

Moose on the Loose

Radio Tracking on the Prescott Peninsula

Moose are North America's largest wild animal. An average adult moose weighs around 1,000 pounds and stands 6 feet tall at the shoulder. Moose and their ancestors originated in Siberia and made their way to North America across the Bering land bridge. At the time of European settlement, moose were distributed from Alaska, across Canada into the northern United States from North Dakota east to Pennsylvania and all of New England, including Massachusetts. Moose also extended down the Rocky Mountains in the West. Temperature was probably the limiting factor in the southern distribution of moose in North America. Because moose are adapted to cold northern climates, winter stress typically occurs when temperatures exceed 23°F and summer stress when temperatures are greater than 59°F.

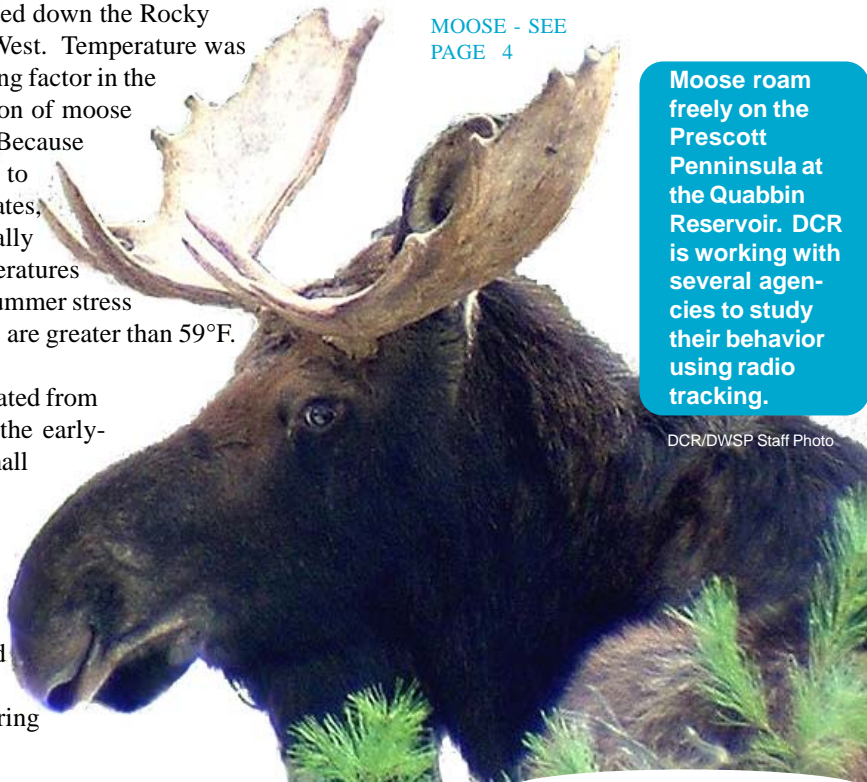
Moose were extirpated from Massachusetts by the early- to mid-1800s. A small number of moose escaped from a game preserve in Berkshire County around 1911 and may have persisted for several years. Most sightings during

the next 50 years were probably northern moose who wandered south. Since the late 1980s, the number of moose sightings has increased greatly. In 1998, the state's moose population was estimated as at least 75 animals including cows with calves. In 2006, the estimate had increased to about 1,000 animals. Reasons for the increase in moose populations include the absence of predators, reversion of farms to forested areas, legal protection, increased wetlands

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Moose roam freely on the Prescott Peninsula at the Quabbin Reservoir. DCR is working with several agencies to study their behavior using radio tracking.

DCR/DWSP Staff Photo



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In This Issue:

With spring, the outside world once again thrives. The grass, trees, birds and a host of other players are busy at work. This issue of *Downstream* describes how DCR staff keeps tabs on one of our larger animal friends as they go about their daily business. Useful information is also provided for those who will take to fishing in the coming months.

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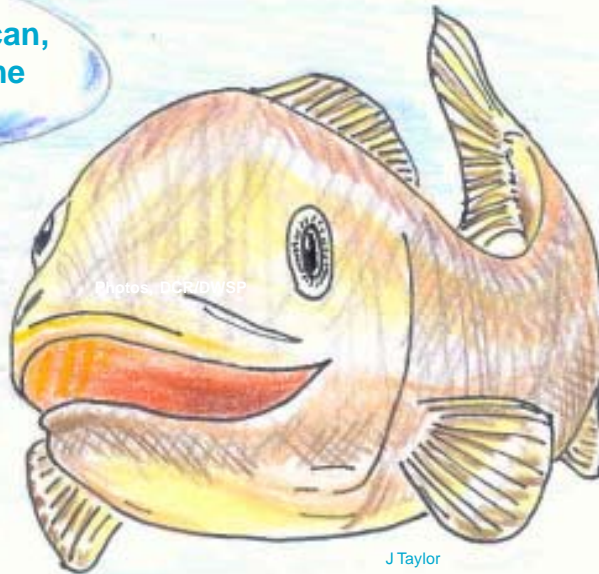


Department of Conservation
and Recreation
Division of Water Supply
Protection
[www.mass.gov/dcr/
waterSupply.htm](http://www.mass.gov/dcr/waterSupply.htm)

Hooks, Line Sinking All Wildlife

by MARY ANNE MAGEIRA. This article has been reprinted with permission of the author and the *Worcester Telegram & Gazette*.

Catch me if you can,
but don't hurt me
if you can't



I cringe every time a smallmouth throws a senko off my line into the lake, knowing that something plastic, made from petroleum products, can't be good for the water or the fish that live there.

Then, there's the disbelief that surfaces when I see wads of fishing line tucked here and there into divots and tree branches while having my lunch on the shore.

As it turns out, abandoned fishing line, especially with hooks and lures (all kinds) attached, kills fish and wildlife. The jury is still out on the dangers of discarded plastic baits.

"We do have issues with plastics and fishing line," said John Scannell, regional director of the Wachusett and Sudbury watersheds for the state Division of Water Supply and Protection. "We're trying to come up with ways to convince people to get rid of it, to carry it out with them."

The state's policy of carrying out all the stuff you bring in when you fish at the Wachusett and Quabbin reservoirs is not working. The agency spends a small fortune getting rid of endless balls and strings of fishing line and other things left behind at the end of every fishing season.

"We spend a lot of time working out of a boat at Wachusett. We're always picking up entangled wildlife," said Paula Packard, an aquatic biologist with the state Department of Conservation and Recreation. "I reached my limit last week after we found a drowned muskrat all tangled up in fishing line. The hook and rubber worm was still attached."

Although the problems are much worse at Wachusett because it is limited to shore fishing, the Quabbin, where most fish from boats, also contributes to the problem. Among other species, Packard recently found a dead female common merganser entangled in line at Quabbin.

The muskrat incident moved Packard to take on a public education project to convince people to carry out their tangled line. It is expected to debut at Wachusett this spring. The project will feature disposal canisters designed for discarded fishing line at key reservoir entry points and signs to educate the public about the dangers of discarding fishing line. The agency will also seek assistance from sportsmen's clubs and bait shops. "It's a privilege to fish at Wachusett," Packard said. "It's a reservoir; we don't want rotting bodies there. We have rare species there and we have to take care of them."

The issue of thrown and discarded plastic lures is somewhat less straightforward. "Certainly, never throw plastics overboard. Keep as many as you can in the boat and take them out with you," said Todd Richards, an aquatic biologist with the state Division of Fisheries and

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Please Recycle Your Old Fishing Line!

The DCR Office of Water Supply Protection is launching an initiative aimed at reducing the amount of discarded fishing line at the Wachusett Reservoir. Improperly discarded fishing line poses a grave danger to many kinds of wildlife.

If you have old fishing line or see fishing line on the ground, please place it in one of the canisters, similar to one shown here, that you will find at a number of shoreline locations around the reservoir.

Thank you for helping to keep the Wachusett Reservoir pristine and our wildlife safe! If you'd like more information about this project or the risks from improperly disposed fishing line, please contact Aquatic Biologist Paula Packard at 508-792-7423 Ext.220.



DCR/DWSP Staff Photo

The Safety of Dams...

Managed by
the Office of
Water Supply
Protection

The Wachusett Dam
at the Wachusett
Reservoir in July of
2006.

Photo:
DCR/DWSP Dam Inspection Team



The October 2005 and May 2006 “Storms of the Century” placed a spotlight on dams in the Commonwealth. The DCR Office of Dam Safety, which ensures compliance with regulations pertaining to dam inspection, maintenance, operation and repair, valiantly worked along with local, state, and federal officials to avoid catastrophes, especially at the Whittendon Pond Dam in Taunton. The Office of Dam Safety subsequently promulgated new regulations and

implemented the first phases of a new program calling for registration, inspection, and repair of dams by owners. Owners of 800 dams were identified, 700 dams were clarified for regulatory jurisdiction, and 1,500 dam inspections were completed. All 340 DCR-owned dams, including the 83 maintained by the Office of Watershed Management and the Massachusetts Water Resources Authority, have achieved regulatory compliance.

Dams are classified based on their hazard potential into three categories:

1. **High Hazard Potential** dams are located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
2. **Significant Hazard Potential** dams are located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities.
3. **Low Hazard Potential** dams are located where failure may cause minimal property damage to others. Loss of life is not expected.

Dam owners are required to hire a qualified engineer to inspect and report results every 2 years for High Hazard Potential dams, every 5 years for Significant Hazard Potential dams, and every 10 years for Low Hazard Potential dams.

There are 19 High Hazard Potential dams in the DCR/MWRA watershed system, including Wachusett Dam and the Winsor Dam, which respectively hold back water for the Wachusett and Quabbin Reservoirs, as well as the four dams within the Sudbury Reservoir watershed.

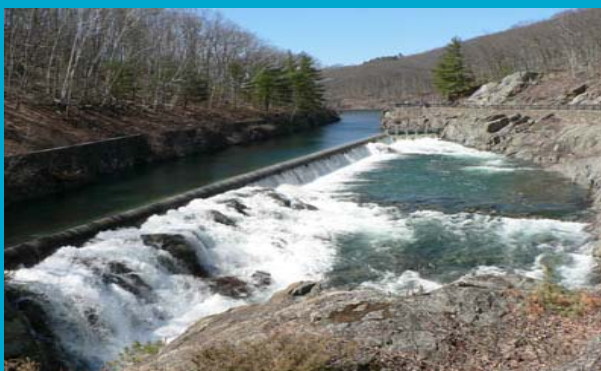
When a Dam Is More Than Just the Dam

A dam is defined by the Federal Emergency Management Agency (FEMA) as “a barrier built across a watercourse for impounding or diverting the flow of water.” There can be more to holding back water than just a dam. Spillways and dikes are key components to several of the reservoirs in the DCR Watershed System.

The Winsor, Wachusett, and Sudbury Dams also have spillways, which are “structures over or through which flood flows are discharged.” MWRA and DCR are currently in the process of rehabilitating the Wachusett Spillway.

A dike, also referred to as a levee, is a “long low embankment whose height is usually less than 4 to 5 meters and whose length is more than 15 times the maximum height...[it describes] embankments that block areas on a reservoir rim that are lower than the top of the main dam and that are quite long.” The Goodnough Dike at Quabbin Reservoir, for example, is 2,140 feet wide at the top and 878 feet wide at the bottom. It prevents the overflow of the lowlands surrounding Beaver Brook, rather than directly damming that tributary’s flow.

The Quabbin Spillway safely
managing the 2007 spring
rain .



DCR/DWSP Quabbin Visitors Center

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from expanding beaver populations, and larger forest openings.

Moose populations continue to expand in Massachusetts. Department of Conservation and Recreation (DCR) land in the Quabbin Reservoir and Ware River watersheds represent some of the best moose habitat in the state. Given their tremendous size and appetites – moose can eat 40-60 pounds of browse daily – the Division of Water Supply Protection is interested in how many moose are present on Division lands and their life histories. In order to address these questions, DCR has been involved in two methods of information gathering.

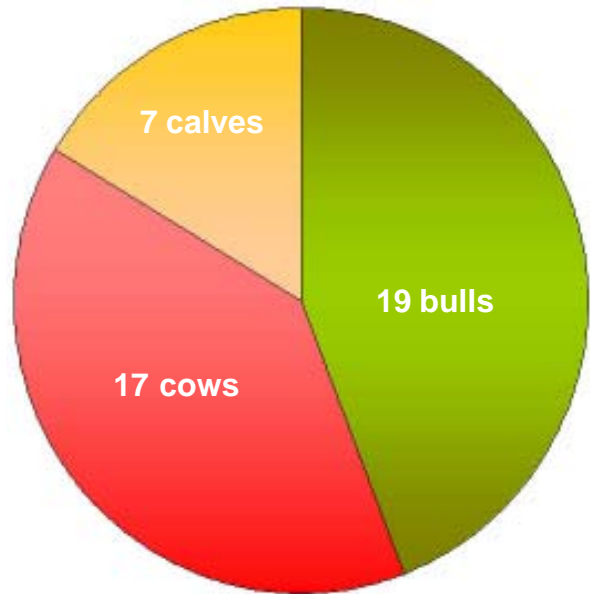
GPS collars

A cooperative study was initiated in 2005 to capture moose and attach GPS collars around their necks. Researchers from the University of Massachusetts, Amherst and the US Geological Survey's Massachusetts Cooperative Fish and Wildlife Research Unit, with support from the DCR and MassWildlife, have caught and collared 11 moose in Massachusetts, including 3 in the Quabbin Reservoir

Moose Sighted on the Prescott Penninsula During 2006 Quabbin Deer Hunt

This chart shows the total number of moose counted during the 2006 deer hunt on the Prescott Penninsula at the Quabbin Reservoir.

The population total of 43 represents about 2 moose per square mile.



watershed. One animal has died of natural causes, while the collars on the remaining ten animals collect locations ten times daily. Information is stored within the collar; when the collar is eventually retrieved, scientists will be able to download detailed data on where and when the moose traveled, providing an informative glimpse into these animals movements and habitats.

Quabbin hunter survey

The annual Quabbin Reservation controlled deer hunt was initiated in 1991 to help maintain deer densities at levels that allow for the continued establishment and development of forest regeneration. Hundreds of hunters take to the woods in late November and early December in search of deer. Over the years, DCR staff noticed that, in addition to deer, hunters often saw a lot of moose. In order to capitalize on this excellent source of information, DCR handed out a formal moose sighting survey to hunters during the 2006 hunt. Participants were given survey cards and were asked to keep an eye out for moose as they were hunting. Upon sighting a moose, the hunter filled in the time, location, and type of animal they saw. Hunters then turned in their cards at the end of the day. Surveys were administered in all the hunting blocks (Prescott, Pelham, New Salem, and Petersham). Survey information was then compiled and mapped for each block. The results from the Prescott block showed some interesting, and surprising, results.

Approximately 360 hunters attended the Prescott hunt on the first day; 298 (approximately 83%) turned in a card at the end of the day. Ninety-two hunters saw at least one moose, and 206 hunters didn't see any moose. In the end, there




This bull moose browses the underbrush on the Prescott Penninsula with its radio collar in place

Photo: Kiana Keonen, DCR/DWSP Staff

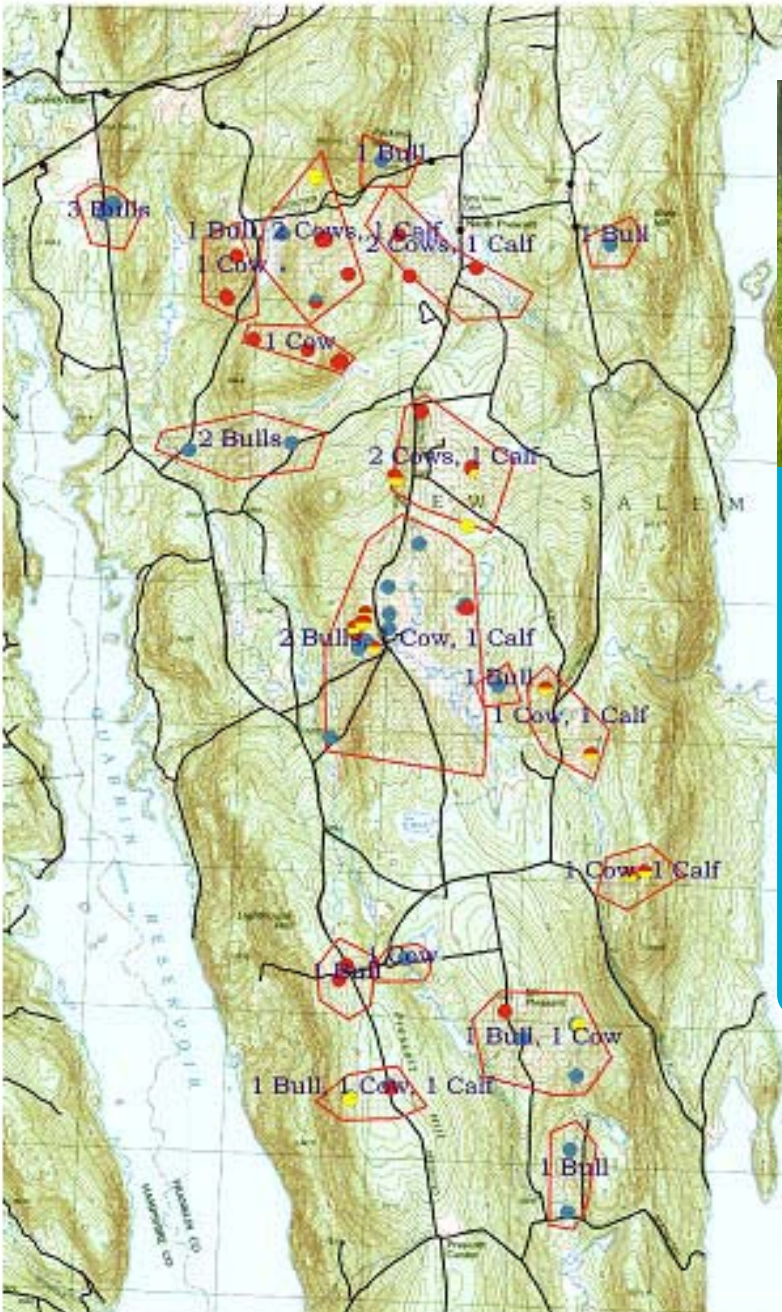
were 81 unique moose sightings, and 11 unusable sightings (i.e., a location wasn't provided). DCR staff spent several days determining how many of the 81 sightings were actually different moose. Ultimately, it was concluded, based on the cards' information (time the animal was sighted, sex, etc.), that there were 43 moose just on the Prescott peninsula.

In order to get a sense of how the moose were distributed, all locations were plotted on a map. This also helped determine which sightings were truly unique and which ones were the same animal. The map indicated that moose were distributed throughout the peninsula, although more moose were seen in the northern end.

Both studies will continue in the future. The Division is working towards

deploying 10 more GPS collars this year. The hunter survey will continue during the 2007 Quabbin controlled deer hunt. In addition to these studies, the DCR contracted with a company this spring to conduct aerial infra-red surveys of Quabbin reservation in order to identify both deer and moose. The combination of all this information will provide a much clearer picture of not only how many moose there are, but how they interact with the environment. 

- Dan Clark, DCR/DWSP Acting Director,
Natural Resources Section



This Map of the Prescott Peninsula shows the locations that moose were sighted during the 2006 Quabbin deer hunt.



The moose cow above is very likely aware of the photographer taking this picture and keeps a watchful eye on its calf.

Photos: Dave Small, DCR/DWSP Staff

The moose calves in the picture at right stay close together at the edge of a woods road on the Prescott Peninsula.



References:

- Franzmann, Albert W., and Charles C. Schwartz. *Ecology and Management of the North American Moose*. Smithsonian Institution Press and Wildlife Management Institute. 1997. 733 pp.
- Peek, James M., and Karen I. Morris. *Status of Moose in the Contiguous United States*. *Alces*. 34(2): 423-434. 1998.
- Vecellio, Gary M., Robert D. Deblinger, and James E. Cardoza. *Status and Management of Moose in Massachusetts*. *Alces*. 29: 1-7. 1993.

Quabbin Controlled Deer Hunt: <http://www.mass.gov/dcr/waterSupply/watershed/hunt2006.htm>

HOOKS - FROM PAGE 2

Wildlife. "Fish do pick them up. We find them in trout, in lake trout, and in everything else. Fish do consume them, but the jury's still out as to the impact." The plastic lure issue brings up a conundrum that fisheries biologists deal with all the time, said Richard Hartley, also a MassWildlife aquatic biologist.

"Is an activity having a population effect? There's no doubt that an individual fish that maybe has a rubber worm lodged somewhere is going to have difficulty," Hartley said. "However, we have to manage the resource on a population level. Is it having a population-wide impact? Probably not, but we have to do the research."

A veterinary pathologist in Maine and a scientist at Auburn University in Alabama have spent considerable time on the issue. "What we do know is that the hook doesn't break down. So, if a rubber worm is lodged in a fish attached to a hook, it is fatal," said G. Russell Danner, a fish and wildlife pathologist with the Maine Department of Fisheries and Wildlife. A series of small studies conducted since 2004 has not been able to conclusively determine the effects of fish retaining the plastic without a hook. "It's not a good situation, but does it affect how much they can eat and grow? It's going to be difficult to tease that one out," Danner said.

Maine researchers force-fed a variety of plastic lures to 100 yearling brook trout. Within a week, most of the lures were

found on the bottom of the raceway. The lures that remained in the stomachs most securely were those attached to hooks and line. Most of the fish in that situation died from internal bleeding after the hook pierced the stomach wall and lacerated a blood vessel. Another experiment in 2005 showed that older brook trout readily consumed plastics left in their raceway, but the older fish failed to quickly vomit up the lures.

"The biggest problem I've seen is that the plastic lure will get jammed between a fish's stomach and small intestine and the fish will starve," said Dr. Russell Wright of Auburn University.

Wright spearheaded research that led to the development of plastic baits made from food-based proteins that are completely digestible by fish and biodegradable. They are now commercially marketed by FoodSource Lure Corp. Largemouth and spotted bass, Wright said, are more likely to grab a lure and not get hooked than pick up a plastic lure off the bottom like a trout.

Practices that may help reduce unwanted fish consumption of plastics:

- Use less power on your cast. Fine-tune your equipment to get more distance.
- Detect bites sooner by focusing on your line.
- Use barb-less hooks and circle hooks.
- Replace plastics as soon as they begin to fray.
- Keep that deep-hooked fish. 💧

DCR DAM SAFETY - FROM PAGE 3

Ten Office of Watershed Management dams are Significant Hazard Potential, and the remaining 54 are Low Hazard Potential or currently unclassified.

DCR engineers are responsible for inspecting and ensuring repairs on all the Significant and Low Hazard dams. For example, the Unionville Pond Dam in Holden received \$105,000 rehabilitation in 2006. DCR has an agreement with the MWRA for the Authority to assume the capital responsibilities of maintaining the High Hazard dams. DCR performs monthly inspections and routine maintenance on all its watershed dams, while MWRA issues contracts for major repairs or upgrades. MWRA is also now responsible for producing, and annually updating, the requisite Emergency Action Plans that detail the procedures to follow in case of a disaster.

For more information on the Office of Dam Safety, go to www.mass.gov/dcr/pe/damSafety. 💧

- Joel Zimmerman, DCR/DWSP Planner

The Gatehouse at Foss Dam (Framingham Reservoir #3).

Photo: DCR/DWSP Dam Inspection Team



A Few Words About Fish Consumption

There are some risks associated with eating the fish that one catches. Pollutants released in the air from distant industry, like mercury, return to earth via rainfall throughout New England. This deposition poses a negligible threat to drinking water quality because these materials quickly sink to the bottom of a water body. However, fish that feed from the bottom, or those that feed on things that eat from the bottom, can accumulate measurable amounts of these pollutants. Keep the following in mind if you go fishing...

- ▶ The safest alternative is to fish just for fun and release what you catch.
- ▶ Fish for stocked species. They are raised in hatcheries and will have less accumulated pollutants.
- ▶ Be size selective for non-stocked species. Smaller fish have had less chance to accumulate these materials. For example, choose bass no longer than 16" or lake trout no longer than 20".
- ▶ Only take fish that you know you will eat soon, otherwise release it to keep their numbers strong.

Visit the Department of Public Health website at www.mass.gov/dph for complete fish consumption advisories. Quabbin and Wachusett Reservoir water quality data can be viewed at www.mass.gov/dcr/waterSupply/waterSupply/watershed/dwmwq.htm or www.mwra.com/watertesting/watertests.htm.

For More Information...

About Moose

Ecology and Management of the North American Moose. Franzmann, Albeart W. and Schwartz, Charles C.. (1997) Smithsonian Institution Press.

Mammal Tracks & Signs. A guide to North American Species. Elbroch, Mark. (2003) Stackpole Books.

A Guide to Animal Tracking and Behavior. Stokes, Donald & Lillian. (1986) Little, Brown and Company.

The North American Moose Foundation's website:
www.moosefoundation.org/

About Radio Tracking

Radio Tracking and Animal Populations, Millspaugh, J J and J M Marzluff, Editors. (2001) Academic Press.

A Manual of Wildlife Radio Tagging (Biological Techniques), Kenward, Robert E. (2000) Academic Press.

And Another Thing...

by J. Taylor



"...and I can't find a headphone jack on this thing anywhere!"

Kids Corner

Making Tracks

Who's been here before?

We see signs of wild animals a lot more often than we actually see the animals. Tracks in the snow or in the mud can tell us what animal walked by, where it was going and what it was doing in that place. It provides a fascinating story for us to read.

By studying the pattern of the tracks closely we can first determine to what group of animals our subject belongs. This helps narrow the choices quite a bit.

Animals that show a straight walking pattern are members of the dog and cat families as well as deer and moose. Some animals leave a hopping pattern, like rabbits, mice, chipmunks and squirrels. Their back feet leave a larger imprint than their front feet. Other animals are waddlers, leaving tracks that show them lumbering along in a slow pace. If you find waddling tracks, they are usually left by skunks, porcupines, raccoons or bear. Bounding animals, like weasels, fishers and otters, leave perfectly paired tracks of the same size.

Once you determine the pattern, the size is important. Guides for animal track sizes can be found at your local library or on the internet. Some good books are:

- Animal Tracks by James Kavanagh, info@waterfordpress.com
- Pocket Guide to MA Animal Tracks, www.masswildlife.org
- Critters of Massachusetts, www.masswildlife.org

Collecting tracks can be a fun and educational activity!

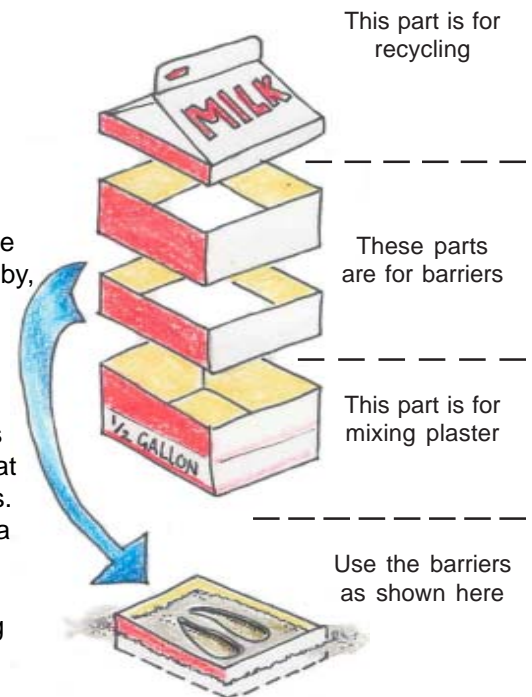
Materials: Half-gallon milk carton, scissors, plaster of Paris, water, mixing stick or spoon.

Procedure: Find a clear animal track in the sand or mud. Cut the milk carton following the illustration above. Place the barrier around the track. Use the bottom half of the carton to mix the plaster according to the package directions. Pour onto the track filling the mold. Leave it to harden.

Lift it carefully from the track and remove the barrier. Mark on the bottom of the track the date, location and name of animal. Soon you'll have your own collection of animal tracks! - Jim Lafley, DCR/DWSP Wachusett Education Coorinator

| | | | | | | | |
|-----------------------|--------------------------|-------------------------|------------------------|-----------------------|------------------------|---------------------|---------------------|
| Raccoon | Squirrel | Skunk | Woodchuck | Porcupine | Opossum | Beaver | Rabbit |
| | | | | | | | |
| rear front 4" 2.5" | rear front 2.25" 1.5" | rear front 1.5" 1.5" | rear front 2.25" 2" | rear front 3" 2.5" | rear front 2" 1.75" | rear front 6" 3" | rear front 4" 1" |

These are just a few of the tracks that you may find. See the sources above for more examples.



Use the barriers as shown here

A New Historic Marker For West Rutland

The second of three historical markers in the Ware River watershed was dedicated on May 20, 2006 in a ceremony attended by over 100 people, including 20 - 30 former residents, Senator Stephen Brewer and Representatives Anne Gobi and Lewis Evangelidis. The marker (shown at right) sits at the former site of the Village of West Rutland by the intersection of Routes 122 and 122A, commemorating this former community in the Ware River Watershed.

While the disincorporated towns of the Quabbin valley are well known and documented, the villages of the Ware River watershed that were removed in the late 1920s and 1930s have received relatively little attention. Legislation filed by Senator Brewer was approved to establish historic markers at the



Photos: DCR/DWSP Quabbin Visitors Center



The West Rutland Worsted Company mill building as it appeared in 1927.

former village sites of West Rutland, Colebrook Springs and White Valley. Working with local historical commissions and historical societies, DCR has dedicated two markers to date; the third, White Valley, is slated for installation and dedication later this year. These markers are important tributes to those who sacrificed their homes and land for the protection of the water resources of the Ware River watershed.

- Clif Read, DCR/DWSP Quabbin Visitors Center

DOWNSTREAM

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Downstream is produced twice a year by the Massachusetts Department of Conservation and Recreation, Division of Water Supply Protection. It includes articles of interest to residents of the watershed system communities. Our goal is to inform the public about watershed protection issues and activities, provide a conduit for public input, and promote environmentally responsible land management practices.

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