



A Clean Water Act Success Story..... The “Mighty” Merrimack River



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Agenda

- History
- Economic Engine for the Textile Industry
- Collateral Damage
- Building the Foundation
- Clean Water Act
- CWA Saves the Mighty Merrimack River
- Observations/Conclusions
- Questions



The Merrimack River and Its Watershed



Merrimack River

A Picture is Worth a Thousand Words



The Merrimack River - Stats

- Length - 117 miles
- Watershed – 5,010 square miles
 - 4th largest in New England
 - 6 defined sub basins
 - 12 rivers enter the Merrimack
- Flows – 7,562 ft³/s (4.8 billion gallons per day)
- Starts – Franklin, NH Confluence of the
 - Pemigewasset River
 - Winnepesaukee River
- Ends – Newburyport, MA
 - Atlantic Ocean
 - Gulf of Maine



The Merrimack River – A Rich History

- The center of Native American living:
 - Agawam
 - Pawtucket
 - Namoskeag
 - Pennacook
- Merrimack – “*Swift Water Place*”
- Amoskeag – “*Good Fishing Place*”



The Merrimack River – A New History

- 1605 - “Discovered” Samuel de Champlain
- Immediately became a means of commerce - Beginning of the problem



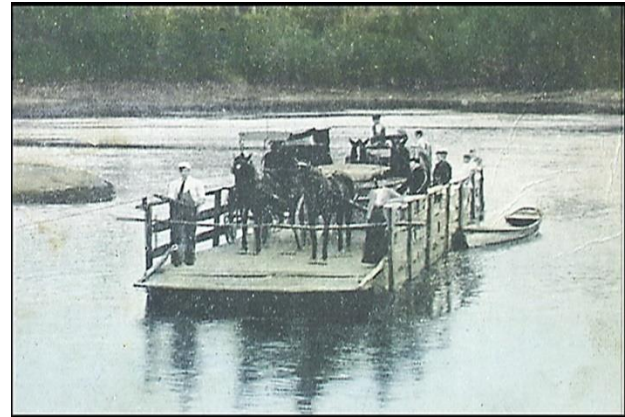
Merrimack River – An Inspiration to Many

- Henry David Thoreau
 - One of our country's first environmentalists
 - 1839 – A Week on the Concord and Merrimack Rivers
- Jack Kerouac
 - One of our country's first beatniks
 - 1959 - Doctor Sax
 - Flooding of the Merrimack River a central theme
- Several naval ships have been named ***USS Merrimack***
- A personal inspiration to me!



The Merrimack River – The Early Days

- 1700s - Settled by immigrants from Europe
- 1800s - Evolved from Agrarian to Industrial Society
- 1807 - First Lock and canal system constructed to navigate around waterfalls
- 1820 - Quickly advanced to hydro power which would fuel the Industrial Revolution



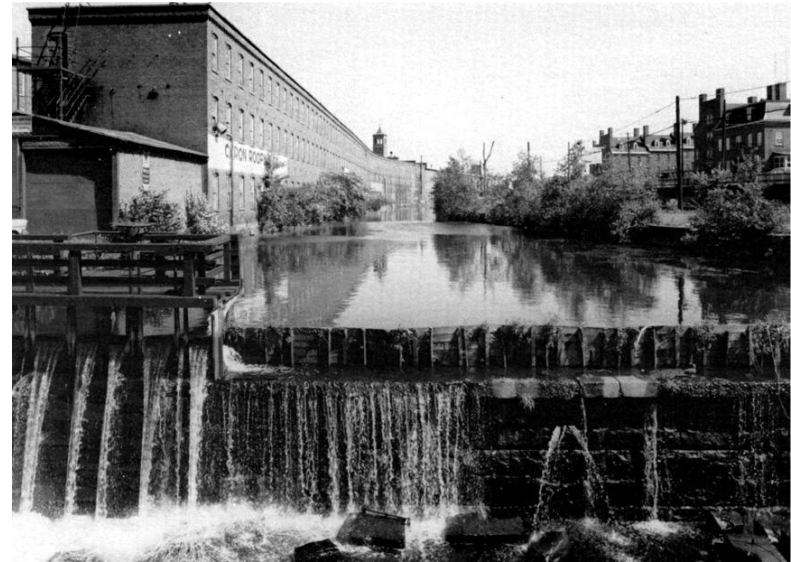
The Merrimack River – The Economic Engine for the Industrial revolution

- Dam Construction
 - 1820 – Pawtucket Falls in Lowell 32'
 - 1836 - Amoskeag Falls in Manchester 50'
 - 1848 – Great Stone dam in Lawrence 35'
- A few wealthy industrialists controlled the river that allowed them to control the mills.
- 1840 - Bought rights to the waters of Lake Winnepesaukee, Newfound Lake, and Squam Lake



The Merrimack River – The Economic Engine for the Industrial revolution

- Textile Mills soon dominated the New England economy
- Largest employer in the Merrimack Valley and dominated the economy in five cities
 - Manchester
 - Nashua
 - Lowell
 - Lawrence
 - Haverhill



Manchester's Amoskeag Mills

- Largest cotton textile mill in the world
- 1810 to 1935
- Peaked during WW - I
- 17,000 workers
- 40 buildings
- Supplier of denim for Levi Jeans
- 30 Turbine Water Wheels
 - 16,290 hp = 12,147 kW
 - 583 Electrical motors
 - 662,000 spindles
 - 24,800 looms



The Death of the Textile Industry and the Merrimack River

- Started downhill after the Civil War
- Cost to ship cotton north
- Cost to heat buildings
- Higher labor cost in northeast
- Most mills closed during the Great Depression
- 1935 - After 135 years of neglect, we are left with a dead river.....



Collateral Damage No. 1 – Energy

- Dams built in the river with no regard to environmental consequences
 - Diadromous fish (salt to freshwater) no longer able to migrate upstream to spawn
 - Impoundment changed water biology
- Lowell created 18 mile long “mill pond” upstream of dam
 - Common practice
 - Stagnant water
 - Changed ecosystem
- Concord, NH power plant had “coal tar” lagoons adjacent to the river



Collateral Damage No. 2 - Pollution

- Mills all dumped their waste into the River
 - Dyes, bleaches, wash-water
 - Solid waste that would make the river un-navigable
- Increased population to work in the mills
 - Promoted dense urban living
 - Increased wastewater discharge
 - Increased pollutants in stormwater
- All other industries also discharged to the Merrimack
 - Foundries, tanneries, pulp/paper



Collateral Damage No. 3 – Unable to Use It

- Merrimack River is so polluted unable to use it as a drinking water source
 - Diseases traveled downstream from one river city to another
 - 1832 – 674 cholera deaths in Manchester
 - 1849 – 147 cholera deaths in Lowell
- River so odorous a hardship living adjacent to it
- No longer a food source
 - No fish mitigation
 - Can not support aquatic life



A Period of Inaction and Degradation 1935 to 1970

- Merrimack River ultimately makes the list of one of the Ten Most Polluted Rivers in the Country
- With mills closed, these cities became depressed. Populations moved to the suburbs
- No funding, no leadership, no Champion
- Merrimack River water quality further degrades with 170 years of unabated industrial and domestic pollution



Laying the Foundation - Locally

- 1878 - Massachusetts General Court - Prohibiting discharge of refuse or any “polluting substances” into streams or public ponds
 - Bowed to corporate pressure and exempted the Connecticut and Merrimack Rivers as well as the Concord within the city limits of Lowell.
- 1893 - Lawrence Experiment station. Groundbreaking water engineering work
- 1917 Lowell engineering report recommends “the construction of proper sewerage facilities”
- 1929 – NEWEA
- 1947 - NEIWPC



Laying the Foundation – Nationally

- 1899 - Rivers and Harbors Appropriation Act. The country's oldest federal environmental law
 - Addressed navigation of harbors, not water quality
- 1912 - Public Health Service Act to study problems of sanitation, sewage and pollution
- 1915 to 1945 – World War I, Great Depression, World War II
- 1945 – The Surgeon General warns that over half of the U.S. population relied on drinking water supplies of “*doubtful purity*”
- 1948 - Federal Water Pollution Control Act. Weak law with no funding and no leadership
 - Amended in 1956, 1961, 1965, and 1966



The Clean Water Act of 1972 – A Home Run!

- 1970 – First earth day, social activism proven during the Vietnam War tackles the environment
- 1970 – EPA created, Leadership void filled!
- 1972 – Federal Water Pollution Control Act (1948) amended and now known as the Clean Water Act (CWA).
 - Established water quality standards
 - Established NPDES permit
 - Provided funding for construction of WWTPs - 90% federal, 5% state, and 5% local



Construction of WWTPs Biggest Bang for your Buck \$\$

- Franklin, NH
- Concord, NH
- Hooksett, NH
- Manchester, NH
- Nashua, NH
- Lowell, MA
- Lawrence , MA
- Haverhill, MA
- Newburyport, MA



Other Programs Followed to further improve Merrimack River Water Quality



- “Separated” collection systems were constructed to direct flows to WWTP
- 1980s – IPP
- 1990s - MS4
- 1994 - CSO Policy
- 2000s - Nutrients

Observations/Conclusions

- In my lifetime the Merrimack River has gone from un-swimmable, unsightly, and underutilized to.....
- The Merrimack River is the cleanest and healthiest it has been in 200 years
- Fully recreational above Amoskeag Falls
 - Swimming
 - Boating
 - Water skiing
 - Fishing
 - Hiking



Observations/Conclusions

- The CWA was one of the most significant and successful engineering achievements over the past 100 years
- The CWA has cleaned the nation's waterways in 50 years.
- The CWA has established environmental stewardship as one of our nation's priorities



Observations/Conclusions

- Merrimack River has become an economic engine once again.....this time in a more environmentally responsible manner
 - Sustainable – No collateral damage
- Textile mill buildings are thriving once again along the bank of the Merrimack River
 - NEIWPCC – Wannalancit Mills
 - CDM Smith - Jefferson Mill
- Merrimack River continues to be an inspiration to the next generations of environmentalists and beatniks



Questions?



**EPD Campus
in Manchester
along the
Mighty Merrimack**

