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Stanislaus National Forest  
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Subject: Pine Reproduction Weevil Survey, Mariposa RD  
(FPM Report C98-2)

To: District Ranger, Mariposa RD

On April 29, 1998, at the request of Mark Smith, Forest Silviculturist, Sierra NF, John Wenz, Forest Pest Management (FPM) entomologist, Joy Barney, Groveland RD (Stanislaus NF) and Francey Blaugrund, Mariposa RD, surveyed several pine plantations on the Mariposa District for pine reproduction weevil (PRW) activity. The pine reproduction weevil, Cylindrocopturus eatoni (see attached Biology), attacks young pine plantations in central and northern California and is currently associated with significant levels of ponderosa pine mortality over about 2,000 to 3,000 acres of plantations on the Groveland RD. Localized, current PRW-related mortality has also been found in plantations on the Calaveras RD, Stanislaus NF. The purpose of the survey was to determine if PRW was a problem on the Mariposa RD and, if so, to discuss appropriate management actions to mitigate any unacceptable impacts.

Five plantations (754-36, 754-37, 728-107, 728-117 and 750-509) were surveyed across a range of geographical locations on the Mariposa District from the northwest near Feliciana Mountain through the Miami Creek drainage to west of Bass Lake. Pine reproduction weevil-related ponderosa pine mortality was found in each plantation. Although some mortality in Unit 754-37 involved trees four feet in height, mortality was most common in pines three feet high or less and tended to occur in localized pockets of about 5 to 15 trees. In Unit 754-36, PRW mortality was confined to the natural regeneration one to two feet in height and was not observed in the five to ten feet tall trees planted in 1990. The latter are growing out of the most susceptible height range for PRW attack but may be at some risk for the next few years if PRW populations build up and/or if they become stressed by other factors (e.g., drought). Mortality was commonly noted in natural pine regeneration on private land between Jerseydale and Darrah and between Darrah and Highway 49 along Triangle Road.

At least 90% to 95% of the mortality involves the 1997-98 weevil generation. These trees were attacked in the spring/early summer of 1997 and are currently infested. A few trees killed by the 1996-97 generation were present in the immediate vicinity of the current mortality groups. The weevil brood in the currently infested trees was still in the larval stage on April 29 in all of the plantations except Unit 754-37 where a few pupae were present in one tree.

As noted above, PRW has the potential to cause significant mortality in young pine plantations. The initial, very limited, survey conducted on April 29 found PRW in plantations across the District. The comparison of the number of currently infested trees (1997-98 PRW generation) to the number of older,

1996-97 generation, killed trees indicates that PRW-related mortality started to appear two years ago and, while still at low to moderate levels, is increasing and has the potential to further increase over the next several years.

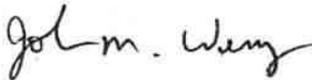
Given these findings, the following actions are suggested to reduce the potential for continued, increased, PRW-related mortality in young pine plantations:

(1) Surveys. Conduct surveys of all pine plantations with trees from one to five feet in height for incidence of PRW-related mortality. Plantations with trees up to 10 feet in height are also at some risk and should be surveyed if possible.

(2) Suppression. The option to control existing PRW infestations is to remove and destroy all currently infested trees prior to the emergence of the next generation adults. Although this does not preclude subsequent migration of adults into the treated areas from nearby untreated areas, it will reduce PRW populations within the treated areas and potentially reduce the number of trees infested by the next generation. Studies are underway on the Groveland RD to assess the efficacy of this treatment. Adult emergence can occur approximately two weeks after pupation. While most of brood was still in the larval stage on April 29, a few pupae were present. This indicates, that, to be most effective, depending to an extent on weather, the susceptible plantations should be surveyed and all currently infested trees removed/destroyed within the next two to four weeks.

(3) Monitoring. It will be important to survey the plantations next fall to assess incidence of 1998-99 generation PRW-related mortality. This is necessary to help evaluate the effectiveness of suppression efforts and to obtain information on PRW-related tree mortality incidence and trend to plan appropriate management action(s) in 1999. It is suggested that monitoring be conducted whether or not any suppression is implemented.

These actions are not limited to the Mariposa RD but should also be considered by the Minarets, Pineridge and Kings River Districts. At a minimum, the survey and monitoring activities should be considered with suppression dependent on the results of the detection surveys. Forest Pest Management Insect and Disease Prevention and Suppression funds (SPFH QC312) can be used to support the survey, suppression and monitoring activities discussed above. None of these funds are available in FY98 because of existing allocations to other insect and disease projects. However, a project proposal can be prepared for submission in the fall for funding in FY99.



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## BIOLOGY

### Pine Reproduction Weevil Cylindrocopturus eatoni (Coleoptera: Curculionidae)

The pine reproduction weevil (PRW), is a native insect that became of interest in the early 1940's when it was found to be destructive to pine plantations established to reforest brushfields in northern California. It has subsequently been a periodic problem in pine plantations below about 4,500 feet in elevation in northern and central California. It's range may extend into Oregon and southern California. Ponderosa pine is the primary host although it sometimes attacks sugar and foothill (gray) pines. Jeffrey pine may also be attacked when planted within the range of ponderosa pine.

The PRW completes a life cycle in one year. The grayish appearing adults (2.5 mm in length) emerge from infested trees from late-April to mid-July. They feed on pine foliage, twigs and stems for about two to three weeks. The feeding punctures leave concentric brown rings about 1 mm in diameter on the needles and small pitch globules on the twigs and stems. Adult females lay eggs, singly, in feeding punctures on the main stem and/or laterals below the current year's growth. The eggs hatch in about two weeks. The cream colored, legless, larvae bore into the cambium-phloem area where they feed until fall when they construct pupal chambers in the outer layers of the wood or in the pith of smaller diameter stems. The principal damage to the host pine is the destruction of the cambium-phloem area resulting from larval feeding. The larvae generally tunnel in the above ground woody portions of the tree but infestations often extend into the roots two to three inches below the soil surface. The PRW overwinters as mature larvae (about 4 mm in length) in the pupal chambers. Pupation occurs the following spring. The pupal stage lasts about two to four weeks after which the next-generation adults emerge leaving emergence holes in the bark.

Attack is usually restricted to pines between about 18 inches to 5 feet in height although trees 8 inches up to about 10 feet in height can be infested. Infested trees become evident starting in late-summer and fall when the foliage begins to fade from the top down. The foliage becomes progressively straw colored and chlorotic and by the following spring is usually reddish brown. Sometimes only the upper part of the tree is attacked and killed and, with taller reproduction, only laterals may be attacked. In both cases, such trees are often re-attacked and killed the following year. The wood in areas of the stem/laterals attacked by PRW is often discolored by wood-staining fungi.

The natural enemy complex of the PRW has not been well studied but nine species of Hymenopterous parasitoids and one predaceous clerid beetle have been reared from PRW infested hosts and may play an important role in regulating PRW populations. Most problems with PRW have occurred in plantations under stress from one or a combination of factors including competing vegetation, poor planting practices (J/ L-roots), use of stock poorly adapted to the site and/or soil moisture stress. Under such conditions, infestations can persist for several years and destroy a large proportion of the plantation. Maintaining suitable growing conditions in plantations is the most effective means to prevent PRW impacts.