

BOCC
6-9-13

FOREST STEWARDSHIP PLAN

Submitted by
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To

Kittitas County

For

*Transfer from Designated Forest Land to Open Space Timber Tax Status
RCW 84.34*

Applicant Signatures _____



Tax parcel, map number, Acres, and Legal Description
17672, 20-15-22000-0014 – 19 acres
Lot 14, Bk 28 Pg 177-178 of Surveys
AFN 200302030013

in Sec. 22, T20N, R15E

PLAN DATE: May, 2013

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TABLE OF CONTENTS

INTRODUCTION.....	1
GOALS and OBJECTIVES	1
LOCATION and LAND USE HISTORY	2
LAND FORM, WATER, ROADS and SOILS.....	2
VEGETATION RESOURCES and MANAGEMENT	5
Stewardship Principles	5
Tree stocking Basics –.....	6
Commercial Timber Harvest considerations –.....	14
FOREST HEALTH	16
Dwarf Mistletoe	16
Western Spruce Budworm (will affect Douglas fir).....	18
Understanding Bark Beetles	19
<i>Understanding Root Diseases</i>	20
FIRE PROTECTION and FIRE-WISE	22
NOXIOUS WEEDS.....	23
WILDLIFE HABITAT	24
SUPPLEMENTAL INFORMATION ATTACHMENTS.....	25

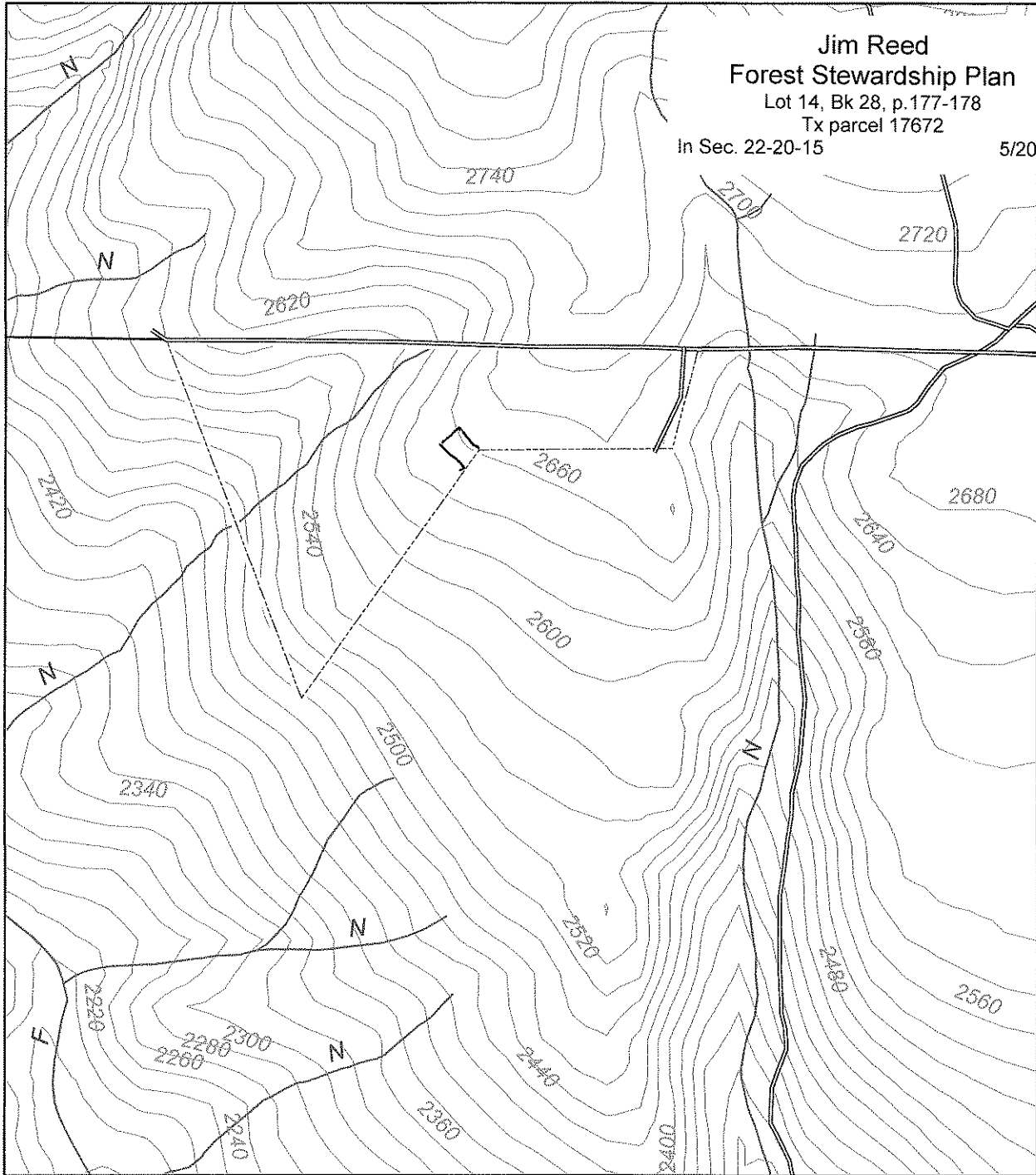
Topographical Map






T20N R15E Sec 22

Jim Reed
Forest Stewardship Plan
Lot 14, Bk 28, p.177-178
Tx parcel 17672

In Sec. 22-20-15

5/2013

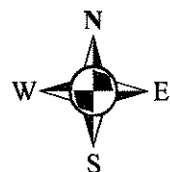


	Ownership
	Section Lines
	Streams
	20 ft Contours
	Roads

0 250 500 1,000 Feet



Scale: 1:6,000



Silvicultural Solutions

INTRODUCTION

Acquisition date: Nov. 2012

The land is in compliance with Title 76 RCW.

The land is not presently used for grazing.

This plan is being submitted together with an application for transfer from designated forest land tax status to Open Space-timber under RCW 84.34 and Kittitas County Commissioner's Resolution No. 2002-99 [94-25].

The plan includes by this reference the County Wildfire Protection Plan adopted under BOCC Resolution 2009-18 dated 2/18/09 and also by this reference includes County Code Title 12, Roads and Bridges.

This plan also complies with WA Dept of Revenue *Guidelines for Timber Management Plans, June 2010* and *WA State Integrated Forest Management Plan Guidelines, date Feb. 14, 2012*.

There are no improvements. A forest improvement site has been segregated from the parent parcel

GOALS and OBJECTIVES

The owners are committing to a long term forest management plan. The goals are to:

- Growing and harvesting of timber for commercial purposes.
- Create and maintain a healthy, firesafe forest.
- Maintain and improve wildlife habitat.
- Protect soil and water resources.

And to comply with the Open Space Timber current use tax statute, Chapter RCW 84.34 and Kittitas County Commissioner's Resolution 2002-99.

The new owner is in the process of gaining a good working knowledge of applicable forestry and related stewardship practices. They will continue to build on that knowledge through information available through WSU Extension Forestry, Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, USDA Natural Resource Conservation Service, and forest land resource consultants. They are members of the Kittitas Chapter, WA Farm Forestry Association.

Plan implementation will assure continued stewardship of all resources inherent with a forested landscape, providing significant natural resource and environmental benefits to the community.

The plan will be reviewed in 5 years and updated as necessary. The new owner is aware that RCW 84.34 provides for current use tax status for forest land that is *devoted primarily to growth and harvest of timber for commercial purposes*. The applicants confirm by their plan signature that it is their intention to comply with the statutory obligations of RCW 84.34. The

applicants are aware there is a 7 year potential tax liability including interest and possible penalty if the land becomes ineligible for current use tax status under RCW 84.34.

LOCATION and LAND USE HISTORY

The property is located on Cle Elum Ridge, approximately 1.5 miles north of Cle Elum via a private road system. Adjacent properties are all private non-industrial ownerships. The predominant land use in this area is timber production, coal mining and wildlife habitat, but much of the private land in the vicinity has been sold in smaller parcels as rural residential home sites.

Surface coal mining was a significant activity through the early 1900's. There is evidence of old surface mine activity on the west part of the property.

The property is delineated on the maps and aerial photo accompanying this plan.

LAND FORM, WATER, ROADS and SOILS

Property elevations range from 2480 feet near the south corner to 2700 near the northeast corner. Slopes are moderate to gentle, south and southwest facing. A significant feature is a *type N* (non-fish) NE to SW draw through the east portion of the parcel. Average annual precipitation is 20 to 30 inches

Water

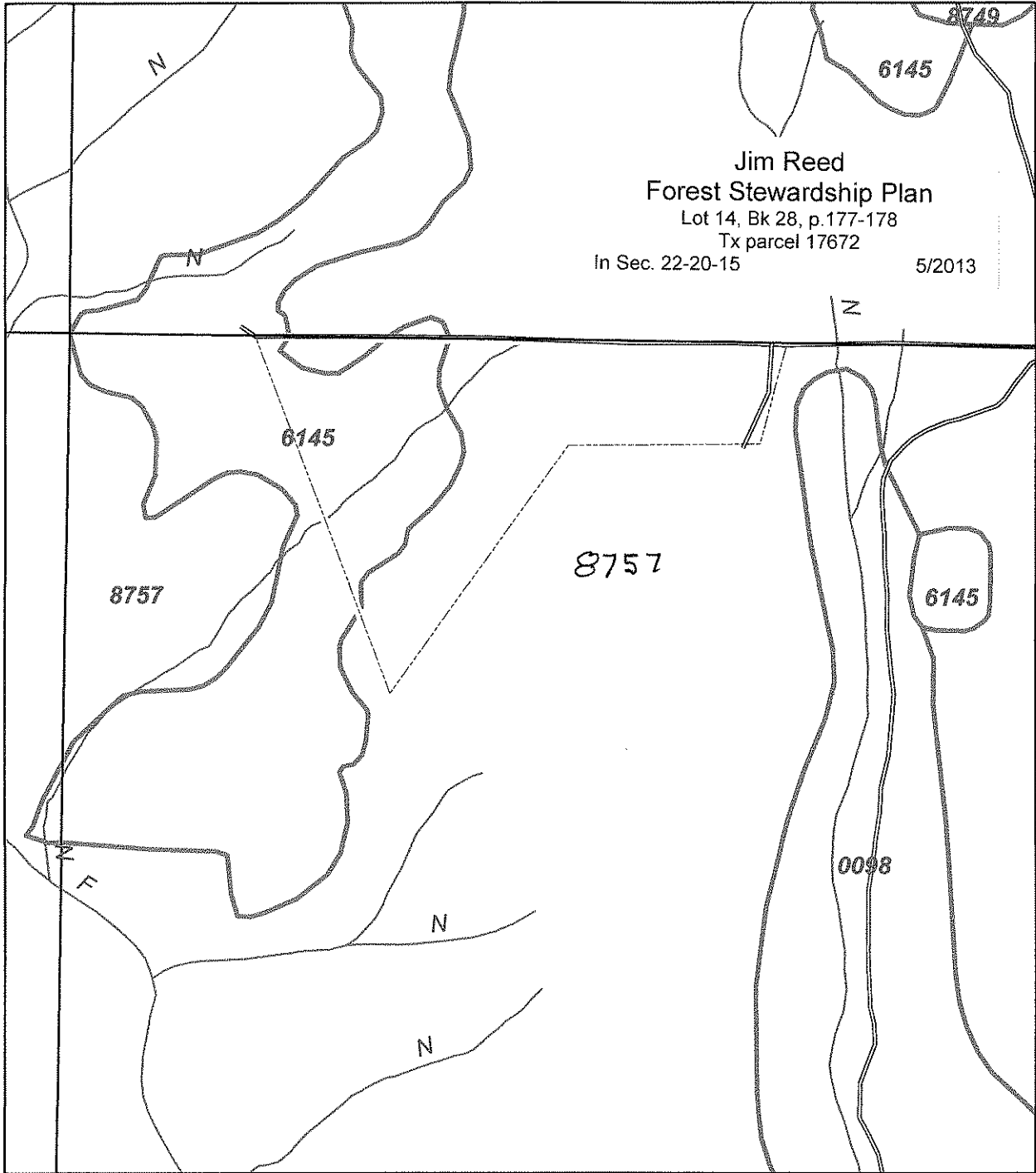
Type N streams can be either *Np* (non-fish perennial) or *Ns* (non-fish seasonal). It is up to the landowner to make this determination, but it is subject to approval by the DNR forest practices forester. If there is a year round source of surface water at any point in the stream channel then it is *Np* and without it are *Ns*. *Np* streams require a 50 foot each side RMZ (riparian management zone) where activities are limited. *Ns* streams do not have a RMZ but there is a 30' ELZ (equipment limitation zone) with regulatory implications.

Roads

Existing access is off of 6th street in Cle Elum, northerly on the private Summit View paved road to the property. Roads will meet current State forest practices requirements for timber harvest. No new roads will be required for timber harvest.

Soil Type Map

T20N R15E Sec 22



Jim Reed
Forest Stewardship Plan
Lot 14, Bk 28, p.177-178
Tx parcel 17672
In Sec. 22-20-15 5/2013

- Section Lines
- Roads
- Ownership
- Soil Type Lines
- Streams

0 250 500 1,000 Feet

Scale: 1:6,000



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Forest Practices Applications

To harvest trees or build forest roads for timber harvest in the State of Washington a Forest Practices Application (FPA) is required. There are few exceptions. The standard FPA is good for 3 years and is renewable for successive 3 year periods. There are very few marketable trees and it will take many years before you have trees ready for commercial harvest.

At some time in the future, you may wish to apply for 15 year FPA now available for small forest landowners; also known as long term application (LTA). Although the 2 part application process is more paperwork, once in place it will give you the flexibility to time harvest entries with the best log markets. You may only remove up to 5 MBF per year for personal use without an FPA. All other removals require an FPA.

Soils

Soils are the basic resource. All plant growth is dependent on soil characteristics.

Forest Soils are made up of four main ingredients: *mineral particles, organic matter, water and air*. Soil *texture* refers to the make up of the mineral particle size: sand, silt, and clay. Soils that have a larger proportion of clay and silt are fine textured. A higher proportion of sand results in a coarse texture soils. Finer soils are usually more productive than coarse soils, but don't drain as quickly, are very susceptible to *compaction*, and are more easily eroded than coarse soils. A soil made of roughly equal amounts of sand; silt and clay are referred to as loams. Loams tend to be more fertile, and have good water holding capacity. Organic matter – decaying vegetation and woody material - is an important component of a forest soil. Soils with high organic matter have better *structure* and leads to greater fertility and water holding capacity. Since plant roots (including trees) need air to breathe and water to grow, soil texture and structure are very important. More than half of the *feeder roots* of trees and other plants are in the top 6" to 8" of the soil. Soil compaction and other site disturbances reduce soil pore space for air and water and results in lower site productivity.

Forest soils support a wide range of life forms: plants and animals, including large conifer trees, large and small mammals, avian species and microorganisms. The type and quantity of such life depends on the soil parent material, soil, climate, and annual precipitation. All these elements are interrelated, and together make up the forest ecosystem.

Classifying and mapping soils provides the landowner with an important tool for judging productivity and choosing the proper cultural practices that will not damage the soil resource. Also, soil productivity classification is the basis for the *forestland grades* used by the county assessor to determine assessed value for lands designated under the forest tax and open space laws.

The soil survey map classifies two forest soil series as illustrated on the attached soils map.

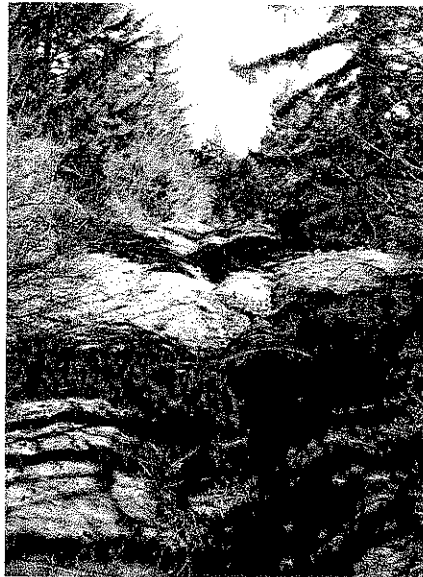
Varelum Variant Sandy Loam (8757)

This is the dominant soil on the parcel. It is a moderately deep (20 to 40"); well-drained soil formed from Roslyn Sandstone with a mixture of volcanic ash and loess in the top layers. There is weathered sandstone bedrock at about 30". Site index is rated 83 for ponderosa pine (PP), and 90 for Douglas fir (DF) which means these species will potentially reach a heights of 83 feet and 90 feet respectively in 100 years. The potential average annual growth is about 200 BF per acre assuming fully stocked, properly spaced conditions over the long term.

The soil is rated *medium* for compaction potential meaning that heavy equipment should not be operated during wet conditions to avoid soil compaction, which will in turn impede seedling establishment and health of trees. Erosion potential is rated *medium*, indicating only moderate potential for surface erosion but it is still important to maintain a vegetative ground cover to protect the soil and build structure.

Old surface mining, (6145)

This soil classification on the west end of the property was originally a Varelum soil series. Surface mining in the early 1900's altered the soil and this activity is reflected in the current soil classification system. The area has naturally reclaimed itself and now supports a stand of young trees.



This old road grade in **Stand 2** is eroding and should be cross-drained and seeded to grass.

Throughout the property, existing ground cover is sufficient to protect the soil from erosion. Any fresh soil disturbances should be promptly grass seeded to prevent the soil surface from puddling and erosion, and help prevent the invasion of noxious weeds. Contact Phil Hess for the best place to acquire grass seed mixes.

The recommended seed mix is:

30% Sheep Fescue	30% Creeping Red Fescue
30% Canada Bluegrass	10% Chewings Fescue

VEGETATION RESOURCES and MANAGEMENT

The pre-settlement forest vegetation has been significantly altered by surface mining (early 1900's) and a stand replacement wildfire in the mid-1960's. These events have resulted in a relatively young, naturally regenerated forest.

For planning and management purposes, there are four vegetation types or "stands" that have resulted from past disturbances and natural conditions. Stand boundaries are shown on the aerial photo. Stand descriptions and recommendations follow.

The **management goals** for the property are driven by the following objectives:

- ◆ Create and maintain stands of healthy trees for commercial timber growing and harvesting.
- ◆ Forest fuels management
- ◆ Maintain and enhance wildlife habitat values
- ◆ Control Noxious Weeds

All of these objectives are inter-connected and include the essential element of managing vegetation to minimize risk of stand replacement and property damaging wildfire. Implementation of this plan will achieve a balance of forest health, forest fuel levels, silvicultural, wildlife habitat values and the other objectives. On-the-ground prescriptions can be customized for site specific vegetation conditions and to fit your use of the property.

Stewardship Principles

It is important to recognize that forest plant communities are in a continuing state of change. This change, referred to as succession, is imperceptible to occasional observation because it occurs very slowly over time. Forests that have not been "disturbed" in many years may appear to be static or permanent, but this is never the case. Disturbance is the most common agent for change – natural as in a wild fire, or human influenced as in a timber harvest. Planned for "change" can enhance habitat, reduce risk of stand replacement wild fire and lead to vegetation management goals. The idea is to work with nature to achieve a desired future condition or values.

Following are descriptions of current stand conditions and management recommendations. The plan should be periodically reviewed and updated to reflect changing conditions.

Current Conditions and Management Recommendations

For current planning and management purposes there are 3 vegetation types or "timber stands" that have resulted from past management activities and natural conditions.

Management recommendations are prescriptions to improve forest health, reduce the risk of stand replacement wildfire and upgrade the forest over time.

Abbreviations used in the Stand descriptions:

DF = Douglas fir
 PP = ponderosa pine
 GF = grand fir
 TPA = trees per acre
 BA/ac = basal area per acre
 SF/ac = Square feet of basal area per acre
 LCR = Live Crown Ratio (% of total tree height with live green branches)
 DBH = diameter breast height
 MBF = 1000 board feet (M = 1000 in forestry/logging)
 Reprod or regen = young trees that have naturally regenerated or planted
 WLT's = wildlife trees
 CWD = coarse woody debris
 MT = dwarf mistletoe
 RPI = rings per inch
 SBW = western spruce budworm (a DF defoliator)

Tree stocking Basics –

It is easiest to think in term of spacing between trees and/or number of trees per acre (TPA). For example:

<u>TPA</u>	<u>SPACING</u>
10	66 X 66
40	33 X 33
150	17 X 17

However, the size of the trees along with the number of trees is the correct way to determine "stocking" on any given site.

This is why we use basal area (BA) as the metric for tree stocking. Basal area is the amount of area a tree (or stand of trees) occupies in the forest.

Basal area is the square feet occupied by tree stems as measured at DBH (4.5' above the ground). Basal area is expressed in square feet of basal area per acre – BA/Ac. Approx BA/tree = $DBH^2 \times .00545$

Two separate acres can have the same basal area but a different number of trees. The tree diameter (or the average diameter of a stand) is an important variable.






For example: an 8" DBH tree is .349 SF and if the average spacing is 10'x10' then:

Jim Reed
Forest Stewardship Plan
Lot 14, Bk 28, p.177-178
Tx parcel 17672
In Sec. 22-20-15 5/2013
= Stand Boundary

201515

204522

Legend

-  Roads
-  Section
-  Parcel
-  Firewise
-  Project Area



Average TPA is 435

$$\frac{(43,560)}{10 \times 10} = 435 \text{ TPA}$$

And the average BA/acre is $435 \times .349 = 152 \text{ SF BA/acre}$. The best way to determine BA/acre is with 1/10 acre or 1/20 acre circular plots. Measure DBH of all the trees in the plot and multiply by 10 (or 20) to arrive at TPA and BA/acre.

Stand 1, approximately 1 acre, located at the southern tip of the parcel. This vegetation type is dominated by a tall and medium shrub that has not naturally regenerated to conifer. There are young widely spaced conifer trees struggling to compete with the shrub layer.



Stand 1 as viewed from the trail on the north edge.

The very thick tall shrub layer is cherry, hazelnut and ocean spray. There are scattered PP, DF & GF.

Stand 1 Management Recommendations. –

More conifer establishment would be possible with masticator site preparation and plant to seedlings. But this would be expensive. An alternative I recommend would be to cut the brush around the existing PP and DF to release them from the moisture competing shrubs.

Stand 2, approximately 9 acres. This is the strip mine area in the west portion and includes the type N draw. There is a wide range of stand structure with an overstory of cottonwood and willow in the draw bottom to PP and DF that is filling in the strip mine area.



Overview of Stand 2 from the road on the north property line. Ponderosa pine and Douglas fir have naturally regenerated from the coal strip mining era. Cottonwood is the broadleaf tree.



This is inside **Stand 2**, west of the type N draw. 95% PP and 5% DF with a medium to tall shrub layer. There are numerous naturally regenerated DF in these areas.

Stand 2 at this location -

Average Diameter Size: 7"

Average Basal Area stocking: 60 SF/acre

Ave. number Trees per acre: 180

Canopy closure: 20%-30%

Sample Tree #1: PP 13.1" DBH; 50% LCR; 58' tall growing at 10 RPI which means 1" in DBH every 5 years.

Sample Tree #2: PP 7.4" DBH; 50% LCR; 47' tall growing at 14 RPI or 1" DBH every 7 years.



Same location as above, inside Stand 2. This illustrates diversity of stand structure. A patch of overstocked naturally regenerated DF, ranging size from 2" to 6"



Stand 2 brushy type N draw.

Here it is predominantly cottonwood, willow, hazelnut, and bitter cherry but there is also big leaf maple, vine maple

Stand 2 Management Suggestions. –

It would be beneficial to pre-commercial thin the overstocked patches and ladder fuel prune the larger trees. Where there are young small trees coming in you could cut the shrubs around them to release the trees from moisture competition.

The existing stand structure and understory vegetation provides good habitat for a wide range of mammals (large and small) as well as avian species.

Stand 3, approximately 9 acres. This stand is situated east of the draw, north of Stand 1.



Inside Stand 3, south of home site clearing.
At this location, Stand 3 is similar to Stand 2 west of the draw.

Stand 3 at this location:

Species Mix: 95% PP, 5% DF with an occasional GF.

Average Diameter Size: 8"

Average Basal Area stocking: 88 SF/acre

Ave. number Trees per acre: 240

Canopy closure: 30%-40%

Sample tree #1: 14.8" PP; 54' in height; 75% LCR; growing at 8 RPI which means 1" in DBH every 4 years.

The medium to tall shrub layer species are hazelnut, ocean spray, bitter cherry, and ceanothus. Low shrubs are spirea, snow berry, rose, Oregon grape. Kinnikinnick is the woody ground cover. Herbaceous species

are pinegrass, elksedge, fescues, lupine, balsamroot, yarrow, strawberry, arnica, and bracken fern.



Stand 3. Looking south from the home site.

Stand 3 Management recommendations south of the home site

I recommend the firewise treatment that is on-going north of the home site be extended down slope to Stand 1.

Stand 3 north of the house has been recently Firewised with thinning, ladder fuel pruning and slash masticated.



This is northern part of Stand 3 that has been recently thinned, ladder fuel pruned and the slash and shrub layer have been masticated.

Stand 3 at this location:

Species Mix: 100% PP

Average Diameter Size: 7"

Average Basal Area stocking: 74 SF/acre

Ave. number Trees per acre: 280

Canopy closure: 40%-50% with some more open

Sample tree #1: 10.4" PP; 43' in height; 50% LCR (pruned); growing at 6 RPI which means 1" in DBH every 3 years.



At another location in the northern part of Stand 3 that has been recently thinned, ladder fuel pruned and the slash and shrub layer have been masticated.

Stand 3 at this location:

Species Mix: 100% PP

Average Diameter Size: 7.8"

Average Basal Area stocking: 94 SF/acre

Ave. number Trees per acre: 280

Canopy closure: 40%-50% with some more open

Sample tree #1: 11.0" PP; 48' in height; 50% LCR (pruned); growing at 7 RPI which means 1" in DBH every 3.5 years.

The herbaceous layer will recover soon. The first species to re-appear will be lupine, snowberry, pinegrass, elksedge, kinnikinnick and a variety spring wildflowers. The large shrub species will begin to resprout in 2014.

Management Suggestions for this portion of Stand 3 –

I recommend keeping the large shrub species from becoming re-established by herbicide spot spraying shortly after they begin to resprout Glyphosphate (Round-up; Eraser) applied in late summer early fall.

If you don't want to use herbicides, hand mowing is an alternative.



A handle bar, shoulder harness brush mower with the saw blade attached is most effective. A "Forester" brand, 9", 36 tooth carbide blade is best.

Maintain tree spacing at a basal area of under 100 SF/acre with periodic thinning as trees become larger.

Note: it will be several years before there are commercial, marketable trees of sufficient volume to warrant logging. The following is included for that eventuality.

Commercial Timber Harvest considerations –

Commercial thinning in about 15-20 years will be advisable in order to adjust stocking levels to reduce inter-tree competition for moisture. This management practice will improve the resiliency of trees to withstand the periodic bark beetle and defoliator attacks common to our area and reduce risk of property damaging wildfire.

Following is a guide for thinning:

Characteristics of "cut trees":

- Poor crowns ratio (<30%)
- Poor height growth and crown form – off color.
- Mistletoe infected trees.

Characteristics of "leave trees"

- Good live crown ratio (>30%)
- Good height growth and well formed trees
- Mistletoe is absent or light.

It is recommended that commercial thinning be planned for in the next 15 to 20 years. Following are steps to prepare for this entry:

- 1) Apply for a FPA (forest practices application) well in advance of the planned for timber harvest. A LTA (long term application – 15 years) is strongly recommended. This will allow you to react to favorable log markets and any natural disturbance events that may result in imminent mortality such as bark beetles.
- 2) Clearly identify harvest unit boundaries (parcel boundaries) on the ground prior to submitting LTA.
- 3) Time harvest entry to fit favorable log markets.
- 4) Select trees to harvest (or leave) with paint marking based on the above criteria. You can use a consulting forester, DNR stewardship forester, or NRCS forester to help with this.
- 5) Prepare or acquire a sample logging contract.
- 6) Select a logger that has a good reputation and is certified with WA Contract Loggers Association.
- 7) Log marketing should be supervised by your consulting forester.
- 8) Post logging clean-up should balance forest floor fuel concerns with nutrient re-cycling. Green slash contains roughly half of a tree's above ground nutrients and can amount to the equivalent of up to 120 pounds of nitrogen per acre in addition to micronutrients and other elements such as sulfur and boron essential for tree health and growth. Do not 100% dispose of all the logging slash. If forest fuels or visual is a concern it is better to masticate the slash on site.



An excavator mounted masticator is the recommended alternative to piling and burning of logging slash and FireWise fuels reduction.

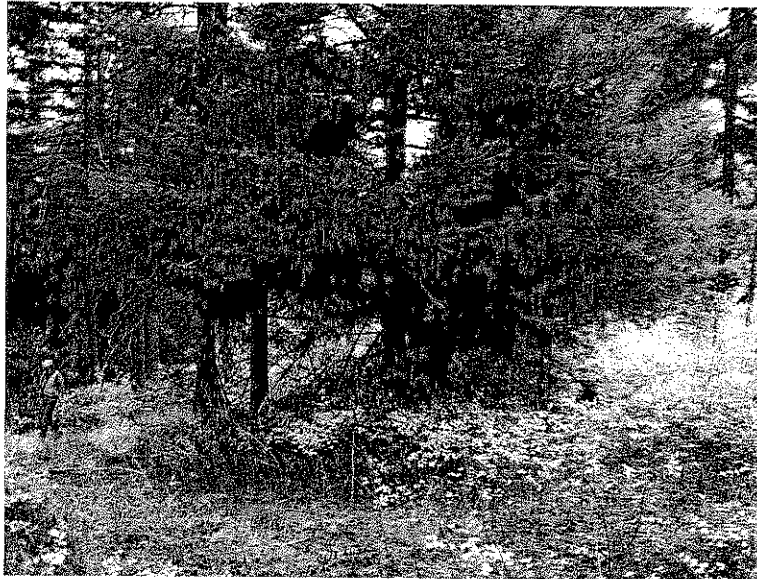
FOREST HEALTH

As with any forest property there are risks. Common or likely in this area are bark beetles, defoliators, root diseases, and mistletoes. There is not evidence of these on your property but they are common in the vicinity and something to watch for. Fire is a risk on any forested landscape.

It is important to recognize that insect and diseases are a natural part of a healthy forest ecosystem. In a healthy forest there is a balance between insects and pathogens and the forest trees.

It is also important to recognize that native conifers of the Pacific Northwest have the highest levels of genetic variation found in plants. Our trees exhibit large genetic differences in seedling survival, form, growth rate, and disease susceptibility. The large tree may not be the oldest. It may be a fast growing younger tree and definitely one to save. Size is more a function of rate of growth than age. So, when selecting to cut, as in thinning look at genetic characteristics such as height and fullness of crown and leave the best. The objective is to improve stand conditions for future growth and health.

Dwarf Mistletoe



Example of a Doug fir mistletoe; Hawksworth rating of 4.

Basic Mistletoe Facts:

- 1) It is a parasitic plant depending on a tree host for water and nutrients.

- 2) It is specific to each species of tree. It only survives on living trees. When the tree or branch dies, so does the mistletoe.
- 3) The spread is relatively slow in single layer stands. The spread is usually downward.
- 4) Mistletoe survives by stealing water and nutrients from the tree. By itself, it is rarely a tree killer but it does weaken the tree and it will be more susceptible to bark beetle attacks in overstocked stands.
- 5) Mistletoe results in a branching deformity, but these "brooms" provide nesting and hiding cover for birds and small mammals. The "fruiting body" is a food source.

Complete eradication is impossible. The best approach is to control by cutting heavily infected trees during thinning, or pruning the mistletoe branches in the overstory and any young trees that become infected.

The Hawksworth Dwarf Mistletoe Rating System is used to assess likelihood of mortality due to mistletoe. Trees that are likely to die have a Hawksworth rating of 5 or 6. Trees with a Hawksworth rating >4 are more susceptible to bark beetle attack.

Ideally trees, with a rating >4 should be removed, the infected limbs cut off if practical or girdled if not practical to remove infected limbs.

In an individual tree, mistletoe infection is progressive. A tree with light infection will overtime develop to severe infection. Control while trees are young is by far the best approach.



This is an example of a ponderosa pine heavily infected with mistletoe on another property. This is an example of Hawksworth rating of 6 the highest. See supplemental attachment for Hawksworth details.

Western Spruce Budworm (will affect Douglas fir)

This defoliating caterpillar like insect has been present in Kittitas County forests since the early 1980's, and no doubt even before then and is a risk to DF and GF on this property. Population build-up runs in cycles, usually during periods of low precipitation. SBW is presently wide spread on the east slope including the Teanaway and the Swauk, but not on your property yet.

Key Points –

- 1) It is a defoliating insect (eats the needles) and does not necessarily always kill the trees.
- 2) It will weaken trees and make them more vulnerable to bark beetles.
- 3) Needles will appear blighted or scorched on the tips. Needles will be bound together with webbing at branch tips.
- 4) The caterpillars are about 1" with green markings and white spots on the sides. Appear in the spring or early summer.



Current year growth SBW defoliation on GF in the Teanaway.
Manage stands to reduce impacts with proper tree spacing and species diversity.

Understanding Bark Beetles

Bark beetle populations fluctuate year-to-year depending on stress causing conditions in a stand of forest trees. The most common stress problem is available moisture. During normal precipitation years, beetle populations tend to decline because vigorous trees are better able to resist beetle attacks. During drought years, such as we have recently experienced, beetle populations tend to increase, especially in over-stocked stands. Bark beetle outbreaks can last for several years depending on weather and forest conditions. The last major out break was in the late 1980's and early 1990's.

Pine Bark Beetles

There is no evidence of pine bark beetle on your property but they are common in the area.

Pine Bark Beetle Facts:

- 1) Bark beetles only infest living trees or damaged and down trees that are still green.
- 2) Beetles will seek out moisture stressed trees because these trees produce less resin.
- 3) A vigorous tree can repel beetles with an abundance of resin flooding the entrance holes and galleries.
- 4) Once beetles find a suitable host tree, they release a chemical (called pheromones) to attract other beetles.
- 5) Bark beetles develop through 4 life stages: egg, larva, pupa, and adult. There is usually only one live cycle (or generation) per year.
- 6) Beetles spend almost their entire life beneath tree bark. The female will excavate an egg gallery.
- 7) The eggs hatch within a few weeks and the larvae feed on the inner bark of the tree, pupate and then emerge as an adult.

- 8) The adult beetle spends only a few days outside the bark and then will fly to locate a new host tree.
- 9) Bark beetle attacks often leave plainly visible evidence outside the bark such as pitch tubes, resin streams, and a reddish brown boring dust in bark crevices. Under the bark, distinctive egg galleries are specific to each kind of beetle.
- 10) Normal populations of bark beetles are kept in check by woodpeckers and other insect eating birds.
- 11) The green needles will begin to fade in the fall and sometimes not turn brown until the following year.
- 12) ***It is a good thing to create and maintain good bird habitat in your forest.***

There are four major groups of beetles common to Central Washington pine forests. They are native and a natural part of a forest ecosystem. They all have characteristic gallery patterns and preferred host tree types.

- 1) Mountain Pine Beetle (MPB) is generally associated with stands of ponderosa pine larger than 8" DBH in older, overstocked stands. They make long J-shaped egg galleries under the bark of trees. This is the most damaging beetle in our area. It can begin in weakened trees and even spread to healthy trees.
- 2) Western Pine Beetle (WPB) will most likely attack large, old ponderosa pine with low vigor, usually in clumps. They make winding, criss-crossing egg galleries under the bark of trees.
- 3) Pine Engraver Beetle (*Ips*) attack pine 5" to 8" DBH, logging slash, pre-commercial thinning slash, wind throw, or top portions of larger trees which have been weakened by drought. Out breaks are usually associated with spring and early summer drought. Their egg galleries radiate out from a central chamber under the bark of trees. Branches 2 to 6 inches long extend from the central chamber. Avoid creating green slash from early winter through mid-summer.
- 4) Red Turpentine Beetles attack the lower trunk of weakened or stressed pole-sized and larger pine. Look for conspicuous globular reddish pitch masses about 1 inch across on the lower trunk. The egg galleries are irregular shaped; can be up to 1" wide and about 12" long. These beetles are rarely lethal by themselves but they will weaken the tree and make it more susceptible to MPB or WPB attacks.

Understanding Root Diseases

Fading, weak crowns in DF and GF are possibly an indication of the presence of root disease, but this condition can also be the result of stress by extreme exposure to sun and wind. DF that have grown in stands of trees, often times show stress when the stand is opened up.

Research has confirmed that root disease organisms are native and a natural part of a healthy forest ecosystem. In a healthy forest there is a balance between the fungus and trees. The trees and the fungus have evolved with each other and pre-settlement periodic low intensity fires they lived in balance with each other.

There are 3 primary root rot fungi in the area: *Armellaria*, Laminated and Annosus, with the first two being most common. Root rot pockets are easy to identify in the forest. There will be patches of dead trees, some broken off or fallen with the root wad exposed. Often there will be a heavy patch of vine maple, oceanspray, hazelnut or alder which have responded to more sunlight reaching the forest floor.

Selective harvest will aggravate the spread of root rots because fresh stumps are quickly colonized by the fungus. The roots of these stumps in contact of roots of adjacent green trees allows the fungus to spread to these green trees and they will be dead within a year or two. In other words a "flush" of infection and mortality usually follows colonization of stumps created by selective harvesting infected trees. In any event, it is safe to say the fungus once present on a site will always be present. Normally, the fungus spreads very slowly from infected trees to adjacent trees. This may take years.

In areas that have been clear-cut and planted it is common to see pockets of dead young trees or just an individual dead tree. This is an indication the fungus is surviving in old stumps.

Host species vary in their susceptibility but all coniferous species are moderately too highly susceptible until they are 12 to 15 years old. After this age, some species become less susceptible to mortality, especially pines and western larch. Choosing to manage for pine is logical management option. If you notice infected trees, keep in mind the pocket could be $\frac{1}{4}$ acre and up to 2 acres in size. Cutting what appear to be infected trees will only aggravate the spread of the fungus to adjacent healthy trees, *unless* you cut all the susceptible trees in the pocket (GF and DF) and leave the pine. In this case, it will be ok to leave any dominant DF that have well formed, full crowns.



If you observe trees with weak or fading crowns, then it is likely because of root disease. There are exceptions: In some cases, DF that have grown in stands of trees, often times show stress when the stand is opened up.

If you are unsure of a tree health problem, contact your forester.

FIRE PROTECTION and FIRE-WISE

Fire is an inherent risk on any natural landscape. Kittitas County is a "FireWise" community, which is a program emphasizing practices designed to minimize the risk of fire to structures in the forest-urban interface.

Kittitas County has a Community Wildfire Protection Plan (CWPP) for the entire County, [BOCC Resolution 2009-18 dated 2/18/09] *. A Local, neighborhood CWPP should be a high priority for the Vistas; these plans are usually initiated through local landowner coalitions (or core groups) and involve the local Fire District, and DNR.

Participation in a CWPP is strongly recommended. The program will reduce (but not eliminate) the risk of a property damaging wildfire and assure the property is in compliance with the County's "Defensible Space" formula.

You and some of your down slope neighbors have already implemented FireWise, forest health prescriptions under the Kittitas County Conservation District (KCCD) program.

I recommend you extend this treatment down slope from the building site to the south edge of Stand 3.

It will be important to maintain proper tree stocking and minimal ground fuels in these treated areas over time.

Note: * This is available on the Kittitas County CDS website. I recommend you download and become familiar with this document, prior to the public hearing on your OS-t application.

Defensible space –

You have already incorporated defensible space treatment in your current KCCD program. I recommend a defensible space prescription down slope from the building site for a total of 200 feet.

Following are defensible space guidelines.

Defensible space is the area between a structure and an oncoming wildfire where the vegetation has been modified to reduce wildfire threat and provide firefighters an opportunity to defend the house. Live, low-growing, native vegetation is permissible in the landscaping but in a fashion that does not create a fire risk to the structure. Immediately adjacent to the buildings and decks there should be a 2 to 3 feet border of landscape gravel.

The herbaceous layer can include native pinegrass/elk sedge and low growing forbs. If these species are absent then seeding to the recommended grass mix is advisable. If water is available, keeping the grasses green is ideal. Low shrubs such as Oregon grape, kinnikinnick, snowberry, and spirea can be maintained. Medium to high shrubs can be present toward the

outer edges if spaced with 3 to 4 feet between crowns. Native conifer trees are permitted so long as there is 10 to 15 feet between crowns, limbs do not overhang the roof (10-foot minimum), and lower limbs are pruned to a height of 12 to 15 feet to eliminate ladder fuels. Both ponderosa pine and Douglas fir are acceptable so long as they meet the criteria.

The size of defensible space will vary depending on the type and amount of vegetation and topography. For this property, **200 feet** is recommended. Firewood and any other flammable material should be at least 30' from the house and other buildings during the summer.

This property is in a moderate to high fire risk situation because of the south slope, dry summer conditions and the increasing level of human activity in the neighborhood.

Ladder fuel Pruning -

Pruning is desirable when trees are 8' (or more) tall or are about 6" in diameter at the ground. Use loppers or a hand pruning saw to remove lower branches (limbs) close to the ground. This eliminates "ladder fuels", which reduces the risk of a ground fire traveling up limbs to become a crown fire, and is referred to as a "shaded fuel break". Always leave at least 1/3 of the live crown. Cut branches just outside the crown collar – the swell where limbs grow away from the trunk – to encourage faster healing. Be careful not to damage the crown collar or bark of the tree. As pruned trees grow in height, an additional pruning or "lift" may be appropriate. Re-evaluate pruning needs within 5 years. Pruning every tree in a patch or stand is not necessary . . . diversity is good.

There is a vast source of information on FireWise landscaping. Go to www.firewise.org for good information and links and you may always contact your forester for specific on site advice. Call Phil Hess: 509-952-0678.

NOXIOUS WEEDS

Knapweed is common in the area and is noticeable in the old strip mining areas in Stand 2.

The acceptable herbicide prescription recommended by the County Weed Board is available on their website. This treatment is effective in our area when applied at the knapweed rosette stage in May-June. Localized infestations can be treated with a regular garden type weed sprayer using the recommended herbicide at the right stage of development.

For more information check out the Kittitas County Weed Board web page. Go to <http://www.co.kittitas.wa.us/noxious-weeds/default.aspx>.

WILDLIFE HABITAT

The type N draw shrub and broadleaf tree vegetation is well established and is providing good diversity of habitat for a wide range of wildlife species and birds.

Another important wildlife habitat category are snags (wildlife trees) and coarse woody debris (pieces or patches of logs and large branches on the ground). Snags include both dead standing trees and those live trees with high levels of decadence or defect. Both hard and soft snags and down woody material in various stages of decay are important.

Because the property was heavily logged during the coal mining era and the forest is relatively young, there are only few wildlife trees developing in the cottonwood. However, there are opportunities to develop other wildlife trees as the forest develops. In the mean time, I recommend you install some nest boxes.

In this area there are over 60 species of birds and small mammals that are dependent on snags for some or all of their life requisites and an equal number of species dependent on coarse woody debris. A cavity is excavated in a recently dead tree by woodpeckers, or "primary excavators". These cavities are later used by a maximum of 27 bird and 18 mammal species, who are "secondary cavity users" because they can't excavate a cavity. Birds help control forest insects that may be detrimental to tree health.



This is an example of DF wildlife tree (snag) on another parcel. Woodpeckers will create cavities in search of insects. These cavities are then used by a large group of secondary cavity nesters.

Save your Wildlife Trees! "*Birds Eat Bugs*"



The decaying wood process provides habitat for many species of fungi, moss, lichens, invertebrates, reptiles, and amphibians that form an integral part of a healthy forest. Nearly all life forms in the forest begin with decaying wood. The decaying wood provides microsites for beneficial mychorrizal fungi and a long term, time release source of humus, organic matter, phosphates and nitrogen all desirable for healthy tree growth. Also, decaying wood acts as a reservoir for water storage by slowly releasing moisture throughout the summer.

This example is on another parcel .

SUPPLEMENTAL INFORMATION ATTACHMENTS

Kittitas County Noxious Weed List
Hawksworth Dwarf Mistletoe Rating System
Facts about Cavity Nesting Birds
Nest Box Specifics

If you have any questions or comments, please contact the plan preparer
Phil Hess, Consulting Forester 509-952-0678
Email: hessphil09@gmail.com

2013 KITTITAS COUNTY NOXIOUS WEED LIST

Common Name	Scientific Name	Common Name	Scientific Name
CLASS A NOXIOUS WEEDS		CLASS B NOXIOUS WEEDS	
buffalobur	<i>Solanum rostratum</i>	knotweed, Bohemian	<i>Polygonum bohemicum</i>
common crupina	<i>Crupina vulgaris</i>	knotweed, giant	<i>Polygonum sachalinense</i>
cordgrass, common	<i>Spartina anglica</i>	knotweed, Himalayan	<i>Polygonum polystachyum</i>
cordgrass, dense-flowered	<i>Spartina densiflora</i>	knotweed, Japanese	<i>Polygonum cuspidatum</i>
cordgrass, saltmeadow	<i>Spartina patens</i>	kochia	<i>Kochia scoparia</i>
cordgrass, smooth	<i>Spartina alterniflora</i>	loosestrife, garden	<i>Lysimachia vulgaris</i>
dyer's woad	<i>Isatis tinctoria</i>	loosestrife, purple	<i>Lythrum salicaria</i>
eggleaf spurge	<i>Euphorbia oblongata</i>	loosestrife, wand	<i>Lythrum virgatum</i>
false-brome	<i>Brachypodium sylvaticum</i>	parrotfeather	<i>Myriophyllum aquaticum</i>
floating primrose-willow	<i>Ludwigia peploides</i>	perennial pepperweed	<i>Lepidium latifolium</i>
flowering rush	<i>Butomus umbellatus</i>	poison-hemlock	<i>Conium maculatum</i>
French broom	<i>Genista monspessulana</i>	policeman's helmet	<i>Impatiens glandulifera</i>
garlic mustard	<i>Alliaria petiolata</i>	puncturevine	<i>Tribulus terrestris</i>
giant hogweed	<i>Heracleum mantegazzianum</i>	rush skeletonweed	<i>Chondrilla juncea</i>
goatsrue	<i>Galega officinalis</i>	saltcedar**	<i>Tamarix ramosissima</i>
hawkweed, European	<i>Hieracium sabaudum</i>	Scotch broom	<i>Cytisus scoparius</i>
hawkweed, yellowdevil	<i>Hieracium floribundum</i>	spurge laurel	<i>Daphne laureola</i>
hydrilla	<i>Hydrilla verticillata</i>	spurge, leafy	<i>Euphorbia esula</i>
johnsongrass	<i>Sorghum halepense</i>	spurge, myrtle*	<i>Euphorbia myrsinites</i>
knapweed, bighead	<i>Centaurea macrocephala</i>	sulfur cinquefoil	<i>Potentilla recta</i>
knapweed, Vochin	<i>Centaurea nigrescens</i>	tansy ragwort	<i>Senecio jacobaea</i>
kudzu	<i>Pueraria montana var. lobata</i>	thistle, musk	<i>Carduus nutans</i>
meadow clary	<i>Salvia pratensis</i>	thistle, plumeless	<i>Carduus acanthoides</i>
oriental clematis	<i>Clematis vitalba</i>	thistle, Scotch	<i>Onopordum acanthium</i>
purple starthistle	<i>Centaurea calcitrapa</i>	water primrose	<i>Ludwigia hexapetala</i>
reed sweetgrass	<i>Glyceria maxima</i>	white bryony	<i>Bryonia alba</i>
ricefield bulrush	<i>Schoenoplectus mucronatus</i>	wild chervil	<i>Anthriscus sylvestris</i>
sage, clary	<i>Salvia sclarea</i>	yellow archangel	<i>Lamium galeobdolon</i>
sage, Mediterranean	<i>Salvia aethiops</i>	yellow floatingheart	<i>Nymphoides peltata</i>
shiny geranium	<i>Geranium lucidum</i>	yellow nutsedge	<i>Cyperus esculentus</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>	yellow starthistle	<i>Centaurea solstitialis</i>
Spanish broom	<i>Spartium junceum</i>		
spurge flax	<i>Thymelaea passerina</i>	CLASS C NOXIOUS WEEDS	
Syrian beancaper	<i>Zygophyllum fabago</i>	absinth wormwood	<i>Artemisia absinthium</i>
Texas blueweed	<i>Helianthus ciliaris</i>	Austrian fieldcress	<i>Rorippa austriaca</i>
thistle, Italian	<i>Carduus pycnocephalus</i>	babysbreath	<i>Gypsophila paniculata</i>
thistle, milk	<i>Silybum marianum</i>	black henbane	<i>Hyoscyamus niger</i>
thistle, slenderflower	<i>Carduus tenuiflorus</i>	blackgrass	<i>Alopecurus myosuroides</i>
variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>	cereal rye	<i>Secale cereale</i>
velvetleaf	<i>Abutilon theophrasti</i>	common barberry	<i>Berberis vulgaris</i>
wild four-o'clock	<i>Mirabilis nyctaginea</i>	common catsear	<i>Hypochaeris radicata</i>
		common groundsel	<i>Senecio vulgaris</i>
		common St. Johnswort	<i>Hypericum perforatum</i>
		common tansy	<i>Tanacetum vulgare</i>
		common teasel	<i>Dipsacus fullonum</i>
		field bindweed	<i>Convolvulus arvensis</i>
		fragrant waterlily	<i>Nymphaea odorata</i>
		hairy whitetop	<i>Cardaria pubescens</i>
		hawkweeds, nonnative spp. not listed	<i>Hieracium spp.</i>
		hoary cress	<i>Cardaria draba</i>
		jointed goatgrass	<i>Aegilops cylindrica</i>
		lawnweed	<i>Soliva sessilis</i>
		lepyrodicls	<i>Leprodicls holosteoides</i>
		longspine sandbur	<i>Cenchrus longispinus</i>
		old-man's-beard	<i>Clematis vitalba</i>
		oxeye daisy	<i>Leucanthemum vulgare</i>
		perennial sowthistle	<i>Sonchus arvensis spp. arvensis</i>
		scentsless mayweed	<i>Matricaria perforata</i>
		smoothseed alfalfa dodder	<i>Cuscuta approximata</i>
		spikeweed	<i>Hemizonia pungens</i>
		spiny cocklebur	<i>Xanthium spinosum</i>
		Swainsonpea	<i>Sphaerophysa salsula</i>
		thistle, bull	<i>Cirsium vulgare</i>
		thistle, Canada	<i>Cirsium arvense</i>
		white cockle	<i>Silene latifolia ssp. alba</i>
		wild carrot	<i>Daucus carota</i>
		thistle, Canada	<i>Cirsium arvense</i>
		white cockle	<i>Silene latifolia ssp. alba</i>
		wild carrot	<i>Daucus carota</i>
		yellowflag iris*	<i>Iris pseudacorus</i>
		yellow toadflax	<i>Linaria vulgaris</i>
		cornflower (bachelor's button)*	<i>Centaurea cyanus</i>
		horseweed (mares tail)*	<i>Conyza canadensis</i>
		russian thistle*	<i>Salsola iberica</i>

Highlight indicates known presence in Kittitas County
 * Control required in designated areas
 **If you are aware of any noxious weeds that are not highlighted, please contact the Kittitas County Weed Board
 The Noxious Weed List of Kittitas County (RCW 17.10.090) is comprised of all Class A and Class B noxious weeds described in the 2013 Washington State Noxious Weed List (WAC 16-750) and the Class C weeds listed above

Appendix 1: Field method to assess likelihood of mortality due to dwarf mistletoe.

Hawksworth Dwarf Mistletoe Rating System (Hawksworth 1977):

1. Divide the live crown into thirds, and rate each third using the following scale:
 - 0 No visible infection
 - 1 < 50% of the total branches infected
 - 2 \geq 50% of the total branches infected
2. Sum the three individual ratings to obtain a total mistletoe class (0 to 6) for the tree.

Example: A conifer tree has no infection in the top third of crown, light infection in the middle third, and has many brooms in the lower third. The total score is $0 + 1 + 2 = 3$. The Hawksworth Dwarf Mistletoe rating for the tree is "3".

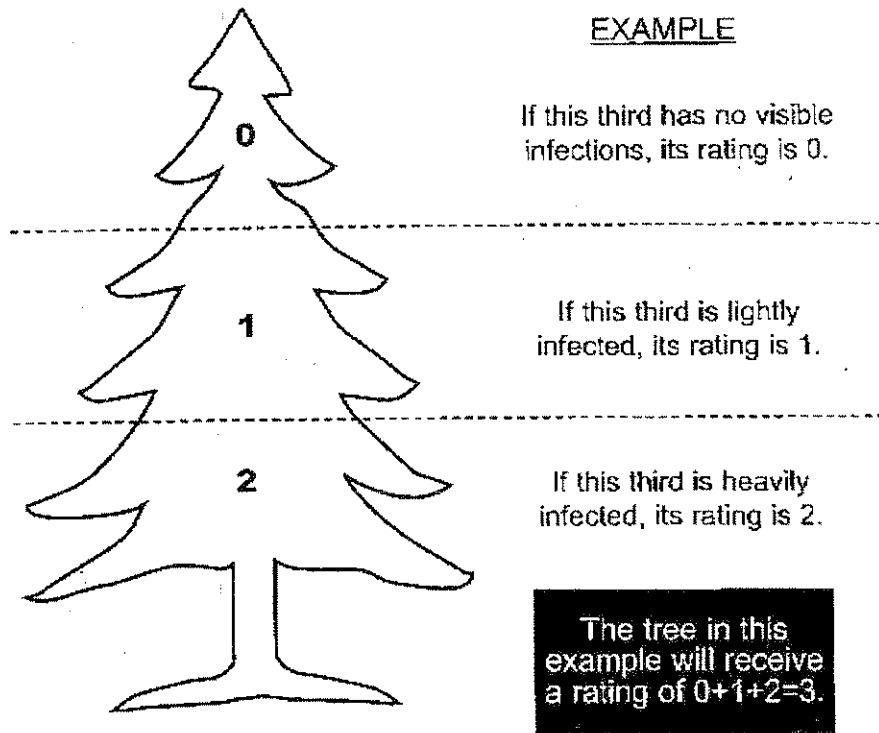


Figure from Goheen and Willhite (2006).

Dwarf Mistletoes

There are **many species** of dwarf mistletoe, *Arceuthobium* spp.

Hosts: Most dwarf mistletoe species only affect one species of conifer, although there are exceptions. Most eastern Washington conifers are affected by one or more species of dwarf mistletoe.

Identification:

Signs: Parasitic plants with scale-like leaves of various colors growing on the trunk or branches of the host trees.

Symptoms: Abnormal growth in the tree crown forming "witches brooms" or swelling of stems and branches. Crown deformities are slow to develop and slow to kill.

Mortality criteria: Trees that are likely to die within five years are conifers that have Hawksworth dwarf mistletoe rating of 5 or 6. Although some trees with a rating of 5 or 6 may survive for many years, their growth loss is very high and they will remain a source of infection for nearby healthy trees of the same species. See Appendix 1 for a description of the Hawksworth dwarf mistletoe rating system (Hawksworth 1977).

Contributing factors:

Bark beetles: Trees that are severely infected with dwarf mistletoe (Hawksworth rating > 4) are more susceptible to bark beetle attack and will likely die within five years if they are successfully attacked by bark beetles (fir engraver, mountain pine beetle, Douglas-fir beetle, spruce beetle and western pine beetle only). To determine the likelihood of mortality, refer to the mortality criteria for the bark beetle species involved.