

# The Thirteen-Lined Ground Squirrel: Controlling Damage

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This NebGuide describes the physical characteristics, habits, management and control of the thirteen-lined ground squirrel.

## Description

Thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*) are common throughout Nebraska. Thirteen-lined ground squirrels, as their name suggests, have 13 light stripes with rows of light spots that run the length of their backs (Figure 1). The background color is tan or brown and the belly is white. This color pattern helps them blend into the landscape, thereby providing some protection from predators. Thirteen-lined ground squirrels are usually about 11 inches long, including a 5- to 6-inch tail. Adults weigh 4 to 5 ounces in the spring but will double their weight by the fall in preparation for winter hibernation. They exhibit six different calls. The most commonly heard is a high-pitched trill that the ground squirrel uses to alert neighbors and young of danger. Interestingly, research has shown that thirteen-lined ground squirrels are very inconsistent with their warning calls.

Although often called “striped gophers,” thirteen-lined ground squirrels actually belong to the squirrel family, which includes chipmunks, ground squirrels, tree squirrels, prairie dogs, and woodchucks. True (pocket) gophers (*Geomys bur-sarius* and *Thomomys talpoides*) belong to a different family of rodents.



Figure 1. Thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*). Photo by Stephen M. Vantassel.

Four other species of ground squirrels reside in Nebraska but none have state-wide distribution. Woodchucks (*Marmota monax*) are limited to the eastern half of the state. They are Nebraska’s largest ground squirrel, reaching weights up to 12 pounds. Woodchucks prefer mixed landscapes of woods and fields that provide easy access to clover and gardens.

Franklin’s ground squirrels (*Spermophilus franklinii*) exist in the eastern half of the state and along the Platte River. They are quite small, averaging 10 inches in combined head and body length and weighing up to 20 ounces. Their preferred habitat consists of tall grass prairies and abandoned fields.

Spotted ground squirrels (*Spermophilus spilosoma*) are found only in the short-grass prairie and Sandhills of western Nebraska. They are Nebraska’s smallest ground squirrels, averaging only 5 to 6 inches in combined head and body length and weighing up to 7 ounces. Their name reflects the faint white spots scattered across their backs.

Wyoming ground squirrels (*Spermophilus elegans*) are the least common ground squirrel in Nebraska and are found only in the southwestern Panhandle. Their head and body length is around 11 inches and they weigh less than 10 ounces. They prefer sage brush, rangeland, and well drained soils.

## General Biology

“Thirteen-liners” are most active during sunny days when temperatures range between 86°F and 104°F. They prefer low-grass vegetation and thus are commonly found in golf courses, cemeteries, parks, yards, roadside ditches, and other open areas with manicured lawns. Agricultural and residential development have actually increased the range of the thirteen-lined ground squirrel in the Great Plains.

Thirteen-lined ground squirrels dig burrows that are 15 to 20 feet long and often have more than one entrance. Escape burrows are shorter and have only one entrance. The burrow entrances are inconspicuous, appearing only as small, 2-inch diameter holes in the ground. Mounds of soil are seldom present at the burrow entrances because the ground squirrels will scatter rather than pile the excavated soil. Active holes may be identified by their clean and well-manicured appearance.



Figure 2. Holes caused by thirteen-lined ground squirrels digging up seed. Photo by John Pickle.



Figure 3. Yield loss due to thirteen-lined ground squirrel consumption of planted seed. Photo by Scott E. Hygnstrom.

Additionally, the grass around the hole may be well worn from frequent use. Burrow entrances often are plugged at night with grass or soil.

To survive the winter months, thirteen-lined ground squirrels hibernate in their burrows, entering in October and only emerging when the soil warms up enough to allow them to dig out, typically late March or early April.

Both sexes emerge around the same time, but females return to the den for another one to two weeks. Mating occurs shortly thereafter.

After a 28-day gestation period, females give birth to a single litter of seven to 10 hairless young. In six weeks (around mid-June), the young are mature enough to forage outside the den. Male ground squirrels do not assist with rearing of the young.

Thirteen-lined ground squirrels are usually solitary, although they do congregate in loosely structured colonies. In prime habitat, their numbers may reach 10 or more per acre. Their home ranges can fluctuate from three to 10 acres, depending on habitat.

As the first half of their scientific name suggests (*Spermophilus* i.e. seed-lover), thirteen-lined ground squirrels feed on seeds throughout their active season, especially in the fall, in preparation for hibernation. Other plants they consume include grasses, garden vegetables, and flowers. “Thirteen-liners” are not strict vegetarians. Researchers have found that ground squirrels will eat the eggs and young of ground nesting birds, earthworms, lizards, mice, and insects to obtain protein. In fact, during the summer, insects can constitute up to half of their dietary intake. They are particularly fond of grasshoppers and the larvae of beetles and moths.

### Economic Significance

“Thirteen-liners” are native to Nebraska and prey to several predators, including badgers, coyotes, hawks, weasels, and a variety of snakes. They benefit people in three ways:

- they feed on many harmful weeds, weed seeds, and crop-damaging insects;
- their digging behavior may improve soil conditions, according to some researchers, by turning over and aerating the soil; and
- Ground squirrels also provide enjoyable opportunities to view wildlife with family and friends.

Thirteen-lined ground squirrels can cause problems, however, when they create burrows in lawns, golf courses,

cemeteries, parks, and earthen dikes; dig up newly planted seeds; consume sprouting seeds, and damage garden vegetables (Figures 2 and 3).

In addition, thirteen-lined ground squirrels and other rodents cause an estimated \$2 million damage each year to Nebraska cornfields. Nevertheless, eliminating these ground squirrels isn’t the right answer either, as their predation on crop-damaging insects provides an important benefit. Instead, land managers should manage ground squirrel populations at levels where they can be appreciated.

### Prevention and Control Methods

Do not try trapping squirrels by hand. They are very evasive and have a powerful bite.

Read the following control options carefully and choose those that apply best to your particular situation. Remember, the best results are achieved by adopting an integrated approach that employs several methods initiated at opportune times.

### Cultural

Discourage ground squirrels — who like low vegetation levels — by allowing grasses and other vegetation to grow tall and dense in areas such as roadside ditches, field edges, earthen dams, and pastures. Residents next to areas with many ground squirrels can deter them by establishing tall, dense plantings of shrubs, tall grass, or flowers around the borders of their property. The downside of tall vegetation is the increased potential for problems with other rodents, such as voles.

Reduce crop damage by employing prevention and control techniques before ground squirrels emerge from hibernation. First, deep tilling of soil can destroy dens and disrupt their habitat. Note: repeated filling or blocking of entrances to ground squirrel holes will *not* result in ground squirrels abandoning the area.

Second, sow cold-resistant seed strains in March or early April so that emerging ground squirrels will find the plants are too mature to be consumed.

A third option is to provide alternative seed to distract ground squirrels from plucking seeds and seedlings. At planting, broadcast four bushels of cracked corn per acre over the outside four to eight rows adjacent to ground squirrel habitat.

It may also be necessary to spot-treat fields in areas where damage is expected or observed, especially if you use conservation tillage.

## Repellents

Thiram (75 percent concentration) is registered by the U.S. Environmental Protection Agency (EPA) as a seed treatment to reduce damage to seeds by thirteen-lined ground squirrels. Follow label instructions carefully. Home-made repellents such as mothballs and dried blood meal have had limited success in controlling ground squirrels and are not recommended.

## Fencing

A fence made of half-inch wire mesh or sheet metal will help keep ground squirrels, rabbits, and other problem animals out of gardens and flowerbeds. The fence should be at least 18 inches high and buried six inches. Persistent ground squirrels have been known to climb over and dig under fences to reach highly preferred foods.

## Toxicants

Always be sure to read, understand, and follow the instructions found on any pesticide label. Failure to abide by label instructions is a violation of federal and state laws and can endanger the safety of the user, neighbors, other local animals such as pets, and the environment.

## Baits

Zinc phosphide (2 percent) is the only bait registered for control of thirteen-lined ground squirrels, and is cost-effective when large areas and several ground squirrels are to be treated.

Some labels are General Use Pesticides (GUP) so a pesticide applicator's license is not required.

To obtain a pesticide license, contact your local extension office, the Nebraska Department of Agriculture Pesticide Program at 877-800-4080, or online at <http://www.agr.state.ne.us/division/bpi/pes/pest1.htm>.

Zinc phosphide baits, formulated as pellets or grain baits, are most effective in spring and late summer when ground squirrels actively gather seeds.

Follow prebaiting instructions. Prebaiting with untreated pellets or grain is recommended to habituate the squirrels to consume the bait quickly. Rapid consumption is necessary to decrease the likelihood of ground squirrels identifying and avoiding the bitter taste of the zinc phosphide-treated grain.

Zinc phosphide is highly toxic to wildlife and humans. To reduce risks to non-target animals, it's best to dispense treated baits in tamper-resistant bait stations or place bait directly into active burrows. Consult NebGuide G1646 *Bait Stations for Rats and Mice* at <http://www.ianrpubs.unl.edu/sendIt/g1646.pdf>.

Do not place toxic baits in tall grasses, where ground squirrels may not find them, or on bare ground, where they may attract other animals. Always read and follow label recommendations as the label is the law.

## Fumigants

Burrow fumigants are effective when treating small areas. Fumigation may be the most humane method between mid-April to mid-June because both female ground squirrels and their dependent young are present in the burrows. However, using fumigants requires additional safety precautions. Never use fumigants in holes in or near buildings occupied by people or other animals.

Aluminum phosphide is a Restricted Use Pesticide (RUP). Aluminum phosphide tablets and pellets release toxic phosphine gas when they contact moisture in the burrow.

First, locate all the thirteen-lined ground squirrel burrows. Be careful not to confuse holes with burrows as a single burrow system may have more than one hole associated with it.

Second, treat each burrow system by inserting two to four tablets or 10 to 20 pellets deep into the burrow. Before sealing the opening with soil, place crumpled newspaper into the hole. The paper wad will prevent the toxicant from being smothered by soil.

Be sure all other holes connected to the treated burrow are closed with enough soil to make an airtight seal. Do not use aluminum phosphide in or near buildings occupied by humans, livestock, or pets. Applicators must create a fumigation management plan before treating burrows. Learn how to create a plan at <http://www.agr.state.ne.us/division/bpi/pes/fmp.htm>.

Gas cartridges are General Use Pesticides (GUPs). When burned, cartridges release carbon monoxide, carbon dioxide, and other noxious gases. Light the fuse and hold onto the cartridge until the cartridge has been ignited. Then place the cartridge fuse-end first, into the burrow and plug the burrow with soil or sod. Gas cartridges are most effective when the soil is moist, since less gas will leak out of the burrow and it also reduces the risk of accidental fire. Choose cartridges that are narrow enough to be easily placed inside the 2-inch burrow openings.

## Trapping

Several types of traps are effective for ground squirrels.

### Lethal trapping

Lethal traps include steel-jawed footholds (#0 and #1) and snap-type rat traps. The latter are preferred because they are readily available, inexpensive, and easier to set than steel-jawed traps. Consult local ordinances before using steel-jawed traps as some communities have restricted their use.

### Baited Traps

- Place baited traps out for two to three days before setting them. Experiment with several types of baits such as peanut butter, peanut butter mixed with oatmeal, nuts, and grains.
- Secure solid baits to the trigger with glue or by a thread or wire.
- Use mouse-sized traps during early summer, when young ground squirrels are present.
- Place traps and trap stations near burrow entrances and along runways and check them frequently.
- Wear gloves when removing trapped ground squirrels.
- Notify neighbors (especially parents and pet owners) of any trapping activities.
- Always place traps inside a box with 2-inch wide hole to prevent non-target captures. Tamper-resistant bait stations used in controlling rats provide excellent containers for traps (*Figure 4*).

### Cage Trapping

Cage trapping is an easy way to capture problem thirteen-lined ground squirrels.

- Construct a cage trap (*Figure 5*) using a 12-inch by 20-inch piece of 1/2-inch mesh hardware cloth (wire mesh).
- Bend the hardware cloth to form the rectangular body of the trap with 3-inch openings on either end.



**Figure 4.** The Snap Trap Station manufactured by J.T. Eaton is suitable for holding two rat-sized snap traps. Photo by Stephen M. Vantassel.

- Secure the free edges with hog rings or wire.
- Cover one of the open ends with a 3-inch square piece of hardware cloth.
- Make a trap door at the opposite end by using a 2 3/4-inch by 8-inch piece of half-inch hardware cloth. Attach this piece to the top of the trap, recessed about 1/2 inch, and make sure it can swing freely.
- Place the door end of the trap into a burrow that an animal has recently entered. Secure the trap into the opening to force the squirrel to push up the swinging door and enter the trap. The door must be flush to inhibit escape.
- Support the opposite end of the trap with soil or a block of wood.

Often, within five minutes, the ground squirrel will climb out of the burrow, slide under the swinging door, and enter the trap. Plug any holes within 20 feet with soil to reduce the chances of escape, check traps often to avoid undue stress on captured animals.

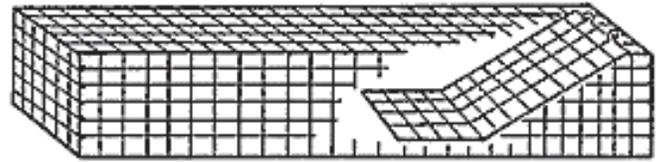
The flooding of burrows can encourage ground squirrels to enter cage traps more quickly. Don't flood burrow systems adjacent to your home to avoid water entering your basement.

Wear thick leather gloves when handling traps to prevent injuries.

Euthanize captured ground squirrels with carbon dioxide gas. For information on euthanasia visit <http://www.icwdm.org/wildlife/euthanasia/default.asp>. Nebraska does not permit the translocation of any wildlife beyond 100 yards from site of capture.

Another approach to cage-trapping incorporates chipmunk-sized traps (16"x6"x6") baited with oats or other desirable seeds. Place traps near den entrances and check daily.

Avoid using larger traps to reduce the chances of capturing a skunk or other non-target animal. Use snares made of



**Figure 5.** A burrow-entrance cage trap can easily be constructed from rigid welded wire mesh.

monofilament line to catch ground squirrels when they emerge from their burrows, but take special care handling snared ground squirrels to prevent painful bites.

### Shooting

Small populations of ground squirrels can be controlled by shooting. A .22 caliber rifle or .177 caliber air rifle is adequate. Local laws may prohibit use of firearms in residential or urban areas. Always use firearms safely.

Your local Extension office can provide a wide range of information on prevention and control of wildlife damage. For information on locating organizations providing assistance with wildlife damage management, consult NebGuide G1828, *Wildlife Encounters and Conflicts: A Nebraska Guide to Finding Assistance*, <http://www.ianrpubs.unl.edu/sendIt/g1828.pdf>.

Local private pest control operators may provide wildlife damage control materials and services.

In addition, you can buy toxicants and other materials from USDA-APHIS-Wildlife Services (402) 434-2340.

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**This publication has been peer reviewed.**

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