



WSCAC Meeting

Location: Blue Meadow Conference Center
Quabbin Reservoir
Belchertown, MA
June 11, 2019 – 10:00 A.M.

Members in Bold in Attendance:

Michael Baram, WSCAC Chair, BU

Whitney Beals, NE Forestry

William Copithorne, Town of Arlington

Steven Daunais, Tata and Howard

Andrea Donlon, CT River Conservancy

Gerald Eves, Trout Unlimited

Bill Fadden, OARS

Bill Kiley, BWSC

Paul Lauenstein, NepRWA

Martha Morgan, Nashua River Watershed

Martin Pillsbury, MAPC

Janet Rothrock, League of Women Voters

Bruce Spencer

Kurt Tramosch, Wayland Wells

Roger Wrubel, Mass Audubon

Non-Members in Attendance:

Terry Connolly

Lexi Dewey, WSCAC staff

Ken Gooch, DCR

Kristina Gutches, DCR

Nicole Keleher, DCR

Yuehlin Lee, DCR

Daniel Moss, independent

Paula Packard, DCR

Ace Peckham, WSCAC staff

WSCAC Business

Lexi Dewey called the meeting to order, and Michael Baram asked if there were comments on the April meeting summary. No comments were offered, and Bill Fadden moved to vote on the minutes. The motion was seconded, and the minutes were approved unanimously. Additionally, two new potential members, Steven Daunais and Bruce Spencer, introduced themselves and provided some information about their backgrounds. Bruce worked with DCR until he retired in 2006, and still manages a wood lot of his own, while Steve is a Senior Project Engineer with Tata & Howard. The committee voted unanimously to approve their joining the committee. Michael turned the meeting over to Lexi. Lexi introduced Ken Gooch and Nicole Keleher, both with DCR's Forest Health Program.

Forest Insects and Diseases – presentation

Nicole Keleher presented "Forest Insects and Diseases". The Forest Health Program has two main components: one, which Nicole works on, is focused on identifying insects and disease issues, while the other works on arboreal health.

The biggest tool that the Forest Health Program uses to start is an aerial survey of the entire state, which is then followed up with ground visits to confirm and examine any damage that has been spotted. The aerial survey is generally done during the growing season, so as to spot any dead or dying sections, although the timing is sometimes shifted around, depending on the latest threat (for example, the winter moth infestation in the 1980s vs the gypsy moth infestation of the last few years).

Nicole shared a map of the Quabbin over several decades, which highlighted the different issues facing the forests over the years. Michael asked about the process of linking damage seen from the air to a specific insect or disease, and Nicole explained that the defoliation that's seen from the air is confirmed by a ground survey. The maps also reveal that certain areas are more often defoliated than others – for example, some of the islands in the Quabbin are more stressed than other areas, because they tend to be sheltered from extreme temperatures due to their locations.

One of the current major threats is gypsy moths, which feed on oaks and other hardwoods. Oaks are generally sturdy, and can handle 3 years of full defoliation if not subjected to any other stressors; however, in practice, other stressors are unavoidable (such as native insects or droughts), so they generally survive 2 years of defoliation. The moths will also eat pine and hemlocks, but conifers will die after 70% needle loss.

There are some natural controls to gypsy moth population levels. Predators such as birds and mice help keep population levels low, NPV (the nucleopolyhedrovirus) affects the caterpillar life stages when population levels are very high (the virus is contagious via contact with other caterpillars), and the *Entomophaga maimaiga* fungal disease is very effective as long as there are good weather conditions (a cool wet spring is ideal, but Massachusetts has had several very dry springs, which is why the infestation grew so large).

The egg mass surveys of last fall indicated that this year would be another heavy year of gypsy moth infestation, but the spring was cooler than usual, and very wet, which delayed the caterpillars' hatching and growth. Many caterpillars starved, as they weren't warm enough to leave their hatching nests, and now the leaves are slightly more mature than the caterpillars prefer, which may affect their growth rate as well.

The trees are still stressed from previous years, and are vulnerable to attacks from other fungi or insects, such as borers. However, Nicole reminded the committee, the forests have grown up with gypsy moth outbreaks, so they're relatively resilient

The Emerald Ash Borer was first detected in Massachusetts in 2012, and is currently detected in 78 communities, 9 counties. They affect all different types of ash, and move primarily through human-assisted movement, typically in wood. It's usually noticed due to woodpecker damage, as the birds can hear the larva chewing in the wood and bore through the bark to pick them out (and by this point, the infestation is usually too far along to save the tree).

DCR has released three types of parasitic wasps that attack the Emerald Ash Borer, in hopes of controlling the borer. Michael asked where these wasps were released, and Nicole explained that they're only released on state lands, because the site has to be unmanaged for at least five years. Ash is also a delicate species, and not very drought-tolerant, so often experiences decline unrelated to the Emerald Ash Borer.

Hemlocks are also susceptible to diseases and pests, both introduced and native. The biggest issue is the Hemlock Woolly Adelgid (an insect), which goes through cycles of population. They're also vulnerable to weather changes, especially in winter. Janet asked about what causes the adelgid to die during weather changes, and Nicole explained that if the temperatures rise in the winter, fluids begin to circulate through the adelgid's body, and then when the temperature drops again, that causes a die-off.

There are two species of beetles that prey on adelgids, but releasing them into the wild hasn't been very successful, due to the population fluctuation of the adelgids (the beetles do not have a consistent food supply).

Elongate Hemlock Scale (another insect) is also an issue for hemlocks, and is much more cold-hardy than the adelgid. Both the scale and the adelgid are easily spread, even by wind. There are some pesticides that can be applied directly to the tree, and are then absorbed through the bark, but this is an expensive and work-intensive endeavor. Bill Kiley and Janet asked what other consequences the pesticides may have, and Nicole responded that the pesticide is absorbed by the tree, so doesn't wash off, and breaks down after several years. Additionally, very few other species feed on hemlock, and the trees are wind-pollinated, so pollinators are also not affected.

Hemlocks are also affected by a native insect, the Eastern Hemlock Looper, which bites off needles and causes defoliation and mortality, and native fungal outbreaks, which are generally most detrimental to stressed trees.

Eastern White Pine is suffering from a decline, primarily due to needlecast diseases. The White Pine typically sheds needles every three years, but native fungal infections can cause the tree to drop needles every one to two years, which doesn't directly kill the tree, but reduces its health and vigor. Drought can help reduce the needlecast, because the fungus needs moisture to survive, but it stresses the tree in turn. There's another native fungus which causes the Caliciopsis Canker, which doesn't generally kill the tree unless it girdles the bark.

Michael asked about the Asian Long-Horned Beetle, which is its tenth year of the eradication program. The program has been very successful thus far – instead of finding ten thousand of infested trees as they did in the first year of the infestation, last year DCR has only found 16 infested trees in Massachusetts. This is mostly due to a very concerted effort to remove any infested trees. Paul asked what happened to the trees that had the beetle, and Nicole explained that the trees are chipped to 1" X 1", which is smaller than the size of the larva and stops them from being able to move between pieces of wood (they're prone to drying up). The chips are then typically mulched or composted (the larva can't survive the high temperatures of compost piles, either).

Climate change impact: Climate change is changing the composition of the forests, including shifting some of the more common New England species away from this area (e.g. sugar maples, which prefer colder weather), and then invasive species are able to move in to areas abandoned by native species. The temperatures also may make the area more hospitable to insects, both new threats and already present threats – the Hemlock Woolly Adelgid, for example, often dies off during the cold months, but as the winters grow milder, we may see that threat increasing.

Precipitation patterns will also affect the forests. While we may not see different amounts of rain in total, we may see longer periods of drought and heavier periods of rain. This stresses the trees, causing a decline in drought-sensitive plants, and can beneficially affect the insects that prey on trees.

Climate change causes an increase in storm events (floods, hurricanes, blizzards, tornadoes), which can cause damage to trees such as broken branches, which in turn opens up vulnerabilities to diseases and insects.

Andrea asked about managing watershed land and promoting biodiversity to improve resilience. Nicole explained that avoiding monoculture forests, and also promoting age diversity, are both end goals for the forests. Bruce commented that white pines, for example, do best in smaller stands. Daniel Moss asked what effort is put into working with private landowners, and Nicole said that the main focus is on publicly-owned lands, but there's a lot of effort in outreach.

Bruce asked whether anything is attacking the Hemlock Woolly Adelgid, as he hasn't seen it much recently. Nicole responded that they often do not thrive in heat, so it could be related to the weather, or they could be still building back up their population after the last crash.

In good news, the Asian Long-Horned Beetle's reduction has been a great success, and winter moth, which was incredibly detrimental, has been reduced significantly due to the release of a predatory fly, which has spread and crashed the moth population.

Bill Kiley asked about the process of salvaging lumber. Nicole explained that there is an attempt to salvage the wood, but that exporting it is challenging, as there's a need to be careful that we're not exporting invasive species elsewhere.

Michael asked about genetic modifications to trees to help defeat tree stressors. Nicole said that there is some work, but it's an incredibly long process, as it takes multiple generations of trees to see if a trait could be passed on, and not all tree offspring have their parents' traits.

Daniel asked whether we need the participation of private landowners to fully eradicate issues, and Nicole responded that DCR works with communities as much as possible, and puts a lot of effort into outreach. Additionally, Massachusetts has large corridors of publicly owned land, which helps spread the predatory insects that are released to prey on invasives. Ken noted that DCR doesn't have access to private land, and that USDA has specified that the release of predatory insects to help control invasives can only occur on public lands, but there is an effort to work with groups as well.

Daniel then asked whether there were any concerns about releasing predatory insects. Nicole confirmed that there are extensive tests done before any release occurs, and most of the insects released deliberately primarily only attack a single species of insect, the invasive one.

Paul and Janet asked about American Chestnuts and Elms, respectively – whether there are any stands remaining, and if there are any street tree programs. There are still some resistant trees, but offspring don't always inherit resistant genes, and towns looking to plant street trees tend to prefer heartier trees that will survive for longer.

There was some discussion of the steps taken to ensure that the cure for the infestations is not more detrimental than the infestation itself. Ken commented that the gypsy moth outbreak looked like it would be terrible this year, and he recommended spraying BT (*Bacillus thuringiensis*, a spray to kill the caterpillars) to reduce the population. However, the commissioner preferred to wait and see how the spring went, which was the right call, as the spring was so cool and wet that the moths are at much lower rates than previously expected.

Janet asked what would happen if the watershed oaks were wiped out. Ken said there are other species that would take over, and Bruce commented that we've already seen a huge variation of trees over the centuries, and the forests are already not "natural", but to improve forest health, we need to improve forest diversity. Nicole added that if the oaks were to die out, she would recommend avoiding salvaging, and allowing the replacement trees to take over naturally.

Nicole and Ken were thanked for their presentation, and the meeting adjourned for lunch.

The afternoon presentations were introduced by Yuehlin Lee, DCR's Head of Environmental Quality for the Quabbin and Ware River Region, who noted that their focus is on monitoring and protecting water quality, watching for invasives, deterring wildlife, and watching for possible threats such as hazardous materials or local issues such as construction projects, road salt concentrations, or erosion.

Protecting the Quabbin Reservoir and Watershed – presentation

Paula Packard, Aquatic Biologist at DCR, presented "Protecting the Quabbin Reservoir and Watershed". She shared her current ongoing projects at DCR, which include plankton analysis, reservoir and watershed monitoring for aquatic invasive species, boat decontamination programs (both for warm and cold weather), and education and outreach.

Plankton can make the water smell or taste "off". Additionally, algae can clog filters, and Cyanobacteria can produce toxins. Tracking this information enables DCR to see annual trends. DCR tests for plankton twice monthly from May to October, and then once a month for the rest of the year. There are multiple methods for tracking plankton trends, but overall, Quabbin numbers are low. This is presumably because the Quabbin is considered ultra oligotrophic (relatively low in plant nutrients), because it's so protected by the land and forest around it.

The boat decontamination program, started in 2009 to prevent invasive species from entering the Quabbin, is made of two approaches, one for warm weather and one for cold weather. In the warm weather, the boat and trailer are inspected, the motor is run until exit water is 140 degrees F, the boat is washed with water over 140 degrees F, and then the boat is tagged. There is a \$45 fee for this inspection, which goes directly to House of Wax. During the cold weather, the boat and trailer are inspected, the boat is tagged, and the fee is waived.

In response to questions, Paula explained that the tag is attached where the boat is hitched to the trailer. When the boat is brought in to the Quabbin, the tag is removed and noted, and then reattached when the boat is brought out. However, if the tag is broken elsewhere (i.e. the boat is removed from the trailer and taken into the water somewhere other than at the Quabbin), the boat must go through decontamination again.

Janet asked about zebra mussels, which are very prevalent in Lee. Paula confirmed that the zebra mussels are still there, and steps have been taken to keep them from spreading. Quabbin, however, doesn't have a high risk of zebra mussels – there are other species that are of much greater concern.

The specific Aquatic Invasive Species that Quabbin is working against are Spiny Water Flea, Asian Clam, Swollen Bladderwort, Brittle Naiad, and Curly Pond Weed, among others. The Spiny Water Flea, for example, is almost impossible to get rid of, is highly detrimental to water quality, and is not edible by fish. DCR works

closely with other water sources, not only watershed, to help reduce invasive species in local waterways. Paula also reviewed some invasive plants, including phragmites, curly pond weed, and swollen bladderwort.

Education and outreach is essential for raising awareness of invasive species. DCR is running a self-certification program at a few waterways in Massachusetts, which has been successful in engaging boaters and getting the public involved. Additionally, Paula and other DCR staff volunteer at local schools and clubs, distribute brochures, run an annual presentation at the Visitor's Center, and provide education during decontamination and at fishing areas.

Overview of the Water Quality Monitoring Program for Quabbin Reservoir Watershed and Ware River Watershed – presentation

Kristina Gutchess, Environmental Analyst III at DCR, and Yuehlin Lee, DCR's Head of Environmental Quality for the Quabbin and Ware River Region, presented "Overview of the Water Quality Monitoring Program for Quabbin Reservoir Watershed and Ware River Watershed". Kristina first introduced the collaboration between DCR and the MWRA system, showing a map of the Quabbin, Ware River, and Wachusett Watersheds.

The Source Water Treatment Rule, established in 1989 by the EPA, requires water sources to be treated with disinfection and filtration. The Quabbin Reservoir has been exempt from filtration since the inception of the rule, as it meets strict criteria, including microbial quality and turbidity (which has many causes, including wind, erosion, and human behavior).

The goals of the Water Quality Monitoring Program are to protect public health (both present and future), satisfy the filtration avoidance requirements, identify and eliminate or mitigate pollution sources, and to provide proactive surveillance of water quality trends, which supports ongoing assessment of threats to water quality.

At the watershed core and at EQA sites, DCR/DWSP monitors physical parameters (stream flow, stream characteristics, temperature, specific conductance, dissolved oxygen, and PH) and water quality parameters (alkalinity, turbidity, fecal coliform, e. coli, nutrients, UV254 [which is a test to determine total organic carbon] and sodium chloride). At the Quabbin Reservoir sites, DCR/DWSP monitors similar physical parameters (weather, water conditions, temperature, specific conductance, dissolved oxygen, PH, and transparency) and water quality parameters (alkalinity, turbidity, fecal coliform, e. coli, nutrients, UV254, phytoplankton, zooplankton, Cyanobacteria, and chlorophyll-a). This data has been collected and recorded since 1987. The committee discussed what information can be learned from reviewing that data, and also historical data showing water levels in the Quabbin during droughts and heavy rain periods.

Lin explained that the short-term forestry monitoring program involves ensuring that logging or salvaging will not cause any issues with the water quality. As such, DCR reviews timber lot showings quarterly. Foresters propose lots for harvesting. If the lot is approved, loggers bid on lots. EQ reviews what is up for potential logging, and also monitors stream crossings for turbidity at multiple stages in the process: before harvesting begins, in order to establish baseline conditions, during the harvest operations, including installing or removing temporary crossing structures, and then monthly for the next year after the harvesting is complete.

Lin shared graphs of the 2018 source water from the Quabbin at the Brutsch Water Treatment Facility, which included turbidity rates and fecal coliform rates. While there were variations in the levels throughout the year,

they consistently remained well below the MA DEP guidelines and the SWTR Standard, meeting all criteria for avoiding filtration requirements.

Kristina shared a slide on turbidity, explaining that it's often elevated during heavy precipitation events, while e. coli is typically higher during the spring and summer. Ware River often shows higher turbidity than the Quabbin Reservoir, which is simply due to the differences in land use around the watershed. When e. coli is elevated, DCR will then resample the same site in order to determine the cause of the increase (often related to the presence of animals or heavy precipitation). Conductivity and nutrients are also closely related to precipitation, as well as road salt and other contaminants. Quabbin levels have historically been very low, especially in the summer (when plants and animals are consuming nutrients).

Water Quality Monitoring will continue throughout the year, which helps ensure that the requirements of the filtration avoidance criteria are fulfilled.

Paula, Lin, and Kristina were thanked for their presentations, and the meeting was adjourned.

WSCAC will meet again in August for the MWRA Advisory Board Field Trip. Please [visit our website](#) for more information on this meeting.