGD is for the municipal public water source. The USGS has noted that flow in the upper segment of the Taunton River is affected by diversions to and from the basin for municipal water supplies.

The Taunton River receives discharges from six facilities permitted through the NPDES program, which include four municipal major, one industrial major and two minor NPDES permits. Both the Taunton Wastewater Treatment Plant and the City of Fall River are authorized to discharge stormwater/wastewater from combined sewer outfalls. Both facilities have taken steps to address pollution from the combined sewer outfalls. The Taunton WWTP completed upgrades to its system in 2001/2002 and the City of Fall River has developed a three-phase program under a management plan to deal with combined sewer overflows. Additionally, there are numerous Multi-sector General Stormwater Permits for facilities in the communities of Bridgewater, Raynham, Dighton, Berkley, Somerset, Taunton

and Fall River. These communities and the Town of Freetown are Phase II stormwater communities. Each community was issued a stormwater general permit from EPA and MassDEP in 2003/2004 and is authorized to discharge stormwater from their municipal drainage system. Over the five-year permit term, the communities will develop, implement, and enforce a stormwater management program to reduce the discharge of pollutants from the storm sewer system to protect water quality (Domizio 2004).

Water quality data were collected at three sites on the Taunton River during the ENSR International study. As part of the NAWQA Program the USGS also conducted monthly water quality sampling at one site. Additionally, the TRWA conducts water quality sampling at three sites and the Bridgewater State WAL does water quality monitoring at one site. Results indicated elevated phosphorus concentrations, somewhat low dissolved oxygen and % saturation levels and elevated levels of bacteria.

To summarize the detailed assessments that follow this section, the *Aquatic Life Use* is assessed as support in Segments MA62-01 and MA62-02 and as impaired in Segment MA 62-04 due to a reduced abundance and diversity of fish. The Shellfish Harvesting Use is assessed as impaired in all three downstream segments due to elevated bacteria counts. None of the other uses (Primary Contact and Secondary Contact Recreation and Aesthetics) have enough information to make assessments so they are not assessed.

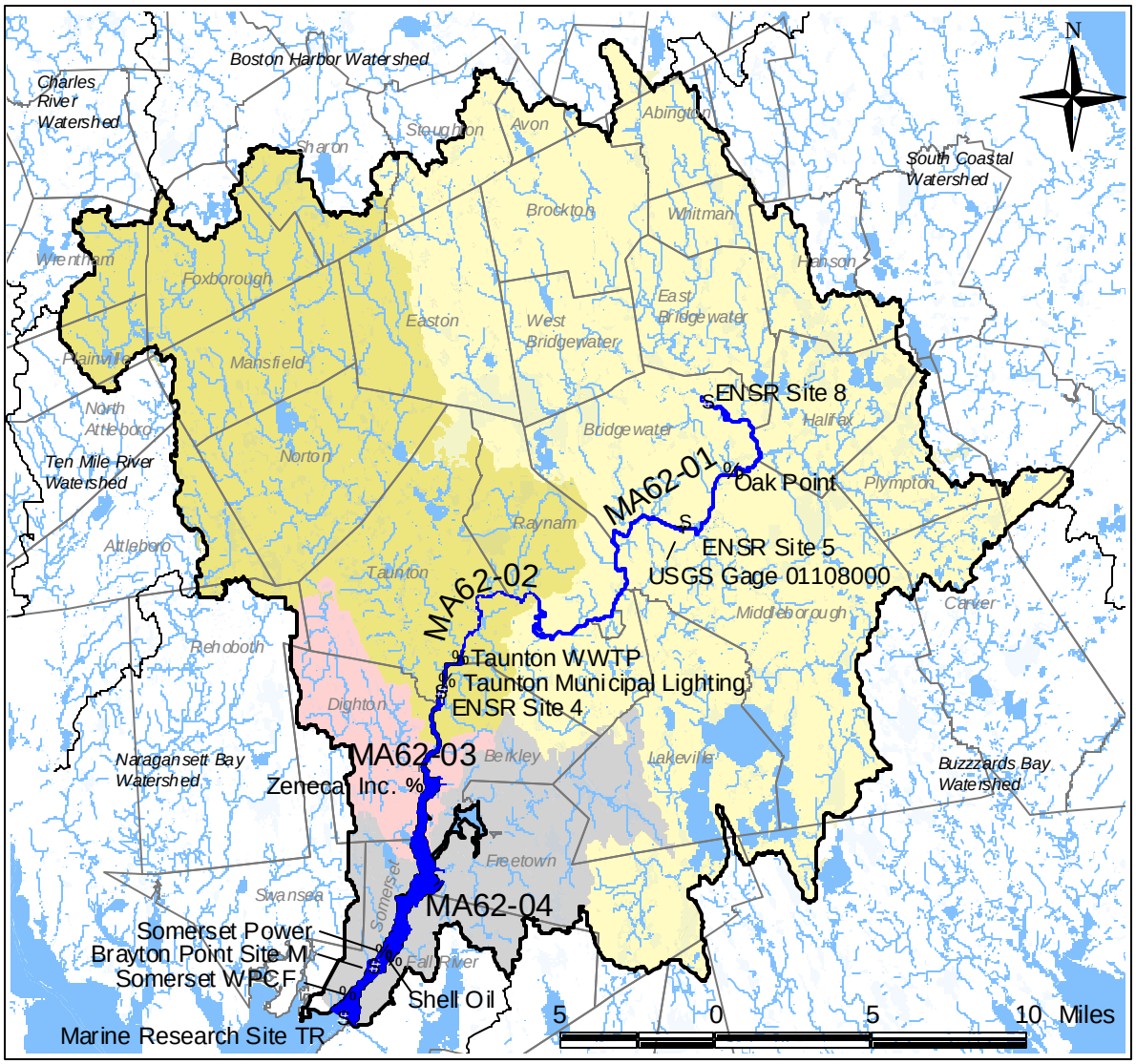


Figure 8. Taunton River Watershed

TAUNTON RIVER (SEGMENT MA62-01)

Location: Confluence of Town and Matfield rivers, Bridgewater to Route 24 bridge, Taunton/Raynham.
Segment Length: 20.4 miles
Classification: Class B, Warm Water Fishery

The drainage area of this segment is approximately 302.3 square miles. Land-use estimates (top three) for the subwatershed:

Forest 48.2%
Open land..... 9.0%
Residential..... 22.1%

The impervious cover area for this subwatershed is less than 10%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

There is one site awaiting a NPL decision located in this subwatershed. The site description was excerpted from the EPA website (EPA 2005b).

> The Middleborough Rockland Inc. property was operated by Rockland as a dye manufacturing facility from 1966 to 1982. The facility manufactured "dye assist" products for the textile industry. Allegedly, wastes from manufacturing processes were disposed of within a former lagoon, former filter beds, the septic system, and floor drains in one of the buildings. Analytical results of groundwater samples collected from the property in 1989 indicated the presence of 12 volatile organic compounds (VOCs). In 1993 drinking water samples were taken from a nearby private well and no VOCs were detected, therefore no impacts to nearby groundwater drinking supplies are known or suspected. Stormwater runoff from the property flows west to the on-site wetlands, and eventually towards the Purchade Brook and the Taunton River. In 1968 an investigation of wastewater discharged from the property determined that the Purchade Brook had a pH of 3.2, and sediment samples taken from the brook indicated the presence of two semivolatile organic compounds and two polycyclic aromatic hydrocarbons. Based on this investigation the impact is attributable to Rockland property. The Rockland property is classified by MassDEP as a Tier IA site and is currently in Phase II of the five-phase Massachusetts Contingency Plan.

MDFW has proposed that Basset, Puddingshear, Spring and Otis Pratt brooks, which are all tributaries to this segment of the Taunton River, be listed in the next revision of the SWQS as a cold water fisheries (Richards 2003b).

It should be noted that MDFW conducted fish population sampling with a backpack shocker at three additional tributaries to this segment in July – September 2002. Samples were collected from one station along Dean Brook, near Dean Street, Raynham (Station 727). A total of two fish, both red fin pickerel, were collected. Sampling was also conducted in Dam Lot Brook near Warren Street, Raynham (Station 731). A total of 17 fish, representing four species, were collected. American eel dominated the sample. Other species included chain pickerel, largemouth bass, and tessellated darter. Sampling of Snows Brook near Vernon Street, Bridgewater (Station 725) resulted in the collection of 17 fish, representing three species. The sample was dominated by tessellated darter (Richards 2003a).

WMA WATER WITHDRAWAL SUMMARY (APPENDIX G, TABLE G5)

There are 4,762 acres of land which are classified in the Land-Use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 13.04 MGD.

Facility	WMA Permit Number	WMA Registration Number	Source (G = ground, S = surface)	Authorized Withdrawal (MGD)
Olde Scotland Links Golf Course, Town of Bridgewater	9P442504203	NA	01G	0.14 perm
Middleborough Water Supply*	9P42518201	42518203	4182000-09G	1.53 reg 1.50 perm Total – 3.03
Poquoy Brook Golf Course	NA	42514601	01S	0.10 reg

* Indicates system-wide withdrawal

NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G3)

Oak Point Retirement Community (Oak Point) in Middleborough is authorized (MA0032433 in August 2004) to discharge, via outfall #001, 0.185 MGD (average monthly flow) of treated effluent to the Taunton River. This tertiary treatment facility incorporates rotating biological contactors to treat domestic wastewater and to perform nitrification for ammonia-nitrogen reduction (no limit in permit). Soda ash is added as an alkalinity supplement for nitrification. The highest concentration of NH_3-N in the effluent between July 1999 and July 2004 was 0.3 milligram per liter (mg/L) (TOXTD database). Total phosphorus (TP) reduction (1 mg/l TP average monthly April 1 to October 31) by design, will be accomplished by chemical addition using polyaluminum chloride (PAC). The pH of the effluent between July 1999 and July 2004 ranged from 6.6 to 7.2 SU (n=22) (TOXTD database). The facility utilizes ultraviolet light (UV) for annual disinfection (Hallisey 2005). The facility's recently issued permit requires whole effluent toxicity testing (lethal concentration to 50% of the test organisms (LC_{50}) ≥100% effluent limit) with a monitoring frequency of one time/year, using *Ceriodaphnia dubia* and *Pimephales promelas*, as opposed to quarterly testing requirements in the previous permit.

USE ASSESSMENT

AQUATIC LIFE

Habitat and Flow

The USGS maintains one gaging station (01108000) on the mainstem Taunton River near Titicut Road, Bridgewater. The gage has been in operation since 1926. The mean annual flow of the Taunton River at this gage (drainage area is 258 square miles) is 471 cubic feet per second (cfs) (Socolow *et al.* 2003). The USGS remarks for this gage note flow affected by diversions to and from the basin for municipal supplies and the flow is regulated by reservoirs. Prior to 1975 flow was also regulated by power plants upstream (Socolow *et al.* 2003).

Toxicity

Ambient

The Oak Point staff collected ambient water from the Taunton River adjacent to Auburn Street, Middleborough approximately 0.8 miles upstream from Outfall #001 for use as dilution water in their whole effluent toxicity tests (Hallisey 2005). Between July 1999 and July 2004 survival of *Ceriodaphnia dubia* and *Pimephales promelas* exposed (48 hours) to river water ranged from 75 to 100% (n=20).

Effluent

Between July 1999 and July 2004, acute whole effluent toxicity tests were conducted on the Oak Point effluent using *Ceriodaphnia dubia* (n=19 valid tests) and *Pimephales promelas* (n=20). The effluent did not exhibit any acute toxicity (LC_{50}'s were all >100% effluent).

Chemistry – water

As part of their site-specific copper criteria development study, ENSR conducted sampling at two stations in this segment of the Taunton River: at the upper end of this segment near Plymouth Street (Route 104), Bridgewater (Site 8) and off Titicut Street, Bridgewater (Site 5) (ENSR 2002).

The Oak Point staff collected ambient water from the Taunton River adjacent to Auburn Street, Middleborough approximately 0.8 miles upstream from Outfall #001 for use as dilution water in their whole effluent toxicity tests between July 1999 and July 2004. Data from the facility's whole effluent toxicity test reports are maintained in the TOXTD database by DWM.

The USGS has conducted water quality sampling in this segment of the Taunton River at their gaging station (01108000) near Titicut Street, Bridgewater. The data from 19 surveys collected from June 1998 through August 2002 are summarized below (Socolow *et al*. 1999, Socolow *et al*. 2000, Socolow *et al.* 2001, Socolow *et al.* 2002, and Socolow *et al*. 2003).

Sampling of the Taunton River (DO, temperature, pH, TSS, nitrate-nitrogen, total phosphorus, and bacteria) is conducted on a monthly basis by TRWA near Green Street Bridge, Middleborough/Bridgewater (Sampling Station TNT-158). Although a draft Quality Assurance Project Plan (QAPP) was reviewed by MassDEP in 2001, a final QAPP for the TRWA has not been approved so

their data are not quality-assured. For the purpose of this report data reported by TRWA for 2002/2003 were reviewed for consistency with other quality-assured data sources.

The Bridgewater State WAL conducts water quality sampling in the Taunton River at Titicut Street, Bridgewater (Curry 2005). Between June and September 2004 the Taunton River was sampled six times using a Hydrolab® minisonde to collect data on temperature, pH and DO through a 22-hour period. Additionally, WAL took nutrient samples (total phosphorus, soluble reactive phosphorus and nitrate-nitrogen) every hour using a Sigma 900 automated sampler with samples for every other hour used for analysis. A QAPP for the WAL has not been approved by MassDEP so their data are not quality-assured. For the purpose of this report data reported by WAL for 2004 were reviewed for consistency with other quality-assured data sources.

The following is a summary of the sampling results for the above-mentioned datasets.

Dissolved Oxygen and % Saturation
The DO near Plymouth Street (Route 104), Bridgewater (Site 8) was not less than 6.2 mg/L or 72.1% saturation.
DO near Titicut Street, Bridgewater reported by USGS ranged from 4.3 to 12 mg/L and saturations between 48 and 98%. Two of the 19 DO measurements were less than 5.0 mg/L and three of the saturation values were less than 60%. ENSR (2002) reported DOs at Site 5 (Titicut Street) between 5.28 and 12.37 mg/L and saturations ranging from 62 to 96.7%. It should be noted that none of these measurements were taken pre-dawn.
TRWA results did not indicate any violations of the water quality standard for DO at the Green Street Bridge, Middleborough/Bridgewater (Station TNT-158).
During its hourly Hydrolab® sampling in 2004 WAL did not report any DO measurements <5.0 mg/L.

Temperature
The maximum temperature at Site 8 was 23.7°C
The maximum temperature near Titicut Street, Bridgewater reported by both ENSR and USGS was 24.5°C.
Temperatures reported by TRWA (Station TNT-158) were consistent with the above and did not exceed 25°C.
Hourly Hydrolab® temperature measurements by WAL did not exceed 28.3°C during its 2004 sampling.

pH and Alkalinity
The pH near Plymouth Street (Route 104), Bridgewater (Site 8) ranged between 6.4 and 7.1 SU. Only one measurement was <6.5 SU. Alkalinity measurements were 23 and 25 mg/L as $CaCO_3$.
The pH measurements from samples collected approximately 0.8 miles upstream from Outfall #001 between July 1999 and July 2004 ranged from 6.0 to 7.1 SU with six of the 22 measurements <6.5 SU. Alkalinity ranged from <10 to 48 mg/L (n=22) (TOXTD database).
At the USGS site instream pH ranged from 6.0 to 7.6 SU with 5 of the 19 measurements (26%) less than 6.5 SU.
The pH near Titicut Street, Bridgewater (Site 5) ranged between 6.5 and 7.4 SU.
The pH near the Green Street Bridge, Middleborough/Bridgewater (Station TNT-158) reported by TRWA was consistent with the upstream locations.
Hourly Hydrolab® measurements for pH taken by WAL also were within the ranges reported above with some readings at or below 6.5 SU.

Specific conductance
Specific conductance ranged from 250 to 447 µS/cm at Site 8.
Specific conductance from samples collected approximately 0.8 miles upstream from Outfall #001 between July 1999 and July 2004 ranged from 89 to 398 µmhos/cm (n=22) (TOXTD database).
Specific conductance reported by ENSR ranged from 183 to 315 µS/cm near Titicut Street (Site 5). USGS results ranged from 118 to 432 µS/cm.

Hardness
Hardness of the river reported by ENSR at Site 8 was 46 and 52 mg/L as $CaCO_3$.
Hardness from samples collected approximately 0.8 miles upstream from Outfall #001 between July 1999 and July 2004 ranged from 11 to 84 mg/l (n=22)(TOXTD database). Seven of the 22 measurements were <25 mg/L.
Hardness reported by USGS at their gage near Titicut Street ranged from 27 to 65 mg/L as $CaCO_3$ (n= 5).

Turbidity
Turbidity reported by ENSR ranged from 3.93 to 7.40 nephelometric turbidity units (NTU) at Site 8 and between 2.66 and 6.30 NTU at Site 5.

Ammonia-Nitrogen
Ammonia-nitrogen concentrations reported by ENSR at Site 8 were both <1.0 mg/L.
The ammonia-nitrogen values reported from samples collected in the Taunton River approximately 0.8 miles upstream from Outfall #001 between July 1999 and July 2004 ranged from <0.05 (nine measurements were reported as less than the method detection levels of either 0.05 or 0.1 mg/L) to 2.33 mg/L (n=22) (TOXTD database).
Detectable concentrations of ammonia-nitrogen reported by USGS ranged from 0.026 to 0.85 mg/L (n=18).

All of these measurements were below 2.63 mg/L NH_3-N (chronic instream criterion for ammonia at pH of 7.6 SU and temperature of 26°C) (EPA 1999a).

Total phosphorus
Total phosphorus concentrations reported by USGS ranged from 0.101 to 0.28 mg/L (n=16).
Similar results were reported by TRWA near the Green Street Bridge, Middleborough/Bridgewater (Station TNT-158).
Values obtained by WAL for total phosphorous were also within this range.

Total Residual Chlorine (TRC)
TRC was <0.05 mg/L at Site 8 on both sampling dates.
TRC measurements from samples collected approximately 0.8 miles upstream from Outfall #001 between July 1999 and July 2004 were all <0.05 mg/L (n=22) (TOXTD database).

Copper
Between 15 March and 19 September 2001, dissolved copper concentrations reported by ENSR ranged from 2.5 to 4.00 µg/L at Site 8 and between 0.83 and 4.40 µg/L at Site 5 (n=5 measurements at each site) (ENSR 2002). The total dissolved copper concentrations near Titicut Street reported by USGS ranged from 1.4 to 3.3 µg/L (n=13). Only one of the five measurements reported by ENSR at each of their sampling sites and one of the 13 measurements reported by USGS exceeded the current EPA water quality criterion of 3 µg/L at a hardness of 25 mg/L. A site-specific copper criterion is currently being developed.

The *Aquatic Life Use* is assessed as support for this segment of the Taunton River based primarily on the good survival of test organisms exposed to the river water, the water quality data and best professional judgment. Although instream biological data (response type indicators of in-stream water quality conditions) were not available, occasionally low dissolved oxygen/saturation (not representing pre-dawn conditions) and elevated total phosphorus concentrations were documented and therefore, this use is identified with an Alert Status.

PRIMARY CONTACT AND SECONDARY CONTACT RECREATION
Fecal coliform and *E.coli* bacteria samples were collected by USGS at their gaging station (01108000) in Bridgewater, MA (Socolow *et al*. 1999, Socolow *et al*. 2000, Socolow *et al.* 2001, Socolow *et al.* 2002, and Socolow *et al*. 2003). The fecal coliform bacteria counts ranged from 29 to 5,900 cfu/100 mL (n=17). Of the 14 samples collected during the primary contact season, the geometric mean was 134 cfu/100 mL, however, two of the 14 samples (14%) exceeded 400 cfu/100 mL. The geometric mean for all of the fecal

coliform bacteria samples collected (n=17) was 169 cfu/100 mL. Only one sample exceeded 2,000 cfu/100 mL.

TRWA reported similar fecal coliform bacteria results for the river at the Green Street Bridge, Middleborough/Bridgewater (sampling station TNT-158).

Given the length of this segment of the Taunton River, too limited data are available (poor spatial coverage) to assess the status of the *Primary* and *Secondary Contact Recreational* uses. The *Primary Contact Recreational Use* is identified with an Alert Status however, given the problems identified in the Matfield River just upstream from this segment.

Taunton River (MA62-01) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED*
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

*"Alert Status" issues identified, see details in the use assessment section

RECOMMENDATIONS

Conduct monitoring (biological, habitat and water quality) adequate to evaluate the status of the *Aquatic Life Use* in this segment of the Taunton River bracketing potential sources of pollution (e.g., discharges, major tributaries, developments).

Conduct bacteria sampling with sufficient spatial coverage to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

Continue to monitor compliance with WMA registration/permit limits and other special conditions of the permits.

NPDES permits should be updated with appropriate limits and monitoring requirements including consideration of site-specific copper criterion.

MDFW has proposed that Basset, Puddingshear, Spring and Otis Pratt brooks, which are all tributaries to this segment of the Taunton River, be protected as cold water fishery habitat. Additional monitoring of the fish population, dissolved oxygen, and temperature is needed to evaluate MDFW's proposal to list this stream as a cold water fishery in the next revision of the Surface Water Quality Standards.

The TRWA and WAL should continue to conduct water quality monitoring at their established sampling sites in this segment of the Taunton River to meet their sampling objectives. In order for the MassDEP to utilize the TRWA and WAL data for water quality assessment reporting purposes, the TRWA and WAL should work with MassDEP to meet its quality assurance/quality control requirements.

TAUNTON RIVER (SEGMENT MA62-02)

Location: Route 24 Bridge, Taunton/Raynham to Berkley Bridge, Dighton/Berkley.
Segment Size: 0.29 square miles
Classification: Class SB, Shellfishing (R), CSO

The drainage area of this segment is approximately 457.6 square miles. Land-use estimates (top three) for the subwatershed:

Forest 49.3%
Open land..... 8.4%
Residential..... 23.4%

The impervious cover area for this subwatershed is less than 10%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 5 as not meeting water quality standards for pathogens (MassDEP 2003).

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLES G1, G2 AND G3)

There are 5,504 acres of land which are classified in the Land-Use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 49.14 MGD. However, 4,762 acres of this cranberry acreage are located in the subwatershed for Segment MA62-01 upstream from this subwatershed.

Bay State Gas, a natural gas/propane distribution facility, was authorized under the NPDES General Permit to discharge non-contact cooling water into the Taunton River. This permit (No. MAG250040) was issued December 1, 2000 and this discharge was eliminated effective March 26, 2004.

The City of Taunton is authorized (NPDES permit MA0100897 issued in March 2001) to discharge from the Taunton Wastewater Treatment Plant (WWTP) via Outfall #001 an average monthly flow of 8.4 MGD of treated industrial and sanitary wastewater and stormwater to the Taunton River. This conventional activated sludge facility conducts seasonal nitrification for ammonia-nitrogen reduction (1 mg/l NH_3-N average monthly June 1 to September 30). The concentration of NH_3-N in the effluent between January 1996 and August 2004 ranged from <0.05 to 16.04 mg/L (n=36) (TOXTD database). The pH of the effluent between January 1996 and August 2004 ranged from 6.66 to 7.61 SU (n=36) with the exception of one test event (6.37 SU, April 1997) (TOXTD database). The facility utilizes sodium hypochlorite for disinfection and sodium bisulfite for dechlorination (TRC limit = 0.046 mg/L average monthly and 0.08 mg/L maximum daily) (Domingos 2005). The TRC values of the effluent between January 1996 and August 2004 were all <0.05 mg/L (n=36) (TOXTD database). The facility's whole effluent toxicity limits (both the September 1995 and March 2001 permits) are $LC_{50} \geq 100\%$ and C-NOEC $\geq$ 24% with a monitoring frequency of four times/year using *Ceriodaphnia dubia*. *Pimephales promelas* were also tested as part of the 1995 permit. During wet weather the permittee is also authorized to discharge stormwater/wastewater from combined sewer outfall #004 (West Water Street south of Fifth).

The Taunton Municipal Lighting Plant (TMLP) is a municipally owned 135 Mega Watt steam electric power generating facility. The TMLP Cleary-Flood Station has two generating units (8 and 9). Water is withdrawn directly from the Taunton River (approximately 38.1 MGD instantaneous maximum flow rate) at an intake structure adjacent to the main power generation building for use as cooling water. Unit 8, completed in 1966, employs a once-through cooling water system which can generate approximately 25MW. Typically, when in operation the unit is online for approximately 11 hours/generation event during peak demand periods (summer and winter). Unit 9, which began operation in 1975, is a combined cycle system, which can generate a total of 110 MW. Typically, when in operation the unit is online for approximately 13 hours/generation event during peak demand periods (summer and winter). NPDES permit# MA0002241 was issued to the facility in September 1994, however, in December 1994 the EPA reinstated the conditions of the April 1988 permit. The facility is authorized to discharge via the following outfalls (upstream to downstream):

Outfall #005 – Discharge of trash rack spray nozzles (64 nozzles with an instantaneous flow of 0.165 MGD) operated continuously during the fall and periodically through the rest of the year to keep leaves from accumulating on the trash racks to this segment of the Taunton River.
Outfall #004 – Discharge of approximately 0.013 MGD of traveling screen backwash water (only operated on days when plant is operated) to this segment of the Taunton River.
Outfall #003 –0.50 MGD maximum daily (0.35 MGD average monthly), of blowdown from Unit 9 cooling tower (83°F maximum daily) which is chlorinated daily (2 hours/day when operating) (TRC limit 0.1 mg/L) to this segment of the mainstem Taunton River.

Two additional outfalls are discharged into an unnamed tributary (see segment MA62-48) which runs adjacent to the Taunton River for approximately 2000' prior to flowing into this segment of the Taunton River.

As part of the NPDES permit renewal process, no intake or discharge effects to finfish populations in the Taunton River were projected to occur as a result of the operation of the TMLP (Earth Tech 2002). Therefore no 316(b) studies were required or conducted for this facility.

The Town of Dighton received funding in 2003 from the Clean Water SRF to identify areas of the community where existing on-site sewage disposal systems are inadequate for wastewater disposal and to develop recommendations for wastewater management to protect groundwater and surface waters including the Taunton River.

USE ASSESSMENT

AQUATIC LIFE

Toxicity

Ambient

The Taunton WWTP staff collected water from the Taunton River at the Plain Street Bridge for use as dilution water in their facility's whole effluent toxicity tests (Domingos 2005). Between October 1996 and August 2004 (n=30 tests), survival of *Ceriodaphnia dubia* exposed (7 days) to river water ranged from 10 to 100%. Survival was $\geq$ 80% except for three test events (July 1997, July 1999 and February 2002 with survivals of 70, 10, and 70%, respectively) (TOXTD database). Between October 1996 and January 2001(n=16 tests), survival of *Pimephales promelas* exposed (7 days) to river water ranged from 57 to 97%. Survival was $\geq$ 77% in all but two test events (October 1997 and January 1998 with survivals of 70 and 57%, respectively) (TOXTD database).

Effluent

Between October 1996 and August 2004, a total of 29 valid whole effluent toxicity tests using *Ceriodaphnia dubia* were conducted on the Taunton WWTP effluent. The LC_{50} results were all >100% with the exception of three tests (July 1998, May 2001, May 2003 with LC_{50}'s of 34.6, 66, and 85.4%, respectively). The C-NOEC results ranged from 6.25 to 100% (n=29 valid tests). The C-NOEC results did not meet the limit of 24% in four of the 29 test events (TOXTD database), but all of the tests conducted since July 2000 have met the permit limit of 24%. Between October 1996 and January 2001, a total of 16 whole effluent toxicity tests were conducted using *Pimephales promelas*. The LC_{50} results were all > 100%. The C-NOEC results were all 100% except for one test event (<6.25% July 1997) (TOXTD database).

Chemistry – water

Sampling of the Taunton River (DO, temperature, pH, TSS, nitrate-nitrogen, total phosphorus, and bacteria) is conducted on a monthly basis by TRWA at three locations in this segment of the Taunton River: near Longmeadow Road Bridge, Taunton (Station TNT-050); near Plain Street, Taunton (Station TNT-043); and near Center Street (Berkley Bridge), Berkley (station TNT-000). Although a draft Quality Assurance Project Plan (QAPP) was reviewed in 2001, a final QAPP for the TRWA has not been approved and their data are not quality-assured. For the purpose of this report data reported by TRWA for 2002/2003 were reviewed for consistency with other quality-assured data sources.

The Taunton WWTP staff collected water from the Taunton River at the Plain Street Bridge for use as dilution water in the facility's whole effluent toxicity tests. Data from these reports, between January 1996 and August 2004, are maintained in the TOXTD database by DWM and are also summarized below.

As part of their site-specific copper criteria development study, ENSR conducted sampling (n=5) at one station in this segment of the Taunton River off Railroad Avenue, Taunton (Site 4 - upstream from the confluence with the Threemile River) (ENSR 2002).

Dissolved Oxygen and % Saturation
Measurements for DO at Site 4 ranged from 6.26 and 12.67 mg/L and saturations from 74.0 to 92.5%. All measurements met water quality standards (>5.0 mg/L and 60% saturation), however, it should be noted that measurements at Site 4 do not represent worst-case (pre-dawn) conditions. A similar range for DO was recorded at the TRWA sites with all measurements meeting the water quality standard.

Temperature
The maximum temperature recorded at Site 4 was 23.7°C. Temperature measurements taken at the TRWA sites did not exceed 26°C.

pH and Alkalinity
The pH of the Taunton River collected near the Plain Street Bridge between January 1996 and August 2004 ranged from 6.4 to 7.5 SU with 1 of the 36 measurements <6.5 SU. Alkalinity ranged from <10 to 46 mg/L (n=35) (TOXTD database).
Of the five measurements taken at Site 4, only one was slightly below 6.5 SU at 6.4 SU and the highest measurement was 7.8 SU.
Measurements taken at the TRWA sites indicated numerous readings below 6.5 SU.

Hardness
Hardness of the Taunton River, collected near the Plain Street Bridge between January 1996 and August 2004, ranged from 19 to 79 mg/L with seven of the 36 measurements $\leq$25 mg/L (TOXTD database).

Specific Conductance
The specific conductivity of the Taunton River collected near the Plain Street Bridge between January 1996 and August 2004, ranged from 117 to 469 µmhos/cm (n=36) (TOXTD database).
At Site 4 the range for specific conductance was 206 to 335 µS/cm.

Turbidity
Turbidity at Site 4 ranged from 3.84 to 12.4 NTU.

Suspended solids
The suspended solids of the Taunton River, collected near the Plain Street Bridge between January 1996 and August 2004, ranged from <10 to 22 mg/L (n=36) (TOXTD database).
Measurements for suspended solids at the TRWA sites were generally lower than the above range.

TRC
TRC measurements (n=36) of the Taunton River, collected near the Plain Street Bridge between January 1996 and August 2004, were all <0.05 mg/L (TOXTD database).

Ammonia-nitrogen
The ammonia-nitrogen concentrations of the Taunton River, collected near the Plain Street Bridge between January 1996 and August 2004, ranged from <0.05 to 0.85 mg/L (n=36) (TOXTD database). All of these measurements were below the conservative criterion of 1.09 mg/L NH_3-N (chronic instream criterion for ammonia at pH of 8.0 SU and temperature of 30°C) (EPA 1999a).

Total Phosphorus
The TRWA reported high phosphorus levels at their sampling station near Plain Street, Taunton (Station TNT-043) in May 2002 (Domingos 2003a).

Copper
Between 15 March and 19 September 2001 dissolved copper concentrations reported by ENSR ranged from 0.23 to 5.70 µg/L (n=5) (ENSR 2002). Two of the measurements exceeded the current EPA water

quality criterion of 3 µg/L at a hardness of 25 mg/L. A site-specific copper criterion is currently being developed.

Although instream biological data (response type indicators of instream water quality conditions) were not available, the *Aquatic Life Use* is assessed as support for this segment of the Taunton River based primarily on the good survival of test organisms (particularly during the more recent testing), limited water quality data and best professional judgment.

SHELLFISH HARVESTING

The DMF Shellfish Status Report of 2003 indicates that area MHB2.2 is prohibited (Sawyer 2003).

Based on the DMF shellfish growing area status, the *Shellfish Harvesting Use* is assessed as impaired for this segment of the Taunton River because of elevated bacteria counts.

PRIMARY CONTACT AND SECONDARY CONTACT RECREATION AND AESTHETICS

Sampling of the Taunton River (bacteria) is conducted on a monthly basis by TRWA at three locations in this segment of the Taunton River: near Longmeadow Road Bridge, Taunton (Station TNT-050); near Plain Street, Taunton (Station TNT-043); and near Center Street (Berkley Bridge), Berkley (Station TNT-000). Although a draft Quality Assurance Project Plan (QAPP) was reviewed in 2001, a final QAPP for the TRWA has not been approved and their data are not quality-assured.

The TRWA reported high fecal coliform levels at their Plain Street, Taunton sampling station (TNT-043) in May 2002. The TRWA found that high coliform counts intermittently occurred at this station (Domingos 2003a).

The Taunton WWTP has a combined sewer outfall #004 (West Water Street south of Fifth), Taunton. Prior to upgrades completed in 2001/2002, the CSO activated on a regular basis. A summary of the overflow events over the last several years can be summarized as follows (Shepard 2005):

In 2000 there were 24 overflow events that discharged between 0.022 to 3.79 MG (no total).
In 2001 there were only four events -- total discharged 0.913 MG.
In 2002 there were no overflow events.
In 2003 there were two events – total discharge 3.59 MG (one event August 8/9 discharged 3.545 MG intermittently over 16 hour period).
In 2004 there was one event – total discharge of 0.073 MG.

The *Primary* and *Secondary Contact Recreational* uses are not assessed for this segment of the Taunton River due to a lack of quality-assured bacteria data but is identified with an alert status due to high levels of bacteria reported by TRWA sampling. Too limited data are available to assess the status of the *Aesthetics* use.

Taunton River (MA62-02) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Shellfish Harvesting		IMPAIRED Cause: Fecal coliform bacteria Sources: Unknown (Suspected Sources: Discharges from municipal separate storm sewer systems, CSO and septic systems)
Primary Contact		NOT ASSESSED*
Secondary Contact		NOT ASSESSED*
Aesthetics		NOT ASSESSED

*Alert Status issues identified, see details in use assessment

RECOMMENDATIONS

Conduct monitoring (biological, habitat and water quality) adequate to evaluate the status of the *Aquatic Life Use* in this segment of the Taunton River bracketing potential sources of pollution.

Continue to evaluate NPDES facilities to determine compliance with permit limits and need for enforcement if deemed necessary.

The City of Taunton (NPDES MA0100897) should develop and implement a long-term control plan for their CSO.

Review and implement recommendations in the DMF shellfish sanitary survey reports and the triennial reviews for growing area MHB2.2.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

The TRWA should continue to conduct water quality monitoring at its established sampling site in this segment of the Taunton River to meet its sampling objectives. In order for the MassDEP to utilize the TRWA data for water quality assessment reporting purposes, the TRWA should work with MassDEP to meet its Quality Assurance/Quality Control requirements.

TAUNTON RIVER (SEGMENT MA62-03)

Location: Berkley Bridge, Dighton/Berkley to confluence with Assonet River at a line from Sandy Point, Somerset northeasterly to the southwestern tip of Assonet Neck, Berkley.
Segment Size: 0.92 square miles
Classification: Class SB, Shellfishing (R), CSO

The drainage area of this segment is approximately 480.1 square miles. Land-use estimates (top three) for the subwatershed:

Forest 50.1%
Residential..... 23.0%
Open land..... 8.3%

The impervious cover area for this subwatershed is less than 10%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 5 as not meeting water quality criteria for organic enrichment/low DO and pathogens (MassDEP 2003).

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G4)

There are 5,505 acres of land which are classified in the land-use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 49.15 MGD. However, 5,504 acres of this cranberry acreage are located in the subwatershed for Segments MA62-01 and MA62-02 upstream from this subwatershed.

Zeneca, Inc. (formerly ICI Americas, Inc.) used to discharge to Muddy Cove Brook (NPDES MA0005291) but the discharge was moved to the Taunton River via Outfall 011A in 1992 (permit revision signed in June 1992). The facility was engaged in the manufacturing of textile dyestuffs and other organic chemicals. Manufacturing operations of the site ceased in 1995. Wastewater was generated as a result of facility decommissioning and RCRA Corrective Action (Zeneca 2000). This permit was terminated by EPA in November 2003. The facility is currently discharging stormwater under a multisector general stormwater permit (MAR05B053) via Outfall 011S to Muddy Cove Brook. The company needs to reapply for a new multisector general stormwater permit.

USE ASSESSMENT

SHELLFISH HARVESTING

The DMF Shellfish Status Report of 2003 indicates that all growing areas within this segment (MHB2.1 and MHB2.2) are prohibited (Sawyer 2003).

Based on the DMF shellfish growing area status, the *Shellfish Harvesting Use* is assessed as impaired for this segment of the Taunton River because of elevated bacteria counts.

Taunton River (MA62-03) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		NOT ASSESSED
Shellfish Harvesting		IMPAIRED Cause: Fecal coliform bacteria Source: Unknown (Suspected Sources: Discharges from municipal separate storm sewer systems, CSO, septic systems and marina/boating pumpout releases)
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

Review and implement recommendations in the DMF shellfish sanitary survey reports and the triennial reviews for growing area MHB2.2.

Conduct appropriate monitoring to evaluate the status of the *Aquatic Life Use* in this segment of the Taunton River.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

TAUNTON RIVER (SEGMENT MA62-04)

Location: Confluence with Assonet River at a line from Sandy Point, Somerset northeasterly to the southwestern tip of Assonet Neck, Berkley to mouth at Braga Bridge, Somerset/Fall River.
Segment Size: 2.65 square miles
Classification: Class SB, Shellfishing (R), CSO

The drainage area of this segment is approximately 528.9 square miles. Land-use estimates (top three) for the subwatershed:

Forest 51.0%
Residential..... 22.7%
Open land..... 8.2%

The impervious cover area for this subwatershed is less than 10%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 5 as not meeting water quality criteria for organic enrichment/low DO and pathogens (MassDEP 2003).

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLES G1, G2, AND G3)

There are 5,917 acres of land which are classified in the Land-Use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 52.83 MGD. However, 5,505 acres of this cranberry acreage are located in the subwatershed for segments MA62-01, MA62-02, and MA62-03 upstream from this subwatershed.

Somerset Power LLC and Somerset Operations, Inc. (Somerset Power) formerly Montaup Electric Company-Somerset Station, has the ownership of the originally issued permit (MA0001856 issued in September 1994) and transferred effective April 1998) to operate a 112 MW once-through cooling water coal-fired electric power generating station along this segment of the Taunton River. Water from the Taunton River is withdrawn via an intake channel and Somerset Power is authorized to discharge via the following outfalls to the Taunton River:

- Outfall #007 – Condenser cooling water from Unit 6 - 142 MGD average monthly, 200 MGD maximum daily, maximum temperature 100°F.
- Outfall #002 – Treated wastewater (boiler blowdown, seal water, bottom ash, sluicewater, floor drains, equipment drains, generation wastes, coal pile runoff, belt filter wash and filter backwash) - 0.126 MGD average monthly, 0.145 MGD maximum daily with $LC_{50} \geq 50\%$, monitored 2 times a year
- Outfall #002a – Treated wastewater (outfall 002 plus additional chemical cleaning waste) - 0.215 MGD average monthly, 0.270 MGD maximum daily.

Somerset Power is also authorized to discharge (via outfalls SD1-5, 006, and 013-017) stormwater runoff to the Taunton River. As part of this permit the facility must develop a Stormwater Pollution Prevention Plan. As the stormwater runoff outfalls are consolidated into three areas the permittee has requested that one representative outfall from each area be permitted for testing requirements (outfalls # SD1, 013, and 016). Numerous internal outfalls discharge a variety of wastewater substances from many different sources, which are treated at the on-site wastewater treatment plant. Some of the sources of wastewater that are treated on-site include: boiler blow down, seal water, bottom ash, floor drains, water softener, generated chemical cleaning and metal wastes, coal pile runoff, belt filter wash, and filter back wash. The facility is also authorized to discharge intake screen backwash water and fish sluice water to the Taunton River via outfalls # 020, 021, and 022.

The pH of the facility's Outfall #002 effluent between April 1995 and April 2004 ranged from 6.3 to 8.1 SU with only one measurement of the 18 (October 2000) <6.5 SU (TOXTD database). The TRC concentrations of the effluent between April 1995 and April 2004 ranged from <0.02 to 0.08 mg/L (n=17). The concentration of ammonia-nitrogen in the effluent ranged from <0.07 to 4.9 mg/L with the exception of one measurement (11.8 mg/L in April 2003) (n=18) (TOXTD database). The facility's acute whole effluent toxicity limits are $LC_{50} \geq 50\%$ with a monitoring frequency of two times/year using *Mysidopsis bahia* and *Menidia beryllina*.

An NPDES permit, originally issued to the Shell Oil Company for their bulk storage and distribution terminal, to discharge via Outfall 001 into this segment of the Taunton River (NPDES permit #MA0004871) was issued November 1978. Although a more recent permit has not been issued, several

permit reapplication packages were submitted and the original permit has been administratively continued. Currently the Fall River Marine Terminal LLC is submitting DMRs for this permit (Kaegael 2005). Former permit holders appear to include Shell Oil Company, Jay Cashman, Inc. and Shell Fall River Terminal. According to the permit reapplication submitted in 1994, groundwater remediation wastewater, stormwater, and contact water were being discharged to this segment of the Taunton River from this site. This is the site of a proposed Liquefied Natural Gas (LNG) terminal.

The Town of Somerset is authorized to discharge (NPDES permit MA0100676 issued in May 2004) from the Town of Somerset WPCF an average monthly flow of 4.2 MGD of treated effluent to the Taunton River via Outfall #001. This conventional activated sludge secondary treatment facility treats municipal wastewater and has continued a nitrogen monitoring program (NH_3-N, TKN, NO_2-N, NO_3-N). The NH_3-N concentrations in the effluent between July 1999 and August 2004 ranged from 1.3 to 25.0 mg/L (n=21) (TOXTD database). The pH of the effluent between July 1999 and August 2004 ranged from 5.80 to 6.97 SU (n=21) with 7 of the 21 test events <6.5 SU (TOXTD database). The facility utilizes gaseous chlorine for disinfection and sodium bisulfite for dechlorination (TRC limit = 0.2 mg/L average monthly and 0.3 mg/L maximum daily) (Garcia 2004). The TRC measurements of the effluent (n=21) between July 1999 and August 2004 ranged from <0.02 to 0.70 mg/L with the exception of one measurement (17 mg/L, July 2002 test event) (TOXTD database). Two of the 21 measurements exceeded 0.3 mg/L. The facility's whole effluent toxicity limits are $LC_{50} \geq 100\%$ with a monitoring frequency of four times/year using *Menidia beryllina*.

The City of Fall River is authorized (NPDES permit MA0100382) to discharge Combined Sewer Overflow (CSO) via four outfalls to this segment of the Taunton River. The outfalls are located along the eastern shore of the river (north to south) in Fall River as follows:

Outfall 014 at the Shell Oil Terminal Dock, Alton Street
Outfall 013 at Cove Street
Outfall 011 at President Ave/ Bicentennial Park
Outfall 010 at Davol Street#1and#2, City Pier

In 1984 the City began their long-term CSO planning process. The CSO management plans have been evolving since that time. In 1992 a deep-tunnel storage and treatment system was recommended to reduce CSO discharges to less than four untreated discharge events per year at one extreme outfall location in Mount Hope Bay. The following has been conducted as part of the three-phase program (Burns 2005):

Phase I -- upgrade the WWTP*:* In 2000 the City's NPDES permit authorized an increased capacity at the plant (from 50 to 106 MGD) to coincide with the completion of the WWTP upgrade.

Phase II --a CSO Tunnel*:* Since 2000 a "south and central tunnel" has been constructed to increase storage capacity of the system. Part of Phase II is the "north tunnel". The schedule calls for an interim evaluation prior to proceeding with the north tunnel and Phase III. However, a modified tunnel plan has been offered due to the known unfavorable site conditions that were found making the "north tunnel" less effective/feasible. Because of this situation, it is likely that a number of CSO discharges to this segment of the Taunton River will be upgraded to receive treatment (screening and chlorination/dechlorination).

Phase III --partial (sewer and catchbasin) separation program*.*

USE ASSESSMENT

AQUATIC LIFE

Biology

As part of their NPDES permit renewal process, Somerset Power was required to conduct entrainment and impingement studies to evaluate potential effects of the intake on fish. Estimates of equivalent adult losses for various important resident species of fish entrained and impinged at the Somerset Station were prepared based on monitoring data collected between February 2001 and June 2002 (Table 3) (Normandeau Associates 2004). Mean and upper 95% confidence limits (C.L.) were estimated using intake flows from the current permit and for the newly requested permit limits. A technical review of these investigations by MassDEP DWM staff is summarized below.

Table 3. Summary of Estimated Equivalent Adult Losses of Selected Species Entrained and Impinged at the Somerset Station Intake (Normandeau Associates 2004).

Species and age	Based on Current Permit Limits:		Based on Requested Permit Limits:	
	Mean	Upper (95%) C.L.	Mean	Upper (95%) C.L
Alewife (Age-2)	43,502	133,847	84,553	260,160
Atlantic Silverside (Age-1)	686,269	1,391,942	1,333,862	2,705,465
Cunner (Age-4)	37,811	77,256	49,959	102,083
Tautog (Age-4)	4,476	9,931	8,699	19,307
Winter Flounder (Age-3)	13,037	20,383	25,339	39,619

Although some of the losses appear high, without knowledge of the current population size for the species above in the Taunton River it is impossible to develop an estimate of the current or projected impact of the facility on specific fish populations in the Taunton River. There are no projected population-level effects on phytoplankton, zooplankton, or benthos in the Taunton River from the intake.

Adverse impacts associated with the Somerset Station Intake include the following:

Impinged fish are washed off screens at high-pressure velocity (80 psi).

Chlorine is injected upstream from traveling screens to control biofouling. Impinged fish may be exposed to toxic concentrations of TRC.

After being impinged on the screens, chlorinated and washed off the screens at high pressure, fish are dropped several feet into the return trough that is channeled into a return sluice flowing into the river about 60 feet downstream from the intake. The potential for re-entrainment is high due to the nearness of the fish-return to the intake. Additionally, when the tide is out, it is probable that many of the fish are eaten by avian or piscine predators waiting at the discharge.

As part of Brayton Point's hydrological and biological monitoring program required by their NPDES permit, one site (Station M), located near Breeds Cove, is sampled in this segment of the Taunton River (USGenNE 2004a and 2004b). Since 1980 Otter Trawl sampling has been conducted on a monthly basis just upstream from the Braga Bridge (Station TR) along this segment by Marine Research, Inc. as part of the Brayton Point Station NDPES permit. The sampling reach is approximately 1,143 m in length. Between 1980 and 2003 the overall number of fish and number of species at this station has declined substantially (Scherer 2005a). According to USGen New England, Inc. (formerly New England Power Company), there has been a shift in Narragansett Bay's fish species assemblage from a demersal assemblage to a more pelagic one, although they report that overall number of fish (biomass) in Narragansett Bay has remained the same. Unlike Narragansett Bay, however, Mt. Hope Bay [and the lower Taunton River] has experienced this same shift and a reduction in overall abundance (USGenNE 2001).

Toxicity

Ambient

New England Bioassay, Inc. (NEB) collected water from the Taunton River approximately 50 to 100 yards south of the "Dark Area" (on-site area) down river from outfall #002 for use as dilution water in the Somerset Power whole effluent toxicity tests (Czorny 2005). Between April 1995 and April 2004, survival of *M. bahia* exposed (48 hours) to the river water was $\geq$ 95% (n=18). Between April 1995 and April 1997, survival of *M. beryllina* (n=5 test events) was also $\geq$ 95%.

The Somerset WPCF staff collected water from the Taunton River [approximately 100 feet upstream or downstream from their outfall (tide dependent)] for use as dilution water in their whole effluent toxicity tests (Garcia 2004). Between July 1999 and August 2004, survival rates of *M. beryllina* exposed (48 hrs.) to river water (n=21 test events) were all $\geq$ 90% except for one measurement [75% in the October 2000 test event (TOXTD database)].

Effluent

Acute whole effluent toxicity tests were conducted on the Somerset Power effluent (outfall #002) using *M. bahia* between April 1995 and April 2004 and using *Menidia beryllina* between April 1995 and April 1997. The effluent did not exhibit any acute toxicity (LC_{50}s were all >100% effluent).

A total of 20 valid toxicity tests (20 out of 21) were conducted on the Somerset WPCF effluent between July 1999 and August 2004 using *M. beryllina*. The LC_{50}s were all >100% so the effluent did not exhibit acute toxicity.

Chemistry water

As part of their NPDES permit renewal process, Somerset Power was required to conduct additional thermal studies to document potential impacts of the Station's cooling water discharge.

New England Bioassay Company collected water from the Taunton River approximately 50 to 100 yards south of the Dark Area (on-site area) down river from outfall #002. Data from the Somerset Power facility's whole effluent toxicity tests reports, between April 1995 and April 2004, are maintained in the TOXTD database by DWM and are summarized below.

The Somerset WPCF staff collected water from the Taunton River [approximately 100 feet upstream or downstream from their outfall (tide dependent)] for use as dilution water in their whole effluent toxicity tests (Garcia 2004). The data from the facility's whole effluent toxicity test reports between July 1999 and August 2004, maintained in the TOXTD database by DWM, are summarized below.

Mid-depth and bottom water temperatures and bottom dissolved oxygen concentrations are measured by Marine Research, Inc. using either a Hydrolab® Surveyor III or YSI 600 meter as part of their trawl sampling effort for the Brayton Point Station's biological monitoring program required by the Stations' NPDES permit (MA0003654). Their DO and temperature sampling data for the Taunton River upstream from the Braga Bridge (Station TR) are summarized below (Scherer 2005b, USGenNE 2004a and 2004b).

Dissolved oxygen

Of the 56 bottom DO measurements reported (August 1997 to December 2003) in the river near the Braga Bridge (Station TR) five were below 5.0 mg/L.

Temperature

Nearfield and farfield thermal surveys were conducted for the Somerset Power Station in the fall 2001 and winter, spring and summer 2002 (Normandeau Associates 2003). No population-level impacts were predicted. Except at slack tide, the thermal plume was not expected to increase river temperatures in more than 25% of the width of the river.

The maximum temperature reported in the river near the Braga Bridge (Station TR) was 25°C in 2002 and 23.9°C in 2003 (USGenNE 2004a and 2004b, respectively).

pH and alkalinity

The pH measurements of the Taunton River samples collected near the Dark Area between April 1995 and April 2004 ranged from 6.9 to 8.7 SU (n=18). Alkalinity ranged from 38 to 95 mg/L (n=18). The pH collected near the Somerset WPCF facility between July 1999 and August 2004 ranged from 6.9 to 7.8 SU (n=21) (TOXTD database).

Ammonia-nitrogen

The maximum ammonia-nitrogen concentration of samples collected near the Dark Area between April 1995 and April 2004 was 0.22 mg/L (n=18). The ammonia-nitrogen concentrations of the Taunton River collected near the Somerset WPCF facility between July 1999 and August 2004 ranged from <0.10 to 6.50 mg/L (n=21) (TOXTD database). Because of the lack of salinity data, no comparisons were made to a salt water ammonia criterion.

TRC

The TRC measurements (n=18) of samples collected near the Dark Area between April 1995 and April 2004 did not exceed 0.05 mg/L. The TRC concentrations collected near the Somerset WPCF facility, excluding the four results reported as <0.2 mg/L between July 1999 and August 2004, ranged between <0.02 to 0.06 mg/L (TOXTD database). Only one of the 17 TRC measurements was >0.05 mg/L.

Chemistry-tissue

Since 1993 quahogs (*Mercenaria mercenaria*) have been collected in April, July and October (sampling occasionally delayed slightly due to weather constraints) at one site (Station M) in the Taunton River located in the vicinity of Breeds Cove (downstream from the Somerset Power Station) as part of Brayton Point's NPDES permit requirements. Tissue samples were prepared and analyzed for 13 heavy metals. The mean concentrations of heavy metals in quahog tissue for this sampling location are reported in the Brayton Point Station 2003 Annual Report (USGenNE 2004b). The mean concentration of total mercury in quahog tissue collected in October/November (end of growing season) between 1993 and 2003 at Station M ranged from 0.02 to 0.24 ppm wet weight (USGenNE 2004b).

The *Aquatic Life Use* is assessed as impaired for this segment of the Taunton River due to the substantial decline in both the abundance and diversity of fish as documented by USGenNE and others. While there are a number of theories as to the cause of these reductions, the actual causes/sources are unproven. Overfishing, nonpoint source pollution/watershed development, power plant operations, climate change (warming) most likely all contribute to the current conditions with regard to fisheries.

SHELLFISH HARVESTING

The DMF Shellfish Status Report of 2003 indicates that all growing areas within this segment (MHB2.1, MHB2.3, and MHB2.4) are prohibited (Sawyer 2003).

Based on the DMF shellfish growing area status, the *Shellfish Harvesting Use* is assessed as impaired for this segment of the Taunton River because of elevated bacteria counts.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

There is a semi-public saltwater beach at Village Waterfront Park along this segment of the Taunton River in Somerset (along the western shore in the northern portion of this segment, across the river from the jetty at the Fall River/Freetown line). No bacteria, Secchi disk transparency data or posting information for this beach have been reported (MA DPH 2003).

The Town of Somerset operates a town beach, Pierce Beach, along this segment of the Taunton River. The beach is tested weekly for bacteria. In 2002 no postings were reported (MA DPH 2003). According to the Board of Health, the beach was posted twice for a total of four days in 2003 and was posted for three separate days in 2004 (Somerset BOH 2005).

There is a semi-public saltwater beach, Branton Beach along this segment in Somerset (along the western shore in the most southern portion of the segment near the Somerset WPCF). No closures have been reported for this beach (MA DPH 2003).

During wet weather the City of Fall River currently discharges stormwater/wastewater from four combined sewer outfalls to this segment of the Taunton River.

Too limited data are available (poor spatial coverage) to assess the status of the *Primary* and *Secondary Contact Recreational* uses for this segment of the Taunton River. These uses are identified with an alert status because of the CSO discharges.

Taunton River (MA62-04) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Reduced abundance and diversity of fish Source: Unknown (Suspected Sources: Cooling water intakes, industrial thermal discharges, municipal storm sewer systems, CSO, municipal point source discharges, and highway and bridge runoff.)
Fish Consumption		NOT ASSESSED
Shellfish Harvesting		IMPAIRED Cause: Fecal coliform bacteria Source: Unknown (Suspected Sources: Discharges from municipal separate storm sewer systems, CSO, septic systems, and marina/boating pumpout releases)
Primary Contact		NOT ASSESSED*
Secondary Contact		NOT ASSESSED*
Aesthetics		NOT ASSESSED*

*Alert Status issues identified, see details in use assessment

RECOMMENDATIONS

Ensure that all NPDES permits are current and in compliance. Permits should further address fisheries issues, as appropriate.

Review and implement recommendations in the DMF shellfish sanitary survey reports and the triennial reviews for growing area MHB2.1, MHB2.3, and MHB2.4.

Conduct bacteria sampling to evaluate effectiveness of point and nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

MassDEP and EPA should work with the power plants in the lower Taunton River Watershed to develop fish population estimates in order to better evaluate the impacts related to impingement and entrainment of fish, eggs, and larvae.

Somerset Power

Chlorine is added to control biofouling and is injected upstream from traveling screens in the screenwell at a rate such that the 0.1 limit will be met in the discharge. Because Unit 6 intake is only 2/3 of the discharge, fish in the screenwell will be exposed to TRC >0.1 mg/L; impinged fish may experience much higher levels. The technical advisory committee reviewing the operations at this facility should consider moving the chlorine injection point downstream of the traveling screens.

A low-pressure wash should be added ahead of the high-pressure wash so that impinged fish can be removed with little or no injury. And the fish return system needs to be altered to lessen potential injury after impingement.

Overflow runoff from the coal pile should be treated prior to discharge to the Taunton River.

The Brayton Point Station Technical Advisory Committee should improve availability/access (electronic or web site) to water quality and biological monitoring data collected from individual stations in the Taunton River as part of the Brayton Point Station's NPDES permit.

OTHER TRIBUTARIES

Other tributaries located throughout the Taunton River watershed include the following:

Winnetuxet River (Segment MA62-24)
Sawmill Brook (Segment MA62-36)
Cotley River (Segment MA62-41)
Forge River (Segment MA62-37)
Cobb Brook (Segment MA62-43)
Unnamed tributary (Segment MA62-48)
Segreganset River (Segment MA62-53)
Segreganset River (Segment MA62-54)
Segreganset River (Segment MA62-55)
Muddy Cove Brook (Segment MA62-52)
Muddy Cove Brook (Segment MA62-51)
Broad Cove (Segment MA62-50)

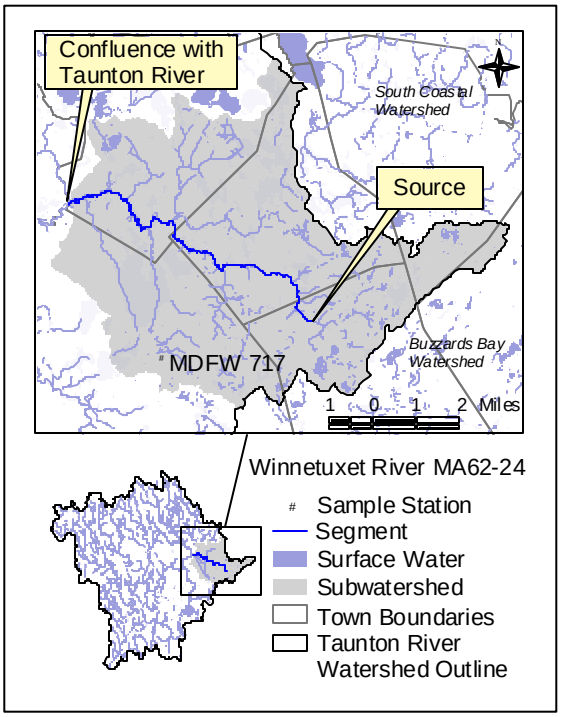
The majority of land use in these tributaries is forested, followed by residential with lesser amounts in open space and agricultural areas. The exception to this is Cobb Brook, which is highly residential and has an impervious area of 19.8%, suggesting that water quality may be impacted by impervious surface water runoff. The Forge and Cotley Rivers have impervious areas of 11.8 and 10.5%, respectively, suggesting that there may be some impacts to water quality from impervious surface water runoff. The impervious area in the other tributaries is generally less than 10% indicating there is a low potential for adverse water quality impacts from direct surface runoff. Some of the highest amounts of agricultural land in the Taunton River Watershed are found in Broad Cove, Sawmill Brook, Muddy Cove, Cotley River and Segreganset River subwatersheds.

Numerous Multi-sector General Stormwater Permits have been issued for facilities located in the watersheds of these tributaries. The communities of Carver, Plympton, Middleborough, Bridgewater, Raynham, Taunton, Dighton and Halifax are Phase II stormwater communities. Each community was issued a stormwater general permit from EPA and MassDEP in 2003/2004 and is authorized to discharge stormwater from their municipal drainage system. Over the five-year permit term, the communities will develop, implement, and enforce a stormwater management program to reduce the discharge of pollutants from the storm sewer system to protect water quality (Domizio 2004).

The *Aquatic Life Use* is assessed as impaired for two segments of these tributaries. In the Segreganset River (Segment MA 62-53) it is assessed as impaired due to low and no flow conditions that frequently occur during the summer and fall months of the year. In the unnamed tributary (Segment MA62-48) the *Aquatic Life Use* is assessed as impaired due to habitat degradation and impacts to the benthic and fish communities. Because of elevated fecal coliform concentrations in the Segreganset River, Muddy Cove and Broad Cove, DMF has classified these shellfish growing areas as prohibited and thus the shellfish use is assessed as impaired. Due to the fact that there was either too limited data or the data were not quality-assured, the majority of the other designated uses in these tributaries are not assessed.

WINNETUXET RIVER (SEGMENT MA62-24)

Location: From the outlet of a small, unnamed pond near Cole Mill in Carver to the confluence with the Taunton River in Halifax.
Segment Length: 11.8 miles
Classification: Class B



The drainage area of this segment is approximately 40.7 square miles. Land-use estimates (top three) for the subwatershed:

Forest 54.1%
Open land..... 13.9%
Residential..... 13.7%

The impervious cover area for this subwatershed is less than 10%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

The use assessments for Muddy Pond (MA62233), Johns Pond (MA62096), North Center Street Pond (MA62132), Cooper Pond (MA62046), Muddy Pond (MA62125), Fuller Street Pond (MA62234), and Savery Pond (MA62167) are in the Lake Assessment section of this report.

WMA WATER WITHDRAWAL SUMMARY (APPENDIX G, TABLE G5)

There are 2,224 acres of land which are classified in the Land-Use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 19.86 MGD.

Facility	WMA Permit Number	WMA Registration Number	Source (G = ground)	Authorized Withdrawal (MGD)
Country Club Halifax	NA	42511803	Well #1 Irrigation pond	0.23
Halifax Water Department	9P42511801	42511801	4118000-01G 4118000-02G 4118000-03G	0.35 reg 0.33 perm Total – 0.68
Middleborough Water Supply*	9P42518201	42518203	4182000-08G	1.53 reg 1.50 perm Total – 3.03

* Indicates system-wide withdrawal

NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G3)

The Richmond Park Water Treatment Plant, located off Plymouth Street in Halifax, was issued an NPDES permit (#MAG640008) in July 2002 to discharge treated filter backwash water into Turkey Swamp. This wetland area is adjacent to Palmer Mill Brook that flows into the Winnetuxet River. This permit is due to expire in November 2005.

USE ASSESSMENT

AQUATIC LIFE

Habitat and Flow

A shoreline survey along the Winnetuxet River documented that the banks are thickly vegetated and wildlife is abundant. A stand of loosestrife was observed near the Plympton/Halifax line. One section of the Winnetuxet River has been designated a Core Habitat site by the MDFW's Massachusetts Natural Heritage & Rare Endangered Species & Wildlife Program (Winnetuxet River Stream Team 2003).

Biology

MDFW conducted fish population sampling at one tributary to this segment in August 2002. Samples were collected from one station along Raven Brook, near Plympton Street, Middleborough (Station 717) using a backpack shocker. Three brook trout (multiple age classes) were collected (Richards 2003a). As a result of these findings, MDFW has proposed that Raven Brook be listed in the next revision of the SWQS as a cold water fishery.

Chemistry – water

The Bridgewater State WAL collected water quality samples in Raven Brook which is a tributary to the Winnetuxet River (Curry 2005). Between June and September 2004, Raven Brook was sampled six times near Wood Street, Halifax using automatic samplers to collect temperature, pH and DO data through a 22-hour period. Additionally, nutrient samples (total phosphorus, soluble reactive phosphorus and nitrate-nitrogen) were taken every hour using a Sigma 900 automated sampler with samples for every other hour used for analysis. WAL found consistently low levels of DO as well as low pH levels. Very low levels of nutrients were also consistently measured. A QAPP for the WAL has not been approved by MassDEP so their data are not quality-assured.

Too limited data are available, so the *Aquatic Life Use* for the Winnetuxet River is not assessed.

PRIMARY CONTACT AND SECONDARY CONTACT RECREATION AND AESTHETICS

The Winnetuxet River Shoreline Survey Report (2003) noted that although the river water was dark in color, it appeared to be free from major pollution. There were no strong odors, nor did the water surface exhibit any sheens or foamy conditions. Areas of litter, particularly near bridges, were noted in the upstream portions of the river.

The *Primary* and *Secondary Contact Recreational* uses are not assessed. The *Aesthetics Use* is assessed as support since with the exception of isolated areas of trash and debris near bridges, no other objectionable aesthetic conditions were identified in the Winnetuxet River.

Winnetuxet River (MA62-24) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		SUPPORT

RECOMMENDATIONS

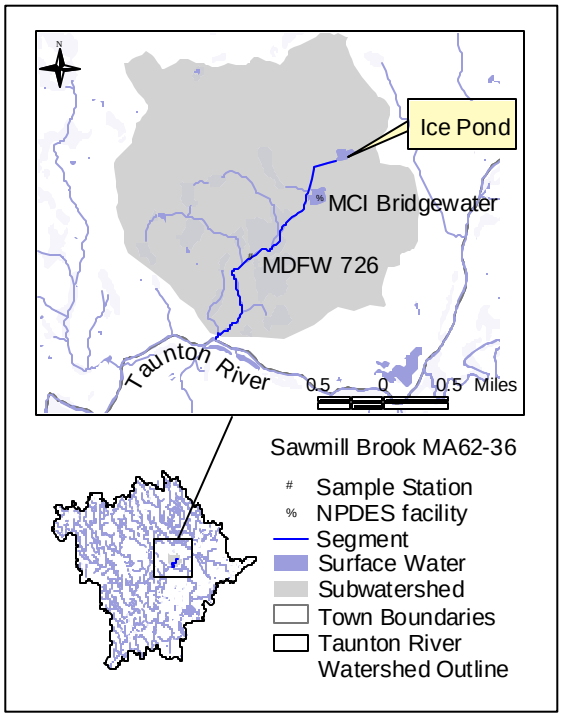
The Winnetuxet River Stream Team should continue in its efforts to preserve the Winnetuxet River. Recommendations identified in the Winnetuxet River Shoreline Survey and Action Plan should be reviewed and implemented, as appropriate.

Water quality monitoring (e.g., in-site monitoring and benthic macroinvertebrate sampling) should be conducted to bracket potential sources of pollution and to evaluate the status of the *Aquatic Life Use*.

MDFW has proposed that Raven Brook, a tributary to the Winnetuxet River, be protected as cold water fishery habitat. Additional monitoring of the fish population, dissolved oxygen, and temperature is needed to evaluate MDFW's proposal to list this stream as a cold water fishery in the next revision of the Surface Water Quality Standards.

SAWMILL BROOK (SEGMENT MA62-36)

Location: Outlet of Ice Pond, Bridgewater to confluence with Taunton River, Bridgewater.
Segment Length: 1.9 miles
Classification: Class B, Warm Water Fishery



The drainage area of this segment is approximately 3.9 square miles. Land-use estimates (top three) for the subwatershed:

Forest 45.9%
Residential..... 20.1%
Agriculture 16.6%

The impervious cover area for this subwatershed is less than 10%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G2)

There are no WMA regulated water withdrawals in this subwatershed.

The MCI Bridgewater Water Pollution Control Facility (WPCF) is authorized (MA0102237 issued in September 1998) to discharge a flow of 0.55 MGD (average monthly) of treated sanitary wastewater via Outfall #001 to the Sawmill Brook. This advanced extended activated sludge treatment facility treats municipal wastewater from the prison. Nitrification is performed for ammonia-nitrogen reduction (2 mg/l NH_3-N average monthly May 1 to October 31). The NH_3-N concentrations of the effluent between January 1999 and July 2004 were all <0.1 mg/L (n=22) (TOXTD database). This facility incorporates effluent sand filtration by physical means. The facility utilizes sodium hypochlorite for disinfection and sodium bisulfite for dechlorination (TRC limit = 0.014 mg/L average monthly, 0.024 mg/L maximum daily). The TRC measurements of the effluent between January 1999 and July 2004 were all <0.03 mg/L (n=19) (TOXTD database). The facility's whole effluent toxicity limits are LC_{50}≥100% and C-NOEC ≥81% with a monitoring frequency of four times/year using *Ceriodaphnia dubia*.

USE ASSESSMENT

AQUATIC LIFE

Biology

MDFW conducted fish population sampling at one location along this segment, north of Route 28 and Route 18, Bridgewater (Station 726) using a backpack shocker in August 2002. A total of 18 fish, representing six species were collected. The sample was dominated by American eel and redfin pickerel while an individual each of tessellated darter, pumpkinseed, largemouth bass, and bluegill were collected (Richards 2003a). With the exception of one tessellated darter, the fish community was comprised of macrohabitat generalists. Both redfin pickerel and American eel (two most dominant species) are common in slow-moving wetland dominated streams. Bluegill, largemouth bass and pumpkinseed may have originated in the impoundment (Ice Pond) at the upstream end of this segment.

Toxicity

Ambient

The MCI Bridgewater staff collected water from Sawmill Brook approximately 20-25 feet upstream from Outfall #001 for use as dilution water in their whole effluent toxicity tests (Dubois 2004). Between January 1999 and July 2004, survival of *Ceriodaphnia dubia* exposed (7-day) to river water (n=23 test events) was 100% (TOXTD database).

Effluent
A total of 23 modified acute and chronic whole effluent toxicity tests using *Ceriodaphnia dubia* were conducted on the MCI Bridgewater effluent between January 1999 and July 2004. The effluent did not exhibit any acute toxicity (LC_{50}'s were all >100% effluent) and the C-NOEC results ranged from 81 to 100% effluent.

Chemistry water
The MCI Bridgewater staff collected ambient water from the Sawmill Brook, approximately 20-25 feet upstream for Outfall #001, for use as dilution water in the whole effluent toxicity tests between January 1999 and July 2004 (Dubois 2004). Data from these reports, which are maintained by DWM in the TOXTD database, are summarized below.

Ammonia-nitrogen
The ammonia-nitrogen concentrations were all below the reported detection limits (0.03 or 0.1 mg/L) (n=22). All of these measurements were below the conservative criterion of 1.09 mg/L NH_3-N (chronic instream criterion for ammonia at pH of 8.0 SU and temperature of 30°C) (EPA 1999a).

TRC
TRC measurements were all below the minimum quantification level of 0.05 mg/L (n=19).

Hardness
Hardness ranged from 35 to 52 mg/l (n=18).

Specific conductance
Specific conductance ranged from 220 to 470 µmhos/cm (n=18).

The water quality data available for Sawmill Brook, upstream from the MCI Bridgewater discharge, does not indicate any water quality degradation. However, too limited data are available for the brook downstream from the discharge, so the *Aquatic Life Use* is not assessed.

Sawmill Brook (MA62-36) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

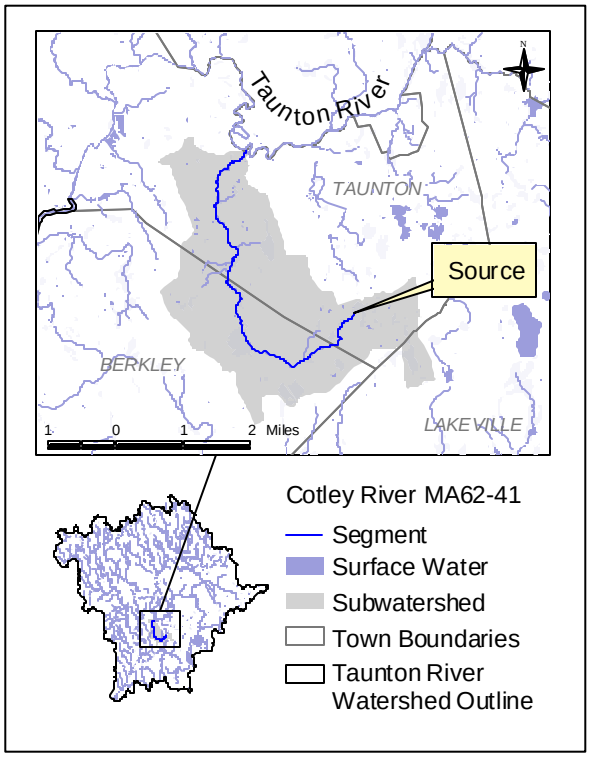
RECOMMENDATIONS
Conduct monitoring (biological, habitat and water quality) to evaluate the status of the *Aquatic Life Use* in Sawmill Brook bracketing potential sources of pollution (e.g., discharge, cranberry bogs, developments).

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

Continue to monitor compliance of the MCI Bridgewater WPCF effluent with their permit limits and other special conditions of the permit.

COTLEY RIVER (SEGMENT MA62-41)

Location: Headwaters near cranberry bog south off Seekell Street, Taunton (thru Barstows Pond) to the confluence with the Taunton River, Taunton
Segment Length: 5.9 miles
Classification: B



The drainage area of this segment is approximately 7.6 square miles. Land-use estimates (top three) for the subwatershed:

Forest 59.0%
Residential..... 15.7%
Agriculture 7.5%

The impervious cover area for this subwatershed is 10.5%.

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY

There are 83 acres of land which are classified in the Land-Use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 0.74 MGD.

Based on available information there are no NPDES dischargers in this subwatershed.

USE ASSESSMENT

Sampling of the Cotley River (DO, temperature, pH, TSS, nitrate-nitrogen, total phosphorus, and bacteria) is conducted on a monthly basis by TRWA near Middleborough Avenue, Taunton (Station COT-004). The TRWA reported that DO at the Cotley River sample site was below 5.0 mg/L in September 2002 (Domingos 2003a). Although a draft Quality Assurance Project Plan (QAPP) was reviewed in 2001, a final QAPP for the TRWA has not been approved and their data are not quality-assured.

The Bridgewater State WAL collected water quality samples in the Cotley River near Middleboro Avenue, Taunton once a month in June, July and August 2004 (Curry 2004). Grab samples were collected for nutrients (total phosphorus, soluble reactive phosphorus and nitrate-nitrogen). A Hydrolab® minisonde was used to obtain instantaneous measurement of pH, dissolved oxygen, temperature and specific conductance. The WAL indicated that water quality standards were generally met for pH, DO and temperature. A QAPP for the WAL has not been approved by MassDEP and their data are not quality-assured.

Since the available data on the Cotley River is not quality-assured, the designated uses for the Cotley River are not assessed.

Cotley River (MA62-41) Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS

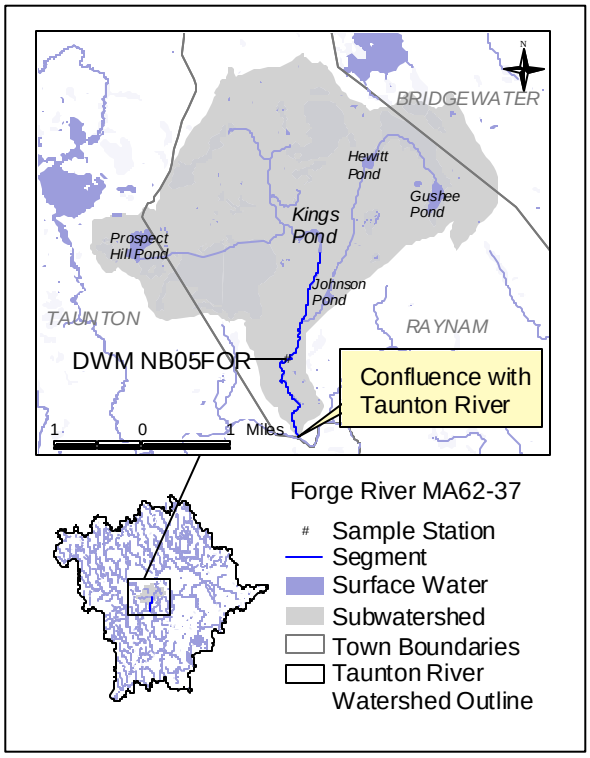
Conduct monitoring (biological, habitat and water quality) to evaluate the status of the *Aquatic Life Use* in the Cotley River bracketing potential sources of pollution (e.g., cranberry bog operations, developments).

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

The TRWA and WAL should continue to conduct water quality monitoring at their established sampling sites on the Cotley River to meet their sampling objectives. In order for the MassDEP to utilize the TRWA and WAL data for water quality assessment reporting purposes, the TRWA and WAL should work with MassDEP to meet its Quality Assurance /Quality Control requirements.

FORGE RIVER (SEGMENT MA62-37)

Location: Outlet of Kings Pond, Raynham to confluence with Taunton River, Raynham.
Segment Length: 2.5 miles
Classification: Class B



The drainage area of this segment is approximately 9.3 square miles. Land-use estimates (top three) for the subwatershed:

Forest 43.7%
Residential..... 22.8%
Open land..... 7.7%

The impervious cover area for this subwatershed is 11.8%.

This segment is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

The use assessments for Hewitt Pond (MA62088), Gushee Pond (MA62084), Johnson Pond (MA62097), Prospect Hill Pond (MA62149), and Kings Pond (MA62101) are in the Lake Assessment section of this report.

WMA WATER WITHDRAWAL SUMMARY (APPENDIX G, TABLE G5) AND NPDES WASTEWATER DISCHARGE SUMMARY

There are 6 acres of land which are classified in the Land-Use theme as cranberry bog in this subwatershed (UMass Amherst 1999). For the purpose of this report, a conservative estimate of water use for this bog area is 0.05 MGD.

Facility	WMA Permit Number	WMA Registration Number	Source (G = ground)	Authorized Withdrawal (MGD)
Raynham Center Water District*	9P42524501	42524502	4245000-01G 4245000-07G 4245000-09G	0.40 reg 0.42 perm Total – 0.82
North Raynham Water District	9P442524502	42524501	4245002-01G 4245002-03G 4245002-04G 4245002-05G 4245002-06G	0.32 reg 0.0 perm Total – 0.32

* Indicates system-wide withdrawal

Based on the available information there are no NPDES discharges in this subwatershed.

USE ASSESSMENT

AQUATIC LIFE

As part of the Biocriteria Development Project DWM conducted a habitat assessment, benthic macroinvertebrate and fish population sampling of the Forge River near South Main Street (Route 104), Raynham (Station NB05FOR) in September/October 1996 (MassDEP 1996b and Appendix I). *In-situ* measurements (DO, % saturation, pH, temperature and conductivity) were also recorded (Appendix B).

Habitat and Flow

The total habitat assessment score for the Forge River near South Main Street (Route 104), Raynham (Station NB05FOR) in September/October 1996 was 136/200. Habitat was limited by embeddedness, sediment deposition, and riparian zone/bank stability (MassDEP 1996b).

Biology

DWM and Fugro East, Inc. biologists conducted fish population sampling (7 October 1996) on the Forge River near South Main Street (Route 104-Station NB05FOR), Raynham as part of the Biocriteria Development Project. Six species were collected including, American eel (*Anguilla rostrata*) and tessellated darter (*Etheostoma olmstedi*), pumpkinseed, bluegill, fallfish and one brook trout (MassDEP 1996b). A replicate reach was also sampled downstream from Route 104. Two additional species, an individual each of white sucker and largemouth bass, were captured. Although overall numbers were low, communities were similar at both sampling locations. Approximately 50% of the fish collected were fluvial specialists/dependants, mostly fallfish and tessellated darter. An individual brook trout and one white sucker make up the remainder of this group.

No recent data are available so the *Aquatic Life Use* is currently not assessed.

AESTHETICS

The Forge River Stream Team surveyed the lower section of the Forge River (downstream from the confluence of the unnamed tributary downstream from Johnson's Pond) near Raynham center (Forge River Stream Team 2003). The river was described as being tea-colored. With the exception of trash and debris (shopping carts, tires and bottles) and a colorful slick (undetermined as to whether it was natural or petroleum based), no other objectionable conditions (odors, turbidity) were noted.

No aesthetic quality degradation (odors, turbidity, oil, grease, etc.) was identified by DWM biologists in the Forge River near South Main Street (Route 104-Station NB05FOR) in September/October 1996 (MassDEP 1996b).

Too limited data are available so the *Aesthetics Use* is not assessed. It is identified with an Alert Status because of the trash and debris noted by the Forge River Stream Team.

Forge River (MA62-37) Use Summary Table

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

*"Alert Status" issues identified, see details in the use assessment section.

RECOMMENDATIONS

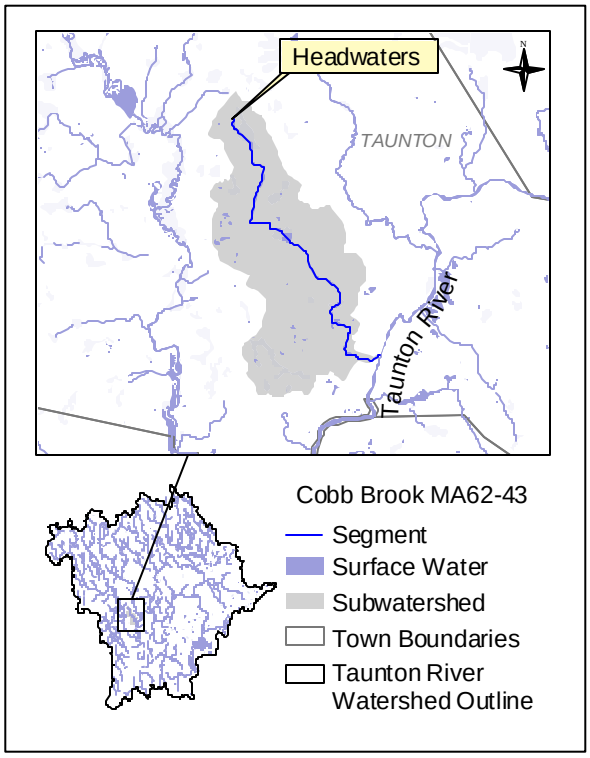
Conduct additional monitoring (biological, habitat and water quality) to evaluate the status of the *Aquatic Life Use* in the Forge River bracketing potential sources of pollution.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

The Forge River Stream Team should continue in its efforts to assess the condition of the Forge River. Recommendations identified in the Forge River Shoreline Survey Report and Action Plan should be reviewed and implemented, as appropriate.

COBB BROOK (SEGMENT MA62-43)

Location: Headwaters south of Dunbar Street (in Crapo Bog), Taunton to confluence with the Taunton River, Taunton.
Segment Length: 3.5 miles
Classification: B



The drainage area of this segment is approximately 2.5 square miles. Land-use estimates (top three) for the subwatershed:

Residential..... 61.3%
Forest 24.8%
Open land..... 7.5%

The impervious cover area for this subwatershed is 19.8%.

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY

Based on available information there are no WMA regulated withdrawals and NPDES dischargers in this subwatershed.

USE ASSESSMENT

Sampling of Cobb Brook (DO, temperature, pH, TSS, nitrate-nitrogen, total phosphorus, and bacteria) is conducted on a monthly basis by TRWA near General Cobb Street, Taunton (Station COB-013) and near West Water Street, Taunton (Station COB-000). The TRWA reported high phosphorus and fecal coliform levels at their sampling station near General Cobb Street, Taunton (COB-013) in May 2002. The TRWA found that high coliform counts occurred at this station and at Station COB-000 intermittently throughout 2002 (Domingos 2003a). Although a draft Quality Assurance Project Plan (QAPP) was reviewed in 2001, a final QAPP for the TRWA has not been approved and their data are not quality-assured. Therefore, the designated uses for Cobb Brook are not assessed.

Cobb Brook (MA62-43) Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS

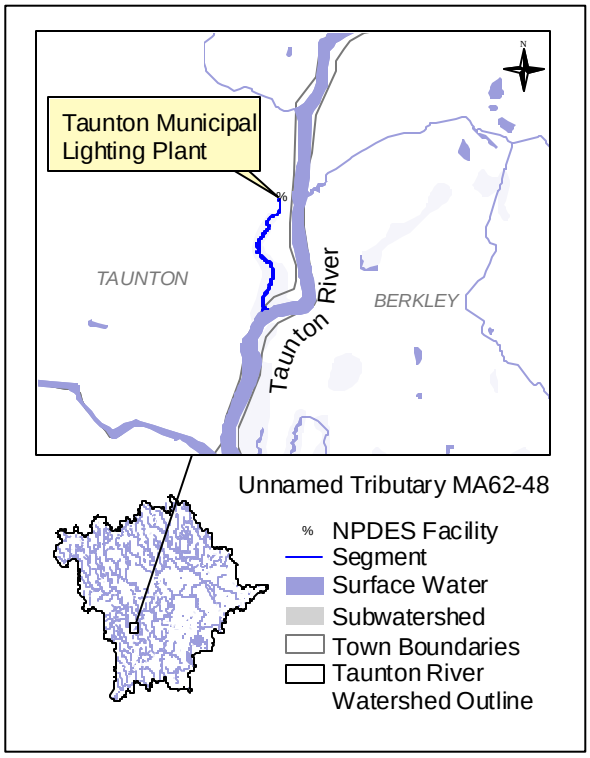
Conduct monitoring (biological, habitat and water quality) to evaluate the status of the *Aquatic Life Use* in Cobb Brook bracketing potential sources of pollution (e.g., development).

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

The TRWA should continue to conduct water quality monitoring at its established sampling site on Cobb Brook to meet its sampling objectives. In order for the MassDEP to utilize the TRWA data for water quality assessment reporting purposes, the TRWA should work with MassDEP to meet its Quality Assurance /Quality Control requirements.

UNNAMED TRIBUTARY (SEGMENT MA62-48)

Location: Channel from Taunton Municipal Lighting Plant, Taunton to confluence with Taunton River, Taunton.
Segment Size: 0.002 square miles
Classification: Class SA (Proposed SB)



Based on information from a 1963 U.S. Geological Survey map of the area, this channel was originally a wetland; i.e., no channel or stream was apparently present prior to the Taunton Municipal Lighting Plant (TMLP) facility being built. Thus, the channel was either dug or formed from the force of the discharge. The channel is now considered to be a "tidal creek".

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G2)

Based on the available information there are no WMA withdrawals in this segment.

The Taunton Municipal Lighting Plant (TMLP) is a municipally owned 135 MW steam electric power generating facility. The TMLP Cleary-Flood Station has two generating units (8 and 9). Water is withdrawn directly from the Taunton River (approximately 38.1 MGD instantaneous maximum flow rate) at an intake structure adjacent to the main power generation building for use as cooling water. Unit 8, completed in 1966, employs a once-through cooling water system which can generate approximately 25 MW. Typically, when in operation, the unit is online for approximately 11 hours/generation event during peak demand periods (summer and winter). Unit 9, which began operation in 1975, is a combined cycle system, which can generate a total of 110 MW. Typically, when in operation, the unit is online for approximately 13 hours/generation event during peak demand periods (summer and winter). The facility is authorized (NPDES permit# MA0002241 issued September 1994, but in December 1994 the EPA reinstated the conditions of the April 1988 permit) to discharge via the following outfalls (upstream to downstream) into this tidal creek, which runs adjacent to the Taunton River for approximately 2000' prior to flowing into the Taunton River:

- Outfall #001 –39.5 MGD maximum daily of once through condenser cooling water (90°F daily maximum) from Unit 8 which is chlorinated daily (2 hours/day when operating) with sodium hypochlorite (TRC limit 0.02 mg/L).
- Outfall #002 –0.45 MGD maximum daily (0.260 MGD average monthly) of boiler blowdown, gland seal leakoff, neutralized demineralizer regeneration wastewater, and carbon filter backwash from both Unit 8 and 9, and auxiliary equipment (90°F daily maximum).

Stormwater is also discharged via several outfalls with monitoring requirements of two times/year for pH & oil and grease.

A draft permit is expected to be developed in 2005.

USE ASSESSMENT

AQUATIC LIFE

As part of their NPDES permit renewal process, TMLP was required to conduct additional biological and water quality studies to fulfill requirements of Section 316(a) and (b) of the Clean Water Act (Murphy 2001 and EarthTech 2002). The investigation was developed to address the following three items: thermal effects from the Unit 8 discharge on the aquatic flora and fauna that would be expected to exist in the channel in the absence of the discharge, representative intertidal areas upstream and downstream from the mouth of the channel in order to assess the extent to which the biotic community within the channel has changed, and possible modification to the TMLPs intake structure fish return system (EarthTech and

Marine Research 2004). These studies were initiated in June 2002 and were completed in July 2003. A technical review of these investigations by MassDEP DWM staff is summarized below.

Habitat and Flow

The physical characteristics of the tidal creek to which the effluent is discharged were compared to two other tidal creeks in the area. Basic findings of the report (EarthTech and Marine Research 2004) are as follows: 1) flow rate in the tidal creek receiving the discharge is about 217 times greater than natural flow without the discharge; 2) scouring of benthic substrates, erosion of channel banks, deepening of channel were evident and silt and sand were probably scoured from the area - coarse sand predominated when the survey was conducted. By comparison benthic substrates of neighboring creeks had a much greater component of mud and silt. Dilution of the effluent was negligible when Unit 8 was discharging. Most fish appeared to be pushed out of the tidal creek when the discharge was in operation.

Biology

Flora and fauna of the segment were compared to two other tidal creeks in the area. Diversity and evenness of benthic samples from the discharge channel were about half that found in each of two reference creeks but the number of organisms/square meter was 1.5 to 2x greater in the discharge channel when compared to the reference creeks. This was primarily due to the fact that the oligochaete population in the channel was about 2-3x that of the reference creeks. The species of oligochaetes found were not identified to species level.

Benthic differences were more pronounced in June and less as pronounced in September. Two fish, American eel and naked gobie were found in reference creek "baskets" that were put in place to sample fish. No fish were found in the discharge channel baskets. The total number of banded killifish counted in the reference creeks over all survey dates was 3600; the total in the test creek (discharge creek) was 97 although 33% more collections were made in the test creek. Fish collections in the discharge channel were made before (n=54 events), during (n=9 events) and after (n=34 events) a thermal discharge took place. Current velocity was cited as probable cause of impact, although chlorine effects were not evaluated.

White perch were much more abundant in reference creeks than in the test creek. Low numbers of perch were thought to be caused by increased velocity and heat. Discharge temperatures exceeded lethal levels in some cases.

During discharge events the number of bluegills found in the discharge creek was much lower than those found in reference creeks. Effects were thought to be caused by increased velocity and heat. In addition, during discharge events the number of largemouth bass in the discharge creek was about one-third to one-quarter the population size when the discharge was not in operation. Effects were thought to be due to velocity and heat.

Yellow perch were found in small numbers at all sites. However, when found, they were typically present in higher numbers in the reference creeks.

Threespine sticklebacks were found in high numbers in one reference creek but in low numbers in the other reference creek and the discharge channel. Temperatures in the discharge channel during August and September, 2002 exceeded lethal levels for sticklebacks, so mortality would have been expected during discharge events in those months.

Hogchokers were found in high numbers (about 36 individuals) in one of the reference creeks during one sampling period, but were typically absent at other times and absent from the other reference creek. They were especially absent from the discharge creek. Temperatures in the discharge at times exceeded lethal levels recorded for this fish.

Chemistry - water

Temperatures in the discharge creek were essentially the same as the discharge when it was in operation. Potential for thermally-induced acute or chronic toxicity to fish in the creek exists.

Whether or not TRC concentrations in the TMLP discharge would cause exceedences of acute and/or chronic water quality criteria are not known at this time.

The *Aquatic Life Use* is assessed as impaired for this unnamed tributary to the Taunton River as a result of habitat degradation/alteration, elevated temperatures, and adverse impacts to the benthic and fish communities. The source of the impairment is the result of the discharge and operation of the TMLP.

Unnamed tributary (MA62-48) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Habitat, biota alterations, anthropogenic substrate and flow regime alterations, physical substrate alterations and temperature (Suspected Cause: Chlorine) Source: Channel erosion/incision from upstream hydromodification, impacts from hydrostructure flow regulation/modification and industrial thermal discharge
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

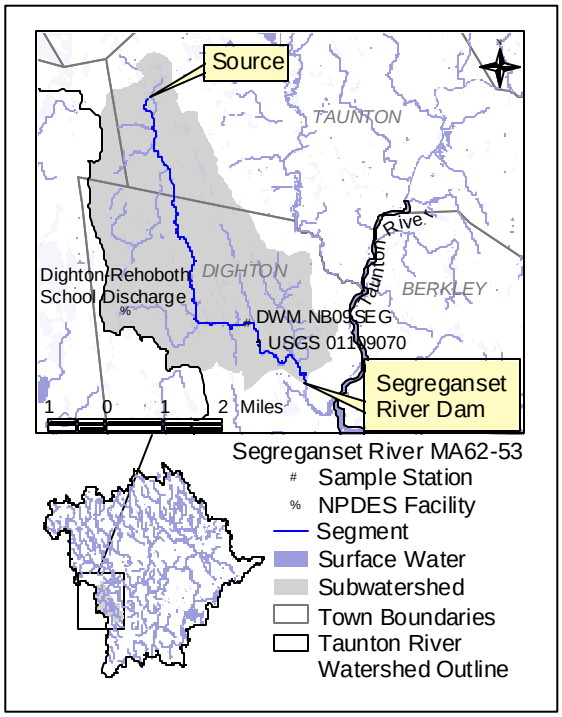
Given the impacts documented to this tidal creek, the possibility of replacing the once-through cooling water discharge with a closed-loop system (i.e., cooling tower) should be evaluated. Off-site mitigation of impacts should be required if the once-through cooling water discharge is not eliminated. In the interim the NPDES permit for TMLP should be reissued with appropriate limits and monitoring requirements. The permit should include the following requirements:

Reduce volume and annual thermal load to this waterbody.
Dechlorination or alternative biofouling controls should be implemented.
Instream monitoring for temperature, biological, and habitat quality should be required.
The actual need to operate this facility should be documented.

An investigation of the fish community should be conducted regarding any impacts related to the cooling water intake and discharge. This should include recommendations for mitigation including an evaluation of fish exclusion barriers.

SEGREGANSET RIVER (SEGMENT MA62-53)

Location: Source in wetland north of Glebe Street, Taunton through the Segreganset River Ponds to the Segreganset River Dam, Dighton.
Segment Length: 7.9 miles
Classification: Proposed Class A
(This segment was formerly part of segment MA62-18)



The drainage area of this segment is approximately 13.5 square miles. Land-use estimates (top three) for the subwatershed:

Forest 72.3%
Residential..... 13.8%
Agriculture 6.2%

The impervious cover area for this subwatershed is less than 10%.

Segment MA62-18 is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

The use assessment for Segreganset River Pond (MA62169) is in the Lake Assessment section of this report.

A USGS gaging station (01109070) on the Segreganset River in Dighton, MA, has been in operation since July 1966. The drainage area at the gage is 10.6 square miles. The USGS remarks for this gage note occasional regulation by ponds upstream and diversion upstream for Dighton Water District. The average mean flow at this gage over the period of record (1966 to present) is 22 cfs (Socolow *et al.* 2003).

WMA WATER WITHDRAWAL SUMMARY (APPENDIX G, TABLE G5)

Facility	WMA Permit Number	WMA Registration Number	Source (G = ground)	Authorized Withdrawal (MGD)
Dighton Water District	NA	42507601	4076000-04G 4076000-05G	0.37 reg
Somerset Water Department*	9P42527301	42527301	4273000-02S	2.81 reg 1.61 perm Total – 4.42
Segreganset Country Club	9P42529303	NA	Unknown	0.12 perm

* Indicates system-wide withdrawal

NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G3)

The Dighton-Rehoboth Regional School District is authorized to discharge 0.01 MGD of treated wastewater via Outfall # 001 to an unnamed tributary to this segment of the Segreganset River (NPDES permit # MA0022586 issued October 1987). A new permit is being developed for this facility.

USE ASSESSMENT

AQUATIC LIFE

As part of the Biocriteria Development Project, DWM conducted a habitat assessment and benthic macroinvertebrate sampling of the Segreganset River near Briggs Street, Dighton (Station NB09SEG) in October 1996 (MassDEP 1996b and Appendix I).

Habitat and Flow

The total habitat assessment score for the Segreganset River near Briggs Street, Dighton (Station NB09SEG) in October 1996 was 148/200. Habitat was limited most by limited epifaunal substrate and fish cover, limited velocity/depth combinations (all considered only marginal), sediment deposition, and riparian zone/bank stability (MassDEP 1996b).

No flow (0.0 cfs) was reported by USGS at their gage on the Segreganset River between 8 July and 15 September in 1999 (a drought year) and 23 to 29 July and 1 August to 16 September in 2002 (Socolow et al. 2000 and 2003).

The *Aquatic Life Use* is assessed as impaired in this segment of the Segreganset River because of the low and no flow conditions that frequently occur during the summer and fall months of the year.

Segreganset River (MA62-53) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Low flow alterations Sources: Flow alterations from water diversions and impacts from hydrostructure flow regulation/modification
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

Conduct monitoring (biological, habitat and water quality) to evaluate impacts to the Segreganset River from potential sources of pollution (e.g., golf course, developments, water withdrawals), document impairments caused by low flow conditions, and to better assess the status of the *Aquatic Life Use*.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

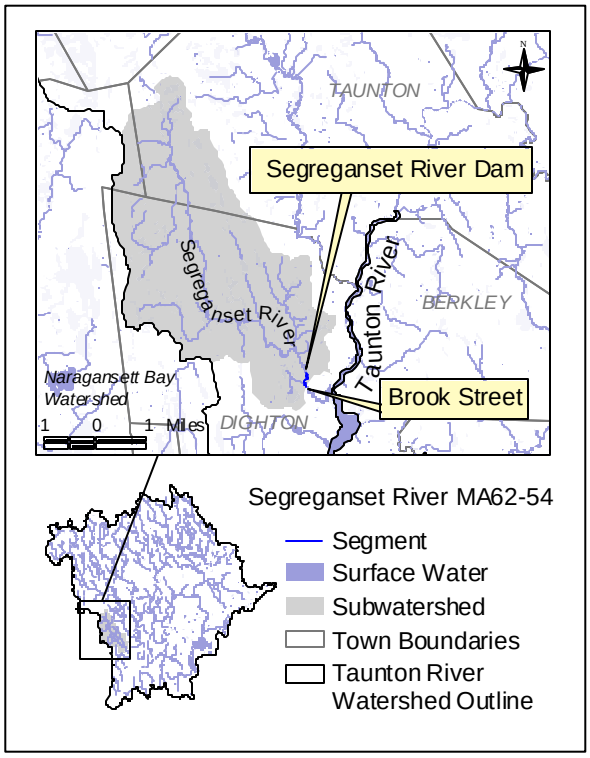
Continue to monitor compliance with WMA registration/permit limits and other special conditions of the permits.

Consideration should be given to developing a water budget and safe yield determination for the Segreganset River.

Dams on the Segreganset River should be evaluated for the potential for their removal.

SEGREGANSET RIVER (SEGMENT MA62-54)

Location: From Segreganset River Dam, Dighton to approximately 250 feet north of Brook Street, Dighton.
Segment Length: 0.4 miles
Classification: Class B
(This segment was formerly part of Segment MA62-18)



The drainage area of this segment is approximately 14.3 square miles. Land-use estimates (top three) for the subwatershed:

Forest 71.5%
Residential..... 13.6%
Agriculture 6.4%

The impervious cover area for this subwatershed is less than 10%.

Segment MA62-18 is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY

Based on available information there are no WMA regulated withdrawals or NPDES discharges along this segment of the Segreganset River.

USE ASSESSMENT

AQUATIC LIFE

Habitat and Flow

No flow (0.0 cfs) was reported by USGS at their gage on the Segreganset River between 8 July and 15 September 1999 and 23 to 29 July and 1 August to 16 September 2002 (Socolow et al. 2000 and 2003). Furthermore, water can be taken from the Segreganset River at the Somerset Water Department's intake near the Segreganset River Dam.

The *Aquatic Life Use* is assessed as impaired in this segment of the Segreganset River because of the low and no flow conditions that frequently occur during the summer and fall months of the year.

Segreganset River (MA62-54) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Low flow alterations Sources: Flow alterations from water diversions and impacts from hydrostructure flow regulation/modification
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

Conduct monitoring (biological, habitat and water quality) to evaluate impacts to the Segreganset River from potential sources of pollution (e.g., golf course, developments, water withdrawals), document impairments caused by low flow conditions, and better assess the status of the *Aquatic Life Use*.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

Continue to monitor compliance with WMA registration/permit limits and other special conditions of the permits.

SEGREGANSET RIVER (SEGMENT MA62-55)

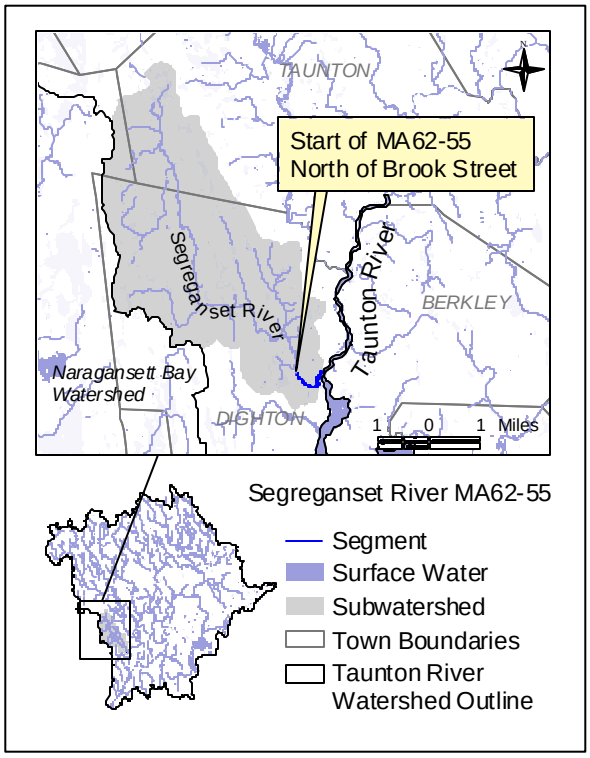
Location: From approximately 250 feet north of Brook Street, Dighton to confluence with the Taunton River, Dighton.
Segment Length: 0.02 square miles
Classification: Class SA (proposed SB, Shellfishing Restricted)
(This segment was formerly part of Segment MA62-18)

The drainage area of this segment is approximately 14.8 square miles. Land-use estimates (top three) for the subwatershed:

Forest 70.3%
Residential..... 13.9%
Agriculture 6.8%

The impervious cover area for this subwatershed is less than 10%.

Segment MA62-18 is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).



WMA WATER WITHDRAWAL AND NPDES WASTEWATER DISCHARGE SUMMARY

Based on available information there are no WMA regulated withdrawals or NPDES discharges along this segment of the Segreganset River.

USE ASSESSMENT

SHELLFISHING

The DMF Shellfish Status Report of 2003 indicates that area MHB2.2 is prohibited (Sawyer 2003).

Based on the DMF shellfish growing area status, the *Shellfish Harvesting Use* is assessed as impaired for this segment of the Segreganset River because of elevated bacteria counts.

Segreganset River (MA62-55) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		NOT ASSESSED
Shellfish Harvesting		IMPAIRED Cause: Fecal coliform bacteria Source: Unknown (Suspected Source: Discharges from municipal separate storm sewer systems)
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

Review and implement recommendations in the DMF shellfish sanitary survey reports and the triennial reviews for growing area MHB2.2.

Conduct monitoring (biological, habitat and water quality) to evaluate impacts to the Segreganset River from potential sources of pollution (e.g., developments) and to better assess the status of the *Aquatic Life Use*.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

MUDDY COVE BROOK (SEGMENT MA62-52)

Location: Source south of Hart Street, Dighton through Muddy Cove Brook Pond to outlet of small impoundment behind 333 Main Street (Zeneca, Inc.), Dighton.
Segment Length: 2.0 miles
Classification: Class B
(Formerly part of Segment MA62-23.)

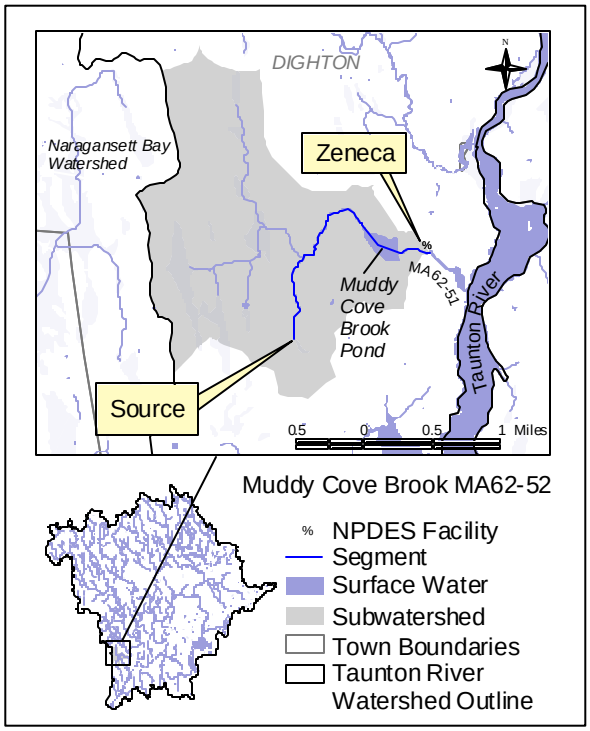
The drainage area of this segment is approximately 2.9 square miles. Land-use estimates (top three) for the subwatershed:

Forest 71.8%
Agriculture 12.8%
Residential..... 7.1%

The impervious cover area for this subwatershed is less than 10%.

Segment MA62-23 is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

The use assessment for Muddy Cove Brook Pond (MA62124) is in the Lake Assessment section of this report.



WMA WATER WITHDRAWAL SUMMARY (APPENDIX G, TABLE G5)

Facility	WMA Permit Number	WMA Registration Number	Source (G = ground)	Authorized Withdrawal (MGD)
Somerset Water Department*	9P42527301	42527301	4273000-05G	2.81 reg 1.61 perm Total – 4.42
Zeneca Inc.	NA	42507603	01G 01S	1.19 reg

* Indicates system-wide withdrawal

NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLE G2)

Zeneca, Inc. (formerly ICI Americas, Inc.) used to discharge non-contact cooling water, stormwater runoff, and/or steam condensate via several outfalls to this segment of Muddy Cove Brook (NPDES MA0005291). The facility was engaged in the manufacturing of textile dyestuffs and other organic chemicals. Manufacturing operations ceased in 1995. The discharges from the outfalls along this segment of Muddy Cove Brook have been eliminated with the exception of stormwater runoff (Zeneca 2000). EPA terminated the individual wastewater NPDES permit in November 2003. The need for the facility to apply for coverage for stormwater discharges to this segment of Muddy Cove Brook needs to be determined.

USE ASSESSMENT

AQUATIC LIFE

Toxicity

Ambient

Water was collected from Muddy Cove Brook downstream from Main Street, Dighton near the inlet to Muddy Cove Brook Pond for use as dilution water in the facility's whole effluent acute toxicity tests for their stormwater outfalls (02S, 03S, 005, and 06S) which discharge to this segment of Muddy Cove Brook. Survival (48-hour exposure) of *Ceriodaphnia dubia* and *Pimephales promelas* was not less than 85 and 75%, respectively, in any of the tests conducted between November 1999 and October 2002.

Effluent
Acute toxicity tests have been conducted on four stormwater outfalls (02S, 03S, 005, and 06S) which discharge to this segment of Muddy Cove Brook. Six tests were conducted on outfalls 02S and 06S and eight tests were conducted on outfalls 03S and 005 between November 1999 and October 2002 using *Ceriodaphnia dubia* and *Pimephales promelas* as test organisms. No acute toxicity (i.e., $LC_{50} \geq 100\%$ effluent) was detected by either test organism in any of the tests conducted.

Too limited data are available so the *Aquatic Life Use* is not assessed.

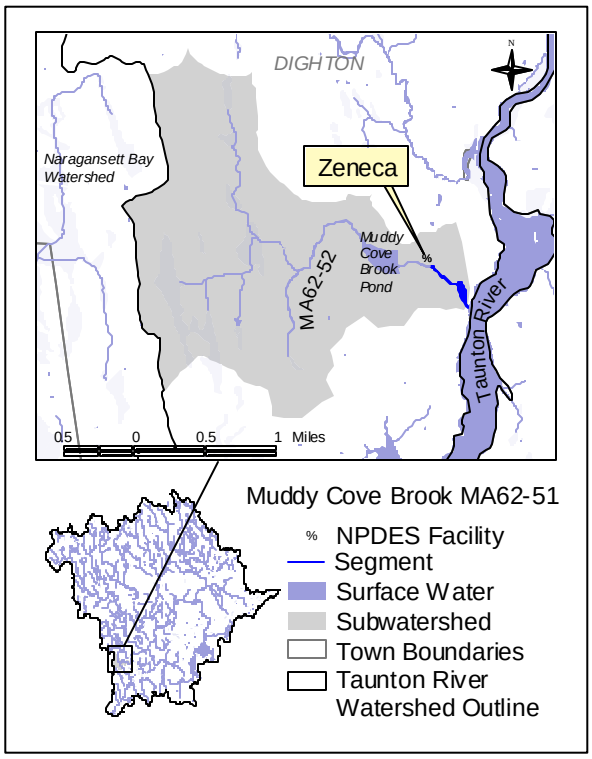
Muddy Cove Brook (MA62-52) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
The Town of Dighton should implement recommendations for wastewater management to protect groundwater and surface waters that are made in the 2003 SRF Comprehensive Wastewater Management Project.

MUDDY COVE BROOK (SEGMENT MA62-51)

Location: From outlet of small impoundment behind 333 Main Street (Zeneca, Inc.), Dighton to confluence with Taunton River, Dighton.
Segment Length: 0.01 square miles
Classification: SA
(Formerly part of Segment MA62-23)



The drainage area of this segment is approximately 3.0 square miles. Land-use estimates (top three) for the subwatershed:

Forest 69.8%
Agriculture 12.5%
Residential..... 8.6%

The impervious cover area for this subwatershed is less than 10%.

Segment MA62-23 is on the Massachusetts Year 2002 Integrated List of Waters – Category 3 (MassDEP 2003).

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX G, TABLES G2 AND G4)

Based on available information there are no WMA regulated withdrawals in this subwatershed.

Zeneca, Inc. (formerly ICI Americas, Inc.) used to discharge treated wastewater to this segment of Muddy Cove Brook (NPDES MA0005291) but in 1992 the discharge was moved to the Taunton River via outfall 011A (permit revision signed in June 1992 – see Segment MA62-03). The facility was engaged in the manufacturing of textile dyestuffs and other organic chemicals. Manufacturing operations of the site ceased in 1995. Wastewater generated was a result of facility decommissioning and RCRA Corrective Action, which was discharged via outfall 011A to the Taunton River (Segment MA62-03) (Zeneca 2000). EPA terminated the individual NPDES permit in November 2003. The facility was discharging stormwater under a multisector general stormwater permit (MAR05B053) via Outfall 011S to this segment of Muddy Cove Brook. However, the permit has expired and the company needs to reapply for a new multisector general stormwater permit.

USE ASSESSMENT

AQUATIC LIFE

Toxicity

Effluent

Acute toxicity tests have been conducted on stormwater from Outfall 011S. A total of eight tests were conducted between November 1999 and October 2002 using *Ceriodaphnia dubia* and *Pimephales promelas* as test organisms. No acute toxicity was detected by either test organism.

Too limited data are available so the *Aquatic Life Use* is not assessed.

SHELLFISHING

The DMF Shellfish Status Report of 2003 indicates that area MHB2.2 is prohibited (Sawyer 2003).

Based on the DMF shellfish growing area status, the *Shellfish Harvesting Use* is assessed as impaired for this segment of Muddy Cove Brook because of elevated bacteria counts.

Muddy Cove Brook (MA62-51) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		NOT ASSESSED
Shellfish Harvesting		IMPAIRED Cause: Fecal coliform bacteria Source: Unknown (Suspected Sources: Discharges from municipal separate storm sewer systems and septic systems)
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

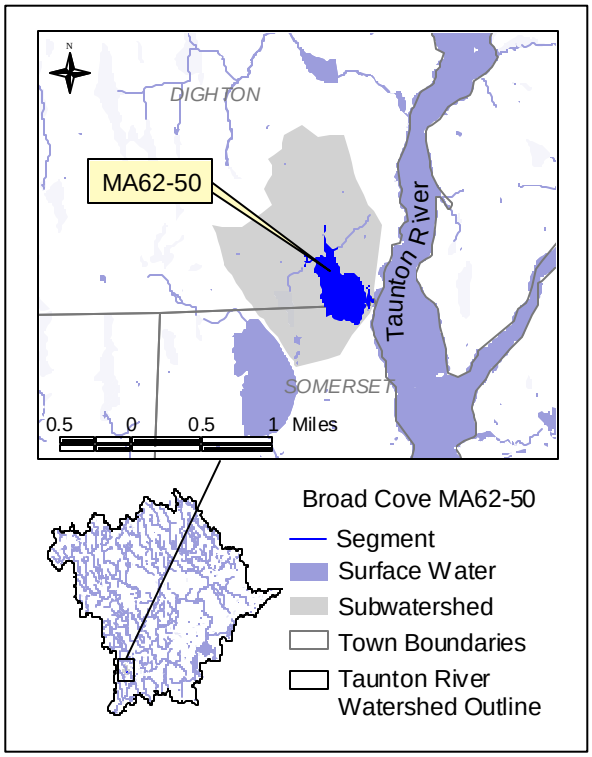
Review and implement recommendations in the DMF shellfish sanitary survey reports and the triennial reviews for growing area MHB2.2.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.

Zeneca, Inc. is required to reapply for a new multisector general stormwater permit.

BROAD COVE (SEGMENT MA62-50)

Location: Somerset/Dighton
Segment Size: 0.13 square miles
Classification: Class SA
(Formerly reported as Segment MA62022)



The drainage area of this segment is approximately 1.1 square miles. Land-use estimates (top three) for the subwatershed:

Forest 39.7%
Agriculture 18.3%
Residential..... 17.1%

The impervious cover area for this subwatershed is less than 10%.

Segment MA62022 is on the Massachusetts Year 2002 Integrated List of Waters – Category 2 (MassDEP 2003).

WMA WATER WITHDRAWAL SUMMARY AND NPDES WASTEWATER DISCHARGE SUMMARY

There are no WMA withdrawals or NPDES discharges in this segment.

USE ASSESSMENT

SHELLFISH HARVESTING

The DMF Shellfish Status Report of 2003 indicates that all growing areas within this segment (MHB2.2) are prohibited (Sawyer 2003).

Based on the DMF shellfish growing area status, the *Shellfish Harvesting Use* is assessed as impaired for Broad Cove because of elevated bacteria counts.

Broad Cove (MA62-50) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		NOT ASSESSED
Shellfish Harvesting		IMPAIRED Cause: Fecal coliform bacteria Source: Unknown (Suspected Source: Discharges from municipal separate storm sewer systems)
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

RECOMMENDATIONS

Review and implement recommendations in the DMF shellfish sanitary survey reports and the triennial reviews for growing area MHB2.2.

Conduct bacteria sampling to evaluate effectiveness of nonpoint source pollution control activities and to assess the status of the *Primary* and *Secondary Contact Recreational* uses.