

DRAFT

**DEPARTMENT OF NATURAL RESOURCES
FOREST PRACTICES
COMPLIANCE MONITORING PROGRAM DESIGN**

In progress

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INTRODUCTION

The most significant objective of the Compliance Monitoring Program is to create an intensive, consistent, and repeatable field based methodology to determine if landowners are conducting Forest Practices in compliance with the rules. It is imperative that all compliance decisions be made in the field. An on the ground, field based review is necessary to clarify when rules are difficult to interpret, where training opportunities may exist, and most importantly offers a well grounded insight into how we assist the board in making decisions to rules and board Manual Guidance. All field assessments are accomplished with Department of Natural Resources (DNR) Forest Practices Foresters (FPFs) in collaboration with field experienced representatives of the Departments of Ecology (DOE) and Fish and Wildlife (DFW) along with Tribal participants.

The Compliance Monitoring participants strive to complete the field reviews as consistently as possible. This assures that bias is not a factor in implementing an effective and cost efficient program. However, numerous questions on rule interpretation, Forest Practices Application requirements, and special circumstances occur on almost every Forest Practices Application. Rule clarification and educational opportunities are important outcomes of this Program. The DNR has endeavored to cover all aspects of Compliance Monitoring from *Program Specifics* to *Sampling Design* to *Data Collection and Analysis Procedures*. All of these aspects are essential and necessary, however, the Specifications and Guidelines, Field Forms, and Field Data Templates (Appendices A, B and C) are the salient components in gathering the required data to determine compliance with the rules.

Washington State Forest Practices rules have been characterized as “perhaps the most detailed and extensive rules in the Untied States” by the Chair of the National Council for Air and Stream Improvement Inc. (NCASI) (Ice, 2007). This creates many challenges. While timber harvest and its associated activities are evaluated to be out of compliance with the rules if two or three trees are harvested within a 2000 foot long Riparian Management Zone (RMZ), we will try to use our collective professional judgment to determine a three tiered “out-of-compliance” level to offer perspective to the data. A comprehensive biennial report is required to be submitted to the Forest Practices Board (FPB) for consideration and support of rule and guidance analysis.

BACKGROUND

During the period from 1985 to 2004, approximately 8400 Forest Practices Applications (FPAs) were filed each year in Washington State. The DNR, Forest Practices Division, implements the rules approved by the Washington State Forest Practices Board (FPB) and provides staff to regulate forestry and related operations on non-federal forestlands in Washington State. The listing of steelhead and other salmonids from 1997 through 1998 resulted in at least seven emergency rules from 1998 to 2000 that affected Riparian harvest management. In 2001, the FPB approved a comprehensive revision of the Forest Practices rules (WFPB 2001) in response from data in sixty watershed analyses and other information presented in the Forests and Fish Report, (1999). Forest landowners and operators are subject to these revised Forest Practices Rules wherever they grow or harvest trees or conduct activities such as road building and forest-related quarry mining (FPB, 2001). The goals of these Forest Practices rules are:

1. Provide a framework for compliance with the Federal Endangered Species Act for aquatic and riparian-dependent species on non-federal forestlands.
2. Restore and maintain riparian habitat such that it can support a harvestable supply of fish.

3. Meet the requirements of the Federal Clean Water Act for water quality on non-federal forestlands.
4. Maintain an economically viable timber industry in Washington State.

DNR field staff, forest landowners, timber owners, and operators are responsible for ensuring that ongoing Forest Practices are in compliance with the Forests Practices Act and Forest Practices Rules. In order to ensure these objectives are realized, DNR is required to develop and implement:

1. Effectiveness monitoring to ensure the rules are accomplishing these goals,
2. Projects designed to guide adaptive management, and
3. Compliance monitoring.

This Program describes the initial phase of compliance monitoring and borrows heavily from a literature review of Compliance Monitoring programs throughout the United States and from three compliance-monitoring projects that have been completed by the DNR over the last 16 years.

Non Program Administrative Compliance

Compliance consists of two components. The first is administrative compliance that asks the question, “How well does Forest Practices Applications documentation reflect pre- and post Forest Practices activities?” The second is field compliance, which asks the question, “How well are the rules and the terms of the approved FPA being applied on the ground?” Although a few aspects of administrative compliance will be addressed, this Compliance Monitoring Program focuses on field based reviews to determine compliance. Compliance assessments on the ground are the only approach that addresses the question of whether the rules are being implemented properly on the ground.

Most administrative, policy, and procedural activities that are not directly connected to natural resource protection (affecting aquatic or upland habitats or function) are not included in this Program. By design, compliance and field audits (DNR, 2006) conducted within the FP Division’s jurisdictions will satisfy administrative compliance evaluation. Information on the Forest Practices field audit Final work plan is available at: <http://www.dnr.wa.gov/forestpractices/compliancemonitoring/auditplan.pdf> Issues about interdisciplinary team operation or consistent application processing can be part of the regular application procedures. Approved applications will be assumed to have administrative compliance in order to reach the approval stage.

Program Limitations

While DNR has applied considerable effort in establishing a compliance-monitoring program in the past; limited resources, conflicting responsibilities, and a tendency to expand the scope of the program among those involved in planning had delayed actual implementation of a full scale program. The DNR is focused on determining if the rules are being implemented properly on the

ground, reporting to the Forest Practices Board for consideration and support of rule and guidance analysis, and providing statistically sound information. Therefore Compliance Monitoring cannot:

1. Provide the framework for effectiveness monitoring, direct water quality monitoring, or validation monitoring,
2. Be considered a scientifically exhaustive investigation,
3. Cover all types of operations,
4. Serve as an enforcement program,
5. Serve as an audit of the DNR's regulatory staff, or
6. Be considered a Cooperative Monitoring, Evaluation, and Research Committee project.

Non-Compliance enforcement protocol

There are no enforcement objectives within the Program. Findings of non-compliance that normally would be subject to an enforcement protocol will be treated as follows:

1. Notify the appropriate DNR Region Forest Practices office of the violation. Provide the location of the violation, date and time observed, and the nature of the violation.
2. The Region will respond as per Forest Practices enforcement protocols. These procedures are the same taken for any reported Forest Practices violation during normal operations.

PROGRAM DESIGN

Compliance monitoring is an important and major component of the Forests and Fish Report. The Department of Natural Resources Forest Practices (FP) Division envisions that Compliance Monitoring will be conducted for many years. WAC 222-08-160 (4) states that:

The department shall conduct compliance monitoring that addresses the following key question: "Are Forest Practices being conducted in compliance with the rules?" The department shall provide statistically sound, biennial compliance audits and monitoring reports to the board for consideration and support of rule and guidance analysis. Compliance monitoring shall determine whether Forest Practices rules are being implemented on the ground. An infrastructure to support compliance will include adequate compliance monitoring, enforcement, training, education and budget."

We have been asked to develop a protocol at the earliest reasonable time, but not later than mid-2006. For these reasons, this protocol is designed around the following considerations:

1. A data set that fairly characterizes the statewide status of compliance of quantifiable sections of the 2001 rule package must be achieved prior to the end of the 2005/2007 biennium in order to report to the FP Board by the fall of 2007.
2. The protocol must achieve these results within existing constraints of budget and allotted personnel.

3. Compliance monitoring during FY07 will be oriented toward producing descriptive statistics, which will provide an accurate snapshot of Washington's Forest Practices activities (rather than a comprehensive package that may suggest cause and effect relations and other higher-level conclusions).
4. Inclusion of a few qualitative questions, for example those that call on operators to, "minimize" a given impact, will be included along with prescriptive rule requirements.
5. Emphasis is placed on developing a statistically valid data set as a whole rather than developing a group of data sets that achieve geographic or rule-set objectives.

The last point is critical. Developing stratified data sets, which are data sets based on pre-sorting FPAs according to subcategories (i.e. Regions, landowners) rather than selecting applications at random, has the advantages of pointing to specific problems with compliance. However, stratification will adversely affect statistical validity of the set for use in future studies unless very large data sets are gathered. Preliminary analysis of the sizes of the sample needed to achieve an accurate statewide picture using stratified components indicate hundreds of Forest Practices applications will need to be examined thus contravening considerations 1) and 2) above. Compliance Monitoring covering several years will provide sufficient data to analyze trends in geographic areas, landowner compliance, and specific rule sets or questions. These elements of the Program are explained in greater detail below.

Program Objectives

As noted above, the Compliance Monitoring Program (hereafter referred to as the "Program") is designed to provide information necessary to determine if all of the timber landowners and operators are conducting Forest Practices in accordance with the Forest Practices Rules in effect since July 2001. The objectives of the Program to meet our goals are as follows:

1. Develop methods to streamline and maintain a cost effective compliance monitoring process.
2. Provide relevant and accurate information to the adaptive management program to modify or to clarify the rules in order to improve compliance.
3. Identify opportunities to provide education (especially for complex Rule categories) for landowners, regulators, consultants, and operators as suggested by non-compliance rates.
4. Provide information for Rule and Board Manual Revision if necessary.

Program Organization

DNR Forest Practices Operations Division is responsible for the administration of the Program and consists of a Program Manager and Field Coordinator and oversight and guidance by the Assistant Division Manager for Forest Practices Operations. The Program Plan was developed with assistance from DNR personnel, and cooperators from the Washington Department of Fish and Wildlife (DFW) and Washington Department of Ecology (DOE).

Program Manager duties include:

1. Develop the Program,

2. Oversee data acquisition,
3. Supervise and train Division staff,
4. Assist in field protocol training
5. Respond to intra-and interagency requests,
6. Assure that the project is completed on time,
7. Assume the ultimate responsibility for quality control,
8. Analyze field data to meet reporting requirements, and
9. Make necessary adjustments to the program based on end of the year field evaluations by the assessment teams.
10. Adjust Program elements to reflect new or revised changes to the Forest Practices rules.

The Field Coordinator will:

1. Assist in designing field methods and protocols,
2. Organize and implement field training,
3. Create field notes templates in order to record field data consistently,
4. Organize interagency field teams,
5. Provide quality control, quality assurance protocols and data management,
6. Assist in development of and organization of field training,
7. Oversee and manage the Forest Practices Application selection process, and
8. Upon completion of the field season, conduct a post survey evaluation of the first year's Compliance Monitoring field reviews. Incorporate comments and suggestions from the Forest Practices Foresters, DOE, DFW, and tribal participants to improve the Compliance Monitoring Program.

Field Personnel for Assessments

Compliance Monitoring is a DNR Region performance deliverable. The Department is committed to utilizing DNR Forest Practices Foresters (FPFs) for the compliance monitoring field assessments. It is the prerogative of each region to select the appropriate number of FPFs to complete the job. These experienced foresters have a thorough understanding of the rules, which are sufficiently complex that each FPA evaluation team must include an expert in use of the rules and forestry. Performing the more extensive field reviews that are required for the Compliance Monitoring program will add to their knowledge of the rule requirements. The group of DNR FPFs used in the program has collectively many years of "on the ground experience" in Forest Practices.

DOE and DFW will also supply experienced field staff with operational knowledgeable of the Forest Practices rules. Tribal representatives are invited to participate, and landowners are invited to attend field reviews. The FPFs will liaison with the field coordinator and will:

1. Review the random sample FPAs for their Region and determine if the activities have been completed. They will notify the Field Coordinator within 3-4 weeks of receiving their list.
2. Review the field schedule and confirm participation of their regional DOE, DFW and tribal participants by email or phone to confirm field dates. Notify the landowner with a courtesy call with date of field review. Landowner may attend.

3. Work to perform the assessment surveys consistently and according to the established protocols throughout the field season, and at each site.
4. Assure that the FPF who approved the original application is available to provide site directions, logistical information, help with field measuring, and providing any information that may be helpful in understanding the application, but she/he will not make decisions related to compliance during the field reviews.
5. Be responsible for maintaining or obtaining field notes as outlined in the Specifications and Guidelines during the review.
6. Submit all field notes and forms to the Division in a timely manner.

DOE and DFW participants are expected to:

1. Respond to scheduling requests for field days in a timely manner.
2. If unable to attend a scheduled field day, to find a replacement from your respective agency.
3. Come prepared with at least the following field gear and supplies:
 - a. Field vest: paper, pencils, permanent pen/paint pen, and loggers tape with diameter measurement. Bring laser range finder, two way radios, etc., if you have them available to you or items requested by the Lead DNR person.
4. Participate in field measurements following the Specifications and Guidelines and instructions from DNR Lead. If there are concerns over how the field work is being conducted, discuss with DNR Lead and consult Specifications and Guidelines.
5. Provide constructive discussion of the questions in the field forms.
6. If there is disagreement about the rule, consult the rule book along with constructive discussion of the rule in question.
7. The DNR Lead has the final call on field procedures and answers on the field forms. It is up to the DNR Lead to be accountable for accuracy and consistency of the field work.
8. If any concerns that aren't being fulfilled by the DNR Lead, contact the Program Field Coordinator, Program Manager, or DNR Operations Manager.

Program Budget

The DNR received approximately one million dollars for two years of compliance monitoring. Of that amount, 26% is for overhead expenditures (office, computers, field vehicle gas and maintenance). Pass-through funds of approximately \$179,000 to DFW and \$269,000 to DOE for Program development, field participation, and review and assistance in data analysis were allocated.

Program Plan Review

The Program Plan was developed with representatives from the DNR, DOE, and DFW. In May 2006, after internal review, the Program Design was distributed to caucuses in the TFW stakeholder group. These groups were comprised of: The Conservation Caucus, Northwest Indian Fisheries Commission, Small Forest Landowners, Washington Forest Protection Association, Washington Farm Forestry Association, United States Fish and Wildlife Service, National Marine Fisheries Service, and the Washington Association of Counties. Each caucus chose a representative to collate and submit comments and suggestions. The Program Manager together with agency representatives reviewed comments and either modified the plan or responded in writing to comments.

During the review process a few stakeholders wanted a detailed review of the Compliance Monitoring Program by the Cooperative Evaluation, Monitoring, and Research (CMER) group of the Adaptive Management Program. The Compliance Monitoring Program is not a CMER project. Therefore, the FP Board approved a motion in February 2007 that required an independent technical review of the Program by four to five participants with operational monitoring experience. This effort is being led by Darin Cramer, the Adaptive Management Program Manger and results will be available by early fall, 2007.

Table 1 illustrates the proposed schedule for the 2006 Program to assure meaningful results the first field season.

Table 1 Schedule for completion of the Compliance Monitoring Program 05/07 biennium.

Event	Proposed Date	Participants	Outcome	Comments
Program Manager hired	January, 2006	Temporary field coordinator	Work with DOE and DFW representatives	Begin Program Plan
Draft Plan complete for Review	April 10, 2006	Internal review	Draft for external review	Incorporation of previous concerns from stakeholders pre 2006
Plan sent out for external review	April 14, 2006	TFW caucuses	Comments from designated representative	
Review comments Due	May 1, 2006	One representatives from each Caucus		Meeting dates set
Completed Program document	May 15, 2005	DNR, DOE, DFW	Final draft document	
Finalize Random Sample with data on completed activities	May 10, 2006	Regions, Division	2006 list of FPAs for review	
Final Field Schedule Completed	May 13, 2006	DNR Regions, DOE, and DFW	For planning purposes to ensure participation	
Training	May 1 to June 20, 2006	FPF, DOE and DFW and tribal; representatives	Consistent understanding of expectations and methods used	Both office and field training. Region locations are at FPA locations that are part of the Program Random Samples.
Field Surveys	June 2006 to November 2006	Regions Forest Practices Foresters (FPFs), DOE and DFW participants	Completion of all field assessments.	Send raw data to Division for analysis. Both field forms and excel sheets will be saved for future comparison
Quality Assurance and Control	During the entire field season	DFW, DNR Program Mgr. and Field Coordinator	Field review at least 10% of completed assessments	Field reviews of randomly selected FPAs
Start 2007 Program	January 15, 2007	DNR, DOE, DFW Tribes	An even flow of field reviews from January to June 30th	Reduce the impact of fire, summer vacations on scheduling.
Reinvigorate Stakeholder meetings	March 2007	TFW caucuses	Comment and contribute to biennium the 07/08 Compliance Monitoring	Determine new rules to review, assist in refining the Program
Program sent for technical review	July 2007	Reviewers to be decided by June 2007	Review technical aspects of the Program. Questions developed by stakeholder groups.	FP Board passed a motion in Feb 2007 to require reviewers to have operational monitoring experience.
Begin Biennium 2007/2008 Field Reviews	July 1, 2007	DNR, DFW, DOE and tribal representatives	Continue Compliance Monitoring of Riparian and Roads and new rules by scheduling field reviews to coincide with biennial requirements	Also review 20 Acre Exempt parcels, and Alternate Plans.

Training requirements

A classroom and field-based training will occur every year as the primary means of assuring high-quality results and timely completion of the biennial work. Training in will be required of all FPFs, DOE, and DFW participants. Tribal representatives who are interested in participating in this program will also be required to attend training. Tribal personnel are aware that

landowners may restrict entry to their property. Training will stress the importance of consistent field method protocols, data collection procedures, use of field equipment, error analysis, and measuring parameters in reviewing the applications. A key topic will be maintaining the discipline to obtain consistent measurements throughout the field season, regardless of site conditions. (Protocols for data collection will closely follow the methods available to landowners when designing their operations. See Specifications and Guidelines, Appendix B).

Auditing, quality assurance - quality control

Quality control will be accomplished by several mechanisms:

1. Assigning a limited number of DNR personnel who will be dedicated to the program.
2. Training in field protocols methods as described in the Compliance Monitoring Data Collection Specifications and Guideline.
3. Direct oversight by the Field Coordinator spending approximately 65% of his/her time participating in field reviews. The Forest Practices Division Compliance Monitoring staff will work with the field teams for 50 to 75% of the FPAs to impress consistency, provide ongoing training, and make decisions when issues arise in the field.
4. Participation within the regions with designated DOE and DFW representatives will add another layer of consistency to the project.

SAMPLING DESIGN

Rule categories and “activities”

Forest management professionals agree that activities with the greatest potential to impact public resources are those associated with Riparian Management Zones and Roads. The 2005/07 Program will provide evaluation of compliance primarily covering two major rule categories:

1. Forest Practices defined in rules WAC 222-30-021 Western Washington Riparian Management Zones, WAC 222-30-022 Eastern Washington Riparian Management Zones.
2. Road Construction, Maintenance, Landings, Road Abandonment, Permanent and Temporary Crossings on Type N water, and Fords from WAC 222-24 Road Construction and Maintenance.

FPAs can contain numerous harvest options or multiple road activities. A single FPA may contain a “No-Inner Zone Harvest”, “harvest on a Type N stream”, and a “Wetland Management Zone”. There may also be “new or temporary road construction” and a “road abandonment” project. Each one of these Forest Practices are grouped into specific “activities” for the purposes of Compliance Monitoring field reviews. This rule structure can result in over 100 possible questions within an individual rule category. Successful Compliance Monitoring will be the result of asking questions with “Yes” and “No” answers to specific and direct requirements of the rules. All compliance questions are directly tied to specific WAC language

Other rules such as WAC 222-28 - Forest Chemicals, will not be addressed as the ability to monitor chemical applications and the effects on soil and water are complicated and better

addressed by effectiveness monitoring. Also, rules such as “Even-Aged Harvest-Size and Timing” (WAC 222-30-025) can be monitored with air photos and can be assessed in the office if this rule set is monitored in the future.

Several activities occur too rarely for inclusion in a sample set based on random sampling. These activities may be evaluated in separate surveys in subsequent years. These include:

1. Small Forest Landowner (SFL) 20-acre exemptions,
2. Alternate plans,
3. Cultural resources,
4. Hardwood conversions,
5. Unstable slopes delineation and avoidance, Class IV Specials
6. Class II applications (non-renewals).

Table 2 shows an example of the occurrence of alternate plans and 20 acre exempt parcels for selected years that the Forest Practices Application Review System (FPARS) has information. A random sample would probably only access a couple of these applications per year.

Table 2. This table illustrates the rare occurrence of approved FPAs Alternate Plans and 20-Acre exempt activities during the period from 2000 to 2005. (Data from Forest Practices Application Review System (FPARS) Oracle database.) The yearly average of all classes of applications for this time period is 6144.

Approved Alternate Plans for Large landowners							
Region		2000	2001	2002	2003	2004	2005
NORTHEAST		0	0	3	2	6	4
NORTHWEST		1	2	6	13	4	7
OLYMPIC		5	4	11	8	20	8
PACIFIC CASCADE		1	2	9	9	24	21
SOUTH PUGET SOUND		0	0	0	2	7	12
SOUTHEAST		2	0	0	4	0	4
Totals		9	8	15	11	61	28
Approved Alternate Plans for Small Landowners (Note: no data for 2000 and 2001)							
STATEWIDE				2002	2003	2004	2005
Totals				14	27	42	28
Approved 20-Acre Exemptions (Note: no data for 2000 and 2001)							
Region				2002	2003	2004	2005
NORTHEAST				3	12	36	21
NORTHWEST				2	30	37	31
OLYMPIC				3	9	9	10
PACIFIC CASCADE				4	68	54	62
SOUTH PUGET SOUND				3	20	26	13
SOUTHEAST				1	5	1	2
Totals				17	144	163	139

Population Description

The population for 2006 field assessments will be chosen from all *approved* and *completed* Class II (renewals), Class III, and Class IV-Special FPAs with approval dates between August 1, 2004 and July 31, 2005 for the 2006 field season. We will consistently use these dates (adding one year to each date) as the parameters for each successive year of Compliance Monitoring. This time frame was chosen because:

1. A consistent annual sampling period will reduce intra-annual variation in application submission among landowners so that one landowner is not more likely to be sampled based upon arbitrary application submittal practices.

2. Obtaining landowner permission will not be required as these applications will be active during the field season that will expand for year round collection. Requiring landowner permission and being denied may bias the entire project.
3. Every year there is a probability that the activities will not be completed by the field season. These applications will obviously be deleted. The other possibility is that some applications may expire if the field season is extended due to fire or other circumstances. Knowing these two situations, there is not an ironclad system that will allow us to be sure that all applications could be selected for review for each field season.

There is a perception that prior knowledge of an FPA being chosen for compliance may bias the study results. Therefore, the review of activity completion will be conducted without the knowledge of the landowners.

Random Sampling and the number of FPAs for selection

“A random sample is a good thing. It gives every member of the population (our FPAs) an equal chance of being selected and it uses some mechanism of chance to choose them” (Rumsey, 2003). Landowners don’t select or eliminate themselves from the population. DNR, DFW, or DOE cannot manipulate the selection, and there is no bias as to selection based on preconceived ideas or other agenda driven objectives.

We assumed a binomial response to the question of whether the Rules were implemented correctly on the ground for each Forest Practices Application (Yes/No). Our population for the 2006 field season was 4671 Class II renewal, Class III, and Class IV- S applications that met criteria described above. A sample size calculation was used to determine the optimum sample size for a study with a 95% confidence level and a projected 10% confidence interval (also known as margin of error, which can only really be calculated when the project analysis is complete). The sample size for this population is 94. However, we hope we can review ~ 100 FPAs during the field season, thus improving our confidence and shortening the time needed to collect enough samples to estimate compliance for Rule categories (RMZs and Road activities). We can increase this number if the Compliance Monitoring reviews are conducted in an even flow throughout the year.

There have been an average of 8432 Class II, II renewals, III, IV-Generals, and IV-Specials FPAs annually during from 1985 to 2004. In 1994 the FPA was lengthened to a two year approval time line, rather than the previous term of one year. However, if we look at applications since the new Forest and Fish rules were adopted Rules in 2001, this average fell to 6072 per year. (See Figure 1) The number of applications approximately mimics the region proportionality of the state average annual number of applications except for Pacific Cascade Region. As the Program progresses there will be statistically valid information to determine regional similarities and differences, training needs, and opportunities for effectiveness or adaptive management studies. It is expected that the total number of FPAs reviewed will approach the distribution of the population of FPAs received as Compliance Monitoring continues in the upcoming years.

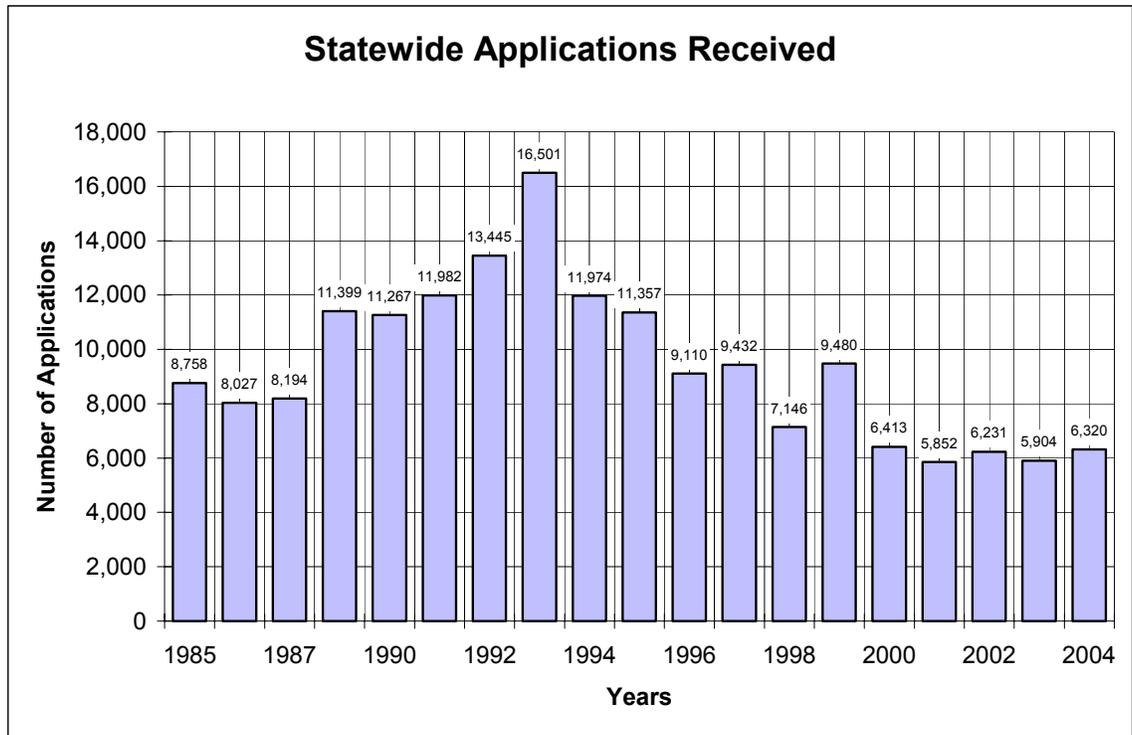


Figure 1. Number of all classes of applications submitted per year from 1985 to 2004. The new forest Rules were enacted in 2001 and the number of applications has remained relatively constant since then.

Figure 2 illustrates the distribution of applications among the six DNR regions. The numbers for the Pacific Cascade region include both the previous Central and Southwest Regions. Each year the population of applications that will be sampled will change. We expect the number to be over 4,000, as we are not including Class IV-Generals and Class II applications.

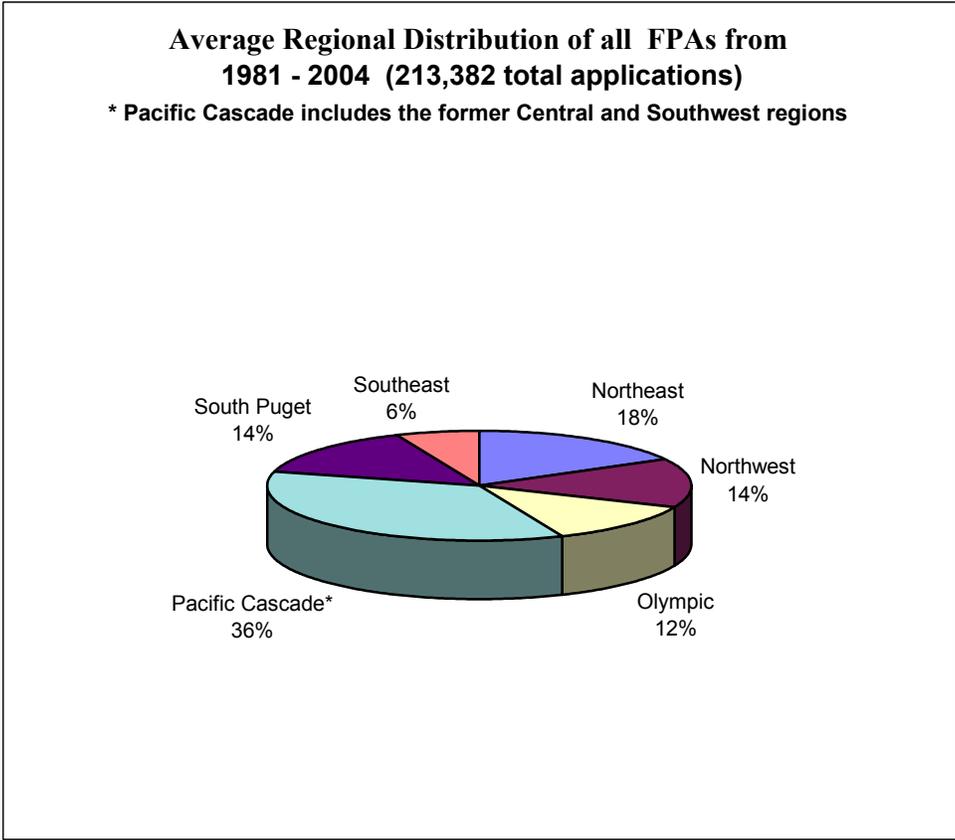


Figure 2. The pie chart shows the average distribution of FPAs by Region from 1981 to 2004. Class II, II Renewals, III, IV-Gs and IV-S are included.

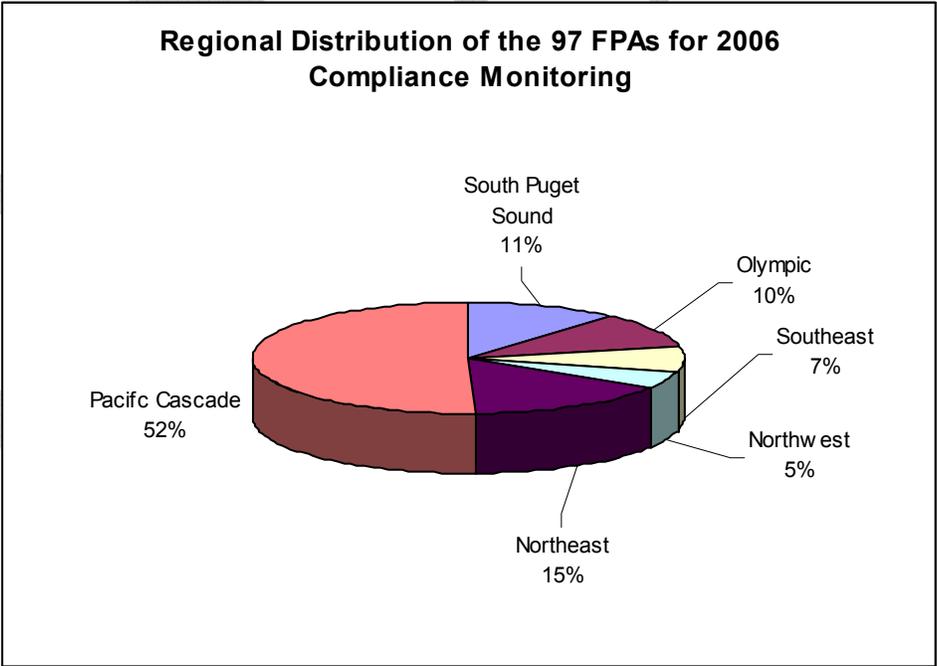


Figure 3. The 2006 distribution of the random sample selection for 97 FPAs for review. Class II renewals, Class III, and Class IVS applications are included in this data set.

Sample Criteria

In order to assess the implementation of the Rules that have the most potential to impact public resources, the Simple Random Sample results were screened to select those applications with either RMZs and/or Road activities. An FPA can have more than one forest activity, and assessing compliance on more than one Rule while on site increases operational efficiency. Each activity representing a different aspect of the Rule category will be assessed separately and without inferring that there is any connectivity from one Rule category to another. Each Rule category will be assessed with specific questions taken directly from the WACs, using unique protocols, measurement methods, and with specific analyses in the database. If relationships appear as a result of data analysis, these will be reported. However, the program is not designed to address the relationships between the various activities being monitored.

Selection of FPAs for Field Review

DNR will use a consistent method for identifying FPAs for review. The steps used to identify the samples for the 2006 assessment were:

1. DNR randomized the population of FPAs approved between August 1, 2004 and July 31, 2005 using the DNR Oracle database.
2. Each application was opened and reviewed by the DNR Compliance Monitoring Program Manager, Field Coordinator, or the DFW Compliance Monitoring biologist assigned to this project. FPAs that did not meet the sampling criteria were passed over and the next FPA in random order was checked.
3. Each region received a list of these random and criteria-confirmed FPAs for confirmation of completed activities. These determinations will be conducted without the knowledge of the landowners. There is a perception that prior knowledge of an FPA being chosen for compliance may bias the study. If the activities are not complete, the next randomly selected FPA will be chosen.

Landowners will be notified that their FPA will be part of a Compliance Monitoring program review prior to the actual field assessment. See Scheduling Field Assessments, page 28)

A pool of 225 applications was needed in order to obtain our 97 samples meeting our criteria. Fifteen of the first 100 FPAs were passed over due to aerial sprays, an historical site issue or Small Forest Landowner Family Forest Fish Passage Program culvert replacements. FPAs may be deleted from the sampling pool if the forest activity is not completed by the start of the field season. Some FPAs may be deleted if the water typing was in error and an on the ground assessment showed there was no water issues. Applications will be continually selected from the random sample order if circumstances or sampling criteria preclude inclusion for field review.

Sample Size

The primary objective is to estimate the proportion of FPAs statewide that are in compliance with the Rules. In completing this estimate we will be determining the number of rule activities that are in compliance, which will ultimately answer the question “are Forest Practices being conducted in compliance with the rules?”. We hope to eventually estimate the compliance rate by specific geographic regions (east side verses west side), by specific Rule categories (roads, Type N streams, Type F streams), and by each of the six DNR administrative Regions.

The confidence interval for a test (chi squared) of compliance versus non-compliance is a function of the estimated proportion of the population (FPAs) that is compliant, the level of confidence required (Figure 4), and the number of FPAs evaluated (sample size) (Figure 5). The level of compliance is unknown but a 50% compliance rate results in the widest (worst case) confidence interval (margin of error). The alpha value or confidence level chosen depends largely on the level of confidence required in the estimate. Increasing sample size will decrease the confidence interval width but with diminishing effect, especially after sample size exceeds 30-35. The confidence interval for a population with compliance rate=50% (worst case), with a confidence level of 95%, and sample size=35 is approximately +/- 14% and was chosen as a target for the program. Earlier compliance monitoring studies have shown higher rates of compliance, 80%, yielding a confidence interval of approximately 11%.

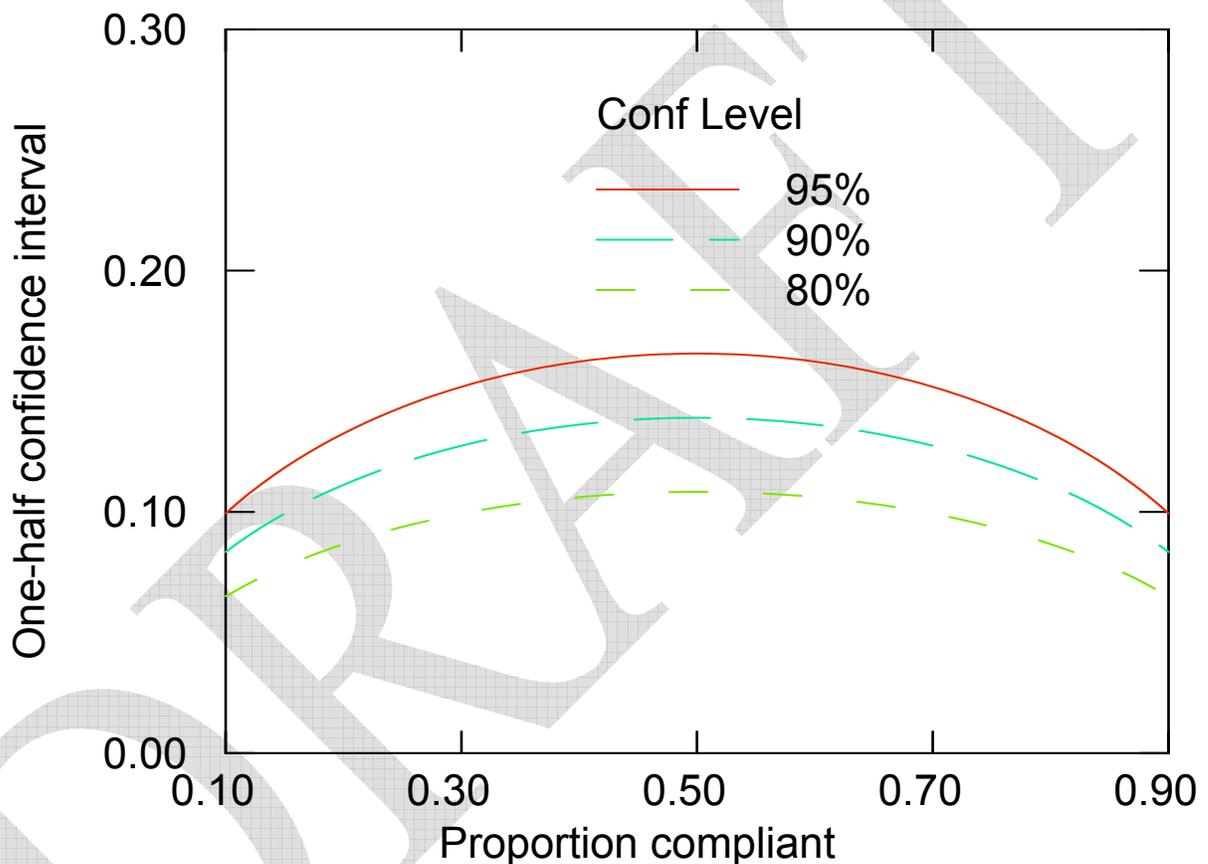


Figure 4. This plot shows how the confidence interval (CI) varies with the estimate of the proportion meeting a particular criterion (compliance, in our case). The CI is widest at 50% compliance and decreases as we accept an answer with less confidence. In our case, with N= 35 samples (FPAs) and an estimate of 50% compliance our 95, 90, and 80% confidence intervals are 50% plus/minus 17, 14, and 11%, respectively.

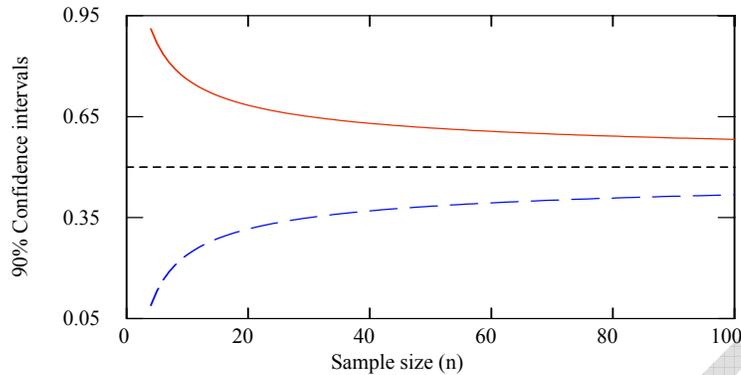


Figure 5. This plot shows the relationship between sample size and 90% confidence interval (CI) assuming a worse case scenario (with regard to CI width) with a compliance rate of 50% (dashed line). Other confidence intervals (80% or 95%) would look similar but with smaller or larger CI, respectively.

Achieving Statistical Validity

The DNR ran an analysis of the first 100 randomly selected FPAs and 85% included an RMZ harvest or roads. The remaining 15% were a mix of chemical applications, Class IV Generals, and other rare occurring activities. By initially focusing on the subset of FPAs with RMZs or Roads, the rate of compliance of the vast majority of FPAs can be estimated and characterized. Table 1 shows the percentage of these FPAs summarized by Rule group, east versus west side, and by DNR Region. Using the 23 year average of FPAs submitted (Figure 2, page16) 76% of these FPAs are on the west side and 24% east of the Cascade Crest. Percentages by DNR Region range from 6% in the Southeast to 36% in the Pacific Cascade Region. Based on these percentages, 100 FPAs sampled per year, (Green = one year to achieve sample size, Blue = 1 to 4 years, and red = 4 to 5 years, black = longer than 5 years) See Table 3.

Target sample sizes will be reached in year one for the statewide assessment and west side assessment of all three Rule categories. East side targets are met in two or three years. Target samples sizes for most DNR Region scale assessments will be reached within five years. Assessments of the Southeast Region by Rule group may take up to 10 years because of the small number of FPAs received.

The projected number of years needed to achieve the target sample size of 35 assuming 100 FPAs monitored per year are shown in parenthesis. Years were rounded up to next whole number. If time allows, extra samples may be achieved by increasing the number of FPAs for those Regions with the longest time to achieve target sample sizes.

Table 3 shows the projected number of years needed to achieve a sample size of 35 at the target precision listed above

The estimated number of FPAs by Region for 2006 followed by the number of years that will be required to achieve the target sample size in parentheses. (The target, which allows a 90% confidence level, requires a minimum of 35 samples per rule category.)

	DNR Region								
	Statewide	W WA	E WA	PC	OLY	NW	SPS	NE	SE
FPA	100 (1)	76 (1)	24 (2)	36 (1)	12 (3)	14 (3)	14 (3)	18 (2)	6 (6)
F RMZ	59 (1)	45 (1)	14 (3)	21 (2)	7 (5)	8 (5)	8 (5)	11 (3)	4 (8)
N RMZ	76 (1)	58 (1)	18 (2)	27 (2)	9 (4)	11 (4)	11 (4)	14 (3)	5 (8)
Road Activities	74 (1)	56 (1)	18 (2)	27 (2)	9 (4)	10 (4)	10 (4)	13 (3)	4 (8)

The following table is the actual numbers based on the first year of activities reviewed. We reviewed 97 FPAs with 278 activities. Green = one year to achieve sample size, Blue = 1 to 4 years, and red = 4 to 5 years, black = longer than 5 years

Table 4 Years to achieve target sample size for Type F and Type N RMZs and Road Activities based on 2006 actual field review data.

The total number of FPAs by Region for 2006 followed by the number of years that will be required to achieve the target sample size in parentheses. (The target, which we assume should be at least 35 samples to be meaningful).

	DNR Region								
	Statewide	W WA	E WA	PC	OLY	NW	SPS	NE	SE
Percent of FPAs 2006	100%	77%	23%	52%	10%	5%	11%	15%	6%
FPA	97 (1)	75 (1)	22 (1.6)	49(1)	10 (3.5)	5(7)	11(3.2)	15 (2.3)	7(5)
F RMZ	59 (1)	52 (1)	8 (5)	21 (1.7)	7 (5)	8 (4.4)	8 (5)	11 (3.2)	4 (8.8)
N RMZ	59 (1)	42 (1)	17 (2.1)	27 (2)	9 (4)	11 (4)	11 (4)	14 (2.5)	5 (8)
Wetlands	7(5)	4(8.8)	3 (11.7)	1 (35)	0	0	3(11.7)	3(11.7)	0
Road Activities	152 (1)	107 (1)	45 (1)	64(1)	23(1.5)	14(2.5)	16(2.2)	21(1.7)	14(2.5)

Sampling Units

The Sampling unit must be compatible with the with the plan objective. Since the RMZ portion of the Program involves evaluation of Rules based on complete stream segments; sub-segments cannot be evaluated separately (McFadden, 2004). It will be necessary to evaluate the entire segment. These segments will be chosen randomly by selecting the first segment identified in the FPA, (A or 1 depending on the numbering system on that FPA). For different harvest options on a single application, randomly selected segments representing each option will be assessed. For example, when there are Type F, Np and Ns streams on an application, one complete segment for each type of riparian activity will be reviewed. This scenario will expand for all of the activities that field protocols have been developed.

All road construction will be reviewed on an FPA will be reviewed and will be driven with emphasis on water crossings and potential to impact any typed waters. Road abandonment sections will be chosen as the most northern or eastern segments until there is a total of 2500 feet reviewed. This procedure will be followed every year, however to reduce any bias, the number order or geographic parameters may change.

DATA COLLECTION AND ANALYSIS

Specifications and Guidelines for Field Reviews were developed (See Appendix B). Separate forms for each activity within RMZ and Road rules have been developed and are included in Appendix C. Field Noted Templates are in Appendix D. Field data will be recorded on field forms and transferred to excel spreadsheets for analysis.

Incidences of mistyped or unidentified streams, wrong site class designation, tree species selection at planting, etc. will be noted but not disqualify an FPA for compliance if the conditions were adhered to. This is an important point, as compliance on individual FPAs will be based on the FPA as it was approved by DNR.

All Compliance Monitoring information will be entered into an Excel database. DNR Forest Practices Division Information Technology personnel may create an Oracle database if the department determines this is necessary. The integration with the existing corporate Forest Practices Oracle database will allow professional technical support, greater analysis capability, and consistent biennial reporting. Budget will decide this integration.

The data analysis will include all field observations for each activity. A summary of the questions on the forms that consistently indicate non-compliance with the rules will be reported. The analysis will also report comments on each non-compliance determination to fully understand these determinations. There is a mixture of both quantitative information generally subject to a single compliance/non-compliance decision and qualitative information that require knowledge of a particular rule and site constraints.

1. Quantitative information includes specific questions as:
 - a. Core, Inner and Outer Zone buffer distances WAC 222-30-021(1) (ii) (B) (II) Option 2 Leaving trees closest to the water.
 - b. Sizes of relief culverts as per WAC 222-24-020 (15)
 - c. Seep and Np confluence protection buffer measurements.
2. Qualitative information includes questions such as:
 - a. “Outslope the road surface where practical. Where outsloping is not practical, provide a ditch with drainage structure on the inside of the road, except where roads are constructed in rock or other material not readily susceptible to erosion” (WAC 222-24-020 (17)). Such rules require a determination to what is “practical”, what is “susceptible to erosion”, and “how much erosion is the minimum.”

- b. WAC 222-30-020 (6) (e) “Approximate determinations of the boundaries of forested wetlands greater than 3 acres shall be required. Approximate boundaries and areas shall be deemed to be sufficient for harvest operations.” Such approximate boundaries are commonly delineated by harvest managers using GPS points subject to considerable uncertainty, but acceptable for approximations. There is no guidance as to what approximate means, which further complicates compliance on these types of rules.
- c. “Was sediment delivery limited?” (WAC 222-24-010 (2))

All questions will have multiple-choice answers of Yes/No/Not Applicable/No Consensus. All the participants on the field review will be trained in answering these questions to reduce inconsistency and bias. In order to answer these questions the following procedures will be adhered to:

1. “Yes/No” answers will reflect consensus among all parties.
2. “Not Applicable” answer will reflect that the Rule question does not pertain to this particular activity.
3. The “No Consensus” answer reflects that there was non-concurrence in the field. As DNR is ultimately responsible for this project, these questions will be referred to the DNR lead FPF for an answer. The No Consensus will be noted in the analysis.

Data Gathering

The methods for data collection are described in Appendix B: Standard and Guidelines. The challenge of evaluating compliance is complicated in that riparian zones can be used to meet multiple requirements. All trees in the riparian zone can be counted toward meeting the wildlife reserve trees (WRTs) and green tree recruitment (GRTs) requirements. The rules state that WRTs and GRTs left to meet other requirements of the rules shall be counted toward satisfying the requirements of this section [222-30-020(11) (c) Wildlife Reserve Tree Management]. The rule [222-30-020(11)(e)] also says WRT and GRT “retention areas may include, but are not limited to, riparian management zones, riparian leave tree areas, other regulatory leave areas, or voluntary leave areas that contain WRTs and/or GRTs.” While measurement of a riparian zone may indicate that enough basal area and trees per acres exist to comply with the riparian requirements some of the residual trees may have been counted toward green tree requirements. This creates the possibility that the buffer may comply with one regulatory requirement but not another. (McFadden, 2004).

For example, the Bull Trout Overlay in Eastern Washington requires a 75 foot shade buffer on Type 3 streams. This element of the Riparian rules will be evaluated first if applicable; otherwise the rules for the various habitat types will be evaluated. The evaluation of compliance with the shade requirements is also subject to a general lack of precision based upon the use of a densiometer to quantify shade. It is also impossible to reconstruct shade measurements once trees have been harvested.

General Office Review for both Eastern and Western Washington

1. Obtain FPAs (chosen at random by Forest Practices Division).
 - a. The segment for review will also be identified by random sampling
2. Obtain vicinity maps and photos if possible.
3. Examine the application to verify:
 - a. Stream lengths from map (scale from map, GIS, or orthophoto etc.).
 - b. Site class(es) (for the segment being examined).
 - c. If the application lies within any sensitive species areas, for example, within the Bull Trout overlay in Eastern Washington.
 - d. Harvest options used:
 - i. Determine applicable rules,
 - ii. Determine stream width,
 - iii. Inner zone width,
 - iv. Outer zone width and required number of outer zone trees based on the acres of outer zone,
 - v. CMZ presence, and or Log placement strategy used (if any).
4. If needed, contact the local FPF who approved the FPA for assistance with any additional information they have.
5. Review RMZ field data collection form; determine types of data needed to complete the assessment.

Levels of uncertainty in measurements

Compliance monitoring in Forest Practices is a function of several elements. For example, the position of the bank full width needs to be determined as accurately as possible before using a measuring tool to define the width of the buffer. Buffer measurement becomes an exercise in significant figures analysis and such determinations can only be as exact as the error in measurement. Both landowners and the Compliance Monitoring Teams are subject to the same error.

The forest industry and FPFs commonly use a variety of measurement techniques, each with their own inherent uncertainty. For example, foresters may use logger's tapes or string boxes, which have absolute uncertainties on the order of 0.5 feet or laser range finders with absolute uncertainties of between 0.5 to 3.0 feet depending upon the model and cost. Uncertainty in tapes and string boxes arises from an inability to remove sag, obstacles along the path of measurement, undulating terrain, thick brush, and the mere fact that no one will ever stand at the same spot when measuring RMZs from a bankfull width. Therefore, the relative uncertainty for a typical 100-foot buffer measurement may be on the order of 5% for a logger's tape or string box. Both methods are subject to error that arises from failure to hold the end of the tape or sighting point vertically above the actual edge of the channel.

Small forest landowners typically cannot afford laser range finders and in other cases, laser range finder measurement may not be possible due to fog, heavy brush, or inadequate reflectors. FPFs do not wait for another day to check a buffer if their batteries fail, they pull out their loggers tapes. Error in tape measurement could allow removal of significant volumes of timber needed to assure adequate shade, whereas the accuracy of laser range finder measurements must be rounded upward orders of magnitude when performing significant figure determinations for compliance monitoring data sets that include tape measurements.

However, uncertainty associated with the measurement tool is small as compared with uncertainty from physical factors in the field. These include but are not limited to:

1. Channel margins that are obscured by blow down, thick and impenetrable brush, sloughing or overhanging banks, bank instability, or other obstructions.
2. Stream characteristics such as deep incision, braided channels, or a high degree of sinuosity.
3. Steep channel side-slopes preclude accurate measurement owing to the inability to see the edge of the stream requiring multiple measurements owing to a lack of continuous visibility. Multiple measurements require multiplying individual measurement errors in order to determine total error. Measurement on steep slopes is difficult with any measuring tool and, if a tape is used, the slope distance must be corrected for slope angle using an inclinometer, which has its own relatively uncertainty in measurement (which increases as a function of slope angle). Steep side slopes are commonly such dangerous terrain that foresters cannot always obtain an accurate measurement. Furthermore, steep areas are commonly unstable, further compromising the position of the stream edge.
4. Landowners frequently do not accurately flag areas with large patches of brush or devils club if these do not contain any harvestable timber whatsoever. (Given that marking buffers is time consuming and exact Rule application is difficult, such practice is certainly acceptable.)
5. The act of measuring itself and the inability to stand or measure from the exact same places that the Forest Practices applicant measured.

The absolute uncertainty from physical factors in the field is about 1-foot under perfect conditions, but typically it is on the order of several feet. Finally, Rules do not contain measurement protocols. This would be onerous at best and unnecessary considering natural variability in terrain. It would be unreasonable to hold landowners to standards of accuracy that markedly exceed those achieved by Forest Practices regulatory personnel and the standards of the industry.

These considerations indicate that the relative uncertainty for the 2006 data set as a whole will be on the order of about 5 parts in 100. Therefore, a 47.5-foot measurement on a 50-ft buffer will represent a measurement uncertainty of 5%. The protocol requires documentation of all trees within this measurement uncertainty, and all trees harvested with required buffer widths. On the ground discussions of these measurements will determine if the activity is in compliance or not. The trees harvested within the measurement uncertainty would not be considered out of compliance unless there is a “bias in RMZ buffer widths” as explained below.

Bias in RMZ buffer widths

There is definitely a need to have some leeway in measuring RMZs as noted above. However, there needs to be a common sense approach when all measurements along an RMZ are pushing these uncertainty tolerances. We will stress in training that if trees are consistently cut within the tolerance limits established (5%) all along the RMZ, then this is most represent a deliberate choice on the part of the landowner to harvest outside the RMZ requirements. This should be perfectly clear when following the Standards and Guidelines protocols established for the field implementation portion of the Compliance Monitoring assessments.

Status of Compliance

The categories listed below were used to describe the status of compliance. The criteria defining these categories were developed in concert with representatives of the Forest and Fish policy group. The descriptors have been modified as the program has developed this year.

- ***Compliant:*** Meets protection identified in the FPA and rules.
 - .
- ***Exceeds Rule:*** Landowners conducted their Forest Practices activities above the minimum requirements of the rule. Examples from the Specifications and Guidelines include:
 - Type S or F: Twice as many leave trees as required by the rule or DFC worksheet in the Inner and Outer Zones of RMZs.
 - No harvest zones are preserved in areas the applicant originally had planned to harvest.
 - Type S, F, or Np: 20% greater no harvest buffer width than what is required by rule.
 - Type Np: 20% greater length of no cut buffer on Np stream system.
 - This length must be a 50 foot no cut buffer to count as exceeds when it is 20% longer than what is required.
 - No harvest zones that otherwise could have been harvested under the rules.
 - Road improvements beyond those required by rule were employed.
 - Road abandonment that included more than required such as mulching, distribution of trees and woody debris along the road prism to deter off road vehicle travel.
 - Swales, erroneously defined as typed channels that were protected.
- ***Out of compliance:*** Non-compliance with the Rules. Examples include:
 - Harvest in Riparian Management Zones (RMZs) beyond the pre-determined 5% measurement uncertainty protocol. See the DNRFPMP. Document.
 - Leave tree requirements not met.
 - Water-crossing structures inadequate for stream protection standards.
 - Stream size or stated length as reported on the Desired Future Condition (DFC) worksheet that deviated more than 10% of the distance measured in the field.

Compliance –non compliance

A key question is, “what does a 90% compliance rate really mean in terms of impact to the resource?” Does non-compliance findings reflect significant resource damage, or are many FPAs only slightly out of compliance and cause little resource damage? How does one address the problem of defining the impact from removal of one or two trees at the outer edge of the inner zone? The short answer to these inquiries is that, in order to be meaningful and to avoid agenda-driven outcomes, compliance determinations must be rigorously objective. In most cases, the findings must be reported as simple compliant/non-compliant calls. Making a determination as to whether a single tree removed from a no-cut zone is di minimus, or is representative of widespread ‘fudging’ on a buffer will require a full blown assessment of the impacts on riparian function for each FPA activity. (Creating a methodology to accomplish this

task is beyond the scope of Compliance Monitoring). Such detailed work is beyond the biennial budget for this project. Furthermore, these considerations overlap with effectiveness monitoring, an entire separate discipline and one that will be addressed by DNR with assistance of the Cooperative Monitoring, Evaluation and Research Committee (CMER).

These concerns notwithstanding, representatives of several caucuses and the Services have asked that we create a process for evaluating the levels of compliance as a result of non-compliance findings. The Program has tested the following approach in 2006/07 to determine if any feasible and/or meaningful determinations can be reached.

Professional Judgment and “Out-of-Compliance”

“The new Forest and Fish rules in Washington are perhaps the most detailed and extensive rules in the Untied States” (Ice, 2007). This poses an obvious question when one or two trees are harvested within the boundary of the Core, Inner or Outer Zone of a riparian area. Experienced field professionals have the sensible perception of the constraints of fitting the physical environment into a set of standardized rules. We intend that no actual measurement of the degree of damage be taken because such measurement would be costly, beyond the scope of Compliance Monitoring, and would diminish our productivity.

Not all infractions of Forest Practices regulations have the same effect on public resources. For instance, cutting down half the trees in the Core Zone of a RMZ generally has the potential to cause significantly more environmental damage than removing one or two trees from the Outer Zone. It is beyond the scope of the compliance monitoring program to quantify resource damage or assume we are conducting effectiveness monitoring. However, the DNR wants to have some indication of the relative seriousness of non-compliance activities which could help focus the agency's future day-to-day compliance work. The field teams comprised of experienced professional hydrologists, foresters, geologists, and biologists demonstrated that the use of professional judgment that is used in our everyday evaluations of both the natural variability of nature and how to manage the environment in relation to forestry can be useful in putting out-of-compliance decisions in perspective. We are committed to utilizing our professional expertise and judgment to make these evaluations on the relative level of non-compliance for each out-of-compliance determination.

It is important to note that these out-of-compliance levels do not have statistical validity nor should they be used to excuse Forest Practices activities that violate the rules or the approved application. Although the process was not rigorous in its entirety in evaluating these out-of-compliance determinations due to some inconsistencies among field teams, the information for year 1 suggests that the out-of-compliance determinations reflect a small number of “major” out of compliance levels.

There were several suggestions as to how to rate practices that were out-of-compliance. We could have used levels with descriptors of 1, 2, or 3; Low, Medium or High; or any other similar labels. We decided to attach the following “categories” for the level of non-compliance. The following dictionary definitions for these categories along with examples to characterize these determinations are provided.

- a. ***Trivial***: *Unimportant, insignificant, trifling, commonplace*. Minor impacts of short duration over a small area. Examples include:

- i. Evidence of slight sediment delivery that does not appear to be persistent.
 - ii. A few trees cut in the Inner or Outer Zone of the RMZ of the same or lesser ecological significance as the remaining RMZ trees.
- b. **Apparent:** *Readily understood, evident, obvious.* Potential impacts to resources, but generally of moderate effect. Examples include:
- i. Required leave trees for the Outer Zone trees not attained.
 - ii. Culvert sizing is questionable, but potential impact to resources is not readily apparent.
 - iii. Soil stabilization has not occurred and there may be a potential for future impacts.
- c. **Major:** *Greater in size, amount, number or extent.* Damage to public resources is evident or the potential for damage is high. (These include situations normally referred to the Region). Examples include:
- i. Harvest in the Core Zone. Harvest in areas not delineated on the FPA.
 - ii. Roads built without an FPA.
 - iii. Evidence of direct sediment delivery to typed water that appears to have been persistent.

No consensus: This is used when the participants can't agree on the compliance level. If this is the case, the Forest Practices Forester makes the determination. It is important to note that these professional judgment non-compliance levels do not have statistical validity nor should they be used to excuse Forest Practices activities that violate the rules or the approved application.

Implementing this system requires the following assumptions:

1. All participants realize that this process relies on professional judgment and agree to the rather broad definitions. It is acknowledged that this process is not meant to represent any effectiveness determination.
2. There will be no intense statistical analysis beyond the narrow scope intended. These decisions are used as a snapshot of the conditions on the ground at the time of field review.
3. This is not a surrogate for effectiveness monitoring; only an educated assessment based on experience in the field of the level of the non-compliance as it relates to the resource.
4. This process helps to put some perspective to the rules that are intensely prescriptive.

Scheduling of Field Assessments

Scheduling Protocol for field reviews will be as follows:

1. Regions will be given a list of FPAs selected for each field season. During the regular course of their jobs, DFW, DOE or the FPFs can drive by the selected FPAs to determine if the activities are completed. (If an activity appears to be close to completion, this FPA can be earmarked for review at the end of the field season rather than just delete it. All agency personnel will have the list of FPAs. Once an FPA has been verified, an email should be sent to the other Region participants so efforts will not be duplicated.
2. Once step 1 is completed, the Regions will notify the Compliance Monitoring Field Coordinator who will create the final list of Compliance Monitoring FPAs for review.

3. During this process, the landowners will not be asked to verify completion of the FPA, as there is concern that this will create bias in the samples selected if the landowner knows that they will be selected for Compliance Monitoring.
4. The timetable for field reviews will be finalized with DFW and DOE to ensure participation, and to be sure that at least one of these agency representatives attends each field assessment.
5. Approximately one week before the actual field assessment, landowners should be notified. Landowners are welcome to observe and answer questions, but the field team is not required to have the landowner on site during the visit. (Reducing scheduling problems and assuring access to each FPA site are the main reasons the Program addresses active FPAs only.)
6. DNR field leader will prioritize the FPAs for review based on geographic locations, expected time to complete assessment, and the need to minimize travel times.
7. Scheduling will ultimately be at the discretion of the DNR field leader. DFW and DOE shall arrange schedules with the regional DNR field leader.
8. The schedules will be sent to the Program Field Coordinator who will review and determine if there is overlap. This is necessary to ensure that DFW and DOE participants will not be needed by two FPF at the same time.
9. The Program field Coordinator will distribute a final Compliance Monitoring Schedule to all participating field personnel before field season begins. Deviations from the schedule and progress updates will be submitted to the Program Field Coordinator in a timely fashion.
10. The Field Coordinator may call upon FPFs from other regions if help is needed to complete the reviews in another region.

Compliance Monitoring 2006 Interim Data Analysis

The attached interim data analysis provides the DNR template for reporting results of the 2006 field season. Data collected until June 30, 2007 will be added to these results with additional analyses to put the results into context with the rules.

2007/2009 Biennial Compliance Monitoring Scheduling

To complete the field reviews for the 2006-2007 biennium. The Regions will be given at least three weeks to determine if the activity has been completed on the FPAs selected for that Region. We will work with Northeast and Southeast Regions to help facilitate this process, due to snow and inaccessibility in the Eastern part of the state. DNR will meet with DOE and DFW during training refreshers to set up Compliance Monitoring schedules of approximately 2-3 days a month for field reviews. If activities appear to have a completion date within the field review period, that application can be saved for review later. If activities are not completed, the Division will delete that application and assign a replacement application to the appropriate region.

Compliance Monitoring field reviews will be conducted in an even flow manner beginning in July 2007 for the with the 2007/09 biennium. This schedule will eliminate setting large blocks of time aside during the summer field season, which normally conflicts with fire responsibilities. We believe that this will reduce costs, increase efficiency, and allow a greater number of field reviews to be completed each year in all the seasons. Road activities may be reviewed during the winter season to determine the effectiveness of roadwork and drainage in wet weather conditions. Training will be mandatory as updated or additional rule activities are added to the program.

REPORTING

The Compliance Monitoring Program has a reporting obligation to the Forest Practices Board (WAC 222-08-160 (4)). The reports will provide data and summary tables that address the key question: “Are Forest Practices being conducted in compliance with the rules?” The 2006 interim report to the FPB was presented at the February 2007 FPB meeting. A final biennial report will be presented at the November FP Board meeting. Interpretation will be minimized such that the Board may draw its conclusions from thorough, objective, and ample data sets. However, the reports will provide brief descriptions of the status of compliance with each Rule category. Descriptive statistics will be used for the first few years of data analysis until sufficient data have been collected to allow more rigorous statistical comparison and analysis.

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APPENDIX A: OVERVIEW OF EASTERN AND WESTERN WASHINGTON RIPARIAN MANAGEMENT ZONES

Westside Riparian Management Zones

The Forest Board Manual provides a standardized set of field procedures to evaluate riparian stand conditions for the purpose of harvest design. The DFC computer worksheet provides a method to analyze the riparian stand data and identify harvest options adjacent to fish bearing streams in Western Washington. An equivalent computer worksheet does not exist for Eastern Washington. A users guide is available on line at <http://www.dnr.wa.gov/forestpractices/dfc/dfcinstructions.pdf> Detailed instructions and specific rules for the use of this tool are not included in WAC 222-30, so many interpretations can exist for the use of this tool.

The simple definition of compliance for RMZs is, “meeting or exceeding all of the buffer requirements.” However, the measurement procedures specified in the Forest Board Manual create the opportunity for measurement error based on relative lack of precision, for example, the use of two-inch diameter classes to record tree diameter. This creates the possibility that a riparian buffer could comply with all of the regulations when measured with the Board-specified measurement techniques, but could be out of compliance when more precise techniques are utilized. The measurement techniques used to evaluate compliance with the regulations should be the same techniques used to implement the regulations. (McFadden, 2004)

The following overview of the Western Washington RMZ Rules in WAC 222-30 is provided for increased understanding of the Forms, Protocols, and Measurement sections herein.

Type F or S: No harvest within the Inner Zone.

There is always a no cut 50 foot Core Zone. Inner Zone and Outer Zone widths vary according to site class and stream size. Landowners are required to leave 20 conifer trees per acre (TPA) >12 inch diameter breast height (dbh) (8 inch dbh on sensitive features) in the outer zones. Landowner can use excess basal area in Channel Migrations Zones (CMZ), Inner Zone, or from Large Woody Debris (LWD) placement strategy to substitute for 10 of the 20 required leave trees.

Type F or S: Harvest within Inner Zone. Option 1: Thinning from Below DFC printout is required.

Harvest is allowed throughout the Inner Zone of the RMZ, but all harvest is accomplished by thinning from below. Calculations from the Desired Future Conditions (DFC) worksheet determine the maximum allowable tree diameter and size class of thinning. This prescription also requires the landowner to leave a specified number of trees in the Outer Zone. Landowner can place these trees in sensitive areas or spaced throughout the outer zone. When there is either a LWD placement strategy or basal area within a CMZ the landowner can receive leave credits up to half of the number of required Outer Zone trees. A minimum of 10 TPA is required to be left in the Outer Zone in all circumstances.

Type F or S: Harvest within Inner Zone. Option 2: Leaving trees closest to the water, known as ‘pack and whack’. DFC printout is required.

This option is only available on Site Class I and II RMZs or Site Class III streams less than 10-foot bankfull width or Channel Migration Zone (CMZ). The calculations using the DFC program determine the width of the Floor Zone or the inner portion of the Inner Zone where no harvest is allowed. Outside of the Floor Zone, in the remainder of the Inner Zone, the landowner is required to leave 20 TPA, with a minimum dbh of 12 inches, (there are no exemptions to this requirement). The required number of trees in the outer portion of the Inner Zone is calculated from the DFC worksheet by extrapolating the acreage left after the floor is subtracted. This prescription also requires the landowner to leave a specified number of trees in the Outer Zone. Landowners can place these trees in sensitive areas or spaced throughout the Outer Zone. When there is a LWD placement strategy, basal area within a CMZ, or excess basal area in the inner portion of the Inner Zone the landowner can receive leave credits up to half of the number of required Outer Zone trees. A minimum of 10 TPA are required to be left in the Outer Zone in all circumstances.

Type Np:

There is a 30-foot equipment limitation zone measured horizontally from the outer edge of bankfull width (bfb). For waters within 300 feet of the confluence of Type S or F water, a 50-foot no harvest zone on both sides of the water is required for a minimum of 300 feet. From 301 to 1000 feet from the confluence of Type F water, a minimum of 50% of the reach requires a 50-foot no harvest zone on both sides of the water. For Type Np water greater than 1000 feet in length, refer to the table in WAC 222-30 (page 30-15). No harvest is allowed within 50 feet of headwall seeps or side-slope seeps. No harvest is allowed within 56 feet of the intersection of two or more Type Np waters or a Perennial Initiation Point (PIP) or headwall spring. No harvest is allowed on alluvial fans.

Type Ns:

There will be a thirty-foot equipment limitation zone.

Eastern Washington Riparian Management Zones

Type F or S: No harvest within the inner zone

There is a 30-foot Core Zone. For large streams (> 15 feet. bfb) a 70-foot inner zone is also required. For small streams (< 15 foot bfb) a 45-foot inner zone is required. Site class I and II small streams and site class I, II and III large streams require an Outer Zone. The width of the Outer Zone is dependent on site class and stream size. Outer Zone management prescriptions depend on habitat type. Ponderosa pine habitat requires 10 TPA, mixed conifer habitat requires 15 TPA, and high elevation habitat requires 20 TPA. These requirements can be cut in half if the landowner voluntarily implements a LWD placement strategy.

Type F or S: Harvest within inner zone. If activity lies within the Bull Trout Overlay, there is an automatic 75 foot buffer

Ponderosa Pine Habitat Type:

Stands with high basal area: Harvest is allowed in the Inner Zone of stands that have a basal area of greater than 110 square feet per acre. The harvest must leave 50 TPA and the basal area of the leave trees must be >60 square feet per acre. The 21 largest trees must be left and all 50 trees must be greater than 10-inch dbh if available. If greater than 50 TPA are required to meet the 60 square feet per acre requirement, all trees greater than 6 inches dbh must be left standing to a maximum of 100 TPA.

Stands with low basal area and high density: Harvest is allowed in the Inner Zone of stands that have a basal area of less than 60 square feet and greater than 100 trees per acre. 100 TPA must be left after harvest including the largest 50 trees. The other 50 TPA must be larger than 6 inch dbh if available up to a maximum of 100 TPA.

Any harvest in the inner zone also requires the landowner to leave down wood if available. Landowner must leave 6 pieces greater than 16-inch dbh and 20 feet long and 4 pieces greater than 6 inches dbh and 20 feet long. If down wood is not available, the landowner is not required to create it?

Mixed Conifer Habitat Type:

If the basal area is greater than 110-150 square feet per acre, (depending on site index) the landowner is allowed to harvest to 70-110 square feet per acre with a minimum of 50 TPA left unharvested. The trees left must be the largest 21 with the remaining 29 being larger than 10-inch dbh if they exist. If greater than 50 TPA are required to meet the 60 square feet per acre, all trees greater than 6-inch dbh must be left standing.

Stands with low basal area and high density: Harvest is allowed in the Inner Zone if stands that contain 110-150 square feet of basal area per acre (depending on site index) and contain greater than 120 TPA. The harvest must retain the 50 largest trees and an additional 70 TPA greater than 6-inch dbh if they exist. If there are not 120 TPA greater than 6-inch dbh, then all trees greater than 6-inch dbh and the largest remaining trees must be retained.

Any harvest in the Inner Zone also requires the landowner to leave down wood if available. Landowner must leave 8 pieces greater than 16-inch dbh and 20 feet long and 8 pieces greater than 6 inch dbh and 20 feet long. If down wood is not available the landowner is not required create it.

High Elevation Habitat Type:

RMZ widths are the same as other Eastern Washington RMZs, but the management prescriptions follow Western Washington Option 1 Harvest. A DFC calculator is used to determine the level of thinning.

Any harvest in the Inner Zone also requires the landowner to leave down wood if available. Landowner must leave 8 pieces greater than 16inch dbh and 20 feet long and 8 pieces greater than 6 inch dbh and 20 feet long. If down wood is not available the landowner is not required create it.

Type Np: If within the Bull Trout Overlay, there is an automatic 50 foot buffer

Within 50 feet of bfw, the landowner must designate each unit as either a clear-cut or partial cut buffer. This determination will be associated with this unit until July 1, 2051.

Partial Cut: Basal area requirements are the same as an inner zone harvest. The largest 10 TPA must be retained. In addition, up to 40 additional TPA greater than 10-inch dbh must be retained until the basal area target is met. If 50 TPA greater than 10-inch dbh do not exist, the largest trees must be retained until the basal area target is achieved. Side slope seeps must be protected with a 50-foot buffer.

Clear-cut: All clear-cut Np harvest must not:

1. Exceed 300 continuous feet in length,
2. Exceed 30% of the total length of the stream reach in the unit,
3. Be located within 500 feet of the intersection of S or F water, and
4. Be located within 50 feet of a headwall seep, side-slope seep, headwater spring, alluvial fan or intersection of 2 or more Np waters.

For each clear-cut adjacent to Np waters the landowner must also designate a no-cut Np buffer of the same distance as the cut buffer.

Type Ns:

There is a required 30-foot equipment limitation zone.

APPENDIX B SPECIFICATIONS AND GUIDELINES FOR WESTERN AND EASTERN WASHINGTON COMPLIANCE MONITORING FIELD REVIEWS

The Specifications and Guidelines are an integral part of this Compliance Monitoring Program Design and can be downloaded from the Compliance Monitoring website at:
<http://www.dnr.wa.gov/forestpractices/compliancemonitoring/>

Field Assessment Protocols for DFC

The Cooperative Monitoring Evaluation and Research Committee (CMER) has encouraged and supported research on the Desired Future Condition (DFC) requirements for allowable riparian harvest. (Schuett-Hames, Dave, Roorbach, Ashley, Conrad, Robert, 2005). CMER silviculturists have completed a follow-up to this study providing valuable insight into the parameters used to adequately assess whether the DFC output information can be used for Compliance Monitoring, (McConnell, 2006 (in preparation)). This information, along with feedback from field participants on the Preliminary Assessment project give insight into which questions will best determine sensible and meaningful field measurement on DFC compliance. DFC model outputs are not only difficult to replicate, but changes in some model inputs will not alter the final results enough to be visible in the field. This begs the question, “*Can we determine compliance even if we use 100% cruises?*” For instance, basal area outputs from two separate 100% cruises on the same stream segment are likely to be different due to size class variations, data input errors, and measuring variability. These minor changes would make non-compliance determinations difficult at best and could allow challenges to the assessment decisions. On the other hand, stream width or stand composition errors can change the output dramatically. As a result of this information, we have included questions for Compliance Monitoring that may make DFC Option I and II harvest compliance reviews more efficient.

APPENDIX C: FIELD FORMS

The Field Forms are an integral part of this Compliance Monitoring Program Design and can be downloaded from the Compliance Monitoring website
<http://www.dnr.wa.gov/forestpractices/compliancemonitoring/>

APPENDIX D: FIELD NOTES TEMPLATES

These excel workbooks contain all the notes templates for completing Riparian Management Zone Compliance Monitoring reviews. Field tests are being conducted with these templates and may be updated after the 2007/08 field season. They can be downloaded at
<http://www.dnr.wa.gov/forestpractices/compliancemonitoring/>

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