NHWWC
New Hampshire Water and Watershed Conference 2017

Past and Future Challenges of Water Resource Management in NH

Conference Summary Report

March 24th, 2017
Plymouth State University
Plymouth, NH

Agenda for 2017 New Hampshire Water and Watershed Conference

Plenary Talk:

"Water Power, Paradoxes, and Rainmakers" – Thomas Burack, Former Commissioner, NH Department of Environmental Services, Attorney at Sheehan Phinney

Morning Sessions:

River and Stream Infrastructure for Improvements Chair: Shane Csiki

- Stream Passage Improvement for Infrastructure, Fish Passage, and Flood Mitigation – **Melinda Bubier and Shane Csiki**
- Developing a Tidal Stream Crossing Assessment Protocol for NH's Estuaries – **Kevin Lucey and Peter Steckler**
- Blending Engineering and Environmental Considerations in the Design of Infrastructure Improvements – **Sean Sweeney**

Pollutants Chairs: Dave Cedarholm

- Ghosts of MtBE Past, Present, and Future – **Gary Lynn**
- Trends in Methyl Tert-Butyl Ether Concentration in Private Wells in Southeast New Hampshire, from 2005 to 2015 – **Sarah Flanagan**
- The New Hampshire PFC Investigation – **Brandon Kernen**

Outreach Chair: Barbara McMillan

- Outreach, Innovations, and Change Around Municipal Stormwater Management – **James Houle**
- Soak up the Rain New Hampshire: Successes, lessons learned, and what's next – **Barbara McMillan and Lisa Loosigian**
- Arsenic in Private Well Water: Engaging a variety of stakeholders to create lasting change – **Kathrin Lawlor**

Riparian Corridors Chair: David Patrick

- The Role of Riparian Climate Corridors in Promoting Ecological Resilience – **David Patrick**
- The Upcoming Challenges for Wetland Restoration Efforts Along Riparian Corridors – **Michael Simpson**
- Expanding Riparian Forest Buffers in the Merrimack River Watershed – **Karl Honkonen**

Legacy Issues Chair: Paul Susca

- Twenty Five Years of Instream Flow Policy – **Ted Diers**
- Acid Rain Trends in New Hampshire Lakes and Ponds: An overview of waterbody response to acid deposition-related parameters in three NHDES monitoring programs – **Kirsten Nelson**
- Contrasting Chloride and Temperature Threats to Aquatic Ecosystems for Uncertain Histories and More Uncertain Futures – **Shan Zuidema**

Agenda for 2017 New Hampshire Water and Watershed Conference

Afternoon Sessions

Climate Change Chair: Michael Simpson

- Simulated Hydrologic Response to Climate Change During the 21st Century in New Hampshire– **David Bjerklie**
- Projecting Future Changes in Flooding Across New England: More challenging than you might think – **Cameron Wake & Danielle Grogan**
- Drought Management in New Hampshire – **Brandon Kernen**

Mitigation and Restoration Chair: Jennifer Palmiotto

- To Restore or Not to Restore, that is the McQuesten – **Michele Tremblay & Stephen Landry**
- The Homestead Dam removal and broader implications for river restoration and geomorphic predictions – **John Gartner**
- Buffer Options around Great Bay: Understanding the scientific and social context – **Steve Miller & Shea Flanagan**

Outreach Chair: Judy Tumosa

- Watershed Scale BMP Installation: Educating and engaging communities in New England – **Andrew Veilleux & Amy Arsenault**
- Watershed Scale Assessment to Promote Community Restoration Priorities – **Dianne Timmins & Rachelle Lyons**
- A Regional Planning Tool for Community-Based River Management and Protection – **Sam Durfee**

Pollutants Chair: Joe Boyer

- Controls and Impacts of Mercury in Watersheds in the Northeast – **Vivien Taylor**
- Phosphorus Transport to Squam Lake During Storm Events – **Anju Shrestha**
- Long-term Patterns in Cyanobacterial Blooms in Oligotrophic Lake Sunapee – **Kathryn Cottingham**

Planning and Assessment Technology and Tools Chair: Michelle Shattuck

- Regional Coherence in Solute Interactions During Stormflow in a Statewide Aquatic Sensor Network – **Michelle Shattuck**
- The Application of LiDAR to Watershed Management on the White Mountain National Forest – **Landon Gryczkowski**
- Preventing Another Elk River – Improving Knowledge and Awareness Among First Responders, Drinking Water Suppliers, and Tier II Facilities Along the Lower Merrimack River – **Andrew Madison**

Workshop

Interactive session at the end of the day designed to gather ideas and summarize the day

Agenda for 2017 New Hampshire Water and Watershed Conference

Throughout the Day:

Posters on New Hampshire Water Topics Chair: Carolyn Greenough

- Examining Methods of Ecosystem Services Valuation to Better Inform Watershed Policy – **Klancey Burford & Shannon Rogers**
- Reaching Across the New Hampshire-Massachusetts State Boundary to Landowners, Communities, and Volunteers in the Merrimack River Watershed – **Alicia Carlson**
- Characteristics that Influence Level of Concern in the Great Bay Estuary Watershed – **Noah El-Naboulsi & Shannon Rogers**
- NH EPSCoR: Ecosystems and Society – **Kevin Gardner**
- Mobilization of Heavy Metals from Residential Activities – **Scott Greenwood**
- Outcomes from Stakeholder Interviews for the Squam Lakes Watershed Plan – **June Hammond Rowan, Carolyn Greenough, Rebecca Hanson, & Matthew Mazzone**
- Watershed Status in the Gulf of Maine – **Matthew Liebman**
- Modeling Phosphorus Fluxes in the Squam Watershed – **Rebecca Hanson**
- The View from Mt. Prospect: An analysis of the role that Mt. Prospect plays in the Pemigewasset Watershed – **Larry Spencer**
- Examining the Effects of Climate Change and Road Salt Usage on NH's Benthic Macroinvertebrates – **Roy Fruit, Matthew Mazzone, Ryan Duquette, Thomas Lafortune, Dr. Amy Villamagna, & Dr. Brigid O'Donnell**
- Restoring flow in the Beebe River: Implications for Eastern Brook trout – **Tyson Morrill**
- Dam Removal as Compensatory Mitigation: Challenges and Recommendations – **Simone Souza**

Demonstration

Massachusetts Watershed-Based Plans: A new web-based tool for statewide watershed planning – **Robert Hartzel**

Plenary Talk

WATER POWER, PARADOXES, AND RAINMAKERS

Thomas Burack

Former Commissioner, NH Department of Environmental Services,
Attorney at Sheehan Phinney

Note: Thomas Burack gave the plenary talk at the 2017 New Hampshire Water and Watershed Conference. It is impossible to capture the event. Tom served as a tour guide on a journey through a metaphorical watershed where participants actively engaged as water and together made it "rain" inside (just as the snow began to fall outside). The journey helped us see where we have come from and to reflect on where we may be going. His presentation was playful and philosophical. He gave us some unconventional tools, and some new powers, for telling the story of water -- for engaging people in the vital work of ensuring that we're stewarding our water resources in as thoughtful a way as we can. Part of his talk is presented here.

This conference, and the nine that have preceded it, have taken as a set of givens that water is a resource, that water can be managed, and, in fact, that we can manage it as a resource across a watershed. With water, as with all things, there are many knowns, many unknowns, and even some unknown unknowns. Collectively assembled here today are what we might think of as many of the power brokers of water in New Hampshire. For if knowledge is power, there are many, many gallons of water power in this room. And one thing of which I am quite certain is that your powers, particularly if you work together, are greater than you know, and far greater than you may realize.

Let's be honest, how many of you knew the name of the watershed in which you were born? The name of the watershed in which you went to high school? The watershed in which you live now? Probably many more of you knew the answer to the last question. Why would that be? My hypothesis is that you have this greater awareness of your surroundings today because you all have chosen to acknowledge the role that water plays in your lives. You have fallen under water's powerful spell. You have a consciousness about your whereabouts, about your home, in terms of water, not just in terms of human-made features or existential lines on a map. Here's my hypothesis: you (we), are very much in the minority in this country and world. Most people don't know what watershed they live in; many people don't even know what a watershed is. One question we might be asking ourselves is what it would take to get many more people to see things from this perspective, and what difference that could make in how we do our work of managing our state's waters - how we define problems, and how we go about developing solutions to those problems.

Flowing water has huge energy potential, and starting in the early days of colonial times in our state, many of the streams and rivers in watersheds across our state were dammed to support mills that made everything from textiles to paper, and flour to lumber, and in just the past 100 years or so, to make electricity. We talk about "harnessing" water power, which usually means we have found clever

ways to hold some of it back or to channel it, so that we can concentrate the flows and also take advantage of vertical drops to derive mechanical energy to run machinery. Dam building was one of the earliest forms of what today we might call "water resource management," but today it's not much in vogue except for flood control and to make electricity.

As we look to the future, will we again be trying to derive greater power and energy from water? Could the prospects of a changing climate make this not only attractive but also essential? Are there ways in which we could cost-effectively "harness" water power without causing other, detrimental impacts to water quality? Or should we be managing our waters in ways that return them to their natural conditions? Those are some of the many problem/solution challenges that we're going to face in the decade ahead.

Water is a very powerful thing, whether there's a lot of it, or just a little bit of it. Whether there's too much of it, or too little of it. Whether it's nearby or far away. Whether it's fresh, brackish or saline, polluted or unpolluted. Or even if there's just the right amount of just the right quality: Water holds huge power over us, and affects our lives in almost infinite ways.

At the same time, we can turn water's power, and its many attributes, to our benefit as human beings. But that takes the power of people: our intelligence and thoughtfulness and ingenuity and collaboration. Perhaps that's at least part of what we mean when we talk about managing water resources.

It is somewhat paradoxical that one substance, one part of this earth, could hold so much power, regardless of how much of it there is. But it does, and for a host of reasons. Molecularly-speaking, water is a remarkable substance. H2O. It's made up of how two hydrogen molecules to each oxygen molecule. Its ability to so easily be attracted to another molecule that makes water able to flow, to freeze, to thaw, to evaporate, to precipitate, to do all of those amazing things that water does. Not to mention the ability to dissolve things and to hold things in suspension.

When you really think about it, water is amazing stuff in the way it behaves. It has extraordinary powers and properties. What if we as humans could emulate or mirror those powers in service to water? What would we do differently if we approached our water resource management problems and solutions as if we had the powers of water?

In watersheds across New Hampshire, this magnetic power of water has attracted significant development activities of all kinds to our oceanfront, lakeshores, wetlands and riverbanks, and has placed new and increased pressures on those waterbodies. Some years ago the NH state legislature

wisely enacted management measures under the Surface Water Quality Protection Act (previously known as the Comprehensive Shoreland Protection Act) to place some reasonable limits on how close to shore people can build structures and conduct other activities. We've exercised this management prerogative, understanding that we can love a resource so much that we can destroy the very qualities that sparked our love in the first place. Moreover, these measures help to protect people and structures from significant risk during periods of heavy precipitation and high waters, and they also protect water quality at all times, including during dry periods when dilution is less, and rainy periods when untreated runoff due to inadequate filtering provided by natural buffer lands increases pollutant loadings in the receiving waters. This is an interesting and instructive example of the importance and value of developing a water resource management strategy that effectively addresses situations in which we have too much water, too little water, and the Goldilocks scenario of having neither too much nor too little water.

Another major policy achievement has been the development of the instream flow protection program in New Hampshire. We've recognized that there is natural variability in water levels and flows in our rivers throughout the year, and we've developed a scientifically-based approach to ensuring that we don't allow extended periods of extremely low flows to veer too far from the norm. We do this through a watershed-based approach, by looking from the top of the watershed to the bottom. And we developed a system of planned releases of water from upstream locations, where water is stored in lakes and ponds, so that we can periodically bring life-giving water to the river's biota. We've also brought all of the riparian water users together in a collaborative process to ensure that there will be an agreed upon water use plan in situations in which they can't get as much water as they'd like.

As we look into the future, we will need to ensure that our regulatory and our funding structures continue to support the protection of water quality in our lakes, rivers and streams. And, again, we need to plan for the full range of scenarios: too little, too much, and just the right amounts of water. Are there incentives we can provide to promote best practices by private landowners and water users that will protect and enhance water quality? Are shoreland property owners and members of the public alike adequately knowledgeable about the power that water has over their lives and the value it adds to their lives, and about the power they have, through their own actions to protect and enhance water quality?

Debates occurring at the national level would suggest that those of us who work in the environmental field need to do a much better job of helping businesses and members of the public to see that in many instances the costs of protecting water quality are lower than the costs of doing nothing. Or put another way, that the benefits exceed the costs, even if it's true that in the first instance the costs may be incurred by certain individuals or companies while the benefits are derived not only by them

but also by a far larger number of people. It's important to explore how we can more effectively convey the message that water holds huge power over us as humans, that we have it within our powers to ensure that water is there to make our lives better if we show proper care for our waters, and that a key way to successfully protect and manage our waters is to think about them as we have this morning - on a watershed basis. We need to do this outreach in all kinds of ways for all kinds of learners, whether they learn through seeing, hearing, feeling or thinking. Ultimately, everyone in society benefits from having a cleaner environment, as it allows all of us to live healthier lives. And that saves everyone money and makes everyone happier. We must get better at telling this story in ways that are fun, meaningful, engaging.

Water ignites and excites people's passions, especially when they see something that they know is so important being despoiled, and especially given that water, clean water, is essential to people's lives. Without water, we would not exist. And without adequate volumes of clean water, we won't live or live as long. Dehydration is a serious, life threatening condition. Paradoxically, consuming too much water, and especially too much water containing either naturally occurring or human-made contaminants can also cause serious health problems in humans. That's why we've undertaken major public policy and public financing initiatives to remove pollution in the form of human and industrial wastes from our surface waters and groundwater and to ensure that we adequately treat our wastewaters and runoff so that we don't go backwards, so that we don't make our waters polluted again.

First we saw that our waters and watersheds were being assaulted by human sewage and industrial wastes, so we enacted the Clean Water Act and other laws to put limits on those discharges and to provide funding assistance to help municipalities cover the costs of treating that sewage. As a consequence, the health of our waters and our people has improved dramatically and we have many compelling stories of how this has been done in New Hampshire.

Later we saw that our waters were becoming more acidic and full of mercury, so we enacted laws to require treatment of air emissions from factories and power plants. As a consequence, water quality in our lakes and rivers is on the mend. The effects of runoff from development and discharges from septic systems has also received attention as we make efforts to develop and promote best land management practices and sound subsurface treatment of wastewaters to reduce phosphorus loadings and cyanobacteria blooms in our lakes. More recently, we have found human-made substances, including methyl tertiary butyl- ether (MtBE) and polyfluorinated compounds (PFCs), in groundwater,

and chlorides in our surface and groundwaters, and we've undertaken significant legislative and compliance initiatives to secure the necessary resources to clean up those contaminants where practicable and to provide alternative drinking water supplies wherever possible. Now these measures and programs that substantially improved our quality of life and strengthened our economy didn't just happen on their own. They happened because people like all of us saw the problems, recognized the dangers, and came together to find solutions and take action. The threats to our waters exerted a power over people to do something: citizens, public officials, nonprofit organizations, businesses and legislators saw big problems and came together to wield their collective powers to find solutions. This was and is water power at work.

The latest trend is to think of wastewaters as resources that are full of power in the form of energy, nutrients and other substances that can be harvested and put to other good uses. As we contemplate the water power of the 21st century, and look 10 years out and beyond, this way of seeing power in our waters must be embraced and expanded. How can we find power, water power, where we haven't seen or looked for it in the past? How can we find value in what we haven't valued up until now?

There's another challenge that compounds and seems destined to amplify the extremes of all of these other powers of water, and that's the challenge of climate change. It's undeniable that throughout recorded history since the glaciers receded and left us our current configuration of watersheds here in the Granite State that we've experienced floods and droughts.

What's also undeniable is that the modeling indicates that as the earth experiences anthropogenic-induced warming due to increased greenhouse gases, we will experience a greater frequency of high intensity rain events as well as extended periods when we experience little or no precipitation and higher temperatures. So that when it does rain, the rain comes so hard and fast, and hits such dry ground that it is more likely to run off and cause erosion than it is to soak into the ground and recharge the aquifers. Thus, we could be facing a true paradox of water in the age of climate change: "There's so much water that we're going to run out of it." We might dub that the Climate Change Paradox of Water.

We as humans, in fact all forms of life on this earth, depend in one way or another on water. Our health, our welfare, our work, our play, our very lives, and everything on which we rely, lives on water. The fact that there is, for all practical purposes, a finite quantity of fresh water necessarily makes it a valuable commodity to humans and all other forms of life, and because we as humans attach value to it, those who are in a position to exercise some control over it have greater power (actual or potential) than those who do not. But, at the same time that there are limited quantities of water in a universal sense, there are also locations and situations in which there's more water than people are prepared to deal with. And all of this helps in making sense of the diamond-water paradox,

which seeks to explain why the price of water, which is absolutely essential to life, is relatively low most of the time, while diamonds, which are not essential to life, have a relatively high price all of the time.

In addition, as we're learning from a changing climate, drought and flood cycles may become more frequent and more intense. So we must, paradoxically, be prepared at any and all times to deal with situations in which water supplies may be limited, as well as situations in which we have flooding due to too much water. And then there's the California water paradox: why enough is never enough. Somehow, as societies, populations, and economies grow, we want and need more water than we have.

And though diamonds are certainly expensive, it turns out that ensuring that we all have good, clean, safe water for drinking, bathing, swimming, fishing, farming, and commercial and industrial activities, costs a lot of money! Certainly there are ways that we can harness nature's powers and properties to do a lot of water purification for us, but there are many places and situations in which we need to cash in our diamonds in order to have the funds to build or install the water conveyance, treatment, storage, disposal and recovery facilities that we need in this modern era. Most of this is invisible infrastructure -- infrastructure that's underground or otherwise out-of-sight, so that people don't even think about it, just as most people don't even think about living in a watershed. This infrastructure challenge will likely become particularly acute in the decade ahead, as those pipes and plants that were installed or built anywhere from 30 to 100 years ago, cease functioning, require substantial maintenance, or can't keep up with what's being asked of them.

The price tag is a big one, and we're going need to make people aware of this need and convince them it's a problem we have to address. But it starts with just helping people to understand the value of water to their lives and the actual cost of having clean water. This was a key recommendation of the New Hampshire Water Sustainability Commission, formed by Governor John Lynch, and its work that's going forward now. In fact, the first project of a new public-private partnership in New Hampshire, known as New Hampshire Lives on Water, is seeking to update and expand on some economic evaluations done nearly two decades ago of the value of clean water to New Hampshire.

This conference is structured around jointly identifying problems and solutions, bringing exactly the kind of thinking and approach that is needed in these tumultuous times. More than ever before, we need to be learning from and with each other, building and sharing tools and strategies that are successful and cost-effective, and not reinventing the wheel or pursuing flawed approaches. Building an easily accessible catalog of solutions to help manage water resource problems and challenges would be a very worthwhile endeavor. If you collaborate, if you act with water power in mind, there is nothing that these newfound powers can't accomplish.

"Water Power" -- it's all about collaborating in new ways, taking fresh approaches, but also learning all we can from what's been successful in the past. If we are to be successful in water resource management in this new era, we must tell the story in a more compelling and immediate and personal way. We must help people to see and feel real, tangible benefits from environmental protection efforts, and we must engage people on a watershed level, up and down the watershed, to understand that what's upstream of them affects them, and that what they do will affect everyone downstream. That's what watersheds are all about. It requires collaboration, and it's all about water power. The power of water can nurture ideas that will ensure that water will always be there for us if we are there for it. If we are creative enough, if we listen closely enough, we will hear the rain fall ... and we will know that we have water power.

Water Resources Workshop

Learning from the Past, Preparing for the Future

As part of the 10th New Hampshire Water and Watersheds Conference we asked participants to share their insights on successes of the past and challenges of the future. Conference attendees were given the information below. The results of this workshop are presented on the following pages.

NHWWC New Hampshire Water and Watershed Conference

Workshop

NHWWC New Hampshire Water and Watershed Conference

Learning from the Past, Preparing for the Future

As part of the 10th New Hampshire Water and Watersheds Conference, we invite you to participate in an interactive workshop. Please share your insight on successes of the past and challenges of the future for our water resources. We would like you to answer these questions for 5 topical areas:

- "Is there an example of a success or a solution that's worked really well?"
- "What is a challenge facing us in in this area? What do you think is the best way to address this challenge? What connections or information are needed to support this approach?"

The responses are grouped into 5 topical categories:

1. Pollution/Legacy issues
2. Outreach/Planning & assessment tools
3. Mitigation & restoration
4. Climate change
5. General water resources

There are two ways for you to respond throughout the day:

- **Via electronic poll, https://pollev.com/nhwatersheds**
- **On paper – visit the "Idea Tables" in the Fireplace Lounge to share your thoughts and see ideas from others**

We encourage you to respond in either or both formats. You can offer your ideas as many times as you like. The overall goal is to:

- *Identify factors that contribute to successful management or restoration in NH water resources, and*
- *Identify upcoming and ongoing challenges, and approaches or conditions to better address those challenges.*

From 3-4 pm, we will briefly summarize and discuss the responses as well as identify a few significant successes and challenges to highlight in a post conference summary.

Thank you for your ideas and input!

Pollution and Legacy

For a long time we have been working to address water issues broadly and a great deal of progress has been made, but we have faced many challenges that have made it hard to make further progress. Fortunately, people, as well as governments, have made great strides in addressing the issues our water resources face. Under the Clean Water Act, USEPA and the states have implemented pollution control programs and set water quality standards for contaminants. In New Hampshire, we have the Rivers Management and Protection Program (RMPP), the Shoreland Water Quality Protection Act, the Groundwater Protection Act, as well as programs such as Soak up the Rain. However, we are still facing issues with new, un-tracked pollutants, stormwater runoff, and cyanobacteria blooms and we need to work to address these challenges.

Successes:

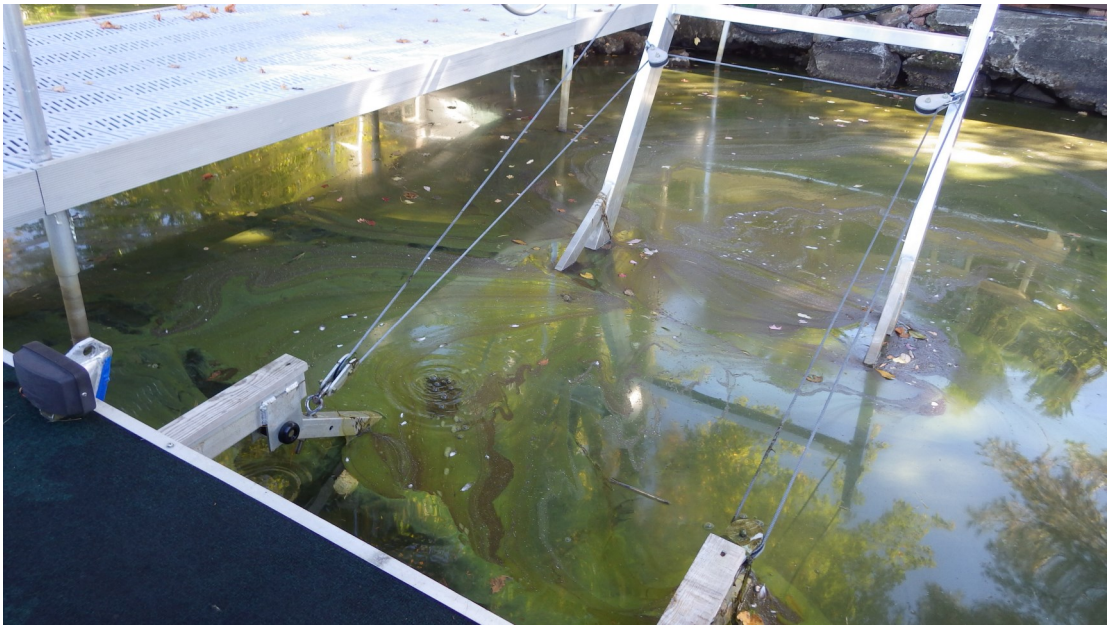
- Outreach with community had helped
- The regulation of point source pollution
- NH Rivers Management and Protection Program (RMPP)
- Clean Water Act
- Section 319
- Stormwater Retention Credit Trading Program
- Reduction in acid rain

Challenges:

- Current Political Atmosphere
- Getting the public to care about pollution sources and educating them on how to reduce the load
- Making sure the public and different organizations realize they are on the same team
- Balancing the desire for development with the protection of these resources
- The need for stronger regulations and enforcement of current laws and regulations
- Non-point pollution such as stormwater runoff and septic system discharge
- New, un-tracked pollutants
- Increased issues due to climate change and/or sediments
- New technology with unknown impacts
- Road salt
- Increased pressure from new development and being smart about redevelopment

Pollution and Legacy—Workshop Discussion Summary

Many of the past successes have revolved around regulatory approaches, but going forward more community engagement will be needed to overcome identified challenges. The Soak up the Rain program (http://soaknh.org/) was brought up as an example of a type of successful engagement and its tremendous ability to catch non-point sources of pollution, as well as it's success with community engagement. More of this community engagement will be necessary to make progress in this aspect. We need to make sure that the science is communicated effectively to the public and that there are connections with the people in the municipalities. In New Hampshire there is an anti-regulation sentiment and building trust with communities takes time. While many people see the need for stronger regulations to protect our resources, we need to engage local watershed groups and work at a local scale for many of these issues.



Outreach

The communication of science to the general public is a necessary first step in helping people make informed decisions. There are many assessment tools that can help with this communication; including, GIS, models, and smartphone apps. The state of New Hampshire has many great examples of how to involve the community in science but there are still challenges that scientists face. These challenges include how to synthesize all of the information into a clear message and how to recruit and connect with people outside the field.

Successes:

- Watershed and conservation planning
- Build-out scenarios/Projections to inform the public
- GIS use to engage and interest public
- Using community-led restoration on appropriately sized watersheds
- Promoting citizen scientists in individual watersheds
- Having resident-based lake associations to involve local stakeholders and put them in a decision-making role
- Increasing public awareness through social media, newsletters and public television
- Having educational events for neighborhoods and youth
- Greater use of rain gardens at homeowner level through "the Soak up the Rain" program
- Having stormwater workshops to educate professionals and government officials
- Funding through Aquatic Restoration Mitigation Fund, as well as State Revolving Loans and Grants
- Increasing awareness though the Invasive Species Prevention Program
- Durham/UNH "Pee Bus" project to engage communities
- Vermont Rivers and Roads Training Programs

Challenges:

- Figuring out how to better use social media to communicate with stakeholders
- Developing messages and graphics to relate with the general public
- The "Live Free or Die" attitude of the citizens in the state
- Figuring out how to synthesize all of the watershed data for the public
- Recruitment for Local River Management Advisory Committees and Lake Associations
- Recruitment of the younger generations to get involved in associations and committees
- How to connect with the public outside of immediate followers
- Needing to combine knowledge with other scientists to develop apps and models
- Outreach and planning tends to be a lower priority for funding

Outreach—Workshop Discussion Summary

In the afternoon discussion attendees discussed some great ways different organizations are reaching new people. Involving youth in different aspects of science is a great way to get them interested in the health of the water bodies from a young age. For example, this has been done through Trout in the Classroom for 4th graders in Wakefield, NH. Acton/Wakefield Watershed Association has successful brought in high school and college-aged students who are now becoming leaders on these ponds. The Nature Conservancy worked with its members to rebuild degraded oyster reef habitat in the Piscataqua Region Estuary. Last year they had around 85 families involved and are using these community scientists to collect data that helps to inform the health of the bay. These partnerships are important to get things done, whether the partnership is with community members, local businesses, or governmental agencies. Some innovative partnerships were discussed such as partnering with a local golf course to get an Audubon certification as a wildlife sanctuary. When working with the public we need to use inclusive language to make sure to involve everyone in the work we do on these resources. People do not need to be scientists to help, everyone understands the connection to the environment. It is just a matter of reaching different stakeholders and working together as a community to figure out the best way to do this.

Mitigation and Restoration

Mitigation and restoration are important for correcting past impacts to our water resources. These approaches can be costly and time consuming in the short term, but the long-term outcomes are significant. Weighing the costs versus the benefits of mitigation and restoration efforts needs to consider the long view. In some cases, assumed negative impacts from restoration projects have not occurred. For example, sediment release can be a negative outcome from a dam removal project, but it has not always occurred to the degree expected. Mitigation and restoration work can also create benefits that were unforeseen such as the multiple benefits from land conservation. Community support, political support, along with scientific and environmental support are needed to gain the full spectrum of benefits.

Successes:

- Dam removal projects such as Winnicutt River Dam Removal in Greenland NH, Exeter River dam removal project in 2016
- NH's strong dam safety regulations can help identify projects that need repair or removal. This can help identify mitigation or restoration at these sites.
- The Aquatic Resource Mitigation program is well run and highly successful.
- Exeter River dam removal project in 2016 - community supported, political support, and scientific/environmental support.
- Watershed master plans have been important not only for acquiring state funding for road projects, but also for identifying problem areas.
- Land conservation has increased thanks to financial assistance for easement costs.
- 319 Program

Challenges:

- Public misconceptions that mitigation and restoration don't make a difference. More funding to design and implement projects to show big improvements can be made is what is needed. Documentaries to demonstrate successes will help support this approach.
- Cost and it seems impossible to replace what is lost. The best way to address this challenge is prevention, enforcement, and protecting ecosystems and their function - put more land into conservation easements/protection.
- Restoration remains an expensive and uncertain science, yet can be incredibly valuable if successful. Developing well-reasoned adaptive management frameworks with sufficient monitoring is vital.
- Dam removals get hung up by people who think history started in the 1800's. The truly historical dam structure would be none at all. Then there are the people who think all dams are flood control dams.

Mitigation and Restoration

More Successes:

- Research studies can reveal and document problems that then can be corrected through mitigation and restoration. For example, demonstrating how a stream crossing (culvert) that is undersized for the flow creates a barrier for fish movement due to a perched outlet due to scour can lead to a restoration of the problem.
- Land Trusts and Lake Associations often monitor timber harvests close to wetlands, streams, and lakes to prevent increased water temperatures, run-off and acidification.

More Challenges:

- Best practices are not always followed and rarely enforced without catching someone in the act. Often times the damage has been done. An informed public is crucial.
- Prioritizing and focusing efforts where they are needed most.
- 319 funding is going away. Department of Justice settlements for Clean Water Act lawsuits are rare. ARM funds are labor intensive for the two stages of application, the management phase, and the monitoring burden after the project is done. You shouldn't have to attend two days of class and be a technical person to apply for funds.
- Degradation of infrastructure and replacement of crossings that end up being impassible barriers to fish.

Mitigation and Restoration—Workshop Discussion Summary

Discussion centered on dam removal projects as they are some of the most visible and publicized examples of restoration projects in New Hampshire. They create compelling stories, but are expensive and the available funding is limited. The pace of dam removal projects is slow and may not be keeping up with the gradual decline of these structures. Effective collaboration is important to getting more project completed quicker. FEMA funding for pre-disaster mitigation funds is a potential source of funding moving forward.

Climate Change

Climate change is occurring and has many probable consequences. However, because it is such a broad topic it is often difficult to come up with a good story about it that motivates change in communities. We do not have a realistic solution to climate change, but we need to use our knowledge to promote changes in policies and practices. We need to include everyone's perspectives in this development of practices in order for it to be successful. There is something to learn from the work that has been done surrounding climate change. Twenty years ago very few people thought seriously about climate change, but now the majority of the world sees it as a serious issue. We should look at how climate change advocates did this and apply it to other water resources issues.

Successes:

- Restoring natural hydrologic cycles to address climate change, such as the re-hydration of lands with rainwater retention
- Developing "no regrets" solutions that target multiple issues
- Collaboration between environmental professionals and stakeholders in the regions to increase awareness
- Advocates have been very successful at creating awareness of the issues and probable consequences
- Creating a Climate Change Observatory within a lake association to connect knowledge with the public to increase awareness and support preventative measures

Challenges:

- There is no realistic solution to climate change yet
- Current political atmosphere in the state and the federal government
- The politicization of climate science has placed a barrier on progress when what we need is a coordinated effort
- There are still a number of climate change deniers and there is concern that they will not understand until "Climate Armageddon" occurs.
- Figuring out how to educate these climate change deniers
- Educating businesses that sustainability is good for their bottom line
- There are going to be more extreme weather events and we need a comprehensive and coordinated national and global action

Climate Change

More Successes:

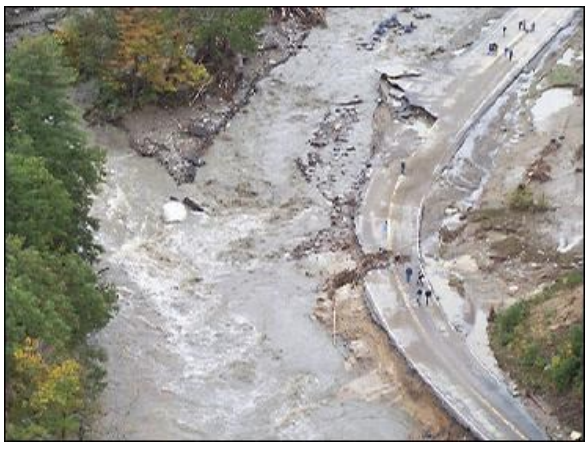
- Governmental policies to alleviate the issues of ozone and acid rain
- The Nature Conservancy has engaged with right-leaning decision makers to better understand the breadth of perspectives on climate change. This information will be used to promote policies and practices with broad bi-partisan support.
- The publication "Weathering Change" (2015) that looked at climate change business perspective rather than using fear.

More Challenges:

- Sea level rise is a large concern for the seacoast area
- Development in flood plains is going to cause a lot of issues in the future
- We need to focus more on the attenuation or retention of water to facilitate infiltration
- We need to invest in storm drains, culverts, etc. to prepare us for the larger weather events
- We have to make sure climate change discussion does not overshadow other clear problems in our regions, such as habitat loss and pollution.

Climate Change—Workshop Discussion Summary

The discussion at the end of the day primarily focused on the challenge of communicating climate change to stakeholders, government officials, and climate change deniers. There are people with many different background that need to be included in these discussions and it takes time to build this trust. We need to figure out how to empower communities to be more climate resistant and this will likely take a lot of time and effort on everyone's part. The project, Climate Risk in the Seacoast (C-RiSe), provided Great Bay municipalities with a report depicting issues that will be faced in these areas with the projected increases in storm surge, sea level, and precipitation. The Regional Planning Commissions took this outreach to the individual towns and gave every planning board the opportunity to see the report. The Coastal Hazards Project has been another successful project that is very inclusive but has required a lot of time and effort of those involved. With most successful projects, the people involved have put in this hard work and it must be acknowledged that this will not be an easy path.



General Water Resources

While this is a very broad topic, we have been able to see many successes in our communities and state. We have numerous programs in place that have made significant advances in the protection of our water resources. There has been increased understanding in the public through education and outreach. However, we still have a ways to go in this front, specifically education the youth, government officials, and tourists.

Successes:

- The Clean Water Act and having an EPA that supports it
- NH's Protected Instream Flow Pilot Program
- NH's Protected Rivers Program that has been ground-up supported
- Aquatic Resources Mitigation Fund
- Innovative and higher standard local regulations for floodplain management and stormwater management
- The permitting of wastewater and point source discharge has been largely successful
- Using porous asphalt for parking lots near water ways to reduce phosphorus loading

Challenges:

- The current political atmosphere in the state and the federal government
- Politics, not science, is currently driving policy
- Funding is going to become more challenging as state and federal funding is declining
- Need to communicate the economic value of our water resources to governmental officials to explain their importance
- Determining a way to educate people (tourists, educators, youth, government officials) on water resources in a way that is fascinating rather than boring
- Need to educate people on the importance of wetlands as a buffer for extreme flood events to help protect them from development
- Need stricter regulations on shoreline development along already damaged and developed shorelines
- Need to figure out better ways to respond to disasters that won't just repeat our previous mistakes
- We have a continued threat of invasive species, non-point source pollution, contaminants of emerging concern (CECs). We need to study these concerns further and learn how to deal with them in the future.

General Water Resources– Workshop Discussion Summary

The discussion at the end of the day revolved around education, the disconnect we see in our state, and what we need to work on in the state. Education about our water resources needs to become a priority in our state. The education of tourists is a concern. Tourists account for a large percentage of the users of the water resources but they will not be reached through community education. They are a much harder stakeholder group to reach, but a necessary one to talk with. There is also a disconnect between science and government, as well as a generational disconnect that needs to be addressed. One way to address the disconnect between science and government is to communicate the economic value of our resources to the governmental officials. By using the environment as a surrogate for a product, we can express how keeping our waters clean will draw people in to the state, which in turn will bring tourism dollars. By expressing the economic worth of these resources, we may be able to grow the number of advocates at the table. The generational disconnect is a harder one to address. The younger generation has always had the experience of clean water and is not as concerned about it. Millennials tend to think that water issues were resolved in the 70's and 80's so our concerns should be more revolved around issues such as climate change, which has been pushed to the forefront of so many of our minds. We need to work to get everyone at the discussion table, not just advocates. This means that we also have to bring these discussions to town level and discuss the impacts on the communities and businesses. Since the state does not do overall water resources planning, we need to engage as many people in these discussions, at a variety of levels, to make changes in the policies of the state.

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