

The Methow Naturalist

Study nature, not books. Louis Agassiz

The Flower that Thought it was a Cow
....and other Stories from the Shrub-steppe



Dicentra uniflora: the flower that thought it was a cow

Also:
Fossorial Mammals
Observing the Shrub-steppe
Vesper and Brewer's Sparrows
An Ecosystem Underfoot: Soil Crusts



A single northern pocket gopher can move up to 16 tons of dirt per year

Digging Up the Dirt on Fossorial Mammals

By Kim Romain-Bondi

Fossorial species of the shrub steppe, or animals that dig in the dirt, can construct very complex and elaborate burrows, and may live year-round or seasonally in an underground world. Primary excavators are wildlife species who significantly alter the environment and burrow underground as a major part of their life activities. For example our local pocket gophers, which may seem annoying in your garden, are considered a keystone species in eastern Washington, because they have a major positive impact on their environment, and they literally create habitat for numerous other species through their extensive tunneling. Similarly, prairie dogs are considered a keystone species of the midwest prairies.

Secondary modifiers are species that utilize a burrow dug by another animal. A former inhabitant of the Methow Valley, the burrowing owl, modifies other animals' subterranean domiciles (such as badger dens or ground squirrel burrows) to fit their needs for nesting and security. They even utilize the bare and mounded soil on the surface to scan the horizon for danger.

Burrowing activity is considered an important ecosystem process, and has been examined from the disciplines of geomorphology, landscape ecology,

soil science, and plant and animal community ecology. Burrowing animals can move surprisingly large amounts of dirt--badgers can turn over two tons of soil a year, and gophers, which dig incessantly, can move up to sixteen tons per individual per year.

The underground material displaced during these activities develops soil fertility by bringing nutrients from deep within the soil horizon and exposing them to the surface. The mounded soil on the surface now has increased oxygen content, nutrient availability, light penetration, and water holding capacity. Studies on mounded soils created by burrowing species found plant growth and flower production greatly increased due to these positive effects on soil development.

In addition to the mounds, the numerous small holes associated with burrows are effective traps for organic matter, soil, and water. Feces and food caches in holes and within mounds contribute to the influx of nutrients.

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Burrowing is itself an adaptation to ecological conditions. What a perfectly reasonable idea: to burrow into a cool and humid underground cave when living in an arid environment. When the weather is hot and desiccating during summer months, windy and frigid during winter months, or even during extreme fluctuations of temperatures over the course of one day, deep underground is a stable and shielding earth-bermed microclimate with full protection from the elements.

Just as grass and low growing shrubs do not provide good protection from extreme weather conditions, neither do they provide protection from predators. Mammals in the Methow Valley like the yellow-pine chipmunk and yellow-bellied marmot create complex, multi-chambered underground burrow systems which can easily confuse a predator that enters the subterranean maze.

Burrows also provide quick escape routes. Instead of having to outrun a predator, these animals can dive into their burrow entrances, which are always close at hand, thwarting a potential predator with their savvy underground tunnel system.

Subterranean environments also make available an excellent food resource. While the moisture in spring provides a salad-bowl of nutritious vegetation from flowering plants, the growing season quickly draws to a close in the shrub steppe of the Methow Valley. Grasses and forbs desiccate in the summer's heat and go dormant until the following spring. Gophers and voles take advantage of underground roots and subterranean parts of plants such as tubers, bulbs, and germinating seeds, which are available year-round. Underground chambers also provide ideal storage temperatures for hoarded seeds and root caches to be used for later consumption.

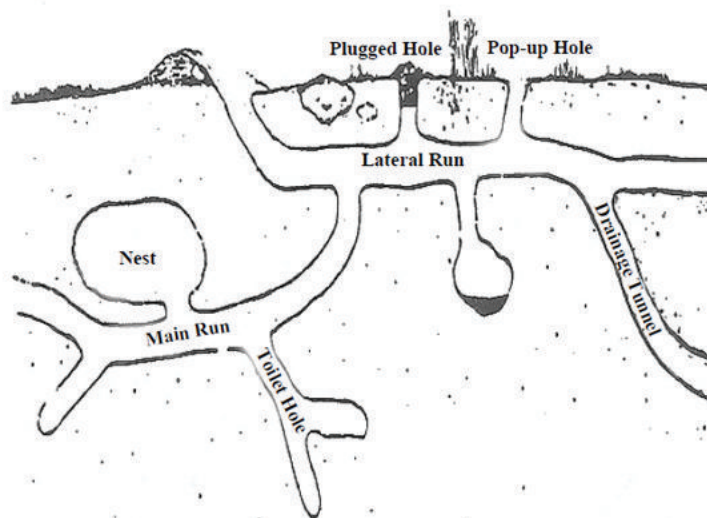
Gophers and voles are more active at the surface during the winter months, when snow covers the ground. They tunnel through the snow in early winter, and then use these tunnels to store dirt as excavations below ground begin anew in early spring. You see the remains of their winter activities when

the snow melts, and the dirt castes of their winter tunnels through the snow are revealed.

Some shrub-steppe mammals, such as the yellow-bellied marmot and Washington ground squirrel, enter hibernation during the hot summer months, and stay there throughout the winter until vegetation is green again the following spring. Hibernation will minimize all body activities for the eight months of the year when food resources are not plentiful.

Some predators have of course evolved to take advantage of the underground refuges of primary excavators.

Short-tailed and long-tailed weasels are two Methow predator species that utilize their long, sleek bodies and short legs to hunt below the surface of the earth. Following underground tunnels built by their prospective prey and digging only when necessary, weasels seek vulnerable creatures that may be nesting or hibernating. Badgers on the



Northern pocket gophers build extensive burrow systems

other hand uses their large clawed front paws, and powerfully built front quarters and leg to rapidly dig into the earth in search of their prey.

Terrestrial reptiles and amphibians take advantage of underground burrows in order to survive the harsh environment of the shrub steppe. Spadefoot toads acquired their name from the distinctive small black "spade" on the first toe of each hind foot. This hardened tissue helps them loosen soil to bury themselves, escaping heat and cold and predation. Gopher snakes use spading and scooping actions with their snout to open and search burrows for prey. They also utilize shallow small mammal burrows late in the day to extend their elevated body temperatures, when the soil has heated and the outside ambient air temperatures are dropping.

Washington has lost the majority of its shrub-steppe habitat in the last 100 years, and with the loss of habitat go the keystone fossorial species that helped hold these wildlife communities together. Our growing appreciation for the vitality and utility of healthy, functioning natural ecosystems may reverse this trend in the future.