



# Meadow Voles

## Are they taking over the world?!

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# Thanks to the following for use of pictures:

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Dr. Glenn Shewmaker, UI Forage Specialist

Sherman Takatori, ISDA



# Vole Overview

- High population peaks
- Significant crop damage to forages, small grains, sugarbeets, potatoes, others
- 30%+ yield losses
- Non-game mammals, can be legally managed on private property and public lands





# Vole Biology

- Several species—Meadow Vole most common
- Sometimes call Meadow Mouse
- Small rodents
- Heavy body, short legs and tail, small and rounded ears
- 4 ½" – 5 ½" long
- Blackish to grayish brown fur with black-tipped hairs
- Bi-colored tail



# Vole Reproduction

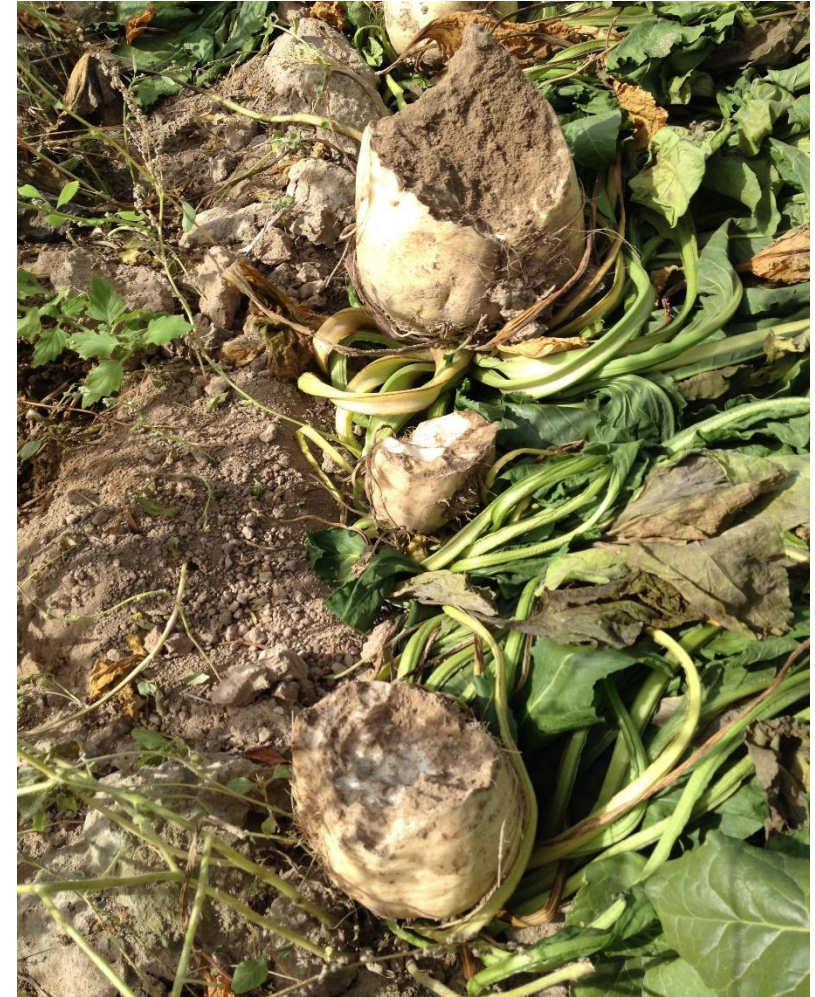
- Peak breeding in spring and fall
- Reproductive maturity at 35-40 days
- 21 day gestation period
- Nests are underground made up of grass, stems, leaves
- Reproduce year-long
- Average 1-5 litters/year
- 3-6 young/litter
- Live up to 2 years, most less than 1 year





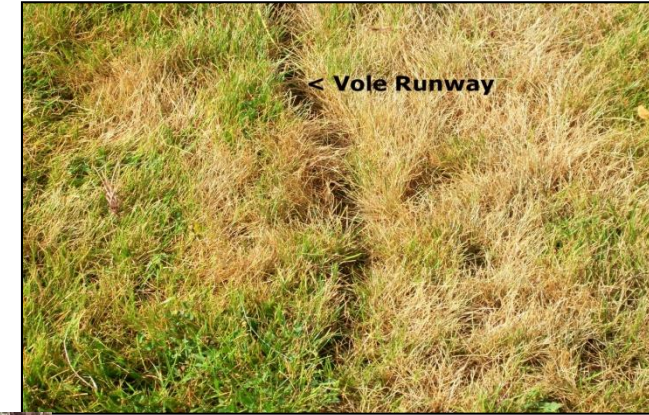
# More.....

- Populations increase rapidly and are cyclic
- Populations can fluctuate dramatically from year to year
- Minor peak populations every 4-6 years
- Epidemic populations every 10-12 years
- Population explosions generally only last about a year



# Vole Behavior

- Active year-round (they do not hibernate)
- Prefer dense ground cover
- Do NOT like crossing bare ground
- Dig short and shallow tunnels on the surface and underground
- “Runways” have the vegetation clipped to the ground
- Tunnel under snow cover







- ✓ **Habitat: vegetation > 6 inches, snow cover, brush piles, leaves, low-hanging tree limbs provide protection**
- ✓ **Pastures, rangeland, orchards, crops, hayfields, home lawns and gardens all provide good habitat and food sources**





# Vole Feeding Characteristics

- Most vole damage is from feeding on crops or tree bark
- Diet consists of green vegetation, roots, seeds, tubers, bulbs, tree and shrub bark, insects, vegetables
- Can eat nearly their body weight daily (3-4 oz)
- Damage trees by girdling and removing bark
- Forage under snow for food





# Vole Management:

Monitor area for signs of feeding activity from early spring to late fall

1. Habitat Modification
2. Plant Protection/Barriers
3. Trapping
4. Baiting with Rodenticides



# Habitat Modification—Reduce Vegetative Cover

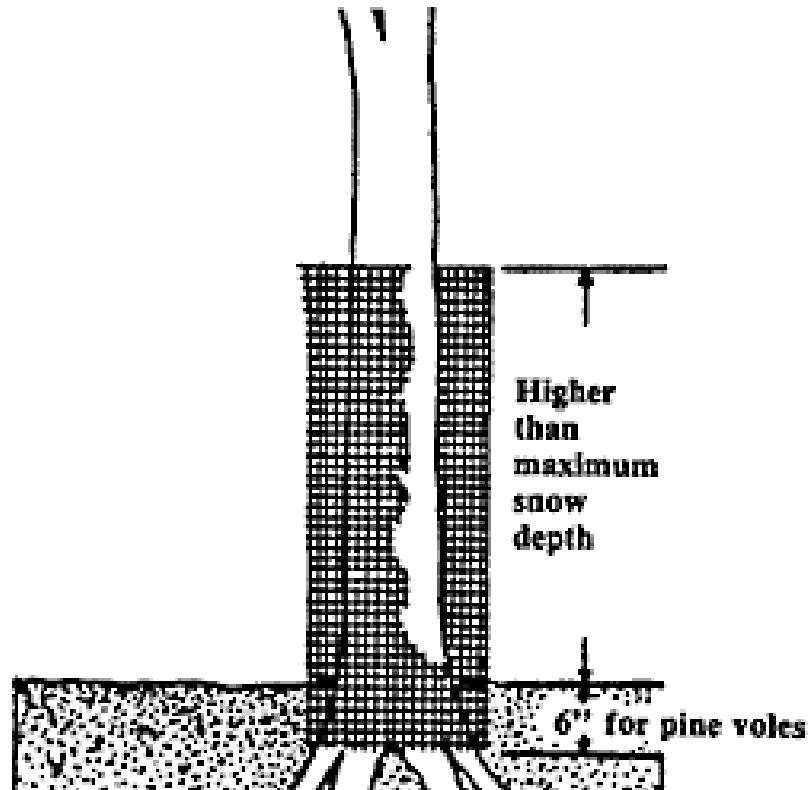
- ✓ Mow or burn ditch banks, barrow pits, and fence lines.
- ✓ Clear weeds and debris
- ✓ Graze or mow alfalfa and pastures in the late fall
- ✓ Plow, disk, rake, burn, and remove snow
- ✓ Develop weed-free cultivated buffer strips around large acreages. **This is an effective technique, if practical.**





# Tree Protection/Barriers

- Screens and wraps will protect young trees
- Protection must be higher than the maximum snow depth
- 3/8" netted wire 6" above and below soil level will protect trees and shrubs
- Difficult for large number of trees



# Trapping

Use of wooden mouse traps

Not practical for large infestations or large areas



# Baiting with Rodenticides

- Most effective management practice for large populations
  - When habitat manipulation is not possible
  - When extensive vole damage is present
- Zinc phosphide can be applied as a broadcast treatment on alfalfa, sugarbeet, potato, barley, wheat, dry beans, triticale
- Most effective in late fall, early winter, and spring when green vegetation is low
- Use bait stations where non-target poisoning might be a concern





# Bait Station Construction

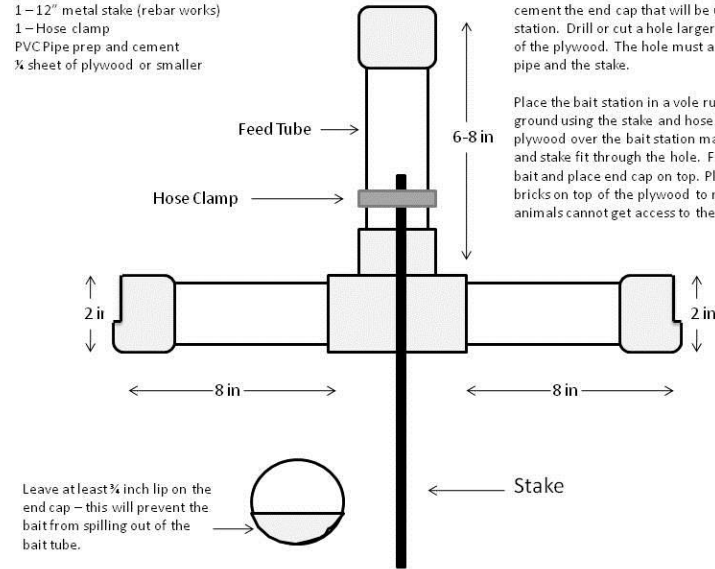
## Materials Needed:

- 3 - 2" PVC pipe cut to 8" lengths
- 3 - 2" PVC pipe end caps (two partially cut, see diagram)
- 1 - 2" T-connection for PVC pipe
- 1 - 12" metal stake (rebar works)
- 1 - Hose clamp
- PVC Pipe prep and cement
- ¼ sheet of plywood or smaller

## Instructions:

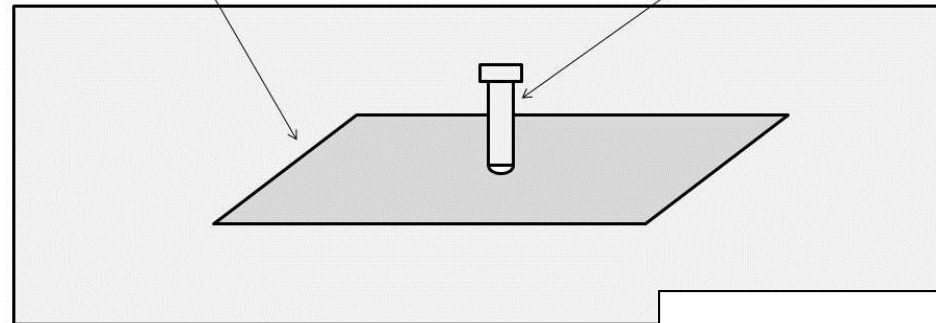
Assemble all of the pieces as seen in the diagram below, making sure that you cement all of the pipes to the T-connection and the two partially cut end caps. Do not cement the end cap that will be used to fill the bait station. Drill or cut a hole larger than 2" in the middle of the plywood. The hole must accommodate the PVC pipe and the stake.

Place the bait station in a vole runway and secure to the ground using the stake and hose clamp. Place the plywood over the bait station making sure that the tube and stake fit through the hole. Fill the feed tube with bait and place end cap on top. Place weight such as bricks on top of the plywood to make sure larger animals cannot get access to the bait.



¼ sheet of Plywood

Fill tube for the bait station



Note: Place heavy object (bricks, weights) on top of the plywood to prevent larger animals (dogs, foxes, etc.) from disturbing the bait station.

# Rodenticide baits labeled for vole control

- **Zinc Phosphide**
- **1<sup>st</sup> generation anticoagulants**
- **Natural products, repellents (homeowner use)**



# Zinc Phosphide



- Prozap® and ZP AG®
- Agricultural use products are RUP—need an applicator's license
- Some products are labeled for home and garden GUP—below ground applications only
- Be sure to read the label for the product you plan to purchase and use





# Zinc Phosphide

- Broadcast applications allowed in sugarbeet, barley, wheat, triticale, alfalfa, potato, dry bean, non-crop areas and rights-of-ways, and non-residential lawns.
- Can place bait in runways or next to burrows, if not broadcasting.
- Moisture activates zinc phosphide, rendering it ineffective
- Voles feeding on the bait that do not die may become “bait shy”
- Works very quickly, within 12 hours
- Bury dead voles—wear gloves!



# Zinc Phosphide Labels:

2 applications/year and maximum 20 lbs. total

Broadcast applications:

Alfalfa=Apply shortly after cutting hay & prior to next cutting with 2" growth. Cannot use alfalfa from treated area until it is harvested

Sugarbeet=Do NOT apply within 30 days of harvest

Wheat, Barley & Triticale=Do NOT apply within 50 days of harvest

Potato=Do NOT apply with 30 days of harvest

Dry bean=Do NOT apply with 30 days of harvest

RUPs



# Baiting Success

- Use fresh bait
- Old bait may have:
  - Off odor
  - Mold
- Pre-bait
  - Non-toxic bait
  - Same size, shape, and formulation
- May increase consumption





# Non-Target Effects of Zinc Phosphide

- Does not accumulate in body tissues
- Predators or scavengers are not likely to be affected by eating poisoned rodents
- ZP Bait is an acute toxicant and is toxic to children, pets, birds, and other animals
- Store out of reach and use carefully to minimize access



# Anticoagulant Baits

- Formulated using grain or other food sources
  - Whole grain baits
  - Pelleted baits
- Moisture-resistant paraffin blocks
  - Useful around ditches
  - Areas where high moisture may cause other types of baits to spoil



# Anticoagulant Baits

- Must be consumed over a period of days to be effective/continued baiting until population controlled
- Cannot be applied directly to food or feed crops
- Place in runways or near burrow openings
- Can be used in areas adjacent to crop fields





# 1<sup>st</sup> Generation Anticoagulants

- Multiple feed
- Residential use
- Bait stations
- Examples:
  - Warfarin
  - Diphacinone (Ramik Brown, Kaput-D)
  - Chlorophacinone (Rozol)—Rozol Vole Bait is a RUP + some of the gopher baits



# Rozol® Vole Bait

- SLN 24(c) Registration
- Aerial application
- A RUP
- Rangeland, non-crop areas, borders, buffer strips and center pivot corners to adjacent crops



# 2<sup>nd</sup> Generation Anticoagulants

- Single feed
  - Not allowed to be sold in grocery, drug, hardware, or home improvement stores
  - Active ingredients include:
    - Brodifacoum (D-Con, Havac)
    - Bromadiolone (Hawk, Maki, Boot Hill)
    - Difenacoum (Victor, Sorex bait blocks)
    - Difethialone (First Strike, Hombre bait and blocks)
- ✓ Products with these active ingredients are restricted to professional, farm, ranch, and facility use
  - ✓ None of these products have voles on the label





# FIFRA Exceptions—2ee

- Any pesticide use inconsistent with the label is a violation of FIFRA
- Except.....
- Pest not on the label is an ALLOWABLE USE
- Application site **MUST** be on the label
- Use rates and patterns **MUST** be on the label



# Meadow Voles and Pocket Gophers: Management in Lawns, Gardens, and Cropland

D. Gunn, R. Hirnyck, G. Shewmaker, S. Takatori, L. Ellis

Meadow voles and pocket gophers cause significant damage to rangeland, alfalfa, pastures, and other agricultural crops. Combined or alone, forage losses from gophers and/or voles have been estimated at 10 to 50 percent in pastures and alfalfa. These rodents also cause significant damage in orchards, nurseries, turf farms, ornamental flower plantings, landscapes, lawns, and vegetable gardens.

Both voles and gophers damage plants by eating roots, trunks, stems, tubers, and leaves. Their tunneling habits also cause damage. Large mounds of soil left by rodents, particularly gophers, can dull knives and discs on harvesting equipment. Soil from mounds also contaminates hay bales. Underground rodent burrows and tunnels interfere with irrigation practices and equipment. The burrowing and mounding capabilities of gophers encourage weed invasion through ground disturbance and can cause injury to people, horses, and livestock that step into holes.

Although voles reproduce more rapidly than gophers, both have remarkable reproductive capacity. Population surges can occur frequently when adequate forage and habitat are available.

Voles and gophers are considered non-game mammals in most states and can be legally managed on private property and public lands. Check with your state wildlife

agency or department of agriculture regarding legal control methods in your area. Management options depend on the pest, the situation, cost limitations, and equipment and labor availability. It is important to understand the target pest's biology and habits before implementing management strategies.

Figure 1. Vole (meadow mouse). Photo by Danielle Gunn.



Figure 2. Vole (meadow mouse). Photo by Danielle Gunn.



## Voles

### Vole biology

Several species of voles exist in the Pacific Northwest, and it can be difficult to distinguish among them. The meadow vole, or meadow mouse (*Microtus pennsylvanicus*), is the most common species in pastures, rangelands, crops, and lawns. Meadow voles are heavy-bodied, small rodents with short legs and tails; small, rounded ears; and coarse, blackish to grayish brown fur with black-tipped hairs and bicolored tails. When fully grown, voles generally average 4½ to 5½ inches long, including the tail (Figures 1 and 2). Under good weather and feeding conditions, voles can reach 7⅝ inches in length.

## Integrated Pest Management

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+

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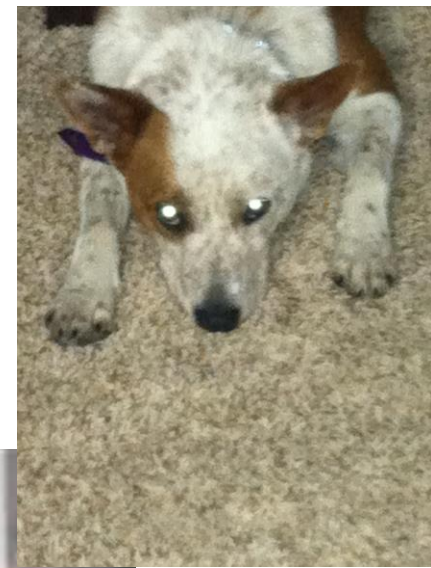
# Endangered and Threatened Species Protection

- Rodenticides may pose a hazard to federally designated endangered and/or threatened species
- Cannot be used in any manner that results in their harm or death
- Applicator's responsibility to perform application correctly
- ISDA, Fish and Wildlife, Extension



# New Vole Control Option

- Low cost, works for food and the occasional scratch behind the ears
- Killing voles comes naturally
- Frequent long naps are a problem



# Vole Benefits

- Cat and Dog Food
  - Dog Toys
- Entertainment

