

**Oregon Department of Forestry's  
Best Management Practices  
Compliance Monitoring Project**

*June 1999*

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## **Introduction**

The Oregon Department of Forestry (ODF) is conducting a Best Management Practices Compliance Monitoring Project (BMPCMP). This is a monitoring program which ODF has been directed to do, both through the governor's "Oregon Plan" for the recovery of salmon and watersheds, and at the direction of the Oregon State Board of Forestry.

Best Management Practices (BMP's) refers to forest practice rules and regulations that are designed to maintain water quality during forest operations. The BMPCMP is a three-year project that is primarily looking at how the department, landowners and operators are implementing the forest practice rules. The project may reveal areas where forest practice rule language can be clarified, administration of the rules can be improved, or where additional landowner and operator education is needed.

Data will be collected by ODF forest practice monitoring staff. This will be done in the field on randomly selected sites throughout the state. The random selection process allows for a statistically reliable sample of rule compliance, which ultimately results in a sound and defensible project. The first year of data collection (1998) was a "pilot" study. The pilot data were used primarily to determine the effectiveness of the field methods, improve the sample design, and make preliminary summaries on rule compliance. A pilot study report will be available in summer of 1999. Current field methods have been designed with a great deal of input from landowner groups, forest practice foresters, and review committees. The finalized protocol will be implemented in the summers of 1999 and 2000 with a final report to the Board of Forestry in 2001.

This document summarizes the goals, monitoring questions, study design and methods, and quality assurance/quality control program. For more detailed information please refer to the Best Management Practices Compliance Monitoring Project (Dent and Robben, 1999).

## **Committees and Coordinators**

### **Internal Review Committee**

John Buckman	Forest Practices Unit Forester: Pendleton
Dave Lorenz	Forest Practices Forester: Roseburg
Dave Morman	Forest Practices Policy Unit Manager: Salem
Scott Hayes	Forest Practices Operations Unit Manager: Salem
George Ponte	Forest Practices Forester: Prineville
Jeff Peck	F.A.C.T.S. Coordinator: Salem
Dan Shults	Forest Practices District Forester: Sweet Home
Gary Schulz	Forest Practices Unit Forester: Coos Bay
John Seward	Forest Practices Geotechnical Engineer: Roseburg
Mike Simek	Forest Practices Unit Forester: Columbia City
Tom Savage	Forest Practices Unit Forester: Tillamook
Cassandra Webber	Forest Practices Office Administrator: Salem
Kathy Wiggins	Forest Practices Forester: Coos Bay

**External Review Committee**

Chris Jarmer	Oregon Forest Industry Council (OFIC)
Jeff Lockwood	National Marine Fisheries Society (NMFS)
Dr. George Ice	National Council for Air and Stream Improvement (NCASI)
Rex Storm	Association of Oregon Loggers (AOL)
Dr. Paul Adams	Oregon State University (OSU)
Steve Hinton	Oregon Trout
Russell Harding	Department of Environmental Quality (DEQ)
Kaylor Martinson	Audubon Society
Terri Lamers	Oregon Small Woodlands Association (OSWA)
Jeff Boechler	Oregon Department of Fish and Wildlife (OSF&W)

**Project Coordinators:**

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# Oregon Department of Forestry's Best Management Practices Compliance Monitoring Project

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## **Section 1. Study Proposal**

### **1.1 Background**

The goals and objectives of the Forest Practices Act and Rules drive the Oregon Department of Forestry's Forest Practices Program (FP Program). The objectives of the Forest Practices Act are to:

“encourage economically efficient forest practices that assure the continuous growing and harvesting of forest tree species and the maintenance of forestland for such purposes as the leading use on privately owned land, consistent with sound management of soil, air, water, fish and wildlife resources and scenic resources within visually sensitive corridors as provided by ORS 527.755 that assures the continuous benefits of those resources for future generations of Oregonians.” (ORS 527.630 Policy, Oregon Forest Practices Act)

The forest practice rules are designed to address these issues. The rules are categorized into divisions, and each division has a description of purpose. The purpose statements further refine the broad objectives of the rules and act.

The Oregon Department of Forestry Forest Practices Act and Rules are considered a Best Management Practices (BMP's) Program. BMP's are defined as practices selected by an agency that are practical and effective at reducing non-point source pollution to standards compatible with water quality goals. Once an agency's BMP's are approved by the state water quality regulatory agency, they are certified as the water quality management plan (WQMP) for landowners that implement them. A WQMP illustrates how a landowner will achieve acceptable water quality. The Oregon Department of Environmental Quality (ODEQ) has approved the Oregon Forest Practices Act and Rules as an acceptable BMP program. When forest landowners properly implement BMP's they are actually implementing an approved WQMP, designed to maintain water quality. It is the responsibility of the Oregon Department of Forestry (ODF) to monitor the effectiveness and implementation of BMP's in achieving that objective.

The ODF achieves BMP compliance through a balanced program of rule education, technology transfer and enforcement. ODF employs 52 forest practice foresters (FPF's), stationed in 25 unit and district offices throughout the state. Through a series of inspections and site visits, FPF's work with landowners and operators to facilitate proper implementation or compliance with the forest practices rules. Not all operations are inspected by FPF's due to extreme workloads. Therefore, FPF's prioritize operations to determine inspection schedules. When rules are not properly implemented, and resource damage results from non-compliance, enforcement action is taken. The Forest Activities Computerized Tracking System (FACTS) and a civil penalties database can be queried to gage level of compliance based on the number of citations. While this is a valuable monitoring tool, a statistically reliable sample of BMP compliance is needed to monitor if the compliance program is producing desired results and to identify methods to improve compliance.

The goal of the Best Management Compliance Monitoring Project (BMPCMP) is to identify the level of overall forest operations in compliance with the forest practice rules and determine if adjustments to the compliance program or program administration are needed. The BMPCMP is one component of the forest

practices monitoring program (Dent, 1997: Forest Practices Monitoring Strategy). The strategy of the monitoring program is to monitor compliance separately from effectiveness and validation monitoring. The forest practices monitoring program currently coordinates separate projects to monitor the effectiveness of forest practice rules with regard to landslides, riparian function, stream temperature, chemical applications, and sediment from roads.

Due to legislative commitments within the Oregon Plan for Salmon and Watersheds, the initial focus of the BMPCMP will be on rules that are applicable to waters of the state. While the primary focus of the BMPCMP is on compliance, there are instances in which data will be collected on the effect of the forest activity on stream resources.

## **1.2 Related Studies**

Other states have implemented projects to assess compliance rates and effectiveness of administration programs to protect natural resources. Most commonly these projects have utilized an interdisciplinary team approach and combined compliance and effectiveness monitoring. Projects typically consist of some sort of rating criterion on which to assess both compliance and effectiveness. The following is a summary of some of these other programs. Others states will be added to this summary at a later date (i.e. Virginia, Florida, and Alaska).

### Montana

In the state of Montana, application and effectiveness of forest practice rules were rated on federal, state, non-industrial and industrial forestland (Frank, 1994). Three interdisciplinary teams were used consisting of a fish biologist, forester, hydrologists, a conservation-group representative, road engineer, and a soil scientist. Forty-two sites were monitored from July through September 1994.

Results indicated that 91% of the practices rated on all sites met minimum BMP requirements. High-risk sites were evaluated separately and 79% were in compliance. The greatest impacts and highest percent of departure from BMP's were associated with road drainage. Departures regarding streamside rules ranged from 36 to 85% depending on land ownership and were typically due to equipment operations within the streamside management zones. In general, BMP compliance improved since 1990.

### Washington/TFW 1991-1992

In Washington three "surveyors", accompanied by one Department of Natural Resources (DNR) staff person, evaluated compliance and public resource damage on private forest operations (TFW, 1992). Data forms and questionnaires were developed to assess all forest practice rules that applied to the site. One hundred and ninety-one sites were randomly selected from notifications and assessed during the summer of 1991.

Low compliance was most commonly associated with maintenance of active and inactive roads, harvest activities within riparian management areas, and "special conditioning" which refers to wildlife protection.

### Maryland

In Maryland survey teams were formed of representatives from each agency with a vested interest in resource protection (Koehn and Grizzel, 1995). Team members were fixed for the field season, yet varied between sites. A field-based questionnaire was implemented on sites grouped by physiographic region. Compliance was rated qualitatively as excellent, fair, good or poor for each BMP. They also used a landowner/operator questionnaire to determine BMP awareness. Ninety-nine sites were sampled from summer through fall 1994. Results indicate an 82% compliance overall. Poorest compliance was associated with soil stabilization on fill and cut slopes, skid trails and road drainage.

### Idaho

An interdisciplinary team was used consisting of a representative from forest landowners, fish and game, USFSA, Plum Creek, BLM, Department of Lands, and DEQ (Idaho Department of Health and Welfare, 1997). The study focused on practices that could result in delivery of pollutants to the stream. Effectiveness and implementation was rated as poor to excellent. Forty sites were monitored from July through September 1996.

Results indicate a 97% compliance. Rule effectiveness was rated as 99% effective, yet ½ the sites delivered sediment to the stream as a result of forest activity. Most common departures from BMP's were associated with road rules.

### Related Research

In 1996, Hairston and Adams researched the response of landowners and operators regarding Oregon 1994 stream rule changes (Hairston, 1997). This study looked at what kinds of factors influenced willingness and support of industrial, non-industrial private landowners, and operators to participate in the administrative program. There was a significant difference in response based on survey group (industrial, non-industrial, and operator). Hairston interpreted this as a reflection of different social norms for these groups and recommended reaching the respective groups with techniques that speak to these norms.

The most consistent finding between groups was that rules don't provide economic compensation or incentives for timber owners. In general there was support of the stream rules (66%). However just as many participants thought the rules were sufficient as thought the rules had gone too far for protecting stream resources.

Costs and personal control were most commonly listed as reasons for lack of support. Factors which influenced support for the rules include understanding and involvement in the revision process (without prerequisite of technical knowledge), economic incentives, rules based on social norms and good science and assurance of no increased regulation.

### Previous ODF Studies and Surveys

In March of 1992 the Oregon Department of Forestry conducted a survey of landowner and operators to solicit ideas for improving program administration (Degenhardt 1996). While this sample was not statistically sound in design, results do provide ODF with guidance for related work.

Results indicate a need to reduce the amount of time spent on notification and written plans. Operators would like explanations of when, how, and why practices are required. There is support for pre-operation and active-operation inspections to prevent the need for enforcement. Personal contact is considered the best educational tool. Under circumstances in which there is an unsatisfactory condition, operators would prefer a phone call to a written statement. Industrial landowners support a zero tolerance policy for rule violation. Civil penalties are considered to be appropriately and fairly assessed.

Inexperienced landowners need information on stocking level thresholds, harvesting methods, and costs associated with planning and conducting reforestation. Educational information needs to be available before issuing enforcement orders. This information should be designed towards understanding by the landowners and operators.

The Hairston study documented a sentiment that due to the importance of road sediment control, more literature needs to be available to operators on such topics as waterbars, culverts and road fills. Forest Practice Foresters should emphasize beginner and small ownership reforestation inspections, give less attention to proven operators and landowner and be freed up from paperwork.

### **1.3 Objectives**

The ODF BMPCMP will build on previous monitoring and research studies of forest practice rules, and learn from projects undertaken by other states. The specific objectives are as follows:

- 1) Determine, through statistically valid sampling, the level of operator/landowner compliance with best management practices (BMP'S).
- 2) Identify opportunities to improve program administration, operator education, and technology transfer or rule clarity.

### **1.3 Monitoring Questions**

In order to meet these objectives we will answer the following monitoring questions:

1. *How often did operators comply with BMP's described in the forest practice rules pertaining to water protection, road construction and maintenance, harvesting, and high-risk sites?*
2. *How do the statistical sample results compare with results based on FPF inspections? Is there a correlation between number of FPF inspections and compliance rates?*
3. *Are there particular rules that consistently have a lower or higher level of compliance? If the former, can the guidance and/or rule language be modified to improve compliance? Are there educational and training opportunities/materials regarding those rules?*
4. *When BMP compliance is inadequate, to what extent are quality and function of riparian areas, stream channels and/or fish habitat compromised?*

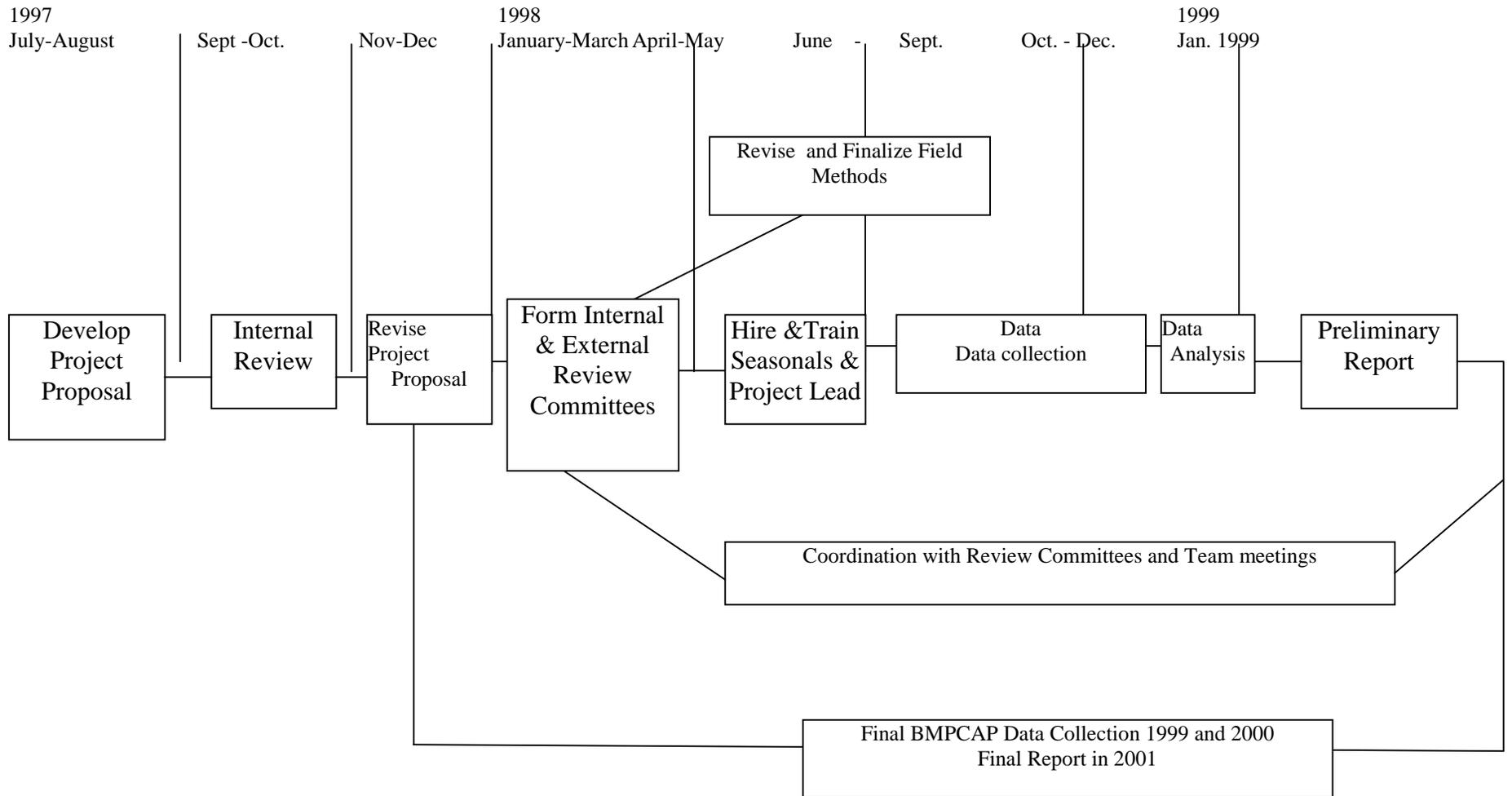
### **1.4 Time Frame**

Project planning and protocol development took place from July 1997 through June 1998 (See figure 1). During that period the proposal was internally and externally reviewed. Following this review and revision process, the first year of project implementation began in the summer of 1998 **in the form of a pilot study**. Annual reports will be made to the Board of Forestry beginning in July of 1999. The finalized BMPCMP field protocol will be implemented in 1999 and 2000. A final report will be issued in 2001.

### **1.5 Approach and Focus**

*Determining Overall Compliance Rate:* A field-based data collection method will be used to address overall compliance and rule implementation. There will be a limited amount of data collected on impacts to stream resources. Sites will be randomly selected and surveyed by 2-person BMP field team and an experienced former FPF. At each site the crew will determine rule compliance and resource protection. The crew will gather numerical information to be used to evaluate compliance, while a former FPF will provide a qualitative compliance assessment in the field. The focus will be on practices that can affect waters of the state. Therefore road, harvest, water protection, and high-risk site rules will be evaluated. A separate inventory will be done on new-road and road-reconstruction sites to assess fish passage.

Figure 1. Time table flow chart for the BMPCMP



## Section 2. Study Design

### 2.1 Pilot Study

The 1998 field season was used to test field methods and implement the pilot study. From April through June, the field methods were refined through a series of field visits to different harvest units and districts. Once the protocol had been refined, data collection began for the pilot study on 52 randomly selected sites. Data from the pilot study were used to evaluate the effectiveness of the protocol and revise it accordingly. The data were also valuable for estimating the total number of samples needed to have a statistically sound study. Finally, with the protocol found to be effective, the data were used to provide preliminary findings on BMP compliance. These preliminary findings reported an average compliance rate of around 97% for all of the FP rules considered. Data collection for the BMPCMP will begin May 1999.

### 2.2 Defining the Population

#### Site Parameters

The focus of this BMPCMP is to monitor forest operations that affect the waters of the state. In addition the focus is on sites which must comply with recent rule revisions. Therefore, potential operations must meet the following criterion to be field surveyed:

- harvest units associated with waters of the state,
- harvest units that were started and completed (or inactive) in the 1998 calendar year (one-half to 2.5 years) prior to data collection.

Sites will be randomly selected from the population of operations that meet these criteria. The sample size needed to achieve a 5% precision is estimated to be 200 based on the pilot study results. These 200 randomly selected sites will be evaluated during the 1999 and 2000 field seasons. Extra sites will be randomly selected to use as backup in the event that property access is denied to some of the initial randomly selected sites.

Prior to data collection for the 1999 field season a query of the FACTS database was performed. This query identified a total of 4075 sites that met the initial criterion (see Table 1).

#### Stratification and Random Selection

There are three characteristics that warrant further consideration in our sampling design. These include:

- heightened concern with fish-bearing streams,
- regional differences in the numbers of notifications and rule requirements, and
- differences between industrial and non-industrial landowners.

Therefore, the sample will be stratified by stream classification, district, and ownership.

*Stream Classification Stratification.* Of the 4075 sites that met the initial criterion, roughly 44% are fish-bearing streams (F), 22% are Domestic (D) or Neither (N), and 34% are unknown (Table 1). The sample will be biased to capture more fish-bearing streams. This is warranted because of the critical issues surrounding fish habitat. In addition, most fish-bearing streams will have a type N associated with them, enabling the capture of data for both type N and Type F streams from one site. Therefore, 60% of the sites will be from sites known to be fish-bearing streams. The remaining 40% will be partitioned according to the relative proportions of N and unknown streams. Therefore 10% of the sites will be known N or D streams and 30% will be unknown.

*District Stratification.* A 5% sample will be randomly selected from each district with a minimum of ten sites for each district. This technique will weight the sample to reflect the number of notifications per district.

*Landownership Stratification.* The landowner classes include: Industrial, Non-industrial, and Other. The sample will be weighted proportionate to the average size of an operation for each landowner classification.

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For example, while the number of notifications for industrial versus non-industrial is comparable (2037 and 1594), the average size of an operation is larger for industrial (137 acres) than for non-industrial (64 acres). Therefore, the sample will be weighted to capture more industrial operations. The relative proportions based on acreage are shown in Table 2.

Table 1. Distribution of BMPCMP population among districts

District Name	Total Population
Tillamook	126
Astoria	147
Forest Grove	632
W. Oregon	562
Linn	204
Clack.-Marion	350
S.W. Oregon	212
Douglas	266
Coos	490
E. Lane	310
W. Lane	286
Cent. Oregon	145
N.E. Oregon	236
Klam.-Lake	109
<b>Total</b>	<b>4075</b>

Total Fish	1796	44%
Total N & D	909	22%
Total Unknown	1370	34%

Table 2. Landowner population characteristics

Landowner Class	Number of Notifications	Average Acres	Total Acres	Percent of Total
1 State, Local & Other	444	72	31184	8%
4 Non-indust.	1594	64	101464	25%
5 Industrial	2037	137	274282	67%

Some of the BMP sites will have culverts to be assessed for fish passage. However, it is uncertain how large of a sample will be generated from the random selection. Therefore, in order to insure adequate sample size, fish passage will also be addressed with a separate but related study. A separate query of the FACTS database revealed 2792 road-reconstruction or new-road activities. From this population, 100 sites will be randomly selected and monitored by a second fish-passage field team during the summers of 1999 and 2000. The purpose is to determine if new stream provide juvenile fish passage and provide for a 50-year design flow. There is a chance that a randomly selected site will be included in both the BMP and fish-passage samples. The BMP field team will monitor such sites. In addition, all BMP sites will be monitored to determine if fish passage is provided regardless of the age of the road.

### 2.3 Rule Focus

Forest practice rules that will be monitored for this project are referenced in Table 2. The randomly selected sites will be assessed in the field for compliance with all water protection, harvest, and road rules that apply to the site. Refer to the detailed methods section for more information. The general approach is to incorporate yes/no answers, measurable aspects of the rules, and rating methods. BMP field team will also document volunteer activities implemented in support of the salmon plan and instances where a landowner has exceeded compliance.

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Table 3. Forest practice rules that will be monitored during the BMPCMP

DIVISION ###_DESCRIPTION	
Rule Number	Rule description
<b>DIVISION 605__PLANNING FOREST OPERATIONS</b>	
629-605-140	Notification – Types of Operations
629-605-150	Notification – When, Where, and How
629-605-170	Written Plans
<b>DIVISION 610__REFORESTATION RULES</b>	
629-610-040	Time Allowed for Reforestation
629-610-090	Land Use Changes
<b>DIVISION 615__TREATMENT OF SLASH</b>	
629-615-100	Maintenance of Productivity and Related Values
629-615-200	Mechanical Site Preparation near Waters of the State
629-615-300	Prescribed Burning
<b>DIVISION 620__CHEMICAL AND OTHER PETROLEUM PRODUCT RULES</b>	
629-620-100	Preventing, Controlling, and Reporting Leaks
629-620-400	Chemicals Application
629-620-800	Notification of Community System Managers
<b>DIVISION 625__ROAD CONSTRUCTION AND MAINTENANCE</b>	
629-625-100	Prior Approval
629-625-200	Road Location
629-625-300	Road Design
629-925-310	Road Prism
629-625-320	Stream Crossing Structures
629-625-330	Drainage
629-625-340	Waste Disposal Areas
629-625-410	Disposal of Waste Material
629-625-420	Drainage
629-625-430	Stream Protection
629-625-440	Stabilization
629-625-500	Rock Pits and Quarries
629-625-600	Road Maintenance
629-625-650	Vacating Forest Roads
<b>DIVISION 630__HARVESTING</b>	
629-630-100	Skidding Yarding Practices
629-630-200	Landings
629-630-300	Drainage Systems
629-630-400	Treatment of Waste Materials
629-630-500	Harvesting on High Risk Sites in Western Oregon
629-630-600	Felling; Removal of Slash
629-630-700	Yarding; Cable Yarding Near Waters Of the State
629-630-800	Yarding; Ground-based Equipment near Waters of the State
<b>DIVISION 635__WATER PROTECTION RULES</b>	
629-635-130	Written Plans for Streams, Lakes, Wetlands, and Riparian Management Areas

Table 3 Continued

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DIVISION 640__WETLANDS AND RIPARIAN MANAGEMENT AREA	
629-640-100	General Vegetation Retention Prescriptions for Type F Streams
629-640-110	Live Tree Retention Credit For Improvement of Type F Streams
629-640-200	General Vegetation Retention Prescriptions for Type D and N Streams
629-640-300	Alternative Vegetation Retention Prescriptions
629-640-400	Site specific Vegetation Retention Prescriptions for Streams and Riparian Management Areas
DIVISION 645__RMAS AND PROTECTION MEASURES FOR SIGNIFICANT WETLANDS	
629-645-010	Live Tree Retention for Significant Wetlands
629-645-030	Soil and Hydrologic Function Protection for Significant Wetlands
629-645-040	Understory Vegetation Retention for Significant Wetlands
DIVISION 650__RMAS AND PROTECTION MEASURES FOR LAKES	
629-650-010	Live Tree Retention for Lakes
629-650-020	Soil and Hydrologic Function Protection for Lakes
629-650-030	Understory Vegetation for Lakes
DIVISION 655__PROTECTION MEASURES FOR OTHER WETLANDS, SEEPS, AND SPRINGS	
629-655-000	Protection Measures for Other Wetlands, Seeps, and Springs
DIVISION 660__SPECIFIC RULES FOR OPERATIONS NEAR WATERS OF THE STATE	
629-660-040	Stream Channel Changes

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Teams will assess:

- Riparian Management Areas: vegetation retention requirements, basal area, ground disturbance, erosion, and accumulation of slash in the stream
- Roads: location, drainage, culverts, erosion, fill/waste/sidecast stability, rock pits, waste areas, etc.
- Slash Treatment: prescribed burning, mechanical site prep., erosion
- High-risk sites: road construction, harvest practices, slash accumulation, and erosion
- Skid Trails: skid trail locations, drainage, stream crossings, erosion
- Landings: location, drainage, and stability
- Fish Passage: when applicable will be assessed, but a separate inventory has been developed to specifically monitor this issue
- Yarding Corridors: vegetation and soil disturbance
- Permanent and Temporary Stream Crossings: stability, drainage, erosion, etc.

## 2.4 Discovery of Non-compliance

Cooperative relationships with participating landowners are critical to this study. Landowners are fully within their rights to deny access to their land. More importantly, landowner cooperation results in availability of related information that otherwise may not be gleaned from a site evaluation.

*This project is designed to assess compliance, not to bring about enforcement.* Therefore no enforcement action will be initiated as a result of this monitoring project. Likewise, this project will have no bearing on an enforcement action established prior to this monitoring effort.

There may be a situation where the monitoring team detects resource damage resulting from a previously undetected non-compliant operation. Through a process of cooperation with all the parties involved, unsatisfactory resource conditions will be addressed. The goal of this policy is to encourage cooperation so that we might better understand our program and improve compliance at a larger scale. This is also in accordance with the goal of the BMPCMP, which is to determine BMP compliance and provide alternatives for improvement. Anonymity will be afforded to landowners and operators whom cooperate with this study.

## 2.5 Resources

### Personnel

Other states have used an interdisciplinary team approach in some cases achieving greater acceptance of results on the part of reviewers. Participants included representatives from other agencies and interest groups. However, due to time constraints, participants could not commit for the duration of the field season. Therefore the statistical validity of the studies were brought into question. Success of this project requires consistent evaluations between sites. Therefore, a single crew will be used during 1999 and 2000 field seasons, as in the 1998 pilot study. Refer to the Quality Assurance/quality Control Section for details on crew consistency.

It is imperative that the project is lead by someone with personal experience in forest practices. Therefore the following arrangement has been implemented:

**Project Coordinators:** Jim Ziobro, ODF Enforcement Coordinator; Liz Dent, ODF Monitoring Coordinator. Jim and Liz have jointly worked in the development of this proposal. The proposal has been subject to internal and external review during its entire development. They will continue to be involved with study implementation, data analyses, and project reports.

**Project Leaders:** Conrad Tull and Joshua Robben. Conrad is a recently retired FPF with 40 years of experience in forestry. His intimate knowledge of rule application provides the needed insight to this project. Conrad will serve as the project lead, working seasonally from March to September. He will provide input on revising this proposal and methods. His responsibilities will include project coordination with landowners, crew coordination, FPF interviews and site compliance assessment documentation. Josh is an assistant in the Monitoring Program and was a member of the 1998 BMPCMP Pilot Study. He will be responsible for project coordination, crew training, crew supervision, crew coordination, and data management.

**BMP Field Team:** Two seasonal employees, David Bergvall and Brett Morrissette, have been hired as the BMPCMP crew for the 1999 field season (May to October). The initial month will involve studying the forest practice rules and going out with Josh, Conrad, and Liz to increase experience in landowner/operator interactions, rule application, and situations where interpretations must be made of how the rules should be implemented. During the next four months they will conduct the numeric data collection protocol on approximately half of the 200 randomly selected sites.

**Private Landowners:** The landowner is an important resource to this project. By granting the team access, the landowner facilitates an opportunity to demonstrate the effectiveness of our administrative program. In addition, the landowner can provide the team with critical information about the history of the site (i.e. harvest date, system used, site prep methods, voluntary measures).

**Other Agencies/Interest Groups:** The interdisciplinary team approach is valuable for increasing acceptance of the final results. However, to maintain statistical validity, participation must be consistent. Therefore, agencies and interest groups will be given the opportunity to participate on an observational basis with specific landowner permission. This means that if someone other than those named above want to observe data collection techniques, they may accompany the monitoring team to the site, **only when landowners permit**. Other agencies and interest groups have been provided an opportunity to give input on study design through the external review committee.

**Internal Review Committee.** The internal review committee consists of an FPF from each area, forest practices policy and operations units representatives, unit and district foresters. This committee has been kept apprised of the project proposal as it develops and given opportunity to help shape it's direction. In addition, once the project has begun, committee members will function as liaisons between the field and staff office by providing field offices with any reports that are generated from the study, and giving feedback from the field to the project coordinators and lead (see Introduction for committee members).

**External Review Committee.** The external review committee consists of representatives from OSU, NCASI, OFIC, key environmental groups, OSWA, OAL, DEQ, NMFS and ODF&W (see Introduction for committee members).

Budget

This project will require significant expertise and experience with Forest Practice Rules and their application. It also requires significant travel due to the statewide focus. Therefore most of the costs will be incurred to hire a project lead and cover travel and per diem costs. The estimated budget is **\$60,896** and **\$68,696** the second year, for a total project cost of **\$129,592**. Costs are broken down as shown in Table 4.

Table 4 Estimated budget for BMPCMP.

<b>Personnel</b>	<u>1999</u>	<u>2000</u>
• Project lead (NRS3 for 6 months)	20,436	20,436
• Seasonals:		
2@1586/mo for 6 months (plus .30 OPEU)	24,460	24,460
<b>General Supplies and Services</b>		
• Computer	2,000	
<b>Travel and Lodging</b>		
• Vehicle	600	600
• Per diem/miles	11,300	11,300
<b>Equipment</b>		
• Field Gear	300	300
• Range Finder	300	
<b>Studies and Analysis</b>		
• Analysis Work		10,000
• Printing	500	500
Annual Totals	<b>59,896</b>	<b>67,596</b>
Project Total	<b>127,492</b>	

## **Section 3. Study Methods**

### **3.1 Approach**

This section describes specific assessment methods used at each site.

#### Overall Methodology

In an effort to answer the monitoring questions ODF developed a protocol with two approaches to data collection: (1) numerical data and (2) compliance assessment data. A 2-person BMP field team surveys the unit-level sites collecting numerical data. At each unit-level site the BMP field team will gather numerical data based on rule requirements and the forest practice rules and statute guidance manual. Data will also be collected on riparian characteristics and erosion and sediment delivery, since interpretation of compliance often hinges on whether sediment was delivered to the stream or not. The team and project has oversight by an experienced former FPF (Conrad Tull) who evaluates each unit using a compliance rating system. Both approaches assess the same rules. The combined assessments will provide greater understanding of compliance and the affects of non-compliance on water and riparian resources.

The project leads (Conrad Tull and Joshua Robben) will coordinate the crew and consult with the FPF and landowner prior to the field survey. They will collect all relevant paperwork, written plans, repair orders, citations, aerial photographs, unit maps, and topographic maps. Tull will document his overall evaluation of compliance, orient the crew to the site, and provide oversight in situation where the crew requires clarification on specific site conditions. Initially Robben will accompany the crew in the field each day. As the season progresses the crew will conduct data collection independently and Robben will focus on site coordination and database management.

The FPF who administrated the site, supervisors, and landowners are welcome to accompany the crew and project leader in the field during the survey. The crew will be collecting numerical data that is not subject to interpretation. However, the landowner will undoubtedly be able to provide the crew with necessary information about the operation and site. Also, there will be opportunity for discussion of the rules and administrative program as a whole with the project lead and FPF. If the landowner grants permission, interested publics may be interested in accompanying the field crew as well.

#### Data Parameters

Twelve rule divisions are assessed in this project: Planning forest operations (division 605), Reforestation (division 610), Treatment of slash (division 615), Chemical and other petroleum products (division 620), Road construction and maintenance (division 625), Harvesting (division 630), Water protection rules (division 635), and Wetlands and riparian management areas (division 640), RMAs and protection measures for significant wetlands (division 645), RMAs and protection measures for lakes (division 650), Protection measures for “other wetlands”, seeps, and springs (division 655), Specific rules for operations near waters of the state (division 660). Sections 3.2 and 3.3 of this document provide a detailed description of the data to be collected.

Appendix A contains a list of all sub-rules addressed by both the numeric and assessment data (Table 5) as well as a list of the monitoring question addressed for each sub-rule (Table 6).

### **3.2 Numeric Data Collection Methodology**

The numerical data are a combination of quantitative data and categorical data. For example in the case of Riparian Management Areas (RMAs) the BMP field team will conduct data collection along transects spaced 200 feet apart for the entire length of the RMA. Along each transect the team will document: area (quantitative) and source (category) of vegetation and ground disturbance, accumulations of slash in the channel (category), width of no-cut buffer (quantitative), sediment delivery (quantitative and source category), and ground and vegetative disturbance on stream and riparian resources (categorical). In addition, if the area is managed for a basal area target the team conducts a 100% cruise of conifers, other trees, and snags that can count towards basal area target (quantitative). A similar approach is used document the condition of other harvest-related features associated with each unit.

The numeric data fieldsheets are designed for efficient data collection as the crew moves through a site. The information collected at each site is therefore grouped and organized by “feature” type to provide for thorough and complete data collection. The fieldsheets into which data collection is organized are:

- General Unit Data – Unit-level harvesting, site prep, information
- RMA Transects – Channel and RMA vegetation retention and soil disturbance conditions
- General RMA Cruise – Detailed RMA tree retention data
- Active Management – Data on large wood placed in stream channels
- Wetlands and Lakes – RMA vegetation and soil disturbance conditions
- Yarding Corridors – Channel, RMA vegetation, and RMA soil disturbance conditions
- Landings – Location, drainage, fill, and waste data
- Skid Trails – Location and drainage data
- Temporary Crossings – Installation and fill conditions
- Roads – New and existing road location, drainage, and stability conditions
- Waste Disposal Areas – Stability and location conditions
- Rock Pits – Stability and location conditions
- Culverts and Stream Crossings – Detailed design, function, and condition data
- Sediment Delivery Sources – Erosion type and volume

Appendix B contains these numerical data fieldsheets and associated codes.

The following sections describe the numeric data collected. The data is organized here by rule division.

## **General Information**

### **1. General Information**

*For each site surveyed, crews will document each of the following:*

- Site name/location
- Notification number
- Legal description of site location
- Georegion
- Crew
- Date
- Site ownership class/unit size

### **2. Photo Documentation**

*Slide photos will be taken of the following features:*

- General unit photo
- Sediment and disturbance sources
- Features with resource-protection issues (temporary crossings, etc.)

### **3. Sediment Delivery to Waters of The State**

*These sediment delivery codes will be used for sources throughout the following data collection sections.*

- Waters of the state which sediment was delivered to:
  - Water name
  - Water type: Stream / Lake / Significant wetland / Other wetland
  - Stream type: None / Domestic use / Fish / Unknown
  - Stream size: Small / Medium / Large
- Volume of sediment delivered to waters of the state (one code per source):
  - NO None
  - IN Incidental (0-1 cubic yards)
  - MD Moderate (1-10 cubic yards)
  - SI Significant (10-100 cubic yards)
  - GT Great (>100 cubic yards)
- Volume of sediment stored for imminent delivery to waters of the state (one code per source):
  - NO None
  - IN Incidental (0-1 cubic yards)
  - MD Moderate (1-10 cubic yards)
  - SI Significant (10-100 cubic yards)
  - GT Great (>100 cubic yards)
- Sediment source erosion type (one code per source):
  - SF Sidecast failure (unconsolidated material)
  - FW Fill washout
  - DR Drainage (surface erosion)
  - DS Deep seated landslide
  - SF Shallow failure
  - OT Other (describe)

## **Division 605: Planning Forest Operations**

### **1. Written Plan Prior Approval (605-170)**

- Written plan approval for the following (Yes / No):
  - Activity within 100 feet of Type F or D streams
  - Activity within 100 feet of Large lakes
  - Activity within 300 feet of significant wetlands
- Compliance with all approved provisions of written plan: Yes / No

## **Division 615: Treatment of Slash**

### **1. Landing Slash Disposal (615-100)**

*At all landings crews will note the following for any harvesting debris >2 feet deep on slopes >65%.*

- Area: Square feet
- Depth: Average feet
- Located in high water: Yes / No

### **2. Mechanical Site Preparation (615-200)**

- Mechanical site prep in RMA:  
See **Division 635, Section 1: RMA Transects** for disturbance, effect, and sediment delivery data

### **3. Prescribed Burning (615-300)**

- Prescribed burn in RMA:  
See **Division 635, Section 1: RMA Transects** for disturbance, effect, and sediment delivery data
- Written plan: Documentation of prescribed burning issues in written plan

### **4. Slash Accumulation (615-300)**

- Slash accumulations in channels:  
See **Division 635, Section 1: RMA Transects** for disturbance, effect, and sediment delivery data

## **Division 620: Chemicals and Other Petroleum Products**

### **1. Preventing Leaks and Spills (620-100)**

- Petroleum leaks on ground: Yes / No
- Petroleum delivery to waters of the state: Yes / No

### **2. Chemicals Application (620-400)**

- Chemical application within 10' no-touch RMA buffer:  
See **Division 635, Section 1: RMA Transects** for disturbance, effect, and sediment delivery data

## **Division 625: Road Construction and Maintenance**

All roads in the unit and newly constructed to access the unit will be assessed using this protocol.

NOTE: When stations are used for data collection, 1 station equals 100 feet.

### **1. Road Location (625-200)**

*Crew will document total number of road stations in each of the following locations. Stations in each location will also be categorized as new construction or existing road.*

- Location (one code per station):
  - High risk site
  - Stream crossing
  - Below high water mark
  - Within the RMA
  - Slopes greater than 65%
  - Wetland
  - Floodplain
  - Other wetlands, springs, and seeps
  - Other (locations without one of the above issues)
- Road designed to avoid excessive stream crossings: Yes / No

### **2. Road Prism (625-310)**

*Crew will document total number of road stations in each of the following locations:*

- Average **new** road construction width: Feet (inside ditch to outside of fill, not just running surface)
- Road prism condition (may be more than one condition tallied per station):
  - No stability issues
  - Unstable fill (eroding, drops, slid)
  - Unstable cutslope (ravel or slides)
  - Fill/sidecast at least 2 feet deep on slopes over 65%

### **3. Written Plan Prior Approval (625-100)**

- Written plan approval and description for the following activities (Yes / No):
  - Temporary crossings
  - Machinery in an F or D stream, significant wetland, or lake
  - Road construction within an RMA
  - Road construction on a high risk site
  - Stream crossing fill greater than 15' deep
  - Boulder or woody debris placement in stream channels

### **4. Stream Crossings (625-320 & 430)**

#### **A. Crossing Description**

- Stream size: Small / Medium / Large
- Stream type: None / Domestic / Fish / Unknown
- Structure type (one code per crossing):
  - RC Round culvert
  - AC Arch culvert
  - OA Open-arch
  - BR Bridge
  - FD Ford
  - LP Log puncheon
  - OT Other
- Crossing age: New / Existing
- Structure size: Diameter, width or span in feet
- Fill depth: Feet from the outside edge of the road surface to the original channel
- Slope: Percent (for culverts only)

**B. Feature Condition**

- Inlet opening (one code per crossing):
  - FO Fully open
  - PO Partially obstructed
  - OB Obstructed
- Fill stabilization (one code per crossing):
  - RR Riprapped
  - VG Vegetated
  - NO No measures and no erosion
  - UN No measure resulting in unstable fill
- Maximum fill depth: Feet
- Outlet drop: Feet
- Unfiltered ditch length: Feet of unfiltered road ditch draining to crossing
- Outlet drop: 1/10 feet
- Culvert seeding code (one code per crossing):
  - BA Bare culvert
  - BF Baffled culvert
  - SN Silt/sand
  - CB Gravel/cobble
  - BL Boulders
- Functional sediment barriers (road approach to crossing): Yes / No
- Appropriate installation location and channel/RMA protection: Yes / No
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**5. Drainage of All active and Inactive Roads in Unit (625-330 & 420)**

**A. Ditch and surface water control data collected**

- Road surface drainage function (one code per station):
  - Ditch blocked
  - Ditch cutting
  - Ditch functional
  - Outsloped
  - Waterbars functional
  - Waterbars non-functional
  - Bermed road
  - Ponding
  - Rutting road
- Drainage to high risk slopes avoided: Yes / No
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**B. Cross drains (exclusive of waterbars) documented for each culvert**

- Diameter: Inches
- Spacing: Adequate / Inadequate
- Inlet function (one code per culvert):
  - FO Fully open
  - PO Partially open
  - OB Obstructed
- Outlet function (one code per culvert):
  - CL Clean
  - DP Deposition
  - GC Gully to channel
  - GH Gully to high risk site
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**6. Waste Disposal Areas (625- 340 & 410)**

*For waste areas > 10 cubic yards within, adjacent, or related to the survey units crews will document:*

- Stable location: Yes / No
- Above high water level: Yes / No
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**7. Rock Pits (625-500)**

*For rock pits within or adjacent to survey units crews will document:*

- Stable location: Yes / No
- Above high water level: Yes / No
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**8. Miscellaneous Road Condition (625-440, 600, & 650)**

- Road oil delivery to waters of the state: Yes / No
- Ditch waste placed in stable location: Yes / No
- Vacated roads effectively blocked: Yes / No

**Division 630: Harvesting Rules**

**1. General Harvesting**

*For each unit crew will document:*

- Harvest type (one code per unit):
  - CC Clear cut
  - PR Partial cut
  - SV Salvage cut
  - OT Other (describe)
- Harvest method (one code per unit):
  - SS Short span cable (<800 feet)
  - LS Long span cable (>800 feet)
  - TS Tractor/skidder/shovel
  - HE Helicopter
  - OT Other (describe)

**2. Skid Trails (630-100 & 300)**

*Crews will document total number of skid trail stations for each location/drainage condition.*

- Location (one location code per station):
  - Unstable/high risk sites
  - Within 35 ft Type F or D
  - Within high water level of a type F or D stream
  - Within high water level type N stream
  - On slopes over 35%
  - Within an RMA
  - Within a floodplain
  - Within a wetland
  - Other locations (none of the above issues)
- Drainage condition (one drainage code):
  - Excess sidecast (sediment delivery evident)
  - Non-functional waterbars or rutted trails
  - Waterbars not installed or inadequately spaced
  - Significant ponding
  - Functional
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes  
*If sediment delivery occurs crew will note distance of skid trail from stream channel and ground slope.*

**3. Landings (630-200 & 300)**

*For each landing in the unit crew will document:*

- Area of landing surface: Square feet
- Location (Yes / No for each):
  - High risk site
  - In RMA
  - In high water
- Drainage (one cod per landing):
  - FU Functional
  - NF Non-functional drainage
  - PD Significant ponded water
- Fill (Yes / No for each):
  - On slopes > 65%
  - In high water
- Debris and waste material (> 2 feet deep on slopes > 65%):
  - Area: Square feet
  - Depth: Average feet
  - In high water: Yes / No
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes  
*Sediment delivery is distinguished between drainage, fill, and debris/waste sources.*

**4. Waste Materials (630-400)**

- Petroleum-related waste material on ground: Yes / No
- Petroleum-related waste material below high water line: Yes / No
- Waste metal below high water line from current operation: Yes / No

**5. High Risk Sites (630-500):**

*High risk sites include the following landforms:*

- Actively moving landslides;*
- Slopes steeper than 80%, excluding stable rock;*
- Headwalls or draws steeper than 70%;*
- Abrupt slope breaks, where the lower slope is steeper and exceeds 70%, except where the steeper slope is stable rock;*
- Inner gorges (not local channel banks) with slopes steeper than 60%; or*
- Sites with other characteristics determined to be of marginal stability by ODF personnel (use for comparison).*
- (First 5 are field determined, last is determined from office files)*

*For each unit crew will document the following high risk data:*

- Written plan approval of harvesting and method for high risk areas: Yes / No
- Area: Crews will document the total percent of the unit which qualifies as a high risk sites
- High risk issue (may be more than one code per unit):
  - GG Gouging (continuous exposure of mineral soil to 6-inch depth)
  - DF Deferral (geotech will review)
  - LS Landslides (on map)
  - SP Sparse slash accumulation
  - NC Non-contiguous slash accumulation
  - CN Contiguous slash accumulation (depth recorded in feet)
- Effect of slash accumulation on stream resource (if slash code used in High risk issue):
  - NO None
  - WQ Potential to impair water quality (slash within wetted width, low gradient, perennial channel)
  - DH Potential contribution to debris torrent hazard (in channels greater than 6% with high-risk site upstream)

**6. Felling; Removal of Slash (630-600)**

- Felling disturbance and RMA slash accumulation: See **Division 635, Section 1: Transect Data**

**7. Cable-Yarding Near Streams (630-700)**

*For purposes of this study, a Yarding Corridor is defined as an opening in the RMA used to yard trees and does not include yarding over the top of trees with no impact to canopy cover, or through an unimpacted natural opening. For each corridor crew will document each of the following:*

- Written plan approval of corridor use and design: Yes / No
- Stream size: Small / Medium / Large
- Stream type: None / Domestic use / Fish / Unknown
- Corridor location along stream: Distance in feet
- Tree felling for an RMA yarding corridor:
  - Trees felled: Yes / No
  - Trees left: Yes / No
  - Width of felled corridor: Feet
- Effect on RMA overstory of yarding through and/or over RMA (one code per corridor):
  - NO No canopy cover loss
  - ML Minor loss of canopy cover (<10%)
  - MD Moderate loss of canopy cover (10% to 30%)
  - HL Heavy loss of canopy cover (> 30%)
- Understory/ground/channel disturbance (one code per corridor):
  - NO None
  - VD Understory vegetation damaged
  - VA Complete elimination of understory vegetation
  - SD Soil disturbance within RMA/no sediment delivered to stream
  - BB Disturbance of channel bed and banks
  - ER Rills, gullies or bank erosion delivered sediment to the channel
  - OT other (describe)
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**8. Ground-based Yarding and Temporary Crossings (630-800)**

**A. Temporary Crossings**

- Written plan: Approval of crossing and design
- Stream size and type
- Crossing location along stream: Distance in feet
- Appropriate installation location: Yes / No
- Fill removal (one code per crossing):
  - CP Completely removed
  - PR Partially removed
  - LT Fill left in channel
  - NA Not applicable (fords)
- Fill max height: Feet
- Fill storage location (one code per crossing):
  - ST Stable location above high water
  - US Unstable location
  - HW In high water
- Sediment barriers at crossing approach and stored fill (one code per crossing):
  - FU Functional sediment barriers installed
  - NF Non-functional or not installed sediment barriers with observable or potential erosion
- Sediment delivery: See **General Information, Section 3. Sediment Delivery** for data and codes

**B. Ground-Based Yarding**

- Yarding RMA and waters of the state disturbance: See **Division 635, Section 1: Transect Data**

## **Division 635: Water Protection Rules**

There are two categories of numeric RMA assessments conducted for RMAs within or adjacent to the harvest unit:

1. *Overall RMA Survey* – To be implemented on all streams in the unit, and
2. *Detailed RMA Survey* – Used if there **was harvesting** within the RMA

(1) An overall assessment of the RMA will be implemented on all the streams using the **Overall Compliance Methods** (described below). Cruises will not be implemented on streams without management within the RMA. The crew will establish the first transect 25 feet in from one end of the unit. Transects will be established every 200 feet after that. At each transect they will measure vegetation retention widths, slope, ground disturbance from harvesting, mechanical site preparation, prescribed burning, disturbance effects, and sediment delivery sources to waters of the state.

(2) The data parameters of the *Detailed RMA Survey* are the same as for the **Overall Compliance Methods** with the exception of tree cruising. A combination of transects and cruising will be used to collect data as described in the **Detailed RMA Methods** (below). As they move along the stream, the crew will cruise the RMA measuring conifers and hardwoods, volunteer efforts in support of the salmon plan, and placement of large woody debris.

### **NOTE:**

Units with more than one managed RMA stream: If there is more than one managed stream in the unit, the crew will randomly select one of the streams and implement the Detailed RMA Survey. This will be done by assigning a number to each of the managed streams, and rolling a die until one of the assigned numbers is displayed.

Long Streams: If the managed streams are longer than 3000 feet, the crew will implement the Detailed RMA Survey on **one side of the stream only**. If the stream is greater than 6,000 feet in length it will be assessed using the overall compliance method rather than the detailed RMA survey.

Small Type N Streams: Due to the subjective nature of small Type N stream protection rules, the crew will not take numeric data on this streams. Small Type N stream protection will be addressed in the Assessment Methodology however.

Written Plans: Available data on basal area (BA) prior to and post harvest, active management plans, written plans, alternative and site specific prescriptions, BA credit, volunteer Oregon Plan for Salmon and Watersheds (OPSW) measures, hand-spraying, and stream crossings, no-cut widths, site-preparation, prescribed burning and/or chemical applications within the RMA; preventing sediment from getting into the stream, placement of wildlife trees in the RMA, other volunteer efforts.

*For each RMA crew will document:*

- Written plan approval for activities near Type F or D streams: See **Division 605, 1. Written Plan Prior Approval**
- Stream Name
- Stream size: Small / Medium / Large
- Stream type: None / Domestic use / Fish / Unkown
- Prescription
- Side of stream (facing downstream): Left / Right
- Direction of survey: Upstream / Downstream
- Regeneration in RMA: Yes / No
- Regeneration within 20 feet of high water line: Yes / No

## Overall RMA Survey Methodology

Data gathered along transects address RMA widths and vegetation retention regulations (635-310, 640-100, 200, & 300); mechanical site preparation (615-200), prescribed burning (615-300), and ground-based chemical applications (620-400), removal of slash (630-600), and yarding and harvesting (630-700 & 800). The crew will have a summary of the written plan. When documenting conditions that are not addressed in the written plan, a note will be made next to the data.

### 1. General Transect Data

- Transect location: Feet along RMA
- RMA width: Feet
- RMA prescription (one code per transect):
  - BW General - buffer width (No RMA conifer harvest)
  - BA General – basal area (harvest to standard target)
  - AM Active management
  - CT Tree tount (1/2 – 1 standard target)
  - HA No-harvest half (<1/2 standard target)
  - CA Alternative 1 (catastrophic event)
  - RT Alternative 2 (retention block)
  - CV Alternative 2 (conversion block)
  - SS Site specific
- Hillslope of RMA: Percent measured with clinometer

### 2. Slash Accumulation in channels (630-600):

*For each reach between transect crew will document:*

- Reach slash accumulation (one code per reach):
  - NO No slash accumulation
  - SP Sparse slash accumulation (no significant clusters)
  - NC Non-contiguous slash accumulation (significant number of pieces touching eachother)
  - CN Contiguous slash accumulation (Many pieces, often piled up)
- Slash accumulation effect on stream resource (may be more than one code per unit):
  - NO None
  - WQ Potential to impair water quality (low gradient, perennial channel)
  - DH Potential contribution to debris torrent hazard (channels greater than 6% with high-risk site upstream)

### 3. Maintenance of stream channel and banks below high water mark (625-600, 700, & 800 and 640-100, 200, & 300)

*For the area below high water and for 10 feet on either side of each transect crew will document:*

- Disturbance source (may be more than one code per transect):
  - NO No channel disturbance
  - MA Machinery in channel
  - YD Yarding in channel
  - FE Felling into channel
  - IN Soil/rock/waste input or removal
  - FL Filling of channel
- Effect on stream resource (may be more than one code per transect):
  - NO None
  - CD Channel disturbance or alteration with no sediment delivered to stream
  - ER Channel disturbance or alteration resulting in sediment delivered to stream
  - WQ Potential to impair water quality (material in wetted width, low gradient, perennial channel)
  - DH Potential contribution to debris torrent hazard (material in channels greater than 6%)

with high-risk site upstream)

**4. Maintenance of understory vegetation w/in 10 ft. of high water mark (640-100 & 200)**

*For the area between high water and 10 feet out and on 10 feet either side of each transect crew will document:*

- Disturbance source (may be more than one code per transect):
  - CA Chemical application
  - SP Mechanical site preparation
  - MA Machinery
  - YD Yarding
  - FE Felling
  - PB Prescribed burning
  - OT Other
- Disturbance effect on stream resource (may be more than one code per transect):
  - NO No effect
  - UD Understory vegetation damaged
  - VG Overstory vegetation damaged
  - ER Rills, gullies, or other erosion delivering sediment to the channel

**5. No-cut width (640-100 & 200)**

*Distance in feet measured from the average annual high water mark to the first stump along each transect:*

- No-cut confer width: Depends on prescription. If crew reaches the outer edge of the RMA without encountering a stump a “+” symbol will be used next to the no-cut width (i.e. on a medium F stream with a BW prescription and an 80-foot no-cut width the data would read 70+ )

**6. Ground disturbance and prescribed burning within the RMA (630-600, 700, & 800)**

*Crew will surveying the area from the 10-foot line and on 10 feet either side of the transects, measuring the distance (ft) from the high water mark and area (ft<sup>2</sup>) of ground disturbance:*

- Disturbance source\* (may be more than one per transect):
  - YD Yarding (Exposed mineral soil)
  - FE Felling (Exposed mineral soil)
  - SL Mechanical site prep (Any on slopes >35%)
  - SP Mechanical site prep (Exposed mineral soil)
  - PB Prescribed burning (Any in RMA)
  - MA Harvesting machinery (Exposed mineral soil)
  - OT Other (Exposed mineral soil) (Describe)
- \* skid trails, roads and landings assessed separately
- Disturbance effect on stream resource (may be more than one per transect):
  - NO No effect
  - UD Understory vegetation damaged
  - VG Overstory vegetation damaged
  - ER Rills, gullies, or other erosion delivering sediment to the channel

## Detailed RMA Survey Methodology

In addition to the *Overall RMA Survey Methodology* described above, the following steps will also be done for RMAs in which conifers were harvested. Basal area measurements will be implemented on streams that have had active management or harvesting within the RMA. These are referred to as managed RMAs.

**1. Basal Area Cruise on Type F , D and Large and Medium Type N Streams (640-100 & 200)**

*ODF BMP Compliance Monitoring Project*

*Crews will gather the following data for each tree within the RMA:*

**A. Conifers**

- Species
- Diameter at breast height to the nearest inch (measured with D-tape)
- Snag (>6 inches DBH, >30 feet tall): Yes / No
- Distance from high water mark: <20 feet / > 20 feet
- Windthrow (trees blown down after harvest only): Yes / No
- Windthrow direction (one code per tree):
  - IN Portion of tree in channel
  - TW Tree fallen towards channel but not in
  - PL Tree fallen parallel to channel
  - AW Tree fallen away from channel

**B. Western Oregon Georegion Hardwoods (>20 feet from stream, non-alder)**

- Species
- Diameter at breast height (>6 inches for cottonwood and ash, >24 inches for all others)

**C. Eastern and Blue Mountain Georegions**

- Species
- Diameter at breast height (>6 inches for all species)

**D. Conifer snags (>30 feet tall)**

- Diameter at breast height
- Type: Conifer / Hardwood

**2. Number of conifers per 1000 feet (640-100)**

*Calculated from the conifer cruise, requirements vary on prescription, stream, and georegion*

**3. Active Management (640-110)**

*When logs are placed in a channel for basal area credit the crew will document the following:*

- Written plan: Approval, basal area placed, basal area claimed, where was basal area claimed (i.e. for a separate unit)
- Diameter at large end: Inches
- Length of log: Feet
- Channel width at placement location: Feet

**4. Alternative Prescriptions (640-300):**

- Written plan approval, length of retention and conversion blocks: Yes / No

**A. Conversion and Retention Block Widths and Lengths**

*Buffer widths will be measured at the beginning and end of each block, **and** every 200 feet in between.*

*Distance from average annual high water mark to the first stump will be documented as follows:*

- Conversion blocks: Measured in feet out to 10 feet, then documented as 10+
- Retention blocks: Large: conifers to 50 feet, then 50+,  
hardwoods to 30 feet, then 30+
- Medium: conifers 30 feet, then 30+,  
hardwoods to 20 feet then 20+
- Small: measured out to 20 feet, then 20+

**B. Maintenance of stream channel, maintenance of understory vegetation w/in 10 ft. of high water mark, disturbance within the RMA, and removal of slash**

- Crew will document each as in **Section 1: Transect Data**, including appropriate disturbance sources, effects on stream resource, sediment volume, erosion type, slash accumulation, and slash accumulation effect on resource

**Divisions 645, 650, & 655: Water Protection Rules for Lakes and Wetlands**

**1. Lakes, Significant Wetlands, Other Wetlands (645-010, 020, & 030; 650-010, 020, & 030; 655-000**

*The crew will document the following for all lakes, wetlands, seeps, and springs.*

- Written plan approval, prescription, and methods: Yes / No
- Size: Acres
- Boundaries properly delineated: Yes / No
- Trees bordering high water lines retained: Yes / No
- Excessive understory vegetation damage in RMA or wetland: Yes / No
- Draining of lake or wetland: Yes / No
- Filling of lake or wetland: Yes / No
- Evidence of snag or downed wood removal: Yes / No
- Source of significant disturbance within RMA or wetland (may be more than one code per RMA):
  - NO None
  - MA Harvest machinery
  - YD Yarding
  - FE Felling
  - CA Chemical Application
  - SP Mechanical site prep
  - PB Prescribed burning
  - OT Other (describe)
- Stream-associated wetlands: See **Division 635, Section 1: Transect Data**
- Road construction, skid trails, and landings in RMAs or wetlands: See appropriate sections in **Divisions 625 & 630**

**2. Harvesting in Lake and Significant Wetland RMAs (645-010 and 650-010)**

*For harvesting within lake or significant wetland RMAs crews will document the following for all trees and stumps within the RMA.*

- Tree species
- Stump or live tree
- Size class (one code per tree or stump):
  - 1 6 to 10 inches DBH
  - 2 11 to 20 inches DBH
  - 3 21 to 30 inches DBH
  - 4 31 + inches DBH

**Division 660: Waters of the State**

*For all operations near waters of the state, especially new road construction and stream crossings, crews will document the following:*

- Diversion of waters of the state prevented: Yes / No

### 3.3 Compliance Assessment Data Collection Methodology

The project lead will consult with the FPF on the operation. Relevant data from the operations file and the FPF consultation will be documented in the *written plan and unit information forms* shown in Appendix C.

While the BMP field team is collecting detailed information at the site level, the project lead will implement an overall assessment of compliance at the unit level, collecting general data. This will include a brief narrative describing the unit, the operation, resource issues, and volunteer measures. In addition the project lead will rate overall compliance and collect data on a more general scale for each of the divisions addressed in section 3.2. Using the data sheets that are shown in Appendix C, the project lead will assess all streams, roads, skid trails, landings, high-risk sites and temporary crossings within the unit.

The protocol provides a rapid quantitative assessment of compliance with the regulations. For example, unlike the detailed RMA Survey, there are no transects involved and no basal area measurements. However, data parameters are the same as those described in section 3.2. Likewise, problem locations on roads, skid trails, landings, high-risk sites, temporary crossings will be documented. While, these assessments do not involve intensive data collection efforts (i.e. road data every 100 feet), parameters are the same as those described in section 3.2.

For each rule division described in listed in Appendix C the project lead will rate compliance as:

- EX: Exceeds rule requirements
- MT: Meets rule requirements
- MI: Minor infraction but average meets regulation
- NC: Non-compliance; Broad infractions throughout the RMA/unit.

The overall compliance data and rating system will be compared with the detailed data to interpret rule and operation compliance.

#### Compliance Assessment Methodology (Former FPF)

The compliance rating system provides qualitative data for each rule for the entire RMA as exceeds compliance, meets compliance, minor infraction, or non-compliance and describes the source of non-compliance. The practice is rated as:

- EX: Exceeds rule requirements
- MT: Meets rule requirements
- NC: Non-compliance.

If there is a non-compliant practice the project lead will note if it was administrative, potential resource issue or an actual impact on stream resources. The overall compliance data and rating system will be compared with the detailed data to interpret rule and operation compliance. A similar approach is used for written plans, wetlands, felling, yarding, treatment of slash, road maintenance, road drainage, stream crossings, landings, and high-risk sites.

The dual design (numerical and rating data) is unique to the ODF BMP Compliance Monitoring Project. All other states rely almost exclusively on rating data to determine compliance. The value of the numerical data is that it provides a non-biased method of determining compliance. In addition, it can be used in concert with the qualitative data to quantify the potential impact to the resource in instances where non-compliance is identified. Finally the two datasets can be compared with each other. If there is good agreement then a well-trained crew should be able to collect data on compliance, reducing the dependence on an experienced FPF to visit every site.

The disadvantage of numerical data is that some of the rules and guidance do not provide numerical definitions of compliance and rely on professional judgement to determine compliance. This is due in part to the huge variability in conditions that can not be accounted and regulated for. Thus language like “minimize and avoid” is used to provide flexibility. The desired outcome it that the most appropriate practice for the particular set of conditions is applied. Out of 168 rules to be assessed at the unit level, 147 have numerical data associated with them while 155 have qualitative data.

### **3.4 Quality Assurance and Quality Control**

What follows is the Quality Assurance/quality control (QA/QC) plan for the BMPCAP. It is designed to:

- Assure repeatability between measurements and between field teams
- Assure the field teams are trained and prepared
- Assure reliability of data

#### Precision and Accuracy

During each of the two years of this project there will be only one field team. The field team will revisit some units previously measured and repeat the measurements. Data can be compared between site visits to determine the precision and accuracy of the methods and the repeatability of the field team. The relative standard deviation (coefficient of variation) can be calculated as measure of precision (EPA 1996). A low relative percent difference between two samples from the same reflects precise measurement. We will also test precision with multiple teams by conducting measures on units by both team. We can then compare the data to determine the precision between teams.

The project coordinator will implement periodic evaluations of the field team performances. This will be done by accompanying the teams in the field throughout the field season. The project lead will be intimately familiar with the data collection procedures and provide constant oversight to the field teams.

#### Procedure

Standardized methods have been developed for data collection procedures. Emphasis will be put on consistent implementation of the methods between sites and throughout the season. This includes proper use of equipment, keeping equipment in good working order, and taking the same measurements, in the same fashion on all the sites. Proper use of the standardized methods will result in comparable data between units.

#### Training

There will be a one month training period in which field teams spend one week in the office studying the forest practice rules, guidance, and BMPCMP protocol. Two weeks will be spent in the field, looking at operations and discussing the protocol and raising questions. The final week will be spent implementing the protocol on units. Split teams will assess each unit, so that differences in measurements can be detected and discussed.

#### Documentation and Records

Data will be collected and recorded on field data sheets developed and refined during the pilot study. The crews will spend 2 to 3 days a month in the office entering data into a computer spreadsheet (EXCEL, QUATTRO PRO or ACCESS). Printouts will be made of the spreadsheet files to check for data entry errors. Data will be backed up onto two different hard drives and CDROM. Field data sheets will be filed for permanent records.

## References

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# **APPENDIX A**

## **Data Rule Applications**

**Table 5 Rules Addressed By Survey**

Rule Number	Description	Numeric	Assessment
<b>ORS 527.670 (6)</b>	Notification - Downstream holders		X
<b>629-605-</b> 140 1	Notification - Downstream holders		X
150 1	Notification		X
170 1a	Written Plan - Streams/Lakes	X	X
1c	Written Plan - Sign. Wetlands	X	X
5	Written Plan - Compliance	X	X
<b>629-610-</b> 040 2	Reforestation/Site Prep - Begin 12 Mos.		X
3	Reforestation/Site Prep - End 24 Mos.		X
090 1	Reforestation - LUC Prior Approval		X
<b>629-615-</b> 100 2	Landing Slash Disposal	X	X
200 1	Mech. Site Prep. - WOS Sed./Debris	X	X
2	Mech. Site Prep. - Filtering	X	X
3	Mech. Site Prep. - RMA Protection	X	X
4	Mech. Site Prep. - WOS Protection	X	X
300 2d	Burning - RMA Protection	X	X
2e	Slash - Channel and RMA Accum.	X	X
3	Written Plan - RMA Burning Requiremts	X	
<b>629-620-</b> 100 1	Petroleum Products - Prevent Leaks	X	X
2	Petroleum Products - Protect WOS	X	X
400 1	Chemicals - RMA Protection	X	X
2	Chemicals - RMA Protection	X	X
4	Chemicals - No Aerial Apps. W/in 60'	X	X
5	Chemicals - 10-Foot No-Touch	X	X
800 3	Notification - Commun. Water Mangr.		X
<b>629-625-</b> 100 2b	Written Plan - Temp. Xings	X	X
2c	Written Plan - RMA Road Construct.	X	X
3	Written Plan - NOW/SWO H.R. Rds.	X	X
4	Written Plan - Stream Xings >15' Fill	X	X
5	Written Plan - Active Management	X	X
200 2	Road Location - WOS	X	X
3	Road Location - Stabiltiy, RMAs	X	X
4	Stream Crossings - Minimize		X
310 1	Road Location - Stability		X
2	Road Waste Mat. - End Haul	X	X
3	Road Width - Minimize	X	X
5	Road Fill - Stabilization	X	X
320 1b	Stream Xings - Minimize Fill Volume		X
1bB	Stream Xings - Fill >15' in WP	X	X
1c	Stream Xings - Prevent Fill Erosion	X	X
2a	Road Drainage - 50-year Peak Flow		X
2b	Stream Xings - Allow for Fish Pass.		X
330 1	Road Drainage - Effective Control	X	X
2	Road Constr. - No Steam Diversion	X	X
3	Road Drainage - Effective Filtering	X	X
4	Road Drainage - Springs and Seeps	X	X
5	Road Drainage - Avoid H.R. Sites	X	X
340 -	Waste Area Location - Stability	X	X
410 -	Waste Area Drainage - WOS	X	X
420 1	Road Drainage - Clear Ditches	X	X
2	Road Drainage - Effective Xdrains	X	X
5	Road Drainage - Remove Berms	X	X
430 1	Stream Crossings - Min. Disturbance	X	X
2	Machinery - Channel Disturbance	X	X
3	Stream Crossings - Instalation	X	X
4	Road Drainage - WOS Filtering	X	X
5.1	Temp. Xings - Removal	X	X
5.2	Temp. Xings - Sediment Barriers	X	X
440 1	Fill/Sidecast/Waste - Stabilization	X	X
3	Landings - No Logs/Slash in Fill		X

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Table 5 Continued

500	1	Rock Pits - Stability, Protect WOS	X	X
	2	Rock Pits - Not In Channels	X	X
	3	Rock Pits - Soil/Rock/Petro out of WOS	X	X
	4	Rock Pits - Prevent Erosion, Landslides	X	X
	5	Rock Pits - Dispose Petro, Waste Mat.	X	X
600	2	Road Drainage - Surface Mainten.	X	X
	5	Road Oil - Application Req'ments	X	X
	7	Road Drainage - Waste Storage	X	X
	8	Stream Crossings - Maintenance	X	X
650	2	Vacating Roads - Effectively Block	X	X
<b>629-630-</b>	100	Yarding - Slopes >35%		X
	3	Skid Trail Loc. - Min. Sidecast	X	X
	4	Skid Trail Loc. - Stable Areas	X	X
	6	Yarding - Min. Soil Disturbance		X
200	1	Landing Size - Minimize	X	X
	2	Landing Location - Stability	X	X
	3	Landing Location - RMAs	X	X
	5	Landing Waste - Stability	X	X
300	1.1	Landing Drainage - Effective	X	X
	1.2	Skid Trail Drainage - Effective	X	X
	2	Skid Trail Drainage - Filtering	X	X
	3	Skid Trail Drainage - Instalation	X	X
	4	Landing Drainage - Instalation	X	X
400	1	Waste/Slash Location - WOS	X	X
	2	Sidecast - Stabilize	X	X
	3	Petroleum Products - Related Waste	X	X
	4	Waste Metal - WOS	X	X
500	1	High Risk Areas - Prior Approval	X	X
	2	High Risk Areas - WP Requirements	X	X
600	1	Felling/Bucking - Min. Disturbance	X	X
	2a	Felling - Fell Away From Streams	X	X
	2cA	Bucking/Yarding - Min. Disturbance	X	X
	3a	Slash - Remove From F/D Streams	X	X
	3b	Slash - Remove From N Streams		X
	3c	Slash - Place above High Water	X	X
700	1	Yarding - Retain Veg./Min. Disturb.	X	X
	2	Yarding - Min. Across Streams	X	X
	3	Yarding Corridors - Written Plan	X	X
	4	Yarding Corridors - Keep off Grnd.	X	X
	5	Yarding Corridors - N/Min. Disturb.		X
800	1	Ground Equipment - Min. Disturb.	X	X
	2	Ground Equipment - Not in Streams	X	X
	3	Ground Equipment - Min. Crossings	X	X
	4a	Temp. Xing Design - Min. Sed.	X	X
	4b	Temp. Xing Location	X	X
	4c	Temp. Xing Fill - Approval forl >15'	X	X
	4d	Temp. Xing Design - Fish Passage		X
	4e.1	Temp. Xing Fill - Removal Timing	X	X
	4e.2	Temp. Xing Fill - Removal Location	X	X
	6	Sediment Barriers - Effective	X	X
	7	Ground Equipment Loc. - RMA	X	X
	8	Skid Trail Location - <35' of Streams	X	X
	9	Skid Trail Location - High Water	X	X
<b>629-635</b>	130	1a	Written Plan - In 100' of F/D Streams	X
		1b	Written Plan - In 300' of Sign. Wetlnd	X
		1c	Written Plan - In 100' of Large Lakes	X
		2	Written Plan - Requirements	X
		5	Written Plan - Compliance	X
310	1c	RMA Width - Wetlands/Side Channels	X	

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Table 5 Continued

<b>629-640</b>	100	1a	F RMA - Retain Required Vegetation	X	X
		2a	F RMA - 10' HWM Veg. Retention	X	X
		2b	F RMA - 20' HWM Tree Retention	X	X
		5	F RMA - # Live Trees/1000', Sizes	X	X
		6a	F RMA - > Stn. Trg. - BA Req'mts	X	X
		6b	F RMA - No RMA Harvesting	X	X
		6cB	F RMA - > 1/2 Stn. Trg. - BW Req'mts.	X	X
		12	F RMA - Islands	X	X
	110	3	Active Man. - Prior Approval	X	X
		11	Active Man. - Live Tree Req'mts	X	X
		12	Active Man. - E.OR SF BA Req'mts	X	X
	200	1a	D/N RMA - Retain Required Vegetation	X	X
		2a	D/N RMA - 10' HWM Veg. Retention	X	X
		2b	D/N RMA - 20' HWM Tree Retention	X	X
		5	D/N RMA - # Live Trees/1000', Sizes	X	X
		6	SN RMA - 10' HWM Veg. Retention		X
		7a	D/N RMA - > Stn. Trg. - BA Req'mts	X	X
		7b	D/N RMA - No RMA Harvest	X	X
		7c	D/N RMA - < 1/2 Stn. Trg. - Prestcrpt.	X	X
		13	D/N RMA - Islands	X	X
	300	3b	Alt. Prsc. #1 - Streamside Tree Retntn.	X	X
		3c	Alt. Prsc. #1 - F - Meet Act. Man. Trg.	X	X
		3d	Alt. Prsc. #1 - D/N - Meet Act.Man. Trg.	X	X
		4a	Alt. Prsc. #2 - Gen. Prsc. Segments	X	X
		4b	Alt. Prsc. #2 - Ret./Conv. Blocks	X	X
		4c.1	Alt. Prsc. #2 - Max. 1/2 Length Conv.	X	X
		4c.2	Alt. Prsc. #2 - <500' Conv. Blocks	X	X
		4c.3	Alt. Prsc. #2 - 200' Ret. B/n Conv. Blks.	X	X
		4dA	Alt. Prsc. #2 - Conv. - Ret. All W/in 20'	X	X
		4eA	Alt. Prsc. #2 - Ret. - L Con/HW Rq'mts	X	X
		4eB	Alt. Prsc. #2 - Ret. - M Con/HW Rq'mts	X	X
		4eC	Alt. Prsc. #2 - Ret. - S Con/HW Rq'mts	X	X
	400	3	Site Specific Plans - Prior Approval	X	
<b>629-645</b>	010	1	Wetlands - Tree Retention	X	X
		2	Wetlands - Tree Retention	X	X
	030	1	Wetlands - Soil Disturbance	X	X
		2a	Written Plan - Wetland Filling	X	
		2b	Written Plan - Wetland Machinery	X	
		2c	Written Plan - Wetland Road Construct.	X	
		3	Wetlands - No Draining		X
	040	2	Wetlands - Understory Veg. Ret.	X	X
		3	Written Plan - Wetlands Req'ments	X	
<b>629-650</b>	010	1	Lakes - Tree Retention	X	X
		2	Lakes - Tree Retention	X	X
	020	1	Lakes - Soil Disturbance	X	X
		2	Lakes - No Draining		X
	030	2	Lakes - Understory Veg. Retention	X	X
<b>629-655</b>	000	2a	Other Wetlands - Soil/Water Quality	X	X
		3	Other Wetlands - Soil/Water Quality	X	X
<b>629-660</b>	040	2	WOS - No Soil/Rock Input/Removal	X	
<b>Total</b>				<b>147</b>	<b>155</b>

**Table 6 Rule Compliance Questions Addressed by Data**

Rule Number	Question Data Addresses:
<b>ORS 527.670 (6)</b>	-
<b>629-605-</b> 140 1	-
150 1	-
170 1a	Are required streams addressed in a written plan?
1c	Are required wetlands addressed in a written plan?
5	Are approved written plan provisions complied with?
<b>629-610-</b> 040 2	-
3	-
090 1	-
<b>629-615-</b> 100 2	Are unstable landing slash deposits disposed of?
200 1	Is mechanical site prep done so as to prevent sediment delivery?
2	Is mechanical site prep kept beyond the 10' no-touch portion of RMAs?
3	Is mechanical site prep done so as to prevent soil disturbance within RMAs?
4	Is mechanical site prep done to prevent sediment delivery?
300 2d	Is prescribed burning done to prevent soil disturbance within RMAs?
2e	Are channels free of harvesting slash?
3	Are prescribed burning RMA effects addressed in a written plan?
<b>629-620-</b> 100 1	Are petroleum spills prevented within the unit?
2	Is petroleum delivery to WOS prevented within the unit?
400 1	Are chemical applications kept beyond the 10' no-touch portion of RMAs?
2	Are chemical applications kept beyond the 10' no-touch portion of RMAs?
4	Are chemical applications kept beyond the 10' no-touch portion of RMAs?
5	Are chemical applications kept beyond the 10' no-touch portion of RMAs?
800 3	-
<b>629-625-</b> 100 2b	Are temporary crossings addressed in a written plan?
2c	Is new road construction within an RMA addressed in a written plan?
3	Is new road construction in NW0 and SW0 high risk areas addressed in a written plan?
4	Are stream crossings with fill of 15 feet or greater addressed in a written plan?
5	Is boulder and/or woody debris placement in streams addressed in a written plan?
200 2	Is new road construction located outside of channels, lakes, wetlands, and floodplains?
3	Is new road construction avoided on unstable and WOS-associated locations?
4	-
310 1	-
2	Are road fillslopes on steep slopes (>65%) kept free of excess waste material (>2' deep)?
3	Are new roads no wider than necessary (22')?
5	Are road fillslopes effectively stabilized?
320 1b	-
1bB	Are fill and drainage design of stream crossing fills > 15' addressed in a written plan?
1c	Is erosion of stream crossing fill prevented?
2a	-
2b	-
330 1	Is road surface drainage effective (functional ditch/waterbars or outsloped) ?
2	Is new road construction done so as to avoid diversion of streams?
3	Is the length of unfiltered road ditch draining at stream crossings less than ___ feet?
4	Are roads through springs and seeps drained?
5	Is road drainage to high risk sites avoided?
340 -	Are waste areas located in a stable spot?
410 -	Is the location of waste areas below high water line and sediment delivery avoided?
420 1	Are road ditches kept free of debris which has routed water out onto the road?
2	Is road surface drainage effective (functional ditch or waterbars, outsloped) ?
5	Are roads free of berms which prevent drainage?
430 1	Does the installation of stream crossings minimize channel and bank disturbance?
2	Is machinery channel disturbance avoided?
3	-
4	Is water quality protected from road drainage sediment delivery?
5.1	Are temporary crossing fills completely removed?
5.2	Are functional sediment barriers installed at temporary crossings?
440 1	Is excess sidecast (>2' deep) removed and fill stabilized on steep slopes (>65%)?
3	-

**Table 6 Continueld**

500	1	Are rock pits stable and sediment delivery to WOS prevented?
	2	Are rock pits located above high water lines?
	3	Is rock pit sediment delivery to WOS prevented?
	4	Are rock pits stable and sediment delivery to WOS prevented?
	5	Is rock pit sediment delivery to WOS prevented?
600	2	Does road surface drainage prevent erosion (eroding ditch, rutted road, or sed. delivery)?
	5	Is road oil application done so as to prevent entry into WOS?
	7	Is ditch waste material in a stable location?
	8	Are stream crossing openings fully open?
650	2	Are vacated roads effectively blocked?
<b>629-630-</b>	100	2
	3	Is excess skid trail sidecast (eroding) avoided?
	4	Is the location of skid trails in unstable areas or slopes >35% avoided?
	6	-
200	1	Are landing sizes minimized (<__ ft2)?
	2	Are landings located in high risk areas or below high water and fill on slopes >65% avoided?
	3	Is landing location in RMAs avoided?
	5	Is landing debris and waste >2' deep avoided on slopes > 65%?
300	1.1	Is landing drainage functionally dispersed?
	1.2	Is skid trail drainage functionally dispersed?
	2	Is skid trail drainage effectively filtered before entering WOS?
	3	Is skid trail drainage functionally dispersed?
	4	Is landing drainage functionally dispersed?
400	1	Is entry of slash and debris into WOS prevented?
	2	Are exposed soils and sidecast effectively stabilized?
	3	Is all petroeum-related waste removed from the site?
	4	Is all waste metal prevented from entering WOS?
500	1	Is prior approval given for high risk site operations in NW0 and SW0 ?
	2	Are soil and water inpacts addressed in a written plan for high rise operations in NW0 and SW0?
600	1	Are stream, wetland, lake, and RMA felling soil disturbance and channel slash accum. prevented?
	2a	Are conifers felled away from streams, lakes, wetlands, and RMAs?
	2cA	Are trees bucked and yarded to prevent bed, bank, and vegetation disturbance?
	3a	Is all harvesting slash removed from type F and D streams?
	3b	Is all harvesting slash removed from type N streams to prevent water quality and stability issues?
	3c	Is all harvesting slash removed from WOS placed in a stable location above high water?
700	1	Is yarding disturbance of soil and vegetation in steams, wetlands, lakes, and RMAs prevented?
	2	Is yarding across streams, wetlands, and lakes minimized?
	3	Is prior approval given for yarding across streams (not SN), significant wetlands, and lakes?
	4	Is ground/understory veg. disturb. prevented when yarding across streams, sign. wetlands, and lakes?
	5	-
800	1	Is yarding disturbance of soil and vegetation in steams, wetlands, lakes, and RMAs prevented?
	2	Is operation of machinery in channels avoided?
	3	Are the number of stream crossings minimized?
	4a	Is sediment delivery for temporary crossings kept at "Incidental" levels (<1 yd3)?
	4b	Are temporary crossing locations chosen to minimize fill and stream bank disturbance?
	4c	Are temorary crossings will fill >8' addressed with constrution and removal in a written plan?
	4d	-
	4e.1	Are all temporary crossings removed immediately after operations and prior to runoff?
	4e.2	Is temporary crossing fill placed in a stable location above high water and sediment delivery prevented?
	6	Are effective sediment barriers constructed to prevent delivery from crossing approaches?
	7	Is machinery activity within 100' of WOS done to prevent channel disturbance and sediment delivery?
	8	Are skid trails 35' from type F and D streams and adequate runoff-filtering distance from all WOS?
	9	Are skid trails located above stream high water lines?
<b>629-635</b>	130	1a
		1b
		1c
		2
		5
310	1c	Are RMA boundaries extented 25' beyond stream-associated wetlands and side channels?

Table 6 Continued

629-640	100	1a	Are the RMA rules properly applied to type F streams?		
		2a	Is all understory vegetation retained within 10' of type F high water?		
		2b	Are all trees retained within 20' of type F high water?		
		5	Are the minimum number of trees per 1000' retained within Type F RMAs?		
		6a	Is the standard target basal area retained within Type F RMAs when B.A. > standard target?		
		6b	Are all conifers retained within Type F RMAs when 1/2 < B.A. < 1 standard target?		
		6cB	Are all required trees retained in Type F RMAs when B.A < 1/2 standard target?		
		12	Is required vegetation retained within Type F RMAs on islands?		
		110	3	Is prior approval given for the placement of woody debris in Type F streams for B.A. credit?	
			11	For active management, is standing B.A. retained above the active management target?	
			12	Are the B.A. requirements for small Type F RMAs the Eastern Cascade and Blue Mt. georegions met?	
		200	1a	Are the RMA rules properly applied to Type D and large/med. S streams?	
				2a	Is all understory vegetation retained within 10' of Type D and large/med. S high water?
2b	Are all trees retained within 20' of Type D and large/med. S high water?				
5	Are the minimum number of trees per 1000' retained within Type D and large/med. S RMAs?				
6	Are all non-merchantable conifer trees within 10' of perennial small N streams retained (per Table 5, page 45)?				
7a	Is the standard target basal area retained within Type F RMAs when B.A. > standard target?				
7b	Are all conifers retained within Type D and large/med. S RMAs when 1/2 < B.A. < 1 standard target?				
7c	Are all required trees retained within Type D and large/med. S RMAs when B.A < 1/2 standard target?				
13	Is required vegetation retained within Type F RMAs on islands?				
300	3b			Are all trees retained within 10 or 20' of high water for Alternative Prescription 1 RMAs?	
				3c	Is active management B.A. target retained in Alternative Prescription 1 Type F RMAs?
				3d	Is active management B.A. target retained in Alternative Prescription 1 Type D and N RMAs?
				4a	Are 200'+ general prescription segments identified for Alternative Prescription 2 RMAs?
		4b	Is the remaining RMA length divided into conversion and retention blocks for Alternative Prescription 2 RMAs?		
		4c.1	Do conversion blocks make up less than half of the total length of Alternative Prescription 2 RMAs?		
		4c.2	Are conversion blocks <500' in length?		
		4c.3	Are conversion blocks separated by 200'+ retention blocks?		
		4dA	Are all trees within 10' of high water retained in conversion blocks?		
		4eA	Are all conifers within 50' and hardwoods within 30' of high water retained in large stream conversion blocks?		
		4eB	Are all conifers within 30' and hardwoods within 20' of high water retained in med. stream conversion blocks?		
		4eC	Are all trees within 20' of high water retained in small stream conversion blocks?		
		400	3	Is approval of site specific prescriptions based on the ultimate improvement of the site?	
629-645	010	1	Are 50% of live trees retained by species and size class within significant wetlands and their RMAs?		
		2	Are all trees bordering significant wetlands retained?		
030	1	Is soil disturbance in significant wetlands and their RMAs prevented?			
		2a	Is resource protection related to filling within a significant wetland described in a written plan?		
		2b	Is resource protection related to machine activity within a significant wetland described in a written plan?		
		2c	Is resource protection related to road construction within a significant wetland described in a written plan?		
		3	Is the draining of significant wetlands avoided?		
040	2	Is understory vegetation disturbance within significant wetlands and RMAs minimized?			
		3	Is understory vegetation retention within significant wetlands and RMAs addressed in a written plan?		
629-650	010	1	Are 50% of live trees retained by species and size class within the RMAs of lakes?		
		2	Are all trees bordering lakes retained?		
020	1	Is soil disturbance in the RMAs of lakes prevented?			
		2	Is the draining of lakes avoided?		
030	2	Is understory vegetation disturbance within the RMAs of lakes minimized?			
629-655	000	2a	Is soil and understory vegetation disturbance within oher wetlands, seeps, and springs minimized?		
		3	Is soil and understory vegetation disturbance within oher wetlands, seeps, and springs minimized?		
629-660	040	2	Is the diversion of water from streams avoided?		

## **APPENDIX B**

### **Data sheets for Numeric Methodology**









Oregon Dept. of Forestry 1999										<b>Culverts and Stream Crossings</b>							
Forest Practices BMPCAP					Site Name:								Date:				
					Crew:												
Culvert Detail					Crossing Detail												
Diameter	Inlet	Outlet	Spacing	SedSht	Stream	New/	Feature	Width	Install	Fill	Fill	Inlet	Drop	Bed	Slope	Unfilt.	Sed.Sht
inches	code	code	adq/inad	Y/N	size/typ	Existing	code	feet	code	Stab.	feet	code	1/10 ft	code	%	Ditch Ft.	Y / N
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
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30																	

**Culverts/Stream Crossings Codes**

**Inlet Codes**

FO Fully Open  
 PO Partially Obstructed  
 OB Obstructed

**Outlet Codes**

FU Functional  
 DP Deposition (blocking drainage or  
 depositing sed. below HWL)  
 GC Gully to Channel  
 GH Gully to H.Risk Site

**Installation**

AL Appropriate Location and  
 minimized channel/bank disturbance  
 IL Inappropriate Location or  
 excess channel/bank disturbance

**Fill Stabilization**

RR Riprapped  
 VG Vegetated  
 NO No signif. measures - No erosion  
 UN No signif. measures - Unstable fill

**Feature Codes**

RC Round Culvert  
 PA Pipe Arch  
 OA Open Arch  
 BR Bridge  
 FD Ford  
 LP Log Puncture  
 OT Other (List)

**Bed Codes**

BA Bare  
 BF Baffles  
 SN Silt/Sand  
 CB Gravel/Cobble  
 BL Boulders

ODF BMP Compliance Monitoring Project

Oregon Dept. of Forestry 1999 Forest Practices BMPCAP		Crew: Unit:					Landings		
#	Area	Location			Drainage		Fill		
	ft. <sup>2</sup>	H. Risk y/n	In RMA y/n	In Chan. y/n	Drainage code	Sed. Sht. y/n	On >65% y/n	In High W. y/n	Sed. Sht. y/n
1									
2									
3									
4									
5									
6									
7									
8									
9									
#	Debris/Waste Material				Notes				
	>2' on area ft. <sup>2</sup>	>65% slope depth ft.	In High W y/n	Sed. Sht. y/n	Landing Issues not captured in columns				
1									
2									
3									
4									
5									
6									
7									
8									
9									

Drainage Code

- FU Funtional Drainage
- NF Non-Functional Drainage
- PD Significant Poding Water



Oregon Dept. of Forestry 1999 Forest Practices BMPCAP		<b>Skid Trails</b>		
Unit:		Crew:		
<b>Location:</b>	Stations Tally	Notes		
High Risk Sites/Unstable Area				
High Water of Type F W/in 35' of Type F/D				
High Water of Type N/D				
Floodplain				
RMA				
Wetland				
Slopes >35%				
Others				
		If Delivery:		
<b>Drainage:</b>	Stations Tally	Sed. Sheet y / n	Source Dist. Ft. to Stream	Slope %
Excessive Sidecast (Delivery)				
Non-Func. Waterbars/Rutting				
Not Installed/Excessive Spacing				
Significant Ponding				
Functional				







## **APPENDIX C**

### **Data sheets for Compliance Assessment Methodology**

ODF BMP Compliance Monitoring Project

**Compliance Assessment Rules Fieldsheet**

Site name:

Site #:

Rule Number	Rule Description	Comp. Code	If Non-Compliance:			
			Rule	Admin.	Res.Issue	Effect
<b>ORS 527.670 (6)</b>	Notify downstream surface water holders					
<b>629-605-</b> 140	Notification					
150	When, where, how					
170	Written Plans					
<b>629-610-</b> O40	Reforestation Timing (RMA only)					
O90	LUC Prior Approval					
<b>629-615-</b> 100	Treatment of slash					
200	Mechanical Site Prep Near WOS					
300	Prescribed Burning					
<b>629-620-</b> 100	Prevention of Petro. Products Leaks					
400	Chemical Application Near WOS					
800	Notification of Community Water Mang.					
<b>629-625-</b> 100	Prior Approval					
200	Road Location					
310	Road Prism					
320	Stream Crossing Structures					
330	Road Drianage - Design					
340	Waste Disposal Areas					
410	Disposal of Waste Materials					
420	Road Drainage - Construction					
430	Steam Protection - Crossings					
440	Stabilization					
500	Rock Pits and Quarries					
600	Road Maintenance					
650	Vacating Forest Roads					
<b>629-630-</b> 100	Skidding and Yarding Practices					
200	Landings					
300	Drainage Systems					
400	Treatment of Waste Materials					
500	Harvesting on HR Sites in Western OR					
600	Felling: Removal of Slash					
700	Yarding: Cable Equipment Near WOS					
800	Yarding: Grnd-Based Eqpmt Near WOS					
<b>629-640-</b> 100	Gen. Veg. Ret. Prescptn. For F Streams					
110	Active management					
200	Gen. Veg. Ret. Prescpt. For D/N Streams					
300	Alternative Veg. Ret. Prescriptions					
400	Site Specific Veg. Ret. Prescriptions					
<b>629-645-</b> O10	Live Tree Ret. For Significant Wetlands					
O30	Soil/Hyd.Func. Protect.for Sign.Wetlands					
O40	Understory Veg. Ret. For Sign. Wetlands					
O50	Snags/down wood for sign. Wetlands					
<b>629-650-</b> O10	Live Tree Ret. For Lakes					
O20	Soil/Hydro. Function Protection for Lakes					
O30	Understory Veg. Ret. for lakes					
O40	Snags/down wood for lakes					
<b>629-655-</b> O00	Protect. of Other Wetlds/Seeps/Springs					
<b>629-660-</b> O40	Stream Channel Changes					
O50	Beaver Dams and Natural Obstrutions					

**NARRATIVE FOR OVERALL DOCUMENTATION**

**Compliance**

**Code:** **Site Name:**  
**Notification Number:**  
**Geo-region:**  
**County:**  
**Written Plan:**  
**Stream Name, Size & Type:**  
**Wetlands:**  
**RMA Prescription:**  
**New Road or Reconstruction:**  
**Legacy Road/Skid Trails:**  
**Industrial/Non-industrial:**

**(2.2) Water Protection Rules**

(1) Management in RMA (prescription, reforestation):

(2) Overall assessment (observations/transect data):

(3) Slash accumulations (w/in hwd):

(4) Voluntary leave areas (S/N; >rules, OSWP):

(5) Basal area credit (Active Mgmt)(log D x L / stream W):

(6) Hardwood Conversion (intensity, disturb., sediment):

**(2.3) Significant Wetlands & Other Wetlands**

(1) Fill into:

(2) Machine activity w/in:

(3) Road construction w/in:

(4) Vegetation/Snags and down wood w/in & RMA:

**Narrative Continued**

**Compliance**

**Code: (2.4) Treatment of Slash**

- (1) Prescribed burning, mechanical site prep. w/in RMA (observations/worksheet):
  
- (2) Prescribed burning w/in unit (intensity, sediment):

**(2.5) Road Construction and Maintenance**

- (1) In-unit roads (primary/other uses, erosion, sediment):
  
- (2) New & Reconstruction (stations, design, location, access/in-unit, fills >15', erosion, sediment):
  
- (3) On high risk sites west of Cascades (old/new, slopes > 65%):
  
- (4) Below hwl (old/new):
  
- (5) W/in RMA (old/new):
  
- (6) Unstable areas/"Deep" landslides (old-new, erosion, sediment):
  
- (7) Stream crossings (old/new, size/type, sediment, erosion):
  
- (8) Drainage (type, adequacy, filtering, sediment, erosion):
  
- (9) Waste disposal areas (failure, below hwl):
  
- (10) Rock pits (active/inactive/vacated; in-channel/bank erosion/fine sediment):

**(2.5) Harvesting: Skidding and Yarding**

- (1) Harvesting system (ground ~T/S,SH, ME) (cable ~SS, LS) (helicopter) (other):
  
- (2) Skid trails/yarding/drainage (slopes >35%, compaction, sidecast on slopes >50%)  
(slumps/slides, downhill cable, erosion, sediment):

**Narrative Continued**

**Compliance**

**Code:** (3) Landings (drainage) (high risk sites) (in RMA) (in-channel) (fill &/or debris 2'+ on slopes >65%) (debris below hwl) (erosion, sediment)

(4) Waste materials (petroleum, slash, sidecast material, machine parts):

(5) High risk sites (disturbance source, erosion, sediment):

(6) Harvesting: Cable and Ground Yarding Near Waters of The State:

(7) Corridors (width, canopy disturbance): Understory/Ground/Channel disturbances:

(8) Ground yarding ( trails w/in RMA <35 ft, w/in hwl, sediment, erosion):

(9) Temporary crossings (written plan, prior approval, 8'+ Type N):

(10) Fill storage location (slopes >65%, below hwl, stable location):

**(2.8) Overall Compliance Methodology**

(1) Exceeds rule requirements:

(2) Meets rule requirements:

(3) Minor infractions, but average meets regulations:

(4) Non-compliance, broad infractions throughout RMA/unit:

**WRITTEN PLAN WORKSHEET**

**SITE NAME:**

- ]LARGE LAKE >8 ACRES w/in 100'
- ]STREAMS w/in 100'
  - ]Type F  ]Type D
    - ]Small/50'RMA  ]Medium/70'RMA  ]Large/100'RMA
- ]COOPERATIVE AGREEMENT SITE w/in 300'
- ]RESOURCE SITE (sensitive/T&E) w/in 300'
  - ]Osprey; nesting  ]Great Blue Heron; nesting
  - ]Spotted Owl; nesting  ]Bald Eagle: nest.; roost.; foraging
- ]RESOURCE SITE "CONFLICT"
- ]T&E NESTING & ROOSTING SITE w/in 300'
  - ]Murrelet  ]Peregrine
- ]SIGNIFICANT WETLANDS w/in 300'
  - ]Wetlands >8 acres/100'RMA
    - ]Estuaries  ]100'RMA
    - ]200'RMA
  - ]Bogs  ]50'RMA
  - ]100'RMA
  - ]Important Springs  ]50'RMA
  - ]100'RMA
- ]PRIOR APPROVAL
  - ]Near (1/2mi.); Critical, T, or E Habitat Sites
    - ]Eagle  ]Owl  ]Murrelet  ]Pelican
  - ]Near (1/2mi. for some); Cooperative Agreement Sites('84)
  - ]Compliance/Alternate Practice
  - ]LUC / Suspension of Reforestation
  - ]Beaver Dam/ Natural Obstruction removal from waters-of-the-state
- ]HIGH RISK SITE
  - ]Deferral: SB1211  ]Other
- ]NATURAL REFORESTATION METHODS
- ]USE OF NON-NATIVE TREE SPECIES

**NOTIFICATION #:**

- GEO-REGION
  - ]COAST RANGE
  - ]SOUTH COAST
  - ]INTERIOR
  - ]SISKIYOU
  - ]WESTERN CASCADE
  - ]EASTERN CASCADE
  - ]BLUE MOUNTAIN
- ]HARVEST TYPE 1/  
THINNING UNITS
- ]HARVEST TYPE 2/  
TYPE 3 UNITS
- ]THINNING/  
PARTIAL CU

TREATMENT OF SLASH

CHEMICAL

- ]Mechanical  ]Prescribed Burning  ]Ground  ]Aerial

ROAD CONSTRUCTION & MAINTENANCE

- ]Risk to waters-of-the-state  ]Machine Activity  ]Fills Over 15' Deep/all streams  ]Stream Enhance.

HARVESTING

- ]Skidding  ]Temporary Crossings(all >8')  ]Yarding  ]Corridors  ]Landings  ]Felling
- ]Harvest High Risk Sites/Western Oregon  ]Yarding Across: L/M Type N Stream; Medium Lake

VEGETATION RETENTION/TYPE F & D STREAMS

TREES RETAINED BY  
DIAMETER / SPECIES

- ]General Prescription
  - ]Basal Area greater than Standard Target
    - ]Standard Target Basal Area
    - ]Active Management Basal Area
  - ]Basal Area more than 1/2 Standard Target
    - ]Maintained Conifer Tree "Count"
  - ]Basal Area less than 1/2 Standard Target
    - ]Default
- ]Alternate Prescription
- ]Site Specific Prescription
- ]Buffered

- ]Significant  
Wetland
- ]Estuary
- ]Bog
- ]Important Spring
- ]Large Lake

### CONTACT LIST

**Site Name:**

**Notification #:**

FPF \_\_\_\_\_ # \_\_\_\_\_ Office \_\_\_\_\_ Phone # \_\_\_\_\_

Landowner \_\_\_\_\_ Phone # \_\_\_\_\_

Address \_\_\_\_\_ FAX # \_\_\_\_\_

\_\_\_\_\_ Key: Yes [ ] No [ ]

Contact Person \_\_\_\_\_ Phone # \_\_\_\_\_

Address \_\_\_\_\_ FAX # \_\_\_\_\_

\_\_\_\_\_ Key: Yes [ ] No [ ]

Other Parties \_\_\_\_\_ Phone # \_\_\_\_\_

Address \_\_\_\_\_ FAX # \_\_\_\_\_

\_\_\_\_\_

### Site Particulars

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**Request Monitoring Report:** FPF Yes [ ] No [ ]  
Landowner Yes [ ] No [ ]