5-6-2005

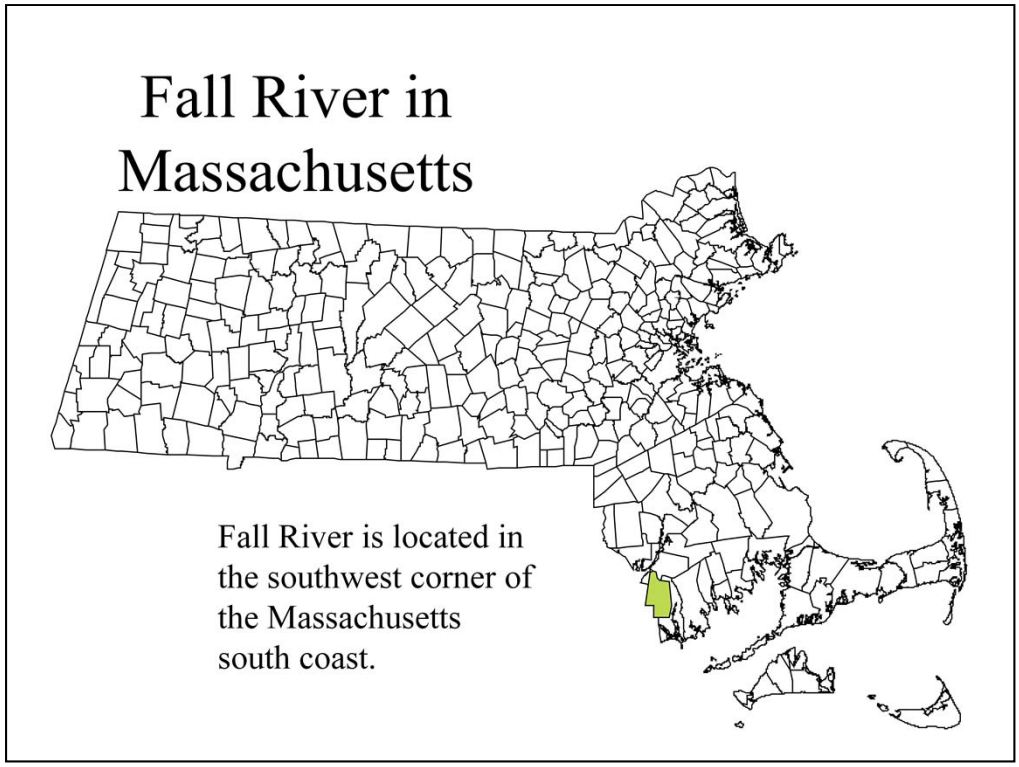
Cleaning the Quequechan River

Cleaning The Quequechan

Hello! Our project is about the Quequechan River, how it has been abused, what its current condition is, and what is being done to improve it.

The Kuss Middle School Environmental Club

This is our Kuss Middle School environmental club. From left to right we are: Eric, Jon, Jamie, Vincente, Christina, Kendra, and Shayna.We are from the city of Fall River.



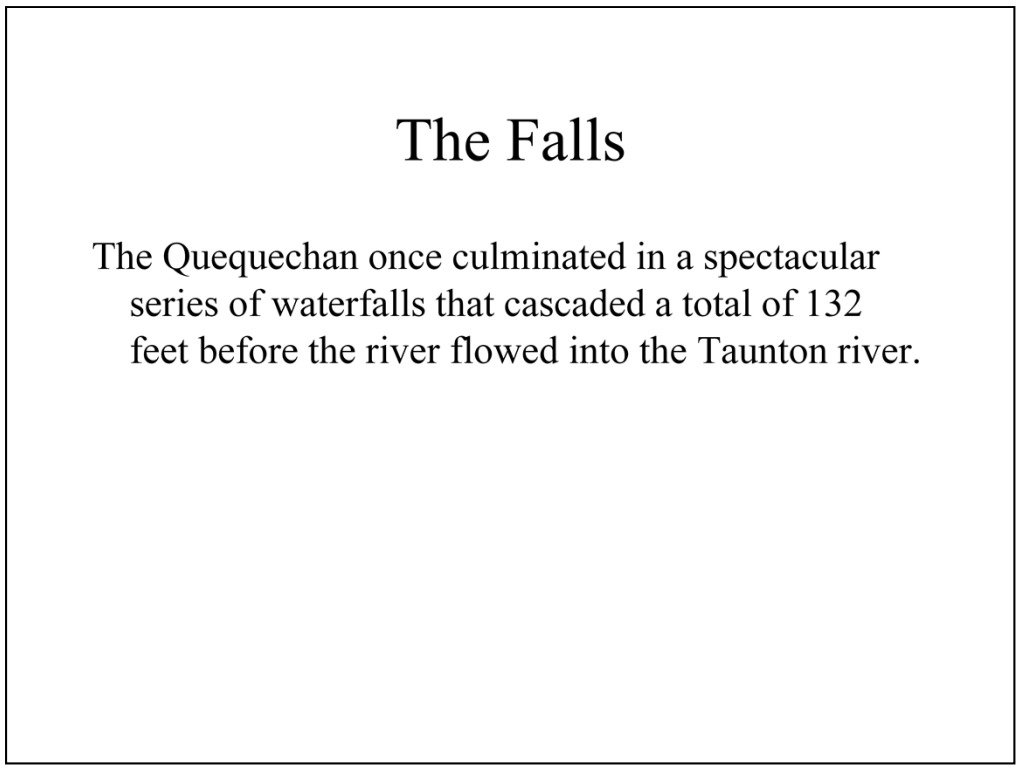
Fall River is located in the southwest corner of the Massachusetts south coast.

The Quequechan River runs through the heart of Fall River, flowing from the Watuppa Pond at the top left of the picture, underneath route 195, underneath city hall, until it is about 3 miles from the pond, when it flows down to Battleship Cove and into the Taunton River at the bottom right of the picture.

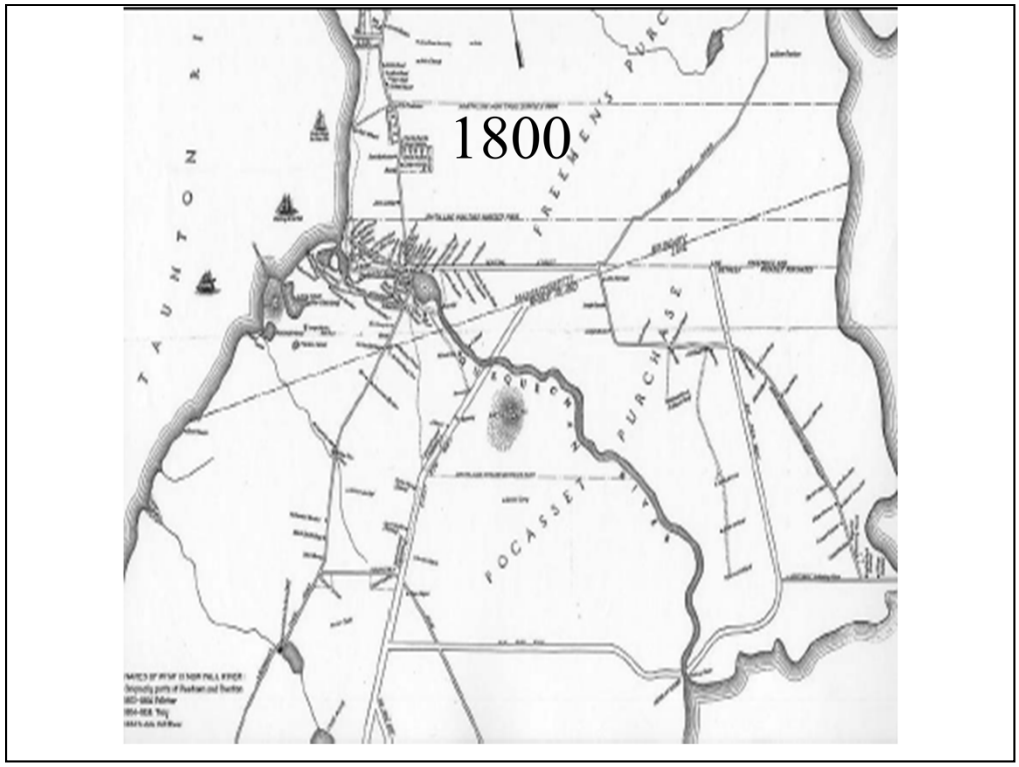
History

Fall River derives its very name from the Quequechan River. The name “Quequechan” means “falling river” in the Wampnoag Indian language.

Fall River derives its very name from the Quequechan River. The name “Quequechan” means “falling river” in the Wampanoag Indian language.



The Quequechan once culminated in a spectacular series of waterfalls that cascaded a total of 132 feet before the river flowed into the Taunton river.



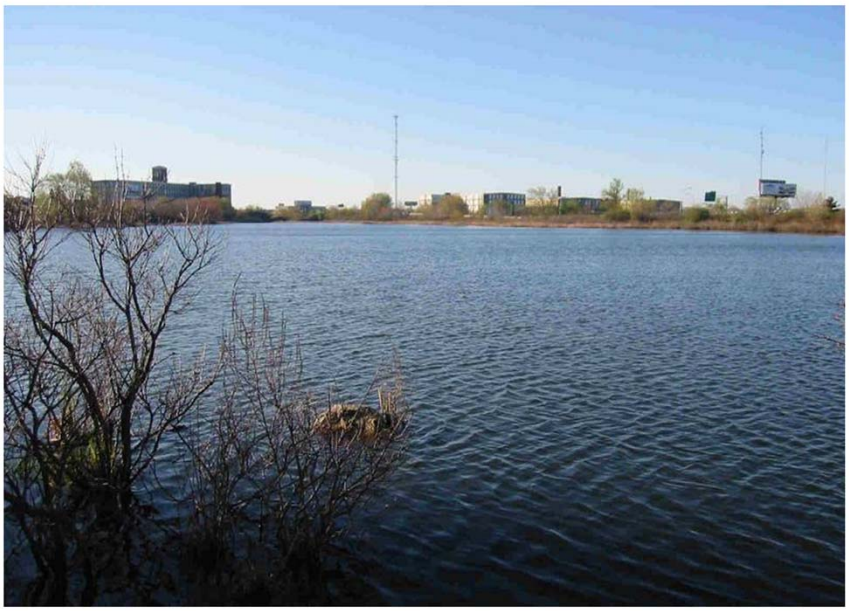
As late as 1800, the Quequechan still had the look of a river. (The river flows up and to the left in this map, from the Watuppa Pond to the Taunton River).

The young city grew up along the river, and the Quequechan’s power provided the energy to run the textile mills built along the river’s edge.

The Culvert

As new sources of energy were found, and the mills no longer relied upon the river for power, the beautiful river and its spectacular falls were forced underneath the city until it re-emerges near the Taunton River. Here is a culvert where the river is forced to travel underground.

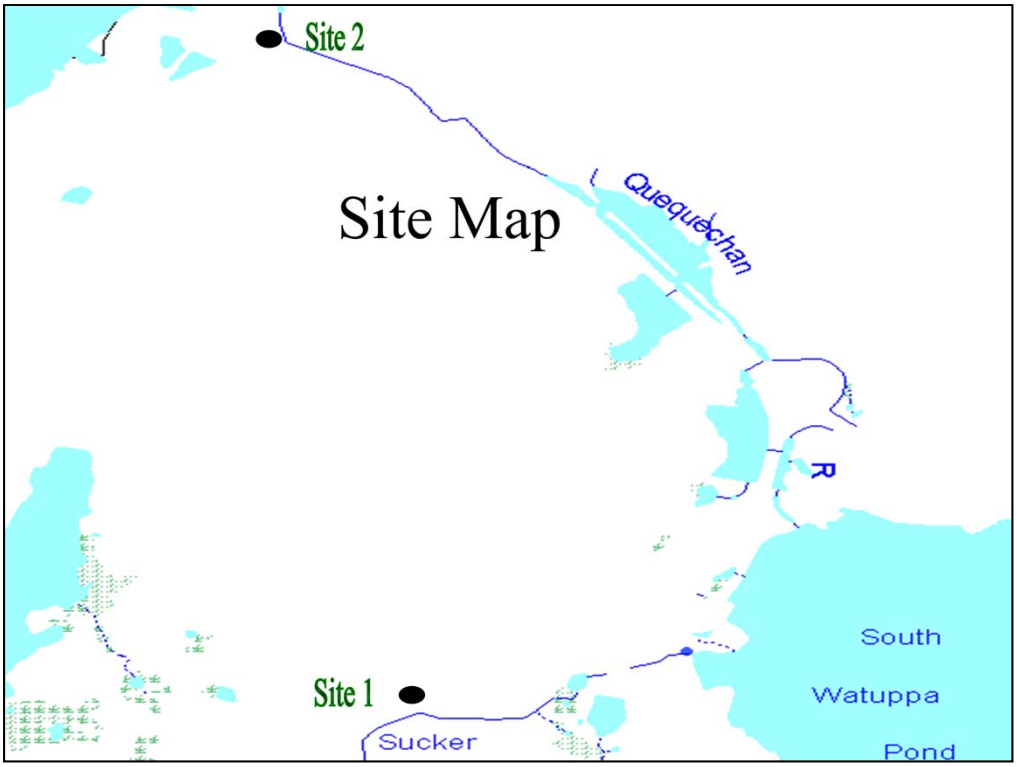
Quequechan “Pond”



In front of the culvert there is almost no current flow, making it impossible for us to select a site upstream to study. We had to select a site that flows into Watuppa pond near the head of the Quequechan. In the distance you can see the highway and the mills that once got their power from the river.

Emerging River

Here the river emerges from underneath a textile mill in downtown Fall River. The supports for highway ramps and the Braga Bridge are decorated with graffiti.



Here you can see our first site at Sucker Brook near the bottom of the screen. The brook is located outside of Fall River in a rural area. It flows into Watuppa Pond near the head of the Quequechan River. Our second site is located at the top of the screen. It is below the city's center where the river emerges from underground.

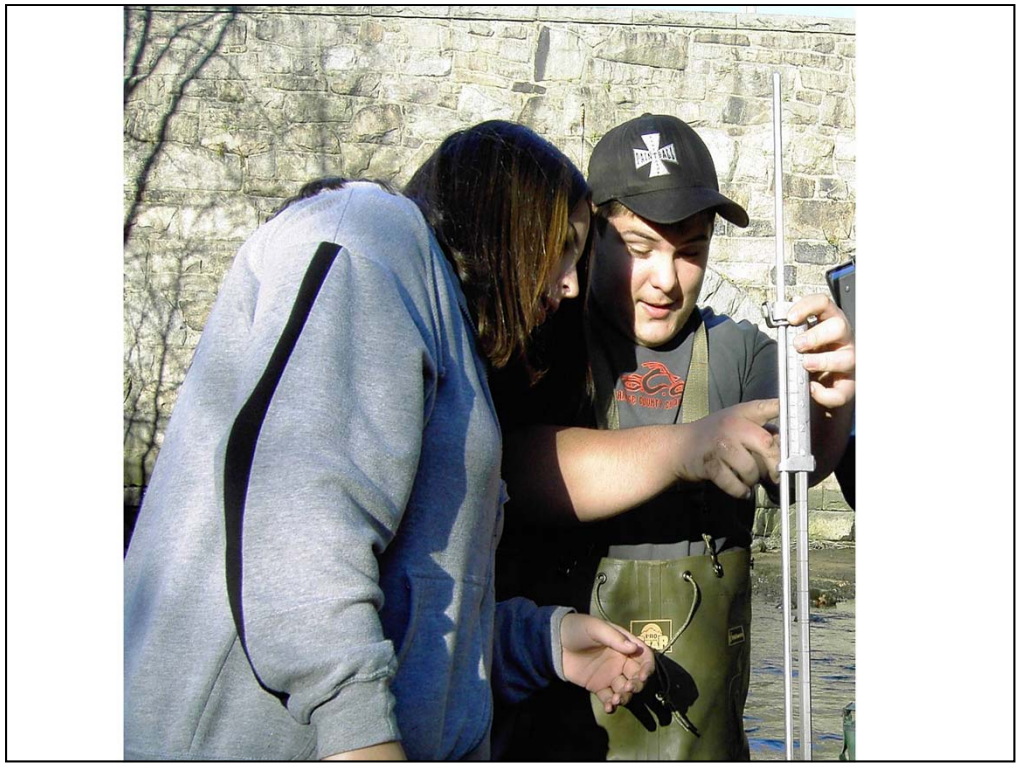
Our Question

- What effect does flowing through the center of Fall River, with its litter, with run-off from nearby parking lots and streets, and with possible sewerage overflows, have on the water quality of the Quequechan River?

Our Question - What effect does flowing through the center of Fall River, with its litter, with run-off from nearby parking lots and streets, and with possible sewerage overflows, have on the water quality of the Quequechan River?

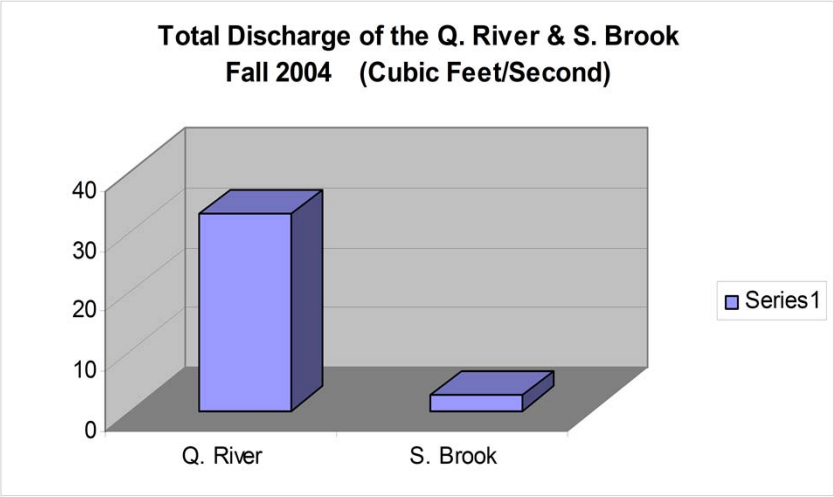
Current Conditions

Now we want to display the data we collected during this 2004-2005 school year.



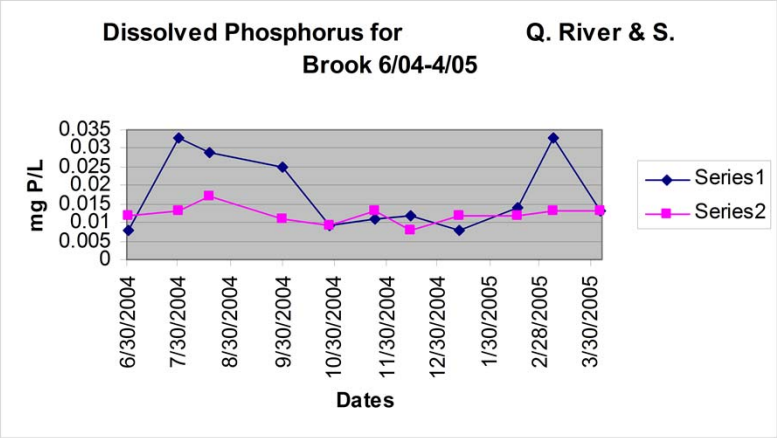
Here, Kayla and Jonathan measure the depth and flow rate at the Quequechan River.

Total Discharge



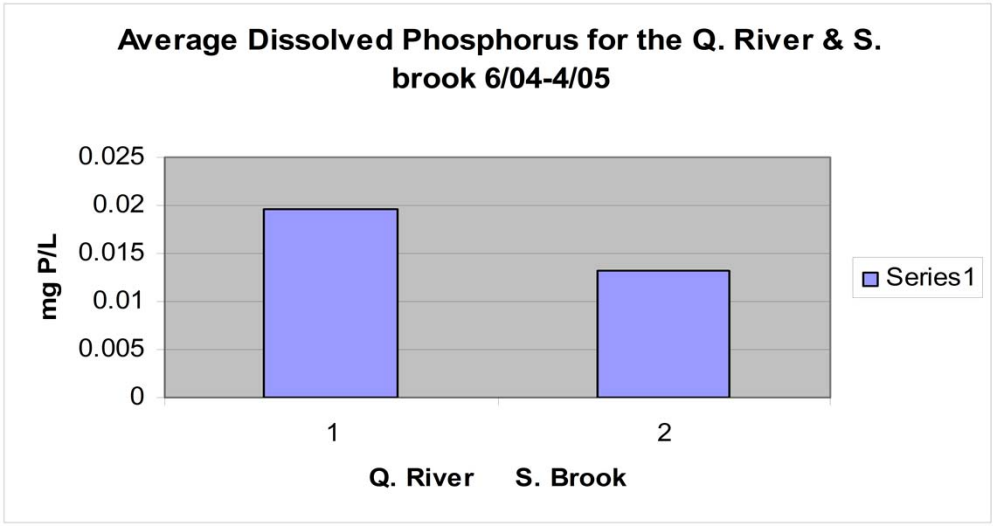
The total Discharge for the Quequechan River was 33 cubic feet of water per second. Total discharge for Sucker Brook was only 2.7 cfs.

Dissolved Phosphorus 6/04-4/05

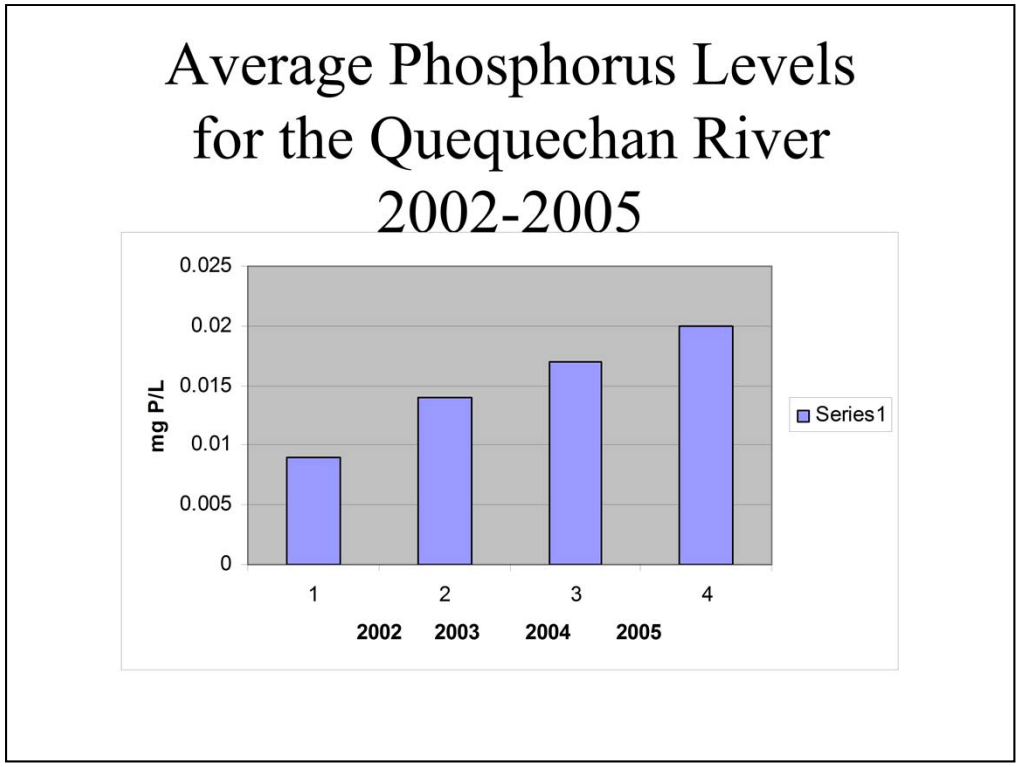


The dissolved phosphorus for the Quequechan was higher than the levels at Sucker Brook, peaking in the summer, and again this spring.

Average Dissolved Phosphorus Levels 6/04-4/05

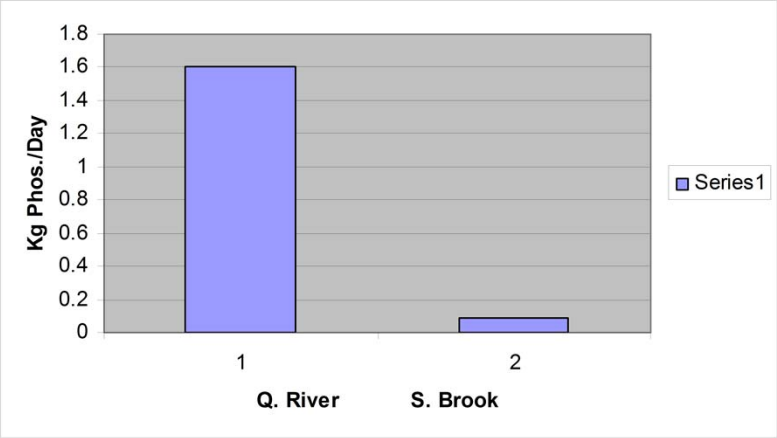


Average dissolved phosphorus levels were higher at the Quequechan River than they were for the same time period at Sucker Brook.



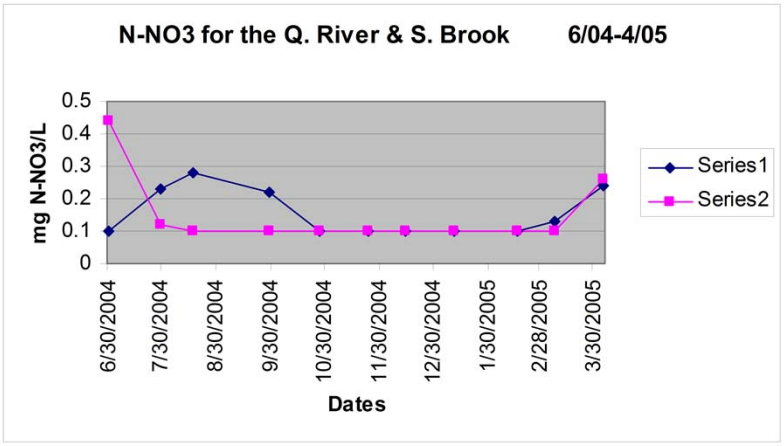
The average phosphorus levels for the Quequechan River have increased every year since 2002!

Phosphorus Load 2005



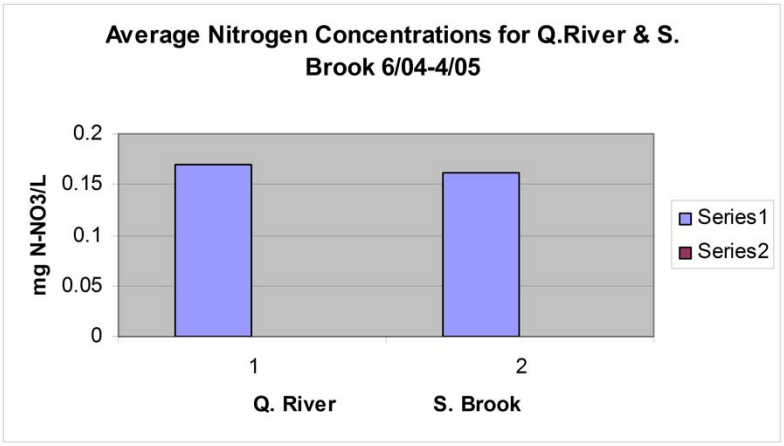
The phosphorus load was much greater for the Quequechan, partly because of the higher phosphorus levels, but also because the Quequechan had a bigger discharge of water. (Load #'s are based on the flow data we gathered on 10/11/02 at Q. river & 11/15/02 at S. brook).

Nitrogen Concentrations 6/04-4/05

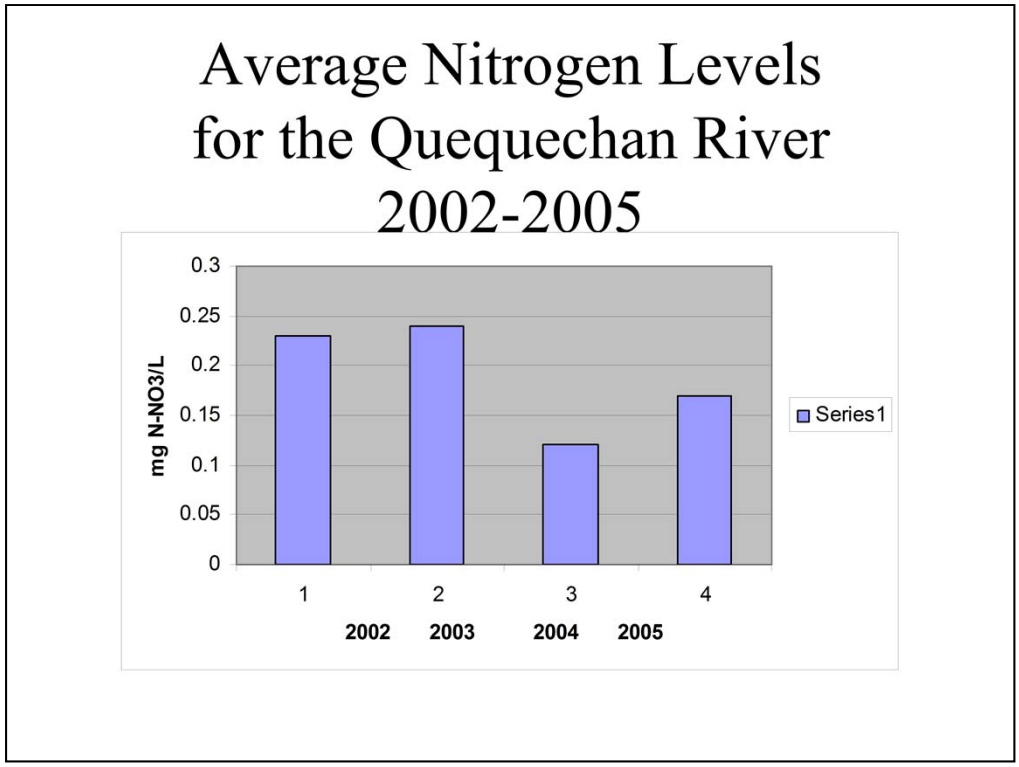


High nitrogen levels of 0.44 mg/L in June dropped down to more acceptable levels by July at Sucker Brook. But nitrogen levels at the Quequechan peaked during July and August.

Average Nitrogen Levels 6/04-4/05

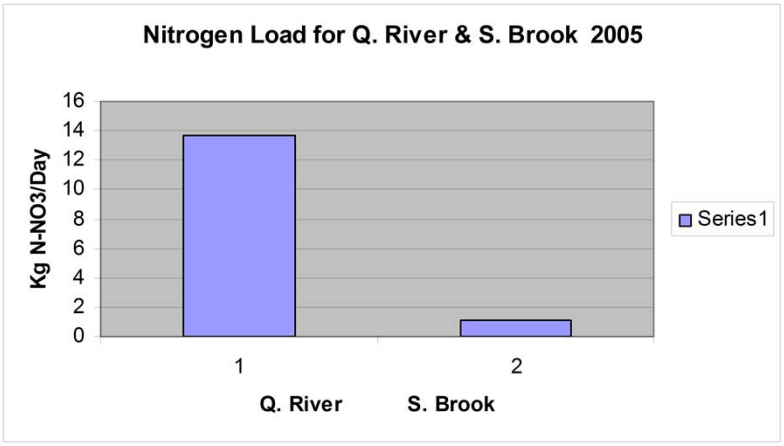


Concentration levels of nitrogen were slightly lower at Sucker Brook than they were over the same time period at the Quequechan River.



While not as low as last year, the average nitrogen concentration for the Quequechan River is still lower than 2002-2003 levels.

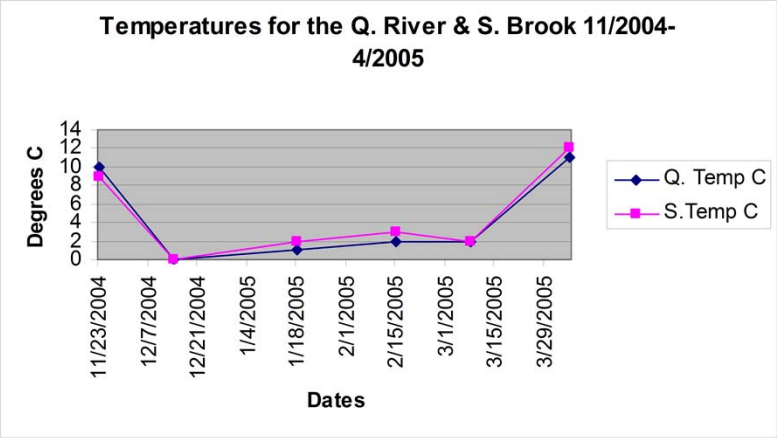
Nitrogen Load 2005



The nitrogen load is much greater for the Quequechan River, even though its ave. % concentration was only slightlly higher than Sucker Brook's, because the river had a higher discharge of water.

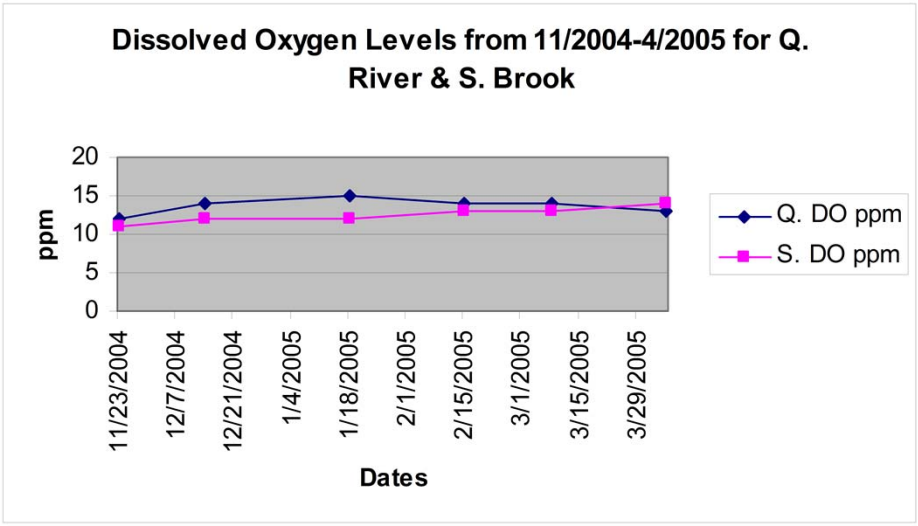
(Load #'s are based on the flow data we gathered on 10/11/02 at Q. river & 11/15/02 at S. brook).

Temperatures 11/23/04-4/5/05



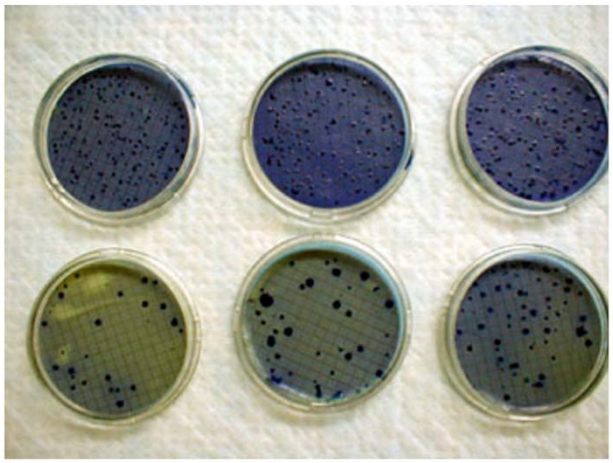
As we might expect, the temperature declined in the Fall and increased in the Spring. The Q. River was slightly lower in temperature for most of the sample period compared to Sucker Brook.

Dissolved Oxygen Levels 11/23/04-4/5/05



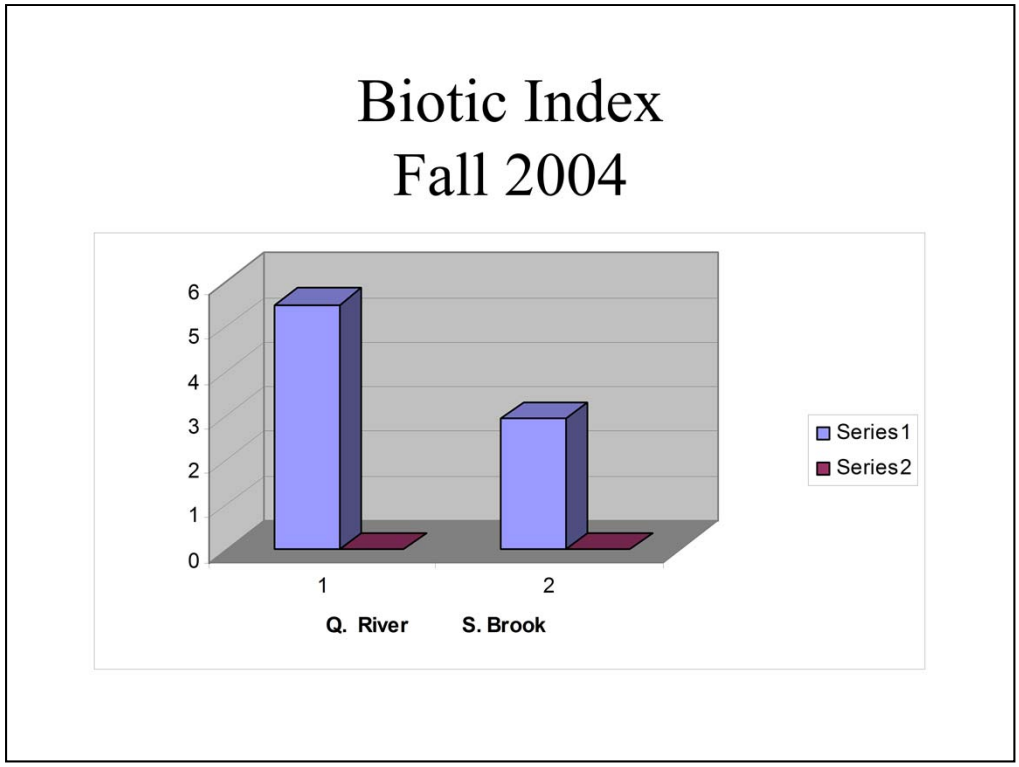
The dissolved oxygen levels were slightly higher for the Quequechan River than they were for Sucker Brook.

Fecal Coliform Bacterial Growth 3/22/05



The bacteria samples pictured above are from out testing done in March of 2003. This year we do not have photos of bacteria colonies from the Quequechan, because for the first time since we started testing three years ago, the results for fecal coliform bacteria at the Quequechan River were negative!

Here Chris and Vincente begin to search for river macroinvertebrates.



Sucker Brook had a biotic index of 3.4 indicating that it was healthy stream. The Quequechan River had an index of 7.0 indicating that it was a severely impaired river.

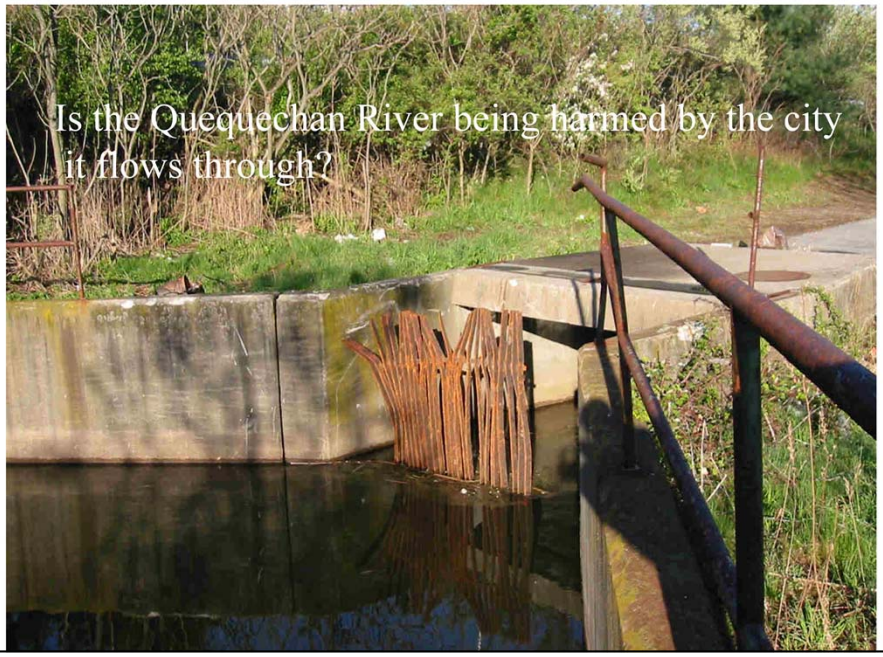
(The lower the index number, the healthier the river is. A index of 6.5 or more shows a severely damaged river because the animals living there are tolerant of pollution. The index is important because animals live in the river all year, so it's more like a video of river conditions over time instead of a snap shot. However, the samples we collected were weak because we were unable to collect a large enough sample of macroinvertebrates.)

Alternative Sampling Method

- Olyssa Starry of the Urban Environmental Institute collected organisms from the Quequechan River over a period of several months this year.
- She compared organisms feeding on decomposing Norway Maple leaves with those feeding upon decaying Red Maple leaves.
- She discovered a much greater variety of organisms using this alternative method, perhaps indicating a healthier river than the one we had found downstream.

Olyssa Starry of the Urban Environmental Institute collected organisms from the Quequechan River over a period of several months this year. She compared organisms feeding on decomposing Norway Maple leaves with those feeding upon decaying Red Maple leaves. She discovered a much greater variety of organisms using this alternative method, perhaps indicating a healthier river than the one we had found downstream.

Summary



Is the Quequechan River being harmed by the city that surrounds it?

Biological implications

- The Quequechan River had a biotic index of 7.0 indicating a river severely impaired.
- It had an abundance of scuds which are tolerant of polluted conditions.

Upstream, Ms. Starry found a healthier river with more diversity even though the river's flow rate was much less.

The Quequechan River had a biotic index of 7.0 indicating a river severely impaired. It had an abundance of scuds which are tolerant of polluted conditions. Upstream, Ms. Starry, using a different collection method, found a healthier river with more diversity even though the river's flow rate was much less.

Nutrient Evidence

- Phosphorus levels have steadily increased over the last four years in the Quequechan River.
- Since phosphorus is a limiting factor in fresh water, such an increase could cause undesirable excessive plant growth.

Phosphorus levels have steadily increased over the last four years in the Quequechan River.

Since phosphorus is a limiting factor in fresh water, such an increase could cause undesirable excessive plant growth.

(Where is that extra phosphorus coming from? Laundry detergents and commercial cleaners)

Fecal Coliform Bacteria Evidence

For the first year, we had no fecal coliform bacteria colonies grow from the samples we collected. In 2004, and 2003 we had 10,000 and 4,000 colonies respectively. The improvement might have been due to the newly completed tunnel diverting sewer overflow, or it may have been due to a lack of rain prior to sample collection.

For the first year, we had no fecal coliform bacteria colonies grow from the samples we collected. In 2004, and 2003 we had 10,000 and 4,000 colonies respectively. The improvement might have been due to the newly completed tunnel diverting sewer overflow, or it may have been due to a lack of rain prior to sample collection. (The State considers levels over 200 fecal coliform colonies/100 mL sample to be unacceptable bacteria level for swimming.)

However, there is a strong possibility that our samples were Contaminated during the collection process. So the above data is not conclusive evidence of pollution.

Note – Mr. Farrell pulled a real bonehead play and lost the sterile collecting bags used to collect water samples, so we had to use new (but not sterile) plastic bags!

Conclusion

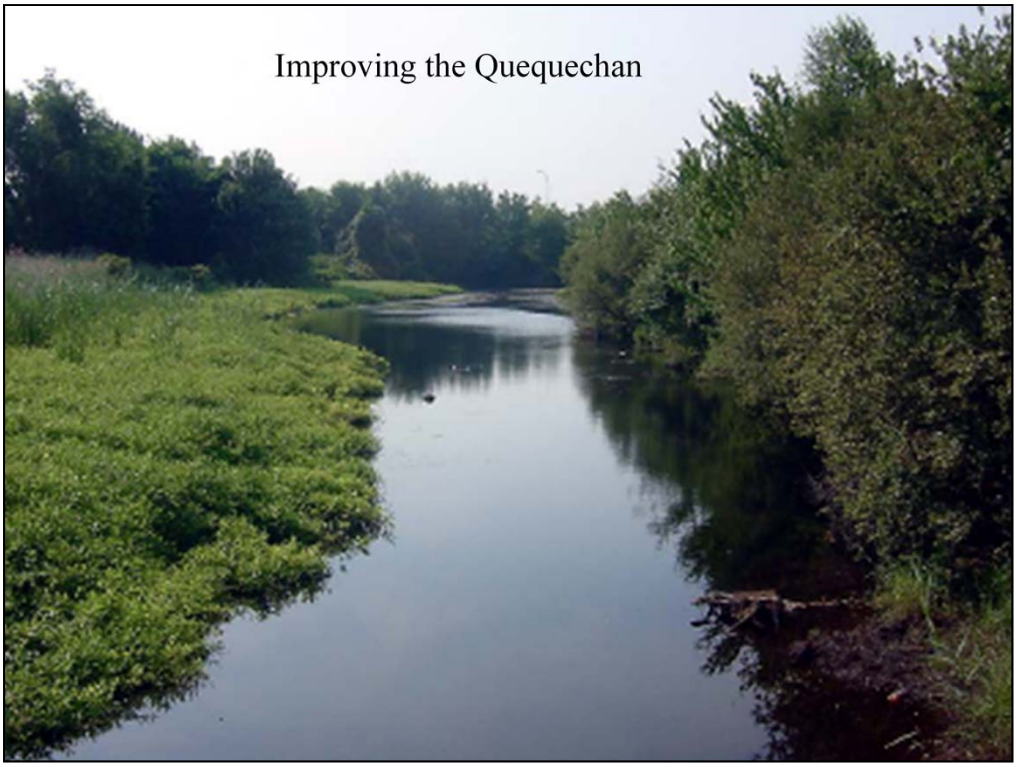
The abundance of pollution tolerant organisms living in the Quequechan river indicates a severe level of impairment at our sample site.

However, the variety of organisms found upstream from our sample site using the decomposing leaf method implies a healthier Quequechan.

- The effect of the culvert on the Quequechan may be the problem.
- It may be that tidal influences such as salinity help to degrade our sample site located near the mouth of the Quequechan as well.

The abundance of pollution tolerant organisms living in the Quequechan river indicates a severe level of impairment at our sample site.

However, the variety of organisms found upstream from our sample site using the decomposing leaf method implies a healthier Quequechan. The effect of the culvert on the Quequechan may be the problem. It may be that tidal influences such as salinity help to degrade our sample site located near the mouth of the Quequechan as well



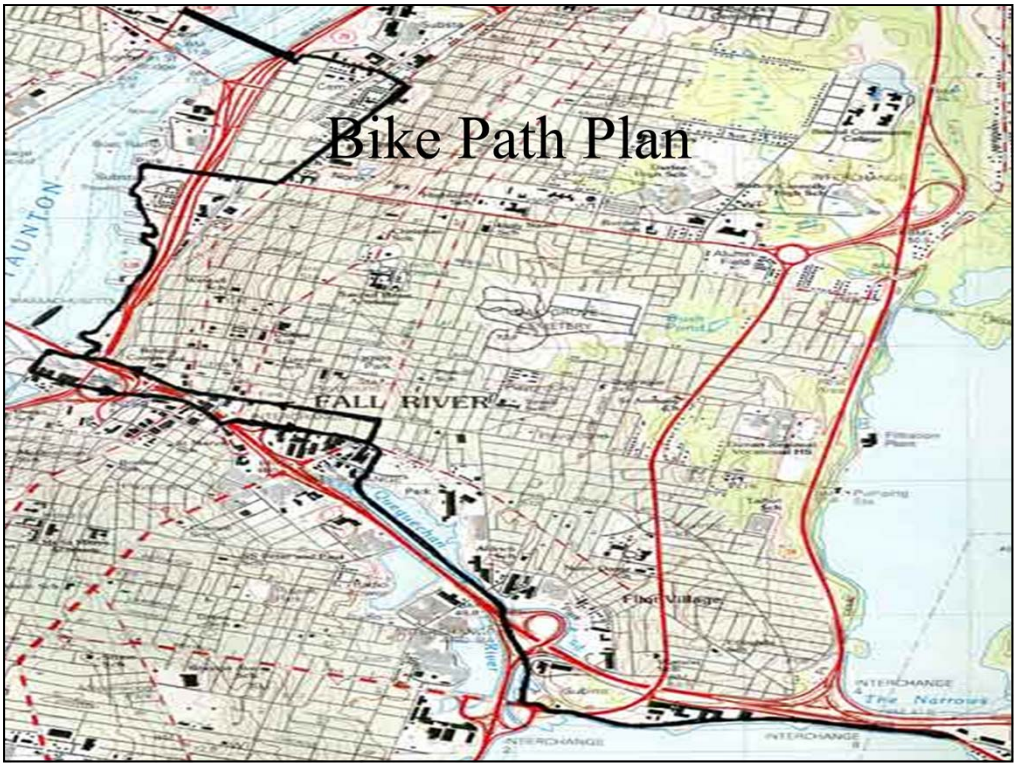
The city of Fall River and many of its citizens are beginning to understand what a wonderful resource is flowing through the heart of downtown.

One way the city is trying to improve the Quequechan is by building a huge tunnel to capture sewerage that, until now, would flow directly into the river during storms. The tunnel project is a 56 million dollar effort to protect the Quequechan River and Mt. Hope Bay into which the Quequechan flows.

The new tunnel project began near the Fall River waste water treatment plant near Mt. Hope Bay where a holding tank will keep the sewer water until the treatment plant can accept it.

This is the machine that cut the tunnel through solid granite across the width of Fall River.

Here the first sewer water flows through the new tunnel on its way to the holding tank next to the Fall River wastewater treatment plant.



Urban River Visions and Green Futures, a local environmental group, sponsored a charette about the Quequechan River. A comprehensive plan was created which included the plan for a bike path along the river that you see here. The master plan also includes a landing area for canoes, a circuit walk around part of the river, and daylighting the river and its spectacular waterfalls.

We believe that the more people begin to use this wonderful resource, the more they will care for their river. And the neglect and abuse of the Quequechan River will be a thing of the past.