UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE

ENVIRONMENTAL ASSESSMENT NO. EA-01-05
Travis Tyrrell Seed Orchard Insect Control

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I. INTRODUCTION

A. BACKGROUND

This action proposes application of insecticide in the spring of 2001 within the fenced boundaries of Travis Tyrrell Seed Orchard located in Section 9 and 15, Township 20 South, Range 5 West, Willamette Meridian, Lane County, Oregon, in the Eugene District of the Bureau of Land Management (BLM). The 832.5-acre orchard is located about 3 miles west of Lorane, Oregon in the upper Siuslaw River basin (Figure 1). The Seed Orchard is managed on lands that are closed to all public use per Public Land Order (PLO) 6662.

The Tyrrell Seed Orchard was established in 1983 as a centralized tree seed orchard designed to provide genetically improved Douglas-fir seed for BLM's Coos Bay, Roseburg and Eugene districts. The seed produced is genetically diverse and is well adapted for reforesting sites in western Oregon. In 1998, a cooperative agreement was initiated with ten private timber and seed companies. This has allowed the BLM to more cost effectively manage the Seed Orchard and make the existing genetic resources available to others. The cooperators share in the annual expenses of all 24 Douglas-fir seed production orchards and are part of a management committee for each of these units. These units range in age from six to thirteen years and have measurable cone production beginning at about age nine. Since the oldest orchard units have just started to produce cone crops in the past several years, the demand for seed from the Seed Orchard is very high.

B. PURPOSE AND NEED FOR THE ACTION

The purpose of the action is to control cone insects which cause damage and seed loss to orchard cone crops. There is a need for control of cone insects in five seed production units (Figure 2) in which a cone crop is expected in 2001. A total of twenty-five acres were stimulated for cone production in three seed production units (Lorane, McKenzie Low, and Swisshome/Mapleton) in spring, 2000 using overlapping, half-circumference girdles, followed with an application of calcium nitrate fertilizer. This method is commonly used in seed orchards and is projected to stimulate a cone crop of about 725 bushels in late summer, 2001. **An additional 17 acres in two seed production orchards, Wells Creek and Noti, are developing a natural cone crop of about 390 bushels.**

Manual treatments to reduce insect damage have been done the past three years. This has included removal of all visible cones during cone harvest in August and removal of conelets in younger orchards in May. In spite of this effort, seed extraction completed in 1999 and 2000 showed a considerable reduction in yield due to insect problems. Damage is anticipated to persist at current levels or become worse. An intensive cone dissection study was completed in September, 2000 under the direction of Beth Willhite, U.S. Forest Service entomologist for the

Westside Forest Insect and Disease Center. Her preliminary report indicated that the Douglas-fir cone gall midge (*Contarinia oregonensis*), the Douglas-fir seed chalcid (*Megastigmas spermotrophus*), and Douglas-fir coneworm (*Dioryctria abietivorella*) caused notable damage to the 2000 seed crop at Tyrrell. **Projected loss from insect-related damage is approximately 196 pounds of seed from the 1,089 bushels collected in 2000 (about $196,000 in lost value). With the level of insect damage in 2000 being at least 34%, it is conceivable that damage could be as high as 40% to 50% in 2001.**

The BLM has a projected seed need from the Tyrrell Seed Orchard of approximately 425 pounds of improved Douglas-fir seed per year. In addition, the cooperators are participating in and financing 68 acres of seed orchard management, with their anticipated yield being 342 pounds of improved Douglas-fir seed per year. The anticipated yield for the cooperators corresponds to approximately 9,500 acres of industrial land which can be reforested with this seed each year. Protecting cone crops from insect damage is necessary to achieve this goal.

C. CONFORMANCE WITH LAND USE PLAN

The Proposed Action and alternatives are in conformance with the Eugene District Record of Decision and Resource Management Plan (RMP)(Bureau of Land Management 1995), which states that seed orchards will be maintained and managed to produce seed as needed for ecosystem management projects (RMP, p. 263). It also addresses the need to plant improved stock on **most of** the harvested acres on the district requiring reforestation (RMP, pp. 262-263). Beyond this direction in the Forest Genetics Program appendix and the provisions in the Resource Program sections for Energy and Mineral, Land Tenure Adjustments, Rights-of-Way, Access and Withdrawals, the RMP does not apply to the Seed Orchard, which has been administratively withdrawn (RMP, p. 100).

The Proposed Action and alternatives are also in conformance with the Lorane Seed Orchard Development Project (EA-OR090-3-35), which directs the development and management of the Tyrrell Seed Orchard and states that insecticides may be applied during the cone production stages (Lorane Seed Orchard Development Project EA, p. 12).

D. RELATIONSHIP TO OTHER PLANS AND ENVIRONMENTAL ANALYSES

An Environmental Impact Statement (EIS) is currently being written to address Integrated Pest Management (IPM) practices for the four BLM seed orchards located in western Oregon. However, because this document is not expected to be completed until 2003, it is necessary to address in this separate analysis the immediate issue of cone insect control for the spring of 2001.

The Seed Orchard is an administratively withdrawn area and does not fall under the standards

and guidelines of the Northwest Forest Plan (RMP, p. 100).

Additional information is available in the Seed Orchard Insect Control project analysis file. This file and documents referenced above are available for review at the Tyrrell Seed Orchard.

II. ISSUES

A. ISSUES SELECTED FOR ANALYSIS

The following issues were identified during development of the action alternatives:

Issue 1: *How does this insecticide affect non-target species including pollinators and insect predators?*

Issue 2: *How will this insecticide application affect Coho salmon and other aquatic species?*

Issue 3: *How will this insecticide application affect northern spotted owl foraging and dispersal habitat?*

Issue 4: *What is the potential impact of insecticide application on worker safety?*

B. ISSUES NOT ANALYZED

The impacts of the Proposed Action on the marbled murrelet were considered, but not analyzed because (1) tracking stations placed to the north of the Seed Orchard in potential habitat detected no murrelets, and (2) potential habitat for murrelets was not found within the fenced perimeter of the orchard.

The impacts of the Proposed Action and alternatives on drinking water were considered, but not analyzed because scoping revealed that there are no private domestic water sources adjacent to the treatment area.

III. ALTERNATIVES

A. PROPOSED ACTION : Application of Esfenvalerate Insecticide through use of Ground-Based Equipment

Five seed production units would be treated in 2001 with esfenvalerate. Spray detection cards would be used to monitor areas adjacent to treatment units for application drift. If spray drift is

detected, spray operations would be halted or modified to eliminate drift.

Truck-mounted or tractor-fitted hydraulic sprayers with hand held trigger nozzles on hoses would be utilized. Only trees bearing cones would be treated. This would include approximately 1235 trees on 42 acres, with most being under 30 feet in height. Table 1 shows the rate of esfenvalerate (trade name ASANA XL®) application proposed for each of the five seed production orchards (DuPont Agricultural Products 2000).

Table 1: Rate of Esfenvalerate Proposed for 2001 Treatment (Proposed Action)

Orchard Unit	Potential Cone Bearing Trees	Treatment Acres	Trees/Acre Requiring Treatment	**Esfenvalerate (Asana XL)**	
				Rate per Tree (lb. of a.i.*)	Rate per Acre (lb. of a.i.)
Swisshome/ Mapleton	450	12	38	0.001	0.038
McKenzie Low	160	9	18	0.001	0.018
Lorane	110	4	28	0.001	0.028
Wells Creek	190	7	27	0.001	0.027
Noti	325	10	33	0.001	0.033

* a.i. = active ingredient

A single spray application would take place in April, depending on time of insect emergence and weather conditions, to suppress the cone gall midge, seed chalcid, and cone worm. Insecticide application would occur in the early morning or late evening when wind, temperature and humidity are optimum for minimizing drift. Spraying would be limited to periods when wind speeds are less than 6 mph, temperature is less than 70^{N}F, and relative humidity is greater than 50 percent. Application would not occur during periods of wind turbulence, when precipitation or fog is occurring or is imminent, during inversions, or when foliage is carrying snow or ice (USDI Bureau of Land Management 1999). When spraying near the edge of seed production orchards, the nozzle would always be directed towards the center of the treatment unit to minimize the chance for drift. All trees within the treatment areas are at least 35 feet from orchard fence lines and neighboring properties.

Areas used for mixing insecticide would be located at least 200 feet from streams with water. A spill kit, filled with absorbent materials, would be located near the mixing area in the event of an accidental spill. An emergency safety plan would be developed, which would include a

contingency for spills, necessary emergency actions, and first aid procedures. Orchard fields would be mowed prior to insecticide application to remove flowers to help minimize the presence and exposure of pollinators, such as bees, to the insecticide.

B. ALTERNATIVE A: Application of Dimethoate Insecticide through use of Ground-based Equipment

Five seed production units would be treated in 2001 with dimethoate. Table 2 shows the rate of dimethoate (trade name DIGON 400) application proposed for each of the five seed production orchards (Wilbur-Ellis 2000).

Table 2: Rate of Dimethoate Proposed for 2001 Treatment (Alternative A)

Orchard Unit	Potential Cone Bearing Trees	Treatment Acres	Trees/Acre Requiring Treatment	**Dimethoate (Digon 400)**	
				Rate per Tree (lb. of a.i.*)	Rate per Acre (lb. of a.i.)
Swisshome/ Mapleton	450	12	38	0.028	1.064
McKenzie Low	160	9	18	0.028	0.504
Lorane	110	4	28	0.028	0.784
Wells Creek	190	7	27	0.028	0.756
Noti	325	10	33	0.028	0.924

* a.i. = active ingredient

A single spray application would take place in April to early June, depending on time of insect emergence and weather conditions, to suppress the cone gall midge, seed chalcid, and cone worm. All other application and mitigation measures would be the same as described in the Proposed Action.

C. ALTERNATIVE B: No Action

The Tyrrell Seed Orchard would not perform pesticide application to control cone insects. Manual pest management techniques such as clean picking cones at harvest time and removing conelets from unstimulated orchards would continue. All other activities related to seed orchard management would continue as usual.

D. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The use of high volume, tractor-pulled vacuums was considered but dropped from further analysis. This tool "rakes", vacuums, and collects organic debris at the soil surface layer, removing the litter layer and disturbing the duff layer. This application is typically done in the fall and potentially captures insects which overwinter at the ground layer. Prototype vacuums are currently being tested at seed orchards in the Pacific Northwest, but the technology has not yet been fully developed (Hallberg 1999).

Pheromone kill traps, currently being analyzed by Simon Frazer University (SFU) in British Columbia, Canada for control of the Douglas-fir cone gall midge, were also considered but not analyzed in detail. Although this method has great potential, adaptive research has not yet progressed to a point where it is a feasible treatment (Bennett 2000). Tyrrell Seed Orchard is currently working directly with SFU by providing field testing locations for their pheromone research.

E. MITIGATION MEASURES

1. Human Health

- A job hazard analysis (JHA) would be developed to provide a detailed description of orchard jobs and associated risks involved with pesticide use and application. It would identify requirements for personal safety equipment, training, and certification to perform specific tasks.

- A pesticide safety plan would be developed and would identify project specific safety procedures.

- Minimum mitigation would follow guidelines shown on the pesticide label. These guidelines, required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), show allowable uses, application rates, and special restrictions for each pesticide.

- Material Safety Data Sheets would be posted at storage facilities and made available to workers (DuPont Agricultural Products 2000)(Wilbur-Ellis 2000). These provide physical and chemical data, fire and reactivity data, specific health hazard information, spill or leak procedures, instructions for worker hygiene, and special precautions.

- Treated areas would not be entered until the spray has dried. Warning signs would be posted to discourage public entry into treated areas.

- Appropriate protective clothing would be worn by all workers. At a minimum, the type and amount of protective clothing listed on the pesticide label would be used. Table 3 shows the minimum protective clothing requirements for those pesticides which are proposed for

use.

Table 3: Minimum Protective Clothing Requirements for Use of Proposed Pesticides.

Pesticide	Label Instructions for Protective Clothing
Dimethoate	Neoprene or rubber boots, neoprene or nitrile gloves, long-sleeved coveralls, aprons when mixing, hat and safety goggles or glasses with side shields and brow protection and an approved respirator for pesticides for the exposures encountered.
Esfenvalerate	Long-sleeved shirt, chemical-resistant gloves, shoes and socks and protective eyewear.

- Orchard workers who are regularly involved with application of organophosphate pesticides would be required to have periodic cholinesterase tests. Baseline testing would be completed and tests repeated each year when such pesticides are being used to determine if exposure is causing any detrimental effects to workers.

- Workers who know they are hypersensitive to pesticides would not be assigned to application projects. Workers who display symptoms of hypersensitivity to pesticides during application would be reassigned to other duties.

1. Natural Resources

- Adjacent landowners would be notified prior to pesticide application.

- Precautions would be taken to assure that equipment used for transport, mixing, and application would not leak pesticides into water or soil. Areas used for mixing pesticides and cleaning equipment would be located where accidental spillage would not run into surface-waters or result in ground-water contamination.

- Applications would be timed so as not to coincide with or closely precede large storm events that could result in substantial runoff.

- Spray detection cards would be placed 35 ft. to 50 ft. outside the perimeter of treatment units, and spaced 50 ft. to 200 ft. apart (depending on sensitivity of area). Where possible, they would be stapled at a 45" angle to the top of fence posts or wooden lathe, with the cards facing the treatment area. Cards placed on fence posts would be a minimum of 35 ft.

from the spray area. Application techniques would be altered or spray operations halted if drift were detected.

- If possible, mowing would take place 2-3 days prior to spraying to remove any floral component that may attract bees into the treatment area. Weather conditions, stage of vegetative growth, and operational limitations could affect the timing of this mitigation measure.

- Pointing the nozzles away from the fence lines and riparian areas would aid in reducing drift. If spray drift is detected, spray operations would be halted or modified to eliminate drift.

- To minimize impacts to non-target insects, such as pollinators, spray operations would be done, if possible, during periods when temperatures are less than 56"F, when temperatures are cooler and insects are less active.

3. Regulatory Procedures

- All applicable local, state and Federal laws, including the pesticide labeling instruction of the Environmental Protection Agency, would be strictly followed.

- Pesticides would be applied within the prescribed environmental conditions stated on the label. This would include consideration of relative humidity, wind speed, and air temperature when determining the timing of application relative to drift reduction.

4. Training

- Pesticide applicator licensing and training would be used as a quality control measure. Training and testing of applicators covers laws and safety, protection of the environment, pesticide handling and disposal, pesticide formulations and application methods, calibration of devices, use of labels and data sheets, first aid, symptoms of pesticide exposure, and other activities (Oregon State University Extension Service 1997).

IV. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

The following resources either are not present or would not be affected by the Proposed Action or any of alternatives: air quality, areas of critical environmental concern, cultural resources, prime or unique farmlands, Native American religious concerns, Wild and Scenic Rivers, wilderness, minority populations and low income populations.

A. SOCIAL AND ECONOMIC ENVIRONMENT

1. Community Information

The Tyrrell Seed Orchard is located in rural Lane County, about three miles west of Lorane, Oregon. The population of Lorane is about 300. Property in the vicinity of the orchard is a mix of rural residential, farmland, vineyards, and forests. The majority of the area within 1/4 mile of the Seed Orchard boundary is private timber land or federal land, with only four residential, non-industrial private land owners on the southerly boundary.

Lane County has a population of close to 315,000 on a land base of 4,620 square miles. Stretching from the Pacific Ocean to the crest of the Cascade Mountain range, about fifty percent of the county is under federal or state ownership. The Eugene/Springfield area, which has a population of about 182,000 people, is the only large urban area in the county. The remaining population base is spread out in small communities throughout the Willamette Valley and along major drainages (Lane County Government Online 2000).

The Seed Orchard currently employs five permanent full-time and two term-seasonal employees, all of whom have their duty station at the Seed Orchard. In addition, the orchard utilizes private contractors for labor-intensive operational work.

2. Economic Information

The Seed Orchard has an annual maintenance and support budget of about $380,000. About **a** of this is made up by contributions from the private cooperators. Approximately $4600 was spent in 2000 on conelet removal and sanitation collections for insect control. The use of pesticides for protection of cone crops has not been utilized to date.

3. Residences

The administrative site at the Seed Orchard comprises an office, a warehouse/shop, a cone storage building, and a seed lab/kiln. There are no residences on the orchard grounds. There are approximately three private residences and one cabin rental complex within one-quarter mile of the fenced orchard boundary, all of which are located on Siuslaw River Road. Their water sources are derived from either wells or springs, none of which are located on federal lands.

Impacts of the Alternatives on Social and Economic Conditions

a. Proposed Action and Alternative A: Although these alternatives would not have a substantial impact on the Lorane or Lane County area, they would have a positive impact upon the economic conditions at the Seed Orchard. Protecting the orchard cone crop would reduce the probable loss of valuable tree seed to insects and would enable the BLM and cooperators to protect their investment and to reforest their lands with improved conifer seedlings.

b. Alternative B (No Action): This alternative would have a substantial impact on the economic setting at the Seed Orchard, but have little impact on the local community. Success or failure of seed crops would be regulated mainly by natural conditions. Moderate to high insect infestations would reduce harvestable seed crops and make them extremely expensive to harvest due to low quantities of viable seed. The seed that is recovered would likely be of much smaller quantity and lower quality than that expected following the use of pesticides. The ability to attain the desired yearly seed yields for BLM and cooperator use would be doubtful.

B. RECREATION

A forest succession trail lies outside the orchard boundaries. It begins at the office compound and follows a northeasterly direction into the southern portion of Section 15. The trail, which shows the stages of forest stand dynamics, is open to the public during business hours and is used by school groups, social organizations, and industrial tour groups. Because the trail is located at least 800 feet from any of the potential treatment areas, recreational use of the trail would not be impacted by the Proposed Action or any of the alternatives.

C. HUMAN HEALTH

The use of chemical pesticides always poses some degree of risk, with the potential increasing for workers involved with the handling, mixing, spraying, and cleaning of application equipment. Access to the seed production orchards is controlled by a series of gates, which limit the chances for directly exposing the public to insecticides. The risk of an insecticide application, as described in the Proposed Action and Alternative A, causing negative consequences to the human health of orchard workers and the general public is expected to be negligible.

Impacts of the Alternatives on Human Health

1. Preferred Alternative (Esfenvalerate): Esfenvalerate (trade name: Asana® XL) is a restricted use synthetic pyrethroid insecticide registered for use on non-crop land (excluding public land such as forests, parks, or recreational), conifer seed orchards and forest tree nurseries. It kills cone insects by contact or ingestion, affecting the function of the nervous system.

Esfenvalerate is not classified as an agent which causes cancer, genetic damage, or birth defects, or as an agent which affects fertility, reproduction, or the development of offspring; however, it is a nervous system poison. Overexposure of the skin to this pesticide can cause burning or prickling that may persist for up to 24 hours and may be accompanied by a rash or visible skin irritation. Other symptoms of acute toxicity (poisoning) such as discomfort and tearing or blurring of vision can occur if esfenvalerate gets into the eyes. Ingestion results in dizziness, headaches, nausea, vomiting, anorexia and fatigue. More serious outcomes include convulsions and coma. Persons with preexisting diseases of the liver, kidneys, skin, or

peripheral nervous system may be more susceptible to excessive exposures.

Chronic toxicity, which occurs as a result of small, repeated doses of pesticide over a long period of time, has not been reported with esfenvalerate. Workers chronically exposed to fenvalerate, a closely related pesticide which contains esfenvalerate, showed symptoms ranging from mild itch to a stinging sensation that becomes numbness in severe cases.

Asana® XL contains two potentially toxic inert substances that have a high priority with the U.S. Environmental Protection Agency for testing: xylene and ethylbenzene; however, when used according to the manufacturer's directions, exposures to inert ingredients will be much less than the levels at which serious health effects have been observed. Asana ® XL formulation is toxic, and may be fatal if swallowed (Oregon State University 1996a).

Risk assessment modeling for the use of esfenvalerate with high-pressure hydraulic sprayers at Dorena Seed Orchard showed the hazard indices to be 0.00451, indicating a negligible risk of noncarcinogenic human health effects to workers applying the insecticide (USDA Forest Service 1995a). Modeling was done with higher spray concentrations and on more trees than is planned for this alternative at Tyrrell.

2. **Alternative A (Dimethoate):** Dimethoate (trade name: Digon 400®) is an organophosphate insecticide registered for use on fruits, nuts, vegetable crops, field crops, seed crops, ornamental tree uses, and trees. It kills some insects by inhibiting an enzyme called cholinesterase which is necessary for proper functioning of the nervous system.

   Digon 400® is not classified as an agent which causes cancer; however, it is a cholinesterase inhibitor. Symptoms of overexposure include numbness, tingling sensations, uncoordination, abdominal pains, headache, dizziness, tightness of the chest, weakness, excessive sweating and salivation, pinpoint pupils, blurred vision, vomiting, diarrhea, tremors and respiratory depression. Very high doses may result in unconsciousness, incontinence, and convulsions or fatality. Persons with preexisting medical conditions involving the above symptoms or those with respiratory ailments, recent exposure to cholinesterase inhibitors, impaired cholinesterase production, or liver malfunction may be at increased risk from exposure to Dimethoate. Dimethoate has not been proven to be a primary skin or eye irritant. Digon 400® formulation is toxic, and may be fatal if swallowed.

   Chronic toxicity, which occurs as a result of small, repeated doses of pesticide over a long period of time, has not been reported with dimethoate. Repeated or prolonged exposure to organophosphates may result in the same effects as acute exposure, including the delayed symptoms. Workers repeatedly exposed to dimethoate also report impaired memory and concentration, disorientation, severe depression, irritability, confusion, headache, speed difficulties, delayed reaction times, nightmares, sleepwalking, and drowsiness or insomnia (Oregon State University 1996b).

3. Alternative B (No Action): Alternative B would have no effect on human health.

D. THE PHYSICAL ENVIRONMENT

1. Soils

a. General Soils Information - Soil is a three phased system - solid, liquid, and gas. When managing soils for seed orchards the important properties are texture, structure, organic matter content, cation exchange capacity, and pH.

Sand, silt, and clay refer to the size of the mineral particles that make up the soil; sand particles are the largest and clay the smallest. Varying amounts of sand, silt, and clay in the soil determine the soil texture. Fine textured soils such as clays and clay loams have low infiltration capacities so surface runoff is relatively high compared to percolation. In these soils the potential for pesticide surface loss is high and the potential for leaching is low.

Organic matter consists of a combination of plant, animal, and microbial residues in various stages of decomposition, and live organisms. The amount of organic matter in a soil determines its potential for pesticide adsorption. Soils high in organic matter have reduced potential for surface loss, increased infiltration, reduced runoff and erosion, and low leaching potential. Pesticides are more likely to be adsorbed by soil minerals in such conditions.

Soil micro and macro organisms are also a principal means by which pesticides are broken down into less toxic substances in the soil.

b. Soils at Tyrrell Seed Orchard - Soils at Tyrrell Seed Orchard were formed from the more easily weathered siltstone and fine sandstone sequence of the Flournoy/Tyee Formation. Table 4 provides a brief description of the soils identified at the Seed Orchard. Erodability ratings are found in Table 5. A soils map can be found in Figure 3.

Table 4: Soils Information for Tyrrell Seed Orchard

Soil Series	Bellpine Silty Clay Loam	Dupee Silt Loam
Units Located	Seed Orchard	Seed Orchard
Depth	20-40 inches	40-60 inches
Slope	2-30%	3-20%
Depth of Surface Horizon (inches)	13 inches	12 inches
Permeability	Moderate to Slow	Moderate to Slow
Texture	Silty Clay Loam	Silt Loam
Depth to Water Table	> 6 Feet	2-3 Feet
Runoff	Slow to Rapid	Moderate to High
Hazard of Erosion (see Table A-2)	Slight to High	Moderate to High
Hydrologic Soil Group*	C	C

* Group C denotes soils with a slow infiltration rate when thoroughly wet. These soils either have a layer that impedes downward movement of water or have a moderately fine to fine texture. These soils have a slow rate of water transmission.

Table 5: Erodability Ratings Based on K and Slope (From Washington DNR Watershed Analysis Handbook (Version 2.1)

Slope Class (Percent)	K < 0.25 Not easily detached	0.25 < K > 0.40 Moderately detachable	K > 0.40 Easily detached
< 30	Low	Low	Moderate
30 - 65	Low	High	High
>65	Moderate	High	High

Utilization of additional erosion control methods - i.e. erosion control blankets, seeding with native seed, water barring - would reduce erosion to minimal levels in the unlikely event of erosion and compaction from downhill logging exceeding District standards.

c. Impacts of the Alternatives on Soils

There may be concern that repeated insecticide use could lead to a buildup of pesticide residues in the soil. Table 6 shows the behavior of the proposed pesticides in the soil.

Table 6: Breakdown Behavior of Pesticides

Pesticides	Solubility in Water	Persistence in Soil	Leaching Potential	Volatility	Major Degradation Mechanism
Esfenvalerate	Low	Moderate	Negligible	Low	Biological and Chemical
Dimethoate	High	Low	Moderate	Moderate	Biological and Chemical

Solubility: *High* - greater than 100 ppm; *Moderate* - 1 to 100 ppm; *Low* - less than 1 ppm.
Persistence: *High* - Half life greater than 180 days; *Moderate* - Half life of 30 - 180 days; *Low* - Half life of less than 30 days.
Volatility: *High* - vapor pressure greater than 1.00 mm of Mercury; *Moderate* - Vapor pressure - 1.0 x 10 mm of Mercury; *Low* - Vapor pressure less than 1.0 x 10 mm of Mercury.

Chemical pesticides primarily break down in the soil and water in two ways: chemically and biologically. Chemical breakdown depends on several factors including pH, temperature, soil minerals, light, moisture, and organic matter content. When pesticides are broken down by the soil itself the process is usually chemical. Chemical degradation of pesticides in soil and water can occur when the pesticide composition is unstable at higher pH and temperatures. If soils are alkaline and contain low organic matter content, hydrolysis may be the primary reaction. Soil composition also affects the ability of a pesticide to be absorbed into the soil particles or adsorbed to the outside of the soil particle. A high organic matter content lessens the amount of pesticide broken down by hydrolysis.

When the breakdown is done by organisms in the soil, there are several ways the breakdown can occur. In microorganisms, e.g., bacteria, fungi, and some algae, hydrolysis

appears to be the major process through which pesticide compounds are broken down to nontoxic products. This action is governed by various enzymes contained within the organisms. Enzymes allow the microorganisms to metabolize the pesticides. These organisms take the chemicals needed for life, such as phosphorus and carbon, and leave the other usually harmless chemicals.

In all breakdown methods, the persistence of the pesticide in the environment is often given a value expressed in half-life. The half-life of a pesticide is the number of days it would take for half of the residue to break down. In the case of pesticides, this value may be a half-life of hours or days. While the chemical may still provide residual pesticidal effects during this time period, the original amount is being reduced and degraded by the methods described above.

Pesticides not broken down can leach out of the soil. The leaching ability of a pesticide is affected by the moisture content, permeability, and absorption or adsorption power of the soil.

In general, the pesticides proposed for use break down fairly quickly and therefore do not accumulate in the soil.

i. **Proposed Action (Esfenvalerate):** Esfenvalerate binds to organic matter in the soil and is not very mobile. It remains unchanged in the soil for varying lengths of time, depending on soil texture and organic matter content. The half-life of esfenvalerate can range from 29.4 to 108 days. It is broken down by soil microorganisms and by photodegradation. Breakdown of esfenvalerate in soil yields carbon dioxide as a major final product. In general, breakdown in the environment produces compounds which are less toxic than esfenvalerate. It is practically insoluble in water and the potential for leaching is low. No information is available on the residual soil activity or the effects of esfenvalerate on soil microorganisms. The soils present affect the movement and breakdown of esfenvalerate, but the Proposed Action would have little to no detrimental effect on the soil resource.

ii. **Alternative A (Dimethoate):** Dimethoate is of low persistence in the soil environment. Soil half-lives range from 4 to 122 day, but a representative value may be on the order of 20 days. It is rapidly broken down by soil microorganisms and will be broken down faster in moist soils. Dimethoate may be subject to considerable leaching as it is highly soluble in water and adsorbs only very weakly to soil particles. It is degraded by hydrolysis and evaporates from dry oil surfaces. Biodegradation may be significant. The soils present affect the movement and breakdown of dimethoate but Alternative A would have little to no detrimental effect on the soil resource.

iii. **Alternative B (No Action):** The No Action alternative would not affect soil resources.

2. Water

a. Climate - The climate affecting Tyrrell Seed Orchard water resources is primarily influenced by the Pacific Ocean. In general, the area experiences cool wet winters and warm dry summers. Rainfall is light during the summer and follows frequent Pacific storm patterns during the late fall and winter periods. Weather station data from Cottage Grove (roughly 12 miles east, 650 feet elevation) indicates that for 29 years of record there is an average of 45 inches of precipitation with approximately 75% of the total precipitation occurring from October though March. Proposed pesticide application periods are April through June. April and May average 1-2 days per month where precipitation exceeds 0.5 inches. June averages less than one day per month where precipitation exceeds 0.5 inches.

The elevation at the Seed Orchard ranges from 800 to 1200 feet above sea level. Although snow can fall at the Seed Orchard during winter cold fronts, this elevation is considered below the transient snow zone. The average annual snowfall in Cottage Grove is 6.7 inches. The average monthly temperatures during the proposed pesticide application periods range from 60" F. to 74" F.

b. Groundwater Resources - Limited information is available concerning the ground water aquifer below the Seed Orchard. General geologic maps of the area (United States Geologic Survey 1991) indicate the dominate underlying geology is composed of the middle Eocene Tyee Formation. The Tyee Formation is composed of fine to medium grained marine sandstone and carbonaceous siltstone. Oregon Water Resource Department (OWRD) (1999a) well log data indicated that there are 33 domestic wells in sections adjacent to the Seed Orchard (sections 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 20, and 21). The static water depths range from 0 to 288 feet. Some of the wells are located in different surface drainage basins or upstream of the Seed Orchard. The average "first water" in the borehole is 69 feet and the average static water depth is 39.7 feet. There is one domestic well within the Seed Orchard. It has a static water level of 87.5 feet and a yield of 2.5 gallons per minute. Depth to "first water" was not noted. The direction of deep groundwater flow is not known and is assumed to follow surface topography. No information depicting groundwater quality was available.

c. Surface Water Resources - Tyrrell Seed Orchard is located within the Siuslaw River (1700020601) fifth field watershed, located in the Mid-Coast Sub-Basin. The Seed Orchard is divided into three primary areas (all located within Township 20 South, Range 5 West), Section 9, Section 15, and Section 21. Channels in Section 15 drain into an unnamed perennial tributary that flows into the Siuslaw River. The developed areas of Section 9 drain into Douglas Creek, a Siuslaw River tributary. The orchard area in Section 21 drains into the Siuslaw River either directly or via Douglas Creek. The Seed Orchard

contains ephemeral, intermittent, and perennial streams. Both Section 9 and Section 15 contain perennial stream flow which is important in terms of susceptibility to pollution. Wetlands within the Seed Orchard are generally associated with the groundwater system adjacent to the stream channels. There are three ponds within the Seed Orchard. Each is associated with either a channel or a spring.

Mid to long term discharge records are not available for either the Siuslaw River in the vicinity of Tyrrell Seed Orchard or Douglas Creek. A United Stated Geologic Survey (USGS) gaging station (14307620), located in the Siuslaw River near Mapleton, Oregon, approximately 35 miles west and downstream of the Seed Orchard, provides an indication of the relative timing and amount of streamflow of a similar watershed in terms of size, precipitation, land use and vegetation. Table 7 illustrates the statistical summary of 20 years of records (adapted from United States Geologic Survey 1990). These values reflect the rainfall precipitation patterns. While no known historical flow data is available for the area, the USGS did operate several local now-discontinued peak flow stations.

Table 7: Statistical summarys of Precipitation at Cottage Grove and Runoff Patterns from the Siuslaw River near Mapleton, Oregon (14307620) .

Month	Mean Monthly Precipitation (inches)	Annual Runoff (%)	Mean Runoff Per Sq. Mile* (cfs/sq. mile)
October	3.60	1.8	0.76
November	7.46	9.7	4.29
December	7.20	20.9	8.95
January	6.53	19.8	8.50
February	5.20	17.0	8.01
March	5.38	14.0	6.00
April	3.53	8.1	3.60
May	2.53	4.1	1.76
June	1.39	2.2	0.96
July	0.53	1.1	0.46
August	0.95	0.6	0.27
September	1.65	0.7	0.34

* derived from mean monthly flows

Hydrologic and riparian information pertaining to the surface waters that are immediately adjacent to, flowing through, or initiating from the Seed Orchard and a surface stream map can be found in the Project Analysis File. This information is pertinent to susceptibility and risk of water pollution from pesticide application.

An Oregon Department of Environmental Quality (DEQ) water quality assessment (Oregon Department of Environmental Quality 1988a) describes the water quality conditions in the larger channels downstream from the Seed Orchard. The report identifies the Siuslaw River as having moderate water quality problems (by observation). These reported conditions are summarized in Table 8.

Table 8: Water Quality Assessment of the Siuslaw River

DEQ 1988 Assessment	Parameter	Impacted Beneficial Use	Suspected Cause
Siuslaw River	Nutrients Sediment Erosion	Cold Water Fish Other Aquatic Wildlife Water Contact Rec. Aesthetics	Erosion Thermal Vegetation Removal

The DEQ 303(d) (1998b) List includes the Siuslaw River from the mouth to headwaters as water quality limited for summer temperature. The list also includes the lower segment of the South Fork Siuslaw confluence located 2 miles upstream of the Seed Orchard, for impaired biological criteria. The list indicates those waterbodies which do not currently meet all applicable water quality standards necessary to protect beneficial uses. Existing and potential beneficial uses listed in Oregon Administrative Rules (chapter 340, rule 340-041-0245) for the Siuslaw Basin include: industrial and domestic water supplies, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing, salmonid fish spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower. Irrigation represents the majority of the recorded beneficial uses for water rights recorded in the vicinity of the Seed Orchard. The state water quality parameter most likely to be affected by introduction of pesticides to water would be the toxic concentrations. The most likely of the beneficial uses to be affected would be resident fish and aquatic life.

d. Impacts of the Alternatives on Hydrology

i. Proposed Action (Esfenvalerate): Esfenvalerate runoff was modeled using GLEAMS v 3.0.1. It is highly toxic to fish with a 96-hour LC5O of 0.0003 mg/l for both rainbow trout and bluegill. The modeling resulted in no esfenvalerate concentrations exceeding the 96-hour LC5O threshold. However, 0.0003 mg/l concentrations were exceeded for one 48-hour period and fewer than fifteen 24-hour periods over a five year modeling period with annual applications. Esfenvalerate and its breakdown products are relatively immobile and pose little risk to groundwater.

Esfenvalerate is nearly insoluble in water and binds with soil and organic matter. As a

result, under the model much of the chemical that reaches a channel would be adsorbed to sediment. The GLEAMS modeling does not take into consideration buffer zones and other site characteristics that would reduce sediment delivery to a channel. It is expected that, while not quantified, instream concentrations would be less than modeled due to very little overland sediment movement because of dense grass and shrub cover, vegetated buffers, and application not occurring adjacent to channels where water is present at the time of application.

ii. Alternative A (Dimethoate): Dimethoate runoff was modeled using GLEAMS v 3.0.1. Dimethoate is moderately toxic to fish with and LC5O of 6.2mg/l for rainbow trout and 6.0 mg/l for bluegill sunfish. The maximum concentrations of runoff did not exceed 0.01mg/l. Further, the modeling did not take into consideration the effects of buffering which could decrease the concentrations further by requiring a longer period of time for runoff to reach the stream channel.

Accumulations of dimethoate are not expected in groundwater. Dimethoate is of low persistence in the soil environment with half-lives that range from 4 to 122 days, but a representative value may be on the order of 20 days. It is rapidly broken down by soil organisms, rapidly soluble in water, adsorbs very weakly to soil particles, and may be subject to leaching. Biodegredation can be substantial with 77% loss reported in nonsterile clay loam after 2 weeks. The half-life in natural river water is about 8 days. The spring application schedule should decrease the possibility of leaching and, due to a relatively short half-life, persistence is not expected. The applications are occurring in up and midslope areas that are not in close proximity to any aquifers.

Due to the combination of application location, application period, relatively short half-life, clay soils, and the chemical characteristics of dimethoate it is expected that any chemical that does reach water will be short term and of small concentration.

iii. Alternative B (No Action): The No Action alternative would not affect water resources.

E. THE BIOLOGICAL ENVIRONMENT

1. Fisheries

The Tyrrell Seed Orchard is located in the Douglas Creek 6th Field, Upper Siuslaw 5th Field, and Siuslaw River 4th Field watersheds. The Siuslaw River does not flow through the Seed Orchard but comes within a few hundred feet at the southeast corner of the orchard. Douglas Creek and two unnamed tributaries flow through and out of the Seed Orchard. The following species have been recorded from the Siuslaw River and tributaries in the project area:

Steelhead (*Oncorhynchus mykiss*)
Cutthroat trout (*Oncorhynchus clarki*)
Sculpin (*Cottus spp*)
Coarse scale sucker (*Catostomus macrocheilus*)
Dace (*Rhinichthys spp*)
Redside shiner (*Richardsonius balteatus*)
Chinook salmon (*Oncorhynchus tshawytscha*)
Coho salmon (*Oncorhynchus kisutch*)
Pacific lamprey (*Lampetra tridentatus*)
Western brook lamprey (*Lampetra richardsoni*)

Coho salmon are listed by the National Marine Fisheries Service as threatened under the Endangered Species Act.

Douglas Creek arises on the low hills marking the eastern slopes of the Coast Range Mountains. While headwater streams are fairly steep, most of the main Douglas Creek and tributaries from the project area have moderate to low gradients. Because of the dominance of underlying sedimentary rock, the Upper Siuslaw subbasin has naturally high sedimentary production levels. In Douglas Creek, fine sediment (silt, sand and clay) are dominants, accounting for 75% of the substrate type. Douglas Creek has been highly impacted by past logging practices. Old abandoned roads and railroad rights-of- way exist throughout the sub-watershed, causing sedimentation to Douglas Creek due to fill failures.

Douglas Creek is used by cutthroat trout, coho salmon, steelhead, sculpin, sucker, lamprey and redside shiner. Coho salmon and sculpin were found during brief netting in this stream. Fish habitat includes pools, riffles, glides, and few rapids where observed near and downstream from the Seed Orchard. Channel substrates are high sand and silt, rubble, gravel, bedrock, low cobble, and few boulders. Moderate amounts of logs and wood debris are present.

Most of the basin is managed for forest values. During the initial logging along Douglas Creek, railroads were used to transport logs to mills. Railroad and road rights-of-ways can still be found along the stream, contributing to bank instability. Stream banks are partly eroded. Larger trees were removed from the riparian area. Current riparian vegetation contains brush, hardwoods, second growth conifers, and some snags. Several beaver dams were recorded during a past inventory by the Oregon Department of Fish and Wildlife. Access into Douglas Creek was improved by replacement of the road culvert by the Oregon Department of Fish and Wildlife in 1999. Fish habitat also is within the following unnamed tributaries to Douglas Creek.

- The tributary near the south boundary of Section 9 was observed downstream from the orchard in the Section 16, NE 1/4. Trout and lamprey are present in the lower part of this stream. Habitat types are glides, riffles, pools, and rapids. Substrates include gravel, sand, and silt. Low to moderate amounts of wood debris and logs are

available. Hardwoods and brush are in the riparian area.

- The tributary to Douglas Creek was observed downstream from the Coquille units near the SE corner of Section 9, where cutthroat trout were found by netting below the Seed Orchard. Habitat types are riffles, pools, glides and a rapid. The streambed contains gravel, sand, silt, and bedrock. Moderate amounts of wood debris and logs are in the channel. Hardwoods, brush and second growth conifers are in the riparian area.

- The Douglas Creek tributary between North Umpqua and Coquille units was observed just inside and downstream from the Seed Orchard fence near the east boundary of Section 9. This stream provides habitat for cutthroat trout and sculpin. Riffles, pools, glides and a cascade contain gravel, rubble, silt, sand and cobble. Moderate to high amounts of logs and wood debris are in the channel. Hardwoods, brush, and second growth conifers are in the riparian area.

- The Douglas Creek tributary below South Umpqua units and north of North Umpqua unit was observed downstream from the orchard in Section 10, NW 1/4. Sculpin were the only fish found by netting the lower part of this stream. The riffles and pools contain gravel, silt, sand and rubble. Low wood debris is near the stream mouth where riparian vegetation contains mainly brush and hardwoods. High amounts of wood debris and logs are in a clearcut where there also are small conifers.

A second Siuslaw River tributary, in the southwest of Section 15 and northeast Section 21 was observed at a few locations downstream from the Seed Orchard to near the Siuslaw River Road in Section 21. Coho salmon, cutthroat trout and sculpin were found in the stream. Fish habitat types are pools, riffles, and glides. Substrates include silt, sand, gravel, rubble, and bedrock. Moderate amounts of wood debris and logs are in the channel. Riparian vegetation contains large conifers, second growth conifers, brush and hardwoods. The lower end of a fork farther upstream near the Wells Creek unit also was netted, and no fish were found.

Seining was done in another Siuslaw tributary in the vicinity east of the Tyee 2 unit within Section 15, NE 1/4. Cutthroat trout and sculpin inhabit this stream adjacent to the orchard. The pools and riffles contain silt, gravel and sand. High numbers of logs and moderate amounts of wood debris are in the channel. Part of the stream is within a bog area. Riparian vegetation includes hardwoods, brush and second growth conifers. The lower part of this Siuslaw tributary also was observed below the Siuslaw River Road where sculpin were the only fish found, although habitat would appear suitable for cutthroat and coho. The habitat includes glides, pools, and riffles which contain high silt, sand, and low gravel. Moderate amounts of wood debris and low numbers of logs are in the streambed.

Slopes and stream gradients in Douglas Creek and other tributaries are mostly moderate, with

little canyon development or channel incisions. Streams have been buffered with vegetation in the Seed Orchard, although upper parts of some minor draws have only brush and ground cover at and near the channels. Wide stream buffers where observed in the orchard and contain mainly brush and hardwoods, with relatively few small conifers.

Macroinvertebrates at streams in the general area include crayfish, aquatic snails, mayflies, stoneflies, caddisflies, water striders, dragonflies, mosquitos, and others.

Impacts of the Alternatives on Fisheries

a. Proposed Action (Esfenvalerate): For a more detailed discussion see Biological Assessment in the project analysis file. Esfenvalerate is highly toxic to fish. The LC50 for both rainbow trout and bluegill is 0.0003 mg/l. Steelhead, the anadromous form of the rainbow trout, are found in Douglas Creek. Adults, juveniles, and recently deposited eggs may be present at the time of proposed spraying. While the esfenvalerate is not classified as teratogenic, the potential for toxic impacts would be highest for the eggs. Tests of toxicity are not described for coho salmon or cutthroat trout but are probably similar to those for steelhead. Juvenile coho, and possibly coho eggs in the gravel may be present, but no adults would be present. Cutthroat spawn at the same time as the steelhead, so all life stages may be present. Cutthroat are the most likely to be close to the proposed areas of application.

No new roads, no ground-disturbing activities and no vegetation changes will be part of the Proposed Action. The action involves spraying for insect pests in established orchards with established accesses. Impacts would be limited to the action of the insecticide to be sprayed. Proposed guidelines are designed to limit the affect of the spray to the immediate orchard or individuals trees to be treated and to limit drift. Guidelines are designed to prevent spray from reaching the aquatic system. One anticipated impact would be a decrease in non-target terrestrial insects, including some that are beneficial. No group of species other than the insects, is expected to be impacted by the Proposed Action.

Esfenvalerate is highly toxic in the water. Based on the GLEAMS model and the proposed mitigation measures, the potential for esfenvalerate to enter the streams near the project area is very low and, if it occurs, would probably be from a spill rather than spray activity. Based on the limited capacity for groundwater or overland flow to transport esfenvalerate to where fish are present, contamination sufficient to cause toxic effects is improbable. Because of the remote possibility that an accident might occur, the determination of May Affect, Not Likely to Adversely Affect was made instead of No Effect in the Biological Assessment.

b. Alternative A (Dimethoate):

Dimethoate is moderately toxic to fish, with an LC50 of 6.2 for rainbow and 6.0 mg/l for bluegill. It is highly toxic to aquatic macroinvertebrates, particularly stoneflies, one of the primary groups of macroinvertebrates in the project area. Dimethoate is teratogenic to mammals but has not been tested for fish. As discussed in the Proposed Action, eggs of both steelhead (anadromous form of rainbow trout) and cutthroat trout would be developing in gravel in streams near the project area.

Dimethoate has limited potential to travel to streams by groundwater or surface flow at concentrations potentially harmful to fish. Full implementation of spraying guidelines and mitigation measures should be sufficient to prevent contamination of surface waters by drift. In the event of contamination by other than a spill into the stream, the most probable result would be loss of aquatic macroinvertebrates in the area of contamination. Studies show that macroinvertebrates usually re-colonize affected areas within a short period of time as long as there is not repeated exposure. The most probably route for impact to fish would be a spill directly into live water, in which case developing eggs would be most susceptible to harm. Because of the remote possibility of a spill, the determination of impacts is Not Likely to Adversely Affect.

c. Alternative B (No Action): The No Action alternative would have no effect on fisheries resources.

2. Wildlife

Wildlife species that occupy the Tyrrell Seed Orchard during all or part of their life cycle are those adapted to early successional environments and are tolerant of disturbance. However, the proximity of older more complex habitats adjacent to the orchard also influences the number and kind of wildlife that use it. The adjacent habitats consist of mid- to late-successional forests, commercial clearcuts, and forested riparian habitat. The 160 birds, 13 amphibians, 8 reptiles, and 57 mammals that occur around the Seed Orchard or use the Seed Orchard are listed in the project file.

As a result of the Tyrrell Seed Orchard's managed condition, the vegetative communities are simple in composition and structure. Much of the vertical structure is absent from the communities within the orchard boundary and the grassland species composition is primarily non-native and reduced in number. The most complex habitat within the fenced perimeter is the uncultivated draws between orchard units. These sites have been cleared of most of the trees and have grown back into dense shrubby tangles. Interspersed with the orchard units, these patches serve as hiding and nesting cover for many birds and mammals that use the orchard units for foraging habitat. The orchard units supply excellent open hunting perch sites, an abundance of vulnerable insects, good small mammal populations, and good grass seed

production to attract foraging animals.

Six habitats were identified in Sections 9, 15, and 21 within the Tyrrell Seed Orchard jurisdiction and are shown in Table 9.

Table 9: Habitats within the Orchard Jurisdiction

Habitat	Total Acres	Acres (Inside Fence Only)
Douglas-fir Forest (older than 30 years)	294.0	0.0
Douglas-fir Orchard (younger than 15 years)	350.0	350.0
Grassland	132.0	132.0
Ponded Water	0.8	0.8
Shrubby Riparian	262.0	247.0
Woody Riparian	63.0	20.0

The eight-foot high welded wire perimeter fence surrounding the orchard units serve as a partial to complete barrier for many wildlife species. Deer and elk are completely excluded from the orchard and only occasional sightings of black bear and mountain lion in the orchard have been documented (G. Miller pers. comm.). Habitats outside the orchard fence are managed Douglas-fir forests stands in various age classes ranging from seedling to late-successional (> 80 years old).

a. Habitat Descriptions

i. **Douglas-fir forest:** All of the older Douglas-fir forest habitat existing within Sections 9 and 15 is outside of the perimeter fence. Douglas-fir stands are located in the south and east sides of Section 15 (139 acres) and the west side of Section 9 (133 acres). These stands are second growth timber around 50 years old except for about 47 acres of older trees (>80 years old) in Section 9. These older stands are more diverse than the younger ones and support several tree species other than Douglas-fir (western red cedar, incense cedar, western hemlock, and Pacific yew). This diversity creates a greater complexity of habitats for a variety of wildlife. These species tend to be relatively specific to the use of these older habitats and are not often found within the Seed Orchard itself.

ii. **Douglas-fir orchard:** About 350 acres of the orchard (45% of land base) currently supports cultivated conifers maintained for their seed. Improved Douglas-fir trees are

grown on all but about 20 acres where mixed conifer species are raised. This habitat is very simple and consists of evenly spaced conifers less than 15 years old with an understory of non-native grasses such as fescues, orchard grass, and velvet grass. This understory is kept simple by management practices such as mowing, tilling, and weeding.

A few species subsist within the orchard unit boundaries. Most of these species are small mammals including long-tailed vole (*Microtus longicaudus*), western pocket gopher (*Thomomys mazama*), and California ground squirrel (*Spermophilus beecheyi*), but also include grassland birds such as western meadowlarks and vesper sparrows. Several species use the orchard units for foraging, some of the most common of which are western bluebird, white-crowned sparrow, violet-green swallow, yellow-rumped warbler, American goldfinch, great-horned owl, and red-tailed hawk.

iii. **Grasslands:** There are approximately 132 acres of non-native open grasslands adjacent to the orchard units within the fence perimeter. These areas are unplanted units that will be used in "Phase II" of the orchard implementation process. Currently the same non-native grass mix that is underneath the seed trees is planted on these acres. Some species that use grassland habitats use these sites; however, the lack of a well developed forb component and the limited number of grass species also limits the number of wildlife species that exploit this habitat. Species that do take advantage of these areas include savannah sparrow, western meadowlark, vesper sparrow, long-tailed vole, western pocket gopher, and California ground squirrel.

iv. **Ponded Water:** There are a few places within the fence perimeter where road construction has crossed a drainage and the culvert has created a small pond upstream. There are at least three such sites totaling about 0.8 acre. These hold water most of the time as evidenced by the obligate wetland plant species such as cattail (*Typha* spp.) growing around them. These sites are suitable as breeding pools for amphibians. Rough skinned newt (*Taricha granulosa*) males in breeding condition were observed in one pool. Aquatic invertebrates are also present in these sites.

v. **Shrubby Riparian:** The drainage courses within the orchard perimeter were not developed for orchard units. They were cleared of forested cover and allowed to revegetate with shrubs and small trees such as vine maple, Himalayan blackberry, evergreen blackberry, scotch broom, and salal. This is a dense, often impenetrable, area that supports a variety of smaller wildlife species. Many species of insectivorous birds were observed perching within the shrubby riparian patches and "hawking" insects over the orchard units. These "non-usable" areas dissect both production orchard sections and make up about 32% of the land base (248 acres) inside the fenced perimeter.

vi. **Woody Riparian:** Most of this type of habitat (36 acres) occurs outside of the orchard

fence and is located in the southeastern corner of Section 9. This is the part of Douglas Creek that flows through this section and consists of larger older second-growth conifer trees intermingled with hardwoods. It is structurally consistent with habitat that can support species that require shaded coniferous riparian conditions. The smaller slivers of woody riparian habitat within the fenced perimeter have only remnant or small trees along the drainage channels. These areas were cleared during the construction of the orchard and are primarily occupied by shrubs. They do not resemble the more mature patches along Douglas Creek outside of the fence.

b. Individual Species of Interest

There are several species of special interest that occur or could occur within the Eugene District. The project file displays the entire list and their potential for occurring in or near Tyrrell Seed Orchard. The narrative below describes only the Threatened and Endangered species that may occur within the vicinity of the Seed Orchard. No RMP designations (e.g., Survey and Manage, Bureau Tracking, or Bureau Assessment) pertain within the Seed Orchard.

Bald Eagle (Status: threatened) - The bald eagle requires large trees or cliffs for nesting. In western Oregon, nests are constructed in large dominant trees about one-quarter the length from the top. Nests are usually in line-of-sight of a major water body. There are no bald eagle nests documented within the area of the Seed Orchard. There is some possibility that bald eagle activity could occur along the Siuslaw River. However, the Seed Orchard itself does not provide bald eagle habitat.

Northern Spotted Owl (Status: threatened) - Spotted owls rely on older seral stages for nesting and foraging. These birds nest in trees large enough to provide a cavity or platform that can hold a nest and young. Douglas-fir reach this size in the Coast Range at about 80 years old. Also at this age forested stands begin to develop snags and coarse woody debris that provide suitable habitat for the owls' prey species.

Suitable habitat for spotted owls exists within the late successional forest remnants located in the southwest quarter of Section 15 as well as in Section 11 northeast of Section 15, and Section 14 just east of Section 15. There is no suitable habitat for spotted owls within the fenced perimeter of the orchard.

Marbled Murrelet (Status: threatened) - In Oregon these birds nest in mature or old-growth forests as far as 50 miles from the coast. Within the Eugene District most murrelet nesting activity occurs within 35 miles of the sea. Tyrrell Seed Orchard falls within the 35 mile to 50 mile distance--at the outer perimeter of the nesting range for this area. Since 1990, the Eugene District has performed seven, 2-year surveys for murrelets. Six stations were placed in potential habitat in Sections 3 and 5 just to the north of the Seed Orchard. No murrelets have been detected. Potential habitat for murrelets is not found within the fence perimeter of the Seed Orchard itself.

Fender's blue butterfly (Status: Proposed endangered) - This species is located within the Willamette Valley. Larvae of this species are limited to lupines and in this area it is using Kincaid's Lupine, *Lupinus sulphereous* var. *kincaidii*, where available and the Spurred Lupine, *Lupinus laxiflorus*, as an alternate host. Currently, it is known from only four areas within the Eugene District, all of which are located in the Willamette Valley and adjacent foothills. It is unlikely that the Fender's Blue would occur as far into the Coast Range as the Seed Orchard nor does the host plant occur there.

c. Impacts of the Alternatives on Wildlife

i. Proposed Action (Esfenvalerate):

Issue 1: How does this insecticide affect non-target species including pollinators and insect predators?

Application of esfenvalerate may have an adverse affect on insect predators and non-target insect species including pollinators. According to the Pesticide Fact Sheet, esfenvalerate is highly toxic to bees (USDA Forest Service 1995b). Oregon State University (1996a) found that esfenvalerate can interrupt pollination by killing bees and effectively repelling bees from the sprayed area for up to two days after application. Toxicity is related only to direct spray and esfenvalerate is not expected to be toxic to bees after drying. In addition, if esfenvalerate temporarily reduces the population of non-target insects in and around the orchards, the food supply for nesting insectivorous birds would also decline. They would have to forage elsewhere until the insect population has recovered. Because of esfenvalerate's short duration of toxicity to insects and the relatively small area that would be sprayed, this would not be expected to result in any reduction in vigor or productivity in these bird species.

Fifty-four species of birds and mammals that inhabit the seed orchard could experience both direct (contact with spray) and/or indirect (consuming sprayed material-- plant or animal) exposure to the chemical. Esfenvalerate is considered moderately toxic to mammals (USDA Forest Service 1995a), and test results regarding toxicity to birds varies from slightly to moderately toxic (Oregon State University 1996a and USDA Forest Service 1995b). Because this would be a one time application, the level of exposure would be acute and would be expected to be far below the toxic threshold. In addition, there would be little potential for chronic exposure to wildlife. The remote exception to this may be that according to the USDA (1995b) there is evidence that esfenvalerate may bioaccumulate in the tissues of fish and other aquatic organisms. Birds and mammals that prey on these species could have chronic indirect exposure to esfenvalerate through consuming tainted prey, but laboratory studies show that low chronic exposure does not have significant adverse affects on laboratory rabbits or rats

(USDA Forest Service 1995b). Also, proper spray procedures would ensure that the chemical would not contaminate any wet areas, streams, or open water where these species reside.

In addition, while esfenvalerate is highly toxic to fish and aquatic invertebrates (USDA Forest Service 1995b), there is no information regarding this chemical's affect on amphibians and reptiles. The possibility that these species are sensitive to this chemical exists and it is possible that direct exposure of resident amphibians and reptiles (red-legged frog, rough-skinned newt, and northwestern garter snake) within the treated unit boundaries could occur. There is the potential of some direct mortality to individuals of these species within the immediate spray zone if this chemical is highly toxic to them as well.

Issue 3: How will this insecticide application affect northern spotted owl foraging and dispersal habitat?

The one time application of this insecticide on specific trees within the seed orchard perimeter would have no affect of any kind on habitat for the northern spotted owl. Because northern spotted owls generally hunt rodents under the forest canopy or in small forest openings, the likelihood of exposure of spotted owls to this chemical either directly (contact with the chemical after spraying) or indirectly (consumption of prey that were exposed) would be remote. No adverse effect on the owl population is anticipated.

ii. Alternative A (Dimethoate):

Issue 1: How does this insecticide affect non-target species including pollinators and insect predators?

Application of dimethoate may have an adverse effect on insect predators and non-target insects including pollinators. According to the Pesticide Information Profile (Oregon State University 1996b), dimethoate is an organophosphate insecticide that is highly toxic to bees. It is also considered moderately to very highly toxic to birds and moderately toxic to mammals.

Fifty-four species of birds and mammals that inhabit the Seed Orchard could experience both direct (contact with spray) and/or indirect exposure to the chemical (consuming sprayed material--plant or animal). Because this would be a one-time application, the level of exposure would be acute and would be expected to be far below the toxic threshold for mammals; however, the greatest concern is in the exposure of insect-eating birds that forage in the Seed Orchard. Western bluebirds and several species of swallows and flycatchers are common residents of the orchards and would have a high likelihood of exposure to the chemical as they hawk for flying insects

in and around the orchard trees as well as forage for insects in the ground vegetation. Dimethoate can be highly toxic to birds and therefore an application of this chemical in the spring of the year when these species are nesting close by would create a situation where there would be a high potential for exposure and could have serious adverse effects on individuals. Effects would be dependent on the amount of chemical the bird absorbed and could range from no adverse effect to illness, increased vulnerability to predators, reduced foraging efficiency, or direct mortality. In addition, dimethoate would reduce the population of non-target insects in and around the orchards thus reducing the food supply to these nesting birds. They would have to forage elsewhere until the insect population has recovered. Because of the relatively small area that would be sprayed, this would not be expected to result in any reduction in vigor or productivity in these bird species.

There would be little to no potential for chronic exposure to wildlife. Laboratory tests with this chemical shows no evidence that it bioaccumulates (Oregon State University 1996b).

Dimethoate is moderately toxic to fish and more toxic to aquatic invertebrates (Oregon State University 1996b); however, there is no information regarding this chemical's affect on amphibians and reptiles. The possibility that these species are sensitive to this chemical exists and it is possible that direct exposure of resident amphibians and reptiles (red-legged frog, rough-skinned newt, and northwestern garter snake) within the treated unit boundaries could occur. The probability and magnitude of exposure would be expected to be low if proper spray procedures are followed.

Issue 3: How will this insecticide application affect northern spotted owl foraging and dispersal habitat?

The one time application of this insecticide on specific trees within the seed orchard perimeter would have no affect of any kind on habitat for the northern spotted owl. Because northern spotted owls generally hunt rodents under the forest canopy or in small forest openings, the likelihood of exposure of spotted owls to this chemical either directly (contact with the chemical after spraying) or indirectly (consumption of prey that were exposed) would be remote. No adverse effect to the owl population is anticipated.

iii. Alternative B (No Action):

Issue 1: How does this insecticide affect non-target species including pollinators and insect predators?

Insecticide would not be applied in this alternative, therefore, there would be no affect on non-target insect species and their predators.

Issue 3: How will this insecticide application affect northern spotted owl foraging and dispersal habitat?

Insecticide would not be applied in this alternative, therefore, there would be no affect on northern spotted owl foraging and dispersal habitat.

3. BOTANY

There are no threatened, endangered or sensitive plants known to exist within the project area. During August of 1999, a plant survey was conducted on the area within twenty feet exterior of the deer fence surrounding Tyrrell Seed Orchard (T. 20S, R. 5W, Sec. 9, 15 & 21). Shrubby riparian areas (270 acres) and eight miles of deer fence (40 acres) were surveyed by the controlled-intuitive method. A random species inventory was taken of the production, breeding and preservation orchards (120 acres).

a. Orchards - To control soil-borne pathogens, orchard areas have been scalped to a depth of sixteen inches. Aside from the tree stock and clones, few native species remain. Typical disturbed-site exotic grass and forb species dominate: annual bromes and fescues, tall and red fescue, bentgrasses, orchard grasses, wild carrot, stork's bill, daisy, etc. (see species list in project file). Frequent mowing seems to inhibit noxious weed species within the orchard area proper, although it may contribute to their spread along fence and shrub area boundaries. Occasionally, thistle, tansy, or goat weed was spotted in the small unmowed tree trunk wells.

b. Fence line - A deer fence surrounds all three orchard areas and traverses all habitats from dry ridge lines to riparian bottoms. Those areas where the fence parallels a boundary with private property mostly have young Douglas-fir plantations outside the fence. The BLM property outside of the fence ranges from a young ponderosa pine plantation to remnant old-growth/mixed-aged forest. The fence line survey area is mowed or brushed at varied times. *Lotus corniculatus*, *Thermopsis montana*, *Epilobium angustifolium*, *Anaphalis margaritacea*, and *Aster radulinus* are some of the common native forbs here. There is also a good native shrub component of salal, Oregon grape, oceanspray, vine maple, *Ceanothus*, *Symphoricarpos*, and others. Broom, blackberry, thistle, tansy, and goat weed are present along the fence line at varying densities. South of the office buildings the fence runs through a stand of approximately 45-year-old Douglas-fir, with a mostly closed canopy. Typical plants here include *Whipplea*, *Oxalis*, *Asarum, Satureja, Lilium columbianum, Galium*, and others.

c. Shrubby Riparian - Shrub areas in the Seed Orchard have been reforested with tree species that will not contaminate the Douglas-fir pollen flow. Sugar pine, western white pine, Pacific silver fir, sequoia, Jeffrey pine, and Port-Orford-cedar are seldom or never

found in native habitats on the Eugene District. Other blocks have been planted to noble fir, grand fir, hemlock, ponderosa pine, and western red-cedar. Shrub species' composition is typical of young plantations. There are no elk or deer trails and the shrubbery is very dense. Broom and blackberry are sometimes thickly established along the edges of the shrub areas, but rarely penetrate far into the interior. There are some nice stands of the native grasses *Bromus vulgaris* and *Elymus glaucus* in more protected edge areas. There are some pockets of older trees, especially at the south end of Section 15 in the creek bottom. A few beavers are active in the main riparian areas in both the east and west orchards. The best (and most accessible) marsh area is above the main road in Section 9 with *Potamogeton natans, Sparganium emersum, Vallisneria americana, Callitriche heterophylla, Juncus acuminatus, J. effusus, J. ensifolius, J. oxymeris, Hypericum anagalloides, Mimulus moschatus*, etc. (See species list in project file.) Other smaller impoundments below and in the Section 15 stream corridor are similar but with far fewer aquatic species. Other smaller boggy areas have cattails or dense *Scirpus microcarpus/Glyceria elata* stands. There is some reed canary grass and blackberry (occasionally dense) scattered along the stream bottoms. Large portions of the creek bottoms and side draws are over-grown with impenetrable barriers of brush and large woody debris.

d. Impacts of the Alternatives on Botany

i. Proposed Action (Esfenvalerate) and Alternative A (Dimethoate): The main concern with insecticide use from a botanical perspective is the potential destruction of insect pollinators (either short term or cumulatively) where sensitive and rare plant species' viability might be negatively impacted. Risk of serious impact to plant populations increases with several factors, such as obligate out-crossing needs or extreme pollinator specificity in the plant, a short pollination window, or a closed, difficult pollination mechanism (Stevens and Burgess 1995).

A thorough botanical survey detected no sensitive plant species within the Seed Orchard fenced boundary or within 20 feet outside the fence. It is assumed for this impact analysis that no lands outside this 20 foot buffer would be impacted by even unintentional effects (for instance, unintentional drift).

There are no sensitive plants known immediately nearby the surveyed area, but surveys have not been conducted in most of these areas (many of them privately owned). The nearest sensitive population of plants known to the BLM are two sites of *Cimicifuga elata* (tall bugbane), each within about one mile from the project area. At this distance, localized, one-time pollinator impacts are unlikely to reduce long-term population viability. However, the issue bears analysis because *Cimicifuga elata* is pollinated by bumblebees and syrphid flies, and loss of pollinators is listed as a potential threat in the conservation strategy for that species (USDA et al. 1996).

Both of the insecticides proposed in this EA are highly toxic to bees (Oregon State University 1996a, 1996b) Since bees and other plant pollinators that come in contact with the spray while it is in the air or any time before it has dried on surfaces will likely be killed, pollinator reduction is a concern. However, several factors reduce the likelihood of serious risk to the *Cimicifuga* populations mentioned above:

- The distance (approximately a mile away, in two directions) reduces the chance that pollinators for these plants would be killed (especially bumblebees, who often do not forage more than several hundred yards).

- The plants have a long period of pollination, and an open pollinator mechanism, so pollination success is not believed to be "limiting" for this species. There is some evidence that they can successfully self-pollinate at least some of the time.

- Both the Proposed Action and Alternative A propose a single application in April-June, which is outside the window of pollination for *Cimicifuga elata*, and unlikely to lead to cumulative effects.

- Mitigation measures provided in both the Action alternatives parallel those specified for the Dorena Tree Improvement pesticide project and approved by the Fish and Wildlife Service through formal technical assistance on (then) Federal Candidate plant species *Aster vialis* (United States Fish and Wildlife Service 1995, 1996). These measures include monitoring of spray detection cards, directing spray toward the center of the project area, attempting to conduct spray operations during lower temperatures, and probable mowing prior to the spray application.

ii. Alternative B (No Action): The No Action alternative presents none of the risks mentioned above in regard to pollinator species.

V. CONSULTATION AND COORDINATION

A. Public Participation

A letter requesting comments on the scope of this analysis was mailed to the following individuals and organizations and no comments were received:

Craig and Cindy Royce, Lorane, OR
Bruce Lesan, Springfield, OR
Sandra Rhodes, Lorane, OR
Mark and Joyce Gorham, Veneta, OR
John and Barbara Robinson, Lorane, OR
Larry Hibbard, Manson, WA
Albert Goins, Lorane, OR
Jeffrey and Shelly Corl, Lorane, OR
Pacific Rivers Council, Eugene Or.

Sierra Club - Many Rivers Group, Eugene, OR
Lane County Lands Department, Eugene, OR
Ira and Barbara Dare, Lorane, OR
Norman and Sandra Maxwell, Lorane, OR
Roy and Kathlyn Smith, Cottage Grove, OR
Weyerhaeuser Co., Tacoma, WA
Bertha Fitch, Harrisburg, OR
Melveena Keep, Lorane, OR
Oregon Natural Resource Council, Eugene, OR
National Coalition for Alternatives to Pesticides, Eugene, OR
Oregonians for Food and Shelter, Salem, OR
Willamette Industries, Inc., Portland, OR
Ronald and Marla Norton, Lorane, OR
Ann Mathews, Eugene, Or
Charles and Reida Kimmel, Eugene, OR
Craig Tupper, Eugene, OR
American Lands Alliance, Eugene, OR
Harold Schroeder, Eugene, OR
John Bianco, Creswell, Or
Kris and John Ward, Eugene, Or
Neil Miller, Eugene, Or
Cadore Timber Co., Eugene, Or
Bruce and Sharon Malcolm, Lorane, Or
Kalapooya Sacred Circle Alliance, Springfield, OR
Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians, Coos Bay, OR
David Simone, Eugene, OR
Governor's Forest Planning Team, Salem, OR
Jan Wroncy, Eugene, OR
John Poynter, Lorane, OR
Lane County Land Management, Eugene, OR
Oregon Department of Environmental Quality, Portland, OR
Oregon Department of Fish and Wildlife, Springfield, OR
Oregon Department of Land Conservation and Development, Salem, OR
Peter Saraceno, Eugene, Or
Rosboro Lumber Co., Springfield, Or
Swanson-Superior Forest Products Inc, Noti, OR
Menasha Corporation, North Bend, OR
Seneca Sawmill Company, Roseburg, OR
Roseburg Resources Company, Roseburg, OR
Oregon Department of Forestry - Western Lane District, Veneta, OR
Pam Hewitt, Marcola, OR
Sondra Zemansky, Junction City, OR
The Campbell Group, Gold Beach, OR
Cascade Timber Consulting Inc., Sweet Home, OR
South Coast Lumber, Brookings, OR
Lone Rock Timber Company, Roseburg, OR
Tree Improvement Enterprises Inc., Cottage Grove, OR

This EA will be mailed to the list above, as well as to the following individuals and organizations:

Pam Chenoweth, Lorane, OR
Wildlife Management Institute, Bend, OR
James Johnston, Eugene, OR

B. Agencies, Groups, and Individuals Consulted

Consultation with the National Marine Fisheries Service will be completed prior to a decision on this project.

C. List of Preparers

The Proposed Action and alternatives were developed and analyzed by the following interdisciplinary team of BLM specialists:

Sally Sovey	Wildlife and Threatened and Endangered Species
Mary D'Aversa	Hydrology
Neil Armantrout	Fisheries
Jeanne Ponzetti	Botany
John Depuy	Soils
Richard Hardt	NEPA Coordinator
Michael Crawford	Author

VI. Figures

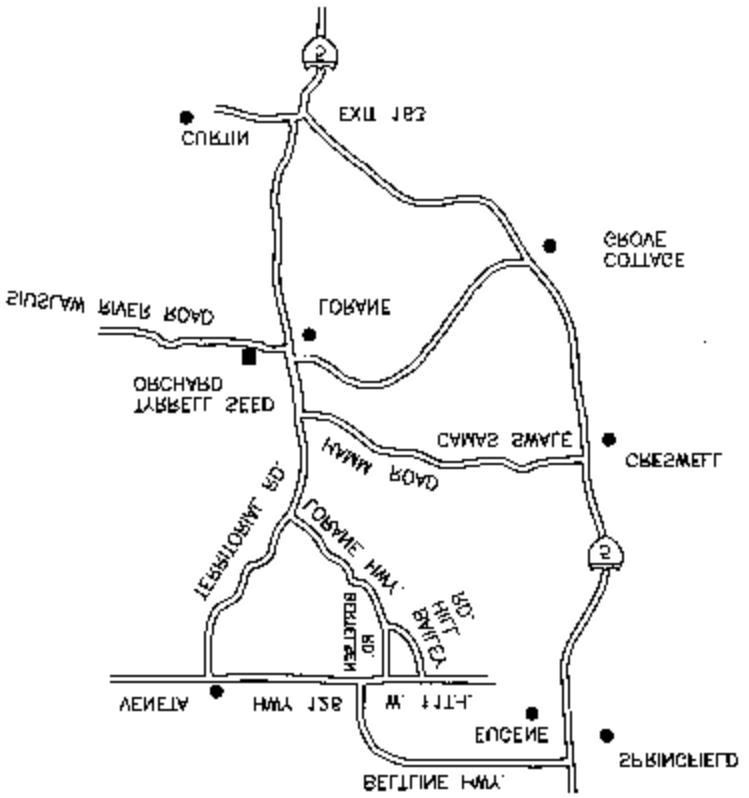
This section contains figures referred to throughout the document. The following figures are included:

Figure 1	Travis Tyrrell Seed Orchard Vicinity Map
Figure 2	Detailed Proposed Treatment Area Map
Figure 3	Soils Map of Tyrrell Seed Orchard

Figure 1: TRAVIS TYRRELL SEED ORCHARD VICINITY MAP

U.S. Department of the Interior
Bureau of Land Management
Eugene District
Travis Tyrrell Seed Orchard
26350 Siuslaw River Road
P.O. Box 121
Lorane, Oregon 97451

Telephone: (541) 683-6445
FAX: (541) 683-6597



From Eugene: Take West 11th and turn south on Bertelsen (which turns into Bailey Hill Road and then Lorane Highway) and proceed 12.5 miles. Turn left on Territorial Road and continue for 6 miles to Lorane. Turn right onto Siuslaw Road and travel 3 miles to orchard, which is on the right.

From I-5 North: Turn off I-5 at Creswell Exit 182 and turn right. Travel west 10.5 miles through Creswell to Camas Swale Road, which turns into Hamm Road. Turn left on Territorial Road and continue 5.5 miles to Lorane. Turn right onto Siuslaw Road and travel 3 miles to orchard, which is on the right.

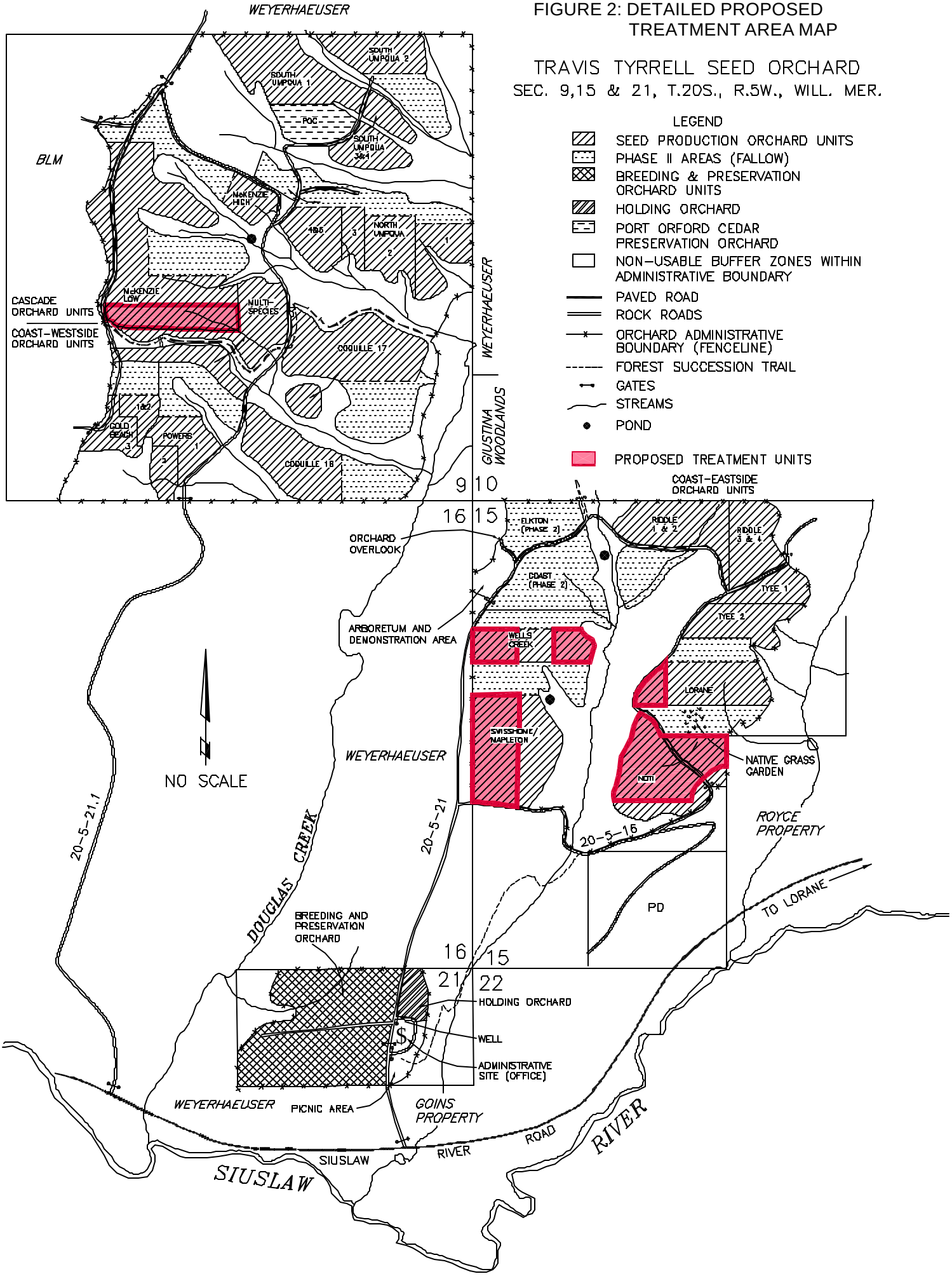
From I-5 South: Turn off I-5 at Curtin Exit 163. Turn right and travel 1 mile. Turn right at Lorane sign and go 9 miles to Lorane. Turn left onto Siuslaw Road and travel 3 miles to orchard, which is on the right.

From Cottage Grove: Proceed west on Main Street. This will turn into Cottage Grove-Lorane Highway. Go 12.5 miles. Turn left in Lorane onto Territorial Road. After approximately 300 feet turn right onto Siuslaw Road and go 3 miles to the orchard, which is on the right.

FIGURE 2: DETAILED PROPOSED TREATMENT AREA MAP

TRAVIS TYRRELL SEED ORCHARD

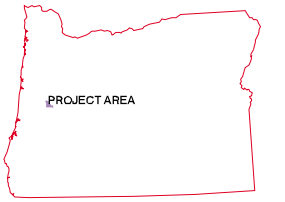
SEC. 9,15 & 21, T.20S., R.5W., WILL. MER.

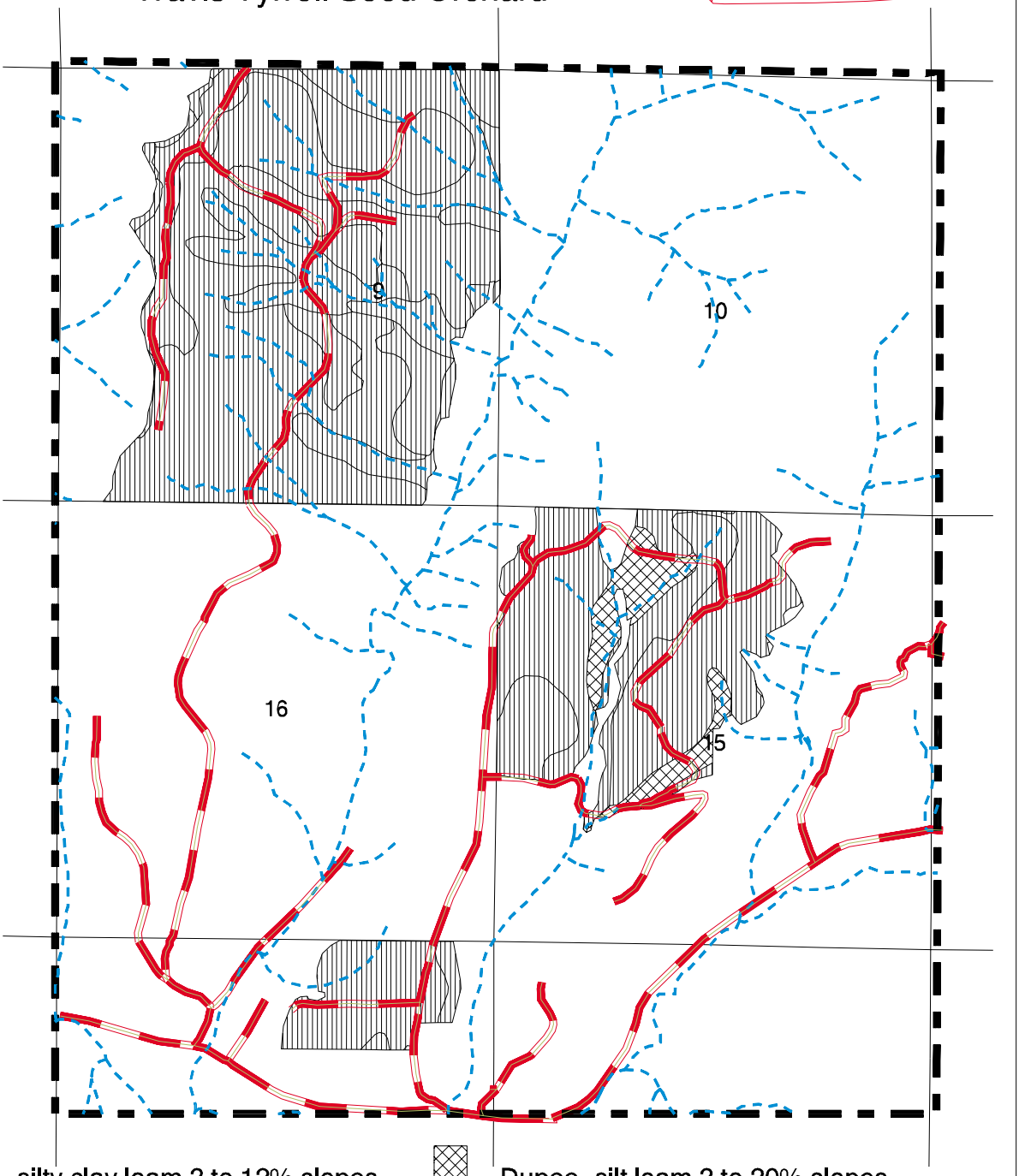


U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Figure 3:

Travis Tyrrell Seed Orchard





Bellpine -silty clay loam 3 to 12% slopes

Bellpine -silty clay loam 12 to 20% slopes

Bellpine -silty clay loam 20 to 30% slopes

Bellpine -silty clay loam 30 to 50% slopes

Dupee -silt loam 3 to 20% slopes

streams

roads

Scale 1:24000

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