

Exeter River Watershed Program Status Report – August 2006

Why is the program needed?

The Exeter River Watershed Program strives to balance all uses of the Exeter River through strong partnerships and decision-making based on sound science. The issues addressed by the program are vital to the successful continued use of the Exeter River as a water supply, fish and wildlife habitat, and recreation destination.

For years, flooding, degrading water quality, declining fish populations, and other issues, possibly related to the Great Dam, have been steadily building on one another in Exeter. These overlapping concerns have created a complex web of regulatory requirements on the Great Dam, Colcord Dam and their impoundments.

The Exeter River Watershed Program goal is to develop management plans that bring together science and policy to address the multiple issues and regulations that come into play when managing this natural resource. This is important because looking at the issues individually could actually result in making one or more of the problems worse.

As of summer 2006, there are four project components under the Exeter River Watershed Program including: Exeter River Study, Lake Level Investigation, Exeter River Watershed Restoration Plan, and Biomonitoring Study. This report summary focuses on the Exeter River Study, which examines water quality and quantity in and around Great Dam. Learning more about the discharge capacity of Great Dam and water flows upstream of the dam is essential in understanding the flooding problems facing Exeter residents. Information collected by this study will also be used by the DES Dam Bureau for the Lake Level Investigation, which will ultimately result in a dam operation plan.

Although the initial focus of the Exeter Watershed Program is the Great Dam, a larger, more comprehensive watershed approach is planned. These program components, the Exeter River Watershed Restoration Plan and Biomonitoring Study, are also discussed in this summary.

Project partners, including the State of New Hampshire, Town of Exeter, Rockingham Planning Commission and others have all contributed money and staff expertise to the projects.

Issues Addressed in the Exeter River Watershed Program

- Flooding problems along the Exeter River, affecting residents and property owners along the river.
- Fluctuating water levels in the impoundment, affecting residents and recreational boaters.
- Increasing water supply demands.
- Degrading water quality, affecting fish habitat and water supply.
- Degrading plant and wildlife habitat along the river, affecting the ecological health and well being of the area.
- Declining fish populations, affecting fishermen and the overall aquatic ecosystem in the river, Great Bay and the Gulf of Maine.

What is the Exeter River Watershed?

The Exeter River is 32 miles long and the watershed, or drainage area, covers an area of approximately 67,700 acres in Rockingham County. Towns in the Exeter River Watershed are Brentwood, Chester, Danville, East Kingston, Exeter, Fremont, Kensington, Kingston, Raymond and Sandown. A very small portion of each of five additional towns (Candia, Derry, Epping, Hampstead and Hampton Falls) are also within the watershed.

What is the program's background?

- 1995--The Exeter River is designated under the New Hampshire River Management and Protection Program. The program was established in 1988 with the passage of RSA 483 to protect certain rivers, called designated rivers, for their outstanding natural and cultural resources. Learn more about the program at <http://www.des.nh.gov/rivers/> or (603) 271-8801.
- 1996--Water quality monitoring periodically since 1996 by New Hampshire Fish and Game, the University of New Hampshire and DES records dissolved oxygen (DO) levels below five mg/l within the Great Dam impoundment, indicating poor water quality conditions for migrating and resident fish. A DO between two and five mg/l is stressful to fish and could be lethal either in the short term or long term; two mg/l and below is lethal. Any DO below five mg/l is either lethal or detrimental to migrating fish. Restoring good water quality is essential for the continuation of diadromous fish restoration on the Exeter River, and this is a major concern for New Hampshire Fish and Game.
- 2000--New Hampshire Fish and Game completes modifications to the Exeter River fish ladder. River herring runs increased in 2001 and 2002, but since 2003, has plummeted to record lows.
- 2000--Town of Exeter is notified by DES that Great Dam doesn't meet 100-year flood requirements. A 100-year storm event, or recurrence interval, has a one percent chance of occurring in any given year.
- 2004--Following a change in New Hampshire state law, which established discharge capacity requirements for existing dams, the Town of Exeter is notified by DES that Great Dam doesn't meet 50-year flood requirements. A 50-year recurrence has a two percent chance of occurring in any given year.
- 2004--Exeter residents request a Lake Level Investigation by the DES Dam Bureau. Requests for this investigation can be made by property owners who feel that changing levels of water are resulting in property damage. Investigation procedures are set forth by New Hampshire state law.
- 2005--Town notified by DES that it is required to address water quality issues associated with upgrades to its water treatment plant.
- 2006--The Exeter River in Exeter is listed as impaired on the 2006 303 (d) list, which means it did not meet state water quality standards.

What are the program's accomplishments?

- 2001-2003--A cooperative study between the U.S. Geological Survey and the New Hampshire Coastal Program at DES examined the connection between development and water quality in the Seacoast. Three of the study's sampling sites were located in the Exeter River Watershed. A report detailing the results was released in 2005. To view the report, visit <http://pubs.usgs.gov/sir/2005/5103/>
- August, 2004--The Exeter River Study Committee is established by the Exeter Board of Selectmen. The committee includes a selectman as chairman, three citizens, the water and sewer superintendent, the town engineer, the fire chief, and a representative from the Conservation Commission, Planning Board, Water and Sewer Advisory Committee, Phillips Exeter Academy and The Mill. The Committee meets monthly and is charged with providing advice to the Board of Selectmen in all matters relating to the management of the Exeter River, its tributaries and watershed. Note: This group differs from the Exeter River Local Advisory Committee that was formed as a result of the Designated River Nomination in 1995.
- 2004-2005--The New Hampshire Coastal Program at DES brings stakeholders together to talk about a multi-partner effort to address the issues facing the Exeter River Watershed. This partnership includes other DES programs, including the Dam Bureau and Watershed Assistance Section, the Town of Exeter, New Hampshire Fish and Game and the Rockingham Planning Commission.
- Spring/Summer, 2005-- Public and agency input on the Exeter River Study is gathered during a series of public meetings facilitated by the Rockingham Planning Commission.
- May, 2005-- Public hearing is held by the DES Dam Bureau to receive testimony for the Lake Level Investigation.
- February, 2006--The consultant provides an interim report on the Exeter River Study, describing the 2005 activities. To view the report, visit <http://town.exeter.nh.us/tm/river/riverinterim.pdf>
- Spring, 2006--Draft project proposal is negotiated for the Exeter River Watershed Restoration Plan. This project will include looking at water quality in the Exeter River's subwatersheds and developing watershed-based management plans to protect and restore water quality and habitat.

Who are the program partners and what are their roles?

Program Partner	Role
DES New Hampshire Coastal Program	Takes the program lead; coordinates program partners; provided \$20,000 to overall program, and between \$10,000-15,000 in staff time; provided funding through annual contract with the Rockingham Planning Commission; coordinates biomonitoring study.
Town of Exeter	Town has contributed \$75,000 in total to the consultant Wright-Pierce to conduct the Exeter River Study, \$25,000 in 2005 and \$50,000 in 2006; town staff helps define management problems and works with consultant.
Exeter River Study Committee (Committee established in 2004 by Exeter Board of Selectmen)	Advises Board of Selectmen in all matters relating to the management of the Exeter River, its tributaries and watershed; provides input on consultant's activities on the Exeter River Study.
DES Dam Bureau	Inspects dam condition; conducts Lake Level Investigation; gives input on Great Dam impoundment levels.
DES Watershed Assistance Section	Coordinates Exeter River watershed-based planning with Exeter River Local Advisory Committee and the Rockingham Planning Commission
New Hampshire Fish and Game	Gives input on dam operation and habitat concerns related to fishery management.
Exeter River Local Advisory Committee (a committee authorized under state statute with representatives from Danville, Raymond, Sandown, Kingston, East Kingston, Brentwood, Kensington, Chester and Exeter)	Helps define management problems; provides information and feedback on program projects; provides linkages to the other towns in the watershed; partner in watershed-based planning effort.
Rockingham Planning Commission	Facilitates stakeholder, agency and public input; serves as liaison to Exeter River Local Advisory Committee and Town of Exeter; DES contractor for watershed-based planning activities.

Exeter River Watershed Program Projects:

Exeter River Study

What data has been collected by the consultant and what is it telling us?

The consultant's work provides information necessary to understand existing water quality and quantity concerns on the Exeter River. Also included was an assessment of funding opportunities for potential Exeter River infrastructure improvements and the evaluation of the feasibility and

costs of automated impoundment level monitoring equipment. To view the full text of the Exeter River Study Interim 2005 Report, visit <http://town.exeter.nh.us/tm/river/riverinterim.pdf>

Data highlights as provided by the consultant:

- The Great Dam spillway capacity is inadequate (page 7-11). Its capacity was evaluated for a range of flows, including values for 50 and 100 year peak flows, "...but the analysis of spillway capacity with the low-level gate in the fully-open position indicates that the overtopping of the right abutment will occur at a flow of approximately 2,650 cfs (cubic feet per second). The return interval of this event is less than 10-years..." (page 7-11).
- Discharge capacity of the gate is inadequate to have a significant affect on upstream flooding. According to page 10-6 of the report, "...the gate has a marginal capacity to regulate upstream water levels at flows higher than approximately 250-cfs" (cubic feet per second).
- In the months of July and August, dissolved oxygen levels are in general decline in the lower reaches of the Exeter River, with the lowest levels in the impoundment just upstream of the dam. In addition, levels of dissolved oxygen measured from a sampling station on the fish ladder were consistently low, posing a risk to migrating fish that require oxygen to breathe. Refer to page 5-19 for figures of sampling dates, locations and results.
- Sedimentation and channel configuration play a significant role in flood water elevations on the Exeter and Little Rivers. "During periods of lower flows...hydraulic effects associated with the Great Dam backwater could be augmented by channel control within the reach of the Exeter River downstream of the Court Street Bridge. In this case, water surface elevations in the affected reach of the river would be a function of both the backwater and limited hydraulic conveyance within the channel," (page 4-2). This is based on a qualitative assessment of the river and not yet been measured precisely.

What are the next steps for the Exeter River Study?

- Summer, 2006--Exeter River Study Committee uses the consultant's 2005 findings, agency and public input to develop the scope of work and identify the next steps for the remainder of the study's data gathering.
- Summer, Fall 2006--Consultant will conduct 2006 activities, including evaluating modifications to Great Dam and how those modifications will mitigate upstream flooding, examining what water flows are necessary to maintain fish habitat and continuing to study aspects of water quality, and conducting river depth profiles to better understand the hydraulics and backwater.
- Early 2007--Consultant will provide draft report.
- Mid-2007--Public invited to comment on draft report.
- 2007--Consultant provides finalized report.

Lake Level Investigation

In 2004, Exeter residents requested a Lake Level Investigation by the DES Dam Bureau. Requests for this investigation can be made by property owners who feel that changing levels of water are resulting in property damage. Investigation procedures are set forth by New Hampshire state law.

The Lake Level Investigation looks at the level at of the impoundment that can be set which balances the rights of individual land owners with the public interests associated with the impoundment. The investigation examines historic flowages and dam levels.

What has been done so far?

- An interim dam operation plan has been put in place. The interim plan was developed in collaboration between DES and the Town of Exeter Department of Public Works.
- A public hearing was held in May 2005, and public comment was received.

What are the next steps?

- A final decision will be issued upon completion and review of the ongoing studies/engineering analysis, also being conducted for the Exeter River Study by the consultant. The final dam operation plan will set the level of the river based on weather conditions, the need for water supply, the flooding concerns around the impoundment and wildlife impacts. As conditions change, the plan will tell the Town how to operate the dam to make sure flooding is lessened, fish can pass over the dam, and the river doesn't run dry.

For more information, contact Steve Doyon, DES Dam Bureau, (603) 271-1966, sdoyon@des.state.nh.us

Exeter River Watershed Restoration Plan

This project will include a classification and prioritization of all subwatersheds, or smaller units within a watershed, within the Exeter River Watershed. Pollution loading estimates for pollutants of concern and the necessary pollutant reductions to meet water quality standards will also be studied for selected subwatersheds.

Ultimately, subwatershed plans will be devised that identify actions needed to reduce pollution and address threats to water and habitat quality. The subwatershed plans will also include the costs and authority to implement the plans, an information and outreach component, a schedule for implementation, measurable milestones, success indicators and an evaluation plan to evaluate the effectiveness of implementation efforts over time.

What has been done so far?

- Data has been compiled for the watershed vulnerability analysis. The data and information are needed to understand the threats to water quality and the areas in need of restoration. Digital mapping information on the location and amount of impervious cover, wetlands and forest cover was collected. Chemical and biological water quality data from environmental monitoring was also compiled.
- An agreement is being negotiated between the Rockingham Planning Commission and DES to conduct the vulnerability analysis and create subwatershed management plans through public participation.

What are the next steps?

- This fall, the grant agreement between DES and the Rockingham Planning Commission will go to New Hampshire Governor and Council. Pending approval, work will begin.

Biomonitoring Study

In 2005, a four-year cooperative NHCP/USGS study report on stream quality and watershed urbanization called “Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region of New Hampshire,” was released. The study included both biomonitoring, or looking at living indicators, and chemical monitoring, or looking at chemical parameters, which complement each other in understanding water quality. Biomonitoring incorporates the cumulative effects of water pollution while the results of a single water sample are limited to that specific date and time. Chemical properties can be sensitive to changing conditions, like intermittent discharges or periodic storm event.

What were the results of this study?

- Three sites in the study were from the Exeter River Watershed, and showed a correlation between forest cover and increased water quality. Impervious surfaces within the watershed and the loss of natural buffers may be contributing to the frequency and severity of the flooding.
- In general, study results show that sites with greater than 14% impervious surface in the watershed showed a decline in overall stream quality as indicated by physical, chemical and biological sampling results. To view the report, visit <http://pubs.usgs.gov/sir/2005/5103/> or contact Sally Soule 559-0032, ssolue@des.state.nh.us for a hard copy.

What are the next steps?

- In 2006, volunteers participating in the DES Coastal Volunteer Biological Assessment Program will gather data on macroinvertebrates, which are living organisms without a backbone that can be seen with the naked eye, at 10 sites in the Exeter River Watershed. Tolerant macroinvertebrates can thrive in polluted conditions while the intolerant are more sensitive. For example, mayflies, stoneflies and caddisflies struggle to survive in polluted waters, while midges and aquatic worms are often found in these conditions. Another indicator is the ratio of pollution intolerant to tolerant species. If the habitat type

is ideal for intolerant types of macroinvertebrates, but a large proportion of the individuals found are pollution tolerant, there could be a water quality problem.

- In late fall, 2006, a report on the macroinvertebrate data collected and future recommendations will be released. The information will be used to aid the development of the Exeter River Watershed Restoration Plan.

Whom do I contact for more information on the Exeter River Watershed Program?

- Ted Diers, New Hampshire Coastal Program at DES, (603) 559-0027, tdiers@des.state.nh.us
- Lionel Ingram, Exeter River Study Committee Chair, (603) 778-0591, lionel Ingram@comcast.net
- Theresa Walker, Rockingham Planning Commission, (603) 778-0885, twalker@rpc-nh.org
- Jennifer Perry, Town of Exeter Engineer, (603) 773-6157, jperry@exeternh.org
- Natalie Landry, DES, working on Exeter River Watershed Restoration Plan, (603) 559-1507, nlandry@des.state.nh.us
- Steve Doyon, DES Dam Bureau, (603) 271-1966, sdoyon@des.state.nh.us