CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Missoula Ponderosa Pine Seed Orchard Insecticide Spraying
Proposed Implementation Date:	May 1 – June 15, 2010
Proponent:	Montana Department of Natural Resources and Conservation
Location:	Missoula Ponderosa Pine Seed Orchard, 2705 Spurgin Rd., Missoula, MT 59804
County:	Missoula

I. TYPE AND PURPOSE OF ACTION

The Montana Department of Natural Resources and Conservation (DNRC) proposes to treat up to 388 ponderosa pine trees in the Missoula Ponderosa Pine Seed Orchard (PPSO) (***Appendix 1, Figure 1***) with a chemical insecticide in order to control the spread of mountain pine beetle. The PPSO serves as a source of genetically improved ponderosa pine seed for use in reforestation efforts on a variety of land ownerships, including state School Trust Lands, federal lands, and private lands. The PPSO is also a heavily-used recreation site for area residents.

In 2007 the PPSO was affected by an outbreak of the mountain pine beetle. In April 2008, DNRC removed 70 trees from the orchard that were killed by beetle attacks with the objective of removing brood trees that would serve as a source of further infestation. All of these trees were “blind attacked”, meaning that there was no outward sign, such as pitch tubes, that would indicate attack.

In August 2008, the infestation within the PPSO intensified, killing 128 trees that were removed in February and March of 2009. Over the two-year span from 2007-2008, 198 of 586 trees in the PPSO (33 percent of the orchard’s trees) were killed and removed due to attack by bark beetles.

In June 2009, all (388) of the trees in the orchard were treated with an application of a chemical insecticide, SEVIN® brand XLR PLUS (hereafter Sevin XLR), to prevent attacks by bark beetles. During August 2009, the mountain pine beetle attacked and killed trees immediately adjacent to the orchard that had not been treated with insecticide, but few signs of attack were observed on the treated trees within the orchard. As of March 2010, no mortality from mountain pine beetle attack is evident in the seed orchard, indicating the success of the June 2009 insecticide treatment.

Because the mountain pine beetle is still active immediately adjacent to the seed orchard and in the Missoula Valley, and although Sevin XLR is effective for up to two years in preventing mountain pine beetle attack, DNRC is proposing to re-apply Sevin XLR to the trees in the seed orchard. Under the proposed action, up to 388 trees in the PPSO would be sprayed with Sevin XLR. The spray would be applied to the bole of the tree from ground level up to a point where the diameter of the bole is 5 inches or less. Per label directions, a solution containing 2% active ingredient would be applied to each tree. The insecticide would be applied by a licensed pesticide applicator and in accordance with label directions. The insecticide would be applied between May 1 and June 15, 2010, which is prior to the flight of adult beetle emergence from brood trees. The insecticide is not effective if applied after colonization of an attacked tree by the beetles (Grosman and Upton 2006).

The active ingredient in Sevin XLR is carbaryl. Carbaryl is an EPA-registered pesticide for controlling insects in a number of applications, including agriculture, turf management and ornamental production, and residential uses, among others (EPA 2004). Carbaryl kills insects through either ingestion or direct contact (Extoxnet 1996) by functioning as an acetylcholinesterase inhibitor, which interrupts the function of the nervous system (SERA 2008). A 2% solution of carbaryl has been shown to provide up to two years of protection against bark beetles in multiple species of pines (Fettig et al. 2006).

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project.

Public scoping for this project began on March 1, 2010, and targeted groups with potential interest in the project, particularly recreational users of the PPSO and neighboring residents. Public notices were placed around the perimeter of the PPSO on March 5, 2009 and remained in place for 11 days. Scoping letters were mailed to residences within one block of the PPSO on March 1. Residences without an available mailing address within one block of the PPSO received hand-delivered public notices on March 1. Internal scoping was conducted via an email to DNRC employees in Missoula on March 4, 2010.

DNRC received written comments from three individuals during the scoping period. DNRC sent written responses or made telephone calls to the individuals who submitted written comments. Comments received during scoping identified the following issues of concern, with the part of this EA Checklist where each is addressed in parentheses:

- Public safety during spraying operations (II.3—Alternatives; IV.14—Human Health and Safety)
- Potential for spray drift (III.6—Air Quality)
- Potential effects to groundwater resources (III.4-5—Geology and Soil Quality, Stability, and Moisture/Water Quality, Quantity and Distribution)
- Potential for using alternative methods of controlling the beetle (II.3—Alternatives Considered)

Upon completion, this EA Checklist will be posted on the DNRC website. Persons who submitted written comments will be notified when the document is posted to the website.

The public will continue to be notified through signing around the PPSO one week prior to and during spraying operations. Signs will remain in place until the area is safe for reentry.

DNRC employees involved with the project were: Tim Spoelma, Forest Management Bureau (FMB) Silviculturist/Forest Ecologist and project leader; Sonya Germann, FMB MEPA Planner; Amy Gannon, Forestry Division Entomologist; and Jeff Schmalenberg, FMB Soils and Hydrology Specialist.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

Commercial and government pesticide applicators are required to comply with the Montana Pesticides Act, which is administered by the Montana Department of Agriculture. The Pesticides Act regulates the use of pesticides in Montana, including licensing of commercial applicators. Although the project area is outside the Missoula city limits, DNRC will comply with Missoula City Ordinance #3022: Pesticide Notification and Contamination Prevention.

3. ALTERNATIVES CONSIDERED:

No-Action Alternative: Under the No-Action Alternative, no insecticide spraying would occur in the PPSO. Mortality due to mountain pine beetle would be expected, reducing the PPSO's ability to produce seed and the quantity of seed collected, and its value as a place to recreate for those who enjoy having trees throughout the parcel. Additional tree removals due to mortality would be needed. Other activities in the PPSO, including irrigation, mowing, and cone harvesting would continue.

Action Alternative: Under the Action Alternative, up to 388 trees on 13 acres in the PPSO would be sprayed with Sevin XLR (carbaryl) insecticide. Application of the insecticide would be done by a licensed commercial pesticide applicator. Insecticide would be applied to the bole (trunk) of each tree from ground level up to a point on the bole at least 5 inches or less in diameter. During the time of application until the insecticide has dried and the area is safe for reentry, the PPSO would be closed to the public; signs will be posted at entrances to the PPSO and around the PPSO notifying the public that pesticide application has occurred. The following specifications to minimize impacts to the public and non-target species would be written into the contract for this project:

1. The Contractor will pour, mix, and store the pesticide on impervious surfaces outside of the project area to prevent the possibility of concentrated product from entering into soil and water resources in the case of a spill.

2. The Contractor will notify the Contract Supervisor at least one week in advance of beginning spraying activities. The Contract Supervisor will post notices around the project area at that time to inform the public of the time frame in which spraying activities will begin.

3. The Contractor will spray only when each of the following conditions are met:

   a. High pressure atmospheric conditions with wind speeds under 5 mph and gusts less than 15 mph measured on site.
   b. The probability of precipitation will not exceed 40% for any day in a 4 day period following application as indicated by the National Weather Service (NWS) forecast for Missoula. If probabilities of precipitation are not listed by the NWS for all or part of a 4 day period, forecasts indicating no more than "slight chance" of precipitation for any day during that period will be used.
   c. Soil moisture will be at or below 20% in the project area.

   The Contract Supervisor will monitor these conditions and notify the Contractor to approve spraying when each of these conditions is met.

   If, during the course of application, conditions are no longer suitable for spraying, the Contract Supervisor will notify the Contractor to cease operations until conditions are favorable for spraying as described in Division B #4.9a-c. The Contract Supervisor reserves the right to curtail spraying activities at any time and for any reason.

4. Spraying will only occur on days when the Contract Supervisor or a representative of the Contract Supervisor is present and available on the DNRC campus. The Contract Supervisor will be present on the first day of spraying activities.

5. Spraying will only take place between the hours of 6:30 a.m. and 9:00 p.m. on days approved for spraying by the Contract Supervisor.

6. The Contractor will have an emergency spill kit on site along with proper training in the event of a spill during mixing, transport, or application.

Alternatives Considered but Dropped From Further Analysis: Alternatives considered but dropped from further analysis included the use of alternative chemical insecticides and the use of anti-aggregation chemicals. The use of two alternative chemical insecticides, permethrin (Astro®) and bifenthrin (Onyx®) was considered. Both of these chemicals are synthetic pyrethroids, which mimic pyrethrum, a naturally occurring insecticide found in the plant genus *Chrysanthemum*. Both of these insecticides are restricted use pesticides, meaning that their use is restricted to licensed pesticide applicators, whereas carbaryl is a general use pesticide that can be used by the general public. Onyx® (bifenthrin) carries a signal word of "warning" on its label, indicating that it is moderately toxic to humans, whereas Sevin XLR (carbaryl) and Astro® (permethrin) carry the signal word "caution", indicating low toxicity to humans. All three insecticides function by inhibiting the insect's nervous system. A 2% solution of carbaryl has been shown to provide up to two years of protection for multiple species of pines; however, permethrin and bifenthrin have been shown to provide one year of protection, meaning multiple applications would be needed to achieve a similar level of protection as carbaryl. DNRC estimated the costs of using each chemical and determined that it was most cost effective to use carbaryl. After combining the cost analysis for each chemical with knowledge of environmental effects, DNRC determined that spraying with Sevin XLR (carbaryl) was the best alternative; therefore alternatives using permethrin and bifenthrin were dropped from futher analysis.

An anti-aggregation chemical, verbenone, was also considered as an alternative to applying chemical insecticides. Verbenone is a pheromone emitted by bark beetles that essentially signals to other bark beetles that a tree has "no vacancy". It is available in pouches that can be stapled to a tree. While verbenone deters

beetles from attacking a tree, it does not guarantee protection of individual trees. It is also less effective in stands that are currently infested with bark beetles. For those reasons, the use of verbenone pouches was dropped from further analysis.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

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4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:
Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify any cumulative impacts to soils.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:
Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify cumulative effects to water resources.

Introduction

The following environmental effects analysis will consider potential impacts to soil and water resources from carbaryl application on approximately 390 individual trees covering 13 acres. Through public and internal scoping, issues relating to this proposed action were developed and are listed below.

- Carbaryl application on trees within the treatment area has the potential to contaminate soil resources within the treatment area.
- Potential effects to soil resources within the treatment area have the potential to facilitate contaminant transport to groundwater resources through leaching processes.

Analysis Area

The analysis area for potential environmental effects related to the issues listed above will include the 13 acres within the seed orchard proposed for treatment. Groundwater resources immediately under and surrounding the treatment area will also be included for effects analysis.

Analysis Methods

The analysis for potential environmental effects relied on numerous data sources including product information from the distributor, peer reviewed scientific publications regarding the fate and transport of the product, well log data from the Groundwater Information center, professionally published soil surveys as well as field review of the treatment area.

Recommended Mitigation Measures

The following effects analysis assumes that the following mitigation measures would be implemented during application of carbaryl within the treatment area.

- Soil Moisture will be at or below 20% to immobilize as best as possible any product accumulated within the soil surface during application.
- High pressure atmospheric conditions with wind speeds under 5 mph to prevent surfactant evaporation and product drift to off site areas during application. No probability of significant precipitation in the forecast for 4 days immediately following the application to further prevent product transport to soil and water resources.
- All pouring, mixing and storage of the product will be conducted on impervious surfaces to prevent the possibility of concentrated product from entering into soil and water resources in the case of a spill.

- The contractor will have an emergency spill kit on site along with proper training in the event of a spill during mixing, transport or application.

Existing Conditions

Soils

The soil within the treatment area is described by the Missoula County Area, MT soil survey as Grantsdale loam on 0-2% slopes. This soil unit can be described as a moderately drained loam typical of stream terrace landtypes. This soil is deep with coarse fragments and gravelly alluvium increasing with depth. Surface duff and organic material is limited and ranges from 0.5 – 1.0". The pH of the soil typically ranges from 6.1 to 7.3 with increasing alkalinity as depth increases.

Water Resources

No surface water resources are present within the analysis area and the only potentially affected water resources would be groundwater sources. There is an irrigation ditch adjacent to the west side of the analysis area with seasonal flow between April 15 and October 1. At its nearest point, the ditch is approximately 110 feet from the analysis area. The ditch is buffered from the analysis area by a shelterbelt of broadleaf trees and hedgerows, and is also upwind of the analysis area in terms of the prevailing wind direction.

The Missoula Aquifer is a stratum of porous sand, gravel, and cobbles 10-70 feet beneath the valley floor that contains extractable groundwater. A layer of clay forms its lower boundary. Porous soil covers the top. The floodwater from the rapid discharge of Glacial Lake Missoula 10,000 years ago, deposited the millions of tons of cobbles over the bedrock and clay that form today's aquifer.

An analysis of groundwater wells in the vicinity (0.5 miles) of the treatment area shows an average static water level of 28.0 feet below the ground surface. The flow of water within an aquifer is controlled by many physical variables such as hydrologic conductivity and aquifer transmissivity, but can generally be described by Darcy's law which states that flow through is porous medium is a function of the flow area, elevation, fluid pressure and a proportionality constant. By using a slightly modified approach of Darcy's Law it has been found that flow rates of the Missoula aquifer ranger from 8-30 ft/day. For the general discussion of groundwater flow within the analysis area, it is assumed here that ground water flow typically mimics elevation gradients observed on the ground surface of the Missoula valley shown in ***Appendix 1, Figure 2***.

Chemical Properties

Carbaryl is one of the most effective and environmentally safe insecticides used to prevent bark beetle attacks (Hastings et al. 2001) largely due to its low solubility in water (~40 ppm) and low mobility in soils, especially in soils with elevated clay content and soil organic matter. In the environment, carbaryl breaks down primarily through hydrolysis and microbial degradation to 1-naphthol and carbon dioxide (Xu 2000). Carbaryl degrades in distilled water with a half-life of 3.2 hours at pH 9 and 12.1 days at pH 7 (Wolf et al. 1978). Scientists observed that carbaryl in river water (pH 7.3 - 8), exposed to natural and artificial light, degrades completely within 2 weeks (Eichelberger and Lichtenberg, 1971). The half-life of carbaryl ranges from 4 days in aerobic soils to 72.2 days in anaerobic soils (Venkateswarlu et al., 1980). Carbaryl degrades more rapidly in aerobic soils due to microbial action.

Environmental Consequences

<u>No Action Alternative:</u>
Direct and Indirect Effects: Under the No-Action Alternative, no trees would be treated within the treatment area resulting in no effects to soil or water resources.

Cumulative Effects: Cumulative effects of the No-Action Alternative would be the same as those described in direct and indirect effects of no action.

<u>Action Alternative:</u>

Direct and Indirect Effects: Under the action alternative, trace amounts of carbaryl would be detectable within surface soils for potentially two weeks after the product was applied but in amounts that would result in no environmental effect to soil resources. If mitigations are properly implemented, transport of carbaryl to groundwater sources within the treatment area is not expected to be detectable at well locations down gradient of the treatment area due to the low solubility of the product in water and relatively fast half-life of the product in aerobic soil environments. Given these constraints and chemical properties of the product being applied, there is a moderate risk of low level direct and indirect impacts to soil and water resources. No effects to surface water would be expected given the ditch's distance from the analysis area, the buffer provided by the shelterbelt, the upwind position relative to the prevailing wind direction, and the requirement for spraying when winds are less than 5 mph.

Cumulative Effects: Given the environmental conditions of the Ponderosa Pine Seed Orchard, soil types and level canopy closure, the half-life of Carbaryl is expected to be similar to the findings of Hasting et al. (1998) which concludes a half-life of approximately 10-21 days. Given this information, residual Carbaryl from the application in 2009 would be immeasurable in both the surface soils and forest foliage. No cumulative effects are expected from this application of Carbaryl. At this time no further Carbaryl applications have been identified by the DNRC. Residential Carbaryl applications are assumed to continue and when considered in conjunction with the proposed action present a low risk of low level cumulative effects to soil and water resources within the treatment area and to the Missoula aquifer in general.

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6. AIR QUALITY:

What pollutants or particulate would be produced? Identify air quality regulations or zones (e.g. Class I air shed) the project would influence. Identify cumulative effects to air quality.

No-Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the No-Action Alternative, air quality in and around the PPSO would not be affected.

Action Alternative:
Direct and Indirect Effects: Under the Action Alternative, there is limited potential for air quality in the PPSO to be affected by drift of particulate matter during spraying operations. Studies of wind drift of carbaryl have indicated that greater than 80 percent of the solution remains on the target area of the tree (Haverty et al. 1983; Fettig et al. 2008) and that 97 percent of drift falls within 50 feet of the tree (Fettig et al. 2008). This indicates that most of the chemical will reach its intended target, minimizing the potential for adverse effects away from the trunk of each tree. Based on this information, air quality in the immediate vicinity of individual trees in the PPSO can be expected to be impacted for a short duration.

Cumulative Effects: Under the Action Alternative, no cumulative effects on air quality are expected. Based on studies of wind drift and specifications required during spraying operations to reduce the potential for wind drift, air quality outside of the PPSO is not expected to be adversely affected. .

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7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify cumulative effects to vegetation.

Existing Conditions

The PPSO is a planted stand composed entirely of ponderosa pine (*Pinus ponderosa*). The orchard was established in 1974. There are currently 388 living ponderosa pine trees in the seed orchard. As recently as 2007, there were 586 living ponderosa pines in the seed orchard. In 2007, the orchard was attacked by mountain pine beetle, causing the loss of 70 trees. The outbreak continued in 2008, resulting in the loss of an additional 128 trees.

The surrounding area contains a variety of species of pine trees on DNRC, residential, and other properties. A row of Scots pine (*Pinus sylvestris*) that has previously been affected by bark beetles is immediately adjacent to the north edge of the PPSO. DNRC was also informed of a shelterbelt to the south and west of the PPSO that

is currently affected by bark beetles. DNRC is not aware of any other pine trees on its property or on any other properties in the surrounding area with trees currently affected by bark beetles.

Analysis Area for Direct, Indirect, and Cumulative Effects

The analysis area for direct and indirect effects on vegetation is the PPSO. The analysis area for cumulative effects is the neighborhood surrounding the PPSO including the area west of Reserve Street, north of South Avenue, south of South 7th Street, and east of Tower Street and 33rd Avenue.

Environmental Consequences

No-Action Alternative:
Direct and Indirect Effects: The number of trees in the PPSO would be expected to decrease in the next two years as the mountain pine beetle attacks and kills remaining trees.

Cumulative Effects: Tree cover in the PPSO and surrounding neighborhood would be expected to decrease over the next two years and beyond. As the number of trees in the PPSO decreases, beetles would likely disperse to surrounding areas in search of suitable host trees. Pine trees in the surrounding neighborhood would be at increased risk of attack by mountain pine beetle, which could result in the loss of pine trees on surrounding properties within the analysis area.

Action Alternative:
Direct and Indirect Effects: Live, uninfested trees sprayed with Sevin XLR would be expected to survive subsequent bark beetle attacks for up to two years. No additional tree mortality from bark beetle attacks would be expected.

Cumulative Effects: Vegetative cover in the PPSO would be expected to persist in its current state for at least two years. Untreated pine trees in the surrounding area would continue to be at risk of attack, and an unknown and unpredictable level of mortality would be expected.

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8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:
Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify cumulative effects to fish and wildlife.

Existing Conditions

The PPSO is currently used by the following types of wildlife: birds, honey bees and other insects, rodents, deer, and other small mammals. The PPSO is frequently used by people as a place to walk their dogs. No population estimates have been developed for wildlife that uses that PPSO, nor have any studies on recreational use of the PPSO by pet owners been conducted. The PPSO contains no surface water resources, and therefore no aquatic organisms.

The surrounding area contains the same wildlife as the PPSO, in addition to a variety of pets and livestock. Three horses are pastured immediately adjacent to the south side of the PPSO.

In 2008, there were 4 registered commercial apiaries within 1.5 miles of the PPSO.

A diversion ditch used for irrigation is adjacent to the west side of the PPSO. The ditch's nearest point to the PPSO is approximately 110 feet, and it is buffered from the PPSO by a shelterbelt and hedgerows. The ditch is also upwind from the PPSO relative to the prevailing winds. Water normally flows through the ditch between April 15 and October 1. Fish are entrained in the ditch during the period of water flow.

Analysis Area for Direct, Indirect, and Cumulative Effects

The analysis area for direct and indirect effects on wildlife, insects, and domestic animals is the PPSO. The analysis area for cumulative effects is the neighborhood surrounding the PPSO including the area west of

Reserve Street, north of South Avenue, south of South 7th Street, and east of Tower Street and 33rd Avenue. Commercial apiaries within 1.5 miles of the PPSO are included in the cumulative effects analysis.

Environmental Consequences

No-Action Alternative:
Direct and Indirect Effects: The continued loss of trees in the PPSO due to mountain pine beetle attack could cause loss of habitat for wildlife, particularly birds, which currently use the PPSO. Because no insecticide spraying would occur under this alternative, there would be no effects on wildlife, insects, or domestic animals associated with the use of insecticides in the PPSO.

Cumulative Effects: The loss of trees in the PPSO and potential for the loss of trees in the surrounding neighborhood could result in reduced numbers of wildlife in the area surrounding the PPSO. Because no insecticide spraying would occur under the No-Action Alternative, there would be no effects on wildlife, insects, or pets in the surrounding area due to the use of insecticides. The use of insecticides or other pesticides by property owners in the surrounding neighborhood could affect wildlife, insects, and domestic animals in and around the PPSO.

Action Alternative:
Direct and Indirect Effects: Carbaryl acts as an acetylcholinesterase inhibitor, which interrupts the function of the nervous system (SERA 2008). As such, it can affect a variety of animals, although its toxicity and symptoms of exposure vary by the type of animal. In mammals, its effects are rapidly reversible, but in insects it is highly toxic (SERA 2008). Effects to animals are possible through the following scenarios: contact from direct spray or treated vegetation, inhalation of particulate, and ingestion of vegetation treated with the chemical.

Effects on mammals: Carbaryl can have neurotoxic effects to mammals due to its function as an acetylcholinesterase inhibitor. Symptoms of neurotoxicity in mammalian animals are similar to those in humans can include the following: excessinve salivation and tearing, dizziness, twitching and muscle tremors, vomiting and diarrhea (NPIC 2009). At high levels of exposure, paralysis and death are possible (NPIC 2009). Generally, the effects caused by acetylcholinesterase inhibition are rapidly reversible (SERA 2008). After exposure, the persistence of carbaryl inside the body is low, as it is readily broken down and excreted (NPIC 2009; SERA 2008). There is no correlation between body size and the toxicity of carbaryl in mammals (SERA 2008). Carbaryl has low toxicity through exposure via the skin or inhalation; comparatively, ingestion of carbaryl is somewhat more toxic than inhalation or skin exposure (NPIC 2009; SERA 2008). Despite the potential for these effects, field studies in published literature do not indicate a clear association between carbaryl applications and detrimental effects on mammals (SERA 2008).

The formulation of carbaryl to be applied under the Action Alternative, Sevin XLR, is labeled with a signal word of “caution”, indicating low toxicity for oral (ingestion), dermal (skin), and inhalation toxicity. Additionally, the requirements that will be implemented during application, particularly the closure and posting of the area and actions to minimize drift, would minimize the possibility of exposure within the project area. Because of these factors, there would be minimal direct or indirect effects to mammals.

Effects on birds: According to the EPA, carbaryl is practically non-toxic to birds; however, some evidence suggests that small passerine birds may be more sensitive to carbaryl but further testing is necessary to confirm this (SERA 2008). Based on EPA’s assertion, there are no expected direct or indirect effects to birds.

Effects on honey bees: Carbaryl is highly toxic to honey bees that are directly exposed to the chemical or residues (NPIC 2009; Extoxnet 1996; EPA 2004) where blooming plants are present. The PPSO does not contain many flowering plants where honey bees would be expected to be present; however, neighboring residences may have flowering plants where honey bees could be present. Because of this, honey bees would be expected to move through the PPSO, but concentrated honey bee activity in the PPSO would not be expected. In addition, carbaryl is sprayed directly to the bark of trees, which is a location that bees would not typically be foraging. Studies indicate that greater than 80 percent of the solution remains on the target area of the tree (Haverty et al. 1983; Fettig et al. 2008) and that 97 percent of drift falls within 50 feet of the tree (Fettig et al. 2008). This indicates that most of the chemical will reach its intended target, minimizing the potential for adverse effects away from the trunk of each tree. Because of these factors, minimal effects on honey bees are

expected. Mortality would likely occur to those bees in the PPSO during spraying, but effects to bees in the surrounding neighborhood will be minimal due to, the high percentage of solution remaining on the target area of each tree, the measures taken to reduce potential spray drift, and the short duration of spraying activities.

Effects on aquatic organisms: No effects on aquatic organisms would be expected under the Action Alternative. There is no surface water in the project area, and the nearest surface water is over 100 feet away from the project area. A drift study by Fettig et al. (2008) indicated that over 80 percent of the solution applied to the tree remained on the tree, with the remainder falling as drift. Of the amount falling as drift, 97 percent falls within 50 feet of the tree. Given that the nearest surface water is more than twice the distance from the tree that most drift accumulates, as well as the upwind position of the surface water relative to the project area, no effects on aquatic organisms are expected.

Cumulative Effects: No cumulative effects to wildlife are expected as a result of this project. DNRC is not proposing and is not aware of additional carbaryl spraying projects within the cumulative effects analysis area. Measures to mitigate drift would decrease the potential to affect the horses pastured adjacent to the orchard through either direct contact from spray or ingestion of contaminated vegetation. The owners of commercial apiaries within 1.5 miles of the PPSO will be notified at least 48 hours in advance of spraying operations as suggested by the Montana Department of Agriculture (2007) in order to minimize potential effects on honey bees.

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9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:
Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

No unique, endangered, fragile, or limited environmental resources currently exist in the PPSO. As such, no direct, indirect, or cumulative effects on unique, endangered, fragile or limited environmental resources would be expected under both the No-Action and Action Alternative.

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10. HISTORICAL AND ARCHAEOLOGICAL SITES:
Identify and determine effects to historical, archaeological or paleontological resources.

No historical and archaeological sites exist within the PPSO. As such, no direct, indirect, or cumulative effects on historical and archaeological sites would be expected both the Action and No-Action Alternative.

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11. AESTHETICS:
Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify cumulative effects to aesthetics.

Existing Condition

The PPSO provides a forested appearance and “open space” on 13 acres within a broader area characterized mainly by residential use. Adjacent property owners have expressed their enjoyment and appreciation of the forested appearance that the PPSO creates in the neighborhood.

Environmental Consequences

No-Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the No-Action Alternative, aesthetic qualities provided by the forested appearance of the PPSO would be reduced with the expected loss of additional trees to attack by mountain pine beetle.

Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the Action Alternative, the aesthetic qualities provided by the PPSO would be maintained similar to their current state. During spraying operations, increased levels of noise in the PPSO and immediately adjacent neighborhood could be expected; however, no significant impacts or

inconvenience due to noise levels are expected because of specified operating hours for spraying between 7:00 a.m. and 9:00 p.m. Impacts from increased noise levels associated with spraying operations would take place intermittently during the month of May and the first half of June, 2009.

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12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:
Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify cumulative effects to environmental resources.

Environmental Consequences

No-Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the No-Action Alternative, no additional demands on environmental resources or land, water, air, or energy are expected.

Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the Action Alternative, water for mixing the chemical solution to be applied to the trees would be required. DNRC estimates that the amount of water needed would range between 1000 and 1500 gallons. This amount of water would not be expected to pose a significant effect on environmental resources.

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13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:
List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

The 2009 EA Checklist prepared by DNRC for the Missoula Ponderosa Pine Seed Orchard Insecticide Spraying project describes an insecticide (carbaryl) application project implemented in June, 2009, and its anticipated effects on the environment. There are no other past, present, or future environmental documents that currently exist for the Missoula Ponderosa Pine Seed Orchard.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

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14. HUMAN HEALTH AND SAFETY:
Identify any health and safety risks posed by the project.

The major effect of carbaryl on humans is neurotoxicity due to acetylcholinesterase inhibition. Acetylcholinesterase inhibition interrupts the function of the nervous system by causing acetylcholine to accumulate at the synapse (the space between two cells), causing the nervous system to be continually stimulated (SERA 2008). Signs of acetylcholinesterase inhibition include excessive salivation and tearing, sweating, blurred vision, dizziness, stomach cramps, nausea, diarrhea, decreased heart rate and blood pressure, rapid breathing, muscle twitching, and, at high doses, convulsions and death due to respiratory arrest (EPA 2004; Extoxnet 1996, NPIC 2009; SERA 2008). There has been only one death due to carbaryl poisoning, and that was the result of intentional suicidal ingestion of 500 mL of a high concentration (80% solution) of carbaryl (SERA 2008).

Carbaryl is rapidly absorbed through ingestion and more slowly absorbed through skin exposure (SERA 2008). It is rapidly broken down and excreted from the body (SERA 2008). Carbaryl's neurotoxic effects are generally rapidly reversible (SERA 2008). Atropine is effective in counteracting the neurotoxic effects of carbaryl (SERA 2008).

The EPA has classified carbaryl as a likely human carcinogen due to increased tumor production in mice exposed to carbaryl (SERA 2008; NPIC 2009). However, the International Agency for Research on Cancer has not classified carbaryl in terms of carcinogenicity to humans due to inadequate studies on animals (NPIC 2009).

Environmental Consequences

No-Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the No-Action alternative, there would be no anticipated effects to human health.

Action Alternative:
Direct and Indirect Effects: Under the Action Alternative, there is moderate risk of potential effects to human health due the application of carbaryl. Specifications for spraying activities are addressed at reducing the risk of potential effects on humans, included posting of signs indicating the closure of the area to the general public due to pesticide application, and requirements for spraying in conditions favorable for minimizing wind drift of the solution and persistence and leaching of the chemical through the soil and into groundwater.

Cumulative Effects: There are no cumulative effects on human health associated with the Action Alternative. DNRC is not planning additional applications of carbaryl at this time and is not aware of carbaryl applications planned by other property owners in the neighborhood surrounding the PPSO. Additionally, since carbaryl's effects are reversible and because it breaks down rapidly in the body and in the environment, no long-term effects are expected from implementing the Action Alternative.

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15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:
Identify how the project would add to or alter these activities.

No-Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the No-Action Alternative, no effects on industrial, commercial, and agricultural activities not associated with DNRC are expected. The loss of additional trees would result in reduced cone crops from the PPSO.

Action Alternative:
Direct, Indirect, and Cumulative Effects: Under the Action Alternative, there is potential for commercial apiaries to be negatively affected if honey bees are using the PPSO during spraying operations. As described in #8 above, carbaryl is highly toxic to honey bees, and DNRC will take measures to reduce potential impacts on honey bees and commercial apiaries, including monitoring bee use in the PPSO, contacting the owners of commercial apiaries within 1.5 miles of the PPSO at least 48 hours prior to spraying operations, and allowing spraying to occur only on days with minimal risk of wind drift.

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16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:
Estimate the number of jobs the project would create, move or eliminate. Identify cumulative effects to the employment market.

This project would provide work for one contractor who is selected to implement the project.

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17. LOCAL AND STATE TAX BASE AND TAX REVENUES:
Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on local and state tax base and tax revenues.

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18. DEMAND FOR GOVERNMENT SERVICES:
Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify cumulative effects of this and other projects on government services

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on the demand for government services.

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19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:
List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on locally adopted environmental plans and goals.

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20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:
Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

No-Action Alternative:
Direct and Indirect Effects: Under the No-Action Alternative, the amount and quality of recreation in the PPSO would be likely to decrease due to the loss of trees. Recreationists enjoy the forested character of the PPSO, and a reduction in that attribute would likely devalue the recreational experience provided by the PPSO.

Cumulative Effects: Under the No-Action Alternative, decreased recreation in the PPSO would likely increase recreational use of other areas, such as city parks and Forest Service recreation areas in and around Missoula. An increase in recreational pressure on other areas could lead to a less-satisfying recreational experience for some users of those areas.

Action Alternative:
Direct and Indirect Effects: Under the Action Alternative, recreational use of the PPSO would continue at or near current levels. Recreational users would continue to be provided with a recreational experience similar to the current one due to the maintenance of the forested character of the PPSO. There would be a temporary and short-term impact during the months of May and first half of June, 2009 on recreational use due to the closure of the PPSO during spraying operations.

Cumulative Effects: Under the Action Alternative, opportunities for recreational use of the PPSO and other existing recreational areas in and around Missoula would not be impacted.

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21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:
Estimate population changes and additional housing the project would require. Identify cumulative effects to population and housing.

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on the density and distribution of population and housing.

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22. SOCIAL STRUCTURES AND MORES:
Identify potential disruption of native or traditional lifestyles or communities.

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on social structures and mores.

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23. CULTURAL UNIQUENESS AND DIVERSITY:
How would the action affect any unique quality of the area?

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on cultural uniqueness and diversity.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:
Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify cumulative economic and social effects likely to occur as a result of the proposed action.

Under both the No-Action and Action Alternatives, there are no expected direct, indirect, or cumulative effects on other appropriate social and economic circumstances.

EA Checklist Prepared By:	**Name:** Tim Spoelma	**Date:** March 22, 2010
	Title: Silviculturist/Forest Ecologist	

V. FINDING

25. ALTERNATIVE SELECTED:

The Action Alternative best meets the objectives of preventing mortality of trees due to bark beetle attack in the PPSO. It provides the most assurance that the PPSO will continue to provide genetically superior ponderosa pine seed and recreational opportunities for the public.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

Based on an evaluation of the potential impacts of the Action Alternative to the physical and human environment, under MEPA, the Proposed Action does not pose significant effects to the human environment; therefore, an environmental impact statement is not a necessary level of review. The following factors lead to a finding of no significant impacts:

- The project area will be closed to the public during application, reducing the potential for impacts to humans
- The formulation of the chemical used has low toxicity to humans, and its effects to humans and mammalian wildlife are rapidly reversible
- Spraying will occur only on days with minimal risk of spray drift, reducing the potential for impacts away from the target area
- Over 80 percent of the chemical is expected to remain on the target area of each tree, and over 90 percent of spray drift is expected to fall within 50 feet of the target area
- Spraying will only occur when soil conditions are not conducive to transport of the chemical to groundwater resources
- The project involves a one-time application over a short time span, reducing the potential for ongoing or long-term impacts to humans and the environment

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

	EIS		More Detailed EA	X	No Further Analysis

EA Checklist Approved By:	**Name:** Shawn Thomas	
	Title: Forest Management Bureau Chief	
Signature: /S/ SHAWN THOMAS		**Date**: March 30, 2010

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Appendix 1 – Maps and Figures

Figure 1*—Location of the Missoula Ponderosa Pine Seed Orchard.*

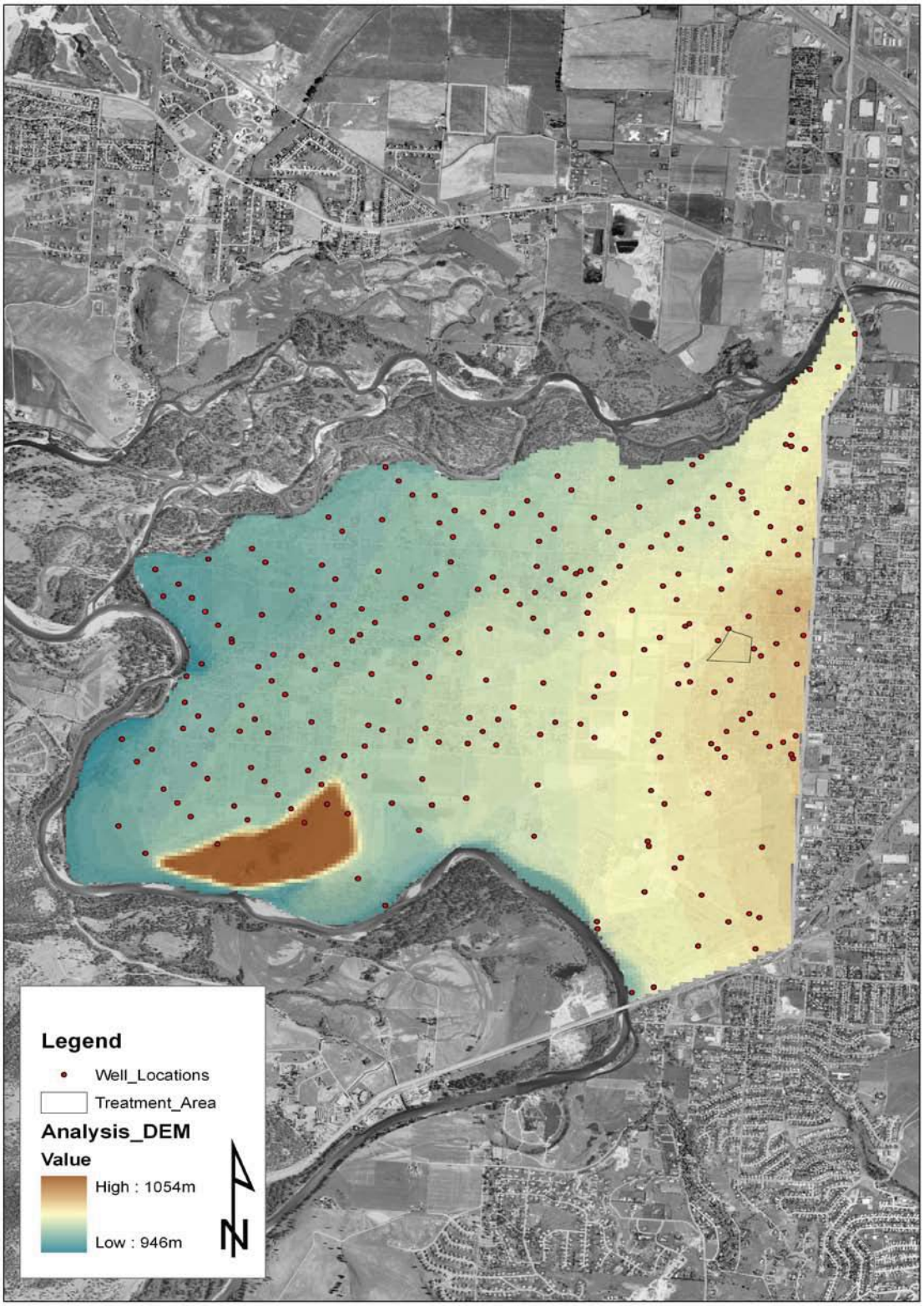

Figure 2*—Surface elevations of the Missoula valley and general flow direction of the Missoula aquifer within the vicinity of the treatment area.*