W. M. BEATY & ASSOCIATES, INC.

Insect & Disease Management Plan

July 11, 2016

Current Conditions & Anticipated Issues

Red River Forests and Shasta Forests are both characterized by healthy forest conditions, primarily due to active forest management. Forest stands are manipulated using silvicultural prescriptions intended to maintain optimal stocking levels and species composition. Because the stands are subject to professional forest management, epidemic outbreaks that affect forest conditions across large scales are uncommon. Endemic outbreaks on a local scale are a natural and accepted occurrence within the forest management units.

Both Red River Forests and Shasta Forests have a long history of salvage activity due drought, beetle activity, and fires. Other common pests which include dwarf mistletoes, black stain root disease, cankers, white pine blister rust, sawfly, Douglas-fir tussock moth, and Western pine shoot borer. The bark beetle/drought interaction results in the most significant damage and mortality across the management area. Beetle activity is currently at a fairly low level across the management units, however, adjacent landowners are experiencing moderate beetle outbreaks, which are being carefully watched for spread. The bark beetle/drought interaction also contributes to fuel loadings and subsequent increase in wildfire risk, with wildfires posing a huge threat to the management units.

A number of native and exotic pests have the potential to affect the forest, either at non-damaging endemic levels, or through epidemic outbreaks. A listing of potential injurious agents separated between forest insects and forest diseases is included in this document. The most likely pests to occur on Red River Forests and Shasta Forests are shown in blue font in the lists below. Extensive insect and disease descriptions and potential impacts are described in the references listed under Supporting Guidelines & Policies.

Management Goals

The goal for Red River Forests and Shasta Forests is to manage for healthy, fire resilient forests, comprised of a diverse range of native species. By maintaining desired stocking levels, individual tree growth and health will be high, giving trees the best protection from injurious agents. Endemic levels of forest pests are an accepted and important mechanism for creating diverse forest structure, and habitat for wildlife. It is not the intent of Red River Forests and Shasta Forests to salvage all trees affected by forest insects and diseases or to sanitize the forest of all pest activity.

Insect & Disease Management

Red River Forests and Shasta Forests are continually monitored to assess stand conditions and the potential for impacts from injurious agents. Frequent harvest, utilizing appropriate silvicultural prescriptions is used to adjust species composition and stocking levels to desired levels. These harvests are intended to promote healthy, diverse, and resilient forests. Endemic pest effects will largely go untreated depending on extent and potential for epidemic outbreak. Isolated trees and larger pockets of

damaged timber may be salvaged during periodic timber sales or during specific salvage sales. Epidemic levels of damage will generally be treated with specific salvage efforts, followed by prompt reforestation when appropriate.

Injurious agents will be managed using the best available forest management practices, and following the California Forest Practice Rules. Management and prescriptions will be adjusted for climatic conditions such as drought stress and wildfire occurrence. A listing of potential management measures available are described in the references listed under Supporting Guidelines & Policies below. Foresters will conduct field evaluations and request assistance from local agency entomologists and pathologists as needed to identify injurious agents and develop appropriate site-specific mitigation measures (if warranted). Management measures will be prescribed and implemented after thorough evaluation of impacted areas and review of the supporting guidelines and policies.

The spatial extent, and severity of pest outbreaks shall be controlled primarily through sound forest management, and maintaining forests in a healthy condition. Should an outbreak occur, early detection, rapid assessment, and thorough implementation of appropriate management actions is the preferred strategy to minimize outbreak effects. Continuing education and training of field staff is also a critical component of pest management so that pests are appropriately identified and managed.

Potential Impacts on Stocking or Harvest

As both Red River Forests and Shasta Forests are generally healthy, impacts from endemic levels of pests generally do not effect stocking or harvest. Epidemic impacts on these forests, such as large bark beetle outbreaks, or catastrophic wildfire greatly affect stocking and harvest levels in the short term. Long-term effects are mitigated through salvage, adjustments to the modeled harvests, and prompt reforestation where practical.

Supporting Guidelines & Policies

Bark and Wood Boring Beetles of the World. https//www.barkbeetles.org

California Department of Forestry and Fire Protection. 2016. California Forest Practice Rules, Technical Addendum Number 3, Brood Material.

California Department of Forestry and Fire Protection. 2015. California Tree Notes Number 19. Managing Bark Beetles in Urban and Rural Trees. http://calfire.ca.gov/foreststeward/pdf/treenote19.pdf

California Department of Forestry and Fire Protection. California Tree Notes Number 30. Identifying Dead and Dying Conifers on Private Land in California. http://calfire.ca.gov/foreststeward/pdf/treenote30.pdf and http://www.fire.ca.gov/downloads/tree_notes/treenote30.pdf

California Forest Pest Council. http://caforestpestcouncil.org/

Oregon Department of Forestry. Forest Health. Factsheets & Information. https://www.oregon.gov/ODF/ForestBenefits/Pages/ForestHealth.aspx

USDA. Forest Service. Region 5 Forest Health Protection. California Insect and Disease Training Manual. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_046410.pdf

USDA. Pacific Southwest Region. Western Forests Insects & Diseases: Publications and Links. http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/insects-diseases/?cid=stelprdb5300513

Wood, David L. 2003. Pests of the native California conifers. Vol. 70. Univ. of California Press.

FOREST INSECTS

Bark Beetles

Douglas-fir Beetle
(*Dendroctonus pseudotsugae)*
Fir Engraver (*Scolytus ventralis*)
Jeffrey Pine Beetle
(*Dendroctonus jeffreyi*)
Mountain Pine Beetle
(*Dendroctonus ponderosae*)
Pine Engravers (*Ips spp.)*
Red Turpentine Beetle
(*Dendroctonus valens*)
Roundheaded Pine Beetle
(*Dendroctonus adjunctus)*
Western Pine Beetle
(*Dendroctonus brevicomis*)

Defoliators

Cutworms
Cypress Tip Moth
Diplodia Blight
Douglas-fir Tussock Moth
(*Orgyia pseudotsugata*)
Elm Leaf Beetle
Fall Webworm
Gypsy Moth
Hemlock Sawfly
Larch Casebearer
Larch Sawfly
Loopers
Needle Miners (Coleotechnites Spp.)
Pine Butterfly
Ponderosa Pine Budworm
Satin Moth
Sawflies
Silverspotted Tiger Moth
Spearmarked Black Moth
Tent Caterpillars

Seed & Cone Insects

Cone beetles
Douglas-Fir Cone Midge
Douglas-Fir Cone Moth
Douglas-Fir Seed Chalcid
Fir Coneworm
Pine Seedworm
Western Conifer Seed Bug

Shoot, Twig, & Terminal Insects

Douglas-Fir Twig Miner
European Pine Shoot Moth
Jeffrey Pine Needleminer
(*Coleotechnites spp.*)
Lodgepole Terminal Weevil
Pine Reproduction Weevil
Ponderosa Pine Tip Moth
Western Pine Shoot Borer
(*Eucosma sonomana*)
White Pine Weevil

Sucking Insects

Balsam Woolly Adelgid
Black Pineleaf Scale (*Nuculapsis californica*)
Boxelder Bug
Cooley Spruce Gall Aphid
Pine Needle Scale
Spruce Aphid

Wood Borers

Ambrosia Beetles
Asian Longhorned Beetle
Carpenter Ants
Citrus Longhorned Beetle
Flatheaded Borers (*Buprestids*)
Longhorned (Roundheaded) Borers
Pitch Moths
Powderpost Beetles
Termites
Weevils
Wood Wasps & Horntails (*Sirex Spp.*)

FOREST DISEASES

Cankers
Atropellis Canker
Hypoxylon Canker
Phomopsis Canker of Douglas-Fir
Pitch Canker (Fusarium subglutinans)

Foliage Diseases
Brown Felt Blight
Cedar Leaf Blight
Elytroderma Needle Blight
Larch Needle Blight
Larch Needle Cast
Lophodermella Needle Casts
Red Band Needle Blight
Rhabdocline Needle Cast
Swiss Needle Cast

Mistletoes
Douglas-fir Dwarf Mistletoe
Lodgepole Pine Dwarf Mistletoe
White Fir Dwarf Mistletoe
Western Dwarf Mistletoe
(Arceuthobium campylopodum)
True Mistletoes

Root Diseases
Armillaria Root Disease
Black Stain Root Disease
(*Leptographium wageneri)*
Heterobasidion Root Disease
Marssonina Leaf Spot or Blight of Aspen
Laminated Root Rot

Rots & Decays
Brown Crumbly Rot
Brown Cubical Butt Rot
Brown Trunk Rot
Dark Brown Cubical Rot
Decay of Aspen
Ganoderma Trunk Rot
Gray Saprot
Pocket Dry Rot / Pecky Rot
(*Oligoporus amarus)*
Mottled Rot
Red-brown Butt Rot (Velvet Top Fugus)
Red Ring Rot (*Phellinus pini*)
Red Rot
Rust Red Stringy Rot
White Mottled Rot
White Trunk Rot of Aspen
Yellow Brown Top Rot

Rusts
Comandra Blister Rust
Fir Broom Rust
Incense Cedar Rust
Spruce Broom Rust
Spruce Cone Rust
Stalactiform Rust
Western Gall Rust
White Pine Blister Rust (*Cronartium ribicola*)

Seedling Diseases
Damping Off
Fusarium Root Rot
Gray Mold
Phytophthora Root Rots of Seedlings
Rhizina Root Rot

Abiotic Diseases & Complexes
Fire
Frost
Heat, Drought, & Sun
Hail
Smoke
Wind

Animal Damage
Beaver
Black Bear
Deer
Elk
Gopher
Livestock
Porcupine
Rabbit, Hare, Squirrel, Woodrat