



# BEAVER SOLUTIONS

*14 Mountain Rd, Southampton, MA 01073*

*Phone: (413) 210-7214*

*Website: [www.beaversolutions.com](http://www.beaversolutions.com)*

## **Municipal Beaver Management Plans by Beaver Solutions LLC**

### **Foreword**

Thank you for your interest in developing a Municipal Beaver Management Plan (MBMP) to provide your community with the most effective and innovative beaver management plan possible. Beaver Solutions serves southern New England.

### **Introduction**

Since 1998 Beaver Solutions LLC has successfully resolved beaver flooding conflicts with our innovative water control devices at over 2,000 beaver conflict sites. Water control devices, also known as flow devices, are the most cost-effective, environmentally friendly, long-term, and humane solution for most beaver conflicts. We also provide beaver trapping for areas where flow devices are not feasible. Our multi-faceted approach makes Beaver Solutions uniquely qualified to recommend the best solution for any beaver-related problem and provide you with the best comprehensive Municipal Beaver Management Plan (MBMP) available.

Since beaver damming can quickly cause serious public health and safety issues, a good MBMP allows for prompt intervention of immediate threats, but also for prioritization of less urgent, as well as potential new beaver problems. This comprehensive assessment of the beaver issues prevents crisis management and budget resources in a logical and efficient manner.

Beaver Solutions specializes in resolving human/beaver conflicts. Our highly successful flow devices are nonlethal and usually offer the most cost-effective and long-lasting solution to beaver-related flooding problems. Our satisfied customers include state and municipal highway departments, water and conservation departments, various State and Federal agencies, public utilities, railroads, environmental groups, businesses, property management groups, homeowners, and others.

# **Beaver Management Principles**

The goals of an effective Beaver Management Plan are multi-faceted and include:

1. Protect resident health, safety and property
2. Implement long term solutions when possible
3. Minimize monitoring time and labor
4. Prioritize cost-effective solutions
5. Promote humane treatment of all wildlife
6. Expedite permitting and problem resolution
7. Accountability

Ideally when beavers or their dams are identified in town they will be in good habitat which does not conflict with human land uses. The ponds that beavers create with their dam building have many important ecological benefits and coexistence with beavers should be embraced and promoted whenever possible. See the attachment “*Why Give a DAMn?*”

When beaver dam building or tree loss is a problem for humans, nonlethal solutions should be the first option considered. These options include water control devices to control flooding from beaver dams, mesh fencing to protect trees from chewing, and sometimes simple tolerance when the beaver activity does not pose a significant threat to human health, safety or property.

If nonlethal options are considered insufficient to resolve the issue(s) then beaver trapping may be necessary. Since it is illegal to relocate any wildlife in MA all trapped beavers must be killed. The licensed trapper should be required to exclusively use humane methods of euthanasia and minimize non-target animal loss. In addition, as per MA Division of Fisheries and Wildlife it is best to avoid trapping when the female is nursing kits between June 1<sup>st</sup> and July 15<sup>th</sup> whenever possible. A good MBMP will reduce out-of-season trapping when the beaver pelts cannot be used.

## **The Natural Beaver Cycle**

When left alone by humans there is a natural cycle with beavers that has repeated itself over millennia.

Beavers use deciduous woody vegetation for food and building materials, so they will choose areas along streams that have an adequate supply of the trees they prefer (e.g.

aspen, poplar, cottonwood, birch, etc.). They will stay in the ponded area they created with their dams until all their preferred trees are depleted, which often takes 10 or more years. During this time the beaver pond supports a wealth of biodiversity.

Once their food supply is exhausted the beavers will relocate to an area uninhabited by other beavers where there is a new food supply that can sustain them. Once beavers relocate, the dams they built are no longer maintained by them. These mud and stick structures deteriorate over time, develop leaks, and eventually the beaver ponds drain out returning the area to its pre-beaver state of a marsh or stream.

Grasses and bushes will reclaim the enriched soil of the drained pond area. This is followed by the growth of new woody vegetation. After a period of 10 to 15 years the woody vegetation has matured to the point where new beavers will find the area attractive again. At this time new beavers will rebuild the dams to restore the beaver ponds. Then this natural beaver cycle starts anew.

Until European colonists intervened and nearly drove the beaver to extinction with unregulated trapping hundreds of years ago, this cycle of habitat successions had continued for eons. Over that vast expanse of time, flora and fauna adapted to take advantage of the environmental changes caused by beavers.

This natural beaver cycle became interwoven with, and an essential element of the web of life for a myriad of species in North America. Due to their importance biologists have classified beavers as a Keystone species. A healthy population of a Keystone species is critically important for a robust and healthy ecosystem. Therefore, the presence of beavers and the dams they create on our landscape are critical for protecting biodiversity.

Other wetland benefits of beaver ponds include recharging ground aquifers, decreasing downstream flooding, increasing stream flows during droughts, removing runoff pesticides and fertilizers from the water, improving downstream water quality, decreasing erosion, improving fisheries, and providing open space for recreation, etc. See the attachment entitled "*Why Give a DAMn ?*" for additional information regarding the many benefits of beaver ponds.

## **Types of Flow Devices**

Below are descriptions of the most common, successful flow devices.

### **1. Pond Leveler Pipe**

A Pond Leveler pipe is a specially designed pipe system which is installed through a beaver dam to control the water level in a beaver pond. See attachment.

It is designed so that beavers cannot detect the flow of water into the pipe and therefore will not try to block it. The pipe is installed through the beaver dam at the desired pond level. It creates a permanent leak in the beaver dam to control the pond at a safe level while allowing the beavers to stay. This long-term approach generally eliminates the need for beaver trapping.

## **2. Fence and Pipe Culvert Protection**

Road culverts are common targets of beaver damming. To a beaver a culvert through a road bed probably appears to be a hole in a dam. With only a relatively small amount of damming the road bed becomes a large dam. The resulting impoundment of water can cause serious health and safety issues and can cause tremendous infrastructure damage.

A Fence and Pipe flow device allows beavers to dam on the culvert exclusion fence and create a small pond in front of the culvert but keeps the pond at a safe level to protect human interests. See attachment.

The Fence and Pipe flow device is usually the best method to protect road culverts when some water impoundment is tolerable upstream of the culvert. . It is 99% effective despite the presence of beavers. It allows us to control where the beaver builds its dam, and controls the height they can build it. It also decreases the ability of beavers to build upstream dams in the ponded area. Note, this flow device is also very effective protecting other manmade drainage structures, such as spillways in manmade dams and drains in retention ponds.

## **3. Culvert Protective Fence**

Culvert Protective Fences prevent beavers from damming culverts to maintain road integrity and safety. When properly designed and installed Culvert Protective Fences are 95% effective at maintaining full culvert water flow despite the presence of beavers. See attachment. They are particularly useful for high flow streams or for areas where no ponding is tolerable.

## **4. Decoy Dam**

A Decoy Dam is the easiest and least expensive and lowest maintenance option for protecting a road culvert from beaver damming. The goal is to create what looks like the beginnings of a dam to the beavers 10 to 15 feet upstream of the culvert to encourage the beavers to dam upon it rather than inside the culvert. It works best if it holds back a few inches or more of water and creates a noisy waterfall that will attract the beaver's attention. It will keep the culvert open. However, it is only feasible where a beaver pond will not pose a threat to abutters or the road.

## **Flow Device Discussion**

When properly designed and installed these three types of flow devices offer long term protection from beaver damming activity, thereby protecting roads, infrastructure, property, human health and safety, and result in significant savings of time and money for years to come. They are 95 – 99% effective over 10 years and are also the most humane and environmentally friendly solution to beaver problems. These are some of the reasons they are the best beaver management practice for most conflicts. See [www.beaversolutions.com](http://www.beaversolutions.com) for studies of our success rates with these devices.

The best flow devices are not only effective, but they are also designed to require minimal maintenance. Nevertheless, the small amount of maintenance that is required is very important.

Culvert Protective Fences should be cleared of any floated leaves and sticks quarterly so that beavers will not dam against the fence. Pond Leveler pipes should be inspected annually in the spring for beaver-related or winter ice damage and the pipes adjusted if necessary to ensure proper pond levels. Fence and Pipe flow devices on culverts generally only need to be checked twice annually to ensure the culvert remains completely open and the flow device remains in good condition.

Usually, no additional maintenance is needed on our flow devices throughout the year. However, if a problem occurs it is important that someone be accountable and available to fix the problem. If a town or any client desires to assume the responsibility for flow device maintenance, Beaver Solutions is very willing to provide training and advice as we are committed to the success of our flow device installations and to our client's complete satisfaction. When this routine maintenance is performed as recommended a flow device will remain effective for a decade or more.

## **Trapping**

Before the development of successful flow devices, trapping or shooting beavers were the primary methods of resolving human-beaver conflicts. However, it is important to understand that removing beavers is typically a short-term solution. This is because despite beaver removal the habitat remains the same and the habitat will attract new beavers. Nature abhors a vacuum so new beavers will move into good beaver habitat.

In some jurisdictions it is legal to relocate trapped beavers, and when beavers are new to a region this method has the benefit of resolving one problem while gaining all the

benefits of the beavers in a different area. However, in many places such as my home state of Massachusetts, beaver relocation is no longer legal where beavers already occupy all the suitable wetland habitats. Where beaver relocation is not permitted any trapped beavers must be killed. Killing beavers should only be done as a last resort when no other options are viable, and it should always be done as humanely as possible. Note, drowning of beavers is legal in many states but is considered a cruel method of euthanasia per the American Veterinary Medical Assoc. Guidelines for the Euthanasia of Animals.

There are occasional sites where we will recommend trapping rather than flow devices because flow devices are not feasible everywhere. In our experience about 25% of beaver conflicts need to be managed with trapping, typically when human infrastructure is located in a floodplain where it would be damaged by any flooding. This is usually where even a small beaver pond will pose a threat to human health, safety or property, so no ponding can be tolerated. These types of areas are classified as “No Damming Zones”, so trapping will need to be utilized anytime that beavers build a dam in that zone.

In our experience, in regions with healthy beaver populations new beavers will typically relocate to the trapped area within 6 - 24 months of trapping. This means that trapping needs to be repeated every time new beavers relocate to that habitat indefinitely. As a result “No Tolerance Zones” usually are more difficult and expensive areas in which to manage beavers. The Beaver Institute’s 20 year study in the town of Billerica, MA concluded that flow devices saved taxpayers an average of \$180.00 per year per site versus the cost of trapping, plus the town gained millions of dollars of ecological services annually by coexisting with beavers.

Problem beaver trapping also has more negatives than killing the beavers such as: beavers typically dam and are trapped in seasons when their pelts have no value, and trapping results in the loss of valuable beaver created wetlands. Also, kill traps sometimes kill non-target animals such as otter, mink, muskrats and turtles. These are some of the reasons flow devices are usually preferable to beaver removal.

Most beavers will not tolerate a two-foot drop in their pond level without new dam building. So, when a beaver pond needs to be lowered 2 feet or more, we will often recommend one round of beaver trapping combined with the installation of a flow device. When new beavers move in, they will not have the memory of the higher water and will often tolerate smaller pond controlled at a safe level by a flow device. To avoid trapping, identifying potential problem sites and intervening early before a beaver dam needs to be lowered by 2 feet or more is important. Having an accepted Municipal Beaver Management Plan in place can support this proactive approach.

## **Tree Protection**

Beavers chew down trees for food and for building supplies for their dams and lodges. Being rodents, they also grind their teeth and chew wood because their teeth never stop growing. These behaviors help keep their incisors the proper length and sharpness.

Landowners who wish to protect valuable trees from beaver chewing is a very common concern. The trees that people wish to preserve may be specific specimen trees or a large stand of trees that offer noise, screening or other benefits to them. Fortunately there are ways to protect individual and groups of trees without eliminating the beaver and the wetland ecosystem they create.

Successful techniques include wire mesh fencing around tree trunks, fencing off a larger area to prevent beaver access, paint and sand applied to the tree trunk, taste aversives applied to the tree trunk, or electric fencing as a barrier deterrent. These tree protection techniques are relatively inexpensive, reliable, and relatively easy to do in a short period of time. Please see the Beaver Solutions website at:

[http://www.beaversolutions.com/tree\\_protection.asp](http://www.beaversolutions.com/tree_protection.asp) or Beaver Institute website [www.beaverinstitute.org](http://www.beaverinstitute.org) for more detailed information on various tree protection techniques.

Beavers have definite preferences for what trees they select for food. Their favorite trees include: aspen/poplar, cottonwood, willow, birch, cherry and apple. If those trees are absent, they will harvest oak and other hardwoods. Maple trees are rarely harvested. Conifers, firs and pines are their least favorite trees, but small ones are sometimes harvested after a long winter. Mature tree trunks are sometimes girdled by chewing, which can kill the trees, making more room for the growth of other plants and trees that beavers prefer.

Whenever possible, beavers like to build up their dams to flood the base trees before harvesting them. This way they can work from the relative safety of the water and the ponding makes it easier to transport cut branches in the water. Pond Leveler pipes can limit the footprint of a beaver pond and help protect some trees. However, beavers will commonly travel 100 – 150 feet from the water's edge to cut trees, so trees this close to the water's edge may be chewed down by beavers. Beavers are also known to dig canals on flat land to access groves of preferred trees lying far from the pond's edge.

When deciding upon which trees to protect, it is important to combine the knowledge of how far beavers will travel on land with the knowledge of the species of trees beavers prefer to harvest. This allows your resources to be used cost-effectively.

## **Conflict Sites: Identification**

The locations of the local beaver conflict sites, as well as the locations of non-problematic beaver sites are generally well known to many different people in town. Usually the local Highway Department is aware of the most beaver problems because beavers commonly block road culverts creating road safety and infrastructure issues. In addition, other municipal staff including: Conservation, Health, Water, Parks and Rec. and others often receive reports of beaver-related issues, so these town staff should be consulted and their information compiled. Sometimes local residents also have valuable information regarding the presence of beavers in town.

In our experience it is ideal if one municipal staff person becomes the point-person for collecting the data on each known beaver issue in town and communicating with your beaver consultant. Having a Town-assigned beaver point person will support efficient and reliable communication. Once this person has gathered information from all the parties, a comprehensive list can be generated. This comprehensive list then becomes the starting point for the Municipal Beaver Management Plan. Note, this comprehensive list should be a dynamic document so that new beaver sites can be added to it as they become identified over time.

## **Conflict Sites: Prioritization**

The next step is to organize each known beaver conflict site on the comprehensive list in order of priority if possible. This prioritization will help future planning and the logical and best allocation of limited resources. However, once a site specific assessment is completed for each location the prioritization of some sites may change, with some sites being deemed less urgent and others more urgent. The order in which beaver management interventions are implemented should correspond to the prioritization of sites reflected on this list.

## **Conflict Sites: Assessments and Recommendations**

Once the comprehensive list is prioritized it is time to begin the site-specific assessments and create recommendations for the prioritized sites. This involves gathering data for each site and using that data to develop site specific beaver management recommendations.

Having resolved over 2,500 beaver-human conflicts since 1998, Beaver Solutions has extensive experience recommending the best intervention for any beaver conflict site.

Once we receive the appropriate site specific data, we analyze it and develop site specific recommendations. To simplify the data collection process for others we have developed data collection sheets for each type of beaver problem. Also, we remain available to answer any questions from those collecting the data.

The data required to complete a site assessment is extensive but is generally easily obtained by most people. When we are on-site we gather the information. However, for years we have been able to help others across the U.S. and Canada when they collect the information needed. The information gathered locally has enabled us to remotely create successful management plans for any site no matter where it is located in North America.

This local and remote collaborative approach maximizes the probability for success and eliminates the risk of wasting precious resources on an intervention that is more expensive than is necessary, or an intervention that is inadvisable for that site and ends up failing.

## **Implement the Recommendations**

Once recommendations are received on the prioritized sites and a budget is in place, it is time to implement interventions. Beaver Solutions and the Beaver Institute have developed Self-Help materials that are available online for free. It is always best to hire a professional experienced in this work. While the devices may appear simple, beavers are persistent and crafty and can exploit any design or construction flaw in a flow device. The Beaver Institute trains professionals across North America and keeps a list of them on its website at: <https://www.beaverinstitute.org>

With a well trained beaver management profession on your team you will have the best outcomes for your Municipal Beaver Management Plan (MBMP).

## **Summary**

Beaver damming can quickly cause serious public health and safety issues, so the development of a Municipal Beaver Management Plan is prudent public planning for a community with multiple beaver conflict sites. Any town can now manage beaver-related issues in a pro-active, cost-effective, ecologically responsible and humane manner once they have created a quality MBMP.

A MBMP allows for prompt intervention of immediate threats, but also for prioritization for less immediate and potential beaver problems. This comprehensive assessment of the beaver issues prevents crisis management and budget resources in a logical and efficient manner. A Beaver Solutions MBMP promotes sound public policy and offers the best beaver management tools available.

## **Request a MBMP**

Most Municipal Beaver Management Plans are developed with a total of 5 - 15 known human-beaver conflict sites and up to 6 prioritized sites. If you are in southern New England and are interested in learning more about developing an innovative and comprehensive Beaver Management Plan for your community please contact John Egan, Beaver Solutions LLC at [john@beaversolutions.com](mailto:john@beaversolutions.com) after reviewing the Beaver Solutions website at: [www.beaversolutions.com](http://www.beaversolutions.com).

The cost for a Municipal Beaver Management Plan with recommendations for up to 6 prioritized conflict sites is typically \$2,500 - \$3,500.

## **Attachments**

1. Pond Leveler Info Sheet
2. Keystone Culvert Protective Fence Info Sheet
3. Fence and Pipe Info Sheet
4. Decoy Dam
5. “*Why Give a DAMn?*” Info Sheet

## **Conclusion**

It is our sincere hope that this document has helped you better understand why beavers are an essential component of healthy watersheds and ecosystems, the wide variety of tools available to cost-effectively manage beaver-related problems, and why it is important for your community to develop the best Municipal Beaver Management Plan possible. We are ready to assist you with this task upon request. Please contact us to discuss your specific needs for additional information.

Sincerely,

John Egan  
Michael Callahan  
Sarah Bagge  
Ed Beattie

*Beaver Solutions LLC*  
*“Working With Nature”*  
*Web: [www.beaversolutions.com](http://www.beaversolutions.com)*  
*Email: [sarah@beaversolutions.com](mailto:sarah@beaversolutions.com)*

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