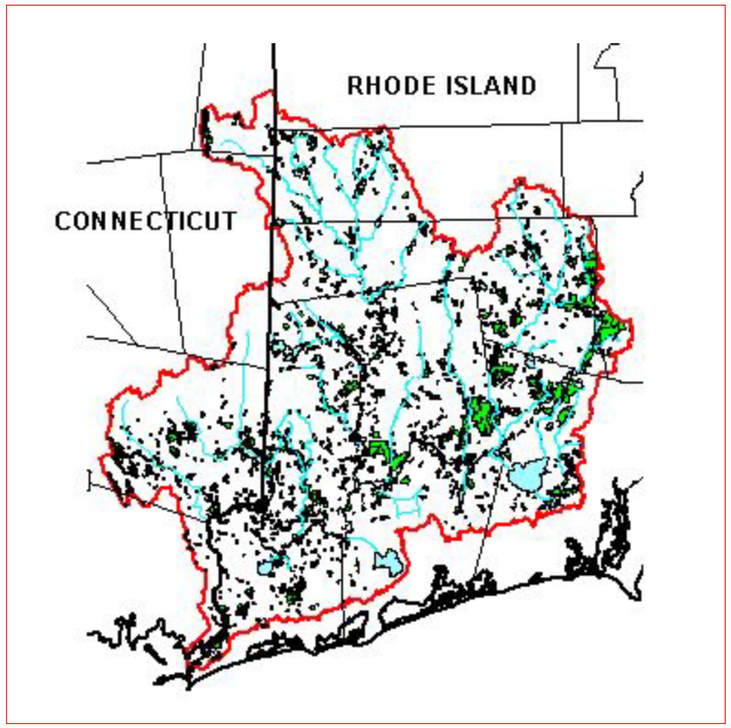
The Pawcatuck Watershed



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University of Rhode Island Coastal Resources Center
United States Environmental Protection Agency

NRCS
Natural Resources Conservation Service

The Pawcatuck Watershed Water Use Optimization Project

BACKGROUND

The Pawcatuck Watershed is home to some of the most pristine water resources in all of southern New England, providing prime trout habitat, outstanding recreational opportunities, and a home to rare and threatened species. The region is also home to some of the most productive agricultural lands in the Northeast. Farmland is located throughout the watershed, but is especially concentrated in the river valleys, where glacial outwash deposits provide significant groundwater aquifers. Farmers historically have relied on streams and groundwater fed ponds for irrigation water supplies. Approximately 3500 acres of cropland are irrigated in the watershed.

The area is also under extreme development pressure. New development relies on groundwater supplies to provide well water for homes and businesses. Seven new golf courses have been constructed in the watershed over the past 10 years, and two other courses are planned. These also rely on the groundwater aquifers and streams to meet water needs. Water use has grown to the point where demand threatens to exceed supply. At the same time, the RI Water Resources Board is investigating new large volume well sites for future development of statewide public drinking water supplies.

THE PROBLEM

Farmers need water to irrigate their crops during the dry summer months. Typically, watershed streams are naturally at their lowest levels during the same periods. As a result, in the past, farmers have been "harassed" by angry citizens who are concerned about fish habitat and noisy pumps. They have been subjected to letters ordering them to "cease all non-essential water use" from state regulatory agencies. While many of these issues have subsided over the past few years as the general public and RIDEM better understand the farmers' needs, farmers in general still feel threatened with the potential loss of their right to the water when they need it most.

Towns are faced with increasing development pressures as the area grows in response to shifting populations and land development priorities. Ten years ago, "development" largely meant small businesses and residential subdivisions. These return most of their water use to the ground via individual septic systems. The current trend is for larger projects, such as the proposed Job Corps training facility at Ladd School in Exeter. While these new uses still rely on ISDS systems

for sewage disposal, their total water needs may be much higher on a "per acre" basis. Unfortunately, neither the state nor the towns have the scientific information they need regarding water supply/availability to make effective long range planning decisions or to evaluate site specific and cumulative impacts of development proposals. As such, new development in the watershed only aggravates the problem, as new homes, businesses, golf courses, etc., compete for the limited water supplies.

We do not know whether we have enough water to meet all current and future needs without jeopardizing the economic or environmental stability of the region.

THE SOLUTION

As a result of continued concern over irrigation water use in the watershed, NRCS consulted with its National Water Management Center, housed in Little Rock, Arkansas. The Center recommended development of a watershed wide "Conjunctive Use Optimization Model" to better assess existing water use needs, and strategically plan for new uses.

What is a "Conjunctive Use Optimization Model"? Very simply, it looks at the combined (conjunctive) uses and provides a look at how to balance (optimize) uses. It requires the development of two computer models, one that looks at groundwater availability and flow patterns, and one that does the same for surface water. The two models are then "linked" to interact with one another (or used conjunctively) to illustrate the integrated effects of water use in the watershed. For instance, as water is withdrawn from a well, the model will illustrate the reduction in groundwater flow to nearby streams. The "Optimization" component adds in management constraints specified in the model. For instance, we will be able to program the model to tell us where to locate an irrigation well to optimize yield and minimize impacts to the stream for a specific farm or for a collection of farms in an agricultural valley.

Once developed, the model will help aid all water users and decision-makers as follows:

- It will determine impacts of both existing and potential future water withdrawals on stream and groundwater levels.
- It will aid decision-makers and stakeholders in determining if the minimum stream flow needed to support aquatic habitat can be maintained, while minimizing impacts to businesses.
- It will optimize the location and rates of new water withdrawals in order to maintain specified minimum stream flows, ground water levels, and supply for established or priority users.
- This model could be used by the state to assess different management schemes, their effect on stream flows, and their effect on existing water users prior to establishing regulations or criteria that serve to limit water use by large volume users. Without the model, the state will most likely develop water use allocations based on limited knowledge of the resulting impact on both the resources and the businesses that rely on readily available water.
- It will help towns guide development to areas adequately capable of meeting water demands while maintaining stream flows, and avoid development in areas not capable of meeting those criteria.
- The model can help define the sustainable yield for the hydrologic system, both surface and groundwater, over the long term.

NRCS received an initial allocation to begin development of the model in 2002. NRCS will partner with the RI Water Resources Board, the United States Geological Survey, the Southern RI Conservation District, and others to manage the development of the model and involve the public, municipalities, farmers, and others in key decisions along the way.

NRCS GOALS FOR THIS PROJECT

1. Develop a tool to evaluate site specific and cumulative effects of surface and groundwater withdrawals for agriculture over time.
2. Develop a tool to assist siting/locating a well to maximize yield potential and minimize impacts to aquatic environments and other users.
3. Use the tool to aid in formulating alternatives, evaluating alternatives, and producing a long term management scheme for agricultural users that meets their needs and protects other users and the environment, in the context of existing/developing legal frameworks.
4. Provide a tool for municipalities and state agencies to use in evaluating new development proposals and/or new water uses.
5. Provide a scientific framework to allow sustainable irrigation and continued agricultural production in the watershed.
6. Provide information to minimize further regulatory burdens on the farm community.
7. Provide a tool for state agencies and municipalities to best manage the use of the water resources over time.

Provide the scientific information needed to help resolve water use conflicts!

TIMELINE

Development of the model may take up to 3 years. An additional year will be needed to run various management scenarios. Following that, the model will need to be updated on a regular basis as land use changes in the watershed, and as towns and other interested parties request evaluations of site specific projects.

In order to maximize the use of the model, a sustained funding source for its long term maintenance and use will need to be developed.