



# Porcupine Ecology and Damage Management Techniques for Rural Homeowners

by  
Rich Olson  
*Rangeland Wildlife Habitat Extension Specialist*

Andrea M. Lewis  
*Extension Publications Assistant*

Cooperative Extension Service  
College of Agriculture

**B-1073**

May 1999

## Table Of Contents

---

Introduction .....	1
Species Description .....	1
Distribution .....	3
Habitat Characteristics .....	3
Den Types .....	3
Food Habits .....	4
Spring .....	4
Ground Feeding .....	4
Salt Demand .....	4
Summer .....	5
Fall .....	5
Winter .....	5
General Biology .....	6
Defense Reaction .....	6
Reproduction .....	7
Social Structure .....	8
Life Span .....	9
Winter Adaptations .....	9
Digestive System .....	10
Damage Problems and Economic Impacts .....	10
Tree Damage .....	10
Damage from Salt Demand .....	12
Legal Status .....	12
Damage Prevention and Management Techniques .....	12
Non-Lethal Techniques .....	12
Ecological Methods .....	12
Exclusion .....	12
Repellants .....	13
Biological Options .....	13
Live Trapping .....	13
Lethal Techniques .....	14
Shooting .....	14
Poisoning .....	14
Trapping .....	14
Summary .....	14
Acknowledgements .....	16

## Introduction

---

The porcupine (*Erethizon dorsatum*) is a common resident throughout Wyoming and the western United States. It is found in a wide range of habitats, including coniferous forests, cottonwood stands along prairie river bottoms, deserts, and alpine tundra. The name “porcupine” comes from the Latin *porcus*, meaning swine, and the French *epine*, derived from the Latin *spina*, meaning thorn. It literally means “the irritable back.”

## Species Description

---

Porcupines are large rodents of the *Erethizontidae* family. Unlike other large North American rodents, their bodies are modified for climbing and maneuvering in trees and feeding on bark, fruit, and leaves. Most members of the *Erethizontidae* family are tropical animals. However, *Erethizon dorsatum* has adapted to survive in extreme cold conditions, up to the tree line in far northern areas.

Best known for their pilage of quills, adult porcupines have approximately 30,000 large quills covering the dorsal and tail regions. More slender and elongated quills blanket the shoulders and sides of the body. Quills are hidden under long, white-tipped guard hairs until animals are agitated or in a warning posture. Guard hairs shed rain, sleet, and snow and convey tactile information from the immediate environment. These hairs are black, brown, or chestnut in color, 6 to 10 inches long, and give porcupines a fluffy appearance. Albino porcupines have been observed but are exceedingly rare.

Porcupines have several adaptations for climbing trees to reach food. Both front and hind feet have extremely long claws protruding from the toes that can be inserted into tree bark crevices to aid in climbing. The four claws on the front feet and five claws on the hind feet are used as a comb during self-grooming. They are long enough to extend through the quill layer

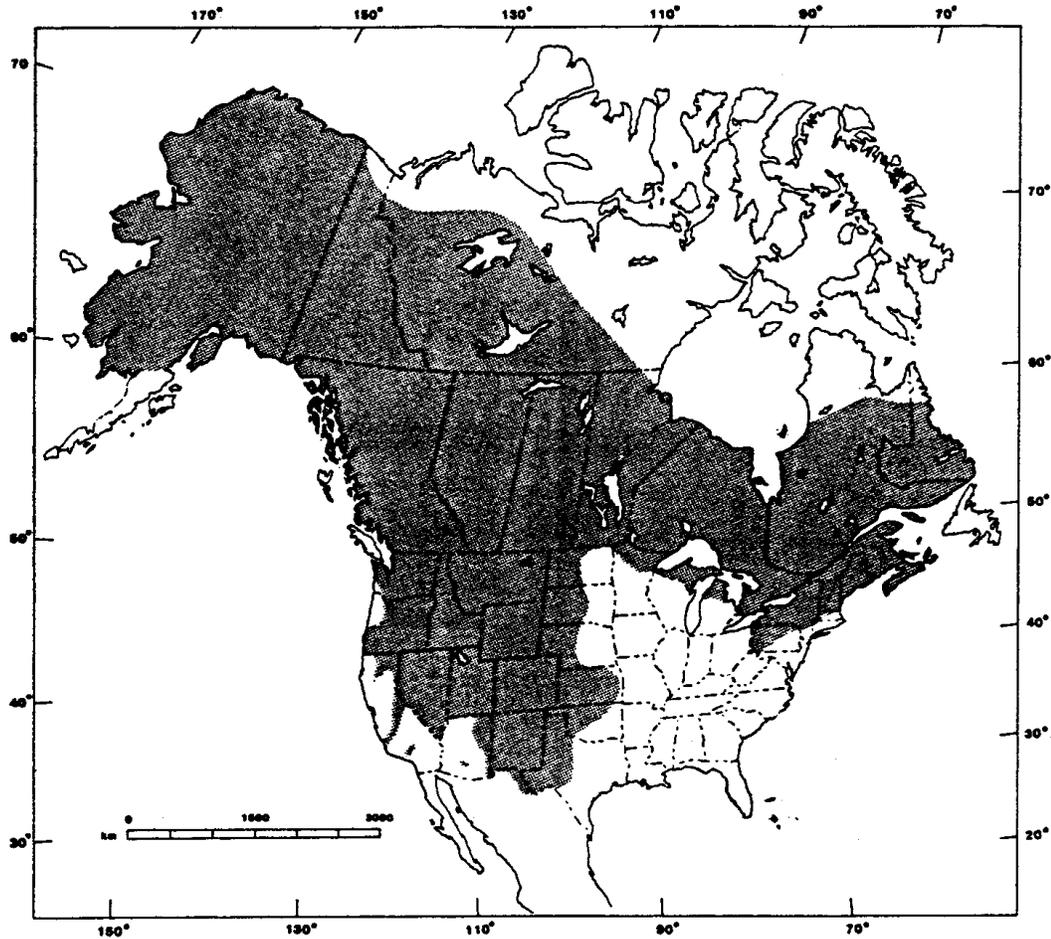
to the skin. Front claws are used to manipulate foods, such as fruits and small branches, and to pull tree branches into feeding range.

Front and hind footpads resemble rubber with a pebble-like texture from structures called tuberosities, which are used to increase friction against the tree trunk. Footpads are used solely for climbing small tree trunks or branches that are too narrow in diameter for claws. Footpad size increases with body size, and males generally have larger footpads than females.

The tail is used for climbing trees. Stiff, backward-pointing bristles on the tail underside are pressed against tree bark while climbing. This provides an anchor against the bark and prevents downward sliding. By moving the tail up and down prior to each claw-hold and feeling the path below, the tail is used as a quick guide stick for crawling down a tree. As porcupines climb up and down trees, their bellies and underarms continually rub against the trunk, resulting in an absence of quills in these areas.

A tree-climbing adaptation of the porcupine is the absence of an external male penis and the addition of a membrane covering the female vagina. In males, the penis is retracted into a cloaca-like structure by muscles attached to a tiny bone (the baculum) inside the penis. In females, a membrane covers the vaginal opening for protection against bark scrapings and debris while climbing. These characteristics make it difficult to distinguish males from females by casual observation.

Porcupines are the second largest member of the rodent family in North America, next to the beaver. In the Catskill Mountains of New York, male porcupines averaged 13.4 pounds while females averaged 11.2 pounds. In shrub desert areas porcupines are generally larger, with one study reporting an average weight of 25.3 pounds for adult males. Porcupines that evolved with smaller deciduous trees and branches are generally smaller in size due to



**Figure 1.** Distribution of the porcupine (*Erethizon dorsatum*) in North America (Dodge 1982).

difficulties associated with feeding among small branches. Weight varies by season since porcupines store a considerable amount of body fat at the beginning of winter and lose all stored fat by spring. The average length of a mature adult varies from 25½ to 36½ inches. Weight variation from young to mature adults varies from 7¾ to 39 pounds. Tail lengths, which are critical for defense from predators, range from 5¾ to 11¾ inches.

### Distribution

Porcupines are found throughout Canada and the western United States (Figure 1). In Wyoming, their distribution covers all regions of the state. Originally from South America, porcupines are an ecologically adaptable species, spreading as far north as Alaska. They

are found in deciduous forests, low deserts such as the Mojave in California, high desert regions of the Great Plains, and coniferous forests throughout the western states.

Porcupine presence is detected by identifying pellets or scats beneath feeding or resting trees. Another distinguishing feature of porcupine presence is discarded “niptwigs” on the ground underneath a feeding tree. Niptwigs are terminal twigs stripped of leaf blades and discarded by feeding porcupines. Niptwigs often are eaten by deer and other mammals.

### Habitat Characteristics

#### Den Types

Porcupines use dens for temporary shelter from rain, snow, and insects or for protection during winter. The two types of dens, pre-winter and

winter, are different in structure and location. Pre-winter dens are usually near favorite roosting or feeding areas and consist primarily of hollow trees. Winter dens are generally rock crevices in steep-sloped areas and located away from their preferred roosting or feeding sites. A string of below freezing temperature days stimulates porcupines to enter a permanent den. Where rock crevices are used for dens, porcupines commonly come out to feed at night.

Although porcupines prefer rock crevices for winter dens, if these are not available, caves, live hollow trees, hollow logs, human outbuildings, and thickly branched crowns of evergreens are suitable substitutes. Den use by porcupines is not mandatory, and some animals remain outside all year. This is especially true in areas where evergreens are abundant and no suitable rock crevices are available. Hemlock, Douglas fir, white spruce, yellow pine, and white fir are favorite trees for winter survival. In addition to providing shelter, these conifer trees also provide a convenient food source.

Porcupines do not use bedding or nesting material in the den but, instead, prefer a dry floor devoid of leaves and debris. Large accumulations of feces occur since dens are used year after year. In moist, temperate climates, feces are decomposed by mites; however, in dry, arid climates, accumulated feces form into an extremely hard concrete-like mass.

Two factors influence springtime exit from a den: a series of days where temperatures are above freezing and decreased snow pack. In areas of deep, fluffy snow where travel is difficult, porcupines leave den sites only when snow pack diminishes.

Porcupines are nocturnal animals and active all year. However, much time is spent resting in trees called “rest trees.” Use of a den or rest tree is evident by the presence of broken quills, recent scats, and the pungent odor of urine. Rest trees are a critical component of their habitat, even during adverse winter weather



**Figure 2.** A typical “rest tree” for porcupines consists of a dense crown that provides cover and protection from predators.

conditions. These trees may be deciduous or conifer species but a common characteristic is a dense crown that provides cover and protection from predators (Figure 2).

## Food Habits

---

### Spring

#### *Ground Feeding*

During spring and early summer, porcupines gorge on a variety of ground vegetation, adding valuable weight in preparation for the next winter (Figure 3). There is geographical variation in feeding behavior. In deciduous forests, porcupines do not need ground vegetation to compliment their diet, although some highly preferred foods, such as raspberry leaves, are consumed in excess when available. In high desert shrub areas, porcupines forage almost exclusively during the night to avoid the daytime heat.

Spring feeding on ground forage is controlled by snow cover. When there is no snow cover, porcupines feed exclusively on whatever ground vegetation is available and edible. Dietary items include grasses, flowers, dandelions, flowering herbs, and various other vegetation. Porcupines in western Douglas fir-juniper forests feed on ground vegetation in spring and return to a diet

of tree bark and evergreen needles after herbaceous forage dries out. Southwest porcupines will eat shrubs such as gooseberry, plums, chokecherry, buffaloberry, elder, black haw, raspberry canes, and buckbrush. Herbaceous plants in their diets include geranium, lupine, cinquefoil, wyethia, and lousewort. Porcupines in Wyoming commonly eat agoseris flower heads, American bistort, alpine bluebells, alpine buttercup, mountain clover, and dwarf willows.

Porcupines gain weight rapidly in the spring, feeding on nitrogen-rich forage. High nitrogen intake and changing climate trigger winter fur molting. The molting process is completed in a matter of days, leaving only the guard hairs, quills, and tail bristles. This rich spring diet has other consequences—a loss of sodium and subsequent desire for salt.

### **Salt Demand**

Porcupines find salt in salt-enriched soils, plants, road salt, wood, and various other items. These animals have been reported eating mud in salty-soil areas and wading in ponds to consume various plants, such as yellow water lily and aquatic liverwort, which have high salt concentrations. Rock salt, left over from salting winter roads to improve travel, is another source of sodium. Plywood, human-handled wood posts and timbers, fresh animal bones, old shoes and boots, paint, and the outer bark of trees contain sources of salt as well. Any object impregnated with urine also attracts porcupines because of the salt content.

### **Summer**

Porcupines alter their feeding behavior in response to seasonal plant species changes and food resource availability. During summer, ground vegetation (skunk cabbage, clover, lupines) comprises up to 85 percent of the porcupine diet. The remaining 15 percent is tree-gathered material, primarily bark. These herbaceous animals feed primarily on inner tree bark, twigs, and leaves with a preference for

Ponderosa pine, aspen, willow, and cottonwoods. Porcupines prefer trees with a thin, smooth bark as opposed to a thicker bark. Hence, young trees with thin palatable barks are often targets for foraging porcupines.

### **Fall**

During fall, porcupines substantially increase their intake of tree-gathered materials for forage to approximately 72 percent. Ground vegetation becomes less prevalent due to declining nutrient content and lower availability because of snow cover.

Porcupines in deciduous forests commonly remain within a small home-range area year-long due to abundant food sources. However, in western mountainous regions, such as Wyoming, porcupines have much larger home-range areas and wander extensively to fulfill nutritional requirements. Mountains, foothills, and desert or sagebrush areas provide varied forages at different times of the year. Porcupines foraging during the fall travel through areas that provide adequate feeding opportunities while enroute to their winter habitat. These are usually areas of rocky terrain interspersed with adequate trees for foraging.

In desert or sagebrush habitat, porcupines may travel toward foothills or riparian zones along rivers where trees are abundant. Porcupines in high mountain meadows may travel from alpine areas down into spruce-fir forests.

Porcupines use many tree species for food; however, differential abundance of these various species influences their dietary choices. Porcupines prefer acorns, beechnuts, piñon nuts, chokecherries, mushrooms, corn, mistletoe, and other types of fruits and nuts when available. Their preference for mistletoe is considered beneficial to forest health.

### **Winter**

In winter, porcupines feed exclusively on tree materials such as tree bark, twigs, buds, and

evergreen needles. Specific tree species used for winter food vary between vegetative community types. One study in Minnesota documented different food habits between two porcupine populations only four miles apart (e.g., the first population used mainly white pine, elm, and linden in its diet while the other used these three tree species for only 23 percent of its diet. Red oak, quaking aspen, and white pine were the primary species used by the second population). Generally, porcupines are not finicky eaters, using whatever species are most abundant in their area, provided they are palatable. Major winter foods of North American porcupines are listed in Table 1.

Porcupines cannot travel easily through snow. Therefore, winter activity and feeding can be as much as 90 percent less than spring and summer activity. Winter home-range areas are considerably smaller than summer home-range areas. However, when snow is crusted over, porcupines can feed freely and travel without much difficulty. When topography and winter weather conditions favor porcupine movement, they may not display any difference between summer and winter foraging habits. The distribution of den sites, their proximity to winter forage, and the amount and type of snow pack determine the extent of porcupine movement.

## General Biology

---

### Defense Reaction

Prior to engaging in a fight, porcupines will warn their attackers by displaying their quills, omitting threatening vocalizations, and producing an offensive odor. Porcupines use their quills as a last resort for defense.

Conspicuous black and white markings are visible to most potential predators from a back view. This contrast is due to the white quillshafts against the darker fur and is easily seen in the dark. Although western porcupines have light brown fur, the contrast is still evident



**Figure 3.** Porcupines depend on open coniferous forest areas with adequate understory ground vegetation for spring and summer foraging.

(Figure 4).

Young porcupines do not have this black and white coloration, but rather depend on concealment as a protection against predators. As they mature, the warning coloration of an adult develops. By three months old, porcupines have well-defined warning coloration.

Teeth clattering also warns potential predators. Porcupines deliberately shiver their bodies and simultaneously close their jaws, causing the incisors and cheek teeth to vibrate against one another. Teeth clattering may only last for 30 seconds, but it can be repeated many times. Porcupines only do this if an encounter is imminent.

Another warning is smell. A powerful odor is emitted from an area of skin above the base of the tail called the “rosette.” Only short, dark-colored quills cover the rosette without fur or guard hairs.

If all three warnings are ignored, porcupines use their quills when attacked. Quills are modified guard hairs, thicker than normal guard hairs and filled with a spongy matrix that makes them light and stiff. Quill tips have tiny fish-hook barbs that make removal difficult.

**Table 1.** Major winter foods of porcupines in North America (Roze 1989).

Food Species	Location	Authority
Spruces, white cedar	New Brunswick	Speer and Dilworth, 1978
White cedar, hemlock, beech	Maine	Curtis, 1944
Hemlock, beech, sugar maple	Massachusetts	Dodge, 1967
Hemlock, red spruce	New York (Adirondacks)	Shapiro, 1949
Beech, sugar maple	New York (Catskills)	Roze, 1984
Jack pine	Ontario	MacDonald, 1952
Hemlock, sugar maple	Michigan	Brander, 1973
Sugar maple, yellow birch	Wisconsin	Krefting et al., 1962
Yellow pine, Douglas fir, piñon	Arizona	Taylor, 1935
Ocotillo	Arizona desert	Reynolds, 1957
Ponderosa pine	Idaho	Curtis and Wilson, 1953
Douglas fir, limber pine	Alberta	Harder, 1979
Yellow pine	Oregon	Gabrielson, 1928
Spruces	Alaska	Murie, 1926

Upper back and neck quills are the longest, about four inches, and lie flat toward the tail when unaroused. When provoked, these quills stiffen up randomly in all directions, providing a defense against any approach to the porcupine. When a charging predator makes contact, quills are embedded barbed-end first by the predator's momentum.

The upper tail surface has short black quills that are much more dangerous than the longer back and neck quills. With a tail slap, these quills become internal projectiles, embedded deeply into the skin of an attacking animal. There are documented cases where a quill has perforated a man's intestine and caused death. Infections seldom occur from embedded quills, however, since they have antibiotic properties.

### Reproduction

Mating occurs in the fall (September to November) with a gestation period of approximately seven months. Reproduction is conducted by the conventional method of most

mammals, while the female's quills are relaxed. A single offspring is born in May or June. The quills, developed at birth, are not injurious to the mother because of protection from the placental sac and the predominate moisture content of new quills. However, quills dry and harden within hours.

Newborn porcupines are fully developed at birth, usually weighing about one pound. They grow rapidly, doubling their weight in about two weeks. Although young porcupines can flick their tails within an hour after birth, their best defense is hiding. Young porcupines are essentially odorless, making it difficult for predators to locate them. In addition, defecation is stimulated by the mother during this early period, and the droppings are eaten to eliminate any fecal odor, which may attract predators. When old enough to climb, young porcupines spend more time in trees as evidenced by the accumulation of tiny droppings under trees.

Porcupines normally give birth to only one

offspring each year. The female nurses the young from a pair of nipples located under the armpits and another pair on the abdomen. The female sits upright on her haunches and tail, allowing the newborn access to her quill-free abdomen. Nursing lasts approximately 127 days, following the 210-day gestation period. Therefore, females spend 337 days of the year either being pregnant or lactating. Porcupines must nurse their young for a long time because of the inherently poor nutritional quality of a leaf and bark diet.

Adult females do not wander far from the offspring during the first six weeks after birth. Young porcupines can climb small sapling-size trees, but these smaller trees are often difficult for adults to climb. Therefore, mother and infant meet only at night on the ground. Generally, though, adult females sleep in a resting tree during the day, with the baby hidden on the ground in hollow bases of trees, rock crevices, under fallen tree trunks, and in slash piles.

As young porcupines mature, the separation distance between mothers and their offspring increases during the day due to greater travel distances. At night, however, mothers always return to the young from distances as far away as a half mile. While accompanying their mothers, young porcupines learn locations of food trees, dens, shelters, and hiding places. Weaning occurs at the end of the mating season in late fall. Male offspring may remain within the mother's home range in the fall, but females generally leave. Young porcupines spend their first winter alone and reach sexual maturity during the third year after birth. Males commonly mate with more than one female to ensure species perpetuity. This is important since reproductive rates are low.

## Social Structure

Porcupines are solitary animals throughout most of the year, except during the fall breeding



**Figure 4.** Displaying their quills is one warning that porcupines use to fend off potential predators. Conspicuous black and white markings from a back view are due to the contrasting white quills against their darker fur.

season. During the breeding season, males are attracted to females by scent. At this time, males will fight with each other over females and territory. Encounters between males at salt sources have been described as “agonistic,” accompanied by high vocalization. In captivity, males will commonly kill each other.

Although there is not a lot of information on porcupine social behavior, there is evidence of some social interaction. Related males commonly have overlapping ranges and develop loosely tied associations with each other. Encounters between males acquainted with each other are tolerated, but meetings between males from different associations result in fights.

Adult females are even more intolerant with each other, mainly because they share limited resources in a smaller home-range area compared to males. Even mother-daughter encounters cause fights after the daughter matures. Unlike males who expand territorial areas as they mature, females maintain small and highly defensible territories. Home-range areas of males may overlap as many as five female home

ranges. Increased competition for breeding in a smaller female home-range induces adult males to disperse and colonize other territories. This situation occurs approximately every four years. Also, yearly differences in food supply may cause porcupines of either sex to disperse at any time.

## Life Span

Porcupines have generally low mortality rates, with an average life span of seven to eight years. Common causes of mortality are disease, winter stress, injury, and human predation. Scabies, caused by the mite *Sarcoptes scabiei*, causes high mortality among porcupines; other parasites include lice, ticks, tapeworms, and nematodes. In severe winters, porcupines die from prolonged sub-zero temperatures and heavy snow pack, which limits access to food material. In some cases, porcupines injure themselves falling out of trees.

Porcupines have few natural predators, although fishers are probably the most efficient at killing porcupines. Fishers can overturn a porcupine easily, exposing the unquilled ventral side to a fatal attack. However, fishers are often fatally injured during this encounter. Other natural predators include mountain lions, bobcats, horned owls, coyotes, fox, black bear, and marten.

## Winter Adaptations

Porcupines have developed two primary adaptations to survive extreme winter temperatures: a thick fur undercoat and changes in metabolic rates to maintain body temperature. A thick, dense fur undercoat develops in the fall as temperatures start dropping. By early winter, this fur is so dense that all quills, except the short rosette quills on the base of the tail, are hidden. During early summer, the fur is completely molted to start the cycle of fur development again. Although they don't provide much warmth, the four other types of

hair are: quills, bristles (found on the tail undersurface), vibrissae (whiskers), and guard hairs.

Another mechanism used to survive extreme winter temperatures is adjusting metabolic rate. Normal basal metabolism, in conjunction with a dense fur undercoat, is adequate to maintain body temperature in outside temperatures down to -4 degrees Celsius. However, as outside temperatures drop below -4 degrees Celsius, porcupines increase their metabolic rates to compensate.

## Digestive System

Porcupines feeding on leaves and bark consume a high percentage of dietary fiber, most of which is not easily digested by mammalian digestive enzymes. Some examples of complex fiber molecules are celluloses, lignin, and pectin. However, bacteria that can digest celluloses and hemicelluloses are found in the porcupine's caecum, a large sack located at the junction of the small and large intestines. Since digestion of dietary fiber takes a long time with these bacteria, the large intestine is extremely long, resulting in a slow passage time. This permits maximum absorption of the fermented products of the caecum.

Cellulose digestion provides another benefit—additional protein metabolism. A by-product of protein metabolism is urea, which is normally excreted in the urine. However, the bacteria in the caecum also break down urea, improving water absorption and reducing kidney function. This function allows porcupines to extract maximum water amounts from consumed foods. This is especially significant for porcupines residing in desert areas or when porcupines remain in a feeding or resting tree for prolonged periods.

Foods consumed by porcupines must be reduced to dust-like consistency for efficient breakdown by digestive bacteria. Porcupines have 20 teeth to accomplish this task: 4

incisors, 4 premolars, and 12 molars. Incisor teeth continually grow and require constant wear to maintain proper length. The premolars and molars are collectively called the “cheek teeth,” and are located far back in the jaws behind a large empty space called the “diastema.” The lips are collapsed over the diastema space while chewing, allowing porcupines to cut food materials with their incisors while keeping their inner mouths closed. Cheek teeth move in a front to back motion while chewing—not sideways as in humans. These teeth have fixed growth roots and can be worn down to the gum line in older animals. Porcupines over 12 years old are typically lighter in weight due to restricted food consumption as a result of worn cheek teeth.

## **Damage Problems and Economic Impacts**

---

Economic losses from porcupines feeding on forest plantations, ornamental trees, and fruit orchards and damage to human articles containing salts (i.e., leather products, wood-handled implements, and fence posts) can be considerable. Porcupines usually are tolerated except where high-value ornamental plantings, commercial timber, nursery stock, or orchard trees are damaged by girdling, basal gnawing, or branch clipping. Often, tree diameter growth is restricted or young saplings are killed from porcupine feeding.

### **Tree Damage**

Most porcupine feeding on mature trees occurs in the crown where preference for leaves, terminal twigs, and young bark prevails (Figure 5). This type of feeding activity does not kill the tree, but it causes lateral branching in various directions where terminal branches are removed. Successive years of pruning terminal branches result in short growth form with several twisted, odd-shaped limbs. Trees that

develop an “eerie” growth form due to porcupine impact are commonly called “witch trees.” Trees most susceptible to mortality are young saplings where porcupine feeding on the ground results in basal girdling.

Porcupine feeding activities can influence the structure and plant species composition of the forest, especially near their winter dens. Since porcupines feed close to winter dens and occupy the same dens each year, trees in these areas sustain heavy impact year after year. Although in some situations, this impact may result in long-term ecological diversification of forest vegetation. In this scenario, trees preferred for feeding are suppressed, allowing unpreferred tree species to compete for existing soil and water resources. Eventually, this results in a more diverse plant community structure. In addition, feeding in the canopy of mature trees reduces canopy cover, permits more light penetration to the forest floor, and stimulates more herbaceous understory plant production. A more diverse understory plant community can provide better habitat conditions for wildlife species such as ruffed grouse, snowshoe hare, white-tailed deer, moose, morning warbler, yellowthroat, and a variety of other songbirds and small mammals.

Porcupines also provide another benefit to forest birds by providing shelter and nest sites in hollow tree trunks. Porcupine feeding activities may expose the tree’s heartwood area where sap and soft inner plant tissue attract insects used by birds as a food source.

In 1957, Weyerhaeuser, Inc., completed a study claiming that a single porcupine could destroy approximately \$6,000 worth of timber during its lifetime. Researchers claimed the majority of damage was due to girdling of Ponderosa pine seedlings, with lesser damage to lodgepole pine, white fir, Douglas fir, and spruce. Timber companies frequently cite porcupines for extensive damage to commercial plantations

but rarely describe the location and size of the damaged area, methods used to estimate damage losses, and considerations of other potential forest animals as perpetrators of tree damage. Before blaming porcupines, other potential causes of damage (such as deer, rabbits, drought, fungi, insects, excessive soil temperatures, and competition from invasive plants) should be considered.

Other economic losses from porcupines include damage to ornamental trees planted around summer cabins, vacation homes, and rural homesteads. In some areas, damage to fruit and nut orchard plantations by porcupines can be extensive. There also have been reports of porcupines damaging corn, small grains, and alfalfa fields.

### **Damage from Salt Demand**

Although porcupine damage to wooden structures and human articles containing salt is generally minimal, there are situations where this type of economic loss can be high, especially in areas of high porcupine density at certain times of the year. Any item containing salt can attract porcupines. Examples are leather goods, saddle blankets, old shoes, fresh animal bones, wood-handle garden implements (rakes, shovels, hoes, etc.), and fence posts handled by perspiring workers. Plywood has a high salt content and is often targeted by porcupines.

### **Legal Status**

---

In Wyoming, the porcupine is classified as a “predatory animal” and can be taken without a license in any manner and at any time of the year. Many other states have adopted protective measures for porcupines because of their vulnerability to human harvesting.

### **Damage Prevention and Management Techniques**

---

## **Non-Lethal Techniques**

### ***Ecological Methods***

Generally, any forest management technique that perpetuates closed canopy tree stands reduces porcupine populations. In closed canopy tree stands there is limited understory herbaceous vegetation, resulting in reduced food for porcupines. These conditions restrict porcupine numbers by reducing reproductive potential, encourage development of larger home-range areas, and increase winter mortality from stress-related causes due to nutritional deficiencies.

Recent theories suggest practices that open canopy cover, such as prescribed burning and timber harvest, result in more favorable habitat conditions and attract natural porcupine predators. Increased predator densities may suppress porcupine populations as well. Therefore, opinions are mixed regarding the success of ecological methods to control porcupine populations.

### ***Exclusion***

Fencing is a preventive measure with limited application due to the high cost of materials. However, fencing can be cost-effective where potential economic losses may be great such as in research areas, commercial tree plantations, and fruit or nut orchards.

Electric fences work best when the smooth hot wire is placed 1½ inches above an 18-inch high poultry wire fence. For non-electric fences, use 12- to 14-gauge woven wire at least 24 inches tall. To discourage climbing, place an overhanging wire strip around the top of the fence, facing outward, at a 65 degree angle to the fence top.

To protect mature trees, place a 30 inch wide band of aluminum flashing around the tree trunk to prevent bark chewing at ground level. For small trees, a wire basket that completely

encloses the tree works well.

### **Repellents**

Repellents, such as thiram, can be used to discourage porcupine chewing, although they must be renewed frequently for maximum effectiveness. Repellents can be sprayed or painted on plants targeted by porcupines.

Exterior plywood can be coated with common wood preservatives to deter chewing, but this is not 100 percent effective. A better solution is to provide an alternative salt source, since chewing on plywood is done mainly to satisfy a salt craving. A short picket fence made from salt-impregnated wood sticks offers a good “salt lick” for porcupines.

### **Biological Options**

One researcher in the Southwest suggested that porcupines inflict more damage to trees when livestock overgrazing removes preferred summer forage. Assuming this relationship exists, light livestock grazing may be used as a tool to stimulate more herbaceous forage production (used by porcupines as a food source), therefore relieving porcupine damage to trees in the area.

Enhancing natural predator numbers is another biological control option to consider. Over time, unrestricted trapping and excessive killing of natural predators, such as the fisher, coyote, and mountain lion, may have promoted higher porcupine numbers. Recently, fishers have been released in California, Idaho, Oregon, Montana, Michigan, Wisconsin, New York, and Vermont to re-establish original numbers. These releases were not conducted to control porcupine populations specifically; however, Michigan researchers report that fishers appear to be impacting porcupine numbers.

### **Live Trapping**

Live trapping porcupines is easy and effective for individual animals damaging gardens, small



**Figure 5.** Damage to trees from porcupines commonly occurs in the crown where feeding preferences for leaves, terminal twigs, and young bark occurs. (Photo courtesy of Lyle Crosby, retiree, USDA APHIS, Animal Damage Control, Casper, Wyoming.)

orchards, or ornamental trees. Commercial cage traps or homemade box traps baited with salt-soaked materials work well in damage areas. Once trapped, animals should be relocated at least 25 miles away in suitable habitat to prevent their return.

Porcupines also can be caught by inverting a garbage can over them, sliding the lid under the can, and turning the can upright. A cone constructed of wire fencing material and inverted over the animal works as well. A piece of plywood can be slid under the wire cone before inverting the cone. With any live-trapping method, avoid the tail area and use thick rubber gloves to handle the animal.

### **Lethal Techniques**

Non-lethal techniques to control problem porcupines are always the preferred approach. But, in some cases of extensive damage or where non-lethal techniques are ineffective on individual problem animals, lethal control techniques must be considered.

### **Shooting**

An effective method of directly controlling porcupine numbers is shooting. Hunting during late-spring and summer is an effective time for harvesting animals feeding on herbaceous ground vegetation, irrigated crops, and orchard trees. Hunting during the fall and early winter may also reduce colonization; however, this usually has less impact on porcupine populations than summer shooting.

### ***Poisoning***

There are no legally registered toxicants to use in controlling porcupines.

### ***Trapping***

Where it is legal, trapping is an effective technique for removing a small number of animals, but it is not practical in areas of high porcupine densities. Steel leghold traps, size 2 or 3, can be set using salt baits and placed near the entrance of active dens or along well-used trails. Coyote urine scent posts set near dens and in areas of damage activity also are effective. However, non-target animals often are trapped so leghold sets must be checked daily to release these animals. Trapped porcupines can be shot or killed by a sharp blow to the head. Baits are usually salt-soaked materials such as wood blocks, sponges, or clothes.

### **Summary**

---

Porcupines are interesting animals and play an important role in ecosystem function. They are one of few animals easily caught by unarmed humans for use as an emergency food source. Their quills have been used for centuries in various decorations, while their fur is a valuable commodity for tying fishing flies. They also provide countless photo opportunities.

Since porcupine activity varies seasonally, specific damage management practices must be adjusted several times each year to provide

optimum damage control. Before implementing a damage control technique, assess the presence of porcupines by looking for broken quills, fecal piles underneath feeding and resting trees, or characteristic damage signs to area trees. Select the most efficient, cost-effective damage control technique that is compatible with the porcupine's seasonal activity pattern.

Before implementing extensive control practices, carefully evaluate the degree of damage actually inflicted by porcupines. Total eradication of porcupines from an ecosystem is neither a practical option nor ecologically wise.

## **Summary of Damage Prevention and Control Methods**

---

### **Ecological Methods**

- Implement forest management practices that perpetuate closed canopy cover to reduce understory forage production (to reduce food supply, encourage larger home ranges and increase stress-related winter mortality).
- Manipulate habitat to attract more natural predators.

### **Exclusion**

- Fence small areas or areas of potentially high economic losses with electric or non-electric fencing.
- Place aluminum flashing around mature tree trunks; enclose small trees with wire baskets.

### **Repellants**

- None are specifically registered, although thiram may repel porcupines.
- Some wood preservatives applied to trees may provide partial damage relief.

## Biological Options

- Light livestock grazing to stimulate herbaceous forage used by porcupines as food sources may reduce damage to area trees.

## Shooting

- Shooting is most effective during late-spring and summer activity periods.

## Poisoning

- There are no legally registered toxicants to control porcupines at this time.

## Trapping

- Use steel leghold traps (size 2 or 3) baited with salt-soaked materials and placed near active dens or well-used trails.
- Live trap with commercial cage traps or homemade box traps baited with salt-soaked materials, then relocate animals at least 25 miles away.

## Other Methods

- The best alternative approach to mitigate damage is to provide alternative salt sources such as salt-impregnated wood.

## Acknowledgements

Information presented in this bulletin was extracted primarily from the following references:

- Brander, R.B. 1973. "Life-history notes on the porcupine in a hardwood-hemlock forest in upper Michigan." *Michigan Academy of Science* 5:425-433.
- Brockman, S. 1992. "Homeowners guide for resolving wildlife conflicts." *Habitat Extension Bulletin No. 45*, Wyoming

Game and Fish Department, Cheyenne, WY.

- Costello, D.F. 1966. *The world of the porcupine*. J.B. Lippincott Company, Philadelphia and New York.
- Curtis, J.D. and E.L. Kozicky. 1944. "Observations on the eastern porcupine." *Journal of Mammology* 25:137-146.
- Curtis, J.D. and A.K. Wilson. 1953. "Porcupine feeding on ponderosa pine in central Idaho." *Journal of Forestry* 51:339-341.
- Dodge, W.E. 1967. "The biology and life history of the porcupine (*Erethizon dorsatum*) in western Massachusetts." Doctoral dissertation, University of Massachusetts, Amherst.
- Dodge, W.E. 1982. "Porcupine." In: *Wild Mammals of North America: Biology, Management, and Economics*, eds., J.A. Chapman and G.A. Feldhamer, John Hopkins University Press, Baltimore and London, pp. 355-366.
- Harder, L.D. 1979. "Winter feeding by porcupines in montane forests of southwestern Alberta." *Canadian Field Naturalist* 93:405-410.
- Horn, E.E. 1925. "Studies relative to economic control of porcupines." USDA Forest Service, Southwest Forest and Range Experiment Station, Flagstaff, AZ. Unpublished report, 25 p.
- Knopf, A.A. 1989. *Audubon society's field guide to north American mammals*. (6th ed.). 520 p.
- Krefting, L.W., J.H. Stoeckeler, B.J. Bradle, and W.D. Fitzwater. 1962. "Porcupine-timber relationships in the lake states." *Journal of Forestry* 60:325-330.
- Lawrence, W.H. 1957. *Porcupine control: A research analysis*. Weyerhaeuser Timber Company, Centralia, WA.

- MacDonald, D.R. 1952. "Some observations on porcupine attacks on jack pine." In: *The Annual Ring*, University of Toronto, Canada, pp.17-78.
- Murie, O.J. 1926. "The porcupine in northern Alaska." *Journal of Mammology* 7:109-113.
- Reynolds, H.G. 1957. "Porcupine behavior in the desert-shrub type of Arizona." *Journal of Mammology* 33:418-419.
- Roze, U. 1989. *The north American porcupine*. Smithsonian Institute Press, Washington, D.C.
- Roze, U. 1984. "Winter foraging by individual porcupines." *Canadian Journal of Zoology* 62:2425-2428.
- Schemnitz, S.D. 1994. "Porcupines: Damage prevention and control methods." In: *Prevention and Control of Wildlife Damage*. Cooperative Extension Service, University of Nebraska, Lincoln, pp. B-81 - B-92.
- Speer, R.J. and T.G. Dilworth. 1978. "Porcupine winter foods and utilization in central New Brunswick." *Canadian Field Naturalist* 92:271-274.
- Taylor, W.P. 1935. "Ecology and wildlife history of the porcupine (*Erethizon epixanthum*) as related to the forests of Arizona and southwestern United States." *Biological Science Bulletin*, University of Arizona, Tucson, 3:1-177.
- Tenneson, C. and L.W. Oring. 1985. "Winter food preferences of porcupines." *Journal of Wildlife Management* 49:28-33.

