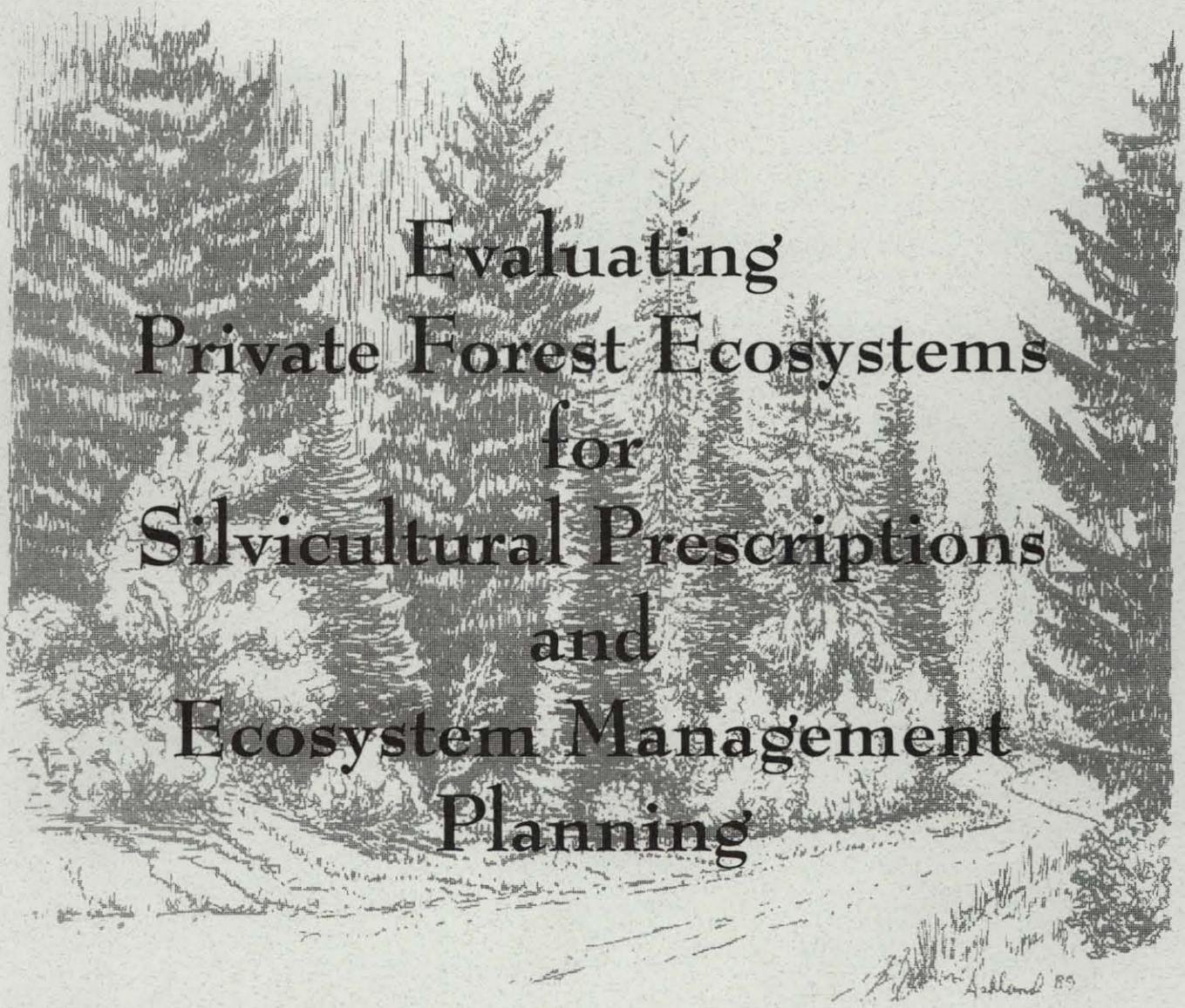




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Evaluating
Private Forest Ecosystems
for
Silvicultural Prescriptions
and
Ecosystem Management
Planning

Ronald L. Mahoney, Harold L. Osborne, and Pamela Town

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Evaluating Private Forest Ecosystems for Silvicultural Prescriptions and Ecosystem Management Planning

Ronald L. Mahoney, Harold L. Osborne, and Pamela Town

Private forest lands in the Pacific Northwest are generally managed to meet objectives specified by the landowner. These objectives may be narrowly focused on the production of specific products such as timber, forage, or commercial recreation. More commonly, landowners objectives are broadly focused on integrated natural resource management that includes a mix of measurable products, and less measurable assets that are often collectively described as *aesthetics*. Private forest owners increasingly understand that they may control a parcel of land that is just a small part of the larger picture. Therefore, they need to consider the impact of their land management activities within a larger ecosystem or watershed context. Equally important to private landowners is the consideration that external land characteristics and activities can impact their own land. The size and characteristics of any ecosystem under consideration must be delineated and described to fit the objectives and technical capacity of the landowner, while considering the landscape characteristics and impacts beyond the property boundaries. Privately owned forests are less constrained by regulation than public lands, but still must be managed under state and federal laws including forest practices regulations and the Endangered Species Act.

Forest ecosystems are complex and dynamic. Landowners and managers must consider a vast array of information to meet either specific or broad management objectives. The evaluation process guided by this publication can be conducted at several levels, separately or simultaneously, to gather and organize information. The forest unit evaluated can be at the stand (a uniform site supporting homogenous forest vegetation) level, the parcel/ownership level (usually for smaller forest owners), or at the watershed level (often crossing ownerships).

Electronic data collection, analysis, and synthesis give natural resource planners and managers the

ability to measure and quantify current and projected conditions for specific ecosystem components, such as commercial timber, grazing capacity, or snag and cavity tree retention. Many ecosystem components, however, are considered important in forest unit prescriptions or landscape-level ecosystem management planning, yet are measured and recognized in a more subjective, qualitative manner in the prescription and planning processes. For example, we know that internal soil drainage is an important factor in tree survival and growth, and affects stability in strong winds or heavy snows. We lack current research that could relate specific, numerical measures of this variable to tree responses. Consequently, we record soil drainage in general terms as poorly drained, moderately drained, or excessively drained. We then develop management recommendations on that specific factor as it interacts with other factors. In most cases, such a descriptive approach is very useful and adequate for most land management purposes, and makes wide application of informed forest management feasible.

Most forest ecosystem components are inventoried by visual observations and recorded in categories on the form provided in this publication. Successful silvicultural prescriptions and ecosystem management planning for private forests will usually require the involvement of a qualified natural resource professional. Professional land managers can interpret these forest ecosystem conditions and select management practices which meet the objectives of the landowner, satisfy regulatory requirements, and consider landscape-level ecosystem impacts. This publication provides a form and format that is designed for use by foresters and other natural resource professionals in the Pacific Northwest. Although the information level is designed for field evaluation by professionals, landowners and others with training and experience can complete much or all of the field evaluation, but

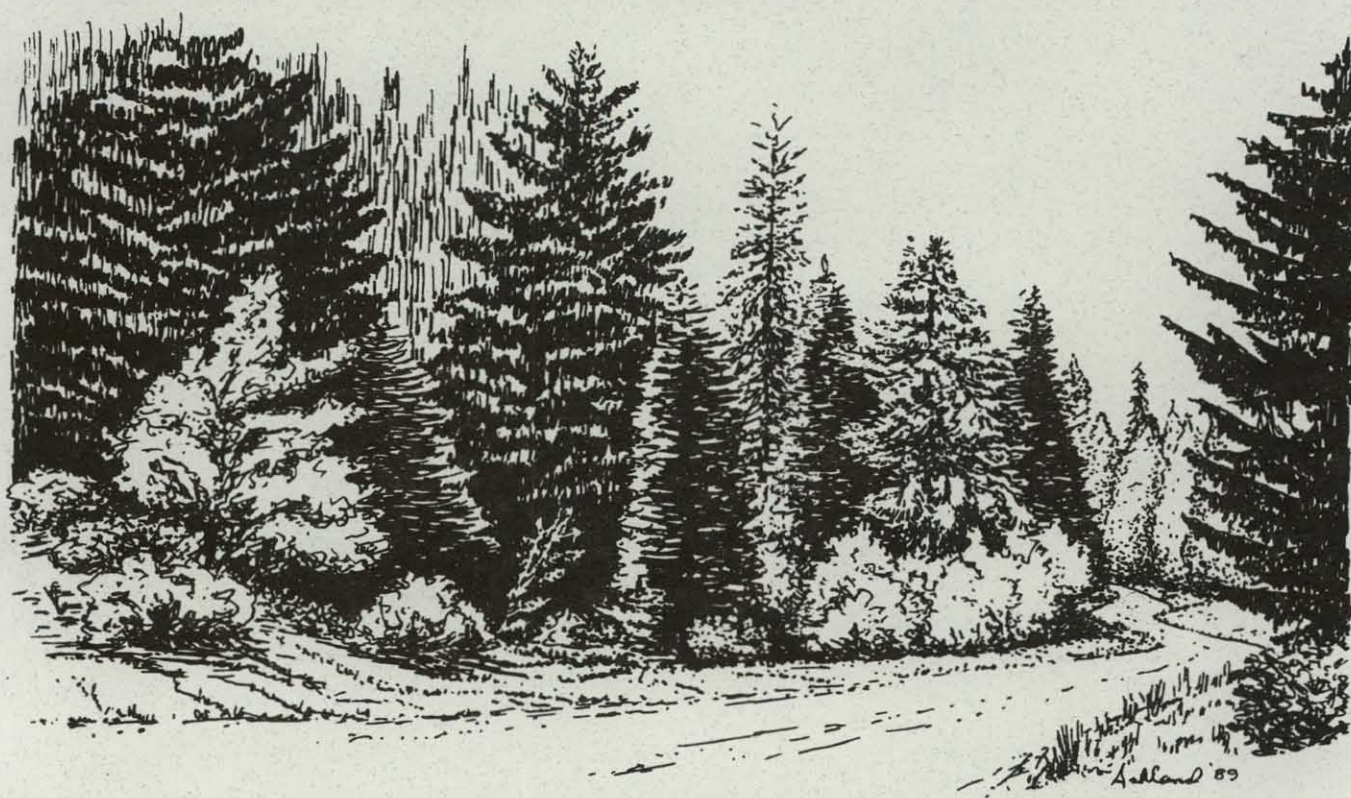
may still need professional assistance to interpret the information and develop management plans. The best land management will involve a partnership of the landowner with appropriate professional assistance. A related publication that provides a format and process for this coached-planning approach, titled *"Forest Stewardship Planning Workbook--An Ecosystem Approach to Managing Your Forestland"* (PNW 490), has been developed by Washington State University and is available from Extension Offices in the Pacific Northwest. That publication provides excellent background information on the concept of ecosystem management for private landowners, and on the planning process.

In addition to this forest inventory, landowners who have a strong interest in wildlife habitat management should also complete the form provided in *"Evaluating Wildlife Habitat for Managing Private Forest Ecosystems in the Inland Northwest"* (FWR Station Bulletin No. 60). Additional inventory of stream environments on private forest lands is available through *"Are Your Streams Healthy? Stream Quality Survey for Managing Private Forest Ecosystems"* (FWR Station Bulletin No. 61).

These publications provide the forms and format to help landowners and professionals consider many factors of the forest environment in the management planning process. The completed inventories should

become part of the permanent record for the land, and can be the basis for developing and writing plans for management practices that will meet landowner objectives. These evaluations should also show which forest situations require additional examination by a specialist in road engineering, forest harvesting, vegetation or soils management, forage, fire ecology, forest health, forest nutrition, wildlife habitat, water quality, or other ecosystem components. The costs and contracts associated with new and sometimes more complex harvest systems directed at meeting ecosystem goals are presented in two additional, related publications titled *"Calculating Timber Removal Costs Under Ecosystem Management"* (FWR Station Bulletin No. 62), and *"Contracting for Timber Harvest Under Ecosystem Management"* (FWR Station Bulletin No. 63).

These field evaluations are not intended to reduce writing prescriptions and planning ecosystem management to a series of mechanical steps, but rather are designed to ensure that many influencing factors are considered during the first forest examination. In addition, the information provided through the evaluation process should help refresh the memory of a resource manager who may write or review a prescription or plan at some future time after the field examination, and will serve as a record for subsequent landowners and managers.



Itemized Explanation of Forest Unit Evaluation Form

NOTE: This section explains each step on the field form that follows. We recommend reading through this section and the field form prior to field use. The observer should use this section as a reference as needed. Once the user is familiar with the form, they may not need this section. The field form is located at the end of the publication to make it easier to photocopy for additional inventories.

1. Name of field observer(s).
2. Date of evaluation.
3. Give the owners' name(s). Identify the unit to be evaluated and its boundaries (i.e. fence, stream, ridge, painted, flagged, etc.); the unit may be based on total ownership, a forest stand, or on a watershed-level ecosystem.
4. Legal description of the property location (i.e. NW 1/4, SE 1/2, Sec 9 T41N R3W BM.). Also provide the name of the nearest town, and the county and state.

The following questions may be answered using aerial photography, topographical maps, and soil and vegetation surveys, then verified in the field.

5. Map names and numbers (include both aerial photos and topographical maps).
6. Size of unit.
7. Elevation (include the minimum, maximum, and average elevation).
8. Estimate the localized landform in terms of landscape contour and percent slope.
9. Record the overall aspect of the slope (if variable indicate dominant aspects).
10. Record the dominant soil types using a USDA soil survey book. Identify the type of bedrock, and surficial deposits if present. Many Pacific Northwest soils are underlain by granite or basalt, for example, and overlain by loess or alluvium.
11. Record the habitat type(s) if available from soil survey or other published work. Be sure to field verify and recognize significant areas of difference.
12. Record the indicators of past fires (charred stumps, charcoal, fire scars, etc.), and estimate when fire(s) happened. Record fuel size classes as large, medium, or small for each fuel load class. [*Heavy* fuel loads comprise a continuous cover of all fuel sizes over most of the stand. *Moderate* fuel loads either lack continuity or a full range of fuel sizes. *Light* fuel loads primarily contain fine fuels with only patchy residues of large and medium fuels. *Large* fuels are those greater than 4 inches in diameter. *Medium* fuels include branches and other woody material 1-4 inches in diameter. *Fine* fuels include duff, litter, grasses and other non-woody fuels, and twigs and branches up to 1 inch in diameter].
13. Record the type and condition of access to and within the inventoried unit. Also include the type of access to and within the surrounding landscape (may include neighbors' property). Indicate the amount of traffic on each type of road/trail (heavy, moderate, or light use). Describe any constraints on new or redesigned roads.
14. Record the current dominant land uses of the inventoried unit and surrounding landscape (may include neighbors' property). Rank each use as primary, secondary, tertiary, etc).

15. Sketch a map of the surrounding landscape and the location of the inventoried unit. Show the scale and orientation of the map. Indicate landmarks and land uses such as roads, permanent water sources, agricultural lands, cover types, or buildings.

The following questions require field verification and are most meaningful when applied to a specific forest stand or other homogenous unit.

16. Record the topographical position relative to local topography.
17. Estimate the air drainage conditions using topography as the main criteria.
18. Record the successional stage(s).
19. Record the forest canopy structure(s).
20. Indicate "none" if not cruised for tree data. If cruised or visually estimated, record observers, date cruised, plot size and type, and number of plots. List basic data, summarized by species, of trees/acre, basal area/acre, range of diameters, and volume/acre from the cruise or ocular estimate.
21. Estimate the level of current and historic foraging (grazing and browsing). [*Severe* foraging includes a majority of the unit having soil displacement and compaction, erosion of heavily used trails, bare soil areas, and browsing past current year's growth. *Heavy* foraging includes a patchy distribution of otherwise severe foraging conditions, or overall less deteriorating soil and vegetation conditions. *Moderate* foraging includes sites where the forage resource is fully utilized with little apparent degradation of the site. *Light* foraging occurs in units infrequently utilized for a short period of time with little impact on soils or vegetation]. Indicate the animal(s) foraging or record the common name of other domestic or wild animals.
22. Identify any water sources and indicate whether they are temporary or permanent. Record if protected or unprotected, and the method of any protection.
23. Estimate the average thickness of the duff layer. Estimate the average size, range of sizes, and number of down logs per acre.
24. Estimate the ground vegetation density, distribution, and list the dominant species. Ground vegetation includes all non-woody plants (ferns, forbs, grasses).
25. Estimate the shrub density, distribution, and list the dominant species. Shrub vegetation includes woody shrubs and seedlings less than 5 feet tall.
26. Estimate the subcanopy density, distribution, and list the dominant species. Sub-canopy includes tall shrubs (i.e. Rocky Mountain maple, alders), and tree saplings.
27. Estimate the percent canopy cover, distribution, and list the dominant species. Canopy cover includes the overstory trees.
28. Record the appropriate soil conditions using a soil probe, auger, clean profile of a roadcut, or gully to estimate soil material and depth characteristics. Visual observation and general knowledge of the potential response of local soils to disturbance are required to estimate the various soil characteristics. Use this information to verify and modify information recorded earlier from the soil survey (item # 10).
29. Record the timber harvest history, including commercial and precommercial entries, year of harvest, silvicultural treatment, species cut, and logging method.
30. Record any past site preparation methods, and chemical products if used.
31. Record historic planting information.

32. Indicate the condition codes of all tree species in the unit by size-class. Indicate P after the code to show potential conditions. Indicate the extent of the existing condition by placing H (*heavy*= > 50%), M (*medium*=25-50%), or L (*light*= < 25%) after the code. Indicate the seed source potential after code 27.
33. Describe the distance to and general location of any watershed/ecosystem constraints to the use and management of the specific unit being evaluated, within or outside the ownership.
34. Describe how the unit contributes to the larger ecosystem.
35. Estimate and record the amount of time that can elapse prior to developing and implementing a prescription. This will mainly depend on anticipated changes in the unit which would require a change in prescription. For example, incipient insect outbreak, rapid loss of vigor due to competition, or loss of stand volume to disease may require that a prescription be developed and implemented as soon as possible (ASAP). A unit that would not benefit from a thinning, but will be more economically valuable given another 20 years of growth, may be delayed for harvest/regeneration or other management prescription.
36. List any additional unit evaluation by a specialist (i.e. wildlife biologist, hydrologist, harvest engineer, etc.) and state why you believe such an evaluation is needed.
37. Describe the forest structure, ecological stability, ecosystem/watershed conditions, constraints, and opportunities. Prescribe actions, giving goals and reasons as indicated.

Forest Unit Evaluation Form for Silvicultural Prescriptions and Ecosystem Management Planning

1. **Observer(s):** _____ **2. Date:** _____

3. **Unit Identification:** Owners' Name(s): _____

Unit Description: _____

4. **Property Legal Description:** _____ Sec. ___ T ___ R ___ M

Nearest Town _____ County _____ State _____

5. **Aerial Photo #s:** _____ **Topographical Maps:** _____

6. **Size (acres):** _____

7. **Elevation:** Min.: _____ Ft Max.: _____ Ft Average: _____ Ft

8. **Slope Conformation:** Concave ___ Convex ___ Uniform ___ Flat ___ Rolling ___

Slope Average _____ % Varies from _____ % to _____ %

9. **Aspect:** _____ Varies from _____ to _____

10. **Soil Type(s):** _____

11. **Habitat Type(s):** _____

NOTE: More specific soils and vegetation information is noted in items 23-28

12. **Fire:** No ___ Yes (Evidence): _____

Year(s): _____

Fuel Size Class

Fuel Load Class

Large	Heavy ___	Moderate ___	Light ___
Medium	Heavy ___	Moderate ___	Light ___
Small	Heavy ___	Moderate ___	Light ___

13. **Accessibility of Inventoried Unit and Surrounding Landscape:**

Condition Codes: Excellent(E) Good(G) Fair(F) Poor(P)

Inventoried Surrounding

<i>Unit</i>	<i>Area</i>	<i>Accessibility</i>	<i>Usage (I = Inventoried, S = Surrounding)</i>
_____	_____	Main Road (1st Class)	Heavy ___ Moderate ___ Light ___
_____	_____	Hauling Road (2nd Class)	Heavy ___ Moderate ___ Light ___
_____	_____	3rd Class Road	Heavy ___ Moderate ___ Light ___
_____	_____	Foot Trails/Skidder Roads	Heavy ___ Moderate ___ Light ___
_____	_____	ATV/Snowmobile	Heavy ___ Moderate ___ Light ___
_____	_____	Gated	Year Round ___ Seasonal Closure ___

Constraints on Road Building: _____

14. Current Land Use of Inventoried Unit and Surrounding Area (1=Primary, 2=Secondary, etc.):

<i>Inventoried Unit</i>	<i>Surrounding Area</i>	<i>Land Use</i>
_____	_____	Timber Production
_____	_____	Recreation - Foot Traffic
_____	_____	Recreation - Vehicle Traffic
_____	_____	Wildlife Management
_____	_____	Agriculture - Crops
_____	_____	Agriculture - Idle (Fallow, CRP, etc.)
_____	_____	Grazing
_____	_____	Aesthetics
_____	_____	Residential and Urbanization
_____	_____	No Active Management
_____	_____	Other: _____

15. Sketch Map of Landscape Use and Unit Location (Show scale i.e. 1" = 500' and indicate direction with a North (N) arrow):

- 16. Topographical Position:** Low Flat _____ Stream Bottom _____
 Lower Slope _____ Middle Slope _____ Upper Slope _____ Narrow Ridge _____
 Broad Ridge _____ Saddle _____ Other _____
- 17. Air Drainage:** Severe (Windy) _____ Good _____ Fair _____ Poor/Frost Pocket _____
- 18. Successional Stage(s):** Grass-Forbs _____ Sapling/Pole _____ Mature _____
 Shrub/Seedling _____ Young _____ Old Growth _____
- 19. Forest Structure(s):** Uneven-Aged (Multi-Storied) _____ Even-Aged (1-Story) _____
 Even-Aged (2-Story) _____ Plantation _____ Other: _____

25. **Shrub Vegetation - Woody Shrubs and Seedlings:**

Density: Heavy (> 50%) _____ Moderate (25-50%) _____
Light (< 25%) _____ None _____ (skip to #26)

Distribution: Consistent _____ Patchy _____

Dominant Shrub Species:

26. **Sub-Canopy - Tall Shrubs and Saplings:**

Density: Heavy (> 50%) _____ Moderate (25-50%) _____
Light (< 25%) _____ None _____ (skip to #27)

Distribution: Consistent _____ Patchy _____

Dominant Sub-Canopy Species:

27. **Canopy Cover - Overstory Trees:**

Percent Cover: > 75% _____ 50-75% _____ 25-50% _____
< 25% _____ None _____ (skip to #28)

Distribution: Consistent _____ Patchy _____

Dominant Tree Species:

28. **Soils:**

% Bare Soil _____ Parent Material(s) _____

Depth: Deep (> 3') _____ Moderate (1 - 3') _____ Shallow (< 1') _____

Depth to Drainage-Resistant Layer: _____ Volcanic Ash Depth: _____

Erosion (Indicate P for Potential, C for Current):

None _____ Light _____ Moderate _____ Severe _____

Indicators: _____

Compaction (Indicate P for Potential, C for Current):

None _____ Light _____ Moderate _____ Severe _____

Indicators: _____

Moisture Draining Capacity: Poor _____ Moderate _____ Excessive _____

Texture: Gravel/Rocks _____ Sandy _____ Loam _____ Ash Cap _____ Silty/Loam _____
Clay/Loam _____ Clay _____ Fragipan _____

29. **Cutting History:** None _____ Yes _____:

Date Silvicultural Treatment Species Cut Method

30. **Site Preparation** (Indicate Year by each Method/Product Used):

None ___ Mechanical ___ Broadcast Burn ___ Pile and Burn ___

Chemical: Spot ___ Strip ___ Broadcast ___

Machinery/Chemicals Used and Time of Year: _____

General Description of Site Preparation Methods and Effectiveness:

31. **Planted?** No _____ Yes _____:

Year Species Stock Type No./Acre Seed Source Planting Tool Nursery

32. **Tree Conditions:** Place the appropriate condition codes in each species/size class block represented in the stand (Indicate P after code if there is a potential condition; H if > 50% affected, M if 25-50%, L if <25%).

- | | |
|------------------------|---|
| 0 Healthy | 15 Porcupine |
| 1 Mountain Pine Beetle | 16 Rodents |
| 2 Fir-Engraver Beetle | 17 Other Animals |
| 3 Ips Beetle | 18 Chemical |
| 4 Other Bark Beetles | 19 Weather (Windthrow, Snowbreak, Hail) |
| 5 Shoot Borers | 20 Suppression |
| 6 Defoliators | 21 Logging (Mechanical Damage) |
| 7 Other Insects | 22 Old Age |
| 8 Root Rot | 23 Unknown |
| 9 Stem Rot | 24 Poor Form |
| 10 Mistletoe | 25 Sound Snag: #/Acre and Avg. Size |
| 11 Needle Disease | 26 Rotted Snag: #/Acre and Avg. Size |
| 12 Fire | 27 Seed Source Potential: |
| 13 Livestock | E=Excellent, G=Good, F=Fair, P=Poor |
| 14 Big Game | |

Species	Reprod <1"	Sapling 1" - 6"	Pole 6" - 12"	Sawtimber 12" - 24"	Peeler >24"	Seed Source Potential

33. **Watershed/Ecosystem Constraints** (Describe the Type, Location and Impacts):

34. **Unit Contributions to Watershed/Ecosystem** (Diversity, Habitat, Water Quality, Threatened/Endangered Species, Soil Conservation, etc.):

35. **Urgency to Develop and Implement a Prescription:**

ASAP _____ By 5 Years _____ By 10 Years _____ Delay to _____

Why?

36. **Recommended Additional Forest Ecosystem Evaluation:**

Specialty: _____

Why?

37. Narrative Evaluation and Prescription:

This is a description of owner's objectives, a summary of unit conditions, structure, miscellaneous observations, and a prescription for silvicultural practices to achieve objectives. List objectives, indicate structure of unit, whether patchy, homogeneous, single-story, double-story, history, evidence of release, pathogens, limiting factors, etc. Estimate unit stability and utilization of site potential. Describe ecosystem/watershed conditions, indicating what was considered and why. Briefly describe the timing and nature of prescribed activities, the target stand, and future options. (Use additional sheet if needed.)

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