Executive Summary
Oregon Department of Forestry Forest Practices Compliance Monitoring Project: 1998 Pilot Study Results
November 1999

INTRODUCTION

The Oregon Department of Forestry (ODF) regulates forestry operations on non-federal land. Landowners and operators are subject to the *Forest Practices Act and Rules* when they conduct any commercial activity relating to the growing or harvesting of trees. The Oregon Forest Practices Act (FPA) was adopted in 1972. The overarching objective of the act is 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 state board of forestry has been vested with exclusive authority to develop and enforce statewide and regional rules. These forest practice rules are designed to address the resource issues identified in the FPA objective. The rules are categorized into divisions, and each division has a description of purpose. The forest practices program is responsible for administering and monitoring the forest practice rules. These rules are subject to revision as necessary based on the best available science and monitoring data. Such revisions shall maintain the goals of the FPA as described above. The rules have undergone many revisions since 1972. The most recent changes to the water protection rules were in 1994 and 1995. Therefore this project was monitoring rules that had only been in place for approximately 3 years.

It is the responsibility of the ODF to monitor the effectiveness and implementation of BMPs in achieving water quality objectives.

The ODF Forest Practices Act and Rules are considered a Best Management Practices (BMPs) Program. BMPs 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 BMPs 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. When forest landowners properly implement BMPs they are actually implementing a WQMP designed to maintain water quality. It is the responsibility of the ODF to monitor the effectiveness and implementation of BMPs in achieving that objective.

MONITORING GOALS AND QUESTIONS

ODF forest practices monitoring program has implemented a pilot study to monitor compliance with BMPs on non-federal forestland. The BMP compliance monitoring project is a three-year project designed primarily to look at how the department, landowners and operators are implementing the forest practice rules. The first year of the project was used to implement a pilot study. The main goals of the 1998 pilot study were to:

1) Test and refine the efficiency and effectiveness of site-selection and data collection protocols developed to address the BMP compliance monitoring questions.
2) Identify the ultimate sample size needed to determine rule compliance with statistical confidence.
3) Provide preliminary data to answer the monitoring questions on compliance with BMPs and stream crossing regulations.

The results of this pilot study have been used to revise the site-selection and data-collection protocols and calculate the needed sample size. Over the next two years, the final version of the BMP compliance monitoring project will be implemented on 189 sites, and a final report will be available in 2001.

Over the next two years the final version of the BMP compliance monitoring project will be implemented on 189 sites.

The goals of the BMP compliance monitoring project are to identify the level of forest operations in compliance with the forest practice rules, based on a statistically reliable sample, and determine if adjustments to the compliance program administration are needed. For example, the project may reveal areas where forest practice rule language can be clarified, administration of the rules can be improved, or where additional education and training is needed.

In order to meet these goals, ODF will answer the following monitoring questions:

1) *How often did operators comply with BMPs described in the forest practice rules pertaining to water protection, road construction and maintenance, harvesting, and high-risk sites? How do these results vary by ownership?*

2) *Have stream crossing structures on newly constructed and/or reconstructed roads been designed and installed according to ODF guidelines regarding fish passage and the 50-year stream flow event?*

3) *How do the statistical sample results compare with results based on forest practice foresters (FPF) inspections? Is there a correlation between number of FPF inspections and compliance rates?*

4) *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?*

5) *When BMP compliance is inadequate, to what extent are quality and function of riparian areas, stream channels and/or fish habitat compromised?*

STUDY DESIGN

The site selection process and field protocols were divided into unit-level sites and stream crossing sites. At a unit-level site, the whole unit (harvest practices, roads, skid trails, etc.) was evaluated for compliance with all forest practice rules designed to protect water quality and fish habitat (roughly 149 rules). At a stream-crossing site, the structure (bridge, culvert or ford) was evaluated for fish passage and capacity for the 50-year stream-flow event. Stream-crossing results are reported in a supplement to this report and will not be discussed further in this document. A description of the unit-level site selection process, data collection and results follows.

Site Selection

The focus of this project was to monitor forest operations that had the potential to affect waters of the state and on sites that had to comply with 1994 rule revisions. A population of 2,591 harvest units met the initial criterion for the pilot study. Using a stratified random sample, 150 sites were selected for the pilot study. The goal was to evaluate roughly 50 sites for the 1998 pilot study. The extra sites were randomly selected to use as backup in the event that property access was not granted or some of the sites did not actually meet the criterion upon field investigation.

52 sites were randomly selected and surveyed. The selection was stratified by stream classification, ODF district, and landowner class.

The sample was stratified by stream classification, district and ownership. The stream classifications were Type F for fish-bearing streams, Type N for non-fish-bearing streams, and Type D for domestic water sources that are not fish-bearing.

ODF has partitioned non-federal ownership into 14 districts spread throughout the state. A 5% sample was randomly selected from the total notifications in each district with a minimum of five sites for each district. This technique weighted the sample by the number of notifications per district and provided a statewide distribution of sites.

The landowner classes include: Industrial, Nonindustrial, and Other. "Other" includes state, non-profit organization, city, locally, and county-owned land. The sample size for each landowner class was proportionate to the average size (in acres) of operations with streams in each landowner classification. The relative proportions used for the sample, based on acreage, were 70% industrial, 20% nonindustrial, and 10% other.

Rule Focus

The forest practice rules designed to protect water quality and fish habitat, are detailed and complex, and span multiple rule divisions. One hundred and forty-nine rules could potentially be assessed at any given unit. Nine rule divisions were assessed: Planning Forest Operations (Division 605), Treatment of Slash (Division 615),

As many as 149 rules from nine rule divisions could potentially be assessed at each site.

Chemical and Other Petroleum Products (Division 620), Road Construction and Maintenance (Division 625), Harvesting (Division 630), Vegetation Retention Along Streams (Division 640), Significant Wetlands (Division 645), Lakes (Division 650), and Other Wetlands and Seeps (Division 655). The purpose and brief description of each division is described in the results section.

Field Methods

In an effort to answer the monitoring questions, ODF developed a protocol with two approaches to data collection: (1) compliance rating data and (2) numeric assessments. Both of these approaches were also used to assess sediment sources.

An experienced retired FPF evaluated each site using the compliance rating system. The compliance rating system provides qualitative data regarding rule compliance. All the rule applications that applied to each site were rated as Exceeds, Meets, or Noncompliant. When noncompliance was identified, the infraction was further described as one of the following types of infractions: (1) administrative, (2) resource concern, or (3) a stream impact.

- ***Compliance was evaluated using a compliance rating system.***
- ***Resource and feature condition were evaluated using a numerically based data collection methodology.***

A two-person BMP field team surveyed the sites collecting numeric data. The numeric data are a combination of quantitative and categorical assessments. The rating system and the numeric data are used to assess the same rules. However, the numeric data are only used to describe the condition of the resource (stream, RMA, etc.) or feature (e.g., road, skid trail, etc.) being assessed while the compliance rating data are used to calculate compliance.

RESULTS

The authors caution against strong conclusions due to the pilot nature of the study. These findings are based on a pilot study of 52 harvest units that were selected using a random stratified sample. One hundred and forty-nine rules could potentially have been assessed at any given site. However, all rules did not apply on each harvest unit, therefore sample size varies by rule. Due to the pilot nature of the study and the small sample size, this study is being repeated on a larger scale to corroborate the pilot study findings.

These findings are based on a pilot study of 52 randomly selected harvest units at which as many as 149 water quality protection rules could have applied.

Trends in Ownership

Three ownership classes were examined to investigate relationships between ownership and compliance: industrial, nonindustrial and other. The average unit-level compliance rates were basically the same across all ownership types. The average unit-level compliance rates were 99%, 98% and 99% for industrial, nonindustrial and other ownerships, respectively. All ownership classes

The average unit level compliance rates were the same across ownership types.

had a maximum compliance rate of 100% compliance. The minimum compliance rates were 98%, 85% and 99% for industrial, nonindustrial and other respectively.

For industrial and nonindustrial lands, the most common RMA prescription was the use of a no-cut buffer (39% and 44% respectively), followed by site-specific plans (18% and 17% respectively) and then standard basal area target (12% and 11% respectively). The riparian conifer restoration and active management occurred only on industrial land. Units with small Type N streams only comprised 24% and 28% respectively of industrial and nonindustrial sample. Lands under other ownership predominantly used the site-specific plan (67%) (Figure 6).

Pilot study results are summarized below for monitoring question numbers 1, 4, and 5. These analyses were done both to determine if the appropriate data were being collected and to provide a preliminary measure of compliance. Monitoring question number 2 is answered with a separate study and monitoring question number 3 will be answered with the final phases of this BMP monitoring project.

Monitoring Question #1

How often did operators comply with BMPs described in the forest practice rules pertaining to water protection, road construction and maintenance, harvesting, and high-risk sites?

Compliance rates were analyzed at two levels: unit level and rule level. Nearly half of the units, 43%, had at least one noncompliant practice. However, only 9 units, 18%, had noncompliant practices which resulted in an impact to the resource. These findings are consistent with results from other states. While it is common to find compliance issues when a site is evaluated closely, the goal of the ODF is to increase the number of units that rate 100% compliance.

- ***Fifty-seven percent of harvest units had 100 percent compliance rates.***
- ***The average unit level compliance rate was 98%.***

Given this, it is perhaps an over-simplification to rate compliance simply on whether or not there is a compliance issue of any kind on a unit (i.e. 43% of the units had one or more noncompliant practices). A more accurate representation of compliance should account for the high numbers of rules that must be applied to a site and if the noncompliance results in an impact to stream resources. The average unit-level compliance across 49 units was 98%. There were 3,365 practices evaluated. There were a total of 62 noncompliant practices identified. Forest practice rules were exceeded on 5% of the practices.

Monitoring Question #4

Are there particular rules that consistently have a lower or higher level of compliance?

Results suggest that at a rule level, compliance rates are quite high. Average compliance rates varied from 91% to 100% for nine rule divisions. The lowest compliance rate for a division was 91% for "Other" Wetlands, Springs and Seeps (OAR 629-655), the sample size was only 11. The highest compliance rate for a division was 100% for Chemical and

Average compliance rates were very high for each division ranging from 91 to 100%.

Other Petroleum Products (OAR 629-620). The sample size varied from 49 to 6 depending on the rule being assessed. Compliance with significant wetlands could only be assessed on one unit. If the sample size is small again in the next phase of the project, significant wetlands may need to be assessed separately.

Practices implemented under the Road Construction and Maintenance Division (OAR 629-625) have a high compliance rate (97%). Results suggest that while there is a general trend towards improvement in road location, there are still problems with road maintenance. The individual practices that demonstrated noncompliance and had the greatest impacts on streams included road drainage and temporary crossings. Of the road-related noncompliant practices, 70% were associated with road drainage and 25% with temporary crossings. The sample size was low for temporary crossings (14 crossings on 9 sites) but there were consistent problems. It is also important to note that these assessments were completed during the dry summer season and consequently are likely to fail underestimate erosion and delivery to stream systems that results from sheet erosion or is obscured by vegetative regrowth.

Practices implemented under the Harvesting Rules Division (OAR 629-6630) have high compliance rates (98%), with the most common issues being skid trail drainage and felling trees away from small Type N streams. We anticipate that felling away from small Type N streams is a bigger issue than these data suggest. The ODF guidance manual requires that small Type N stream be treated the same as any other stream when it comes to protection of bed and banks and water quality during the felling operation. If slash enters a small Type N stream, the guidance manual requires that it be removed so that 50% of the channel is free of slash. This guidance was not properly considered when assessing small type N streams for the pilot study. This situation has been corrected for the final implementation of the BMP monitoring project.

The lowest compliance rates were with rules regarding temporary crossings, road drainage, felling away from small type N streams, and no-cut RMAs. However, the greatest incidence of exceeding rule requirements (42%) was also associated with no-cut RMAs.

Practices implemented under the vegetation retention division have a high compliance rate (95%). However, compliance with riparian management area (RMA) rules specifically was mixed. Both the most common noncompliance and the highest rule exceedance with riparian rules were on RMAs that were designated as no-cut buffers. Operators harvested within these RMAs on 33% of the sites even though written plans indicated no-harvest. However, operators and landowners exceeded the requirements on 42% of the sites. Operators and landowners consistently maintained the 10 foot and 20 foot no-cut buffers.

Monitoring Question #5

When BMP compliance is inadequate, to what extent are quality and function of riparian areas, stream channels and/or fish habitat compromised?

Noncompliance resulted in an impact to the stream on 20 out of the 62 (32%) noncompliant scenarios. The bulk of the impacts resulted from sediment delivery to streams. There were also instances of disturbance to bed and banks and loss of riparian vegetation. Out of the remaining

noncompliant situations, 10 were considered strictly administrative and 32 considered a potential resource concern.

Seventeen miles of stream and 82 acres of RMA were surveyed. When no-cut harvest boundaries were not properly maintained, only 1% of the total riparian area sampled was affected. Only one out of nine noncompliant riparian vegetation practices resulted in an impact to the stream. The remainder were considered potential impacts.

Thirty-two percent of noncompliant practices impacted stream resources. The bulk of impacts were a result of sediment delivery to streams from stream crossings, temporary crossings, and roads. Noncompliance with no-cut buffers only affected 1% of riparian areas surveyed.

Twenty-two sediment sources were identified using the numeric assessment on 11 different sites. Three of the 22 sediment sources delivered sediment to Type F streams the remainder were to Type N streams. Stream crossings and temporary crossings accounted for 63% (14 of the 22) of the sediment sources. There were an additional five sources associated with road construction and maintenance (23%), two with skid trails (9%), and one with a waste area site (5%). The volume of sediment delivered ranged from <1 to 100 cubic yards. There were no sediment deliveries to stream channels as a result of felling and bucking, site preparation, cable yarding, landings, or cross-drain culverts.

RECOMMENDATIONS

Since this is a pilot study, recommendations are limited to two main points: (1) completing the next phase of the Compliance Monitoring Project and (2) raising awareness to department personnel, stakeholders and the public for consideration.

Complete the Next Phase of the Project

This study will be continued over the next two years on approximately 189 sites. Annual reports will be made to the Board of Forestry on preliminary results. ODF will continue to work with the internal and external review committees to provide oversight and to coordinate the project. At the completion of the next phase, the department will consider the long-term needs for this kind of compliance monitoring and where the gaps are that this type of monitoring cannot address.

Raise Awareness on Key Findings

It is important to recognize the limitations of a pilot study. The greatest limitation of this study is the small sample size. Therefore, the second phase of the project is needed to corroborate these findings before strong recommendations can be made. However, there are some actions that can be taken to alert landowners, operators and department personnel of the potential issues that do exist. This allows landowners to adjust operations and department personnel to prioritize as needed, particularly if they have observed the same trends on their ownership or in their district. The main areas of concern identified by this pilot study include:

- A need for increased awareness that small Type N streams must be protected to the same level as any other stream from excessive slash accumulation. This is to prevent detrimental

effects on water quality and channel morphology and retain the sediment and water routing capabilities of the system.

- Road construction and design practices seem to have improved over time. The remaining road-related issues fall predominately to road drainage and temporary and permanent stream crossings. The ODF is in the process of developing a road management guidebook for repair of existing roads that will be available this year. ODF and Oregon State University will jointly sponsor a Road Stewardship Conference in early 2000.

- Landowners, timber owners, operators, and department personnel need to work together to ensure that landowners and operators retain the desired buffer width on RMAs that are intended to be managed with a "no-harvest buffer" and implement erosion control measures on roads, stream crossings, and temporary crossings.

Consider Related Monitoring

While the focus of this study is on compliance some data were provided on erosion and sediment delivery to streams. The bulk of the road construction and maintenance rules are designed to minimize sediment delivery to streams. More quantitative information is needed on the result of this policy in terms of the volume of chronic sediment being delivered to streams. Sediment production, delivery and transport need to be monitored in the winter to determine the effectiveness of forest practice rules in minimizing sediment impacts on streams.

Due to the study design, these samples may underrepresent units with high-risk sites. In addition, the sample size was small for temporary crossings and significant wetlands. At the completion of the BMP compliance monitoring project the forest practices monitoring program will evaluate the need for focused efforts on compliance with high-risk site, temporary crossings, and significant wetlands rules.

The BMP compliance monitoring pilot study and executive summary reports were prepared by forest practices monitoring program staff: Liz Dent and Josh Robben.

For a copy of the full report please contact: Ray Gress, (503) 945-7470, ODF, 2600 State Street, Salem Oregon, 97310.