

NUTRIA

Fig. 1. Nutria (*Myocastor coypus*)



Damage Prevention and Control Methods

Exclusion

Protect small areas with partially buried fences.

Wire tubes can be used to protect baldcypress or other seedlings but are expensive and difficult to use.

Use sheet metal shields to prevent gnawing on wooden and styrofoam structures and trees near aquatic habitat.

Install bulkheads to deter burrowing into banks.

Cultural Methods and Habitat Modification

Improve drainage to destroy travel lanes.

Manage vegetation to eliminate food and cover.

Contour stream banks to control burrowing.

Plant baldcypress seedlings in the fall to minimize losses.

Restrict farming, building construction, and other "high risk" activities to upland sites away from water to prevent damage.

Manipulate water levels to stress nutria populations.

Frightening

Ineffective.

Repellents

None are registered. None are effective.

Toxicants

Zinc phosphide on carrot or sweet potato baits.

Fumigants

None are registered. None are effective.

Trapping

Commercial harvest by trappers.

Double longspring traps, Nos. 11 and 2, as preferred by trappers and wildlife damage control specialists.

Body-gripping traps, for example, Conibear® Nos. 160-2 and 220-2, and locking snares are most effective when set in trails, den entrances, or culverts.

Live traps should be used when leghold and body-gripping traps cannot be set.

Long-handled dip nets can be used to catch unwary nutria.

Shooting

Effective when environmental conditions force nutria into the open. Night hunting is illegal in many states.

Other Methods

Available control techniques may not be applicable to all damage situations. In these cases, safe and effective methods must be tailored to specific problems.



PREVENTION AND CONTROL OF WILDLIFE DAMAGE — 1994

Cooperative Extension Division
Institute of Agriculture and Natural Resources
University of Nebraska - Lincoln

United States Department of Agriculture
Animal and Plant Health Inspection Service
Animal Damage Control

Great Plains Agricultural Council
Wildlife Committee

Identification

The nutria (*Myocastor coypus*, Fig. 1) is a large, dark-colored, semiaquatic rodent that is native to southern South America. At first glance, a casual observer may misidentify a nutria as either a beaver (*Castor canadensis*) or a muskrat (*Ondatra zibethicus*), especially when it is swimming. This superficial resemblance ends when a more detailed study of the animal is made. Other names used for the nutria include coypu, nutria-rat, South American beaver, Argentine beaver, and swamp beaver.

Nutria are members of the family Myocastoridae. They have short legs and a robust, highly arched body that is approximately 24 inches (61 cm) long. Their round tail is from 13 to 16 inches (33 to 41 cm) long and scantily haired. Males are slightly larger than females; the average weight for each is about 12 pounds (5.4 kg). Males and females may grow to 20 pounds (9.1 kg) and 18 pounds (8.2 kg), respectively.

The dense grayish underfur is overlaid by long, glossy guard hairs that vary in color from dark brown to yellowish brown. The forepaws have four well-developed and clawed toes and one vestigial toe. Four of the five clawed toes on the hind foot are interconnected by webbing; the fifth outer toe is free. The hind legs are much larger than the forelegs. When moving on land, a nutria may drag its chest and appear to hunch its back. Like beavers, nutria have large incisors that are yellow-orange to orange-red on their outer surfaces.

In addition to having webbed hind feet, nutria have several other adaptations to a semiaquatic life. The eyes, ears, and nostrils of nutria are set high on their heads. Additionally, the nostrils and mouth have valves that seal out water while swimming, diving, or feeding underwater. The mammae or teats of the female are located high on the sides, which allows the young to suckle while in the water. When pursued, nutria can swim long distances under water and see well enough to evade capture.

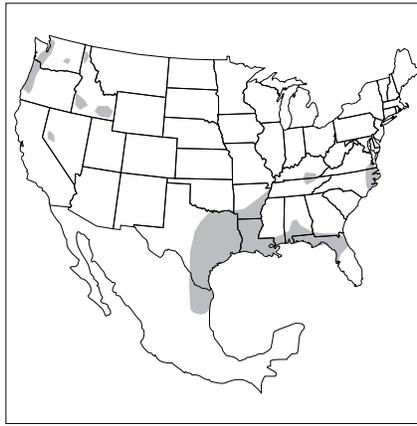


Fig. 2. Range of the nutria introduced in North America.

Range

The original range of nutria was south of the equator in temperate South America. This species has been introduced into other areas, primarily for fur farming, and feral populations can now be found in North America, Europe, the Soviet Union, the Middle East, Africa, and Japan. *M. c. bonariensis* was the primary subspecies of nutria introduced into the United States.

Fur ranchers, hoping to exploit new markets, imported nutria into California, Washington, Oregon, Michigan, New Mexico, Louisiana, Ohio, and Utah between 1899 and 1940. Many of the nutria from these ranches were freed into the wild when the businesses failed in the late 1940s. State and federal agencies and individuals translocated nutria into Alabama, Arkansas, Georgia, Kentucky, Maryland, Mississippi, Oklahoma, Louisiana, and Texas, with the intent that nutria would control undesirable vegetation and enhance trapping opportunities. Nutria were also sold as “weed cutters” to an ignorant public throughout the Southeast. A hurricane in the late 1940s aided dispersal by scattering nutria over wide areas of coastal southwest Louisiana and southeast Texas.

Accidental and intentional releases have led to the establishment of widespread and localized populations of nutria in various wetlands throughout the United States. Feral animals have been reported in at least 40 states and

three Canadian provinces in North America since their introduction. About one-third of these states still have viable populations that are stable or increasing in number. Some of the populations are economically important to the fur industry. Adverse climatic conditions, particularly extreme cold, are probably the main factors limiting range expansion of nutria in North America. Nutria populations in the United States are most dense along the Gulf Coast of Louisiana and Texas (Fig. 2).

Habitat

Nutria adapt to a wide variety of environmental conditions and persist in areas previously claimed to be unsuitable. In the United States, farm ponds and other freshwater impoundments, drainage canals with spoil banks, rivers and bayous, freshwater and brackish marshes, swamps, and combinations of various wetland types can provide a home to nutria. Nutria habitat, in general, is the semiaquatic environment that occurs at the boundary between land and permanent water. This zone usually has an abundance of emergent aquatic vegetation, small trees, and/or shrubs and may be interspersed with small clumps and hillocks of high ground. In the United States, all significant nutria populations are in coastal areas, and freshwater marshes are the preferred habitat.

Food Habits

Nutria are almost entirely herbivorous and eat animal material (mostly insects) incidentally, when they feed on plants. Freshwater mussels and crustaceans are occasionally eaten in some parts of their range. Nutria are opportunistic feeders and eat approximately 25% of their body weight daily. They prefer several small meals to one large meal.

The succulent, basal portions of plants are preferred as food, but nutria also eat entire plants or several different parts of a plant. Roots, rhizomes, and tubers are especially important during winter. Important food plants in the

United States include cordgrasses (*Spartina* spp.), bulrushes (*Scirpus* spp.), spikerushes (*Eleocharis* spp.), chaffflower (*Alternanthera* spp.), pickleweeds (*Pontederia* spp.), cattails (*Typha* spp.), arrowheads (*Sagittaria* spp.), and flatsedges (*Cyperus* spp.). During winter, the bark of trees such as black willow (*Salix nigra*) and baldcypress (*Taxodium distichum*) may be eaten. Nutria also eat crops and lawn grasses found adjacent to aquatic habitat.

Because of their dexterous forepaws, nutria can excavate soil and handle very small food items. Food is eaten in the water; on feeding platforms constructed from cut vegetation; at floating stations supported by logs, decaying mats of vegetation, or other debris; in shallow water; or on land. In some areas, the tops of muskrat houses and beaver lodges may also be used as feeding platforms.

General Biology, Reproduction, and Behavior

General Biology

In the wild, most nutria probably live less than 3 years; captive animals, however, may live 15 to 20 years. Predation, disease and parasitism, water level fluctuations, habitat quality, highway traffic, and weather extremes affect mortality. Annual mortality of nutria is between 60% and 80%.

Predators of nutria include humans (through regulated harvest), alligators (*Alligator mississippiensis*), garfish (*Lepisosteus* spp.), bald eagles (*Haliaeetus leucocephalus*), and other birds of prey, turtles, snakes such as the cottonmouth (*Agkistrodon piscivorus*), and several carnivorous mammals.

Nutria densities vary greatly. In Louisiana, autumn densities of about 18 animals per acre (44/ha) have been found in floating freshwater marshes. In Oregon, summer densities in freshwater marshes may be 56 animals per acre (138/ha). Sex ratios range from 0.6 to 1.6 males per female.

In summer, nutria live on the ground in dense vegetation, but at other times of the year they use burrows. Burrows may be those abandoned by other animals such as armadillos (*Dasypus novemcinctus*), beavers, and muskrats, or they may be dug by nutria. Underground burrows are used by individuals or multigenerational family groups.

Burrow entrances are usually located in the vegetated banks of natural and human-made waterways, especially those having a slope greater than 45°. Burrows range from a simple, short tunnel with one entrance to complex systems with several tunnels and entrances at different levels. Tunnels are usually 4 to 6 feet (1.2 to 1.8 m) long; however, lengths of up to 150 feet (46 m) have been recorded. Compartments within the tunnel system are used for resting, feeding, escape from predators and the weather, and other activities. These vary in size, from small ledges that are only 1 foot (0.3 m) across to large family chambers that measure 3 feet (0.9 m) across. The floors of these chambers are above the water line and may be covered with plant debris discarded during feeding and shaped into crude nests.

In addition to using land nests and burrows, nutria often build flattened circular platforms of vegetation in shallow water. Constructed of coarse emergent vegetation, these platforms are used for feeding, loafing, grooming, birthing, and escape, and are often misidentified as muskrat houses. Initially, platforms may be relatively low and inconspicuous; however, as vegetation accumulates, some may attain a height of 3 feet (0.9 m).

Reproduction

Nutria breed in all seasons throughout most of their range, and sexually active individuals are present every month of the year. Reproductive peaks occur in late winter, early summer, and mid-autumn, and may be regulated by prevailing weather conditions.

Under optimal conditions, nutria reach sexual maturity at 4 months of age. Female nutria are polyestrous, and nonpregnant females cycle into estrus

(“heat”) every 2 to 4 weeks. Estrous is maintained for 1 to 4 days in most females. Sexually mature males can breed at any time because sperm is produced throughout the year.

The gestation period for nutria ranges from 130 to 132 days. A postpartum estrus occurs within 48 hours after birth and most females probably breed again during that time.

Litters average 4 to 5 young, with a range of 1 to 13. Litter sizes are generally smaller during winter, in suboptimal habitats, and for young females. Females often abort or assimilate embryos in response to adverse environmental conditions.

Young are precocial and are born fully furred and active. They weigh approximately 8 ounces (227 g) at birth and can swim and eat vegetation shortly thereafter. Young normally suckle for 7 to 8 weeks until they are weaned.

Behavior

Nutria tend to be crepuscular and nocturnal, with the start and end of activity periods coinciding with sunset and sunrise, respectively. Peak activity occurs near midnight. When food is abundant, nutria rest and groom during the day and feed at night. When food is limited, daytime feeding increases, especially in wetlands free from frequent disturbance.

Nutria generally occupy a small area throughout their lives. In Louisiana, the home range of nutria is about 32 acres (13 ha). Daily cruising distances for most nutria are less than 600 feet (183 m), although some individuals may travel much farther. Nutria move most in winter, due to an increased demand for food. Adults usually move farther than young. Seasonal migrations of nutria may also occur. Nutria living in some agricultural areas move in from marshes and swamps when crops are planted and leave after the crops are harvested.

Nutria have relatively poor eyesight and sense danger primarily by hearing. They occasionally test the air for scent. Although they appear to be

clumsy on land, they can move with surprising speed when disturbed. When frightened, nutria head for the nearest water, dive in with a splash, and either swim underwater to protective cover or stay submerged near the bottom for several minutes. When cornered or captured, nutria are aggressive and can inflict serious injury to pets and humans by biting and scratching.

Damage and Damage Identification

Kinds of Damage

Nutria damage has been observed throughout their range. Most damage is from feeding or burrowing. In the United States, most damage occurs along the Gulf Coast of Louisiana and Texas. The numerous natural and human-made waterways that traverse this area are used extensively for travel by nutria.

Burrowing is the most commonly reported damage caused by nutria. Nutria are notorious in Louisiana and Texas for undermining and breaking through water-retaining levees in flooded fields used to produce rice and crawfish. Additionally, nutria burrows sometimes weaken flood control levees that protect low-lying areas. In some cases, tunneling in these levees is so extensive that water will flow unobstructed from one side to the other, necessitating their complete reconstruction.

Nutria sometimes burrow into the styrofoam flotation under boat docks and wharves, causing these structures to lean and sink. They may burrow under buildings, which may lead to uneven settling or failure of the foundations. Burrows can weaken roadbeds, stream banks, dams, and dikes, which may collapse when the soil is saturated by rain or high water or when subjected to the weight of heavy objects on the surface (such as vehicles, farm machinery, or grazing livestock). Rain and wave action can wash out and enlarge collapsed burrows and compound the damage.

Nutria depredation on crops is well documented. In the United States, sugarcane and rice are the primary crops damaged by nutria. Grazing on rice plants can significantly reduce yields, and damage can be locally severe. Sugarcane stalks are often gnawed or cut during the growing season. Often only the basal internodes of cut plants are eaten. Other crops that have been damaged include corn, milo (grain sorghum), sugar and table beets, alfalfa, wheat, barley, oats, peanuts, various melons, and a variety of vegetables from home gardens and truck farms.

Nutria girdle fruit, nut, and shade trees and ornamental shrubs. They also dig up lawns and golf courses when feeding on the tender roots and shoots of sod grasses. Gnawing damage to wooden structures is common. Nutria also gnaw on styrofoam floats used to mark the location of traps in commercial crawfish ponds.

At high densities and under certain adverse environmental conditions, foraging nutria can significantly impact natural plant communities. In Louisiana, nutria often feed on seedling baldcypress and can cause the complete failure of planted or naturally-regenerated stands. Overutilization of emergent marsh plants can damage stands of desirable vegetation used by other wildlife species and aggravate coastal erosion problems by destroying vegetation that holds marsh soils together. Nutria are fond of grassy arrowhead (*Sagittaria platyphylla*) tubers and may destroy stands propagated as food for waterfowl in artificial impoundments.

Nutria can be infected with several pathogens and parasites that can be transmitted to humans, livestock, and pets. The role of nutria, however, in the spread of diseases such as equine encephalomyelitis, leptospirosis, hemorrhagic septicemia (Pasteurellosis), paratyphoid, and salmonellosis is not well documented. They may also host a number of parasites, including the nematodes and blood flukes that cause "swimmer's-itch" or "nutria-itch" (*Strongyloides myopotami* and

Schistosoma mansoni), the protozoan responsible for giardiasis (*Giardia lamblia*), tapeworms (*Taenia* spp.), and common liver flukes (*Fasciola hepatica*). The threat of disease may be an important consideration in some situations, such as when livestock drink from water contaminated by nutria feces and urine.

Damage Identification

The ranges of nutria, beavers, and muskrats overlap in many areas and damage caused by each may be similar in appearance. Therefore, careful examination of sign left at the damage site is necessary to identify the responsible species.

On-site observations of animals and their burrows are the best indicators of the presence of nutria. Crawl outs, slides, trails, and the exposed entrances to burrows often have tracks that can be used to identify the species. The hind foot, which is about 5 inches (13 cm) long, has four webbed toes and a free outer toe. A drag mark left by the tail may be evident between the footprints (Fig. 3).

Droppings may be found floating in the water, along trails, or at feeding sites. These are dark green to almost black in color, cylindrical, and approximately 2 inches (5 cm) long and 1/2 inch (1.3 cm) in diameter. Additionally, each dropping usually has deep, parallel grooves along its entire length (Fig. 4).

Trees girdled by nutria often have no tooth marks, and bark may be peeled from the trunk. The crowns of seedling trees are usually clipped (similar to rabbit [*Sylvilagus* spp.] damage) and discarded along with other woody portions of the plant.

In rice fields, damage caused by nutria, muskrats, and Norway rats (*Rattus norvegicus*) can be confused. Nutria and muskrats damage rice plants by clipping stems at the water line in flooded fields; Norway rats reportedly clip stems above the surface of the water (E. A. Wilson, personal communication).

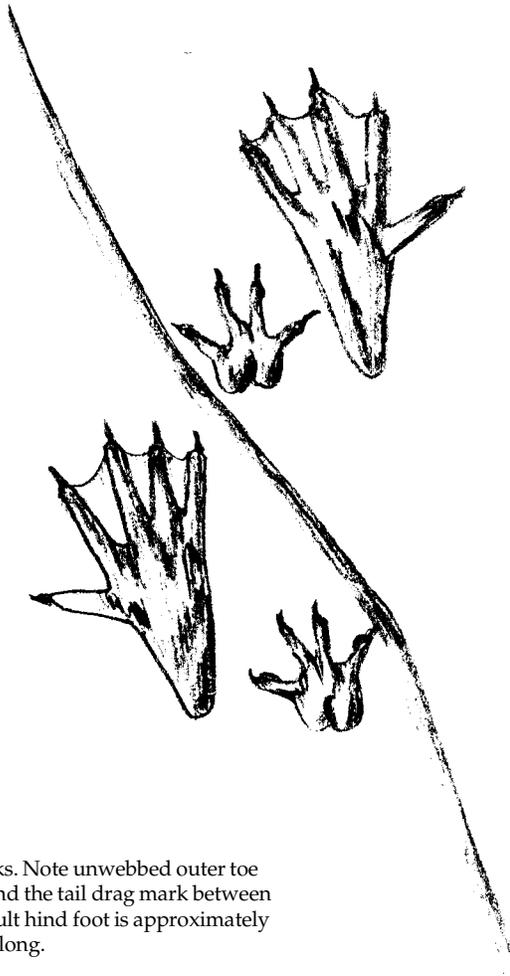


Fig. 3. Nutria tracks. Note unwebbed outer toe on the hind foot and the tail drag mark between the tracks. The adult hind foot is approximately 5 inches (12.7 cm) long.



Fig. 4. Nutria dropping in relation to a 2-inch (5.1-cm) camera lens cover. Note longitudinal grooves along the length of the dropping.

Legal Status

Nutria are protected as furbearers in some states or localities because they are economically important. Permits may be necessary to control animals that are damaging property. In other areas, nutria have no legal protection and can be taken at any time by any legal means. Consequently, citizens experiencing problems with nutria should be familiar with local wildlife laws and regulations. Complex problems should be handled by professional wildlife damage control specialists who have the necessary permits and expertise to do the job correctly. Your state wildlife agency can provide the names of qualified wildlife damage control specialists and information on pertinent laws and regulations.

Damage Prevention and Control Methods

Preventive measures should be used whenever possible, especially in areas where damage is prevalent. When control is warranted, all available techniques should be considered before a control plan is implemented. The objective of control is to use only those techniques that will stop or alleviate anticipated or ongoing damage or reduce it to tolerable levels. In most cases, successful control will depend on integrating a number of different techniques and methods.

Timing and location of control activities are important factors governing the success or failure of any control project. Control in sugarcane, for example, is best applied during the growing season, after damage has started. At this time, nutria in affected areas are relatively stationary and concentrated in drainages adjacent to fields. Conversely, efforts to protect rice field levees or the shorelines of southern lakes and ponds should be initiated during the winter when animals are mobile and concentrated in major ditches and other large bodies of water.

Nutria are best controlled where they are causing damage or where they are most active. Baiting is sometimes used to concentrate nutria in specific locations where they can be controlled more easily. After the main concentrations of nutria are removed, control efforts should be directed at removing wary individuals.

Exclusion

Fences, walls, and other structures can reduce nutria damage, but high costs usually limit their use. As a general rule, barriers are too expensive to be used to control damage to agricultural crops. Low fences (about 4 feet [1.2 m]) with an apron buried at least 6 inches (15 cm) have been used effectively to exclude nutria from home gardens and lawns. Sheet metal shields can be used to prevent gnawing damage to wooden and styrofoam structures and trees. Barriers constructed of sheet metal can be expensive to erect and unsightly.

Protect baldcypress and other seedlings with hardware cloth tubes around individual plants or wire mesh fencing around the perimeter of a stand. Extensive use of these is neither practical nor cost-effective. Plastic seedling protectors are not effective in controlling damage to baldcypress seedlings because nutria can chew through them.

Sheet piling, bulkheads, and riprap can effectively protect stream banks from burrowing nutria. Installation requires heavy equipment and is expensive. Use is usually restricted to industrial or commercial applications.

Cultural Methods and Habitat Modification

Land that is well-drained and free of dense, weedy vegetation is generally unattractive to nutria. Use of other good farming practices, such as precision land leveling and weed management, can minimize nutria damage in agricultural areas.

Draining and Grading. Any drainage that holds water can be used by nutria as a travel route or home site. Consequently, eliminate standing

water in drainages to reduce their attractiveness to nutria. This may be extremely difficult or impossible to accomplish in low-lying areas near coastal marshes and permanent bodies of water. Higher sites, such as those used for growing sugarcane and other crops, are better suited for this type of management.

On poorly drained soils, contour small ditches to eliminate low spots and sills and enhance rapid drainage. Use precision leveling on well-drained soils to eliminate small ditches that are occasionally used by nutria.

Grading and bulldozing can destroy active burrows in the banks of steep-sided ditches and waterways. In addition, contour bank slopes at less than 45° to discourage new burrowing. Sculpting rice field levees to make them gently sloping is similarly effective. Continued deep plowing of land undermined by nutria can destroy shallow burrow systems and discourage new burrowing activity.

Vegetation Control. Eliminate brush, trees, thickets, and weeds from fence lines and turn rows that are adjacent to ditches, drainages, waterways, and other wetlands to discourage nutria. Burn or remove cleared vegetation from the site. Brush piles left on the ground or in low spots can become ideal summer homes for nutria.

Water Level Manipulation. Many low-lying areas along the Gulf Coast are protected by flood control levees and pumps that can be used to manipulate water levels. By dropping water levels during the summer, stressful drought conditions that cause nutria to concentrate in the remaining aquatic habitat can be simulated, thus increasing competition for food and space, exposure to predators, and emigration to other suitable habitat. Raising water levels in winter will force nutria out of their burrows and expose them to the additional stresses of cold weather. Water level manipulation is expensive to implement and has not yet been proven to be effective. Nevertheless, this method should be considered when a comprehensive nutria control program is being developed.

Other Cultural Methods. Alternate field and garden sites should be considered in areas where nutria damage has occurred on a regular basis. New fields, gardens, and slab-on-grade buildings should be located as far as possible from drainages, waterways, and other water bodies where nutria live.

Late-planted baldcypress seedlings are less susceptible to damage by nutria than those planted in the spring. For this reason, plant unprotected seedlings in the early fall when alternative natural foods are readily available.

Frightening

Nutria are wary creatures and will try to escape when threatened. Loud noises, high pressure water sprays, and other types of harassment have been used to scare nutria from lawns and golf courses. The success of this type of control is usually short-lived and problem animals soon return. Consequently, frightening as a control technique is neither practical nor effective.

Repellents

No chemical repellents for nutria are currently registered. Other rodent repellents (such as Thiram) may repel nutria, but their effectiveness has not been determined. Use of these without the proper state and federal pesticide registrations is illegal.

Toxicants

Zinc Phosphide. Zinc phosphide is the only toxicant that is registered for controlling nutria. Zinc phosphide is a Restricted Use Pesticide that can only be purchased and applied by certified pesticide applicators or individuals under their direct supervision. It is a grayish-black powder with a heavy garlic-like smell and is widely used for controlling a variety of rodents. When used properly, zinc phosphide poses little hazard to nontarget species, humans, pets, or livestock.

Zinc phosphide is highly toxic to wildlife and humans, so all precautions and instructions on the product label

should be carefully reviewed, understood, and followed precisely. Use an approved respirator and wear elbow-length rubber gloves when handling this chemical to prevent accidental poisoning. Mix and store baits treated with zinc phosphide only in well-ventilated areas to reduce exposing humans to chemical fumes and dust. When possible, mix zinc phosphide at the baiting site to avoid having to store and transport treated baits. Never transport mixed bait or open zinc phosphide containers in the cab of any vehicle. Store unused zinc phosphide in a dry place in its original watertight container because moisture causes it to deteriorate. Immediately wash off any zinc phosphide that gets on the skin.

Past studies have shown that zinc phosphide can kill over 95% of the nutria present along waterways when applied to fresh baits at a 0.75% (7,500 ppm) rate. Today, the use of zinc phosphide at this concentration is illegal. Federal and state registrations, however, allow lower rates to be used. For example, the label held by USDA-APHIS-ADC (EPA Reg. No. 56228-9) allows for a maximum 0.67% (6,700 ppm) treatment rate. At this rate, approximately 94 pounds (42.7 kg) of

bait can be treated with 1 pound (0.4 kg) of 63.2% zinc phosphide concentrate.

Where to Bait. The best places to bait nutria are in waterways, ponds, and ditches where permanent standing water and recent nutria sign are found. Baiting in these areas increases efficiency and reduces the likelihood that nontarget animals will be affected. Small chunks of unpeeled carrots, sweet potatoes, watermelon rind, and apples can be used as bait.

The best baiting stations for large waterways are floating rafts spaced 1/4 to 1/2 mile (0.4 to 0.8 km) apart throughout the damaged area. In ponds, use one raft per 3 acres (1.2 ha). Rafts measuring 4 feet (1.2 m) square or 4 x 8 feet (1.2 x 2.4 m) are easily made from sheets of 3/8- to 3/4-inch (1.0- to 1.9- cm) exterior plywood and 3-inch (7.6-cm) styrofoam flotation. Install a thin wooden strip around the perimeter of the raft's surface to keep bait from rolling into the water. The raft should float 1 to 4 inches (2.5 to 10.2 cm) above the surface and should be anchored to the bottom with a heavy weight or tied to the shore (Fig. 5).

In small ditches or areas where nutria densities are low, use 6-inch (15.2-cm) square floating bait boards made of wood and styrofoam, in lieu of rafts (Fig. 5). These can be maintained in place with a long slender anchoring pole made of bamboo, reed, or other suitable material that is placed through a hole in the center of the platform. This allows the board to move up and down as water levels change. Attach baits to small nails driven into the surface of the platform. Bait boards should be spaced 50 to 100 feet (15.2 to 30.5 m) apart in areas where nutria are active.

Other natural sites surrounded by water can also be baited for nutria. Small islands, exposed tree stumps, floating logs, and feeding platforms are excellent baiting sites. Avoid placing baits on muskrat houses and beaver lodges. Baits can be attached to trees, stumps, or other structures with small nails and should be kept out of the water.

Baiting on the ground should only be used when water sites are unsuitable or lacking. Ground baiting is justified and effective when eliminating the last few nutria in a local population. Use care when ground baiting because baits may be accessible to nontarget animals and humans. Place ground baits near sites of nutria activity, such as trails and entrances to burrows.

Prebaiting. Prebaiting is a crucial step when using zinc phosphide because it leads to nutria feeding at specific sites on specific types of food (such as the baits; carrots or sweet potatoes are preferred). Nutria tend to be communal feeders, and if one nutria finds a new feeding spot, other nutria in the area will also begin feeding there.

To prebait, lightly coat small (approximately 2-inch [5.1-cm] long) chunks of untreated bait with corn oil. Place the bait at each baiting station in late afternoon, and leave it overnight. Use no more than 10 pounds (4.5 kg) of bait per raft, 4 pieces of bait per baiting board, or 2 to 5 pieces at other sites at one time. Prebaiting should continue at least 2 successive nights after nutria begin feeding at a baiting site. Large

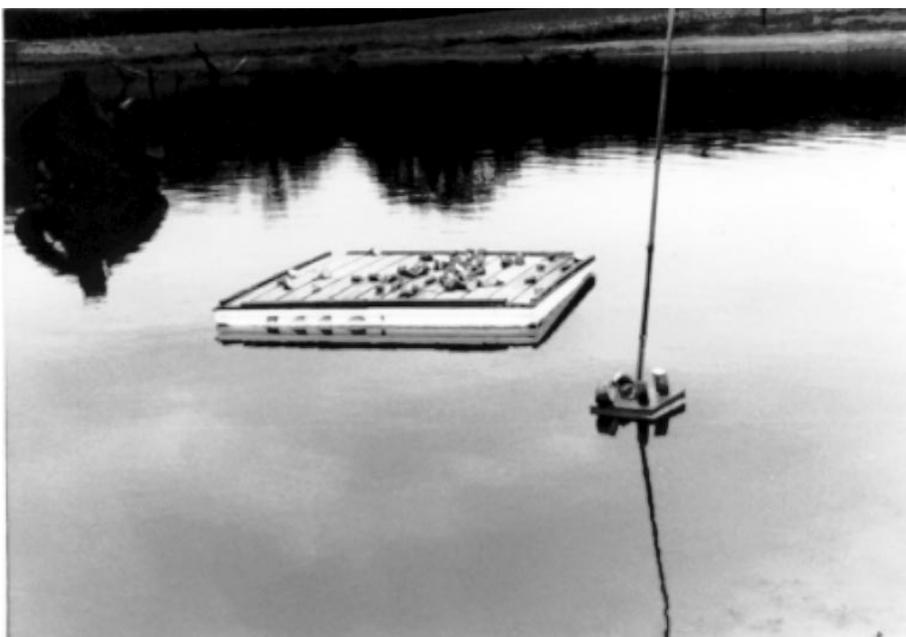


Fig. 5. Examples of a 4-foot (1.2-m) square raft (left) and a 6-inch (15.2-cm) square baiting board, which are used to concentrate nutria for shooting, trapping, or poisoning. These baiting platforms are constructed of plywood and styrofoam and baited with sweet potatoes.

(more than 1 week) gaps in the prebaiting sequence necessitate that the process be started over.

Observations of prebaited sites will help you decide how the control program should proceed. If nontarget animals are feeding at these sites (as determined by sign or actual observations of animals), then prebaiting should start over at another location. Prepare and apply zinc phosphide-treated baits when nutria become regular users of prebaited baiting stations and nontarget animals are not a problem.

Applying Zinc Phosphide. Prepare zinc phosphide baits as needed to prevent deterioration. Treated baits are prepared in 10-pound (4.5-kg) batches (enough to treat one raft) by using the following ingredients: 10 pounds (4.5 kg) of bait (carrots or sweet potatoes are preferred), prepared as for prebaiting; 1 fluid ounce or 2 tablespoons (30 ml) of corn oil; and 1.7 ounces or 7.5 tablespoons (48.2 g) of 63.2% zinc phosphide concentrate.

To prepare treated baits, add corn oil to the bait in a 5 gallon (18.9 l) plastic or metal container. Stir the mixture until the bait is lightly coated with corn oil. Sprinkle zinc phosphide over the mixture and stir until the bait is uniformly coated. Treated baits have a shiny black appearance and should be dried for about 1 hour in a well-ventilated area until the color changes to a dull gray. Properly dried baits are weather-resistant and remain toxic until they deteriorate. Although treated baits can survive light rain, they should not be used when heavy rains are expected or on open water that is subject to heavy wave action.

The amount of untreated bait eaten the last night of prebaiting determines how much treated bait should be used on the first night. When all or most of the untreated prebait is gone from baiting stations by morning, the same amount of treated bait is used on the stations the following night (e.g., up to 10 pounds [4.5 kg] per raft, 4 pieces per baiting board, and 2 to 5 pieces at other sites). When smaller quantities are eaten, reduce the amount of

treated bait that is used per station proportionately. When only a few pieces of prebait on a raft are eaten, the raft should be removed and replaced with several scattered baiting boards.

The quantity of treated bait eaten each treatment night is the quantity that should be put out the following afternoon. Continue baiting until no more bait is being taken. Most nutria can be controlled after 4 nights of baiting. When densities are high, control may require more time.

Post-Control Procedures. Usually only 25% of the poisoned nutria die where they can be found. Many nutria die in dens, dense vegetation, and other inaccessible areas. Carcasses of nutria killed with zinc phosphide should be collected as soon as possible and disposed of by deep burial or burning to prevent exposure of domestic and wild scavengers to undigested stomach material containing zinc phosphide. Dispose of any leftover treated bait in accordance with label directions.

Cessation of damage is the best indicator that zinc phosphide is controlling problem animals. You can quantify the reduction in nutria activity by putting out untreated bait at baiting stations after the last application of zinc phosphide. The amount eaten at this time is compared to the amount of bait eaten on the last night of prebaiting.

Fumigants

Several fumigants are registered for controlling burrowing rodents but none are registered for use against nutria. Some, such as aluminum phosphide, may have potential as nutria control agents, but their efficacy has not been scientifically demonstrated. Carbon monoxide gas pumped into dens has reportedly been used to kill nutria, but this method is neither practical nor legal because it is not registered for this purpose.

Trapping

Commercial Harvest. Damage to crops, levees, wetlands, and other resources is minimal in areas where

nutria are harvested by commercial trappers. The commercial harvest of nutria on private and public lands should be encouraged as part of an overall program to manage nutria-caused damage. Landowners may be able to obtain additional information on nutria management, trapping, and a list of licensed trappers in their area from their state wildlife agency.

Leghold traps. Leghold traps are the most commonly used traps for catching nutria. Double longspring traps, No. 11 or 2, are preferred by most trappers; however, the No. 1 1/2 coilspring, No. 3 double longspring, or the soft-catch fox trap can also be used effectively. Legholds are more efficient and versatile than body-grip traps and are highly recommended for nutria control work. Leghold traps should be used with care to prevent injury to children and pets.

Several ways of setting leghold traps are effective. Set traps just under the water where a trail enters a ditch, canal, or other body of water. Make trail sets by placing a trap offset from the trail's center line so that nutria are caught by the foot. Traps can be lightly covered with leaves or other debris to hide them, but nutria are easily captured in unconcealed traps.

Bait can be used to lure nutria to leghold sets. Nutria use their teeth to pick up large pieces of food; therefore, bait should be placed beside, rather than inside, the trap jaws. Leghold traps are also effective when set on floating rafts that have been prebaited for a short period of time.

Use drowning sets when deep water is available. Otherwise, stake leghold traps to the ground, or anchor them to solid objects in the water or on land (such as floating logs, stumps, or trees and shrubs). Nutria caught in non-drowning leghold sets should be humanely dispatched with a shot or hard blow to the head. Nontarget animals should be released.

Live Traps. Nutria are easily captured in single- or double-door live traps that measure 9 x 9 x 32 inches (22.8 x 22.8 x 81.3 cm) or larger. Use



Fig. 6. Hand-caught nutria must be handled carefully to avoid being bitten or clawed.

these when leghold and body-grip traps cannot be set or when animals are to be translocated. Bait live traps with sweet potatoes and carrots and place them along active trails or wherever nutria or their sign are seen. A short line of baits leading to the entrance of a live trap will increase capture success. Live traps placed on floating rafts will effectively catch nutria but prebaiting is necessary. A large raft can hold up to 8 traps. Unwanted nutria should be destroyed with a shot or blow to the head. Nontarget animals should be released.

Floating, drop-door live traps catch nutria but are bulky and cumbersome to use. The same is true for expensive suitcase-type beaver traps. Unwary nutria can be captured using a long-handled dip net. This method should only be used by trained damage control professionals who should take special precautions to prevent being bitten or clawed (Fig. 6). Live nutria can be immobilized with an injection of ketamine hydrochloride. Funnel traps are not effective for controlling nutria.

Body-gripping Traps. The Conibear® trap, No. 220-2, is the most commonly used body-gripping trap for controlling nutria. Nos. 160-2 and 330-2 Conibear® traps can also be used. Place sets in trails, at den entrances, in culverts, and in narrow waterways. Large body-grip traps can be dangerous and should be handled with extreme caution. These traps should not be set in areas frequented by children, pets, or desirable wildlife species.

Other Traps. Use locking snares to catch nutria when other traps cannot be set. Snares are relatively easy to set, safer than leghold and body-grip traps, and almost invisible to the casual observer. Snares constructed with 3/32-inch (0.2-cm) diameter, flexible (7 x 7-winding) stainless steel or galvanized aircraft cable are suitable for catching nutria. Ready-made snares and components (for example, cable, one-way cable locks, swivels, and cable stops) for making homemade snares can be purchased from trapping suppliers.

Place set snares in trails and other travel routes, feeding lanes, trails, and bank slides. Snares do not kill the animals they catch, so anchor the snare securely. Check snares frequently because they are often knocked down by nutria and other animals. Snared nutria should be dispatched with a shot or blow to the head. Release any nontarget animals that are captured.

Shooting

Shooting can be used as the primary method of nutria control or to supplement other control techniques. Shooting is most effective when done at night with a spotlight, however, night shooting is illegal in many states and should not be done until proper permits have been obtained. Once shooting has been approved by the proper authorities, nutria can be shot from the banks of waterways and other bodies of water or from boats. In some cases, 80% of the nutria in an area can be removed by shooting with a shotgun or small caliber rifle, such as the .22 rimfire. Care should be taken when shooting over open water to prevent bullets from ricocheting.

Shooting at Bait Stations. Baits can attract large numbers of nutria to floating rafts, baiting boards, and other areas where they can be shot. Shooting from dusk to about 10:00 p.m. for 3 consecutive nights is effective once a regular feeding pattern has been established. Feeding sites should be lit continuously by a spotlight and easily visible to the shooter from a vehicle or other stationary blind. At night, nutria can be located by their red-shining eyes and the V-shaped wake left by swimming animals. As many as 4 to 5 nutria per hour may be taken by this method. Shooters should wait 2 to 3 weeks before shooting nutria at the same site again.

Boat Shooting. Shooting can also be done in the late afternoon or early evening from a small boat paddled slowly along waterways and large ditches or along the shores of small lakes and ponds. Nutria are especially vulnerable to this method when water levels are extremely high or vegetative

cover is scarce. At times, animals can be stimulated to vocalize or decoyed to a boat or blind by making a "maw" call, which imitates the nutria's nocturnal feeding and assembly call. This call can be learned from someone who knows it or by listening to nutria vocalizations at night. Nutria become wary quickly, so limit shooting to no more than 3 nights, followed by 2 to 3 weeks of no activity.

Bank Shooting. Nutria can be shot by slowly stalking along the banks of ditches and levees; this can be an effective control method where nutria have not been previously harassed. Unlike night shooting from a boat or blind, bank shooting is most effective at twilight, both in the evening and morning. Several nutria can usually be shot the first night, however, success decreases with each successive night of shooting. Daytime shooting from the bank of a waterway is effective in some situations.

Economics of Damage and Control

Nutria can have either positive or negative values. They are economically important furbearers when their pelts provide income to commercial trappers. Conversely, they are considered pests when they damage property.

From 1977 to 1984, an average of 1.3 million nutria pelts were harvested annually in the United States. Based on prices paid to Louisiana trappers during this period, these pelts were worth about \$7.3 million.

The estimated value of sugarcane and rice damaged by nutria each year has ranged from several thousand dollars to over a million dollars. If losses of other resources are added to this amount, the estimated average loss would probably exceed \$1 million annually.

Management plans developed for nutria should be comprehensive and should consider the needs of all stakeholders. Regulated commercial trapping should be an integral part of any management scheme because it can provide continuous, long-term income to trappers; maintain acceptable nutria densities; and reduce damage to tolerable levels.

The value of the protected resource must be compared with the cost of control when determining whether nutria control is economically feasible. Most people will not control nutria if costs exceed the value of the resource being protected or if control will adversely impact income derived from trapping. Of course, there are exceptions, especially when the resource has a high sentimental or aesthetic value to the owner or user.

Acknowledgments

This chapter is a revision of an earlier chapter written by Evans (1983). Kinler et al. (1987) and Willner (1982) were the primary sources consulted for biological information on nutria.

Figures 1 and 3 by Peggy A. Duhon of Lafayette, Louisiana.

Figure 2 from Willner (1982) and reprinted with permission of The Johns Hopkins University Press, Baltimore, Maryland.

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