

STAFF SUMMARY


TO: Board of Directors
FROM: Frederick A. Laskey, Executive Director
DATE: March 15, 2023
SUBJECT: Watershed Forestry Review



COMMITTEE: Water Policy & Oversight

X INFORMATION
 VOTE

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Preparer/Title



David W. Coppes, P.E.
Chief Operating Officer

RECOMMENDATION:

For information only. Questions have arisen about the current forestry program at the Quabbin, Wachusett and Ware River watersheds, and whether its continuation is important to preservation of water quality, in light of calls for a moratorium on harvest operations on Commonwealth lands.

DISCUSSION:

For many decades the Department of Conservation and Recreation (DCR) and its predecessor agencies have maintained an active forestry management program within the lands owned for watershed protection around MWRA's source waters. DCR staff have provided briefing materials on the watershed forestry program to Executive Office of Energy and Environment staff. This staff summary represents MWRA's review of those programs as essential parts of MWRA's watershed and source water quality protection.

The watershed forestry program is not a production harvest program, rather it is designed and operated for the specific purpose of maintaining a resilient forest to protect MWRA's source water quality. MWRA is one of the few water systems nationwide with water sources that consistently deliver high enough quality water and are sufficiently well protected naturally such that EPA and MassDEP regulations allow MWRA to only provide disinfection of the water. This avoids the use of chemically enhanced filtration with its energy intensive processes.

The watershed forestry program is designed to promote long-term protection of water quality and forest resilience to disease or natural disaster. When the Quabbin Reservoir was constructed in the 1930s, the vast majority of the watershed was in open fields, with the pre-existing forest having been cleared for farm use or damaged in the 1938 hurricane. Thus, almost all of the current forested lands are of a relatively uniform age, with large stands of single species. The goal of the program is to slowly, over many decades, move the forest toward a multi-species, uneven-aged forest that is less likely to be damaged by invasive species or a natural disaster such as a hurricane, thereby reducing the risk to water quality.

MWRA relies on the protective attributes of the forest as a critical component of its watershed protection efforts, and is judged annually by state and federal regulators on the ability of its

protection efforts to reliably ensure high quality source water. The on-going land acquisition programs at each watershed have added to the overall protected forest, avoiding loss of forest cover for development or private lands commercial forestry, and allowing some fields cleared for other purposes to return to forest.

DCR's forestry program is well documented in its most recent (2017) Land Management Plan which is updated periodically with an opportunity during that process for public input¹. The entire watershed forestry program was the subject of an intensive independent scientific review in 2012 by the Science and Technical Advisory Council (STAC²) with extensive public comment opportunities.

The STAC report,³ published in 2012, clearly laid out the scientific basis for active management of the watershed forest as prudent and required to ensure water quality. The report concluded that deferring or eliminating the forestry management programs exposes the water system to decades of increased risk from catastrophic disturbance from a hurricane or other natural disaster. Such risk only increased with the effects of climate change, resulting in unacceptable water quality, failure to meet drinking water quality standards, and the cost and energy and greenhouse gas expenses of building and operating a more intensive water treatment plant. Upon completion of the STAC report, DCR produced a companion report,⁴ demonstrating how it was implementing each of the STAC report's recommendations, and then incorporated those actions into the current Land Management Plan.

The detailed inventory of current conditions within the Land Management Plan, based on decades of intensive surveys, indicates that a large majority of forested acreage at all the watersheds can be dated to late 19th century farm abandonment, to the hurricane of 1938, or to plantations created just after the original land takings at each watershed. The current forestry program aims to regenerate approximately one percent of the manageable forest on each watershed annually, for deliberate and steady progress at a rate within the range of long-term natural disturbance patterns. The plan also places sections of the watershed protection forest in reserves or otherwise protected categories to remain unmanaged. All together, these areas with restricted management total as much as 20-25% of Division of Water Supply Protection (DWSP) holdings.

The regeneration activities are carefully designed and implemented, on small appropriately located parcels within the watershed. While DCR had been criticized in the past for some larger multi-acre cuts, their current practice calls for typical average openings of around one acre, which retain trees within their interior for both habitat and seed sources. These are not large scale clear cutting of

1 **Land Management Plan**, Division of Water Supply Protection, Department of Conservation and Recreation, 2017 www.mass.gov/doc/2017-dcr-division-of-water-supply-protection-2017-land-management-plan/download

2 The STAC was originally chartered in the 1990s by DCR as the Quabbin Science and Technical Advisory Committee, and was later tasked in 2010 to assist in overseeing forestry programs by the Secretary of EEA. It includes forest, wildlife, and natural resource researchers and managers from several University of Massachusetts Amherst departments, Harvard Forest, the USDA Forest Service, Mount Holyoke College, Amherst College, the Institute of Ecosystem Studies, US Geological Survey, Massachusetts Audubon Society, the New England Small Farms Institute, the MA Natural Heritage and Endangered Species Program, Hampshire College, and several state agencies.

3 **Review of the Massachusetts DWSP Watershed Forestry Program**, DWSP Science and Technical Advisory Committee, November 2012, www.mass.gov/files/documents/2017/10/02/review-of-mass-dwsp-watershed-forestry-program.pdf

4 **From Here Forward: Changes to the Department Of Conservation & Recreation, Division of Water Supply Protection's Watershed Forest Management Program**, Department of Conservation and Recreation August 2013, www.mass.gov/files/documents/2017/10/02/changes.pdf

commercial harvest operations. DCR’s standards for forestry cutting practices are substantially stricter than typical commercial scale operations. Individual trees to be removed are marked, access paths and loading zones are delineated, and intensive ecological and erosion control measures are mandated. Regeneration of site and soil-appropriate species is rapid. The photos below show a half acre cut on Prescott Peninsula over a 12 year period.



The DCR Land Management Plan echoes a question answered by a number of scientific studies from around the world: Is there a “best” forest for watershed protection?

“A protection forest has been defined by the Society of American Foresters as ‘an area, wholly or partly covered with trees, managed primarily to regulate stream flow, maintain water quality, minimize erosion, stabilize drifting sand, conserve ecosystems, or provide other benefits via protection’ (SAF, 2008). Given the full suite of potential disturbances likely to influence DWSP watershed forests, a prudent and conservative approach to maintaining water quality is to deliberately create and maintain a protection forest that is both resistant and resilient in the face of a range of such disturbances. A forest that is diverse in age structure limits the impacts of age-specific disturbances” (DCR Land Management Plan, 2017).

An appropriate protective forestry program:

- creates and maintains a watershed protection forest, resistant to and resilient from disturbance;
- monitors, maintains, and enhances overall forest health;
- encourages diversity of native species, while favoring those that are long-lived and adapted to site conditions;
- creates and maintains diversity of forest structure; and
- maintains the ability of the forest to establish abundant, diverse regeneration.

DCR’s watershed forestry program is responsive to each of these criteria.

These conclusions and recommendations are well supported in the scientific literature. The Water Research Foundation and EPA conducted an extensive review of the implications of the type of catastrophic vegetative change that could occur from a hurricane or wildfire, and concluded that species and age class diversity increased resilience, reduced risk, and promoted recovery after

damaging events.⁵ The report indicated that active forestry management practices that promote diversity can be effective both in reducing risk and in managing the effects of any disturbance after an event.

Scientists and natural resource policy experts at the Environment and Natural Resources Program at the Kennedy School of Government at Harvard reached similar conclusions about the need for regeneration within the Quabbin watershed forest in their 1984 report⁶. They recommended a gradual addition to forest reserves as portions of the forest were restructured to near-natural conditions by active management.

The watershed managers for New York City, the largest of the unfiltered water supply systems in the United States, in their forest management plan focused on the long-term water quality benefits of optimization of forest cover resiliency. Their 2011 plan indicates that “the benefits of forest cover are maximized when forests are managed to promote long-term continuity of forest cover. Management to enhance the likelihood of continuous forest cover involves promoting vigorous tree growth and diversity in all aspects of forest composition, e.g., species, forest structure, natural community type, and development stage, to maximize resilience to disturbance. The most effective way to establish and maintain diversity and vigorous tree growth in the Northeast is through active forest management.”⁷ Maintaining a healthy, resilient diverse forest is considered an attribute of their overall watershed protection program and one of the keys to maintaining NYC’s filtration avoidance determination, avoiding the potential for a required \$10 billion filtration plant, according to a recent review of New York City’s programs by the National Academy of Science⁸.

The DCR forestry practices affect only a very small portion of the hundreds of square miles of watershed forest each year. Timber removed from the forest is used for a variety of purposes, ranging from lumber for construction or furniture making, pulp for paper production, or firewood depending on the species and quality of each tree. The regeneration activity unleashed by opening forest floor to sunlight sparks rapid growth of new trees, well suited to the particular soil and slope conditions. These practices are far removed in purpose and effect from the industrial forestry practices in use in other states where there is wholesale removal of all timber for the production, for example, of wood pellets for export.

The forestry program and overall forest management approach contained within DCR’s 2017 Land Management Plan satisfies MWRA’s interest in assuring that DCR’s forest management programs are building a resilient forest and protecting reservoir water quality in both the short term and the longer term. Those programs are an integral part of the overall watershed protection efforts necessary to continue to allow MWRA to maintain its filtration avoidance determination from MassDEP and the US EPA, avoiding the potential for a capital expense of hundreds of millions of

⁵ *Utility Guidance for Mitigating Catastrophic Vegetative Change in Watersheds*, Water Research Foundation and EPA, 2009. www.waterrf.org/research/projects/utility-guidance-mitigating-catastrophic-vegetation-change-watersheds

⁶ *Managing the Greenwealth: The Forests of Quabbin*, Charles H.W. Foster and David R. Foster, Center for Science and International Affairs, Kennedy School of Government, October 1984. harvardforest1.fas.harvard.edu/sites/harvardforest.fas.harvard.edu/files/publications/pdfs/Foster_Greenwealth_1994.pdf

⁷ *New York City Watershed Forest Management Plan*, NYC Department of Environmental Protection, November 2011. www.nyc.gov/assets/dep/downloads/pdf/watershed-protection/opportunities-on-city-lands/dep_forest_management_plan_2011.pdf

⁸ *Review of the New York City Watershed Protection Program*, National Academy of Science, 2020. www.nationalacademies.org/our-work/review-of-the-new-york-city-watershed-protection-program

dollars, and substantial increased use of energy, production of greenhouse gasses and associated rate increases.

BUDGET/FISCAL IMPACTS:

The watershed forestry program is not designed to produce net positive revenue for DCR, as it is a critical part of ensuring resilience and long-term watershed protection. Annual revenue from the foresters bidding on specific wood lots offsets in part the costs of forestry and natural resource staff who oversee the program. The DCR fiscal year 2023 budget assumes gross revenue of \$450,000.



Watershed Forestry Review

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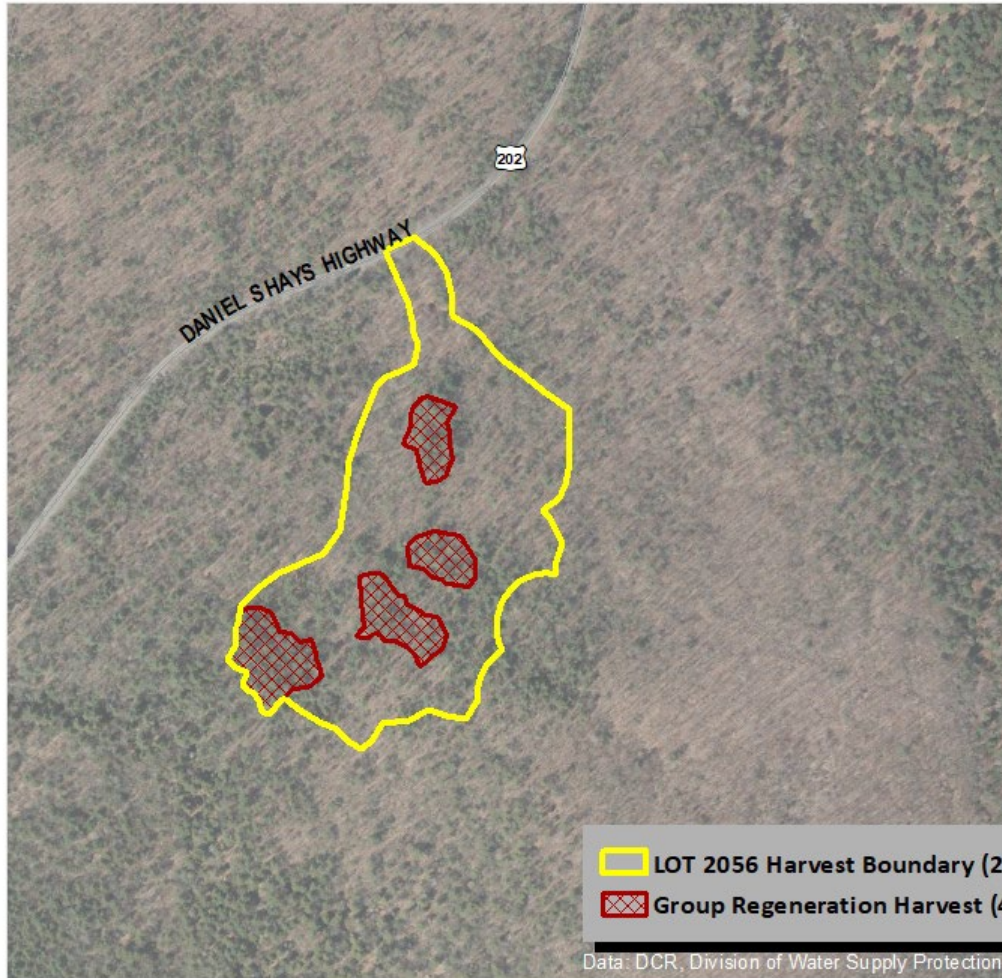
Watershed Forestry Program Goals

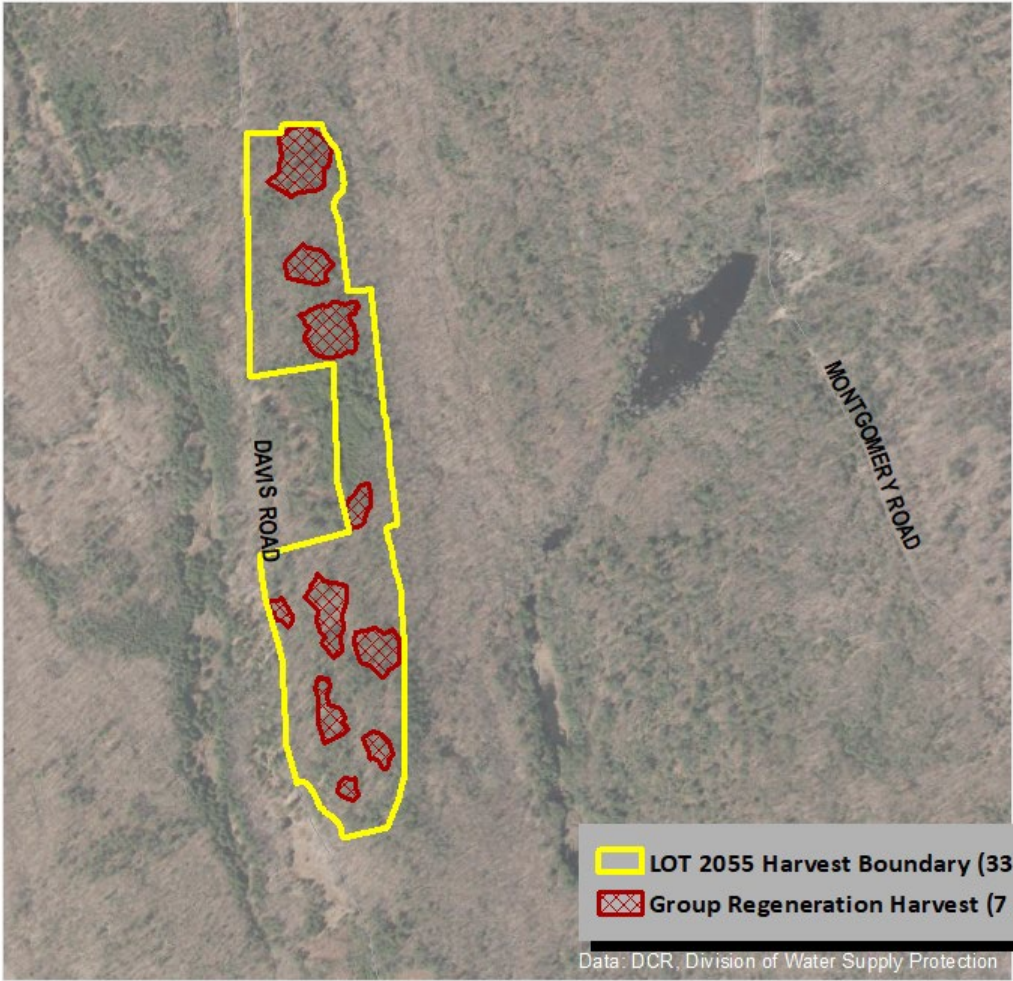
- Protection of water quality
- Creating and preserving a diverse, resilient forest
- Resistant to disease or natural disaster
- Multi-species, appropriate to site and soil
- Uneven-aged, from seedling to mature trees

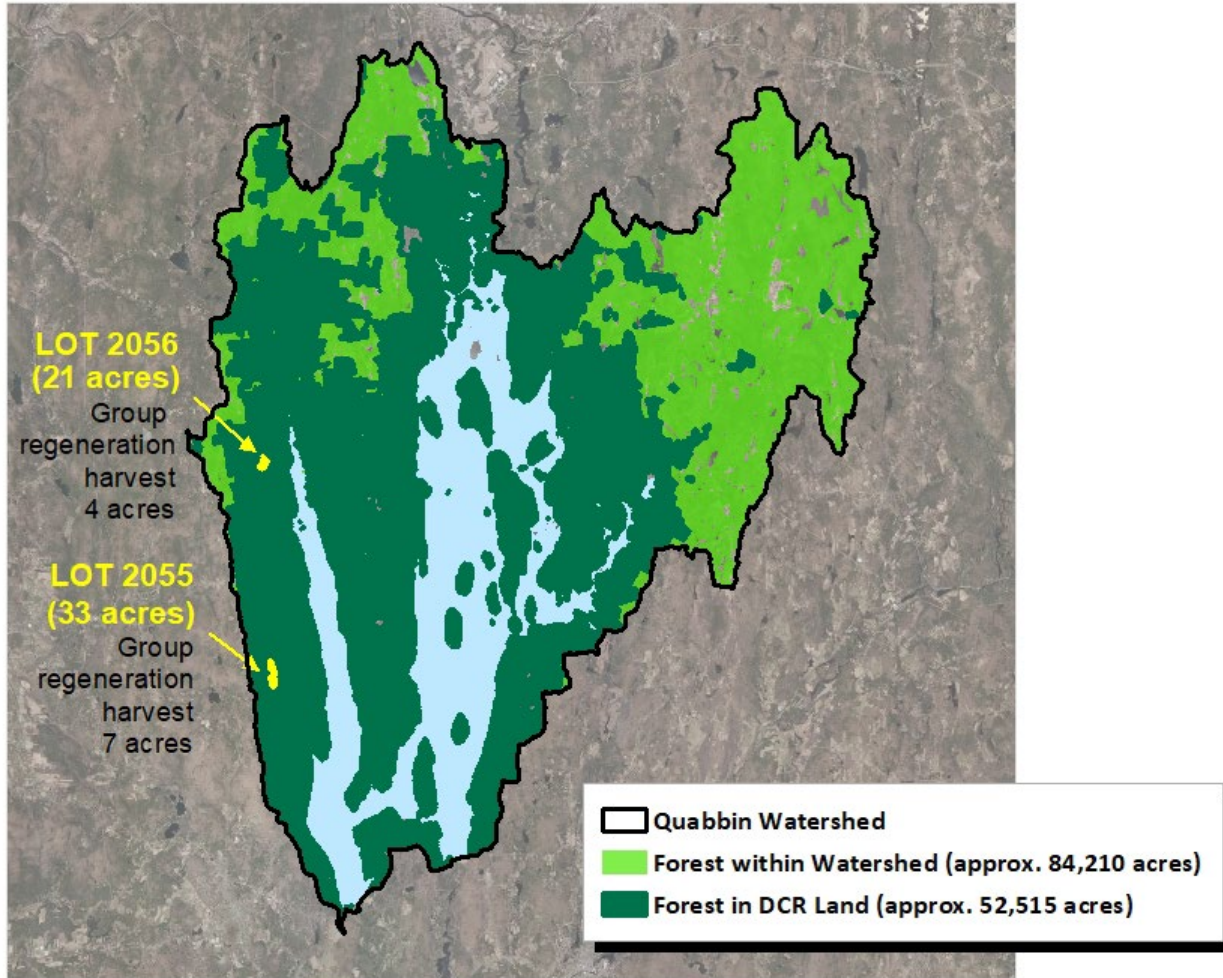


DCR's Watershed Forestry Program

- Incremental progress toward long term goals
- Slow steady progress – over decades
- Manage original single-aged, single-species stands
- Deal with stands that are dying due to disease or infestation
- Carefully designed cutting to release regeneration
- Individually marked cuts, sound cutting practices
- Typical openings average one acre, with trees preserved for seed and habitat
- Less than 1 percent of the managed portion of the forest per year







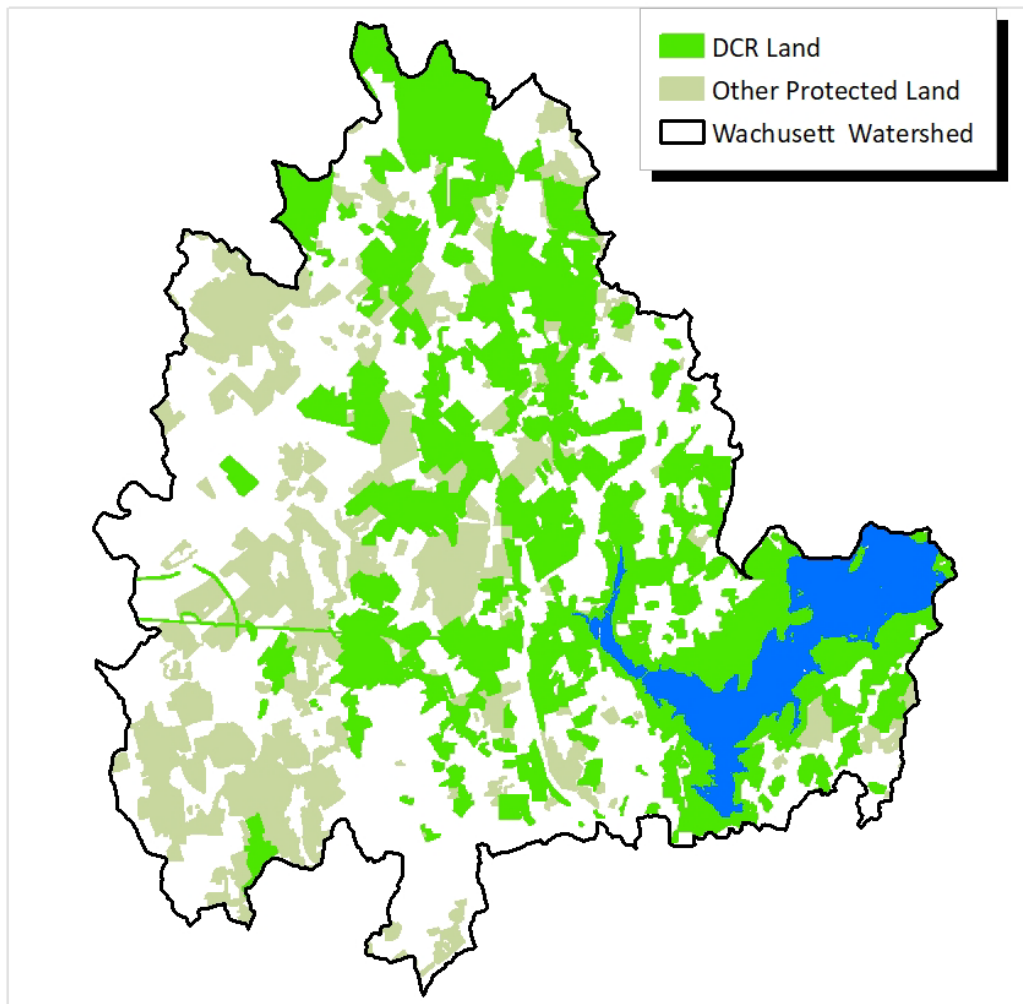


Forest Regeneration – Half Acre Cut, Naturally Regenerates





Land Acquisition for Watershed Protection Preserves Forests From Development





MWRA's Objectives

- Consistent high quality water
- Well protected forested lands, over the long term
- Maintenance of MWRA's Filtration Avoidance Determination
- DCR's watershed forestry programs meet those goals