

Public Education and Participation in Water Quality Decisions: Understanding Dam Removal and Restoration Alternatives for the Assabet River

FINAL REPORT

May 2009

Organization for the Assabet River and Consensus Building Institute

Introduction

This report summarizes the findings of the “Public Education and Participation in Water Quality Decisions: Understanding Dam Removal and River Restoration Alternatives” project. This project, which was conducted by the Organization for the Assabet River (OAR) with the assistance of the Consensus Building Institute (CBI), focused on engaging stakeholders on the issue of the water quality of the Assabet River. It was supported by grants from the Sudbury, Assabet and Concord Wild & Scenic River Stewardship Council and the EPA’s Alternative Dispute Resolution Program. Particular attention was paid to phosphorous pollution, associated eutrophication (excessive aquatic plant growth), and potential steps that could be taken to reduce phosphorous levels, including dam removal and additional wastewater treatment.

This discussion is happening in the context of the state and federal Clean Water Act requirements to reduce nutrient pollution of the Assabet River. A TMDL study¹ prepared by the state assessed the sources and actions necessary to bring the river into compliance with its water quality standard of Class B, supporting fishing and swimming. The nutrient study identified two main sources of phosphorus, the main pollutant: municipal wastewater treatment plant discharges and the sediments captured behind the six old mill dams along the river.

Stakeholders were primarily engaged through two sets of events. The first was a series of eight advisory sessions (focus groups), with a range of thematically-related stakeholders invited to each. The second was a pair of public workshops at which experts made presentations on topics relating to river restoration and stakeholders engaged in dialogue, and keypad polling was conducted. The workshops were planned with a sub-group from the advisory sessions. More information on these events can be found below.

The goal of this report is to provide a resource for OAR and others, as they proceed with their efforts to restore the health of the Assabet River.

Brief Resource Background

The Assabet is one of three rivers in the Sudbury, Assabet and Concord River watershed (SuAsCo). The Assabet flows north for 31 miles from the headwaters in Westborough to Concord, Mass, where it merges with the Sudbury River to become the Concord River. The Concord River flows north to join the Merrimack River in Lowell, Mass. and enters the ocean at Newburyport. There are 19 towns and one city in the watershed, with several towns along the main stem river (Westborough, Northborough, Berlin, Hudson, Stow, Maynard, Acton, Concord) and the City of Marlborough. The watershed includes 177 square miles and some 170,000 residents. In 1999, the last 4 miles were designated as Wild and Scenic by the federal government recognizing the recreation, ecology, scenery, and historic/cultural resources of the river. Seven of the Assabet’s main towns (Westborough, Northborough, Marlborough, Hudson, Maynard, Acton, Concord) get all or part of their public water supply from groundwater and surface sources in the Assabet Watershed. Four municipal wastewater treatment plants from Westborough, Marlborough, Hudson, Maynard and a state facility, Concord MCI, discharge into the river. The river has a long industrial history. Seven old mill dams (Aluminum City Dam, Allen Street Dam, Hudson Dam, Gleasondale Dam, Ben Smith Dam, Powdermill Dam, Damonmill Dam) and 2 flood control dams (Nichols Dam and Tyler Dam) are on the river. See www.assabeteriver.org for more information.

Summary of Key Issues

Participants in the focus groups and workshops raised a variety of issues, concerns and questions. It is notable that while it is clear that people have different perspectives on what the problems and solutions are, there appears to be general consensus around the desire to improve water quality. People had differing visions for the river as a whole. Some would prefer a free-flowing river, returned to its pre-Colonial state to the extent possible, with a return of migratory fish. Others prefer its current state impounded by six dams, which reflects the river’s long history of human manipulation.

¹ “Assabet River Total Maximum Daily Load for Total Phosphorus, Report No. MA82B-01-2004-01, Department of Environmental Protection, 2004.

The nutrient study of the river identified phosphorus discharged by municipal wastewater treatment plants as the main cause of the river's severe water quality problems. This is the main focus of joint regulation by the Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (DEP) under the federal and state Clean Water Acts. However, while nutrient pollution may be the underlying cause of the river's problems, this is not necessarily the primary concern of many stakeholders. Some identify biological integrity as their primary concern, others meeting water withdrawal needs, others the aesthetic value the river provides, and so on.

In terms of phosphorous reduction, implementing measures to meet water quality requirements is putting significant pressure on municipal wastewater treatment plants. Some view this as an increasingly difficult and expensive mandate to deal with pollutants that, to some degree, have already entered the river from a variety of sources. Others argue that wastewater treatment plants, and other sources of pollution, should be primarily responsible for reducing their impacts on the river. Their view is that reducing effluent discharges should solve the problem and be sufficient to restore the river. A counterargument made is that this does not address the phosphorus in the sediments that have accumulated over time in the dam impoundments. Instead of being flushed downstream, this phosphorus recycles annually, causing eutrophication. This understanding is supported by the nutrient study, which proposes an alternative of sediment and/or dam removal.

Dam removal would allow historical concentrations of nutrients and current effluent discharges to flush out, resulting in a significant improvement in water quality. This has the potential to reduce the need for additional costly investments in wastewater treatment technology. It would also allow fish and other aquatic life to move freely within the river system and a healthier riverine ecosystem to return.² However, dam removal is controversial. Some see it as essential to restoring the natural character and biodiversity of the river, while others argue that the river has reached a new equilibrium after a century or more of damming, and that the resulting impoundments provide a variety of important services, including fire suppression, hydropower, recreational and aesthetic opportunities and existing, established habitat.

A more complete list of the comments on and concerns with dam removal, positive and negative, can be found in the Takeaways Report completed at the end of the advisory session phase (attached as *Appendix 1*). Some of the key themes we identified were:

- Concern that the Army Corps study focuses on phosphorus, and thus dam removal as a primary means for dealing with the problem. The study should consider the entire ecosystem, all of the values of the river to residents, and numerous alternatives that might meet multiple parties' objectives and not just that of wastewater utilities and their ratepayers. For instance, there are partial-removal options that may warrant consideration, including lowering the crest and creating a breach in the middle. Fish ladders and opening the bottom of dams to flush sediments may be other options.
- Whether or not removing dams would significantly lower phosphorus levels, and what would ultimately happen with the nutrients and many other potentially hazardous contaminants currently impounded behind dams (i.e., would the problem simply be transported further downstream).
- Questions of fairness. The upstream communities have benefited from using the Assabet River to convey treated wastewater and now they have a responsibility to do what it takes to address the problems they have created. It is not fair that communities without such treatment plants have to suffer adverse impacts and their associated costs because the ratepayers upstream do not want to take full responsibility for their past actions. In unsewered communities the cost of septic systems, which can often be very high, is borne by the homeowners.
- What would the areas currently under impoundments look like post-dam removal. Who is going to clean up and restore these areas, and how?

² A forthcoming U.S. Army Corps of Engineers report (*Assabet River, Massachusetts: Sediment and Dam Removal Feasibility Study*) investigating the feasibility and benefits of sediment and/or dam removal on eutrophication and phosphorous concentrations in the Assabet identifies improvements to wastewater treatment facilities and dam removal as the two most promising ways to reduce phosphorous levels. Better stormwater management runs a distant third.

- Who would own the land currently under impoundments that would be exposed? There seem to be different stipulations in different deeds, but is it always clear? How would zoning and conservation regulations apply? Would there be public access?
- Concerns regarding the viability of flora and fauna were raised both in support of and opposition to dam removal. How would dam removal impact existing habitats, including wetlands? What new habitats would it create? What species would be the ultimate beneficiaries of any changes and to what degree?
- Impoundments are viewed as aesthetically pleasing except when choked with weeds, adding value and character to communities. Some expressed concern about changing the current form of the river and losing the benefits its current state provides (e.g., depth and width).
- Some dams are historically significant, dating back as far as the 1700s. They hold both historic value and the scenic value of water flowing over them. Removing dams may not mean that these resources are lost, but it does mean aesthetic change.
- Recreation is a concern. Would the river still be suitable for canoeing and kayaking without the impoundments? Some stated that they like the current wide, flat waters for paddling and are concerned about losing that. Others complained that it is difficult to travel on the river because of the dams (portaging is required).
- Water is drawn from the river for irrigation, fire suppression and municipal water supply (Concord River, Town of Billerica). Would these users be able to meet their needs without impoundments? Can alternatives be put in place? A related concern is how dam removal might impact water tables, and thus shallow private wells along the river.
- Hydroelectric power generation is another issue. Hydropower depends on dams remaining in place. There is a hydroelectric facility at one dam, and one proposed at another. How does one weigh the environmental benefits of hydropower vs. a cleaner, free-flowing river?

Although reducing phosphorous levels is a key driver for restoring ecosystem health, it is not the direct motivating force for most stakeholders. Some assert that it would be a shame to spend tens of millions of dollars on water quality but ignore habitat, and that dam removal offers a unique opportunity to also restore native fish populations like trout, shad and alewife. Others counter that we need to consider the loss of the habitat that has developed over the past 100 years or more, and questioned whether, if dams were removed, riverine fish species would (and could) really return to the river again (especially with some dams still in place downriver). Others are concerned about the non-habitat related impacts of dam removal such as the loss of mill ponds, the exposure of sediments currently under those ponds (public health), and the potential loss of a water source for irrigation, groundwater replenishment and so on.

To a large degree, these different priorities reflect different visions of what the optimal river would look like. To some, the ideal river is free flowing and populated with riverine and migratory fish. To others, the ideal is a calm, reflective, historic mill pond. Still others value it as a “working river” that conveys wastewater to the ocean. These are ultimately very different and seemingly competing perspectives on what the Assabet should be.

Outstanding issues

As mentioned previously, stakeholders perceive uncertainty around what impacts different interventions would have. One of the core takeaways from this project is that more information is needed. In some cases, OAR may be able to collect the necessary data, in other cases the Army Corps and/or other government agencies must be involved and should be encouraged. Uncertainties include:

- The tradeoffs between dam removal and wastewater treatment plant improvements in terms of the financial and non-financial costs and benefits of each. What would be the impacts of setting phosphorous discharge limits to summer levels year-round? What would the impacts and costs be if phosphorus discharge rates were significantly lower in scenarios both with and without the dams? It was felt that more modeling of what the water column and ecosystem equilibrium would be at various points in the future under different conditions would be useful.
- Further information on the ability of various options to reduce phosphorus levels, and satisfy other goals for the river, both regulatory and not.
- The impacts of dam removal on wetlands, flood plains and water tables.
- What areas altered by dam removal would look like (images), and reports on what has happened elsewhere when dams have been removed. What did it look like, both around the dams but also upstream? What were the environmental changes? What were the short-term visual effects? The long-term ones?
- What, if any, remediation would be needed to sediments exposed and/or disturbed by dam removal, and what hazards do these sediments pose?
- More information on alternatives to complete dam removal, like fish passage and partial removal.
- More information on the ‘phosphorous cycling’ process.

There is also a lack of certainty and disagreement about the most effective means for addressing issues. One stakeholder suggested that modeling may be the best we have, but it should not be taken as gospel; it is valuable as an instrument for predicting trends, but cannot predict conclusive concrete outcomes. Others suggested that there could be more learned from analogous rivers elsewhere that have gone through similar processes.

Process

The two primary components of this project were a series of advisory sessions (focus groups) and a pair of concluding public workshops with presentations by experts on a range of river restoration topics. The advisory sessions were targeted at specific stakeholder groups thematically, while the final two workshops were open to anyone interested in the project and the Assabet in general.

Advisory sessions:

The primary purpose of the advisory sessions was to collect stakeholders’ opinions on, questions regarding, and visions for the Assabet and its restoration; the consultation protocol, which loosely followed in each of the sessions, is attached as *Appendix 2*. In total, 63 people attended the eight focus groups held; a list of attendees is attached as *Appendix 3*.³ A ‘Takeaways’ report was compiled at the end of the focus group phase, summarizing the information and questions collected through the process; it is attached as *Appendix 1*.

The following advisory sessions were held:

Date	Place	# of attendees	Stakeholder group
Monday Oct. 20 10-11:30 am	Marlborough Town Hall	8	Upper Assabet Municipalities (Westborough-Hudson)
Tuesday Oct. 21	Concord Main Library	5	Federal Agencies

³ Telephone interviews were conducted with a further two stakeholders (dam owners) that could not attend any of the sessions, but wanted to contribute to the process.

10-11:30 am			
Thursday Oct. 30	Hudson Town Hall	4	State and Federal Agencies
10-11:30 am			
Thursday Oct. 30	Maynard Public Library	9	Lower Assabet Municipalities (Stow-Acton)
2-3:30 pm			
Tuesday Nov. 18	Hudson Fire Department	8	Landowners and community/advocacy groups
7-8:30 pm			
Monday Nov. 24	Northborough Town Hall	5	Landowners and advocacy groups
10-11:30 am			
Monday Nov. 24	Maynard Public Library	13	Landowners and advocacy groups
2-3:30 pm			
Monday Nov. 24	Hudson Fire Department	11	Landowners and advocacy groups
7-8:30 pm			

Workshops:

The workshop planning and design was done by a Workshop Planning Committee of 12 stakeholders from the advisory sessions who volunteered to work with project staff. Recognizing that dam removal is the hot-button issue most people are concerned with, the Planning Committee decided to tackle it head-on by billing the concluding two public workshops as “Assabet River Restoration: Understanding the Impacts of Dams in Your Community.” Each workshop included a presentation on the history of the Assabet and its dams; a presentation on why dam removal is being discussed; presentations on key issues related to dam removal, including fisheries, the regulatory process and hydropower; results of river modeling from the Army Corps study; and an interactive panel session. A copy of the agenda for both meetings is attached as *Appendix 4*.

The workshops were held on March 14 at the Forbes Municipal Building in Westborough and March 28 at Clock Tower Place in Maynard, with 100 people participating in total. The Westborough workshop was opened by Westborough Selectman Leigh Emery, who also sits on the Westborough Wastewater Treatment Plant Board. Congresswoman Niki Tsongas gave Opening Remarks at the Maynard workshop.

Keypad polling was used at both of the workshops to allow for quick, quantitative feedback from the audience.⁴ It was used at the beginning of each session to identify who was present (i.e., the demographics and affiliations of those in the room), and their initial perspectives on the issues being discussed. A second round of polling was conducted at the end of the day to get an overview of opinions post-presentation and discussion, and get feedback on what OAR, and others, should consider doing next. Audience discussion was engaging, with one participant concluding that, although when driving to the workshop he had felt very agitated and concerned about dam removal, after having listened to the presentations and learned more about river restoration, he doesn’t feel that way any more.

The full results from the keypad polling are attached as *Appendix 5*. Some of the highlights include:

- 46% of participants identified themselves as business owners, property owners, abutters and/or interested citizens; 33% represented a municipality, or state or federal agency; and 19% represented a non-profit or community organization in the watershed. 23% of participants did not live in the Sudbury-Assabet-Concord watershed.
- Some municipalities were highly represented, including Stow (36.5%) and Maynard (25%).
- 85% of attendees were over the age of 40.

⁴ Keypad polling was provided by the Metropolitan Area Planning Council (MAPC).

- A wide range of primary uses were identified, with 'live near it' (20%) and 'enjoy its scenic qualities' (18%) ranking first and second. For secondary use, 28% said they 'enjoy its scenic qualities' and 23% said they 'canoe, kayak, or boat'.
- 34% felt that 'habitat for wildlife' might be the most important thing the river would provide in the future. 16% responded 'scenic views' and 14% responded 'boating'.
- When asked to compare the importance of providing a healthy Sudbury, Assabet, or Concord River for future generations to other environmental issues of concern to them, 61% said it is 'very important' and 34% responded 'important'.
- 57% felt that 'Phosphorus/nutrient loading causing eutrophication (excessive plant growth)' is the most significant threat facing the Assabet. 'Development, sprawl and land use change' ran a distant second-place at 10%. Responses to the second most significant threat question were much more disparate, with 26% answering 'Contaminated sediments (heavy metals, PCBs, etc.)', 19% answering 'Phosphorus/nutrient loading causing eutrophication (excessive plant growth)', and 15% answering 'Threats to fish health and habitat'.
- 35% felt that dam removal would have a 'strong or moderate positive impact'; 33% of participants felt that it would have a 'strong or moderate negative impact'; and the rest were split equally between 'little to no impact', 'both positive and negative impacts' and 'too much uncertainty to decide'.
- 28% rated a 'change in water level and recreational impacts' as the most important impact of dam removal, while 23% chose 'phosphorous and eutrophication'. For the second most important impact, 'wetlands and existing wildlife' and 'change in water level and recreational impacts' each received 22% of the votes.
- 26% felt that OAR should focus on providing information that helps in assessing the 'costs/benefits of dam removal versus stricter wastewater discharge limits' and 18% stated that OAR should focus on the 'visual impact on river shoreline changes'.
- More generally, a third of participants said that they would like more information on the 'cost/benefits of dam removal versus stricter wastewater discharge limits', and a third on 'innovative phosphorous removal strategies and technologies'.
- Three-quarters of participants were Red Sox fans.

Deliverables

In addition to the deliverables already discussed in this report, and attached as appendices when possible, the following products were created under the auspices of this project:

- *Podcast and associated slideshow* – Brief interviews were recorded with some of the advisory session participants. These were edited into a short podcast that both introduces the project and highlights some of the different perspectives on and visions for the Assabet. A slideshow accompanies the podcast. Both are attached to this report in digital form and are on the OAR website.
- *Presentations from the public workshops* – A variety of presentations were given by experts on each topic during the two public workshops. When applicable, the associated PowerPoint presentations are attached to this report in digital form, and are on the OAR website.

- *Website* – This report will also be distilled into project pages on both the OAR and CBI websites. These web pages will convey the lessons learned to the broader watershed community, and inform others in similar situations how processes like this can be implemented. They will also highlight the Podcast with associated slideshow, and other deliverables.

Next steps

Based on the results of the advisory sessions and workshops, there are a variety of things that OAR could tackle next in its efforts to address phosphorus pollution and restore the Assabet River. These include:

- Addressing some of the outstanding issues identified previously, either directly or in concert with the Army Corps and other stakeholders. This includes advocating for studies to answer questions raised by stakeholders, including land ownership, sediment toxicity, and dam removal impacts on groundwater.
- Work on areas in which people have shared views, like stormwater management and invasive plant removal, to build further consensus.
- If the wish is to further explore dam removal, the organization might start with an ‘easy win’—i.e., an interested owner and a non-iconic mill pond—and use that as a process test.
- Some noted that the river is not always aesthetically pleasing in built-up areas, but praised OAR for its engagement in hands-on river clean-up and restoration. OAR could extend this work, perhaps using it as an opportunity to build further relationships with landowners.

The river is why many towns exist, with their history of mills. On the other hand, these towns have typically turned their backs to the river, and are only now bringing it back into focus via nature trails and urban design. This provides an opportunity to increase interest in and support for the Assabet, but it also means that attachments to and visions of the river are growing stronger. OAR has an opportunity to play an important role in this process, harnessing energy and interest, and channeling it towards the restoration of a healthy watershed.

Appendix 1 – Takeaways report (prepared after focus group phase)

Assabet River Advisory Sessions, Fall 2008

Key takeaways

- Everyone agrees that water quality is very important, but many noted the potential tradeoffs, costs, and competing interests between a ‘working river’ (e.g. wastewater treatment, power generation) and a clean, free-flowing river (e.g., aesthetic and recreational resource).
- Increasingly strict wastewater discharge permits produce major pressures on municipalities, which some view as unfunded mandates to deal with pollutants like phosphorous.
- Dam removal is extremely controversial; some see it as essential to restoring the natural character and biodiversity of the river, while others argue that the river has reached a new equilibrium after decades and even centuries of damming, and that the resulting impoundments provide a variety of important services, including recreational and aesthetic opportunities.
- Some argue that wastewater treatment plants, and other sources of pollution, should be responsible for reducing their impacts on the river, and that this should be sufficient for the river. Others argue that pollution needs to be reduced, and dam removal would address both the phosphorus cycling problem and allow fish to run freely and healthier ecosystems to return. Stakeholders perceive there to be a great deal of uncertainty around what impacts different interventions would have.
- The river is why many towns exist, with their history of mills. On the other hand, these towns have typically turned their backs to the river, and are only now bringing it back into focus via nature trails and urban design. In general, access to the river has been a problem.
- Interviewees almost universally state that it is important to raise awareness of the river and the resources it provides. Thoreau and Hawthorne both appreciated it enough to include it in their writings; it should be recognized as the treasure it is once again.
- Many support the notion that the process may be more successful if striving for a cohesive vision for the river, rather than focused on just dam removal or another specific issue.
 - Calls for a broad vision for the health of the river that is bought into by all stakeholders.
- Many stated that more information is required before decisions should be made, including:
 - Reports on what has happened elsewhere when dams have been removed. What did it look like? What were the environmental changes?
 - More information on the ‘phosphorous cycling’ processes. What would be the impacts of setting phosphorous pollution limits to summer levels year-round? What would the impacts and costs would be if we drastically lowered phosphorus discharges today in scenarios both with and without the dams? Generally, a call for modeling of what the water column and ecosystem equilibrium would be at various points in the future under different conditions.
- The regulatory environment is calling for phosphorous to be addressed (essentially making it the number one concern), but this is not necessarily the primary concern of stakeholders. Some identify biological integrity, for example, as their primary concern.
- Beyond the regulatory requirements, there is a lack of clarity around what the goal or standard against which progress is measured is. Are we striving for a river pre-arrival of North Americans, pre-industrial revolution?

Current river uses:

- Recreation, including canoeing, kayaking and hiking
- Fishing (coldwater in tributaries; pond species in impoundments) and hunting
- Conveyance of treated wastewater
- Direct water source for drinking (Town of Billerica)
- Direct water source for irrigation (orchards, farms and golf courses)
- Water for fire suppression (including firefighting ponds near impoundments)
- Indirect water source (shallow wells along banks)
- Esthetic value for residents, office occupants, and visitors (both impounded and free-flowing sections)
- Supports wildlife (including fish, birds, and other animals both aquatic and along banks) and associated bird and wildlife watching
- Hydroelectric generation

Problems

- The river is severely eutrophic, especially in impoundments behind dams. One factor exacerbating the problem is the recycling of phosphorus from sediments in impoundments.
- Aesthetically, many complain about algae and duckweed, and the associated smells in late summer. Other invasive species are also problematic, including purple loosestrife. Some also complain about geese and swans, though others have a more positive opinion of them.
- Most municipalities still discharge high phosphorous loads from wastewater treatment plants. These are coming up against hard requirements set under the Clean Water Act and the Massachusetts Water Quality Standards.
 - The Total Maximum Daily Load is established by the Massachusetts DEP and approved by the EPA. It applies to the entire river.
 - They call for a “native, naturally diverse community of aquatic flora and fauna” to be achieved and protected.
 - There are regulatory mechanisms such as Use Attainability Analysis for modifying these requirements but fairly strict conditions have to be met.
 - Stakeholders should play a role in how we achieve the CWA goals, but cannot decide whether or not the goals themselves are achieved.
- Fish species diversity lost; it was asserted that shad, eastern brook trout and river herring populations have collapsed, for example (though some uncertainty around which species were historically found were). If dams are removed, would they return? What role does the Assabet play in broader regional recovery, given that it cannot be considered in isolation?
- There is a lack of certainty and disagreement around the most effective means for addressing issues. Modeling may be the best we have, but it should not be taken as gospel; it is valuable as an instrument for predicting trends, but cannot predict conclusive concrete outcomes.
- Concern raised that increasing development is problematic because:
 - More wells will draw the watertable down, potentially decreasing the flow at the headwaters, effectively ‘dewatering’ the river
 - Complaint that municipalities are strict on wastewater issues (septic systems), but sign-off on water withdrawal (private wells) with little thought. On the other hand, there are some restrictions on development close to the river in some municipalities.
 - Vital wetlands and headwaters may be destroyed (e.g. drumlin flattening).

- Riverbanks are being degraded, decreasing water quality and spreading invasive species. The enforcement of buffer zones by the Conservation Commissions varies widely from community to community. Some clearing along riverbanks has destroyed important sources of shade.
- The river is not always aesthetically pleasing in built-up areas (e.g. unsightly storage areas and advertisements along the river in Hudson). Suggested that some of the landowners should fence or landscape to improve aesthetics
- Climate change may exacerbate problems, with irregular weather patterns, potential droughts, higher water temperatures.

Wastewater treatment

- The river's flow is dominated by wastewater effluent at certain times of year. When there is a lower base flow in the summer, the proportion can approach 90% effluent in Maynard.
- Municipalities are in the process of upgrading their treatment plants to meet new phosphorous standards and update aging facilities. This is financially difficult, particularly with rapidly increasing costs.
 - Uncertainty around what the next round of permitting will require. Will the work they are doing now be made redundant in a couple of years?
 - Cost is an issue to taxpayers and local government officials; rates already doubled in many municipalities. Also, risk of losing water-intensive industries that are sensitive to higher rates.
- Need to meet the needs of municipalities to discharge treated wastewater.
- From a funding perspective, the position municipalities took was that they would be willing to participate in the sediment study, then decide to either update treatment plants or fund some other work to clean up the river. Unfortunately, they no longer have the funds to do this and, they cannot wait to see the study outcomes with regulatory/permit requirements bearing down.
- The study estimates that a 60% reduction in phosphorous is possible with current (seasonally adjusted) standards; how much greater would the impact be if the summer standards were applied year-round? Why doesn't the study include an analysis of what would happen with a reduction in the winter limits for phosphorus?
- Some suggested that the municipalities should take responsibility for cleaning up the phosphorus via improved treatment; they are the source, so should be the solution, rather than making it someone else's problem. Assertion that, if they are successful, dam removal may not be necessary.

Dam removal

- Typically - unless there are safety issues - it is the owner that must decide to remove a dam.
- Every individual dam is a long, hard road that has many issues to be dealt with.
- Assertion that removing dams would improve pollution levels, as water would carry it away.
 - Others question, however, as increased flow may stir up highly polluted sediment behind dams. What is going to happen to this sediment? Would it be treated? Who would pay for it?
- Significant eutrophication behind dams is evident, as the impoundments smell and are full of weeds by late summer. Sewage treatment plants upstream may cause problem, but aided by water being kept stagnant when perhaps it shouldn't be.
- Concern that the Army Corps study focuses on phosphorus, and thus dam removal as a primary means for dealing with the problem, rather than considering the entire ecosystem and all of the values of the river to residents. There may be other ways to address phosphorous issue.
- Some communities left out of the Army Corps process, as they do not discharge wastewater directly into the river.
- Assertion that we should see how effective improved wastewater treatment is and go from there, rather than doing everything all at once.
- What would happen in flood conditions? What would change with dam removal and different flow rates?

- The state may have the authority to order dam removal due to broader river quality concerns, even if it is in compliance with TMDL standards, but this is not politically realistic. In practice, would only order dam removal due to safety issues or lack of compliance.
- Who is going to clean up and manage the “brownfields” that would be exposed along the former riverbed? What contaminants are left in the sediment? If you remove the water, can you stabilize the soil? Same with dredging (i.e. upsetting the sediments) – can it be controlled? Would landowners be liable for risks from contaminated soils?
- What would be the impacts of dam removal on: wetlands, water temperature, the groundwater table and fish habitat?
 - Would changes in the river flow and course create opportunities for invasive species to move in?
 - What would be the impact of dam removal on Zoning and Conservation Commission jurisdiction? Would development be extended out to new banks?

Ownership

- Dam ownership is an issue – many ownership situations unclear while some owners are not aware of or do not want to acknowledge ownership.
 - Only one is owned by a municipality: Hudson.
 - Some have not been inspected in decades, so seen as risky liabilities to municipalities. If something happens, they would have some responsibility, so would be happy to get rid of them.
- There are also legal issues around property ownership that need to be considered:
 - Who owns the newly exposed land when impoundments disappear? Different stipulations in deeds for different stretches of the river; some parcels go to mid-river, others to high water mark.
 - If going to dredge, whose land are you putting the dredge spoils on? Do you have access?
- There are potentially water rights too – would various changes to the river impact these?
- Some municipalities and organizations are working hard to purchase land along the river to create areas for wildlife, parks, and other recreational and/or redevelopment projects. They would lose out if dams were removed and they no longer had the waterfront property.
 - On the other hand, newly exposed land can be used for new parks or boat launches, becoming an asset to the community.
- If dams kept in place, who would cover their maintenance costs?

Aesthetics and recreation

- Impoundments are viewed as aesthetically pleasing, with paths along them – highly used and enjoyed. They add aesthetic value and character to communities. Some expressed concern with losing this.
- Some dams are historically significant, dating back as far as the 1700s (e.g. Martin’s Grist Mill). They hold both historic value and the scenic value of water flowing over them.
 - However, removing dams may not mean that these resources are lost - in fact, they are often better preserved without water - but it does mean aesthetic change.
- Some dams may be protected under the National Historic Preservation Act. Each has to be assessed under the following framework: How historically significant is the dam? What is its structural integrity? Who owns it and what responsibility are they willing to take for its maintenance and long-term liability?
- What would the river be like in particular stretches if dams are removed? There are graphics of what it would look like immediately around dams, but what about 5 miles upstream?
 - Some concern that the river would be unsightly with removal – ‘stinking mud flats’.
 - Counter claim that vegetation would move in quickly, and any dam removal would naturally include some remediation.
- General consensus that duckweed and other invasive species should be removed.

- No one has seen the stream in its natural state; with familiarity comes contentment, and people are familiar with a broad flat river.
- Would the river still be suitable for canoeing and kayaking without the impoundments? Some stated that they like the current wide, flat waters for paddling and are concerned about losing that. Others complained that it is difficult to travel the river because of the dams (portaging required).

Wildlife and wetlands

- Assertion that it would be a shame to spend tens of millions of dollars on water quality, but ignore habitat; just improving wastewater treatment is not a finished job.
- Assertion that, for the money spent on treatment, the single activity best and most certain payback is dam removal. It not only improves water quality, but also restores the natural habitat. Some organizations feel that native fish populations like shad and alewife should be restored, which requires dam removal and habitat restoration.
 - Counter argument that we need to consider the loss of the habitat that has developed over the past 100 years or more, including the major wetlands that would be lost or changed.
 - Also counterargument that species have been restored elsewhere without dam removal.
 - Some questioned whether, if dams were removed, riverine fish species would really start traveling up and down the river again. This also depends on what restoration efforts take place on the Merrimack River.
 - However, the Clean Water Act calls for the restoration of native/indigenous species.
 - Once people see the result – thousands of fish traveling up the Assabet – they may appreciate the value of a restored river.
- Questions around how many wetlands would be lost if river changed. What new ones would be created? What are the legal repercussions of having this impact on wetlands?
 - DEP's counterargument is that alterations are restoring the overall balance, with overriding benefits. The wetlands impact evaluation process is streamlined for dam removal.
- The 'Wild and Scenic River' designation only applies to the lower four miles (up to the Damonmill Dam). Interest in entire river is based on fact that what happens upstream will have impacts on the aesthetic and recreational assets being protected. If dams removed, communities may seek to extend the designation.
- There are partial-removal options, including lowering the crest and creating a breach in the middle (though this can create safety issues with the increased current, and it is not certain that fish can swim upstream through it). Fish ladders and opening the bottom of dams to flush sediments are a couple of other options.
- If dams removed, could change the depth of the river, what wildlife is present and so on. Could have negative impacts on various species with their habitat altered significantly and quickly.
 - Vernal pool species in particular could suffer if they are no longer seasonally filled due to water table changes due to dam removal.

Water extraction

- Some municipalities draw water for fire suppression from impoundments. Cannot get rid of these impoundments without putting an alternative in place first.
- Some farmers (particularly orchards), golf courses, and the Town of Billerica draw water directly from the river; would they be able to meet their needs without impoundments?
 - Some expressed flexibility, provided that they are still able to meet their water needs (e.g. receive support for the construction of holding tanks).
- Also concern that, if dams are removed, shallow wells along the banks would be impacted due to water table drops. On a related note, concern that water table recharge rates would drop if dams are removed.

Hydroelectric power generation

- Micro-hydro is seen as a clean way of producing electricity.
- Not a major issue, but some possible: Powdermill Dam should be back up and producing power this winter; Clock Tower Place is also considering reintroducing hydroelectric.
- Hydroelectricity is not a priority to the state, but there are programs supporting development. Ironically, the State is putting money into investigating dam removal while channeling funds to dam owners to develop hydroelectric power (Mass. Technology Collaborative).
- Some argued that there is not necessarily any significant energy production potential, as it is a fairly flat river. Most of the sites worth developing have been developed; those being proposed now are only economically viable because of incentives. May be potential now due to the economic environment, but not necessarily for the long-term.
 - Counterargument that it is up to the individuals or businesses who make the investments to determine if energy production is worth pursuing. It is also up to them to justify their investments whether that includes incentives or not and whether their investment window is short or long term.
- Argued that, if we develop hydroelectricity on every dam possible, it is possible that riverine fish communities may be negatively impacted due to cumulative effects of turbine mortality.
 - Counter that fish mortality and dams is a complex issue and it is far from certain that mortality cannot be addressed via appropriate technology and management.

Non-point pollutants

- There are other (non-point) sources of pollution that can become significant, including stormwater runoff and agricultural and lawn runoff.
- The Army Corps models did not deal with non-point sources very well, lumping them all together. It also failed to look at how municipalities could address some of these non-point sources to more cost-effectively meet their requirements.
- Concern that the focus is on wastewater treatment and dam removal only. Treatment plants are definitely the main source of pollution, especially when evaluating based on 'critical low-flow conditions' (days after a long drought). However, on an annual basis, non-point sources do become substantial.
 - Counterargument that these two are overwhelmingly responsible for nutrient problems identified in the TMDL. Other sources, including stormwater runoff, will need to be considered as wastewater and sediments are addressed and these others become more significant.
- Stormwater runoff is one major non-point source, and it is being chipped away at slowly.
- Golf courses are another source; there are certain improvements being made in the industry, but no comprehensive effort being made yet.
- Other issues include: Landowners improperly altering the waterfront, and pesticide and herbicide use on lawns. These are things people can change at a personal level.
- What will be the implications of growth in the watershed, including demographic changes and growth in the volume of wastewater being released by treatment systems?
- Need to educate people on stormwater management, keeping their septic tanks repaired and so on.
- Opportunities to start doing things today. Each municipality needs to do in own way, but some best practices already taking place should be shared. For example:
 - Mapping and monitoring stormwater catch basins to ensure that they are in compliance, and improving them when possible. Able to use them as leverage for improvements when permits requested.
 - Northborough's public paths network to raise profile of the river and provide recreation opportunities.
- There are, of course, other things that can be done that would not necessarily directly impact phosphorous levels, but address many of the other concerns of stakeholders.
 - For example, removing invasive species like knotweed upstream would prevent it from spreading downstream

Visions of the river

- The river gets used recreationally (canoeing, fishing, boating and so on) but these uses should be increased greatly all along the river and its tributaries. Also, people swimming in it again.
- Some prefer the pond fish species that currently populate the river – it is what they are used to – over the more riverine species that would populate a free-flowing river.
- Others would like to see a return to the river’s wild state, with riverine (possibly coldwater) fish species and native plant and bird communities, and feel that you cannot have a natural fishery with the dams there, so would like to see all of them removed.
- More green space along the banks for wildlife and development pushed further back from the shore. Keeping undeveloped land along the river still undeveloped.
 - Acton, for example, has passed a bylaw mandating a 50’ no-disturbance zone and 70’ no-construction zone along the river. Some would like this implemented elsewhere.
- Connections between urban life and the river:
 - Events on the river, like ‘Water Fire’ in Providence, RI.
 - Urban river walks and restaurants oriented towards the river.
- A clean river that is free of duckweed; and free of invasive species, including swans.
- A river where you can canoe all summer long free of aquatic weeds.
- A river that does not smell bad.
- A river of the same dimensions as today, but without duckweed.
- Can stick feet in, walk along, and fish without concern for contaminants, even in vicinity of currently problematic sites, like the W.R. Grace Superfund site in Acton.
- Completion of the Assabet River Rail Trail (ARRT) along its length
- The sources of pollution addressed, and they are not permitted to put more in.
- Cleanup of contaminated sediments already in the river, provided this would not cause more harm than good (i.e. stirring up silt, resulting in release of pollutants). Heal the brownfields under the river.
- Not have to see a ‘wall of suds’ caused by wastewater treatment plant overflows.
- People along the river being active stewards of it, so that it is functioning optimally.
- Dams stay, with hydroelectric power generation; bioremediation to clean up the pollutants rather than the nuts-and-bolts status quo solution; dealing with pollution at the sources; recreation and commerce on a nice wide river.
- An engaged community--even abutters are not engaged with it now. Also need to engage the open space committees, Conservation Commissioners, and other decision makers.
- An educated community, with programs offered via various organizations to familiarize residents with the river, its history and its myriad of various issues.

Community engagement

- Target very specific interests associated with different river issues (e.g. dam owners on public safety and liability).
- Speak at Selectmen meetings, partly because it will get the issue on community cable TV, raising profile.
- Should get regulators involved (rather than just having them mandate).
- It is difficult to get municipalities to work together, but this was achieved with the Assabet Consortium. Fostered recognition that water quality in one place is impacting others. Not always easy, but municipalities committed to process, including financially.
- Should show the pros and cons of the different alternative uses of the river, illustrating benefits, costs and changes that may be positive or negative, depending on perception.
- Should use renderings to help people visualize what changes would look like.
- Challenge will be in extending interest beyond 200ft away from the shore and/or people that have a vested interest in things like hydroelectricity. Some stakeholders convinced that people are not that interested, as low participation in

meetings around multimillion dollar wastewater treatment plant upgrades would suggest. On the other hand, some say that mentioning dam removal will likely get more interest.

- Dilemma between saying 'dam removal' to get people out and risking locking people into positions and that single issue instead of broader visioning for the river.
 - Can't get to the regional vision collectively until you get beyond the dam issue. May get some careful side-stepping, but real deep disagreement will persist.
 - Will need very good and careful facilitation to make sure it does not devolve to just the dam issue. Suggested strategy is to enlist dam owners as advocates of a broader river vision. They have a vested interest in river improvement and may be in the best position to steer discussion away from the single (dam removal) issue.
- One option is getting a large group together and developing complex matrices for a variety of different options, then honing in on the preferred ones and developing an ideal outcome collectively with discussion, education and an expanded buy-in.
 - Extremely useful, with everyone having an opportunity to contribute that, ideally, will lead to better outcomes.
 - However, it will take a great deal of facilitation, and requires defined alternatives.
- The bigger the group, the greater the number of grandstanders. One option is to start with smaller meetings so they can 'fan the flames' much less effectively, and give them the opportunity to support a shared vision in larger, meetings. On the other hand, it may be valuable to have larger meetings first to get the information out and make everyone feel included/welcome, then move to smaller meetings with key stakeholders.
- Drawing from experience: Plymouth and Andover have gone through processes like this. They could be presented as case studies. Also look at Taunton and Greenfield rivers. Riverways Program has worked with a lot of communities.
- In many municipalities, town managers are the conduits for reaching selectmen and are important shapers of local opinions. It is good to get their buy-in early, along with the Conservation Commission chairs and town planners.
- Offer lots of people, including tribes, the possibility to be involved in this process.
- May not want to invite everyone, but rather just representatives from various groups.
 - Is this going to be perceived as inclusive enough?
 - Disadvantage is that innovative ideas often come from unexpected sources, and this would be missed. Further, there is an educational component in reaching many.
 - Advantage of limiting is that it would otherwise be difficult to make sense of the mass of information and perspectives that would come out.
 - Another advantage is that an open meeting may attract many participants that have no idea of riverine dynamics and so on.
 - Smaller, more focused meetings are more conducive to going beyond grandstanding and rehashing positions.
- One idea is a charette-style process that moves towards co-creating a plan.
 - Could be based on 2-3 visions (e.g. no dams removed, some removed, all removed)
- Question is, what happens after plans are developed? Who is going to be the proponent moving the project forward? In practice, it is often a partnership that may involve private landowners, the municipalities, and a non-profit. An organization like OAR may need to step forward to take project management responsibility.
 - Need to have vision and see it as their job to make the project happen. Get on the phone and push progress, engage stakeholders, and so on.
- Ideally, have some meetings in the evening, for working people, and some in the day for retirees.
- Would be nice to have meetings involving more than one town, as they are addressing the same issues, and even the same dams in some cases.
- It is important that the study group is diverse, ensuring that no one is left out of the process and that there is a good balance of different voices from across town.

- Getting people of all ages and types out on the river itself is important; they need to realize that it is there. This would also make them more sympathetic when rates need to be raised to improve sewage works or buy a parcel of land.
- Need to focus on both meetings and public outreach – current plan is to get information out first (primarily in printed form), then hold stakeholder meetings/consultation.
- Different groups will have varying ideas of what constitutes ‘the region’.
- There is a tremendous need for facts. The Army Corps, and other experts, should be brought in to answer a variety of questions, including what would happen if phosphorous discharge levels are lowered year-round, and what the impacts of their recommendations would be.
 - Some complained that the Army Corps study was not sufficient, looking at the situation with a very narrow scope, and that there are a lot of questions unanswered.
 - It is not clear whether or not OAR should, or wants to, take responsibility for the education component, but how education supports and is connected to this process needs to be considered.
 - Need to have all of these questions and answers prepared and distributed in advance. This would start people off from a bit more informed point.
- Target captive audiences, like students and Scout troops for education.
- Engage important, relevant, groups, like: Boards of Health; Planning Boards, Conservation Commissions, and Departments of Public Works. The latter (and Mass Highway) need training on best practices for stormwater management and highway maintenance.
- Provide education on things like good vegetation management, potentially connecting with people and organizations already doing good work (e.g. Bigelow Nurseries).
 - Should use storytelling around the river as a way to raise interest.
- Build awareness and appreciation through activities like: Community service projects; paddling trips; and partnerships with historical societies.
- Important to give people the sense that this process will result in something. People not interested in talking about the same issues again if they don’t feel there will be any impact.
- Argument that discussion should extend beyond the river itself to topics like industry, lifestyle, and energy when appropriate.

Information needs

- Impact of year-round application of summer phosphorus discharge limits on water quality
- Impact of dam removal on:
 - Wetlands and wetlands-related wildlife.
 - Fish species and fish habitat, including water temperature
 - Groundwater/watertable (impacting wells and ponds)
 - The Assabet’s role in broader regional recovery of migratory fish populations
 - What the impoundments would look like (renderings)
 - Flood levels
- Ownership of land under impoundments
- Implications of growth in the watershed for wastewater generation and disposal
- Impacts and costs associated with decreasing the phosphorus limits lower than is currently planned. Corps/CDM modeling study showed that with dams in place further reductions in summer limits has minimal effect on water quality improvement, as with winter limits of 1 mg/l the P flux in the summer is controlled by the winter instream P concentration. More options to deal with phosphorus in the impoundments.
- Impacts and costs of further lowered phosphorus discharges today in scenarios both with and

without the dams.

- Case studies of river restoration with and without dam removal
- Options for managing contaminated sediments while protecting human and ecosystem health
- Water quality—what are the other pollutants in the river?
- Impact of hydroelectric turbines on fish, including eels
- Options for local regulatory changes to improve stormwater management and increase recharge

Appendix 2 – Consultation Protocol

Thank you for speaking with us. CBI is working with the Organization for the Assabet River to help organize and facilitate a public and stakeholder visioning and outreach process for the river. We are seeking the broadest possible range of questions, concerns and visions regarding restoration options. We will use this information to ensure that workshops to be held in early 2009 address these topics.

This interview is confidential (we don't attribute statements by name or organization) and the information gathered will be used to help design the outreach process so that it will be as useful as possible. We ask that you also respect confidentiality.

Background

- Tell me a little bit about your organization, agency or company? [tailor this to specific group]
- In what way does your work relate to the river?
- In what way does the river relate to your personal life, if at all?

Issues

- What do you think are the challenges facing the Assabet River today?
- There are a number of issues related to the Assabet River. How do these rank for you in terms of importance (H, M, L)?
 - Water quality (pollution caused by nutrients and other contaminants)
 - Water quantity (flow in the river, river interface with groundwater, etc.)
 - Fish populations and fish passage
 - Flood control and public safety
 - Public access to and use of the river
 - Wildlife along and near the river
 - Recreation along and in the river [specify what type: boating, fishing, walking, passive, etc.]
 - The current aesthetics of flowing river and calm water impoundments [explain]
 - Energy use
 - A free-flowing river
 - Fire fighting
 - History of the area [specify which type: Native American, colonial, early industrial, etc.]
 - Other
- What do you think are the main impediments to restoration [or causes of current problems]?
- If in ten years the river was significantly “restored,” what would that mean to you? What would river restoration look like in your view? How would you measure success? Another way to say this: What is your vision or goal for the river?
- If in ten years your goal for the river were attained, what would the River look like?
- What questions do you have that you would like answered?

Public Engagement

- In order to engage stakeholders and the general public in an informed dialogue about restoring the Assabet, OAR will host a series of public forums in early 2009. The goal is to engage as broad and diverse set of constituents as possible in considering the future of the river. How might the forums best be organized?
 - Several large, open, well organized public forums for learning, sharing, and dialogue? Should they have a panel format, or have small break-out groups?
 - Have more meetings of existing groups like this one?
 - More poster boards, on-line surveys, and “self-service” efforts?
 - Other?
- What stakeholders need to participate in such forums?
- What is the best way to get the word out to your communities about such an effort? Do you have list serves, mailing lists, websites, we might use to reach out in some way?

Next Steps

Upon completion of the consultation sessions, we intend to:

- Develop a list of issues, ideas, and concerns raised in these discussions.
- Plan for and announce a series of public sessions in early 2009
- Put information in the local press and other methods of dissemination

Potential Stakeholder Groups:

Please bear in mind, this is a preliminary list.

- Municipal staff and officials
- State and Federal agency staff
- Community/advocacy groups
- Residents with land abutting the river
- Dam owners
- Other river users/residents

Appendix 3 –Advisory Session Attendees

Monday October 20, 2008 – Marlborough Town Hall			
Fred Litchfield	Northborough Town Engineer	508-393-5015	flitchfield@town.northborough.ma.us
Jack Perreault	Shrewsbury Town Engineer	508-846-8502	jperreau@th.ci.shrewsbury.ma.us
Tony Marques	Hudson DPW Director	978-562-9333	tmarques@townofhudson.org
Derek Saari	Westborough Planning Dept.	508-366-3055	dsaari@town.westborough.ma.us
Christina Papadopoulos	Westborough DPW	508-366-3076	cpapadopoulos@town.westborough.ma.us
Kara Buzanoski	Northborough DPW Director	508-393-5030	dpw@town.northborough.ma.us
Kathy Joubert	Northborough Town Planner	508-393-5019	kjoubert@town.northborough.ma.us
Priscilla Ryder	Marlborough Conservation Administrator	508-460-3768	pryder@marlborough-ma.gov

Tuesday October 21, 2008 – Concord Main Library			
Barbara Blumeris	Army Corps of Eng.	978-318-8737	barbara.r.blumeris@usace.army.mil
Eric Derleth	USFWS	603-223-2541	eric_derleth@fws.gov
Lee Steppacher	NPS , SuAsCo Wild and Scenic River RSC	617-223-5225	lee_steppacher@nps.gov
Libby Herland	USFWS – Eastern MA NWR Complex Manager	978-443-4661	libby_herland@fws.gov
Tim Roettiger	USFWS-CNEFRO	603-835-7801	tim_roettiger@fws.gov

Thursday Oct. 30, 2008 – Hudson Town Hall			
Bryant Firmin	Mass DEP, CERO, Northborough	508-899-4003	bryant.firmin@state.ma.us
Alice Rojko	Mass DEP, Div. Watershed Management	508-849-4001	alice.rojko@state.ma.us
Dave Pincumbe	EPA	617-918-1695	Pincumbe.David@epa.gov
Melissa Grader	US FWS	413-548-8002	Melissa_Grader@fws.gov

Thursday Oct. 30, 2008 - Maynard Public Library			
Peter Keenan	Maynard Conservation Commission	978-897-8027	peterk01754@yahoo.com
M. John Dwyer	Maynard Conservation Commission	978-897-1848	mjohn.dwyer@verizon.net
Carolyn Britt	Town of Maynard, Planning	978-317-2145	cbritt@communityinvestment.net
Sally Bubier	Maynard Selectman	978-897-5171	Sa_bubier@verizon.net
Richard Asmann	Maynard Building Dept.	978-897-0574	rasmann@townofmaynard.net
Mike McLaughlin	Stow Fire Dept.	978-897-8615	firechief@stow-ma.gov
Pat Pery	Stow Conservation Commission Administrator	978-897-8615	conservation@stow-ma.gov
Dennis Walsh	Stow Conservation Commission	978-621-6340	Walsh.concom@yahoo.com
Jane Ceraso	Acton Water District	978-263-9107	JCeraso@ActonWater.com

Tuesday November 18, 2008 – Hudson Fire Department			
Don Rising	Abutter	978-897-2466	Don.mdrising@comcast.net
Walt Lankau	Abutter, Stow Acres Country Club	978-568-1100	wlanlau@stowacres.com
Deborah Woodcock	Friends of Tripps Pond, Hudson	978-562-3081	dwoodcock@clarku.edu
David Glater	Greater Boston Trout Unlimited	617-523-1841	david@gbtu.org
Peter Schilling	MA/RI Council Trout Unlimited	617-244-5126	pmacds@aol.com
Forest Lyford	Northborough Historical Society	508-393-6680	flyford@msn.com
Nancy Bryant	SuAsCo WCC	978-461-0735	info@suasco.org
Andrew Martin	Abutter, Honey Pot Hill Orchard	978-394-5911	

Monday November 24, 2008 – Northborough Town Hall			
Betsy Griffin	Friends of Assabet River National Wildlife Refuge (FARNWR)		davebets@mac.com
Barbara Volkle	FARNWR		barb620@theworld.com
Claude Guerlain	Northborough Trails Committee, AMC-Worcester		cguerlain@gmail.com

Public Education and Participation in Water Quality Decisions:
Understanding Dam Removal and Restoration Alternatives for the Assabet River

Dudley Darling	Juniper Hills Golf Club		ddarling@juniperhillgc.com
Julia Khorana	OAR, AMC whitewater		jkhorana@assabetriver.org

Monday November 24, 2008 – Maynard Public Library

Ron McAdow	SVT		rmcadow@svtweb.org
Doug Moore	Maynard Conservation Commission		Derm.gee@verizon.net
Jim McCann	Abutter		ermccann@verizon.net
Mike McCloy	Abutter		mpmcloy@gmail.com
Ruth C. Regan	Mill Pond abutter, Maynard		Regan8@tcn.com
Andrew D. Magee	Town of Acton, Selectman		amagee@epsilonassociates.com
David Mark	ARRT		david@dmarknutrition.com
Ingrid Mach	Abutter (Mill Pond)		im@machsite.net
David Griffin	OAR/Maynard Historical Society		davebets@mac.com
Mary Michelman	Action Stream Teams, ACES		msmichelman@comcast.net
Joe Mullin	Clock Tower Place, SuAsCo	978-461-1508	jm@wellesley.com
Nancy Bryant	SuAsCo WCC		info@suasco.org
Tom Arnold	RSC		tba1959@comcast.net

Monday November 24, 2008 – Hudson Fire Department

Bob Collings	Abutter (Stow)	978-562-9182	info@collingsfoundation.org
Beth DiPietro	Abutter (Stow)	978-505-8076	Bcurtis23@hotmail.com
Alan DiPietro	Abutter (Stow)	"	"
Jeri DiPietro	Abutter (Stow)	978-397-9293	
Debbie Listerick	Abutter (Maynard)	978-897-2435	dlisternic@aol.com
Amanda Davis	OAR		
Jeff Richards	Meridian Associates + ARRT	978-838-2130	jrichards@meridianassoc.com
Lisa Vernegaard	Abutter (Maynard)	978-461-0225	lvernegaard@ttor.org
Janet Kresl Moffat	Stow Conservation Trust	978-897-2976	jandomoffat@comcast.net
Richard S. Martin	Abutter (Stow – Honey Pot Hill Orchard)	978-562-5666	
Bob Collings	Abutter (Stow)	978-568-8924	rcollings@collingsfoundation.org

Conference Calls

Marcello Micozzi	Allen St. Dam owner (Northborough)	508-798-8406 x17	MMicozzi@micozzimanagement.com
Michael Coates	Powdermill Dam owner (Acton)		hands.on.hydro@verizon.net
Chip Orcutt	Damonmill Dam manager (Concord)		chiporcutt@att.net
Bill Lazotte	Gleasondale Dam owner (Stow)	978-562-6590	

Appendix 4 – Public Workshop Agendas

Assabet River Restoration: Understanding the Impacts of Dams in Your Community

Workshop dates: Sat. March 14, 9 am-1 pm, at the Forbes Municipal Building, Westborough
Sat. March 28, 9 am-1 pm, at Clock Tower Place, Maynard

Program

- 8:15 am Registration and *Voices of the River* podcast and slide show
- 9:00 Welcome and Introduction to the Day
OAR Board President, Town Host
- 9:10 Informal Polling
Facilitator
- Who is in the room?
 - Key issues and priorities related to river restoration?
- 9:25 History of the Assabet River and its dams
OAR Board President/Maynard Historical Society
- 9:40 Why are we discussing dam removal on the Assabet?
OAR Presenter
- Phosphorus and water quality
 - TMDLs and the regulatory road map
 - Current status of wastewater treatment plant upgrades
 - Army Corps study scope
- 10:10 Presentations of Key Issues related to Dam Removal
- Fisheries (*US Fish & Wildlife & Mass. Div. of Fisheries and Wildlife*)
 - Wetlands (*Mass. DEP*)
 - The regulatory process (*EPA Region 1*)
 - Groundwater impacts and Sediment Contamination (*USGS & EPA*)
 - Hydropower (*Low Impact Hydropower Institute*)
 - Case study of dam removal (*American Rivers & Mass. Riverways Program*)
 - Phosphorus modeling study of Assabet (*CDM Consulting Engineers*)
- 11:10 Break and *Voices of the River* podcast and slide show
- 11:30 Presentations of Key Issues, cont'd.
- 12:00 Panel of Speakers with Facilitator
- Q&A and discussion with the participants and panel
- 12:40 Informal Keypad Polling with Facilitator
- Views of dam removal issues, questions, and concerns
- 12:55 Summing-up and Thanks
OAR Executive Director

1:00 Adjourn

Appendix 5 – Public Workshop Keypad Polling Results

March 14, 2009				
1	Who is your favorite baseball team?			
	1 Boston Red Sox		14	58.3%
	2 New York Yankees		3	12.5%
	3 Other		1	4.2%
	4 Don't Care		6	25.0%
		N	24	
2	Who do you represent? (pick which one best represents your views for this meeting)			
	1 A business in the watershed		1	4.3%
	2 Municipal government		4	17.4%
	3 State government		5	21.7%
	4 Federal government		2	8.7%
	5 A non-profit or community group in the watershed		6	26.1%
	6 An interested citizen		2	8.7%
	7 Other		3	13.0%
		N	23	
3	How long have you lived in the area?			
	1 0 to 1 year		2	10.0%
	2 1 to 5 years		4	20.0%
	3 5 to 10 years		1	5.0%
	4 10 to 20 years		5	25.0%
	5 More than 20 years		7	35.0%
	6 All my life		1	5.0%
		N	20	
4	How old are you?			
	1 13 to 20		0	0.0%
	2 21 to 30		1	4.8%
	3 31 to 40		3	14.3%
	4 41 to 50		10	47.6%
	5 61 to 70		7	33.3%
	6 71 and wiser		0	0.0%
		N	21	
5	How do you personally use the Assabet River? (Primary use)			
	1 I live near it		2	9.5%
	2 I conduct business near it		3	14.3%

3	I canoe, kayak, or boat	3	14.3%
4	I fish	2	9.5%
5	I hike or bike near it	2	9.5%
6	I view wildlife	0	0.0%
7	I enjoy its scenic qualities	3	14.3%
8	For water withdrawal (irrigation or fire suppression)	0	0.0%
9	My city/town uses the river for wastewater conveyance	1	4.8%
10	Other	5	23.8%
		N	21
6	How do you personally use the Assabet River? (Secondary use)		
1	I live near it	0	0.0%
2	I conduct business near it	2	10.5%
3	I canoe, kayak, or boat	3	15.8%
4	I fish	1	5.3%
5	I hike or bike near it	3	15.8%
6	I view wildlife	3	15.8%
7	I enjoy its scenic qualities	3	15.8%
8	For water withdrawal (irrigation or fire suppression)	0	0.0%
9	My city/town uses the river for wastewater conveyance	0	0.0%
10	Other	4	21.1%
		N	19
7	How do you personally use the Assabet River? (Third use)		
1	I live near it	1	4.8%
2	I conduct business near it	1	4.8%
3	I canoe, kayak, or boat	3	14.3%
4	I fish	1	4.8%
5	I hike or bike near it	3	14.3%
6	I view wildlife	3	14.3%
7	I enjoy its scenic qualities	3	14.3%
8	For water withdrawal (irrigation or fire suppression)	0	0.0%
9	My city/town uses the river for wastewater conveyance	2	9.5%
10	Other	4	19.0%
		N	21
8	How does your household dispose of wastewater?		
1	Septic system (single or shared)	5	21.7%
2	Municipal wastewater treatment plant	6	26.1%
3	I don't know	0	0.0%
4	I don't live in the watershed	12	52.2%
		N	23
9	In the future, what three most important things might the river provide for you? (First choice)		
1	Fish for catch and release	3	14.3%
2	Fish to eat	3	14.3%
3	Habitat for wildlife	6	28.6%
4	Scenic views	4	19.0%

5	Swimming	0	0.0%
6	Boating	4	19.0%
7	Drinking water	0	0.0%
8	Irrigation water	0	0.0%
9	Fire suppression water	0	0.0%
10	Conveying treated wastewater	1	4.8%
		N	21
10	In the future, what three most important things might the river provide for you? (Second choice)		
1	Fish for catch and release	1	4.8%
2	Fish to eat	1	4.8%
3	Habitat for wildlife	7	33.3%
4	Scenic views	3	14.3%
5	Swimming	1	4.8%
6	Boating	5	23.8%
7	Drinking water	0	0.0%
8	Irrigation water	0	0.0%
9	Fire suppression water	1	4.8%
10	Conveying treated wastewater	2	9.5%
		N	21
11	In the future, what three most important things might the river provide for you? (Third choice)		
1	Fish for catch and release	3	14.3%
2	Fish to eat	1	4.8%
3	Habitat for wildlife	6	28.6%
4	Scenic views	4	19.0%
5	Swimming	1	4.8%
6	Boating	3	14.3%
7	Drinking water	1	4.8%
8	Irrigation water	1	4.8%
9	Fire suppression water	0	0.0%
10	Conveying treated wastewater	1	4.8%
		N	21
12	Compared to the many environmental issues of concern to you, how important is providing a healthy Assabet River for future generations to you?		
1	Very important	13	59.1%
2	Important	8	36.4%
3	Somewhat important	1	4.5%
4	Not important	0	0.0%
		N	22
13	In your view, the three most significant threats facing the Assabet River are? (First choice)		
1	Invasive species like purple loosestrife and water chestnut	1	4.5%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	14	63.6%
3	Contaminated sediments (heavy metals, PCBs, etc.)	1	4.5%
4	Loss of recharge and stream flow resulting in low river levels	1	4.5%
5	Threats to fish health and habitat	0	0.0%
6	Pollution from stormwater	0	0.0%

7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	2	9.1%
8	Development, sprawl, and land use change	2	9.1%
9	Lack of local stewardship by citizens	1	4.5%
10	Lack of access to the river for recreation	0	0.0%
		N	22
14	In your view, the three most significant threats facing the Assabet River are? (Second choice)		
1	Invasive species like purple loosestrife and water chestnut	1	4.5%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	4	18.2%
3	Contaminated sediments (heavy metals, PCBs, etc.)	8	36.4%
4	Loss of recharge and stream flow resulting in low river levels	3	13.6%
5	Threats to fish health and habitat	2	9.1%
6	Pollution from stormwater	0	0.0%
7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	1	4.5%
8	Development, sprawl, and land use change	3	13.6%
9	Lack of local stewardship by citizens	0	0.0%
10	Lack of access to the river for recreation	0	0.0%
		N	22
15	In your view, the three most significant threats facing the Assabet River are? (Third choice)		
1	Invasive species like purple loosestrife and water chestnut	1	4.5%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	1	4.5%
3	Contaminated sediments (heavy metals, PCBs, etc.)	2	9.1%
4	Loss of recharge and stream flow resulting in low river levels	4	18.2%
5	Threats to fish health and habitat	4	18.2%
6	Pollution from stormwater	2	9.1%
7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	5	22.7%
8	Development, sprawl, and land use change	2	9.1%
9	Lack of local stewardship by citizens	0	0.0%
10	Lack of access to the river for recreation	1	4.5%
		N	22
16	How do you believe dam removal on the Assabet River would impact you?		
1	Strongly adversely impact	1	4.5%
2	Moderately adversely impact	3	13.6%
3	No to little impact	2	9.1%
4	Moderately positively impact	8	36.4%
5	Strongly positively impact	8	36.4%
		N	22
17	The three most important impacts to you regarding potential dam removal are? (First choice)		
1	Aesthetics of impoundments	0	0.0%
2	Fish habitat	4	18.2%
3	Wetlands and existing wildlife	1	4.5%
4	Phosphorus and eutrophication	10	45.5%
5	Hydro-electric development	1	4.5%
6	Property values and ownership of/access to exposed land	1	4.5%
7	Existing water withdrawals	2	9.1%

8	Historic or cultural values	1	4.5%
9	Change in water level and recreational impacts	2	9.1%
10	Other	0	0.0%
		N 22	
18	The three most important impacts to you regarding potential dam removal are? (Second choice)		
1	Aesthetics of impoundments	2	9.5%
2	Fish habitat	6	28.6%
3	Wetlands and existing wildlife	4	19.0%
4	Phosphorus and eutrophication	4	19.0%
5	Hydro-electric development	0	0.0%
6	Property values and ownership of/access to exposed land	2	9.5%
7	Existing water withdrawals	0	0.0%
8	Historic or cultural values	1	4.8%
9	Change in water level and recreational impacts	2	9.5%
10	Other	0	0.0%
		N 21	
19	The three most important impacts to you regarding potential dam removal are? (Third choice)		
1	Aesthetics of impoundments	2	9.1%
2	Fish habitat	3	13.6%
3	Wetlands and existing wildlife	3	13.6%
4	Phosphorus and eutrophication	4	18.2%
5	Hydro-electric development	2	9.1%
6	Property values and ownership of/access to exposed land	3	13.6%
7	Existing water withdrawals	0	0.0%
8	Historic or cultural values	2	9.1%
9	Change in water level and recreational impacts	3	13.6%
10	Other	0	0.0%
		N 22	
20	Would you like more information from OAR on the effects of dam removal on? (First choice)		
1	Costs/benefits of dam removal versus stricter wastewater discharge limits	8	40.0%
2	Wetlands and wildlife	1	5.0%
3	Case studies showing other dam removal projects	3	15.0%
4	Historic preservation	0	0.0%
5	Groundwater wells	5	25.0%
6	Property rights	1	5.0%
7	Flooding	0	0.0%
8	Visual impact on river shoreline changes	1	5.0%
9	Other	1	5.0%
		N 20	
21	Would you like more information from OAR on the effects of dam removal on? (Second choice)		
1	Costs/benefits of dam removal versus stricter wastewater discharge limits	5	25.0%
2	Wetlands and wildlife	3	15.0%
3	Case studies showing other dam removal projects	3	15.0%
4	Historic preservation	1	5.0%

5	Groundwater wells	1	5.0%
6	Property rights	0	0.0%
7	Flooding	2	10.0%
8	Visual impact on river shoreline changes	1	5.0%
9	Other	4	20.0%
		N	20
22	Would you like more information from OAR on the effects of dam removal on? (Third choice)		
1	Costs/benefits of dam removal versus stricter wastewater discharge limits	4	21.1%
2	Wetlands and wildlife	2	10.5%
3	Case studies showing other dam removal projects	0	0.0%
4	Historic preservation	1	5.3%
5	Groundwater wells	0	0.0%
6	Property rights	3	15.8%
7	Flooding	2	10.5%
8	Visual impact on river shoreline changes	1	5.3%
9	Other	6	31.6%
		N	19
23	More generally, what would you like more information on? (First choice)		
1	Cost/benefits of dam removal versus stricter wastewater discharge limits	8	38.1%
2	Innovative phosphorous removal strategies and technologies	4	19.0%
3	Impact of climate change on the river	3	14.3%
4	Timeline for taking action on dam removal	2	9.5%
5	Timeline for taking action on wastewater treatment plant upgrades	2	9.5%
6	Other	2	9.5%
		N	21
24	More generally, what would you like more information on? (Second choice)		
1	Cost/benefits of dam removal versus stricter wastewater discharge limits	4	21.1%
2	Innovative phosphorous removal strategies and technologies	6	31.6%
3	Impact of climate change on the river	2	10.5%
4	Timeline for taking action on dam removal	4	21.1%
5	Timeline for taking action on wastewater treatment plant upgrades	1	5.3%
6	Other	2	10.5%
		N	19
25	Evaluation: The two most useful tools in this workshop to me were? (First choice)		
1	Presentations and technical information	17	85.0%
2	Panel questions, answers, and dialogue	2	10.0%
3	Keypad polling	0	0.0%
4	Slideshow and podcast	0	0.0%
5	Networking with presenters and participants	0	0.0%
6	Other	1	5.0%
		N	20
26	Evaluation: The two most useful tools in this workshop to me were? (Second choice)		

Public Education and Participation in Water Quality Decisions:
Understanding Dam Removal and Restoration Alternatives for the Assabet River

1	Presentations and technical information	1	4.8%
2	Panel questions, answers, and dialogue	10	47.6%
3	Keypad polling	3	14.3%
4	Slideshow and podcast	1	4.8%
5	Networking with presenters and participants	5	23.8%
6	Other	1	4.8%
		N	21

Note: This polling included 2 OAR project staff and presenters.

March 28, 2009

NOTE: Questions from the 14th were added or changed for this poll, so questions that were different are highlighted in yellow below.

1 Who is your favorite baseball team?

1	Boston Red Sox	56	80.0%
2	New York Yankees	0	0.0%
3	Others	5	7.1%
4	Don't Care	9	12.9%
		N	70

2 Who do you represent? (pick which one best represents your views for this meeting)

1	A business in the watershed	1	1.4%
2	Municipal government	13	18.1%
3	State government	4	5.6%
4	Federal government	4	5.6%
5	A non-profit or community group in the watershed	12	16.7%
6	An interested citizen	17	23.6%
7	Property owner or abutter along the river	21	29.2%
8	Other	0	0.0%
		N	72

3 In what city/town do you live or work?

1	Westborough	0	0.0%
2	Shrewsbury	1	1.6%
3	Marlborough	0	0.0%
4	Northborough	1	1.6%
5	Hudson	5	7.9%
6	Stow	23	36.5%
7	Maynard	16	25.4%
8	Acton	4	6.3%
9	Concord	8	12.7%
10	Billerica	5	7.9%
		N	63

How long have you lived in the Sudbury, Assabet, or Concord River watershed?

4				
1	0 to 1 year		3	4.5%
2	1 to 5 years		5	7.5%
3	5 to 10 years		7	10.4%
4	10 to 20 years		11	16.4%
5	More than 20 years		29	43.3%
6	All my life		12	17.9%
		N	67	
5	How old are you?			
1	13 to 20		1	1.4%
2	21 to 30		1	1.4%
3	31 to 40		8	11.3%
4	41 to 50		12	16.9%
5	51 to 60		22	31.0%
6	61 to 70		16	22.5%
7	71 and wiser		11	15.5%
		N	71	
6	How do you personally use the Assabet (or Concord) River? (Primary use)			
1	I live near it		17	23.6%
2	I conduct business near it		2	2.8%
3	I canoe, kayak, or boat		9	12.5%
4	I fish		4	5.6%
5	I hike or bike near it		8	11.1%
6	I view wildlife		7	9.7%
7	I enjoy its scenic qualities		14	19.4%
8	For water withdrawal (irrigation or fire suppression)		3	4.2%
9	My city/town uses the river for wastewater conveyance		6	8.3%
10	Other		2	2.8%
		N	72	
7	How do you personally use the Assabet (or Concord) River? (Secondary use)			
1	I live near it		6	9.5%
2	I conduct business near it		3	4.8%
3	I canoe, kayak, or boat		16	25.4%
4	I fish		1	1.6%
5	I hike or bike near it		4	6.3%
6	I view wildlife		5	7.9%
7	I enjoy its scenic qualities		20	31.7%
8	For water withdrawal (irrigation or fire suppression)		1	1.6%
9	My city/town uses the river for wastewater conveyance		6	9.5%
10	Other		1	1.6%
		N	63	
8	How does your household dispose of wastewater?			

Public Education and Participation in Water Quality Decisions:
Understanding Dam Removal and Restoration Alternatives for the Assabet River

1	Septic system (single or shared)	36	48.6%
2	Municipal wastewater treatment plant	28	37.8%
3	I don't know	0	0.0%
4	I don't live in the Sudbury, Assabet, or Concord River watershed	10	13.5%
		N	74
9	In the future, what two most important things might the river provide for you? (First choice)		
0	Hydropower	7	9.5%
1	1. Fish for catch and release	1	1.4%
2	Fish to eat	3	4.1%
3	Habitat for wildlife	26	35.1%
4	Scenic views	11	14.9%
5	Swimming	2	2.7%
6	Boating	9	12.2%
7	Drinking water	4	5.4%
8	Irrigation water	2	2.7%
9	Fire suppression water	5	6.8%
10	Conveying treated wastewater	4	5.4%
		N	74
10	In the future, what two most important things might the river provide for you? (Second choice)		
0	Hydropower	7	10.0%
1	1. Fish for catch and release	6	8.6%
2	Fish to eat	1	1.4%
3	Habitat for wildlife	22	31.4%
4	Scenic views	14	20.0%
5	Swimming	1	1.4%
6	Boating	11	15.7%
7	Drinking water	0	0.0%
8	Irrigation water	1	1.4%
9	Fire suppression water	4	5.7%
10	Conveying treated wastewater	3	4.3%
		N	70
12	Compared to the many environmental issues of concern to you, how important is providing a healthy Sudbury, Assabet, or Concord River for future generations to you?		
1	Very important	44	61.1%
2	Important	24	33.3%
3	Somewhat important	3	4.2%
4	Not important	1	1.4%
		N	72
13	In your view, the two most significant threats facing the Assabet River are? (First choice)		
1	Invasive species like purple loosestrife and water chestnut	5	10.9%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	25	54.3%
3	Contaminated sediments (heavy metals, PCBs, etc.)	2	4.3%
4	Loss of recharge or excessive well-pumping resulting in low river water levels	2	4.3%
5	Threats to fish health and habitat	2	4.3%
6	Pollution from stormwater	1	2.2%

7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	2	4.3%
8	Development, sprawl, and land use change	5	10.9%
9	Lack of local stewardship by citizens	1	2.2%
10	Lack of access to the river for recreation	1	2.2%
	N	46	
14	In your view, the two most significant threats facing the Assabet River are? (Second choice)		
1	Invasive species like purple loosestrife and water chestnut	1	2.5%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	8	20.0%
3	Contaminated sediments (heavy metals, PCBs, etc.)	8	20.0%
4	Loss of recharge or excessive well-pumping resulting in low river water levels	2	5.0%
5	Threats to fish health and habitat	7	17.5%
6	Pollution from stormwater	6	15.0%
7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	5	12.5%
8	Development, sprawl, and land use change	1	2.5%
9	Lack of local stewardship by citizens	0	0.0%
10	Lack of access to the river for recreation	2	5.0%
	N	40	
16	How do you believe dam removal on the Assabet River would impact you?		
1	Strongly adversely impact	20	42.6%
2	Moderately adversely impact	6	12.8%
3	No to little impact	3	6.4%
4	Moderately positively impact	2	4.3%
5	Strongly positively impact	6	12.8%
6	Both positive and negative impacts	5	10.6%
7	Too much uncertainty to decide	5	10.6%
	N	47	
17	The two most important impacts to you regarding potential dam removal are? (First choice)		
1	Aesthetics of impoundments	2	4.7%
2	Fish habitat	3	7.0%
3	Wetlands and existing wildlife	7	16.3%
4	Phosphorus and eutrophication	5	11.6%
5	Hydro-electric development	0	0.0%
6	Property values and ownership of/access to exposed land	2	4.7%
7	Existing water withdrawals	4	9.3%
8	Historic or cultural values	2	4.7%
9	Change in water level and recreational impacts	16	37.2%
10	Other	2	4.7%
	N	43	
18	The two most important impacts to you regarding potential dam removal are? (Second choice)		
1	Aesthetics of impoundments	2	4.7%
2	Fish habitat	3	7.0%
3	Wetlands and existing wildlife	10	23.3%

Public Education and Participation in Water Quality Decisions:
Understanding Dam Removal and Restoration Alternatives for the Assabet River

4	Phosphorus and eutrophication	3	7.0%
5	Hydro-electric development	1	2.3%
6	Property values and ownership of/access to exposed land	5	11.6%
7	Existing water withdrawals	2	4.7%
8	Historic or cultural values	4	9.3%
9	Change in water level and recreational impacts	12	27.9%
10	Other	1	2.3%
	N	43	
20	Would you like more information from OAR on the effects of dam removal on?		
1	Costs/benefits of dam removal versus stricter wastewater discharge limits	8	19.0%
2	Wetlands and wildlife	7	16.7%
3	Case studies showing other dam removal projects	4	9.5%
4	Historic preservation	1	2.4%
5	Groundwater wells	3	7.1%
6	Property rights	1	2.4%
7	Flooding	2	4.8%
8	Visual impact on river shoreline changes	10	23.8%
9	Other	6	14.3%
	N	42	
23	More generally, what would you like more information on?		
1	Cost/benefits of dam removal versus stricter wastewater discharge limits	11	27.5%
2	Innovative phosphorous removal strategies and technologies	15	37.5%
3	Impact of climate change on the river	2	5.0%
4	Timeline for taking action on dam removal	6	15.0%
5	Timeline for taking action on wastewater treatment plant upgrades	5	12.5%
6	Other	1	2.5%
	N	40	

Combined Results

Who is your favorite baseball team?

1	Boston Red Sox	70	74.47%
2	New York Yankees	3	3.19%
3	Others	6	6.38%
4	Don't Care	15	15.96%
	<i>Total</i>	94	

Who do you represent? (pick which one best represents your views for this meeting)

1	A business in the watershed	2	2.11%
2	Municipal government	17	17.89%
3	State government	9	9.47%
4	Federal government	6	6.32%
5	A non-profit or community group in the watershed	18	18.95%
6	An interested citizen	19	20.00%
7	Property owner or abutter along the river	21	22.11%

8	Other	3	3.16%
	<i>Total</i>	95	
In what city/town do you live or work?			
1	Westborough	0	0.0%
2	Shrewsbury	1	1.6%
3	Marlborough	0	0.0%
4	Northborough	1	1.6%
5	Hudson	5	7.9%
6	Stow	23	36.5%
7	Maynard	16	25.4%
8	Acton	4	6.3%
9	Concord	8	12.7%
10	Billerica	5	7.9%
	<i>Total</i>	63	
How long have you lived in the Sudbury, Assabet, or Concord River watershed?			
1	0 to 1 year	5	5.75%
2	1 to 5 years	9	10.34%
3	5 to 10 years	8	9.20%
4	10 to 20 years	16	18.39%
5	More than 20 years	36	41.38%
6	All my life	13	14.94%
	<i>Total</i>	87	
How old are you?			
1	13 to 20	1	1.1%
2	21 to 30	2	2.2%
3	31 to 40	11	12.0%
4	41 to 50	22	23.9%
5	51 to 60	22	23.9%
6	61 to 70	23	25.0%
7	71 and wiser	11	12.0%
	<i>Total</i>	92	
How do you personally use the Assabet (or Concord) River? (Primary use)			
1	I live near it	19	20.4%
2	I conduct business near it	5	5.4%
3	I canoe, kayak, or boat	12	12.9%
4	I fish	6	6.5%
5	I hike or bike near it	10	10.8%
6	I view wildlife	7	7.5%
7	I enjoy its scenic qualities	17	18.3%
8	For water withdrawal (irrigation or fire suppression)	3	3.2%
9	My city/town uses the river for wastewater conveyance	7	7.5%
10	Other	7	7.5%
	<i>Total</i>	93	
How do you personally use the Assabet (or Concord) River? (Secondary use)			
1	I live near it	6	7.3%
2	I conduct business near it	5	6.1%

3	I canoe, kayak, or boat	19	23.2%
4	I fish	2	2.4%
5	I hike or bike near it	7	8.5%
6	I view wildlife	8	9.8%
7	I enjoy its scenic qualities	23	28.0%
8	For water withdrawal (irrigation or fire suppression)	1	1.2%
9	My city/town uses the river for wastewater conveyance	6	7.3%
10	Other	5	6.1%
	<i>Total</i>	82	

How do you personally use the Assabet - Primary and Secondary across both events

1	I live near it	25	14.3%
2	I conduct business near it	10	5.7%
3	I canoe, kayak, or boat	31	17.7%
4	I fish	8	4.6%
5	I hike or bike near it	17	9.7%
6	I view wildlife	15	8.6%
7	I enjoy its scenic qualities	40	22.9%
8	For water withdrawal (irrigation or fire suppression)	4	2.3%
9	My city/town uses the river for wastewater conveyance	13	7.4%
10	Other	12	6.9%
	<i>Total</i>	175	

How does your household dispose of wastewater?

1	Septic system (single or shared)	41	42.27%
2	Municipal wastewater treatment plant	34	35.05%
3	I don't know	0	0.00%
4	I don't live in the Sudbury, Assabet, or Concord River watershed	22	22.68%
	<i>Total</i>	97	

In the future, what two most important things might the river provide for you? (First choice)

0	Hydropower	7	7.4%
1	1. Fish for catch and release	4	4.2%
2	Fish to eat	6	6.3%
3	Habitat for wildlife	32	33.7%
4	Scenic views	15	15.8%
5	Swimming	2	2.1%
6	Boating	13	13.7%
7	Drinking water	4	4.2%
8	Irrigation water	2	2.1%
9	Fire suppression water	5	5.3%
10	Conveying treated wastewater	5	5.3%
	<i>Total</i>	95	

In the future, what two most important things might the river provide for you? (Second choice)

0	Hydropower	7	7.4%
1	1. Fish for catch and release	7	7.4%
2	Fish to eat	2	2.1%
3	Habitat for wildlife	29	30.5%
4	Scenic views	17	17.9%

5	Swimming	2	2.1%
6	Boating	16	16.8%
7	Drinking water	0	0.0%
8	Irrigation water	1	1.1%
9	Fire suppression water	5	5.3%
10	Conveying treated wastewater	5	5.3%
	<i>Total</i>	91	

Compared to the many environmental issues of concern to you, how important is providing a healthy Sudbury, Assabet, or Concord River for future generations to you?

1	Very important	57	60.64%
2	Important	32	34.04%
3	Somewhat important	4	4.26%
4	Not important	1	1.06%
	<i>Total</i>	94	

In your view, the two most significant threats facing the Assabet River are? (First choice)

1	Invasive species like purple loosestrife and water chestnut	6	8.82%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	39	57.35%
3	Contaminated sediments (heavy metals, PCBs, etc.)	3	4.41%
4	Loss of recharge or excessive well-pumping resulting in low river water levels	3	4.41%
5	Threats to fish health and habitat	2	2.94%
6	Pollution from stormwater	1	1.47%
7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	4	5.88%
8	Development, sprawl, and land use change	7	10.29%
9	Lack of local stewardship by citizens	2	2.94%
10	Lack of access to the river for recreation	1	1.47%
	<i>Total</i>	68	

In your view, the two most significant threats facing the Assabet River are? (Second choice)

1	Invasive species like purple loosestrife and water chestnut	2	3.23%
2	Phosphorus/nutrient loading causing eutrophication (excessive plant growth)	12	19.35%
3	Contaminated sediments (heavy metals, PCBs, etc.)	16	25.81%
4	Loss of recharge or excessive well-pumping resulting in low river water levels	5	8.06%
5	Threats to fish health and habitat	9	14.52%
6	Pollution from stormwater	6	9.68%
7	Non-nutrient pollution from wastewater treatments plants (pharmaceuticals, etc.)	6	9.68%
8	Development, sprawl, and land use change	4	6.45%
9	Lack of local stewardship by citizens	0	0.00%
10	Lack of access to the river for recreation	2	3.23%
	<i>Total</i>	62	

How do you believe dam removal on the Assabet River would impact you?

1	Strongly adversely impact	21	30.88%
2	Moderately adversely impact	9	13.24%
3	No to little impact	5	7.35%
4	Moderately positively impact	10	14.71%
5	Strongly positively impact	14	20.59%

6	Both positive and negative impacts	5	7.35%
7	Too much uncertainty to decide	5	7.35%
	<i>Total</i>	68	

The two most important impacts to you regarding potential dam removal are? (First choice)

1	Aesthetics of impoundments	2	3.08%
2	Fish habitat	7	10.77%
3	Wetlands and existing wildlife	8	12.31%
4	Phosphorus and eutrophication	15	23.08%
5	Hydro-electric development	1	1.54%
6	Property values and ownership of/access to exposed land	3	4.62%
7	Existing water withdrawals	6	9.23%
8	Historic or cultural values	3	4.62%
9	Change in water level and recreational impacts	18	27.69%
10	Other	2	3.08%
	<i>Total</i>	65	

The two most important impacts to you regarding potential dam removal are? (Second choice)

1	Aesthetics of impoundments	4	6.25%
2	Fish habitat	9	14.06%
3	Wetlands and existing wildlife	14	21.88%
4	Phosphorus and eutrophication	7	10.94%
5	Hydro-electric development	1	1.56%
6	Property values and ownership of/access to exposed land	7	10.94%
7	Existing water withdrawals	2	3.13%
8	Historic or cultural values	5	7.81%
9	Change in water level and recreational impacts	14	21.88%
10	Other	1	1.56%
	<i>Total</i>	64	

Would you like more information from OAR on the effects of dam removal on?

1	Costs/benefits of dam removal versus stricter wastewater discharge limits	16	25.81%
2	Wetlands and wildlife	8	12.90%
3	Case studies showing other dam removal projects	7	11.29%
4	Historic preservation	1	1.61%
5	Groundwater wells	8	12.90%
6	Property rights	2	3.23%
7	Flooding	2	3.23%
8	Visual impact on river shoreline changes	11	17.74%
9	Other	7	11.29%
	<i>Total</i>	62	

More generally, what would you like more information on?

1	Cost/benefits of dam removal versus stricter wastewater discharge limits	19	31.15%
2	Innovative phosphorous removal strategies and technologies	19	31.15%
3	Impact of climate change on the river	5	8.20%
4	Timeline for taking action on dam removal	8	13.11%
5	Timeline for taking action on wastewater treatment plant upgrades	7	11.48%
6	Other	3	4.92%

<i>Total</i>	61
--------------	----