Living with Beavers

The American Beaver *Castor canadensis* is the largest living rodent in North America, with adults averaging 40 pounds in weight and measuring more than 3 feet in length, including the tail. These semi-aquatic mammals have webbed hind feet, large incisor teeth, and a broad, flat tail (Figures 1 and 2).

Figure 1. Photo by Cheryl Reynolds and courtesy of Worth A Dam.

Once among the most widely distributed mammals in North America, beavers were eliminated from much of their range by the late 1800s because of unregulated trapping and loss of suitable habitat. Beavers are native to California and historically occurred along the coast throughout the Central Valley, Colorado River basin, and into the Sierra Nevada and Cascades mountain ranges. However, by the early the 20th century their geographic range had decreased dramatically as a result of intensive fur-trapping and loss of suitable habitat caused by extensive land and water development. Two Fish and Game Journal manuscripts by Lanman et al., 2012 and 2013 provide a more in-depth review of the historic distribution of beaver in both the Sierra Nevada and coastal California. Between 1923 and 1950, the State of California conducted a successful reintroduction program using parachutes in some instances to plant beavers in remote mountain locations (Hensley 1946). Today, interest in beavers as Watchable Wildlife in California is on the rise as the benefits to fish and wildlife habitat, carbon sequestration, fire resiliency, water quality protection, surface water storage and ground water recharge become more apparent, especially during drought conditions.

Life History

Beavers are monogamous and mate for life. Females reach sexual maturity at 1.5 to 3 years of age and will typically birth 1-4 or more kits per year, depending on habitat quality and the availability of food. Beavers typically breed only once per year during the winter months, giving birth to kits in late spring, though significant variation occurs depending on latitude and climate (Baker and Hill 2003). Beavers maintain family units which consist of an adult breeding pair, young of the year and young from the previous year. Sometimes, when habitat quality is poor or population levels are near their carrying capacity, older offspring will remain with the family unit for more than 2 years. Beavers are strict herbivores and they generally prefer grasses, leaves, and aquatic plants such as cattails, bulrushes, and water lilies. Fermentation by special intestinal microorganisms allows beavers to digest 30 percent of the cellulose they ingest. In the fall and winter, they feed primarily on the bark and cambium of trees and shrubs. Aspen, cottonwood, willow and alder are preferred woody species in California.

Beavers sometimes consume growing crops, and in some cases may travel 100 yards or more from a pond or stream to reach corn fields, soybean fields, and other growing crops. In these cases, they generally cut the plants off at ground level and drag them back to the water. Beavers do not hibernate. When the surface of the water is frozen, beavers eat bark and stems from a food “cache” they have anchored to the bottom of the waterway for the winter. They have also been seen swimming under the ice to retrieve roots and stems of aquatic plants. They are generally nocturnal, but it is not uncommon to see beavers during daylight hours, particularly in larger water bodies. They generally do not stray far from the relative safety of water.

Viewing Beavers

Figure 2. Beaver at French Creek, Siskiyou County.
Photo by M. Stapleton

Look for signs of beavers during the day; look for the animals themselves before sunset or sunrise. Approach a beaver site slowly and downwind. (Beavers have poor eyesight but excellent hearing and sense of smell.) Look for a V-shaped series of ripples on the surface of calm water. A closer view with binoculars may reveal the nostrils, eyes, and ears of a beaver swimming.

If you startle a beaver and it goes underwater, wait quietly in a secluded spot and chances are that it will reemerge within one or two minutes. However, beavers are able to remain underwater for at least 15 minutes by slowing their heart rate.

When seen in the water, beavers are often mistaken for muskrats. Try to get a look at the tail: Beavers have a broad, flat tail that doesn't show behind them when swimming, whereas muskrats have a thin tail that is either held out of the water or sways back and forth on the water's surface as the animal swims.

Beavers stand their ground and should not be closely approached when cornered on land. They face the aggressor, rear up on their hind legs, and hiss or growl loudly before lunging forward to deliver extremely damaging bites.

Wildlife Habitat Benefits

Figure 3. A beaver uses its tail as a prop in order to sit upright.
(Miller and Yarrow 1994)

Beavers are well known for their construction efforts. They create dams and lodges for shelter and protection, largely with woody material. The woody material used in construction is either gathered from the ground locally, or from small and medium sized trees that the beavers fell with their teeth (Figures 4 and 5). The orange tooth enamel of their incisors is thicker on the front than the back, allowing for a self-sharpening wear pattern that maintains their chisel-like edge.

Figure 4. Beavers have self-sharpening incisors.
Photo courtesy Washington Dept. of Fish and Wildlife.

Depending on the type of water body and local habitat conditions, beavers may also construct burrows in the bank of a stream or river. These bank dens may be used in lieu of, or in conjunction with a lodge (Figure 5) and often take advantage of natural features such as logs or stumps.

Beaver ponds create habitat for many other animals and plants of California. Deer and elk

frequent beaver ponds to forage on shrubby plants that grow where beavers cut down trees for food or for use in constructing their dams and lodges. Weasels, raccoons, and herons hunt frogs and other prey along the marshy edges of beaver ponds. Sensitive species such as Red-legged, Yellow-legged, Cascade frogs, Western pond turtles and Sage Grouse all benefit from habitat created by beaver wetlands. Migratory water birds use beaver ponds as nesting areas and resting stops during migration. Ducks and geese often nest on top of beaver lodges since they offer warmth and protection, especially when lodges are formed in the middle of a pond. In mountain meadows, Willow Flycatchers use the shrubby re- growth of chewed willow stumps to seek shelter, find food, and most importantly as critical nesting habitat. The trees that die as a result of rising water levels, attract insects, which in turn feed woodpeckers, such as Black-backed Woodpecker, whose nesting cavities later provide homes for other wildlife. In coastal rivers and streams, young Coho Salmon and steelhead use beaver ponds and bank burrows to find food and protection from high flows and predators while waiting to grow big enough to go out to sea (Pollock et al. 2003).

Figure 5. Beaver pond and lodge on Sugar Creek Siskiyou County. Photo by CDFW's Mary Olswang.

Preventing Conflicts

While the many environmental benefits of beaver to Public Trust resources in California are increasingly being recognized and valued, nonetheless at times beaver activities can cause problems. Therefore, before beginning a beaver control action, assess the problem and aim to match the most appropriate and cost-effective controls to the situation. There are two basic control methods used in California: prevention and lethal control. There are many non- profit organizations in California that support alternatives to lethal control. Beaver in California: Creating a Culture of Stewardship guidebook is a valuable educational resource that offers practical tips for minimizing conflict and is helpful for those interested in learning how to receive the benefits beavers have to offer while mitigating damage. It is almost impossible as well as cost prohibitive to exclude beavers from ponds, lakes, or impoundments.

Exclusion

Fencing off groups of trees or shrubs or garden plots with a low fence (three feet tall) will protect them. Since beavers generally do not like to stray far from water (this opens them up to greater risk of predation), fences may be effective even if they do not completely surround the area (if you choose to fence only part of an area, fence the portion of the area toward the water source, and part way along the sides). The fence should be constructed of woven or welded wire and be well anchored to the ground, so that beavers do not crush it, crawl under it, or walk over it.

An electrified wire strung 4-6" above the ground may also be an effective beaver deterrent. Fence chargers, wiring, and wire hangers suitable for use on pets and other small animals are generally available at hardware stores, feed stores, and home improvement centers.

Tree Protection

Valuable trees and other plants adjacent to waterways may be protected from beavers by encircling them with hardware cloth (chicken wire is generally too flimsy), welded wire mesh or sheet metal (WDFW 2015). Welded wire mesh of 2” x 4” seems to be an optimal material in terms of effectiveness, durability, aesthetics and cost of construction. The barrier should afford 6 inches to one foot of space between the barrier and the tree, extend at least three (preferably four) feet above ground level and be dug into the ground 3-4 inches for maximum effectiveness (Figure 6).

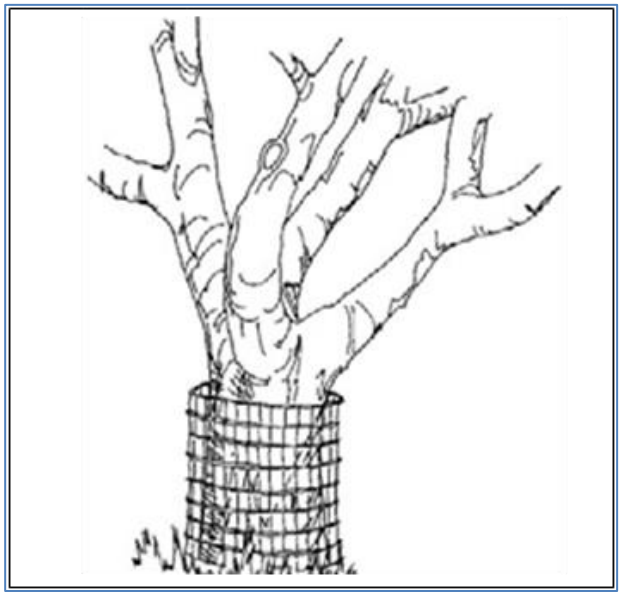

Figure 6. Drawing by Jenifer Reese (Miller and Yarrow 1994)

Alternatively, painting tree trunks with a sand and paint mixture may also prevent beaver gnawing and may be more aesthetically pleasing than metal barriers. A piece of bark can be taken to the hardware store to color match the paint. Beavers do not find the sand to be appetizing, and the mixture will be effective for approximately two years. The sand/paint ratio should be approximately 8 ounces (2/3 cup) of fine sand to one quart of exterior latex paint.

Prevent flooding

Beavers need deep enough water to swim in their food sources while avoiding predators. This is why they build dams, dig canals and/or plug culverts to increase the depth and area of the inundation. Have you ever cut a notch into the dam and come back the next day to see it patched and re-enforced with mud? Beavers are attracted to the sound of running water and will repair most dam breaches and plug most culverts and pipes that are installed in order to drain the ponds. Beavers also require a certain depth of water to move around and escape predation. A variety of devices and designs have been developed for controlling beaver impoundments and keeping blocked culverts open. The Flexible Pond Leveler and Beaver Deceiver are two examples. Visit BeaverSolutions.com for more information.

Modification of beaver dams, or any construction work within lakes or within the bed and bank of a stream, may require a Lake and Streambed Alteration Agreement from CDFW. Before attempting to install any beaver devices, contact your CDFW regional office in order to determine for assistance.

Depredation Regulations

If all alternatives are exhausted and beavers are continuing to damage or threaten to damage land or property, the owner or tenant of such property may apply to CDFW for a permit to kill the depredating animals. Upon satisfactory evidence of such damage or destruction, the Department shall issue a revocable permit allowing the taking of such animals (Fish and Game Code §4181).
No animals killed pursuant to such a permit may be utilized by the permittee or his agent (Title 14, California Code of Regulations, §401(i)). For additional information, contact your regional Department of Fish and Wildlife office or visit https://www.wildlife.ca.gov/Regions.

Public Health Concerns

Beavers are known to host for the parasitic protozoan *Giradia lamblia*, which can cause human giardiasis if infected water is ingested (McNew, Jr. et al. 2003). In addition, beavers can be infected with the bacterial disease tularemia that is transmitted by ticks, flies and ingestion of contaminated water (Gaydos 1998). Therefore, it is prudent to avoid swimming in areas of beaver activity, and to appropriately treat all water taken from such areas prior to drinking or cooking.

Acknowledgments

Occidental Arts and Ecology Center WATER Institute (OAEC) https://oaec.org/projects/bring-back-the-beaver-campaign/

Washington Department of Fish & Wildlife (WDFW) https://wdfw.wa.gov/species-habitats/species/castor-canadensis

References

Baker, B. W., and E. P. Hill. 2003. Beaver *Castor Canadensis*. Pages 288-310 in G. A. Feldhamer, B. C. Thompson, and J. A. Chapman, editors. Wild Mammals of North America: Biology, Management and Conservation. Second Edition. The Johns Hopkins University Press, Baltimore, Maryland, USA.

Gaydos, J. 1998. Giardia and Wildlife. Southeastern Cooperative Wildlife Disease Study Briefs. College of Veterinary Medicine, University of Georgia, Athens, GA. Available online: https://martinezbeavers.org/wordpress/wp-content/uploads/2011/03/GiardiaandWildlife.pdf

Hensley, A. L. 1946. A progress report on beaver management in California. Calif. Fish and Game. 32:87-99.

McNew, Jr., L.B., T.A. Nelson, and S. T. McTaggart. 2003. Prevalence of Giardia intestinalis in Illinois beavers. Transactions of the Illinois State Academy of Science, Volume 96 #2 pp 113-118.

Pollock, M.M., M.Heim, and D. Werner. 2003. Hydraulic and geomorphic effects of beaver dams and their influence on fishes. American Fisheries Society Symposium 37:213-233.

Washington Department of Fish and Wildlife (WDFW). 2015. Living with Wildlife.