The Dusky-footed Woodrat
Bill Tietje, Specialist, UC Berkeley

In outward appearance, the dusky-footed woodrat (Neotoma fuscipes) is almost identical to the Old World rats. Similarity, however, stops there. Taxonomically, the woodrat and the Old World rats (Norway rat, black rat) are unrelated and very different ecologically. The dusky-footed woodrat is native to California. There is recent evidence from genetic finger printing that a second species of woodrat occurs in coastal Central California, separated by the Nacimiento River in Monterey County. Physically, the two species differ most notably in ear size, the northern-most species (N. macrotis) having the larger ears, appropriately named big-eared woodrat. Wood-rats have the unusual habit of collecting and accumulating woody debris—and most any available object, especially if brightly colored—into piles of vegetation which serve as their living quarters, hence, the name packrat. These houses also serve as refuge for several other kinds of animals.
Woodrats prefer well-structured oak woodland with tree canopy and woodland shrub understory for protective cover and large logs for safe travel. Excepting females with pups, only one adult woodrat occupies a house. Population density can be as high as 30 woodrats per acre, especially in preferred habitat and during years of abundant rainfall. During prolonged drought, woodrats do not reproduce and therefore population numbers decline drastically. Surprisingly, due to lower calorie consumption during drought, living through drought tends to prolong life span. Thereby, the animal survives through the drought to replenish the population when normal rainfall returns. Woodrats are mostly active during the night time. Woodrats live an average of 2.5 years. Of 6,000 individuals captured and marked during 1993-2006 in central coastal California, 6 lived for at least 6 years (i.e., 1:1,000 of the individuals). That’s a long time when you think that while foraging each night for six years (over 2,000 nights) these animals avoided being caught and eaten by predators.

In much of California, dusky-footed woodrats are the primary wildlife host for the tick that vectors the spirochete (bacteria) that causes Lyme disease. Woodrats can become a pest by occupying structures in woodland areas. Recently we found that woodrats have a fondness for Elderberry bark. Some recent Elderberry plantings were severely browsed this last winter. After discounting large grazers as the culprits, a motion sensing trail camera discovered that the woodrats not only stripped the bark, but also took large pieces of Elderberry branch back to their nests. Overall, however, woodrats are very important ecologically. They are a keystone species (a species that has a larger effect on the environment than its size or numbers in the environment would indicate) that structures the wildlife community and is therefore an important inhabitant of California oak woodland.

The Soil Food Web
Royce Larsen, Farm Advisor, UCCE Monterey and San Luis Obispo

What lives in your soil? The Soil and Water Conservation Society and the USDA Natural Resources Conservation Service have published a book, “Soil Biology Primer,” that will help you begin understanding this question. The authors are Elaine Ingham, Andrew Moldenke, and Clive Edwards. It may surprise you to know all the life that exists in the soil. The soil food web is all the organisms living, either all or part of their lives, in the soil. It includes an incredible diversity of bacteria, algae, fungi, protozoa, nematodes, arthropods and the ever popular earthworm. Other organisms include insects, small vertebrates and plants. All plants depend on the soil food web for obtaining nutrition. The healthier the food web, the better the production of pastures, crops, trees and shrubs will be.

One of the many functions of the soil food web is to help enhance plant growth, control pests and protect soil, air, and water quality. For example: 1) A healthy food web will store and cycle nutrients, thus decreasing the need for fertilizer. 2) As
soil organisms hold nitrogen in the soil, less nitrogen is leached into the groundwater and more is available for plant use. 3) As the biological activity of the soil profile increases, infiltration also increases allowing more available water for plants and ground water recharge. 4) As soil organisms stabilize soil structure less erosion occurs, helping keep the streams cleaner and the soil on site. 5) Finally, as healthy food web will reduce disease causing organisms and toxins, thus decreasing the amount of pesticides needed and improving downstream water quality.

The food web complexity is determined by the number of individuals within a species, and the number of different kinds of species that are in the soil. The more complex the food web, the more functional the food web is within the soil profile. The more functional the food web the more energy there is being transferred within the soil profile, which increases plant growth. Land management practices can help improve the soil food web, creating healthier soil profiles. The healthier the soil, the more carbon it stores, the better the plant growth is, and the cleaner the water that drains from the soil is. Soil organisms also help decompose organic matter including manure and plant residue. This prevents them from entering a water source and becoming a pollutant. Many organisms also enhance soil structure which increases water movement through the soil profile reducing surface runoff.

Most plants depend on the interaction with the soil food web in order to be healthy and grow. The plant produces by-products, such as roots, which feed soil organisms. In return, the soil organisms decompose organic matter, cycle nutrients, enhance soil structure and control disease-causing pests, allowing the plants to grow. One without the other does not do very well. The “Soil Biology Primer” is a good reference explaining the soil food web and its importance.

Droughts or Floods: Which Will It Be
Royce Larsen

The winter of 1861 – 1862 brought a huge flood during California. This flood was so huge that the entire Sacramento and San Joaquin valleys were flooded for an extent of over 300 miles. The capital in Sacramento had to move to San Francisco because it was flooded. Over 200,000 cattle were drowned, along with homes, ranches and crops being destroyed. In contrast, the great drought of 1862–1865 wreaked havoc on the state and the cattle industry. Since that time we have had several severe droughts. For example, Hazel Pulling’s article in the SAN DIEGO HISTORICAL SOCIETY QUARTERLY January 1965, noted that “the drought of 1898 was, if possible, more devastating in its effects than previous droughts except that of 1862-1864. The southern half of the state was
most severely affected, grasses drying as early as March so that cattlemen were in search of northern ranges early in the year. Lacking grazing facilities or the ability to transfer their herds long distances to better pastures, cattle producers found their stock dying in droves before the end of the summer. Even in the usually humid Pajaro Valley in Monterey County cattlemen resorted to the felling of trees in order to obtain the moss and browse from their branches, Tulare Lake, which had been the succor of thousands of cattle during the drought of 1862-1865, went dry during the summer of 1898”.

As discussed in a paper by Mel George et. al., Rangelands 2010, not all droughts are equal. Droughts tend to be more common in the rain shadow along the Coast Range adjacent to the west edge of the San Joaquin Valley. Even though drought conditions create havoc with management of ranches, ranchers also have to deal with wetter than normal years. There is no such thing as an average year, which makes management decisions very difficult. Forage production and quality can vary greatly from year to year, and is strongly influenced by the timing and amount of rainfall. For example, forage production in San Luis Obispo County over the last 11 years has varied by as much as 4000 lbs/ac, see figure 1. Rainfall amount and timing played a significant role in this variation, which varied by 18 inches of annual precipitation. It is just a fact of life that rainfall amount and timing varies. For example, the lowest rainfall recorded in downtown Paso Robles was 4.8 inches in 1898, see figure 2. The highest recorded was 31.3 inches in 1969, the year that Paso Robles saw water lapping over the 13th bridge. Monthly variation of rainfall is also important in determining production. The average monthly precipitation since 1887 in Paso Robles is shown in figure 3. Last year we had very wet months during December and March, but were quite dry though January and February. The production for 2010 was actually higher than in 2011 (fig. 1) with less total rainfall, because the timing was more evenly distributed (fig. 3). So far this year, we are experiencing another severe drought (fig. 3). Unless it rains very soon, we could equal the severity of droughts during 1894, 1898, 1924, 1976, and 2007, (fig. 2).

It is important to notice that 6 out 10 years are below average (fig. 2). This means that the four years that are above average are very wet. For more practical purposes, the years that are below average determine how much forage can be produced on a ranch over long periods of time. It is this lower value that should be used to determine the number of cattle that can be supported on a sustainable basis. It is very important to the ecological health of rangeland to maintain proper stocking rates. Maintaining the proper amount of residual dry matter (RDM) has become the standard to determine proper utilization. Properly managed RDM provides protection from soil erosion and nutrient losses, and also plays an important role determining the following year’s production as well as the composition of plant species. More information about proper management of rangelands can be found at: http://californiarangeland.ucdavis.edu/ or http://rangelandwatersheds.ucdavis.edu/.

As difficult as it may be to manage ranches properly now, it could become much more difficult in the future. As reported by Barbara Allen-Diaz, in California Agriculture 2009, the Intergovernmental Panel on Climate Change has shown that the earth’s temperature will continue to rise. This means that the dry years will be drier, and the wet years will be wetter. Also, most climate models predict that California will experience an increase in storm severity during these wet years, which could lead to severe flooding. So, Droughts or Floods – It may be both.
Figure 1. Peak Forage Production in San Luis Obispo County, 2001 – 2011.

Figure 2. Rainfall records at downtown Paso Robles, CA. Data is based on water year July 1 – June 30. Average precipitation is 15 in/yr.
Announcements...

San Luis Obispo County Range Improvement Association
Annual Meeting & BBQ
Friday, April 20, 2012 Social Hour - 6:00 pm Dinner, 7:00 pm-$10.00 Dues $5.00
Arroyo Grande Association Hall 707 Hosanna Rd., Arroyo Grande
Featured Speakers include Katcho Achadjian, Cal State Assemblymen, Bill Wietkamp, UC Cooperative Extension, Karen Brooks, APCD, Rob Lewin, Cal Fire
PLEASE RSVP: Mike Zimmerman at 489-4705 mike@dz-law.net

Central Coast Rangeland Coalition Meeting-A Two Day Event
Date: Wednesday, April 18, & Thursday April 19, 2012-9:00 AM - 5:30 PM
Location: Work Ranch, San Miguel

Day 1 Things Ranchers Do Besides Ranching: An Educational Event and Mini Farm Stay
Day 2 Annual Spring Meeting-Soil Food Web Training

Registration Opens: Wed, Feb 15, 2012 for both days
Deadline to Register: Wed, Apr 4, 2012 for both days
For more details and information on overnight camping and to register go to:
http://www.elkhornsloughctp.org/training/index.php#current
Water Troughs—they’re not just for cattle!