

Insects of the riparian

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Abstract.-This paper describes life histories, defoliation problems and other activities of insects associated with forest tree species growing along high elevation streams and river banks. In addition, examples of insects and diseases associated with lower elevation riparian areas are given.

Although the title of this presentation is "Insects of the Riparian," it might be more aptly entitled. "Insects of High elevation Watersheds, Streams and River Banks." As an entomologist with the USDA Forest Service, I provide technical assistance to Federal land managers on insects and diseases. We do not work on state and private lands, but we do work with state counterparts on occasion. Most of the work I do has been in the spruce-fir, mixed conifer, ponderosa pine, and pinyon pine forest cover types. In the higher elevation spruce-fir and middle elevation mixed conifer forest cover types, spruce, true firs, Douglas-fir, and ponderosa pines grow along the streams and river banks. Insect outbreaks associated with these tree species usually affects the entire watershed where these streams and river banks occur. Therefore, I am not going to talk about aquatics such as mayflies, dragonflies, stone flies, etc., but rather about forest insects associated with forest tree species growing along high elevation streams and river banks. Later, however, I will give examples of insects and disease associated with the lower elevation riparian areas.

All of the insects and diseases discussed are native to the Southwest. They have evolved with their hosts for thousands of years. Many of these insects and diseases are host specific. Others feed on a number of host trees. Because of time only few examples of the important insects and diseases will be discussed.

Defoliators are insects that feed on the foliage or needles causing partial or complete foliage or needle loss. The western spruce budworm, *Choristoneura occidentalis*, periodically increases to outbreak levels defoliating large areas of the mixed conifer forest cover type. Areas susceptible to western spruce budworm outbreaks are usually multistoried and very dense. Several outbreak cycles of this insect have occurred in the Southwest in both Arizona and New Mexico. Western spruce budworm larvae feed on the new developing foliage buds and developing needles of spruce, true firs, and Douglas-fir. Defoliated trees usually have a reddish appearance as if the trees were singed by fire. Several years of consecutive defoliation cause the affected trees to appear grey with thinning crowns. Suppressed trees are often killed and many of the dominant and codominant trees are topkilled. These defoliated trees are highly susceptible to bark beetle attack. Outbreaks of the western spruce budworm have occurred on the Carson, Santa Fe, Cibola, Lincoln and Gila National Forests and well as other Federal and adjacent private ownerships. Periodic outbreaks of this insect have also occurred throughout the mixed conifer forest cover types in Arizona.

The Douglas-fir tussock moth, *Orgyia pseudotsugata* is also an important defoliator of ornamental and forest Douglas-fir, white fir, and blue spruce. Needles in the upper portion of infested trees may be completely removed after one or two years of feeding. In Southwestern forests, tussock moth outbreaks have generally been confined to mature and over mature multistoried stands of spruce, white fir and

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Douglas-fir bordering riparian areas. Heavily defoliated trees may result in water temperature increases and erosion. The eggs of the tussock moth hatch in late May and early June. The caterpillars feed on the new and old foliage. Tussock moth larvae are covered with long, thin body hairs that develop into tufts. Some people develop an itchy rash from exposure to the frequently airborne caterpillar hairs. Because the female moth is wingless, the primary means of dispersal from tree to tree is by windblown larvae. Young larvae congregate on the tops of defoliated trees and drop on silken threads. These threads eventually break and give a ballooning effect to the larvae. If caught by a strong wind, some larvae may be blown great distances. Many larvae will never find a suitable host and will perish during dispersal.

Trees heavily defoliated by the western spruce budworm and tussock moth are often susceptible to attack by bark beetles belonging to the genus *Dendroctonus*. These bark beetles frequently attack and kill mature and over mature trees as well as suppressed trees along riparian areas. Because *Dendroctonus* beetles are host specific, they can be easily identified by the trees they attack and kill. For example, the spruce beetle, *Dendroctonus rufipennis*, attacks and kills spruce, the Douglas-fir beetle, *Dendroctonus pseudotsuga*, attacks and kills Douglas-fir, and the fir engraver beetle, *Scolytus ventralis*, attacks and kills white fir. Ponderosa pine, also a component of riparian areas in the mixed conifer forest cover type, is often attacked and killed by one or a combination of mountain pine beetle, *Dendroctonus ponderosae*, western pine beetle, *Dendroctonus brevicornis*, and roundheaded pine beetle, *Dendroctonus adjunctus*. Each of these bark beetles can be readily identified by the egg galleries they make as they bore under the bark. Symptoms of bark beetle attack include boring dust in the cracks and crevices of the bark, pitch tubes (globules of resin) on the trunk of the tree, and foliage changing from green to yellow or red. Woodpecker activity on the trunk is also a good indication that the tree has been attacked.

In 1995, an outbreak of the alder flea beetle, *Altica ambiens* occurred at several areas along the Hassayampa River on the Prescott National Forest, Arizona. This insect usually occurs at low population levels, but occasionally outbreaks occur. The alder flea beetle is a native insect belonging to the

insect family Chrysomelidae and occurs throughout the western United States. These insects are referred to as flea beetles because they are powerful jumpers. Alder is the principal host. Both the adults and larvae feed on the alder foliage often causing light to heavy defoliation to host trees. During the early 1970's, alder flea beetle defoliation was also detected along the Gila River in New Mexico. The adults chew holes in the leaves while the larvae are skeletonizers feeding on the tissues between the leaf veins. The shiny dark blue adults hibernate during the winter in the debris beneath the trees and in other sheltered places. They then reappear in the spring to resume feeding. Outbreaks of this insect appear to be short lived and damages to the infested trees are usually minor.

Numerous insects and diseases also affect the cottonwood and elms and other vegetation growing in the riparian areas along the Rio Grande. At this time of year (fall), for example, the fall web worm, *Hyphantria cunea* can be seen forming webs and feeding in colonies on the cottonwoods along the Rio Grande. Although the webs formed by these insect defoliators are conspicuous and unsightly, web worm feeding activity generally result in little damage to the infested trees. Early in the spring, many of the cottonwood leaves are infested with tiny leaf miners, possibly belonging to the family of true flies (Order Diptera) called Agromyzidae. These insects are a natural component of the riparian ecosystem where cottonwoods reside and generally cause little if any significant damages to the trees they feed on. Siberian elms are also becoming established in the bosque. These trees are susceptible to elm leaf beetle defoliation. Last year (1994) cottonwood leaf beetle adults were observed at high levels near the bosque, however, no defoliation was reported.

Diseases are also a natural part of the riparian ecosystem. Cottonwoods along the bosque near San Antonio, New Mexico are heavily infected with true mistletoe. This disease is an obligate parasite which causes severe branch dieback. This disease is transmitted by birds passing the seeds through their feces. Trees heavily infected with this disease indicate they were used as roosting trees. Cottonwoods are also susceptible to cytospora canker. This disease causes branch dieback on large trees and mortality to infected seedlings and saplings.

Alders are susceptible to hypoxylon and cytospera cankers. These diseases can cause branch dieback and/or tree mortality to stressed trees.

Willows are often infected with rusts. Leaves infected with rust prematurely turn yellow-gold in late August, die, and are shed in early September.

One last comment about the bosque. All of the insects and disease discussed are native. These

insects have a complex of predators and parasites that keep potential native pest insects in check.

Introduced pests, however, can pose a problem.

For example, the gypsy moth, a non-native insect, if introduced into New Mexico, could be a serious threat to hardwoods of the Bosque since they have no native predators or parasites to keep them in check.