



NRWA Policy on Dam Removal

The deliberations regarding the repair and continued upkeep or the removal of any dam involve ecological, safety, political, economic, and social concerns. NRWA decides on recommending dam removal on a case-by-case basis, guided by a consideration of the factors outlined in this Policy on Dam Removal.

NRWA staff members make recommendations to the NRWA Task Force on Dam Policy regarding dam removal projects to endorse opportunities for river restoration; staff members also bring information regarding such opportunities for funding such as the 319 Nonpoint Source Pollution grant program, or the Massachusetts Environmental Trust to the attention of the Task Force. Additionally, the Task Force reports to staff any opportunities or conditions they are aware of for dam removal/ river restoration projects.

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The NRWA Task Force and involved staff bring their recommendation regarding any specific dam or project to the attention of the NRWA Executive Committee, which in turn makes a recommendation to the full NRWA Board of Directors so that the Association's position can be determined on a case-by-case basis.

Preamble

There are approximately 270 dams in the Nashua River watershed listed on the Massachusetts Office of Dam Safety's website (as of June 2011). Numerous additional dams exist, but are not significant enough to make it to the dam safety list. Two significant dams exist on the Nashua River in Nashua, New Hampshire. Many of the dams are used for water supply, recreation, hydropower, and to a lesser extent flood control. However, most of the dams have outlived their original purpose. Many are in poor condition and pose a safety risk to the public. Obsolete and abandoned dams degrade water quality, create barriers to ecological connections including migration of fish, and limit river recreation opportunities such as canoeing or fishing.

This guide outlines factors in four areas the NRWA Dam Task Force should consider when a dam removal project is presented: 1.0 Ecological, 2.0 Economic, 3.0 Societal, and 4.0 Technical/Engineering.

Issues to Weigh for Dam Removal/ River Restoration Decisions

1.0 Ecological

1.1 Considerations for Keeping specific Dams:

- **Hydropower** – Some dams are producing power and have Federal Energy Regulatory Commission (FERC) licenses, or are in the process of obtaining licenses that regulate the hydropower facility, and are unlikely to be taken down in the foreseeable future.
- **Flood Control** - Dams are often times used as reservoirs or “shock absorbers” in a watershed to store water after heavy runoff (snow melt or rain storms) so that it can be released gradually. This reduces downstream flooding.
- **Breakdown of persistent toxins** - Many toxins, such as PCB's and DDT are so chemically stable that they will only be broken down by anaerobic bacteria in pond sediments that lack oxygen (reduced).
- **Prevent nutrient laden sediments from moving downstream** - The sediments that accumulate in ponds often contain high levels of phosphates from agriculture, lawns and detergents. If the sediments are released into a lake, algae blooms can occur. If the sediments are released into a river these blooms are not as likely.

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- **Preservation of upstream wetlands and unique habitats** - If draining a pond significantly reduces water levels upstream, certain habitats can be lost. In the case of Cranberry Pond on Fort Devens, draining the pond would dry up a rare second growth spruce bog which is breeding habitat for Blandings Turtles. Wetland habitat and rare species habitats must be considered as part of the deliberation to keep or remove a dam. (Note: The Mass DEP recognizes that wetlands are usually lost as a result of dam removal but feels that the benefits of removal usually outweigh these losses.)
- **Control of invasive species** – Where water levels can be regulated, invasive species – plant and animal – can sometimes be controlled.

1.2 Ecological Considerations for Dam Removal/ River Restoration:

- **Restore Fractured Ecosystems** – Normally any watercourse and the surrounding uplands are one continuous ecosystem. Both aquatic and terrestrial organisms – all interdependent – are able to move about to settle into specific niches and maintain the balance of the ecosystem. When a dam is constructed and movement is prevented, two separate and distinct ecosystems develop.
- **Enhance and restore genetic variation** - When populations become split, genetic variation is reduced and populations suffer.
- **Cooler temperatures, more oxygen** – Impoundments naturally lead to warmer water temperatures. The solubility of gases in water decreases as temperature increases. Native species tend to suffer to the benefit of invaders.
- **Reduce downstream erosion** –When a dam is placed in a river, velocities decrease and silt carried by the moving water is deposited. At the outlet to a pond, velocities are greatly increased over what they normally would be -since there is no head loss across the impoundment – and the water is generally free of silt. As a result, rivers below dams are often sediment starved.
- **Improve water's ability to clean itself** – Free flowing, aerobic rivers and streams do a remarkable job of cleaning themselves of organic waste.
- **Warmer temperatures lead to faster algae growth** - The rate of growth of many forms of algae increases with temperature.
- **Fish ladders are not always adequate** – Many times fish ladders are used to mitigate some of the impacts of dams. However, fish ladders are not always adequate. For example it is

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estimated that fewer than 6% of shad used use fish ladders installed on dams in Plymouth, MA. There is a high mortality rate in plunge pools and turbines.

- **Keep heavy metals from entering the food chain-** Toxic metals, such as mercury; can only enter the food chain in sediments devoid of oxygen (e.g., behind dams).

2.0 Economic

The costs of repairing and maintaining a dam and the resultant benefits, such as recreation and hydropower, must be weighed against dam removal and the environmental and other benefits of a restored river (fish passage, riverfront revitalization, improved water quality). The property owner bearing the cost of dam maintenance and repair must also be kept in mind, as the dam owner is the sole party liable when the dam fails or needs costly maintenance.

The cost to repair and maintain a dam is significant. Often the cost to completely remove a dam is considerably less. To determine the economic costs and benefits of a dam removal, it is critical to compare the long and short term costs and benefits associated with maintaining a dam to those associated with the proposed dam removal and subsequent restored river. It is also important to be aware of the distinction between the private and public costs and benefits of keeping or removing a dam. For example, the cost of operating and maintaining a dam is often the owner's responsibility (e.g., an individual, municipality, utility), while environmental costs associated with a dam (e.g., need for water quality improvements) may fall to everyone in the community.

3.0 Societal

- **Historical and Cultural Preservation** – In towns where a dam has been in place for many decades, personal and public histories and identities have developed around these bodies of water. These attachments are embedded in the life fabric of many local citizens and therefore, when dam removal is introduced to a community, an emotional response is to be expected. Dam removal studies have shown that each dam is unique and that many factors affect the results of removal.
- **Recreation** - People generally enjoy open-water vistas and recreation that impoundments provide. Fishing, boating, bird watching and swimming are some of the activities that take place in the impounded area behind dams. Property values along lakes and ponds are tied directly to the existence of a dam.
- **Owner's Wishes** – In Massachusetts, dam owners are legally responsible for the maintenance and repair of the dam, and are solely liable. Therefore, the decisions regarding the dam's disposition are entirely theirs. The current MA regulations, dated June 29, 2009, were promulgated in accordance with 2002 revisions of the Dam Safety

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Statute, **MGL Chapt. 253 §§ 44-50**, identify the responsibilities of dam owners to register, inspect, develop emergency action plans for high hazard potential dams and maintain dams in good operating condition. Amendments to Dam Safety Regulations **302 CMR 10.00-10.16** became effective November 4, 2005 with minor clerical revisions in 2009 and are reflective of the 2002 statutory changes. <http://www.mass.gov/dcr/pe/damSafety/>¹

In New Hampshire, dams are regulated under Dam Rules, Env-Wr 100-700. Responsibility for maintenance and repair, and also liability, falls to the dam owner. In addition to the dam owner, the liability can also apply to any company that possesses the dam, or operates or maintains the dam².

<http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wr100-700.pdf>

4.0 Technical/ Engineering

The dam's Hazard Potential Classification³, and the condition of the dam is determined by a dam safety inspection. A dam can be classified as High Hazard Potential but be in "good" condition, needing little maintenance other than routine inspections. Alternatively, a dam may be classified as Low Hazard Potential and be in "poor" condition. A High Hazard Potential dam in poor condition threatens the lives and properties downstream from the dam. Massachusetts law⁴ requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

A Note in Conclusion

¹ It is noted that MA Dam Safety Law MGL Chapt. 253 §§ 44-50 was recently revised by the Legislature and signed into law in January 2013. Prior to implementation of the legislated changes, regulations must be drafted, reviewed and promulgated. Draft regulations will be made available for public comment as part of the promulgation process. (<http://www.mass.gov/dcr/pe/damSafety/>)

² A Dam Maintenance, Removal and Improvement Revolving Loan Fund was enacted by the NH legislature in June 2013 which will allow all dam owners, excluding the state, to receive money from the dam maintenance, removal and improvement revolving loan fund..

³ Hazard Potential Classification

High Hazard Potential dam refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).

Significant Hazard Potential dam refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities.

Low Hazard Potential dam refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

⁴ Dams are regulated under 302 CMR 10.00: Dam Safety, under the Department of Conservation and Recreation (6/26/09)

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Alternatives to removal, such as dam repair, partial removal, or the no-action alternative, are typically considered as part of the evaluative process. Each alternative is weighed with regard to ecological, societal and economic costs.

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