

# Identifying and Managing Mountain Beaver Damage to Forest Resources

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## Introduction

This publication describes techniques landowners and land managers can use to mitigate damage caused by mountain beavers.

The mountain beaver (*Aplodontia rufa*) is a medium-sized rodent that is found throughout the Pacific Northwest, specifically the western regions of Oregon, Washington, northern California, and British Columbia. Mountain beavers are seldom seen, because of their subterranean lifestyle, but can cause considerable damage to forest regeneration. They primarily cause damage by clipping seedlings and small saplings, but they also girdle large saplings and trees and undermine the roots of large, mature trees.

Several management strategies are available to control mountain beaver damage, most typically: trapping, toxicants, exclusion, repellents, and habitat modification. No single method is guaranteed to solve damage problems; a combination of techniques used in an integrated management strategy will more likely lead to higher success.

## Legal status

Mountain beavers are an unprotected, nongame species throughout much of their range; however, a subspecies of mountain beaver in California is listed as endangered. The legal status of wildlife species changes frequently, so ask your state fish and wildlife agency about the legal status of mountain beaver in your area before developing a management plan. In Oregon, contact Oregon Department of Wildlife and Fisheries at 800-720-6339. In Washington, contact Washington Department of Fish and Wildlife at 360-902-2200.



Figure 1. The mountain beaver is a primitive fossorial rodent found in the Pacific Northwest and can cause considerable damage to trees.

## Identifying the mountain beaver

Mountain beavers are generally grayish to reddish-brown in color (Figure 1). Their average weight is 2.3 pounds with an average overall length of 13.5 inches. Relative to other rodents, they have a very short tail (typically 1 inch in length and often unnoticeable). They have a compact body with small eyes and ears, and long silver whiskers. They are further distinguished by long, sharp toenails, which aid in digging.

Mountain beavers are active during all hours but are rarely seen above ground. Signs of feeding and burrowing usually indicate their presence. Mountain beavers are typically found in forests dominated by Douglas-fir and western hemlock. They prefer moist sites that are not subject to continuous flooding but are not restricted to these areas, except in the most arid regions of their range. Mountain beavers prefer open or thinned stands where understory vegetation is prevalent; thus, commercial logging and reforestation sites often create very attractive habitat.

Mountain beavers build extensive underground burrows. These systems are typically 6 to 8 inches in diameter (considerably large for similar-sized burrowing animals) and can contain several passages, specialized chambers, and exits. The tunnels may be up to 10 feet underground but are often near the surface. Occasionally, these shallow tunnels collapse or break along the surface for short distances, creating a “surface run.” Their burrows may also reach the surface underneath logs or brush piles. These areas, as well as entrances and exits, are ideal locations to place traps or toxicants. Mountain beaver burrows can be distinguished from the burrows of other animals by their large diameter, piles of excavated soil near entrances (called “kickouts”), and piles of vegetation left near entrances (called “haystacks” or feeder holes, Figure 2).



Figure 2. Mountain beaver “haystack.” A pile of clipped vegetation typically left outside a burrow entrance.

## Identifying damage caused by the mountain beaver

Mountain beaver damage to trees is often confused with that caused by other wildlife species, but a careful investigation of key factors can help determine whether or not mountain beavers are indeed the culprits.



Figure 3. Typical angular cut of a mountain beaver clipping of a seedling stem.

Plants damaged by mountain beavers are often clipped at clean 45-degree angles (Figure 3), resembling that of other rodents, but may also have a serrated edge as a result of multiple bites. Mountain beavers often clip conifer seedlings near the base, making it difficult to detect seedling predation. Damage caused by ungulates like deer and elk do not have clean angular cuts because these animals lack upper incisors; cuts made by deer and elk will appear rough and shredded. On saplings and small trees, mountain beavers typically climb up and clip stems closer to the tips and will also remove small branches, leaving stubs on the main stem.

The girdling of stems and roots is another common form of mountain beaver damage (Figures 4 and 5). Girdling is when bark is peeled away from the base of stems, typically those 3 to 6 inches in diameter. Mountain beavers also girdle the roots of larger trees. Girdling damage will often kill or weaken the tree.

It is important to properly identify the cause of damage before beginning control measures. For instance, it can be difficult to distinguish between damage caused by mountain beavers, porcupines, and rabbits. One clue is the presence of scat at the damage site. Other species frequently leave their scat on site, while mountain beavers typically defecate below ground in their burrow systems. Rabbit scats are small, ⅜-inch spheres resembling particleboard, while porcupine scats are large (approximately 1 inch in length), hard, and oval-shaped.

Another identifying feature is the nature and size of the incisor marks left on the cambium of cut and

girdled plants. Mountain beavers typically clip stems at a 45-degree angle, leaving horizontal grooves of 1/8 inch that correspond to the width of their incisors. Rabbit clippings are similar and may be difficult to distinguish on smaller seedlings. However, rabbits rarely clip stems larger than 1/4 inch in diameter or 20 inches above ground level, whereas mountain beavers will clip stems up to 1/2 inch in diameter and up to 9 feet above ground level. Porcupine incisor marks are significantly broader than those caused by mountain beavers but can still be difficult to distinguish. You can distinguish mountain beaver girdling of larger trees from girdling by porcupines and bears by the fact that, unlike porcupines and bears, mountain beavers do not leave bark chips scattered around the base of the girdled tree. These factors, as well as the presence of haystacks, kickouts, and large (6 to 8 inches) burrow entrances, will help you to positively identify mountain beaver damage.

## Management options

Control of mountain beaver damage is most effective when using an integrated management approach and combining multiple techniques to fit your specific needs. The methods to control mountain beaver damage discussed in this publication are: trapping, toxicants, exclusion, repellents, and habitat modification. Of these five management options, trapping, toxicants, and exclusion are likely more effective than repellents and habitat modification. However, no method is 100% effective. Fumigation and shooting are not viable options for controlling mountain beaver.

State laws may restrict certain approaches to managing mountain beavers, so be sure to consult your local fish and wildlife agency before applying control measures.

## Trapping

Mountain beavers have relatively small home ranges and are highly territorial, so trapping is one of the most effective management tools available. At the time of this publication, lethal or nonlethal traps can be used to control mountain beaver in Oregon. In Washington, nonlethal traps may be used without a permit; however, use of lethal traps is illegal without a special permit from Washington Department of Fish and Wildlife. To inquire about trapping permits in Washington, find regional office contact information at [wdfw.wa.gov/about/regions/](http://wdfw.wa.gov/about/regions/) or call 360-902-2200. Trapping regulations vary by region and state, so always consult



Figure 4. Mountain beaver girdling damage.



Figure 5. Root girdling caused by mountain beaver.

your local fish and wildlife agency before trapping any wildlife.

Trapping mountain beavers can be challenging. Although mountain beavers have poor eyesight, they have a keen sense of smell. New traps or traps covered with oil-based lubricants are not recommended for trapping mountain beavers because of their unnatural odor. Weather new traps by storing them outside exposed to the elements or by boiling them in water mixed with detergent. This process will remove oil and unnatural odors from the traps, dull the finish, and allow a beginning coat of rust to form on the traps. Rusted traps can be dyed, and traps in need of lubrication can be boiled in a pot with western hemlock or western redcedar branches and foliage, which provides a natural lubricant. After treating the traps, handle them as little as possible and store them in a dry place where they will not absorb unnatural odors.

Mountain beavers are less active in cold temperatures and are very sensitive to hypothermia. If

possible, avoid trapping mountain beavers during snow or other adverse weather conditions. Trapping under these conditions will lead to limited success and, when live trapping, expose the animal to harsh conditions.

For effective and humane trapping, you should check traps as frequently as possible. No matter what trapping style you are using, check traps daily. (In some circumstances, however, this may not be feasible.) For the well-being of the captured animal, live trapping requires checking the traps more frequently. State trapping regulations list the maximum amount of time a trap may be set without being checked. Consult these regulations before planning your trapping operations.

To efficiently trap mountain beavers, traps need to be placed in obvious runs of mountain beaver burrows. To determine if a burrow is active, check for signs of use like the absence of spiderwebs, fresh dirt, clipped vegetation, or recent tracks. To confirm activity, partially obstruct the entrance with sticks and debris. If the material is removed from the entrance within a few days, the burrow is probably in use. Several other species, such as weasels and squirrels, use mountain beaver burrows, so it is important to look for signs that indicate a mountain beaver is currently using that burrow, particularly when lethal trapping. Haystacks and kickouts are good indicators that mountain beavers are present.

There are two methods for trapping mountain beavers: lethal trapping and live trapping. These methods are detailed in the following sections.

### **Lethal trapping**

Lethal trapping of mountain beavers is usually conducted with a bodygrip trap. Bodygrip traps are designed to quickly and humanely dispatch an animal when tripped, by striking it on the neck or chest in a similar fashion to a mousetrap. Safety is an important concern when setting bodygrip traps, and you should use extreme caution as these traps close with considerable force and can easily break bones in the hand. The most common bodygrip trap used for mountain beavers is a single-spring bodygrip trap, such as the Conibear 110. This trap is suited for medium-sized game with a height and width of approximately 4¾ inches. Double-spring traps of the same size, such as the Belisle Super X 120 bodygrip trap, also may be used; however, the additional spring increases the trap's overall width when deployed and may be more difficult to place in a burrow.

To set a single-spring bodygrip trap:

1. Compress the spring and hold the two spring halves together with one hand, while bringing the jaws of the trap together against the spring tension with the other hand. At this point, the wire trigger on one jaw should meet with the latch or “dog” on the other jaw. The dog contains three notches designed to latch onto the trip mechanism on the opposite jaw. These three notches give the user the option to set the trap for more or less force depending on which one is used.
2. Retain tension on the jaws and rotate the dog over the top of the trap, pushing one of the notches firmly onto the trip wire on the opposite jaw. Make sure the trip wires hang directly below the trap and are not angled out away from the opening of the trap.
3. Make sure to retain tension on the jaws with one hand, while securing the spring in the other hand.
4. Retain tension on the spring ensuring it does not open while you release the jaws.
5. The trap is now set, and moving the trip wires in either direction away from the opening of the trap will cause the dog to release and spring the trap. Although no safety mechanisms are installed on this trap, several devices can be used or fashioned to secure tension on the spring or jaws or both to help safely secure the trap while setting.

To set a double-spring bodygrip trap:

1. Compress each spring one at a time, securing one spring with the attached j-hook before moving to the next.



Figure 6. Typical setting of a single-spring bodygrip trap.

2. After both springs are set and secure, the jaws can be compressed together and the dog rotated over the trip wires.
3. Once the trap is set and in place, remove both j-hooks from the springs. This may require compressing the springs slightly to release the hooks.
4. Once the hooks are removed from the springs, the trap is set and ready. Again, always be wary of bodygrip traps, using any available safety mechanisms and being mindful to keep your hands out of the danger zone of the trap at all times.

After the trap is set, position it upright in the burrow as shown in Figure 6. Anchor the trap by placing sticks through the spring loop and spring bars to ensure they do not interfere with trap function.

When lethal trapping, it is important to minimize the risk to nontarget species. The most effective way to do this is by placing the trap below ground in a positively identified active mountain beaver burrow system. Traps placed away from burrows are more likely to catch nontarget species, including domestic pets.

### **Live trapping**

Live trapping of mountain beavers is typically used for capture-release research purposes, but in Washington, where lethal traps are banned, live trapping followed by euthanasia may be the best management option. It is illegal in most states to relocate wildlife without special permits. Live trapping mountain beavers and releasing them elsewhere only moves the problem to someone else and will most likely carry a stiff penalty under the law. Always contact your local fish and wildlife agency before conducting any type of trapping operation.

Live trapping of mountain beavers usually involves the use of double-door cage traps (Figure 7) placed inside a burrow or run (Figure 8). Typical trap dimensions are 6 × 6 × 24 inches. The double-door traps are open at both ends, allowing the mountain beaver to enter from either side. When set, both doors are held open by a hook connected to a pan or treadle in the center of the trap. Bait, such as an apple or sweet potato, can be attached above the pan to encourage the mountain beaver to linger. When weight is applied to the pan, it releases the catch on the doors and traps the animal inside. Single-door traps can be used at a burrow entrance (Figure 9), but are less effective. Two common traps are the Tomahawk and Havahart live traps.



Figure 7. Double-door live trap.



Figure 8. Placement of live trap in burrow.

Trap placement is the key to successful live trapping of mountain beavers:

- Try to avoid placing traps at entrances and exits on the surface. Instead, look for openings in the burrow system that tunnel away from the site in both directions. Tunnels leading toward a water source work best.
- Dig out a space so that the trap sits naturally in the tunnel.
- When the trap is in place, attach bait above the pan, set, then cover the trap with a tarp or blanket (Figure 10) and cover with dirt. This will help insulate the trap and disguise the trap by creating the appearance of a continuous tunnel system.

### **Handling live mountain beavers**

After live trapping, use extreme caution when handling mountain beavers, as they have a tendency

to quickly turn and bite. Always wear gloves and appropriate protective equipment. To secure a live mountain beaver, first place it into a burlap or similar sack. To do this, place the sack over the entrance to the live trap, secure it tightly around the trap entrance, and open the trap door. Hold the door open by grabbing through the burlap sack with your fingers of one hand. Coaxing or prodding the mountain beaver may be required to get the animal out of the trap and into the sack. Make sure the animal is at the bottom of the sack and that the entire sack is closed at the top. When the animal is secured in the sack, place the sack on the ground, and place a knee on the entrance of the sack. Gently coax the animal to one of the bottom corners of the sack. With the sack between you and the animal, grasp it firmly around the neck, using your thumb and pointer finger to grip the animal behind the jawbone. Be sure that your fingers do not completely encircle the animal's neck. With the other free hand, slowly remove the sack while retaining a grip on the animal. Then use this hand to reach into the sack and grip the animal's neck, while releasing hold of your grip with the first hand. This hand can now be used to hold the hind feet after removing the animal completely from the sack.

Euthanasia of a live mountain beaver can be accomplished by several methods, depending on state regulations. Check with your local authority to obtain guidance on properly euthanizing nuisance wildlife.

### Toxicants

Rozol is a restricted-use pesticide registered for use in western Oregon and western Washington. The active ingredient of Rozol is chlorophacinone (0.005%), an anticoagulant rodenticide that has been proven effective for the control of mountain beaver populations. Other toxicants have been used in the past, but Rozol has been shown to be the most effective with the smallest hazard to nontarget species.

Rozol is for use only by certified applicators or persons under their direct supervision. The use of Rozol may vary slightly by state; check with your state fish and wildlife agency or state agriculture department or both before using this product. Read and follow all instructions included on the label specific to your state.

Rozol comes as a weather-resistant paraffinized pellet. Place one unopened packet of bait approximately an arm's length inside active mountain beaver burrow entrances or runways. Only place one bait per entrance and no more than two per burrow system. Do not open the packets of bait, and avoid contact by using appropriate protective equipment. Packets of



Figure 9. Single-door trap placed in burrow entrance (before disguising the trap).



Figure 10. Disguising a live trap with a tarp.

bait should not be placed in or near a water source. The ideal time for application is between October and February. Do not apply Rozol from mid-May to September 1, because of the presence of juveniles and risks to nontarget species.

Studies have shown that a combination of trapping and baiting with Rozol (where applicable) is the most effective method of controlling mountain beaver populations. When combining pesticide use and trapping, it may be slightly more cost effective to bait first and then trap out the remaining population, but this method requires more pesticide and has a greater chance of nontarget species exposure. Trapping first is slightly more expensive on average but reduces the amount of pesticide use. Trapping first is the fastest way to reduce populations, as Rozol takes 7 to 21 days to take effect.

## Exclusion

Individual tree barriers may help protect seedlings during stand initiation; however, fencing is not a viable method to completely exclude mountain beavers, because of their burrowing habits. Mesh and rigid plastic barriers can be costly, and studies have shown that mountain beavers are capable of chewing through the materials. If you use individual tree barriers, use solid, rigid plastic tubes with no holes or edges for mountain beavers to use as a place to start cutting.

## Repellents

Repellents are generally applied to the foliage of seedlings and are marketed mainly to reduce browse. Repellents are subject to weathering and can be short-lived. Thus, application should be targeted to specific times when seedlings are most susceptible. Since mountain beavers clip rather than browse, repellents are not recommended for reducing mountain beaver damage. However, if repellents are used to reduce browse in areas where mountain beavers are present, it is recommended to extend application from the foliage to the base of the seedling. Applying repellents with a stickier application may increase the length of time between reapplications.

Many repellents are organic and are not regulated by federal or state laws; however, some repellents may be regulated. Consult your state department of agriculture to inquire about the safe use of repellents in your area. For Oregon Department of Agriculture's Pesticide Program, call 503-986-4635. For Washington Department of Agriculture's Pesticide Management Division, call 877-301-4555.

## Habitat modification

To reduce ungulate browse during stand initiation, planting larger seedlings can help trees exceed browse range faster than smaller seedlings. This does not help with mountain beavers because they clip the base and are not concerned with seedling height.

Currently, there are no proven methods to reduce mountain beaver damage using habitat modification; however, questions often arise about the relationship of vegetation management (e.g., herbicide site preparation) and wildlife damage. In a research study in Washington, Douglas-fir seedling loss due to mountain beavers did not differ between newly planted stands treated with herbicide versus those with no herbicide treatment; however, this has not been replicated on a large scale. Given their inability to concentrate urine, mountain beavers must acquire one-third of their

body weight daily in water, which they generally obtain from plants they eat. Evidence from a series of studies conducted in captivity and observations in the field suggests that mountain beavers make foraging decisions based on water content in plants. Thus, future research is necessary to determine the relationship between plant diversity and mountain beaver damage in reforested stands.

## Disposal of carcasses

Proper disposal of carcasses usually involves burying the animal at a certain depth, but specific procedures may vary depending on your region and the method in which the animal was dispatched. Stricter requirements may apply if an animal was poisoned rather than caught in a bodygrip trap or euthanized. Check with your local fish and wildlife authority for specific information on the disposal of nuisance animal carcasses in your area.

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All photos courtesy of USDA Wildlife Services.

Use pesticides safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the pesticide label—even if you’ve used the pesticide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

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