A Catalog of Water Quality Research on the Westport River. Westport MA. 1995. Rev. 2010.
Westport River Water Quality Catalog

1968 – A Study of the Marine Resources in the Westport River
By: Massachusetts Division of Marine Resources
In this study the finfish and shellfish of the Westport River were surveyed, and a water quality analysis was completed at eight sites on the river. These sites included: the mouth of the river, Sanford Flat, west of Judy Island, upper West Branch off River Rd., southwest of Gunning Island, Hix Bridge, and the Head of Westport. The study was initiated in the spring of 1965 and ended in the spring of 1966. Samples were analyzed for fecal coliform bacteria, nitrate, phosphate, detergent, and pesticides. The Massachusetts Division of Marine Resources reported fecal coliform concentrations of less than 10 colonies per 100 ml of water at all sites except for the Head of Westport, which had very high concentrations (5,100, 1,500). All other parameters tested had only negligible concentrations, if any. The Division of Marine Fisheries recommended the river have a continued water quality monitoring program, and that the Westport Board of Health rigidly enforce regulations pertaining to discharge of domestic sewage.

1979 – Westport River Proposed Agricultural Water Quality Management Project
By: U.S. Department of Agriculture and Soil Conservation Service
This study includes an inventory of land use in the areas surrounding the Westport River watershed and water quality data presented from the Massachusetts Division of Water Pollution Control. The water quality data was comprised from seven sites including: Shingle Island River, outlet of Lake Noquochoke, Head of Westport, Hix Bridge, and East Branch off Lakes Island, Route 88 Bridge, and the West Branch at the USGS gage in Adamsville. All water samples were taken in July and August of 1975. The water quality parameters tested were: B.O.D., C.O.D., ammonia, nitrate, total phosphorus, total solids, and fecal coliform bacteria. Fecal coliform averages for all sites exceeded state limits set for the safe harvest of shellfish and five out of the seven sites exceeded state limits set for safe swimming. Nitrate and phosphorus concentrations at all sites were high enough to pose a potential eutrophication problem. This study recommended that the town and state officials work with farmers to establish buffer strips between cropland and pastures and streams, to exclude cattle from streams, rivers and wetlands, and to improve animal waste storage facilities and distribution systems. It also recommended that the town implement a continuing water quality monitoring program.

1980 – Westport River Watershed Application for USDA – Rural Clean Water Program Best Management Practices Project
By: U.S. Agricultural Stabilization and Conservation Commission
This document is an assessment of how the Soil Conservation Service's best management practices could be implemented in Westport. It describes the measures needed and the projected cost of improving water quality in the Westport River. It suggested the implementation of stream bank protection, cropland conversion to permanent cover, strip-

cropping, contour farming, grass waterways or outlets, permanent vegetative cover establishment on critical areas, terrace systems, and cropland protection. The estimated cost of implementing these best management practices was $143,524

1985 - Westport River Greenway Protection Plan
By: Westport River Defense Fund
This study points out the sources and types of pollution in the East and West Branches of the Westport River. A series of maps exhibit resources, land use, and environmental threats within the Westport River watershed. The plan includes recommendations to correct existing and potential problems which affect water quality in the Westport River. To make these changes the plan suggests that the town create special bylaw s to implement remedial steps. The suggested bylaw s include a hazardous material bylaw to control design, sitting, installation and monitoring of new underground fuel and toxic chemical storage tanks; new stricter than Title-V regulations to eliminate point and nonpoint sources of fecal coliform contamination; and to reduce nutrient contamination, and a new zoning bylaw to ensure wetland protection and open space preservation.

1986 – Buzzards Bay Water Quality Survey
By: Massachusetts Department of Environmental Quality and Engineering, Division of Water Pollution Control.
This document is a survey of water quality in the East Branch of the Westport River. Water was sampled at five stations including Bread and Cheese Brook, Snell Creek, and Kirby Brook. All samples were taken on June 24 and 25, 1985, and tested for fecal coliform bacteria. All sites had fecal coliform concentrations exceeding state levels set for the safe harvest of shellfish.

1986 – Sanitary Survey of the Westport River Estuary
By: U.S. Department of Health and Human Services
This report presents the findings of a cooperative environmental study of the effects of point and non-point sources on the water quality of the East Branch of the Westport River estuary. The purpose of the study was to evaluate the effectiveness of recent pollution control measures that had been implemented by the Rural Clean Water Program of the U.S. Department of Agriculture's Soil Conservation Service, and to determine the impact that these measures may have had on the shellfish growing areas. The water was sampled at 24 sites and tested for fecal coliform bacteria. Tests were also run to differentiate between animal and human coliform bacteria. The analysis confirmed that fecal coliform contamination is derived from both agricultural runoff and domestic waste. The data also revealed that fecal coliform in the upper portion of the river is derived from animal waste, and in the lower reaches it is derived from human waste.

1986 – A Study to Determine the Causes, Types, and Location of Pollutants Contaminating the Westport River Estuary
By: Boston University Hydrology Group
This study was initiated by the Town of Westport through the Boston University Hydrology Group. Sampling was done throughout the year from July 1984 to September 1985. Approximately 800 samples were taken at 100 sites on the river and analyzed for

fecal coliform bacteria. The study demonstrated that most of the bacterial contamination occurs in the upstream reaches of the East Branch of the Westport River, where most of the large tributaries enter. All samples exceeded state shellfishing standards.

1986 – Relationships Between Suspended Sediments and the Movement of Bacteria in the East Branch, Westport River

By: Boston University Hydrology Group

The sources, movement, and behavior of suspended sediment in the East Branch were studied to identify pollution sources in the East Branch of the Westport River system. It was identified that 4.5×10^6 kg of suspended sediment was contributed from the marine environment annually. It was also determined that suspended sediment prolongs the length and increases the magnitude of fecal coliform contamination in the East Branch. This study concurs with other studies on the Westport River, that the source of fecal coliform contamination is primarily agricultural in origin, from several large farms located along the estuary.

1987 – Hydrology and Contamination Investigation of the West Branch, Westport River

By: Boston University Hydrology Group

This study characterizes the sources, transport and extent of contamination in the West Branch of the Westport River. Water was sampled at 55 sites and analyzed for fecal coliform bacteria and suspended sediments. Contamination sources were identified as inadequate septic systems, agricultural runoff, and stormwater road runoff. The study suggested upgrading septic systems to suit the local hydrogeologic conditions, implementation of farm best management practices, and building detention basins for road runoff, as remedial actions.

1987 — Buzzards Bay Research Bacteriological Data Report 1986

By: Massachusetts Department Environmental Quality and Engineering, Division Water Pollution Control

This study compiled information aimed at describing the relative impacts of non-point sources on bacteriological water quality. Samples were taken on six occasions at four locations on the East Branch of the Westport River and analyzed for fecal coliform. The data collected showed that fecal coliform counts are higher when sampling on the day of, or after a precipitation event. The study also found that bacterial counts in the tributary streams are much higher than they are in the main channel of the river.

1987- Bacterial Water Quality Survey of the East Branch of the Westport River Estuary

By: Town of Westport, MA

This town-sponsored study assessed the possibility of conditionally reopening closed shellfish areas within the East Branch. It measured fecal coliform residence time in relation to the occurrence and amount of rainfall Samples were taken after rain events, and shellfish meats were analyzed on the following days to determine the length of time necessary for the shellfish to purge themselves of bacteria. The study determined that areas south of Hix Bridge required only a few rain free days to be in compliance with

state shellfishing criterion. However, areas north of Hix Bridge required several more days for the fecal coliform level to come back down to acceptable levels.

1988 — A Report on Bacteriological Sampling in the Tributaries of the Westport River

By: Massachusetts Department Environmental Quality and Engineering, Division Water Pollution Control

This study examined fecal coliform concentrations in nine freshwater tributary streams and thirteen main channel Stations of the Westport River. Sampling was conducted over a one week period from 9/30/86 to 10/8/86. Most tributary stream samples were in violation of Class B water quality standards. Snell Creek had the highest level of fecal coliform contamination measured out of any of the tributary streams.

1988- Rural Clean Water Program. Annual Reports (1983-1988)

By: U.S. Department of Agriculture

The purpose of this research program was to evaluate the effectiveness of agricultural best management practices designed and installed by the Soil Conservation Service around the East Branch of the Westport River. Water samples were taken at eleven main channel stations and three tributaries from 1983 to 1988. No substantial long term improvement in water quality was observed.

1989-Nonpoint Source Management Plan for the Watershed of Snell Creek, Westport, Massachusetts

By: Massachusetts Environmental Protection Agency and Metcalf and Eddy, Inc.

This report is a nonpoint source management plan for the watershed of Snell Creek. The purpose of this plan is to outline and implement measures necessary to achieve detectable improvement in water quality. The report includes: a synopsis of past studies, identification and ranking of nonpoint sources, evaluation of best management practices for the study area, and a nonpoint source management plan. Strategies for implementation, estimated costs, and potential problems are outlined.

1990-Sanitary Survey Report of the East Branch of the Westport River (Spring 1990)

By: Massachusetts Division of Marine Resources

This study provides information on the status of the classification of shellfish growing areas in the East Branch of the Westport River. It provides an assessment of all real and potential sources of pollution, and it examines the effects of meteorological and hydrographic influences on fecal coliform contamination. The portion of the East Branch, north and west of Cadman Neck, was identified as the largest contributor of contaminants in the river. The study recommends that the Town of Westport should take remedial action on all potential and actual pollution sources.

1991- Sanitary Survey Report of the West Branch of the Westport River (January 1991)

By: Massachusetts Division of Marine Resources

This study provides updated information on the status of shellfish growing area classifications, and assesses all current and potential pollution problems in the West Branch of the Westport River. The study considers meteorological and hydrographic influences on contamination. A summary of the 1989 and 1990 shellfish harvest and its economic value is provided. This industry generated $407,517 in 1989 and $391,507 in 1990. The study affirms that stormwater runoff negatively impacts water quality in the upper and middle portions of the West Branch. All results confirmed that current classifications of shellfish growing areas (open, conditionally closed, and permanently closed) were correct. The study recommends that the Town of Westport should take remedial action on all potential and actual pollution sources and that the West Branch be continually monitored for fecal coliform contamination.

1991-Westport River Water Analysis
By: Massachusetts Division of Marine Resources, Westport Conservation Commission and Westport Fishermen's Association
This study provides an overview of water quality in the East and West Branches of the Westport River. Water samples were taken from December 1985 to November 1991. Results of fecal coliform testing at 40 sites on the river are provided. The study states that the contamination problem correlates to the degree of stormwater run-off. It lists waterfowl, cow manure, chemical run-off, and failed septic systems as contributing factors to fecal coliform contamination in the Westport River.

1992-Westport River Water Testing Program
Phase I Preliminary Report
By: Westport Board of Health
This report provides a synopsis of fecal coliform monitoring in the East and West Branch of the Westport River from September 1990 to August 1991. Results of testing are presented in graphical form for 17 sampling stations. Sources of fecal coliform were identified as failed septic systems, livestock, and waterfowl. The study suggests that increases in fecal coliform concentration were generally related to rainfall increases. Height of tide, direction of current, and number of waterfowl were listed as other factors influencing the magnitude and distribution of fecal coliform contamination. The report recommends that a detailed inspection of all septic systems along the river be made and that any septage overflow pipe dumping into the river be eliminated.

1992-Westport River Monitoring Results Sept. 1990-Aug. 1991
By: Westport River Watershed Alliance Inc. (River News vol. 15, no.1)
This report provides fecal coliform testing data from the Westport River from September 1990 to August 1991. The data is presented as monthly mean fecal coliform for 17 sites on the river. The data demonstrates that all the sites in the upper portion of the East Branch have fecal coliform concentrations that are above the safe limits for the harvest of shellfish (12 colonies per 100ml). The West Branch had lower fecal coliform concentrations with many samples testing below state shellfish limits.

1993-Sanitary Report of the East Branch of the Westport River (Fall 1993)
By: Massachusetts Division of Marine Resources

This report provides an extensive catalog of the sources, causes, and magnitude of fecal coliform contamination in the East Branch of the Westport River from south of Hix Bridge to the Fontaine Bridge (Rte. 88 bridge). Included is an inventory of tributary streams, and a census of shellfish populations and growing areas, with their respective classification. This study concurs with other research stating that the area north of Hix Bridge is the most contaminated and constitutes a large portion of the source of fecal coliform in the portion of the river south of Hix Bridge. Livestock and failed septic systems were identified as the largest contributor of fecal coliform contamination. The report recommended the following: that the Town of Westport should create and enforce regulations which would require citizens with faulty septic systems to correct them, that the town do the same with agricultural runoff, and that continuing research be pursued in hopes of correcting the problem.

1994-A Buzzards Bay Embayment Subwatershed Evaluation: Establishing Priorities for Nitrogen Management Action
By: Buzzards Bay Project
This report is a preliminary evaluation of the nitrogen loading from residential, commercial, and agricultural development for 30 Buzzards Bay embayments. The East Branch of the Westport River was classified as an embayment with a high resource value, and the West Branch was ranked with a medium resource value. These ratings were given because the Westport River offers a large shellfish resource. Included in the report is a eutrophication index for both branches of the river. The East Branch was ranked the worst embayment in Buzzards Bay in regard to eutrophication. The West Branch was ranked the third worst. Sources of nitrogen were identified as domestic and animal waste runoff and agricultural fertilizer. Both the East and West Branches already exceed their calculated nitrogen loading capacity. This factor, combined with their capability for considerable future development, causes them to be classified as difficult embayments to management.

1994-A Report on the Continuing Study of Fecal Coliform in the Westport River
By: Westport River Watershed Alliance, Inc. (River News, vol.17, no. 8)
This report provides an overview of fecal coliform data from 1992 and 1993 for the Westport River. Samples were taken weekly from 17 sites on the river. Fecal coliform and salinity were presented as monthly means. Rainfall was presented as a cumulative monthly total. The data demonstrates again that the upper portions of the East Branch are highly contaminated with fecal coliform, whereas the West Branch is relatively less contaminated. Rainfall and salinity were identified as factors which affect the magnitude and distribution of fecal coliform contamination. The report states that the amount of rainfall is strongly correlated with the amount of fecal coliform in the river. Salinity was identified as an apparent fecal coliform growth inhibitor when concentrations approached that of 100% sea water (26-32 ppt).

1999 – 2003 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION MASSACHUSETTS WATERSHED INITIATIVE PROGRAM INDICATIVE PROJECT SUMMARIES

This project will conduct an assessment of nonpoint source pollution in the Westport River subwatershed of Buzzards Bay.
Specific tasks include:
1. conduct a comprehensive environmental and land use assessment;
2. map and assess existing and potential nonpoint source pollution;
3. assess local capacity to address nonpoint source pollution impacts;
4. inventory and evaluate stormwater in the Head-of-Westport Area;
5. develop a Quality Assurance Project Plan (QAPP) for water quality and bacteria sampling;
6. develop recommendations and BMP's for nonpoint source pollution remediation; and
7. prepare a final project report.

Hyperlink to document:
http://www.mass.gov/dep/about/priorities/projsums.pdf

DEP (Massachusetts Department of Environmental Protection). 1998. FINAL MASSACHUSETTS SECTION 303(d) LIST of WATERS - 1998. 131 pp.

2000 - Potential Habitat Restoration in the East Branch of the Westport River by Removal of Obstructions to Tidal Flushing at the Hix Bridge
By: Joseph E. Costa, PhD, Buzzards Bay Project
The debris under and just north of the Hix Bridge restricts tidal flushing, which in turn lowers salinity north of the Hix Bridge. This lowered salinity may have contributed to the expansion and invasion of the Common Reed *Phragmites* into fringing salt marshes, eliminating valuable salt marsh habitat. Elimination of the tidal restriction will elevate salinities by at least 1 ppt, and possibly more near the surface. This increased salinity could contribute to the stabilization or possibly decline of the invasive *Phragmites* beds, and also may contribute to the expansion of soft shell clam and quahog populations north of the bridge. It is warranted to conduct at this time a more detailed evaluation of the cost and potential benefits or adverse effects from the removal of this fill.

Hyperlink to document:
http://www.buzzardsbay.org/download/hixbrief.pdf

2000 BUZZARDS BAY WATERSHED- WATER QUALITY ASSESSMENT REPORT
By: Massachusetts Department of Environmental Protection, Division of Watershed Management, November 2003
Water quality assessment reports are produced periodically for each watershed by the MassDEP Division of Watershed Management (DWM), to: publish data generated by DWM to the public; review available quality-assured data from other sources; determine the use support status of surface water bodies;determine the causes and sources of any impairments to uses; and support reporting to the USEPA on the status of the Commonwealth's surface waters (see the Integrated List of Waters).

This assessment report presents a summary of current water quality data/information used to assess the status of these designated uses as defined in the Massachusetts Surface Water Quality Standards: *Aquatic Life, Fish Consumption, Drinking Water, Shellfish Harvesting* (where applicable)*, Primary* and *Secondary Contact Recreation* and *Aesthetics*. Each use, within a given segment, is individually assessed as ***support*** or ***impaired***. When too little current data/information exists or no reliable data are available the use is ***not assessed***.. It is important to note that not all waters are described in this assessment report. Many small and/or unnamed rivers and ponds are currently ***unassessed***; the status of their designated uses has never been reported to EPA in the Commonwealth's 305(b) Report nor is information on these waters maintained in the Water Body System (WBS) database.

Details of ***Aquatic Life Use*** impairments of river and estuary/coastal embayment segments in the Buzzards Bay Watershed.

Waterbody - ID	Causes	Sources:
West Branch Westport River - MA95-37	Estuarine bioassessment (Loss/decline of eelgrass bed habitat) Suspected: Total nitrogen	Suspected: Animal feeding operation, municipal separate storm sewer systems, on- site septic systems
East Branch Westport River MA95-41	Estuarine bioassessment (Loss/decline of eelgrass bed habitat) Suspected: Total nitrogen	Animal feeding operation, municipal separate storm sewer systems, On-site septic systems, changes in tidal circulation/flushing

Details of Impairment of the ***Primary*** **and** ***Secondary Contact Recreational uses*** **and the** ***Aesthetics Use*** for river and estuary/coastal embayment segments in the Buzzards Bay Watershed.

Waterbody - ID	Use Assessment	Causes	Sources:
East Branch Westport River (MA95-40)	1º, IMPAIRED 2º, -2.53 miles SUPPORT 0.32 miles, IMPAIRED	Fecal coliform bacteria	Suspected: Municipal separate storm sewer system, highway/road runoff
East Branch Westport River (MA95-41)	1º, 2º- 2.43 mi^2 SUPPORT 1º, 2º- 0.22 mi^2 IMPAIRED	Fecal coliform bacteria	Animal feeding operation, dairy outside milk parlor area, grazing in riparian zone, municipal separate storm sewer systems

			Suspected: On-site septic systems highway/road runoff
Snell Creek (MA95-44)	1º, 2º- IMPAIRED	Fecal coliform bacteria	Suspected: Municipal separate storm sewer systems, on-site septic systems, highway/road runoff
Bread and Cheese Brook (MA95-58)	1º, 2º- IMPAIRED	Fecal coliform bacteria	Municipal separate storm sewer systems, grazing in riparian zone, highway/road runoff
Snell Creek (MA95-59)	1º, 2º- IMPAIRED	Fecal coliform bacteria	Animal feeding operation, grazing in riparian zone, dairy outside milk parlor area Suspected: Municipal separate storm sewer systems, on-site septic systems, highway/road runoff

Report Recommendations specific to Westport River segments:

- Continue to monitor bacteria levels to document effectiveness of bacteria source reduction activities including treatment of storm water discharges, the Phase II community storm water management programs, and implementation of BMPs to assess the recreational uses.
- Continue to work with the WRWA to promote education and outreach programs to protect surface water resources. Offer technical support and guidance to WRWA to continue/expand their water quality monitoring program. Review final reports to assess the *Aquatic Life Use* and the recreational uses.
- Review the results of the ACOE flushing study and implement recommendations as appropriate. Data from the report could be used to assess the *Aquatic Life Use*.
- Review the sediment chemistry and biomonitoring results of the CZM Coastal 2000 Project to assess the status of the *Aquatic Life Use* and investigate the potential source of sediment toxicity at Station 35A near Little Ram Island.
- Continue to support the implementation of best management practices (BMPs) at dairy farms within the region to reduce bacteria/nutrient inputs to the subwatershed.
- Review and implement recommendations in the DMF anadromous fish assessment report, when available, to improve water quality and spawning habitat. If applicable, review for data to assess the *Aquatic Life Use*.

- Develop a monitoring program for bacteria to document the effectiveness of bacteria source reduction activities including treatment of storm water discharges, compliance with CAFO permit, and the Phase II community storm water management programs and to continue to assess the recreational uses.
- Review and implement, as appropriate, recommendations from DMF shellfish survey program reports (sanitary surveys and triennial reports) to reduce bacteria and remediate sources causing the closure of the shellfish beds. Continue to review DMF shellfish status report to assess the *Shellfish Harvesting Use*.
- Continue to work with the WRWA to promote education and outreach programs to protect surface water resources. Offer technical support and guidance to WRWA to continue/expand their water quality monitoring program. Review final reports to assess the *Aquatic Life Use* and recreational uses.
- Work with the Buzzards Bay Coalition to improve quality assurance procedures, data exchange, and if deemed necessary, increase spatial and temporal coverage of *in-situ* monitoring. Review final reports to continue to assess the *Aquatic Life Use*.
- Implement those 11 salt marsh restoration projects identified in the 2002 *Atlas of Tidally Restricted Salt Marshes – Buzzards Bay Watershed, Massachusetts* that have been evaluated and prioritized by the Town. Sites in this subwatershed are WP04 through WP14. Site WP06 is at the Hix Bridge where the Massachusetts Highway Department has a reconstruction project scheduled for 2003. Develop a monitoring plan to assess the effectiveness of the projects and to assess the *Aquatic Life Use*.
- Continue to support efforts to map the distribution of eelgrass beds throughout the Buzzards Bay Watershed and continue to examine the health and biovolume of the plants as indicators of water quality. Review data to assess the *Aquatic Life Use*.

Hyperlink to document:
http://www.mass.gov/dep/water/resources/95wqar1.pdf
http://www.mass.gov/dep/water/resources/95wqar2.pdf

2002 - Atlas of Tidally Restricted Salt Marshes in the Buzzards Bay Watershed Massachusetts
By: Buzzards Bay Project National Estuary Program
The purpose of this Atlas is to aid state and municipal officials in identifying tidal restrictions. Such a listing will help government officials identify potential remediation opportunities when road and bridge work is being contemplated. Although the Buzzards Bay Project made considerable efforts to locate all tidal restriction sites in Buzzards Bay, we recognize some sites may have been overlooked, and our list should not be considered definitive. Where tidal flow is restricted, the main objective of salt marsh restoration is to improve tidal flow to the affected marsh. In many cases, restoration is easily accomplished by removing the restrictive feature or by providing an opening sufficient enough to allow adequate tidal flow. For example, where tidal flow is reduced by undersized culverts (too small to pass the full spring tide), simply replacing the culverts with larger ones, generally the width of the original channel, and ones of appropriate height, may be enough to restore tidal flow. In other cases, development has taken place in low-lying areas surrounding the marsh and sometimes on fill in the marsh itself. Due to flood risk, restoring full tidal flow to these areas is not possible. However, restoration of

sufficient tidal flow to flood a lower portion of the marsh on a regular basis may be possible if it can be shown that this will not increase the risk of flooding to adjacent structures. Allowing for frequent tidal flooding should be sufficient to promote the return of salt marsh vegetation in areas of high salinity (greater than 18 parts per thousand). In areas of lower salinity, improved tidal exchange (by reconnecting the marsh to the adjacent estuary) is still beneficial. Improving tidal flow to the marsh while preventing property flooding can be accomplished by expanding the culvert size and adding a protective device, such as a self-regulating tide gate or a manually or electronically operated tide gate. These gates can establish an opening that allows passage of normal tides, but prevents entry of storm tides. Some structures can be completely closed, if necessary, to facilitate storm protection. Each proposed salt marsh restoration site should be evaluated to consider potential adverse impacts such as flooding before work is begun.

Hyperlink to document:
http://www.buzzardsbay.org/smatlas/buzzards-bay-salt-marsh-atlas-2002-s.pdf

2003 - Atlas of Stormwater Discharges in the Buzzards Bay Watershed
By: Joseph E. Costa, PhD, Buzzards Bay Project, Funded in part by, Funded by Massachusetts Highway Department, Massachusetts Environmental Trust, Massachusetts Department of Environmental Protection
August 2003

The 100+ page report includes maps of more than 2,600 stormwater discharges and more than 12,000 catch basins along the shores of nearly all of Buzzards Bay.

Hyperlink to document:
http://www.buzzardsbay.org/bbpreports/final-stormwater-atlas-main.pdf

Buzzards Bay Watershed Wetland Restoration Sites
http://www.buzzardsbay.org/download/filled-wetlands-atlas1.pdf

2008 - Technical Memorandum-Westport River Watershed Alliance Ponds Monitoring Project - Summer 2008
By: University of Massachusetts Dartmouth School for Marine Science and Technology Coastal Systems Program
This report summarizes the Pond Monitoring Project undertaken in the summer of 2008 as a collaborative effort between WRWA and SMAST. The focus of the monitoring was to collect baseline data required for assessing the nutrient related water quality of three ponds in the Town of Westport: 1) Forge Pond 2.)Adamsville Pond 3.) Cockeast Pond. Supplementary sampling was undertaken as pro bono work in two additional ponds in Westport, Head Dam Pond and Trout Pond. The first three ponds were found to be eutrophic due to nitrogen enrichment, while the remaining two were found to be highly eutrophic. Further monitoring was recommended.

Final Pathogen TMDL for the Buzzards Bay Watershed
March 2009 CN: 251.1
Prepared as a cooperative effort by: Massachusetts DEP
1 Winter Street
Boston, MA 02108
ENSR International
http://www.mass.gov/dep/water/resources/buzzbay1.pdf

2010 – Westport River Watershed Alliance Westport Ponds 2009 Water Quality Sampling Final Report July 10, 2010
By: University of Massachusetts Dartmouth School for Marine Science and Technology Coastal Systems Program
This report summarizes the continuation of the Pond Monitoring Project undertaken in the summer of 2009. The focus of the monitoring was to continue to collect baseline data for assessing the nutrient related water quality of three ponds in the Town of Westport: 1.) Forge Pond 2.)Adamsville Pond 3.) Cockeast Pond. Water sampling was undertaken once in the summer. Results showed that all three ponds were experiencing eutrophication due to nitrogen enrichment. Further monitoring was recommended.

2010-2012 Westport River Watershed Alliance QAPP for Monitoring Salinity, Turbidity, Temperature, pH, Fecal Coliform Bacteria and Fecal Streptococcus Bacteria Parameters on the Westport River
By: Roberta Carvalho, WRWA Science Director

Westport River Watershed Alliance
Westport Point Stormwater Monitoring
Final Report
July 14, 2010
Dr. Brian L. Howes, Dr. David S. White, Michael A. Bartlett and Sara J. Sampieri
The goal of the project was to sample the flow and contaminant levels from the initial flow to the end of flow at the Westport Point stormwater outfall. Multiple checks of the outfall during "dry" weather indicated that this stormwater system does not have significant I/I and therefore does not discharge except during rain events or due to meltwater inflows.
Sampling occurred under wet conditions (greater than 0.25 inches of rainfall) and was undertaken during on seven events or which three storm events on March 23, April 17 and May 18, 2010 resulted in the necessary flows. The sampling team arrived prior to the onset of rainfall on each sampling date. As the outfall pipe was below the high tide line in the Harbor, the outfall pipe was temporarily sealed by the project team during each sampled storm event in order to accurately measure the volume of water discharged. Samples were analyzed for Nitrogen (NH4, NO3/NO2, TON, TN) Phosphorus (PO4, TP), Particulate Organic Carbon and Nitrogen (POC, PON) and Total Suspended Solids

(TSS). The samples were also assayed for indicator bacteria (Fecal Coliform, E. coli and Enterococcus), 13 Priority Pollutant Metals and Oils/Grease by Bal Laboratories, Cranston RI.

Summary

Each of the studies reveals several reoccurring trends regarding water quality in the Westport River. Fecal coliform contamination has been a problem, and has been increasing since it was first reported by the Division of Marine Resources in 1968. The East Branch north of Hix Bridge is the most highly contaminated area. The contamination diminishes on a southward gradient toward the mouth of the river. The West Branch is relatively less contaminated throughout its course. The primary sources of this contamination are runoff from dairy cow feedlots, failed septic systems, and general land runoff. The amount of fecal coliform in the river is closely related to the amount of precipitation just prior to the sampling date.

What does the future hold for the Westport River? The answer lies within each of us. It is important for each of us to realize that we are all responsible for the pollution problem within the river. There is not one source to blame, and therefore, one person, group, or organization should not be solely responsible for correcting the problem. Westport has a proud heritage of farming and fishing. Keeping this in mind, the community as a whole, including citizens, fishermen, farmers, town officials, and private organizations, must come together and address each issue. Each source of contamination can be examined and systematically removed or reduced if we are willing to work together.

Glossary

Dissolved inorganic nitrogen *is a measure of the amount of nitrogen present within water that is contributed by ammonia, nitrite, and nitrate. Most nitrogen loading from human activities to Buzzards Bay embayments occur as dissolved inorganic nitrogen (DIN). Most of the nitrogen from septic systems enters the embayments typically as nitrate, a compound which is also a principal component of fertilizers. Generally, we expect higher DIN concentrations because these essential nutrients are so readily taken up by plants and algae. Thus, even in very eutrophic embayments, DIN concentrations may never get very high.*

Dissolved oxygen *is a measurement of the concentration of oxygen present in the water. The oxygen concentration is lowest in the early morning because during the night, animals, algae, and bacteria all consume oxygen. During the day, algae photosynthesize and produce more oxygen than they consume, which raises the dissolved oxygen concentrations. The % oxygen saturation is a measure of the amount of dissolved oxygen in the water compared to maximum oxygen concentrations possible given the current salinity and temperature. Reporting dissolved oxygen values this way allows us to compare our dissolved oxygen to the potential dissolved oxygen under ideal conditions.*

Eutrophication *is the process of nutrient enrichment in aquatic ecosystems. In marine systems, eutrophication results principally from nitrogen inputs from human activities such as sewage disposal and fertilizer use. The nitrogen input, which is generally in the form of nitrate, stimulates algae blooms. The algae can become so numerous that at night when they are not photosynthesizing, they utilize large amounts of oxygen for respiration. At very high densities the algae reduce the amount of light transmittance into the water, making it difficult for them to photosynthesize. This causes the algae to die and decompose, which intensifies the problem. Decomposition of algae by bacteria also utilizes large amounts of oxygen. The end result of this process is oxygen starved water. This condition leads to finfish and shellfish kills, and also can alter the composition of flora and fauna in the ecosystem.*

Eutrophication Index *is a management tool used to make relative comparisons among the embayments and to establish baseline information for long-term changes in water quality. The index combines scores from five separate measurements: % oxygen saturation, water transparency, chlorophyll, inorganic and organic nitrogen concentrations. All these parameters respond to nitrogen inputs from human activity.*

Fecal Coliform *is a type of bacteria which lives within the intestines of warm-blooded animals.*

Nitrate (NO_3) *is the most highly oxidized form of nitrogenous inorganic compounds. It accounts for the majority of the nitrogen which enters the water. Nitrate acts as an important nutrient which enhances algal growth.*

Nitrite (NO_2) *is a nitrogenous inorganic compound which is an intermediate between ammonia and nitrate in the nitrification process. This form of nitrogen is only found in small quantities in the water because it is usually quickly oxidized into nitrate.*

Nitrogen Loading *is simply the total amount of nitrogen being added to an environment. Often "loading limits" are set. These are levels at which the concentration of a particular nutrient should not exceed.*

Salinity *is a measure of the amount of dissolved "salt" molecules per volume of water. It is usually expressed in parts per thousand. Salinity, coupled with temperature measurements at the surface and bottom of a station, allows water column stratification to be quantified. A poorly mixed system can result is stressful low oxygen conditions in bottom waters. Salinity can also indicate the degree of mixing with ground water or surface waters.*

Temperature *in a technical sense is a measure of the molecular activity of a substance. The faster the molecular motion the higher the temperature. It is important because of its relationship with dissolved oxygen. Water has a higher capacity to hold dissolved oxygen when the temperature is low and a lower capacity when the temperature is high.*

Total organic nitrogen *is the combined total of "particulate nitrogen" which is mainly the nitrogen incorporated in small organisms floating in the water (plankton) and a smaller amount of "dissolved organic nitrogen" which are complex molecules like proteins, urea, and other nitrogen molecules. In coastal waters dissolved inorganic nitrogen concentrations increase with increased loading.*

Turbidity *is a measure of the amount of suspended particles in a given volume of water. High turbidity levels reduce the amount of light which penetrates the water, and also leads to prolonged survival of fecal coliform bacteria.*