

# **BEAVER DAMAGE CONTROL TECHNIQUES MANUAL**



**COMPILED BY NEW YORK STATE  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION'S  
BUREAU OF WILDLIFE**

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## INTRODUCTION

The purpose of this manual is to provide information on the most effective techniques available for resolving beaver/human conflicts. It will integrate a wide range of topics and issues pertinent to beaver damage control and will hopefully serve as a valuable reference tool for those BOW personnel responsible for handling beaver damage complaints. Information on the history of beaver management in New York State, the natural history and habits of beaver, definition of beaver damage, liability concerns, permit requirements, importance of good landowner/DEC relations, standard procedures for handling beaver nuisance complaints, and the methods/options presently available to resolve beaver damage concerns will be addressed.





## Beaver Management in New York

**T**he North American beaver (*Castor canadensis*) has a long and interesting history of management in New York. Nearly extirpated in the early 1800's, beaver populations made a spectacular recovery during the 1900's. This was made possible through trap and transfer, harvest restrictions and habitat recovery. By the early 1940's beaver had reoccupied New York. Beaver-human conflicts increased as a result. In response, New York established a nuisance focused beaver management policy in 1944. Beaver populations were purposely held at low levels by long fur-trapping seasons. This approach, which lasted through the 1970's, minimized the benefits as well as the costs of beaver.

During the 1960's and 1970's, New York's wildlife biologists examined the wetland-wildlife benefits provided by beaver impoundments. Study findings led to major changes in beaver management. It was determined that the habitat and other benefits of beaver balanced many of the costs. Beaver population objectives for ecologically based management units were established with measures of human tolerance and habitat potential being the key factor in objective setting. The result was higher beaver population objectives. During the 1980's, beaver populations increased throughout much of New York State. Beaver populations were maintained at desirable levels by regulating the trapping seasons. The goal was to provide more net wetland-wildlife benefits to New Yorkers.

Since this time, however, the Bureau of Wildlife's ability to manage beaver populations at objective levels has been severely impacted. This has been brought about by a combination

of factors. Chief among these has been increased beaver habitat due to changes in land use patterns across New York State. In 1880, 75% of New York State was actively farmed and less than 25% was forested. By 1980, 60% of the State had returned to forests. This continuing trend toward less agriculture and general farmland abandonment has resulted in the creation of more available beaver habitat.



A significant decline in trapping interest has been the other major factor contributing to higher beaver populations. This decline can be attributed to low pelt prices, increasing average trapper age and decreased recruitment of new trappers, as well as changes in social attitudes toward the utilization of wild furs. With the European Economic Community (EEC) threatening to impose even stricter trapping standards, the incentive to trap will likely continue to decline.

The result of all this is that presently many of our wildlife management units are at or above the management objectives set for beaver. As legalized trapping becomes less effective as a method of control, beaver populations will continue to increase, resulting in greater beaver-human conflicts. In 1993, it was estimated that there were 17,579 active beaver colonies in New York. This was 3,579 more than the statewide goal of 14,000 and an increase of 19% since 1990. Beaver damage was reported at 2,113 of the sites, resulting in 5.5 million dollars worth of property damage. An additional \$330,000 was spent by the State to handle these complaints. With the limited applicability and high cost of the current beaver damage control technology, the installation of water level control devices alone will not be



enough to resolve the majority of beaver damage problems. It is therefore important to take a more comprehensive approach to resolving beaver damage complaints. By integrating current beaver damage control technology with in season trapping, permit issuance, standardized operation procedures and sound technical advice, we should become more effective in serving our public.



## Biology and Behavior of Beaver

**T**he beaver is the largest rodent in North America with adults ranging from 35 to 46 inches long (including a flattened 12-18 inch tail) and weighing from 45 to 60 pounds. Beaver weighing over 100 pounds have been recorded. The hind feet are very large with 5 long webbed toes. Front feet are small and dexterous, which allows the beaver to carry dam construction material such as stones and sticks.

Both sexes of beaver breed at 21 months of age from December through February. Females ovulate 2 to 4 times at 7 to 15 day intervals during each mid-winter breeding season. There are no records of beaver breeding as first year kits. Development of the fetuses requires 120 days with the young being born between April and July. Litter sizes range from 1 to 9 with an average litter size of 4. The heavier the female, the larger her litter, also the number of young a female bears is inversely related to her family size at the time of breeding. Adult females will breed every year regardless of the habitat quality.

The occupants of a beaver pond or group of ponds is a family consisting of two adults and their offspring of two breeding seasons. Beavers mate for life; however, if

one of the adult breeding pair is removed from the population, the remaining member will readily accept a new mate. The kits remain with the parents until they are 2 years old and then are driven off to find their own territories. This dispersal of juveniles can contribute greatly to the total number of property damage complaints.

As a food source, beaver prefer aspens and willows but will eat the leaves, twigs and bark of most species of woody plants found along the water's edge. During the growing season beaver will also consume large quantities of non-woody plants such as grasses and cattails. During the fall, they will stockpile their woody food supply in the water near their house for use during the winter months. The presence of these fresh cut feed piles is an important indicator of an active beaver lodge. During the ice covered winter months beaver are generally inactive with regard to tree cutting and dam building.

Beaver construct dams which result in the formation of ponds within which the lodge and winter food cache are located. It is believed to be a combination of water flow sensation and the sound associated with running water that stimulates this dam building activity. Within and around the pond the beaver construct canals for security and for the transport of food and building materials. Beaver are primarily active at night with regard to their dam building and tree cutting activity.

The beaver dam and lodge are constructed of sticks and mud, with some beaver utilizing bank burrows along streams or ponds. Lodges consist of one or more compartments with each compartment having two underwater openings for exit or entry. These are also important for escape from potential predators. Their aquatic habitat and instinctive behavior minimizes the adult beaver's susceptibility to predators. Domestic dogs, coyotes, bears and bobcats are among the larger predators in New York State that will prey on beaver if the opportunity arises. However, since beaver rarely travel far from water, they are relatively safe from

most predators. Young beaver are more susceptible, with predaceous mammals such as otter and mink occasionally preying on kits. Overall, natural predation probably has little effect on beaver populations in New York State.

The impoundments created by beaver provide valuable wildlife habitat for assorted furbearer and waterfowl species. In this way, the beaver provides valuable ecological benefits to the public at large. On the other hand, the beaver's dam building activity can result in widespread flooding of woodlands and agricultural land and cause numerous complaints by plugging road culverts, flooding roads, railroad tracks and causing general property damage concerns.



## Status of Beaver Under the Environmental Conservation Law

**A**rticle 11 of the New York State Environmental Conservation Law is commonly referred to as the Fish and Wildlife Law. Sections 11-0505 and 11-0521 of Article 11 defines the legal status of beaver and their dams within New York State.

Section 11-0505 states that no person is allowed at any time to disturb a beaver dam, house or den without written permission from the DEC. This permit will be issued to the person or organization which is being damaged or affected or may potentially be affected. If the permittee (affected party) does not own or legally control the site where the beaver dam is located, it is the permittee's responsibility to obtain permission to go on lands he/she does not own or legally control to carry out the permitted actions.

Section 11-0521 authorizes the DEC to issue permits for the removal of nuisance beaver. This permit will be issued to the

landowner upon whose land the problem is occurring, an adjacent landowner upon whose land the beaver reside or either landowner's agent. The permittee may designate in writing an agent who will kill the beaver. A standard Article 11 nuisance wildlife permit form and its standard conditions is included in Appendix A.

There is also interaction between beaver dam removal (Article 11) and freshwater wetland (Article 24) permits. Article 24 of the Environmental Conservation Law, known as the Freshwater Wetlands Act, deals with the preservation and protection of freshwater wetlands within New York State. Section 24-0701 of this Article outlines situations requiring permits for removal of beaver dams within the protected areas of freshwater wetlands. Regulations governing implementation of Article 24 (Part 663) list "removing or breaching beaver dams" as an activity requiring a permit both within a regulated wetland and its adjacent area. Certain activities, however have been identified as being exempt from Article 24 permit issuance. These would include removal of beaver dams impacting on agricultural activity and removal of beaver dams causing flooding of existing structures. At the time of this writing the Bureau of Wildlife is waiting on a definitive policy specifically outlining other exempt activities concerning beaver dam removal in freshwater wetlands.

Article 15 of the Environmental Conservation Law pertains to the protection and conservation of the water resources of New York State. Section 15-0501.1 of this



Article states that, with certain exceptions, no person or public corporation shall change, modify or disturb the course, channel or bed, or remove any sand, gravel or other material from the bed or bank of any stream which has been designated by DEC as being Class C(T) water or higher class without a permit. If removal of beaver dams in these protected streams will result in any of these type disturbances an Article 15 permit will be required.

To accommodate this requirement for Article 15/24 permit issuance, a general Article 15/24 permit for beaver dam removal has been developed. Where applicable this general Article 15/24 permit should be issued for beaver dam removal in freshwater wetlands and protected streams. Please refer to *Appendix B* for a sample of this general Article 15/24 beaver dam removal permit form. There is hope that in the future the Article 11, 15 and 24 permits can be incorporated into one form, thereby streamlining the permit process.

Due to regional differences in interpretation of these laws and exemptions, please refer to your Wildlife Program Manager for specific regional policy regarding issuance of these permits.

For additional information on relevant Environmental Conservation Law, Fish and Wildlife policy and legal precedent please refer to *Appendix C Policy Memo FW 90, Statewide Policy for Handling Beaver Problems.*

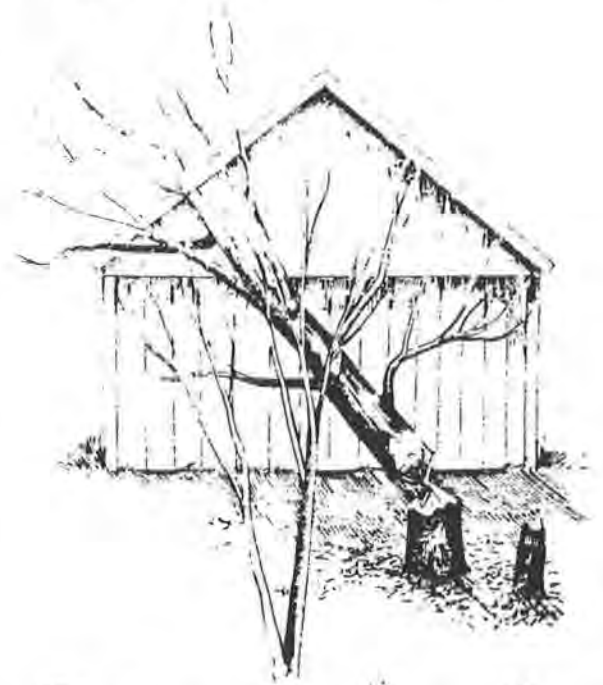


## The Definition of Beaver Damage

**U**nder Policy Memorandum FW 90, entitled: Statewide Policy for Handling Beaver Problems (see Appendix ), the DEC must respond when a Regional Wildlife Unit receives a report of a situation where beaver are perceived by an affected party (private or public landowner or lessee) to adverse-

ly affect their property. Problem situations may include: an impoundment threatening downstream property, upstream flooding of land, trees or crops killed or damaged by flooding, flooding of homes, flooding of highways or railroads, contamination of water supplies, impairment of drainage systems, damage to wildlife habitat or landowner distress.

Perceived is the key word. Though the inspector may not think the problem is valid, the distress is in fact real if the landowner or manager perceives it. Therefore, appropriate action should be taken to solve the problem or to alleviate the apprehension of the complainant. This particularly applies to complaints in WMCU's where beaver are above the management objective density.







## Legal Responsibilities and Liability Concerns

In *Barret vs. State of New York* (1917), the State Court of Appeals found that the State was not liable for property damage caused by wildlife. This landmark decision reversed an earlier judgement in a lower court which had awarded Barret compensation for damage to his property caused by beaver. The DEC is, therefore, not legally liable for wildlife damage.

While it is ultimately the responsibility of the landowner to resolve the problem, the DEC will assist the public in finding appropriate solutions to problems caused by beaver. This will be done within the limits of DEC's legal responsibility, fiscal capabilities and priorities. It is important for the DEC to provide this assistance in order to minimize costly damage and generate public acceptance for beaver populations at sufficient levels to provide desired amounts of wetland/wildlife habitat.

Those assigned the task of assisting property owners with their beaver problems should understand that they are responsible for per-

sonal injury or property damage caused by their negligence. The State will, however, provide for their defense if, while carrying out their responsibilities, they incur a civil action and will also compensate them in the amount of any such judgement (see the memoranda of Wich 08/25/93 and Davis 10/07/93, in Appendix D).

Based on this legal interpretation a DEC employee should avoid creating hazards. The initial breaching of a beaver dam can create such a hazardous situation. To avoid washouts, water levels above and below beaver dams should be equalized by slow and partial breaching before the entire dam is removed. Road culverts immediately downstream of a beaver dam should also be inspected for size and condition prior to dam removal. Furthermore, water level control devices or guards should not be installed that restrict the water flow from the original culvert design unless a safe overflow is provided. This overflow potential can be created by placing tubes through dams or deep water fencing located upstream from road culverts. In this way, excess flood water will flow over the dam or deep water fencing and through the original road culvert. When giving technical advice, property owners and road maintenance personnel should be advised of the consequences of restricting designed water flows.

It would also be advisable to refrain from physically altering the beaver site location in any way that might produce a hazard or danger to the public. For example, caution should be taken when excavating deep water trenches adjacent to public road right-of-ways for control installation unless suitable barriers or guard rails are installed for protection. This should be discussed and agreed upon with the governmental agency responsible for maintenance of the road right-of-way.

Beaver activity in man made ponds and marshes also present a special area of concern. The dikes of many such impoundments are often constructed of topsoil through which a pipe or water control box regulates water levels. Some of these dikes are also built with emergency spillways cut below the rim of the dike. These are designed to prevent washouts in the event the control box should become



plugged. When both the primary water control and emergency spillway become plugged by beaver, water levels will rise possibly resulting in overtopping and washout of the dike. The degree of hazard resulting from such a situation is dependent upon the height and stability of the dike, the acreage and depth of the pond and the proximity of roads or property immediately downstream of the dam site. With this in mind, BOW personnel should avoid maintaining water levels above the designed height of the emergency spillway or the top of the water control box or pipe. It would be best to consult with a regional engineer when asked for advice or service in controlling the level of a beaver pond involving a man made dike.



## Landowner Relations

Only a small percentage of problem sites lend themselves to effective control device installation. In most situations, the effectiveness of the DEC staff is limited by shortages of time and money. For these reasons, skill in relating to others is the most important tool in solving problems caused by nuisance beaver. Courtesy, willingness to listen, tact and sensitivity to the concerns of others is important in serving the complainant and to your own sense of accomplishment as well.

The following is a list of suggestions when dealing with nuisance beaver complainants:

Evaluate the damage situation before discussing the technical options with the complainant.

Suggest the method that you feel will best resolve the situation but encourage feedback from the landowner. To improve customer satisfaction, it is important to involve the complainant in the decision process. In this way, he/she will more likely be satisfied with the action taken.

Do not minimize the complainant's concern even though it may appear to be a perceived problem. If the complainant's concern had not been real, the DEC would not have been contacted for assistance.

Be professional and positive. Provide pertinent and accurate information to help the complainant better understand the behavior of beaver and the nature of the problem.

Be honest about the magnitude of the problem and your own limitations, but be tactful and courteous.

When practical and potentially helpful, inform complainants of the positive wildlife benefits of beaver impoundments, while keeping in mind that your primary responsibility is to the landowner.



## Standard Procedures for Handling Beaver Problems

1. The DEC Regional Wildlife Unit (Unit) in whose region the problem occurs will receive reports of beaver problems.

2. Whenever possible, a Fish and Wildlife staff person will contact the affected party within five working days (or less) of receiving the report.

3. The Unit will determine if beaver are the cause of the situation creating a problem for the affected party (a site visit may be necessary). If beaver are not the cause, no further action by the Unit is needed.

4. When a problem occurs at a site where the recent history is unknown to the Unit, a site visit will be made. If possible, arrangements will be made to meet the affected party at the site. If the recent history at the site is known, a site visit will be made at the Unit's discretion.

5. If beaver are the cause, the report will be logged on a standard complaint record and permit form from which the data will be entered into a computer data base.



6. The Unit will discuss the problem with the affected party and whenever possible satisfy his or her concerns through information and advice only. The affected party may decide that there is no problem or that the situation is tolerable. Or, that solving the problem does not require further action by the Unit (e.g., affected party waits until fur-trapping season to have beaver removed by a trapper, affected party protects trees from damage with wire fencing).

7. The Unit will issue permits to kill beaver to landowners (under ECL 11-0521) and to disturb beaver dams to affected parties (under ECL 11-0505) on request after informing the permittee of a) the positive value of beaver and beaver impoundments (where appropriate), b) whether the requested permit action will solve the problem and c) of the alternatives for solving the problem (e.g., waiting for trapping season to have beaver removed by a fur-trapper, accepting situation, etc.) **UNLESS:**

a. the beaver population in the Wildlife Management Unit is below the population objective. (If the population is below the objective, the Unit will weigh the seriousness of the problem against the value of the impoundment for meeting fish and wildlife management goals when deciding whether or not to issue the desired permit.) or

b. there are other landowners with an equal or greater stake in the outcome (e.g., landowners belonging to a lake association). In these cases, a permit will not be issued without consensus of the stakeholders in support of the requested permit action.

At or above the population objective, there are enough beaver impoundments, associated wetlands and wildlife to meet program objectives. There is no resource reason to deny permits. To do so would create bad feelings toward beaver and DEC. Intolerance of beaver would ultimately yield fewer beaver and impoundments. Arbitrary permit denial could also lead to a loss of permit authority and management opportunity.

8. When the Unit issues beaver dam disturbance permits, the permittee will be the person or organization which is being damaged or affected or may potentially be affected (i.e., affected party). However, if the permittee

(affected party) does not own or legally control the site where the beaver dam is located, it is the permittee's responsibility to get permission to go on lands he/she does not own or legally control to carry out the permitted actions. A DEC permit to disturb a beaver dam does not authorize the permittee to trespass upon private property. DEC is not responsible for any personal or property damage caused by the actions of a permittee or his/her agent.

9. When the Unit issues a beaver dam disturbance permit to lower the impoundment level and an Article 15 and/or Article 24 permit is required by law, these permits will be issued at the same time as the Article 11 permit.

10. When the Unit issues beaver kill permits the permittee will be the landowner upon whose land the problem is occurring, an adjacent landowner upon whose land the beaver reside or either landowner's agent. The permittee may designate in writing an agent who will kill the beaver.

11. When a beaver kill permit is issued, the Unit will offer the names of beaver trappers to permittees. The Unit will provide beaver trappers with lists of permittees. *It is the trapper's responsibility to obtain permission to enter and trap.*

12. The Unit may offer as a beaver kill permit condition the option of commercial sale of nuisance beaver in accordance with Division of Fish and Wildlife Policy Memorandum FW 87-1. See Appendix E.

13. The Unit will not usually allow the relocation of problem beaver. The Unit may consider doing so *only* if the beaver population is below the population objective or, if the population is above this threshold, only under extraordinary circumstances. In any case, the decision to allow relocation by the permittee or his/her agent will be made by the Regional Wildlife Manager. If a permit is issued to relocate beaver, the Unit will specify the release site location as a special permit condition.

14. The Unit will explain the use of any permits issued and, when necessary, will tell the permittee how to comply with any special permit conditions.

15. The original permit will be given or forwarded to the permittee, a copy kept for Unit **B**

records and a copy sent to the local Environmental Conservation Officer and/or regional law enforcement administration.

16. The Unit will explain to the permittee the need for any other agency permits or permission that may be required.

17. The Unit may provide assistance beyond issuing permits and advice (e.g., labor and/or materials to assist in water level control device installation) within the limits of available resources when:

- a. the affected party desires assistance;
- b. the desired assistance will solve or help solve problem;
- c. providing desired assistance helps achieve fish and wildlife goals (e.g., producing wetland habitat, minimizing threat of washouts).



### Protect Trees and Shrubs

(Note: No permit is required). Individual shrubs and trees can be protected by loosely wrapping to a minimum height of 36 inches with welded wire fencing, zinc or plastic coated, or roofing felt held in place with string or wire.

Groups of shrubs or trees can be protected with 36 inch high fences made of welded wire, woven wire or 12 inch high tensile electrified wire with a minimum of 3 strands of wire spaced at 4 inch intervals.

(Note: Fencing may not be effective in late spring where deep late snow persists).

### Protect Road Culverts Against Blocking

(Note: It is not safe to constrict the flow of water through a road culvert. Culvert guards must be as open as possible, regularly inspected and cleared of debris. It is also extremely hazardous to stand in the water in front of a culvert while unblocking it or to crawl into one to open it).

### Pitchfork-shaped guard

(Handout 3). This is made of heavy steel rods, welded 6" apart to 2 horizontal braces or a piece of 3 to 4 inch channel iron. This device is pushed into the bottom to hold it in place in front of the culvert. It is a preventive measure to keep wandering beaver from getting inside a culvert and plugging it.

### Deep Water Fence

(Handout 4). These D-shaped or square fences, 10' to 20' on each side, made of 6" by 6" reinforcing steel mesh held by 6' steel fence posts. These are placed above intakes to prevent flood-water debris or beaver from blocking a culvert. If beaver place material against the fence, the resulting dam becomes a temporary emergency spillway which must be removed or modified because road grades should not be used as dikes. If a Water Level Control Device (WLCD) is to be used in a culvert, it should be used in conjunction with a deep water fence.

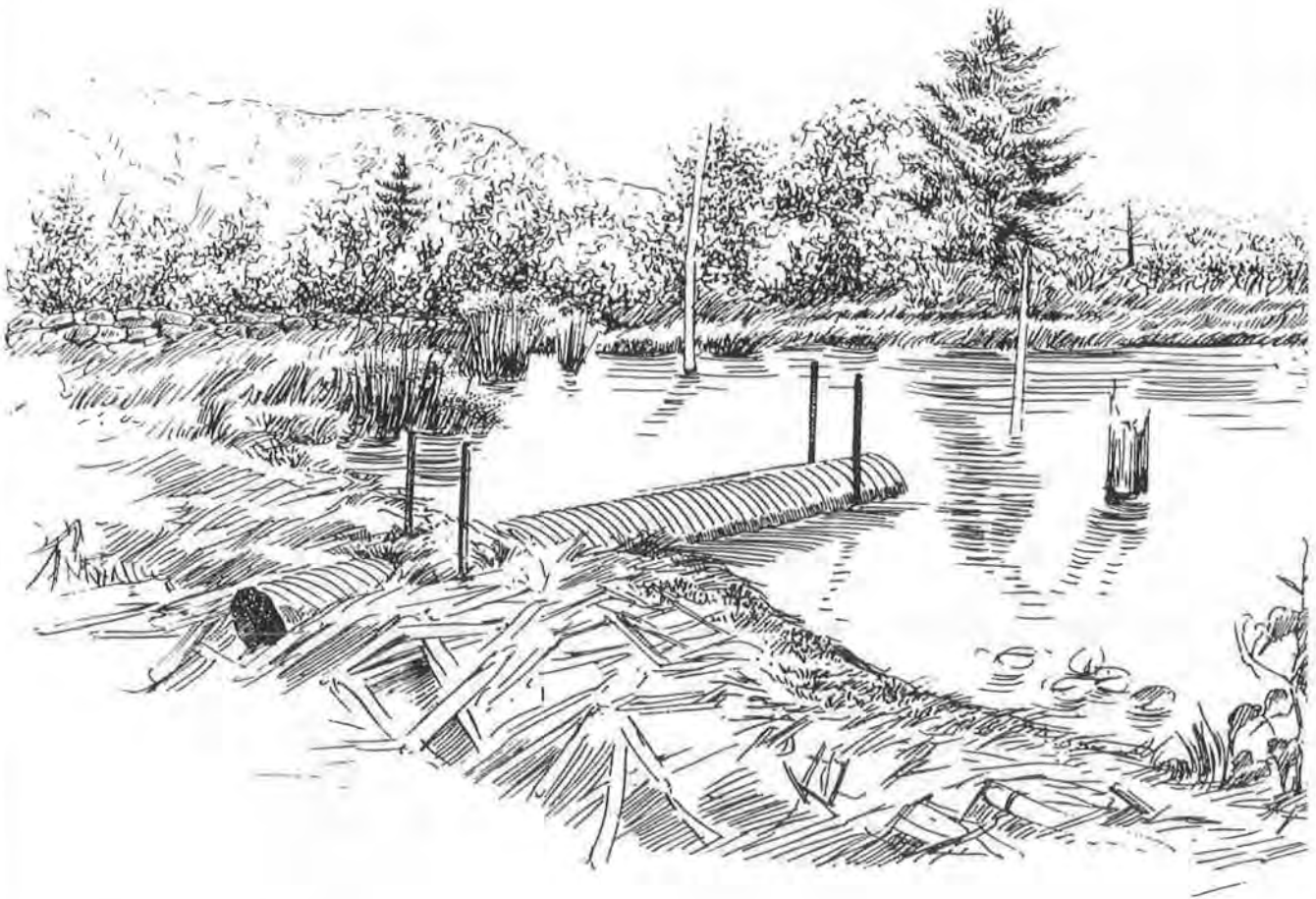




# CAUTION

## WATER LEVEL CONTROL DEVICES (WLCD'S) WORK IN A VERY LIMITED NUMBER OF APPLICATIONS!

Many important details must be considered.





## Special Concerns Regarding Water Level Control Devices

**A**s mentioned above, few beaver problems (three percent in 1993) can be solved with a Water Level Control Device (WLCD) in New York State. Therefore, it is important to choose a site carefully because a lot of time and money is required to build, install, and maintain it. Even where one can be successful, a complainant must be committed to the concept and it is likely to fail if not regularly inspected and maintained. More importantly, a failed water control device is not only a loss of time and money but also causes a loss of public confidence in the effectiveness of BOW staff members to provide relief from beaver damage. Therefore, consider the following before installing a WLCD:

### How does a WLCD function?

a. By excluding and regulating. The best devices keep beaver away from their intakes and regulate the water level in the pond. Some devices only delay the beaver from getting to the intake of the device and merely delay their plugging it.

b. The best devices muffle the sound of escaping water and make the sensation of flow undetectable. An example would be the clemson tube or combination deep water fence and tubing. If the pond is drawn too low and the beaver are unable to neutralize the device, the beaver must build another dam upstream or downstream or abandon the pond.

c. The level at which a beaver pond may be held and have the beaver remain varies. The depth of the lodge or burrow entrance may be used to gauge this level.

### Why should a WLCD be installed?

a. To prolong the life of a desirable beaver wetland. However, few sites can support beaver

for more than a few years if young beaver are not harvested each year.

b. To resolve a dispute between adjacent property owners affected by the same beaver family. But one or both owners must agree to purchase materials and to assemble, install, and maintain the device.

### Where can a WLCD be used?

a. Only in a beaver dam that does not directly involve a water control box, dike, culvert, or man-made structure. Structures for retaining or passing water must handle runoff of severe storms and partial obstruction of these can be disastrous. **Never** restrict flow capacity from the original design. (Note: See Handout #6).

b. Only in beaver dams where temporary flooding will do little harm. A WLCD should not be installed where flooding to the original level cannot be tolerated. It is important not to underestimate the flow rate when installing tube style WLCDs. Inadequate size tubing will result in persistent flooding problems.

c. In areas where there is minimal opportunity for beaver to neutralize their effectiveness. A drainage that provides countless dam sites should be avoided. A WLCD should not be installed in a dam if there is a constriction in the topography downstream of the site.

d. In beaver ponds with pool depth of 4 feet or more. A WLCD can be installed in less water than this if the device disguises the flow of water into the intake and/or the intake is protected by an enclosure.

e. In ponds with clay or gravel bottoms. Soft mucky or silty bottoms allow beaver material for blocking WLCD intakes. This is especially true for WLCDs that have intakes that are not protected by enclosures or do not disguise the flow of water.

f. Only in accessible sites. People must get to the site easily for construction, inspection, and maintenance.





## Water Level Control Device Materials

**Polyvinylchloride (PVC) pipe** is quieter than most other suitable materials but is limited to diameters of 10" or less because of weight. The clemson tube, made with this material, is especially effective.

**Corrugated Flexible polyethylene tubing** must be protected from beaver chewing by wrapping with chicken or welded wire, and tends to float so it must be staked up every 5 to 10 feet. It is also limited to diameters 10" or less but is the cheapest material available.

**Corrugated galvanized steel pipe** is limited to small diameters (less than 8") because of weight and high cost. It's more likely to attract beaver plugging because water causes excessive noise when passing through it.

**Welded wire cylinders** must be reinforced to prevent crushing by beaver and are seriously weakened by corrosion. They often become non-degradable litter because they are very difficult to remove. However, they are cheap, easily carried to remote sites and can be used for quick relief until a more suitable device can be assembled.



## Water Level Control Devices (WLCD)

(Note: Prior to installing a WLCD in a beaver dam, the pond level should be lowered to the installation height. Large amounts of water flowing through a narrow opening in a dam not only make installation more difficult, but can be dangerous as well. Depending on the physical characteristics of

the pond, the length of time needed for drawdown may vary from a few hours to overnight).

**Combination Deep Water Fence/Tubing—(Handout #7).** This is a 10 foot square or larger rectangle made of heavy reinforcing mesh or welded wire fencing placed out in the deepest water of a beaver pond. A length of solid tubing is extended from the fence through the dam at the desired water level. The fence prevents the beaver from plugging the intake of the pipe, but sometimes they build a dam around it if they hear or feel the flow of water.

**Clemson Pond Leveler—(Handout #8).** This is a perforated PVC tube within a welded wire tube and is installed so that the inlet is always submerged. It is designed so that the beaver cannot feel or hear the flow of water into the WLCD and don't try to block the intake. This device is suitable only for small watersheds and intermittent streams.

**Pond Drain Tubes—(Handouts #9 and #10).** These WLCDs do not disguise the flow of water. They are usually suspended on posts (3' to 4') above the bottom of the pond. This helps to delay the beaver from building a dam around the intake. The harder the bottom, the longer the delay. These WLCDs are less expensive and lightweight, but require more maintenance than other WLCDs.

**Electric breach guard—(Handout #11).** This is a charged smooth wire fence with dangling bobs built in front of a dam to keep beaver away from a breach or away from a previously blocked culvert. This device provides a wide range of water level control. An expensive energizer and battery is required. The battery can be completely drained by prolonged contact between a water-soaked log and the fence. Both it and the energizer are often stolen. For these reasons, this device is often ineffective if not inspected and serviced once each week.

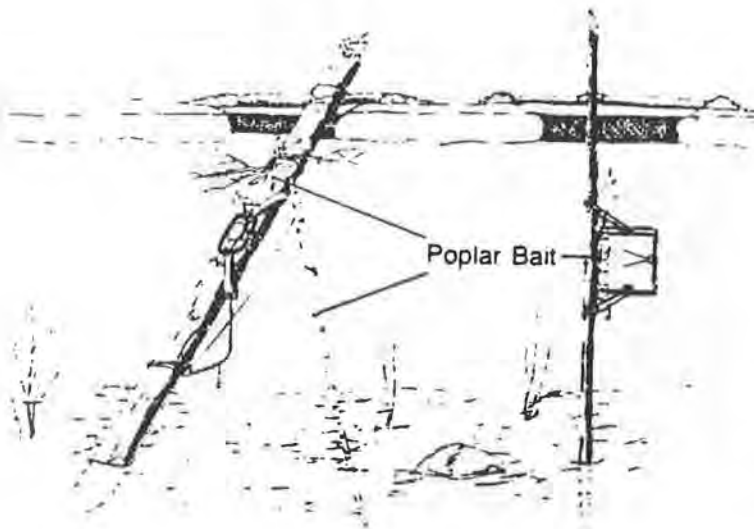






**Open Season**—The trapper/landowner partnership is undoubtedly the best long-term solution for minimizing beaver damage. A trapper can solve a landowner's problem by trapping beaver during the open season. Beaver pelts are at their prime during these winter seasons. The Bureau of Wildlife maintains a list of active beaver trappers in your region (See appendix F). Trapping methods include the use of foot-hold and conibear traps.

Under Ice Baited Beaver Sets



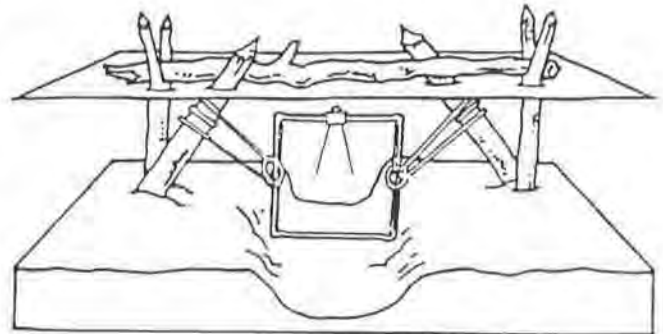
**Closed Season**—Complainants must obtain an Article 11 permit from the Bureau of Wildlife to destroy beaver and/or their structures. Fees may be incurred to have trappers remove beaver during the closed season. Pelts are of no value at this time of year.

**Methods of Take During the Closed Season**—(Note: Complainants or their agents acting under Article 11 permit authority on land owned or leased by the complainant, do not require trapping or hunting licenses).

**Foothold Traps**—Catch target animals by one foot. Drowning sets are recommended.

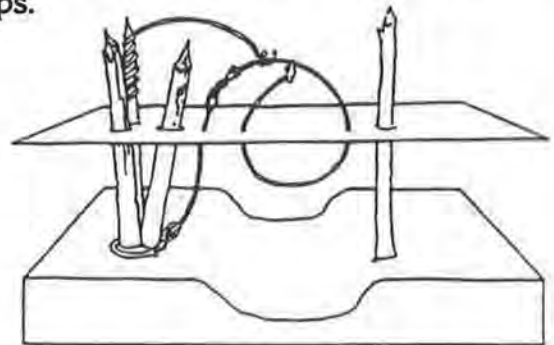
**Body Gripping (Conibear Type) Traps**—Strike and hold target animals on the neck or chest.

Underwater Dive Set (runway set) using a Conibear 330 Trap



**Snaring**— (Note: These methods are lawful ONLY under authority of an Article 11 permit). Loops of light cable are suspended in channels or in front of burrows to catch beaver swimming through. Snares can be set to drown or hold beaver alive.

Snare clusters of four or more small loops of wire are extended from a pole which can serve as bait and anchor. Beaver attracted to a freshly cut aspen pole become entangled in the loops.



Snare Used in a Runway Set

**Shooting** — Bullets or shot discharge-over water are likely to ricochet beyond the target. Firearms may not be lawfully discharged within 500 feet of a farm, building, or



dwelling, without the consent of the owner, or within 500 feet of any school or playground, over any public highway or in a municipality with a law forbidding it.

A nuisance beaver can usually be attracted to a breach in its dam, where shooting will be safe. A shotgun with number 4 buck is recommended. Beaver are more likely to inspect a breach early in the morning or late in the evening. If the shooter misses, the beaver seldom provides another chance.

**Relocation of Problem Beaver**— DEC will not authorize relocation of problem beaver except under extraordinary circumstances and then only after there has been careful consideration of all other options. This decision to relocate will be made by the Regional Wildlife Manager. If a permit is issued to live trap, transfer and release beaver, DEC will provide the release site location as a special permit condition.



(Note: Except under authority of an ECL Title 11 Permit, it is unlawful to disturb any structure made by a beaver. A complainant or agent who breaches a beaver dam under such permit authority is personally liable for any flooding damage done to downstream property).

If the beaver are not killed, dam removal is a very short-term solution. Beaver usually rebuild dams quickly and sometimes in larger volume. Beaver are most active at night, therefore, dams should be breached in the morning to allow water to flow all day.

The draining of beaver ponds is more successful during the dry summer months when there is less available water to resupply ponds that are being drained. Ponds that are supplied by seasonal runoff can sometimes be drained during dry periods so as to discourage beaver and cause them to relocate.

After beaver are removed and the water has

been drained from the pond, it is advantageous to remove as much of the dam as possible. A narrow notch in the dam of an abandoned pond is very easily plugged by wandering beaver.

**Hoing by hand**—Potato hoes or stone hooks are the best tools. Shovels and spading forks are ineffective. Good water control is possible if the breach is kept shallow and broad so that the water level falls slowly. In the case of a large blocked culvert (2' diameter or greater) it is very unsafe to stand in the water in front of it or crawl into it from the other end.

**Power Excavating**—Tractor or truck mounted excavators are often used by town, county or state highway employees to remove large amounts of material from beaver dams and can inadvertently cause down-stream flooding.

**Blasting**—Like hand tools, explosives are easily carried to inaccessible sites (Caution: Users of explosives must be licensed). Using explosives to breach a beaver pond is, unfortunately, almost certain to cause down-stream flooding and excessive siltation and is seldom justified. Neighbors should be told where, when, and why this is going to be done. If this method must be used, it is best to do it in mid-summer when the water is low.



**T**his is sometimes done in the hope of driving beaver out or to discourage other beaver from occupying the pond site in future years (Note: It is unlawful to disturb a structure made by a beaver, EXCEPT under a permit which clearly gives authority for this action). Destroying an occupied lodge seldom causes a beaver family to leave. However, after the beaver have been removed and the pond drained, it may be advantageous to destroy the lodge so that the site is less of an attractant.

(Note: Abandoned beaver lodges have some value as habitat for other wildlife).

## Solving Beaver Problems

### **The Unwelcome Visitor**

The water is rising in the basement and flooding the driveway, and as you inspect the back creek, you come across a pile of sticks, a neatly-packed dam, and the SLAP of a beaver tail. Now what are you going to do? You have a beaver problem. But, who do you call for help?

Call us. The New York State Department of Environmental Conservation's Bureau of Wildlife can offer a variety of services to landowners with beaver problems.

### **Population Management**

First and foremost, the Bureau of Wildlife serves the public by managing the size of the beaver population. Without management, beaver populations grow too large. A pair of beaver and their offspring can produce up to 600 offspring over their 10-year reproductive life. With proper management, however, they provide great benefits to all the people of New York.

### **Open Seasons**

Management in the case of beaver translates to annual harvest by licensed trappers during an open season. By varying the length of the open season we can vary the number of beaver taken and consequently the size of next year's population. [The season is open from mid-December to late March in most of New York State. Check the trapping regulations guide for exact dates in your area.]

### **The Management Process—WMU's**

Biologists have divided the State into ecologically-based Wildlife Management Units (WMU's). For each WMU, a beaver population management objective has been set. These objectives are the result of careful analysis of beaver biology, habitat quality, human land use, and public tolerance levels. Objectives vary from a 10% to 30% occupancy rate in our region. In other words, wildlife managers would like to see beaver in 10% to 30% of the places where beaver could live.

### **Measuring Success**

Setting the management objectives is the most important beaver management decision. But, we don't stop there. Biologists also measure whether these objectives are successfully being met. Each year DEC monitors the beaver harvest in two ways - first, by requiring New York trappers to report every beaver they take, and secondly by conducting telephone surveys to refine these figures.

But, measuring the annual harvest doesn't always tell us exactly how many beaver are out there. There are natural variations in populations, too. So, to annually re-assess the population size, trained observers conduct aerial surveys to count colonies.

### **The Right Number**

All of these activities (WMU mapping, objective setting, harvest assessment, and population surveys) are designed to arrive at a population that will afford the people of New York the opportunity to enjoy all the benefits of beaver without suffering the problems that beaver can also cause.

### **The True Problem Solvers**

But that's not all there is to beaver problem solving. There is another important step, namely trapping. It is the biologist-trapper partnership that makes beaver management work, and it's the trappers, themselves, who are the problem-solvers.

### **Trapper Lists**

It's the trapper who will solve your problem. But, the DEC can play matchmaker; joining problem with solution. We can give you a list of trappers and/or trapper's organizations that you may contact to get help. We can also give your name to experienced trappers so they might contact you for permission to trap your land.

### **Damage Permits**

The biologist-trapper partnership is undoubtedly the best long term solution for beaver management in New York, but there are times when it does not provide relief as fast as some would like. There will always be cases where beaver problems need immediate attention, even if the season is closed. In these cases, a landowner can apply for a Wildlife Damage Permit by calling the DEC Regional Office. Wildlife staff may visit your site to assess the situation and offer solutions.

This may even involve authorization for you or an agent to take beaver out-of-season. Unfortunately, during the summer and fall, the beaver pelt is of little value due to natural seasonal pelage changes and the pelt cannot be sold. So, taking out-of-season beaver under permit is a poor way to reduce the population because it decreases one of the important values of beaver. Many times the best solution is to wait until the season opens.

### **Those Tricky Dams**

Often beaver problems aren't with the beaver as much as the dam. Many landowners would like to have beaver if only they wouldn't raise the water so high. State regulations require that you must consult with the DEC Bureau of Wildlife before you do anything to a beaver dam. A permit will have to be issued. This permit process allows us to provide important advice about dams and beavers. The management of beaver dams, you see, is just as important as the management of beaver.

Beaver build dams to increase the size of their habitat. They gain access to more food as the pond gets bigger. Some measure of protection from predators is also provided.

The sound of running water triggers beaver activity. If there is a leak in the dam, you can be sure beaver will work through the night cutting more trees and hauling more mud to patch it up. It is for this reason that we recommend against disturbing the dam. The end result is always more disturbance to the area's trees and a likely *increase* in water levels.

In some situations, there are methods to quietly leak the water through the dam, without arousing the beaver. Wildlife professionals can give you advice on construction of these devices, and the required permit for disturbance to the dam. These devices are not maintenance free, however, and they can prove expensive in both materials and time.

### **The Good News is...**

With all this talk about beaver problems, one might think that that's all beaver do is create problems. Really, that couldn't be further from the truth. In fact, they can be credited with inexpensively creating valuable wildlife habitats.

### **Let Us Help**

So, we hope all your encounters with beaver will be pleasant ones. We do think our Official State Mammal is quite a wonder to behold. More times than not, beaver and man can co-exist. But if you should have a problem, give us a call, and we'll find some way or someone to help.

For more information about beaver and beaver regulations, contact the New York State Department of Environmental Conservation's Bureau of Wildlife at the Regional Office near you.

New York State Department of Environmental Conservation  
Bureau of Wildlife 1996



THE BIOLOGY AND  
BEHAVIOR OF THE  
**NORTH  
AMERICAN  
BEAVER**  
(*Castor canadensis*)

**T**he beaver is the largest rodent in North America with adults ranging from 35 to 46 inches long (including a flattened 12-18 inch tail) and weighing from 45 to 60 pounds. Beaver weighing over 100 pounds have been recorded. The hind feet are very large with 5 long webbed toes. Front feet are small and dexterous, which allows the beaver to carry dam construction material such as stones and sticks.

Both sexes of beaver breed at 21 months of age from December through February. Females ovulate 2 to 4 times at 7 to 15 day intervals during each mid-winter breeding season. There are no records of beaver breeding as first year kits. Development of the fetuses requires 120 days with the young being born between April and July. Litter sizes range from 1 to 9 with an average litter size of 4. The heavier the female, the larger her litter, also the number of young a female bears is inversely related to her family size at the time of breeding. Adult females will breed every year regardless of the habitat quality.

The occupants of a beaver pond or group of ponds is a family consisting of two adults and their offspring of two breeding seasons. Beavers mate for life; however, if one of the adult breeding pair is removed from the population, the remaining member will readily accept a new mate. The kits remain with the parents until they are 2 years old and then are driven off to find their own territories. This dispersal of juveniles can contribute greatly to the total number of property damage complaints.

As a food source, beaver prefer aspens and willows but will eat the leaves, twigs and bark of most species of woody plants found along the water's edge. During the growing season beaver will also consume large quantities of non-woody plants such as grasses and cattails. During the fall, they will stockpile their woody food supply in the water near their house for use during the winter months. The presence of these fresh cut feed piles is an important indicator of an active beaver lodge. During the ice covered winter months beaver are generally inactive with regard to tree cutting and dam building.

Beaver construct dams which result in the formation of ponds within which the lodge and winter food cache are located. It is believed to be a combination of water flow sensation and the sound associated with running water that stimulates this dam building activity. Within and around the pond the beaver construct canals for security and for the transport of food and building materials. Beaver are primarily active at night with regard to their dam building and tree cutting activity.

The beaver dam and lodge are constructed of sticks and mud, with some beaver utilizing bank burrows along streams or ponds. Lodges consist of one or more compartments with each compartment having two underwater openings for exit or entry. These are also important for escape from potential predators. Their aquatic habitat and instinctive behavior minimizes the adult beaver's susceptibility to predators. Domestic dogs, coyotes, bears and bobcats are among the larger predators in New York State that will prey on beaver if the opportunity arises. However, since beaver rarely travel far from water, they are relatively safe from most predators. Young beaver are more susceptible, with predaceous mammals such as otter and mink occasionally preying on kits. Overall, natural predation probably has little effect on beaver populations in New York State.

The impoundments created by beaver provide valuable wildlife habitat for assorted furbearer and waterfowl species. In this way, the beaver provides valuable ecological benefits to the public at large. On the other hand, the beaver's dam building activity can result in widespread flooding of woodlands and agricultural land and cause numerous complaints by plugging road culverts, flooding roads, railroad tracks and causing general property damage concerns.



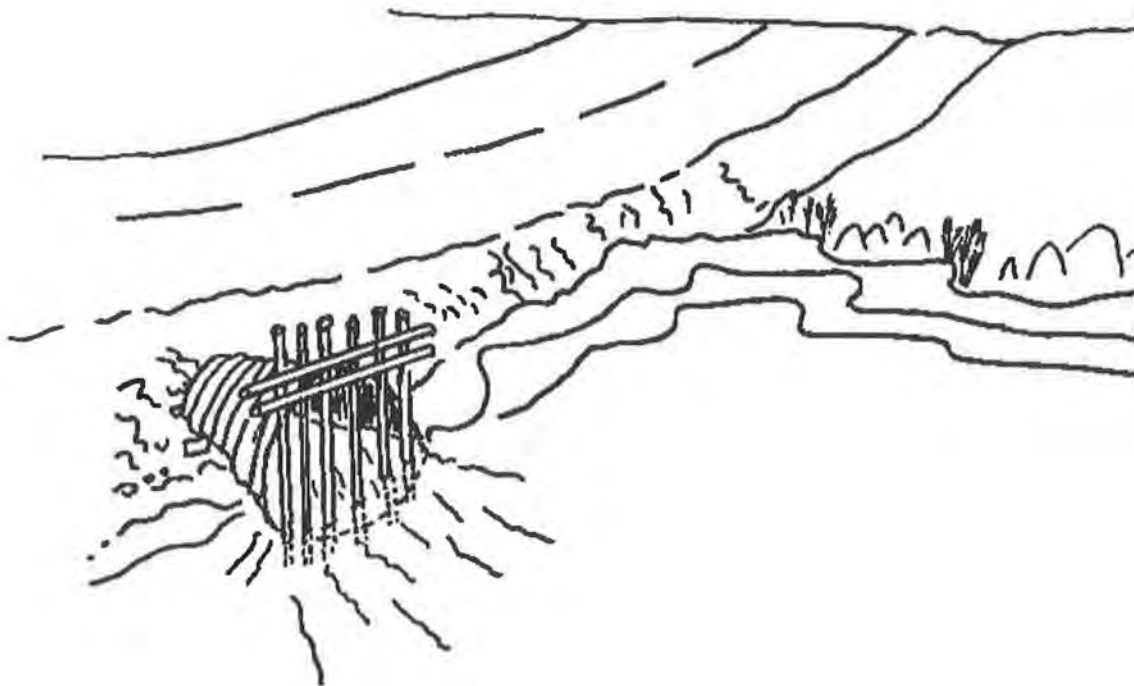




**PITCHFORK  
GUARD**

**T**his device prevents beaver from building a dam inside a culvert. This is a preventive measure and not a water regulation device. If beaver build a dam in front of the culvert, other measures should be taken.

- ❖ 1/2"-3/4" metal rods spaced 6" apart and held together only at the top with horizontal rods.
- ❖ Held in place by the current and by driving the vertical rods into the bottom.
- ❖ Easier to remove than wire mesh because there are no horizontal bars to catch on deposited material.





**DEEP-  
WATER  
FENCE**

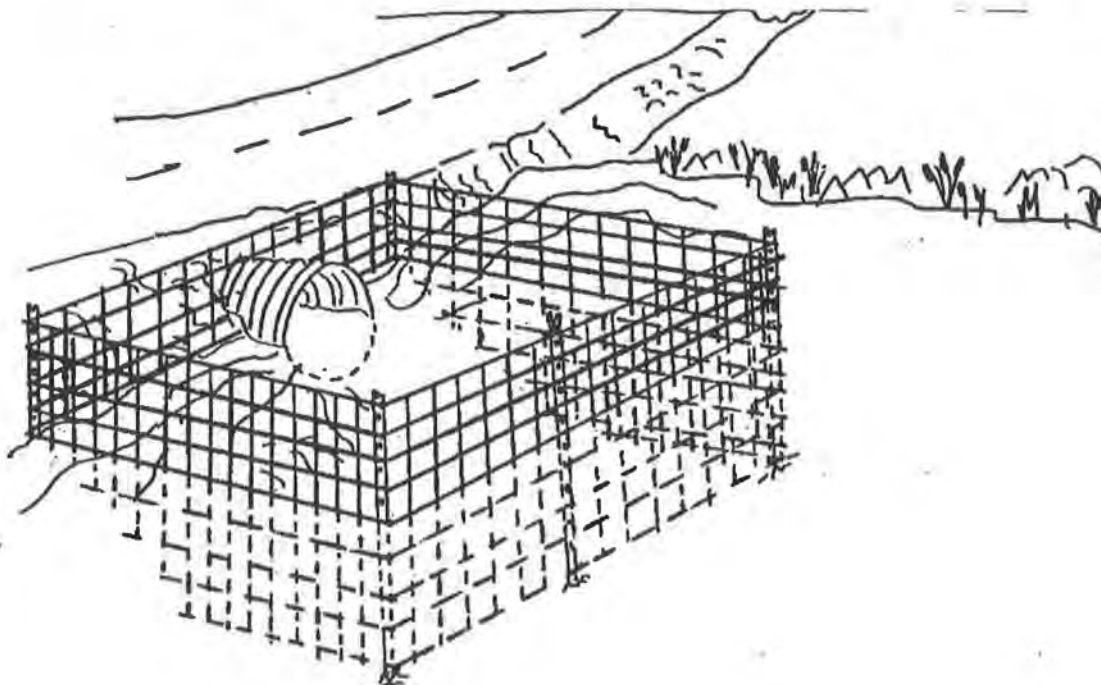
**T**he purpose of the deep-water fence is to physically exclude beaver from plugging the intakes of road culverts and prevent them from detecting the flow of water into the culvert which can initiate dam building activity.

**Installation Guidelines**

1. Beaver must be prevented from gaining access to the culvert by keeping the wire enclosures tight against the bottom and extending the wire 18-24 inches above the water level.
2. The enclosure must be of sufficient size so as to effectively eliminate the sensation of waterflow entering the culvert. If material is deposited on the wire and it becomes a temporary dam, the flow capacity of the enclosure must be at least equal to that of the road culvert.
3. A 10' x 10' area is generally adequate. Culverts with high flow may require larger enclosures. The larger the enclosure, the more effective it is in reducing the sensation of flow.
4. In areas with uneven bottoms, a floor may be added to prevent beaver from swimming underneath the enclosure.

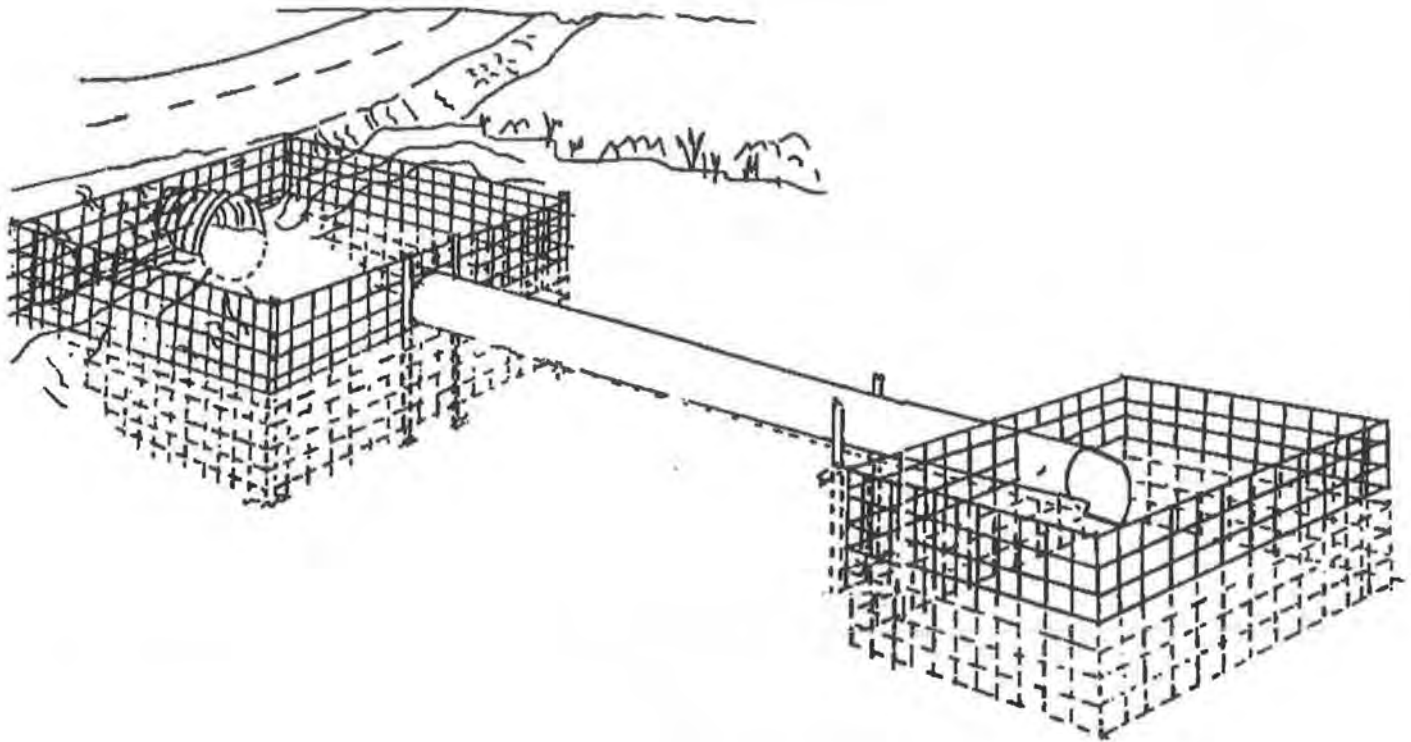
**Materials Needed**

1. 6" x 6" mesh 60" wide concrete reinforcement wire (6 gauge) has been found to exclude beaver and still allow debris to pass through. This comes in 5' x 10' panels and in 60" wide rolls.
2. Heavy duty steel posts.





If beaver do begin to construct a dam against a fence installed to protect a culvert, it then may be necessary to install a WLCD to regulate the water level. The deep-water fence protecting the culvert will act as an emergency spillway during high run-off conditions when the WLCD cannot handle the flow. (Note: Road grades cannot usually be used as dikes. Deposited debris may have to be removed or modified.)



# Modifying Sites to Discourage Beaver Occupation

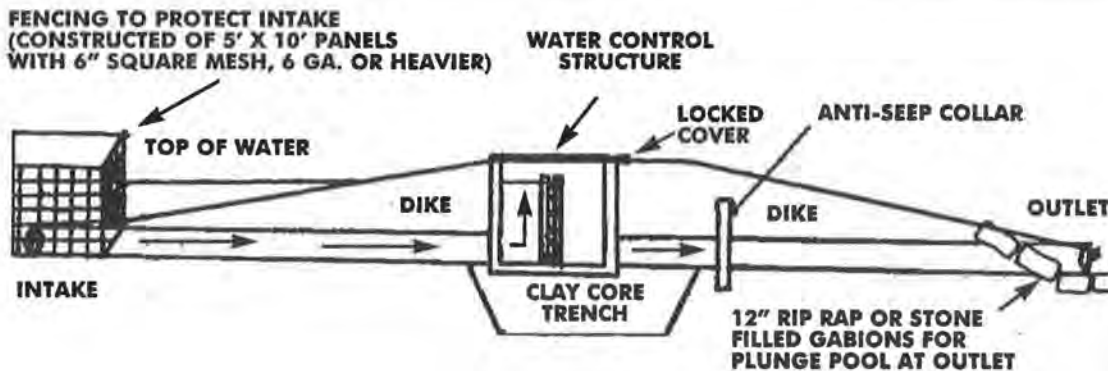
**W**henever possible, include beaver damage prevention, control techniques or structures in initial engineering plans. For instance, where it is feasible, trees and shrubs on the banks of streams and ditches should be removed. This eliminates material beaver might use to construct dams and/or utilize as a food source. This can be particularly effective along agricultural drainage ditches and immediately upstream and downstream of road culverts.

To make mowing easier, the banks of drainage ditches and man-made ponds should be gently sloped. This discourages beaver from burrowing and minimizes the probability of dam construction. (Note: Without an Article 24/15 Permit, it is a violation of The Environmental Conservation Law to disturb the bed or banks of any protected stream).

Beaver activity can also be discouraged by eliminating pools and creating riffle areas leading into road culverts. This can be accomplished through mechanical grading and placement of coarse stone or rubble in the stream bed. This prevents beaver from obtaining mud and/or from moving material to a site which they have previously dammed. Beaver are also less likely to construct dams in high gradient areas. Again, this is most effective when all vegetation is removed from the immediate area.

Beaver control technology should be incorporated into engineering designs for pond and marsh construction. In shallow water impoundments, dikes should be constructed with wide bases, gentle slopes, and be no higher than the top of the water control box. The control should be an in-line water control structure placed in the center of the dike or as far away from the intake as possible. The top of the box should be protected with a locked cover. Water levels should be maintained so that the intake remains completely under water. The intake should also be protected with a deep water cage or fence to prevent beaver or flood debris from plugging it. To facilitate mowing of the dike, the control box can be set at grade on the top of the dike.

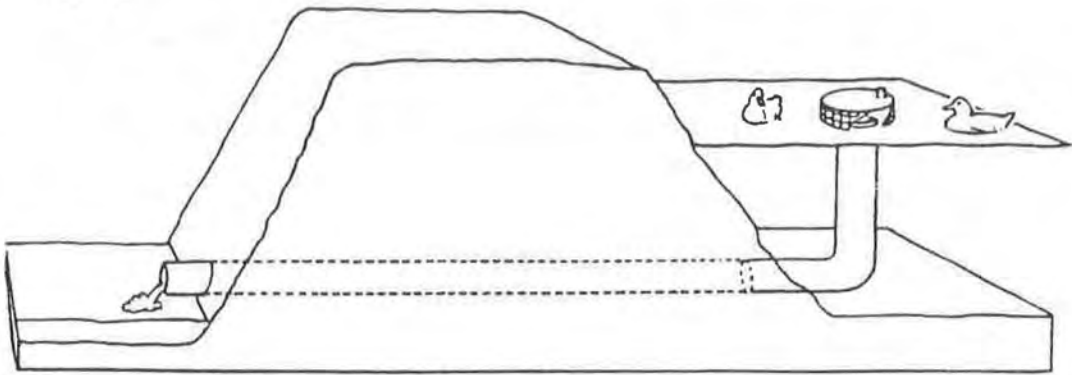
The objectives of this design are two-fold. One is to construct a wide, low level dike which minimizes the washout potential. The other objective is to disguise the flow of water at the intake and protect the water control box from beaver activity.



**CROSS SECTION OF DIKE AND WATER CONTROL STRUCTURE**

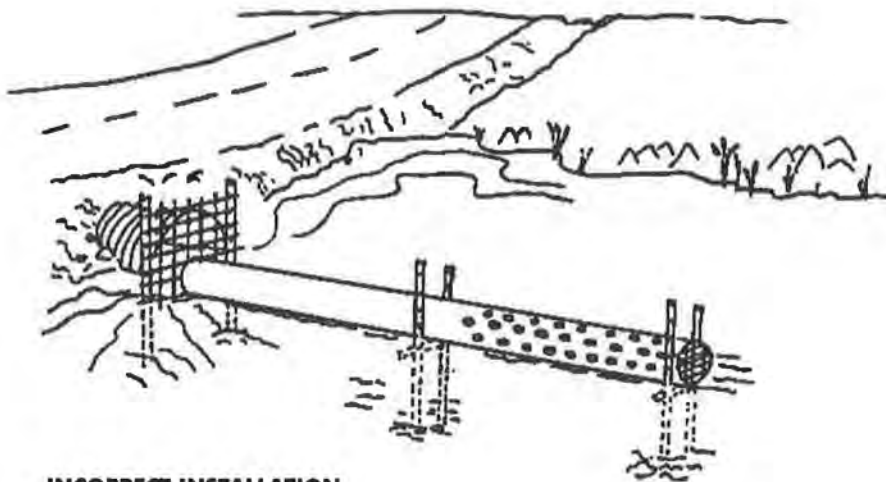


**Mesh bars installed  
to protect the riser from  
clogging.**



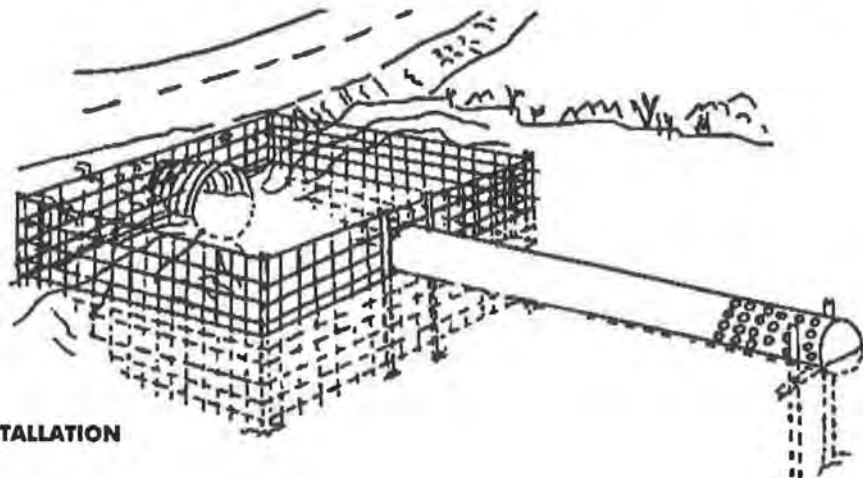
# Use of Water Level Control Devices in Road Culverts

If a decision is made to install a water control device in a road culvert, the device must be able to handle at least the same amount of water as the road culvert to avoid road flooding and liability problems. In figure 1, the water level control device passes water directly into the screened-off culvert. The screening is easily plugged leaving only the device, which is much smaller than the road culvert, to handle the flow.



**INCORRECT INSTALLATION**

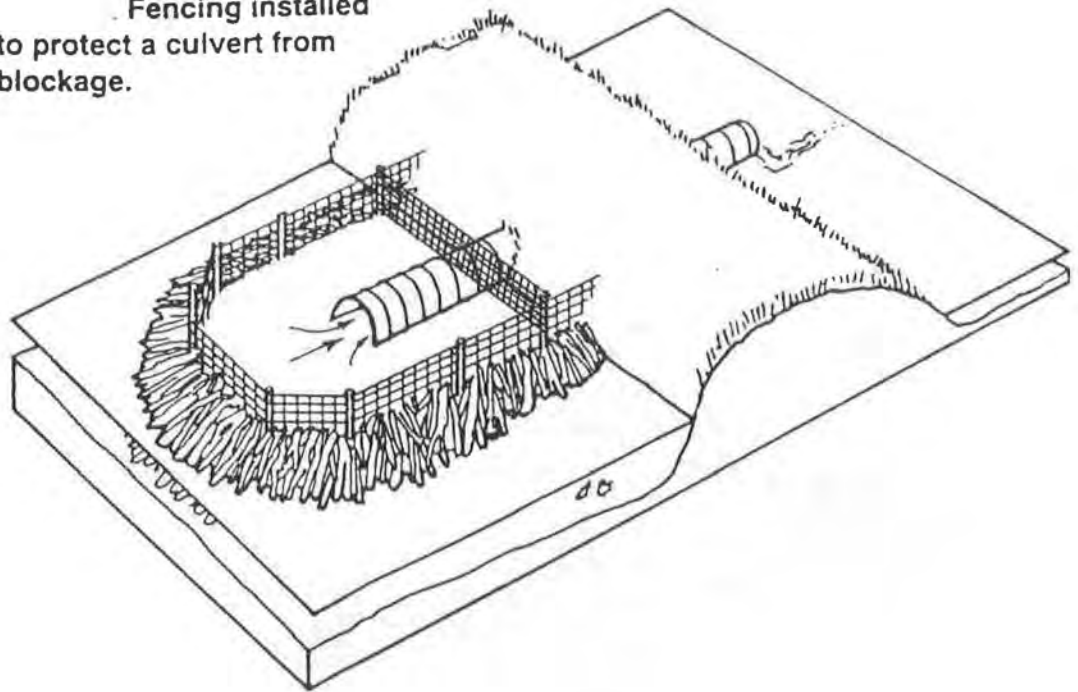
If the water control device does not handle the water flow, the fenced off enclosure will act as an emergency spillway



**CORRECT INSTALLATION**



Fencing installed  
to protect a culvert from  
blockage.

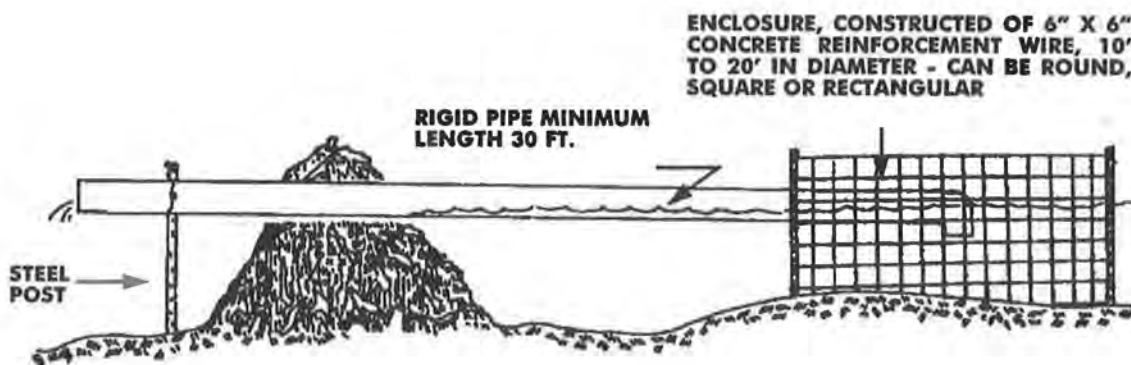


## Combination Deep-water Fence and Tubing

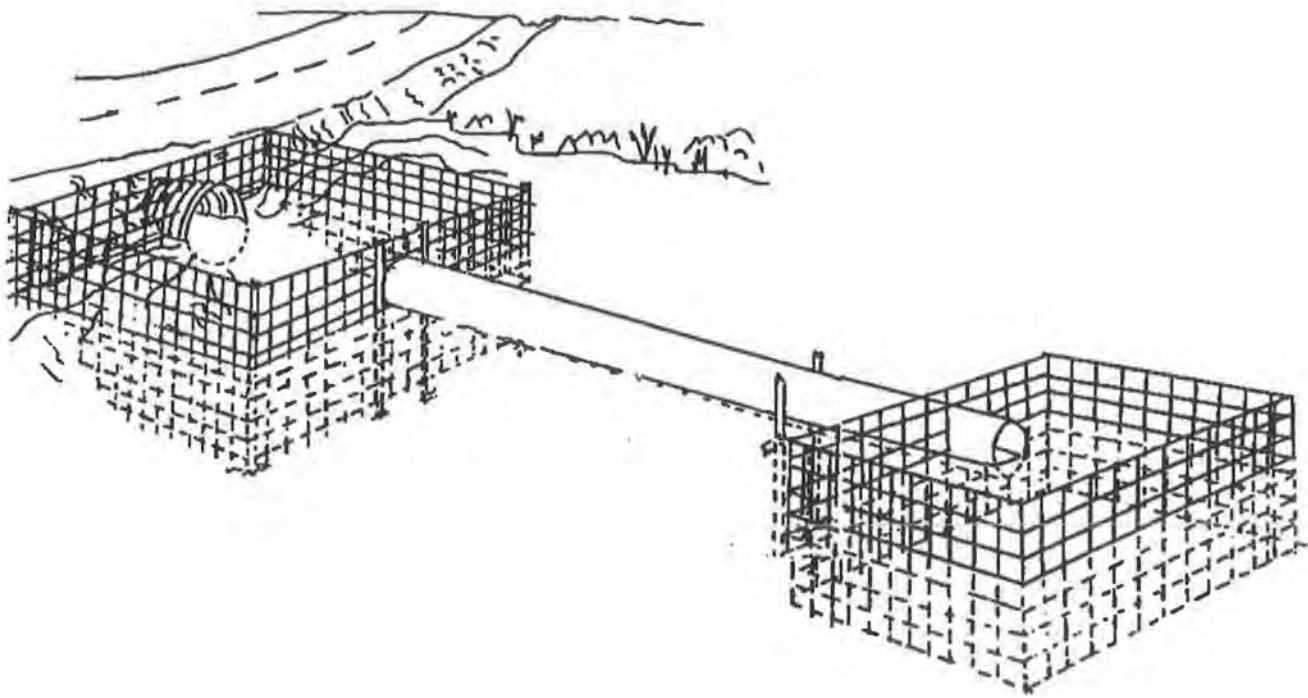
**T**he tubing draws water from the deeper portion of the pond with an enclosure used to keep the beaver away from the intake. This device is based on the principle that if beaver cannot feel or hear water flowing into the intake, they will not be attracted to it.

### Special Considerations

1. Use pipe material that conducts the least amount of sound. Rigid, smooth PVC pipe is probably the best.
2. Use 6" x 6" mesh concrete reinforcement wire (6 gauge). The mesh size is small enough to keep beaver out and still let debris through the enclosure. This wire is available in 5' and 10' panels and rolls.
3. Use of an elbow or angling the pipe so that the intake remains underwater at all times when the device is operating will cut down on the sound of water flowing.
4. The larger the enclosure, the more effective in reducing the sensation of waterflow.
5. The wire enclosure must be tight against the bottom of the pond so that beaver are unable to get underneath it and extend 18"-24" above the pond level. In areas with uneven bottoms, a floor may be added to prevent beaver from swimming underneath.



**Combination deep water fence and tubing used in a road culvert situation.  
Note: It is not safe to restrict the flow of water through a road culvert.**



## Clemson Pond Leveler

The pond leveler intake device is designed to minimize the probability that current flow can be detected by beaver. This particular design is limited to situations where the water input to a pond is from a small stream or spring. During periods of unusual high rainfall, problems related to the inability to handle large amounts of water may occur. The situation must be such that occasional flooding is acceptable.

### Construction and Installation Guidelines

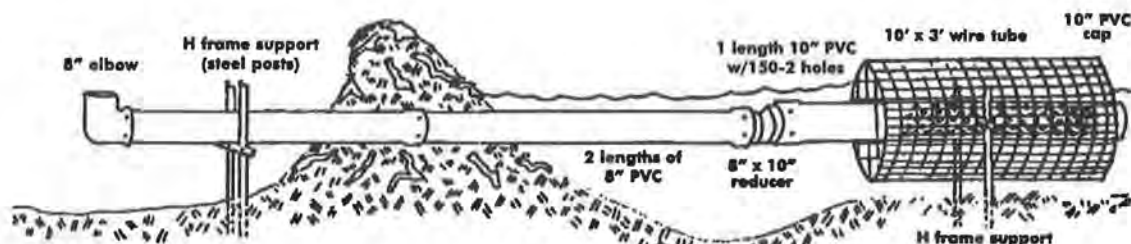
Beaver are stimulated by the sound of water falling or trickling and the sensation of the flow of running water. The pond leveler must be constructed and installed using the following guidelines:

1. The intake should be installed so that it is always underwater. This helps to eliminate the sound of the water trickling.
2. The intake requires 150 2-in holes drilled into the 10 in PVC with a 3 ft diameter wire tube surrounding the drilled section of 10 in PVC. Also, the 10 in PVC is reduced down to 8 in PVC. This helps to reduce the sensation of water flowing.
3. An 8 in PVC is installed on the end of the device facing up. This helps to keep the intake of the leveler under the surface of the water.
4. The farther the outlet is from the dam, the less attractive it is to beaver.
5. Because the intake of the pond leveler must be under water, there will be a minimum of 2 ft of water at the location of the pond leveler.

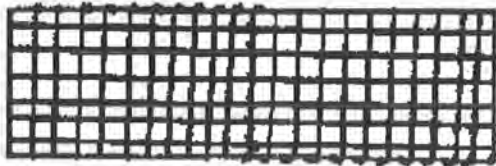
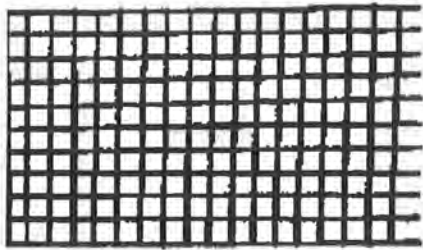
### List of Materials

- 1...13' section of 10" diameter SDR-35 pipe
- 1...10" x 8" SDR-35 pipe reducer coupling
- 2...13' sections of 8" diameter SDR-35 pipe
- 1...10" SDR-35 PVC cap (wooden plug may be substituted)
- 1...8" elbow (SDR-35)
- 2...96" section of 6" x 6" x 60" concrete reinforcement wire
- 1...96" section of 2" x 4" x 72" galvanized welded wire
- 1...96" section of 2" x 4" x 48" galvanized welded wire
- 2...48" sections of 6" x 6" x 60" concrete reinforcement wire
- 1...box of hog rings
- 20..Drill point screws to secure the PVC pipe together
- 5...8 ft steel "lug-u" posts
- 4...2"-5/16" or 1/2" bolts with nuts and washers
- Tie wire to attach the cage to the 10" PVC pipe

The above materials are required to assemble the beaver pond leveler as shown below:

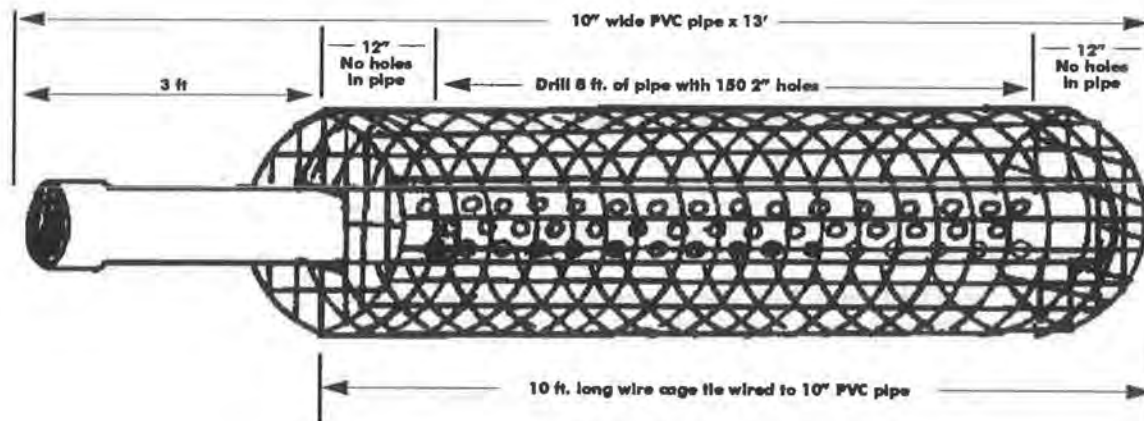






## POND LEVELER INTAKE CONSTRUCTION

1. Cut 2-- 8 ft. sections of 6" x 6" x 60' concrete reinforcement wire.
2. Cut the wire so that there are 6" wire ends.
3. Fold into cylinder 5 ft. long; use the wire to fasten the cylinder together.
4. Fasten the two 5 ft. cylinders together with tie wire; alternate the seams for a stronger cage.
5. Cap the ends of 10ft. long cylinder with 3 ft. square pieces of concrete reinforcement.
6. Cover cage with 2" x 4" mesh welded wire.



New York State Department of Environmental Conservation  
Bureau of Wildlife 1996



# NOT JUST ANOTHER BEAVER POND LEVELER

BY

Roger L. Miner

Fish and Wildlife Technician

New York State Department of Environmental Conservation

## INTRODUCTION

The NJA beaver pond leveler depicted in Figure 1. was developed as a non lethal inexpensive means to resolve extensive flooding damage caused by beavers where landowners can tolerate their presence.

The leveler is designed to minimize current flow and the sound of flowing water. These two features are the most important stimuli that beaver respond to when building or repairing dams. When properly installed, these devices will help reduce land flooding, plugged road culverts and water control structures on ponds and small marshes.

The NJA design is limited to stream flows of about 10 cubic feet per second (cfs) or less. Streams subject to periodic flash flooding or exceeding 10cfs are not suited for this style of leveler. The cost of this leveler is about \$65 for materials and 8 hours in labor for construction and installation.

New York Law requires that landowners first obtain permission from the NYS DEC to disturb beaver dams. Please remember to do so if you plan on installing this or any other pond leveler.



FIGURE 1. A PROPERLY INSTALLED BEAVER POND LEVELER



FIGURE 2. MATERIALS AND TOOLS FOR CONSTRUCTING A POND LEVELER

## MATERIALS NEEDED

Beaver pond levelers are basically a wire fence cylinder installed through a beaver dam, road culvert or stand pipe that beaver are plugging. They can be made of fence with mesh size less than 4"x 4". The NJA design works best with 1"x 2" galvanized fence reinforced with 3/4" flexible plastic tubing. To build a 16'x 20.5" leveler you will need the following materials and tools.

### ITEM

- 3 - 6' SECTIONS 1"x 2"x 6' GALVANIZED WIRE FENCE
- 4 - 64" SECTIONS 3/4" PVC FLEXIBLE PLASTIC PIPE
- 2 - 63" SECTIONS 3/4" PVC FLEXIBLE PLASTIC PIPE
- 6 - 3/4" PLASTIC COUPLINGS
- 3 - 8' STEEL FENCE POSTS
- 100 - HOG RINGS
- 25' - #12 GALVANIZED WIRE

### TOOLS

- STANDARD PLIERS
- HOG RING PLIERS (OPTIONAL)
- SIDE CUTTING PLIERS
- POST MAUL OR FENCE POST DRIVER

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For further information on this beaver pond leveler contact Roger L. Miner or Robert F. Gotie \* NYS Department of Environmental Conservation, Bureau of Wildlife \* Box 5170, Fisher Ave \* Cortland, N.Y. 13045, (607) 753-3095.





# Electric Breach Guard

**A** fence energizer is a device that was designed to control livestock. However, it can also be used to keep beaver from repairing a breach in a dam by creating an electrified enclosure.

### How it Works

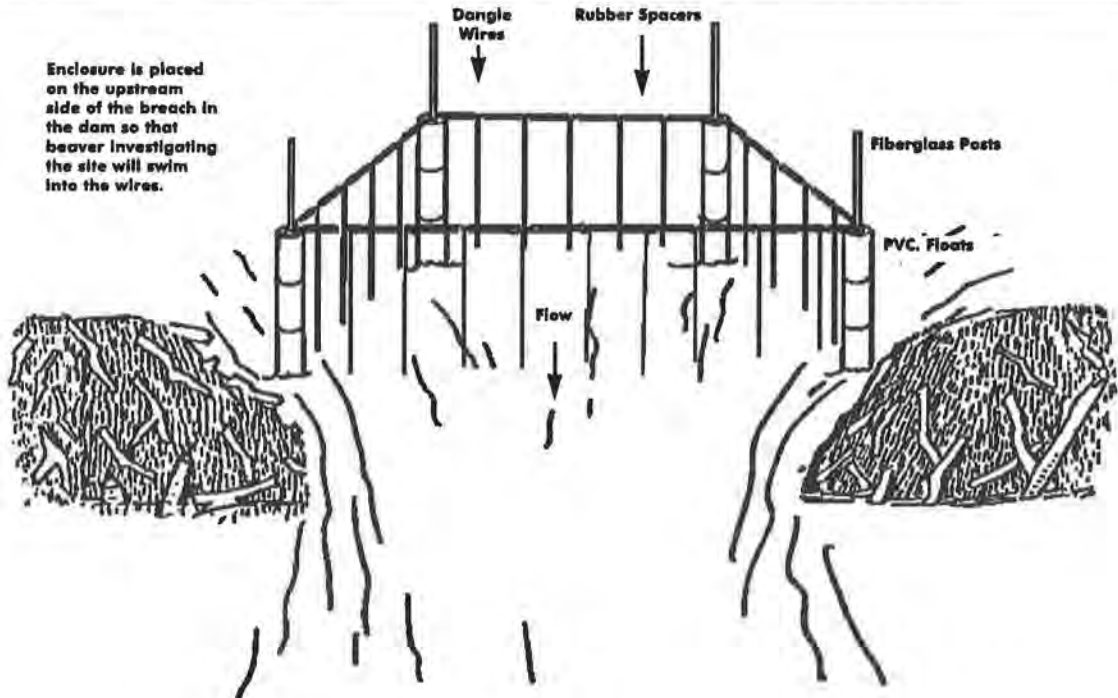
A rigid main wire is suspended above the water on floats. Several short "dangle" wires hang from this main wire. These wires extend to within an inch of the surface. When a beaver swims up to inspect the breach in the dam, it will receive a vicious shock when it touches one of the dangle wires.

### Special Considerations

1. The main advantage of the beaver shocker is that it is easy to install and is a fairly compact device to carry in the field.
2. The device has to be checked daily after the installation until the beaver receive a shock and learn to leave it alone.
3. Maintenance is minimal. The device must be checked for battery condition and to make sure there is no debris in the breach that might short out the system and shorten the life of the battery.
4. Use only deep-cycle RV batteries. They are designed to be recharged many times without damage.
5. The depth of the breach in the dam determines the depth of the water in the pond. If the water becomes too shallow behind the dam, beaver may try to build a dam around the upstream side to try to neutralize the device.
6. Don't use fence energizers that utilize 120-volt house current. This will create a dangerous situation.

### Materials (4 ft wide breach in a beaver dam)

1. Electric Shepard ES250 fence energizer which delivers 8000 kilovolts-no load and 1500 kilovolts-heavy load (a substitute energizer can be used as long as it is comparable).
2. 12-volt deep cycle battery 600 CCA (cold cranking amps) minimum
3. 4 - 6 ft x 5/8 in diameter fiberglass posts
4. 12 - 6 in x 4 in PVC floats with 3/4 in diameter hole
5. 16 ft 1/8 in diameter soft steel wire



## Giardiasis

### **W**hat is Giardiasis?

Giardiasis is a gastrointestinal infection caused by a microscopic parasite called *Giardia lamblia*. This is a common parasite causing gastrointestinal illness in the United States. Giardiasis can be a problem in areas where sanitation is poor, in settings in which there may be problems with personal hygiene, such as institutions or day-care centers, or when unfiltered water supplies are contaminated with the organism.

### **How is Giardiasis Spread?**

A *Giardia* infection can be acquired when you ingest food or water which has been contaminated with the parasite. The parasite multiplies in the small intestine and is passed out with a bowel movement. Any food or drink which has become contaminated with an infected stool can transmit the parasite. The infection can also be spread person-to-person when hands, which are contaminated with an infected person's stool, are brought in contact with the mouth. Swallowing as few as ten parasites can cause the infection. Person-to-person transmission is the main way that giardiasis is spread, such as in day-care centers and institutions, where personal hygiene may be poor due to age (infancy, elderly) or disability. Giardiasis can also be spread in this manner in a household setting.

### **Are Animals Involved in the Spread of Giardiasis?**

*Giardia* parasites have been found in the stools of many animals, including rodents, dogs, cats, cattle, and wild animals. Animals living near water supplies, such as beavers and muskrats, have been found to be infected with *Giardia*. The extent of direct animal-to-human transmission of *Giardia* is minimal; there is greater evidence of indirect transmission such as through contamination of water supplies.

### **What are the Symptoms of Giardiasis?**

Symptoms of Giardiasis usually appear 7 to 10 days (and sometimes as long as 4 weeks) after ingesting the parasite. The most common symptoms are diarrhea, foul, greasy stools, abdominal cramps, bloating, increased gas, weakness and weight loss.

### **Do all People Who are Infected With Giardia Get Sick?**

No. Some people who are infected with the parasite may only have minor symptoms and some people may not have any symptoms at all. However, these people can still pass *Giardia* parasites in their stool and become a source of infection for others.

### **How is Giardiasis Diagnosed?**

Giardiasis is usually diagnosed through a laboratory examination of a stool sample. Your physician will forward the stool sample to a laboratory which will use a microscope to look for the parasite. Several stool samples may need to be examined to detect the parasite. The disease can also be diagnosed through a sample of fluid or a biopsy from the small intestine.



### **What is the Treatment for Giardiasis?**

There are several medications which are effective in treating the infection. They are only available by prescription from your physician. Other treatments for diarrhea, such as increased fluid intake, may also be recommended by your physician.

### **How Can Giardiasis Be Prevented?**

Giardiasis can be prevented by practicing good hygiene and using caution before drinking water from an unknown source.

*Some general guidelines are:*

1. Always thoroughly wash your hands with soap and water before meals, before preparing food, after having a bowel movement, after changing diapers, and after playing with you pets.
2. Do not drink untreated water from a surface water supply such as a pond, lake, or stream. Although the water may appear to be clean, it may contain Giardia parasites which cannot be seen without a microscope. If only untreated water is available, boil the water before drinking it.
3. If you are taking care of a person with Giardiasis, use extra precautions after contact with the person's stool (for example, after changing diapers). Promptly and carefully dispose of any material which has been contaminated with stool and always wash your hands after such contact.
4. If your source of drinking water is from a well or another surface water supply, do not allow humans or animals to defecate (have bowel movements) near the water. In addition, appropriate water filtration systems can be effective in removing Giardia parasites from contaminated water.

## CREDITS, ACKNOWLEDGEMENTS, AND REFERENCES

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Beaver Management in New York State: History and Specification of Future Program, May 1, 1992. The Beaver Management Team, N.Y.S. Department of Environmental Conservation.

Not Just Another Beaver Pond Leveler, Roger L. Miner, Fish and Wildlife Technician, N.Y.S. Department of Environmental Conservation.

Solving Beaver Problems, Jim Eckler, Fish and Wildlife Technician, N.Y.S. Department of Environmental Conservation.

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Clemson Beaver Pond Leveler, Dr. Gene Wood, Mr. Larry Woodard, Dr. Greg Yarrow, Clemson University, South Carolina.

Control of Beaver Damage, The First Eastern Wildlife Damage Control Conference, Cornell University, Ithaca, New York. James E. Miller, National Program Leader, Fish and Wildlife, USDA - Extension Service, Washington, D.C. 20250.

Commonwealth of Massachusetts, Division of Communicable Disease Control and Division of Fisheries and Wildlife.

Trapping Furbearers, N.Y. Trapper Training Student Manual.

A Bibliography - various literature regarding beaver damage control around the nation, compiled by the BDCT. 1994.

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