PONDEROSA PINE WOODLAND AND SAVANNA ECOSYSTEM

The ponderosa pine woodland and savanna is the largest ecosystem on Vermejo covering roughly half of the property. The ecosystem is typified by pockets of denser woodlands with adjacent open savannas with large mature trees and a grass understory. Ponderosa are the dominant tree in western North America in the montane elevation zone. The ponderosa merge with pinyon-juniper woodlands in the lower elevations and transition to subalpine forest in the upper extent of elevation range. The ecosystem has small patches of mixed conifer on wetter north facing slopes and oak shrubland pockets in drier areas.

Ponderosa Biology

The Rocky Mountain ponderosa pine (*Pinus ponderosa var. scopulorum*) is typically smaller than the ponderosa of the Pacific Northwest, with trees reaching over 200 feet in height. Ponderosa have very long needles that they will occasionally cast or drop to the ground in order to regrow new needles. Mature trees are easy to identify with their thick layered orange to yellow bark, sometimes referred to as puzzle bark or yellow bark. The trees also have a distinctive vanilla smell when the sap is warmed by the sun. The root system of a ponderosa pine is fairly widespread with a deep taproot allowing the pine to try and collect as much water as possible in the drier climates of the southern Rocky Mountains. The root system also supports the trees during windy conditions. The trees reproduce after reaching the age of about 25 years, growing cones that hold winged seeds. The cones will open and close with changes in moisture protecting the seeds inside from moisture and opening to allow the seeds to be carried away in the wind when dry, enhancing the odds that the seeds will travel further from the tree.

The understory of the ponderosa savanna and woodland is a mix of grass, shrub and forbs but is mostly grass covered. Blue gramma, mountain muhly, pine dropseed, Parry's oatgrass, and Arizona fescue are common grass species of the ecosystem. Understory shrubs may include Gambel's oak, wax current, mountain mahogany, kinnikinnick or bearberry, and common juniper in low shrub form. Forbs found with the ponderosa include fleabane, chickweed, asters, stemless daisies, pasqueflower, pussytoes, penstemon, western wallflower, rock clematis, and yarrow. Mountain ball, kingcup, and beehive/pincushion cacti can also be seen in drier locations.

Tree Mortality

Dwarf mistletoe, technically a shrub, is a parasitic plant that attaches to the branches of ponderosa pine. Seeds expelled from mature mistletoe launch and stick to needles of a new host tree. They later fall or are washed by rain onto twigs and seeds take hold. It takes two years for a swelling to appear on the twig or branch. In two more years, mistletoe shoots appear. The parasite does not have leaves and obtains all its water and nutrients from the host tree. After another two years, the mistletoe will create fruit and seeds to continue the reproduction cycle.

The mountain pine beetle can cause mortality in ponderosa stands. The beetles spend all but a very short period of their lives under the bark of the trees. The beetles and their larvae feed on the cambium or inner bark of the tree, creating a network of tunnels under the thick bark. The trees defense of creating pitch to block the beetles is not always successful. Tree mortality occurs when the tunnels interrupt enough of the xylem function of the tree that delivers water and nutrients to the branches and needles, basically cutting off the trees water source and ability to create food through photosynthesis.

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Long term drought in the southwest combined with fire suppression has made forest stands more susceptible to beetle mortality as the trees are already stressed by the lack of precipitation and/or insufficient nutrients from overcrowded stands where fire suppression has resulted in overly dense forests. It is also likely that the denser spacing of trees makes it easier for the beetles when they emerge from under the bark on their 'flight' to find a new home nearby to reproduce.

Symbiosis

Unlike the dwarf mistletoe and the pine beetle, the ponderosa have an obligate symbiotic relationship with mycorrhizae (literally fungus roots). The fungal organism grows filaments that intwine with ponderosa roots. The fungus is more efficient at absorbing moisture from the soils than the tree roots. The fungi supply additional water to the tree and the tree, in turn, supplies carbohydrates from photosynthesis via the tree roots, benefiting both organisms.

Animals of the Ponderosa Ecosystem

Ponderosa woodlands provide habitat and food for the Abert's squirrel, a large gray tassel-eared squirrel, that eat the cambium or inner bark, male pollen cones, and false truffles. The squirrels spread the spores of the false truffles that pass through their digestive tracks unharmed. Ponderosa are also key habitat for the flammulated owl, a yellow watch species, that nest in cavities of old trees and snags. The small owl, only about six inches tall, mostly eats insects.

Other species that live in the woodland and savanna are least chipmunks, little brown Myotis (little brown bats), porcupine, raccoon, skunk, gray fox, coyote, bobcat, mountain lion and black bear. Bison, elk and mule deer also utilize the habit. Some of the many bird species of the habitat include Steller's jay, northern flicker, Clark's nutcrackers, pygmy nuthatch, wester tanagers, pine siskin, black-headed grossbeak, common nighthawk, and great-horned owls. Many of the bird species do not migrate and have adapted to survive cold winters in the southern Rockies. The pygmy nuthatch, only 3-4 inches long, will sleep in a cavity with up to one hundred other pygmies to maintain body temperature. The small birds also use controlled hypothermia to help them survive winter in the mountains.

Wildland Fire

The southern Rocky Mountains have very high number of lightning strikes in the summer. Pre-European settlement, these strikes caused smaller, low-intensity fires at an interval of 6-13 years, cleaning the understory, clearing small seedlings, dropped needles, shrubs and decadent grasses, while increasing soil nutrients. Clearing the understory helped prevent larger fires. The thick bark of the mature ponderosa allowed the trees to withstand the low intensity fires but does not protect the tree from current high intensity fire behaviors in the west. (see Wildland Fire abstract).

Ponderosa Habitat Treatments

Historic logging, early grazing practices, and suppressed wildland fire have resulted in overly dense homogenous (same age class and size) ponderosa pine ecosystems that are more prone to disease, insect mortality, and catastrophic wildland fire. Vermejo's goal is the restoration of natural ecological process and improving the resiliency of the forests. Roughly 1,200 acres are treated per year producing 24,000 tons sent to local sawmills. With the treatments spanning over 25 years, VPR has recreated a significant landscape mosaic of heterogeneous seral stages (plant succession over time in an ecosystem) that may already be aiding

in reducing the risk of lightning caused larger wildland fires. (for more information, please see the Ponderosa Forestry Management Abstract).