OREGON DEPARTMENT OF FORESTRY

Forest Practices Compliance Audit: 2017 Annual Report

John Hawksworth
Monitoring Specialist

Paul Clements
Compliance and Training Specialist

Jon Laine
Forest Management Technician

The assistance and cooperation of private landowners and Oregon Department of Forestry (ODF) field staff were instrumental in designing and implementing this project.

The external review team continues to provide valuable input. The authors would like to thank all the ODF Stewardship Foresters who on a daily basis keep the goals and objectives of the Forest Practices Act in the forefront of their delivery of services to forest landowners, operators and the citizens of Oregon.

Table of Contents

Table of Tables

Table of Figures

TEAMS AND COORDINATORS

This study has periodic oversight by an external review team. The team's main functions were to review and provide feedback on the study design, field protocols and reports. This input was utilized by the Oregon Department of Forestry (ODF) in carrying out the study and completing the report. The team met throughout the development of the project, and will continue to meet as needed.

Additionally, input on study design was received from department field staff, and the study monitoring group has conversed with field staff on an ad hoc basis throughout the project.

External Review Team

The following stakeholder groups were represented on the External Review Team:

Oregon Department of Forestry – State Forests Program
Stimson Lumber Company
Sustainable Forestry Initiative
Oregon Small Woodlands Association
Oregon Forest Industries Council
Oregon Tree Farm Program
Olympic Resource Management
Weyerhaeuser Company
International Paper
Collins Pine & Forest Stewardship Council
Oregon Department of Environmental Quality
Associated Oregon Loggers

Project Coordinators

Marganne Allen, Manager, Forest Health and Monitoring Manager
Paul Clements, Compliance and Monitoring Specialist
John Hawksworth, Monitoring Specialist

COMPLIANCE AUDIT REPORT: 2017

EXECUTIVE SUMMARY

In 2011, the Oregon Legislature directed the Oregon Department of Forestry (ODF) to conduct an audit of timber harvest practices regulated under the Oregon Forest Practices Act (FPA) and to use a private contractor. An initial audit of 200 sites was completed in December 2013; overall compliance was 96%. Again in 2014, 2016, and 2017 ODF employed a private contractor to collect data according to same protocols, on 100 sites. This report concerns the 2017 effort.

The compliance audit focuses on harvest and road rules, and a subset of the water protection rules. Contractors collected data at sites harvested between 2014 and 2015, and provided ODF with these data, and associated photographs and notes. ODF staff used a database and Geographic Information System (GIS) software to analyze the data and assess compliance based on pre-set decision criteria. Analysis focused on implementation of Forest Practices Act rules and potential or actual impacts to resources. Without a full enforcement investigation and legal decision on compliance, the agency considers outcomes as apparent rates of compliance or non-compliance, although for readability the word "apparent" is not used but implied.

The study stratified harvest sites by FPA administrative areas (Eastern Oregon Area, Northwest Oregon Area, and Southern Oregon Area) and by ownership classes (Private Industrial, Private Non-industrial, and Other). The Other class represents governmental entities, including state and county forests.

The 2017 study revealed an overall rule-level compliance rate of 97% (Table ES1).

The highest compliance rates were with Division 625 (Road Construction and Maintenance; 98%) and Division 660 (Water Protection Rules: Specific Rules for Operations near Waters of the State; 99%).

The agency and forest industry use findings of the compliance audit studies as topics for training efforts. Third party certification systems (ex. Sustainable Forestry Initiative) also use the findings in their process. ODF reports rates of compliance with the Forest Practices Act rules (a Key Performance Measure) to the legislature.

Table ES1. Compliance rates for Areas and Ownership Class.

Compliance Rate	
Overall	**98%**
FPA Area	
Eastern Oregon Area	98%
Northwest Oregon Area	98%
Southern Oregon Area	97%
Ownership Class	
Private Industrial	98%
Private Non-industrial	96%
Other	98%

We found compliance rates greater than 95% for most rule divisions tested. The lowest compliance rates (68%) were found with rules involving Written Plan requirements, primarily on lands of PNI ownerships. The low rate for Written Plan requirements may be associated with 2013 rule changes related to waivers.

Table ES2. Compliance rate for rule divisions.

Rule Division		Compliance Rate
Several	Written Plans	68%
625	Road Construction and Maintenance	98%
630	Harvesting	96%
640[1]	Vegetation Retention Along Streams	96%
645	Protection for Significant Wetlands	94%
655	Protection for "Other Wetlands"	89%
660	Operations Near Waters of the State	99%

[1] In July 2017, these rules were incorporated into Rule Division 642.

INTRODUCTION

The Oregon Department of Forestry (ODF) regulates forestry operations on non-federal forest land by means of the Forest Practices Act (FPA). Landowners and operators are subject to the FPA statutes and rules when they conduct any commercial activity related to the growing or harvesting of trees. The purpose 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(1))

FPA rules were developed to achieve the objective of the FPA and are contained in Oregon Administrative Rules Chapter 629. The ODF Private Forests Program administers these rules and monitors their implementation. ODF and industry use findings of compliance monitoring efforts as topics for training efforts. Third party certification systems also use these findings in their process. ODF reports rates of compliance with FPA rules (a Key Performance Measure) to the legislature.

History of Compliance Monitoring

Between 1998 and 2000, the ODF Forest Practices Monitoring Program implemented the BMP Compliance Monitoring Project (BMPCMP). The Program designed the study to identify the level of forest operations in compliance with FPA rules. ODF employees conducted the study in a statistically rigorous manner. A 2002 report summarizes results (ODF, 2002).

In 2011, the Oregon Legislature directed ODF to audit rates of compliance with Forest Practices Act standards[2]. In contrast with the 2002 study, the legislature stipulated that this work was to be conducted by contractors. ODF designed the audit to have contractors responsible for collecting field data, but ODF retained responsibility for interpreting field data and making compliance estimates. Results

[2] 2011 Legislative Session-Budget Note #1

from the first year efforts were summarized in the 2013 Compliance Audit Report (ODF, 2013).

Continuity in Sampling and Analysis 2013 -2017

In the 2017 study, ODF used similar methods, criteria, and contractor for data collection to those of the 2013-2016 studies. One notable exception is that the 2016 and 2017 studies relied entirely on the use of FERNS notification data.

The agency designed the study to answer the following monitoring questions at a broad spatial scale:

1. How often did operators comply with FPA rules pertaining to harvesting, road construction and maintenance, and water protection?
2. How does compliance vary by FPA Administrative Area ("Area") and landowner type?
3. Which rules have relatively high and low compliance rates?
4. What is the scale of resource impacts resulting from non-compliance?
5. In what practices, if any, do landowners, operators and ODF staff need more training and education to reduce resource impacts?

The agency also designed the study to answer rule-specific questions regarding implementation of FPA rules that seek to avoid or eliminate:

- Ongoing or imminent delivery of sediment or organic debris to Waters of the State. This was the criterion used in most rules to assess compliance.
- Logging debris and petroleum products in Waters of the State.
- Petroleum products left in the forest.
- Stream channel disturbance.
- Loss of shade or other riparian functions.
- Disrupted hydrology.

Sample Site Selection - 2017

In 2017 the contractors collected data at 100 sites spread across all three ODF Administrative Areas (Figure 1). The number of sites chosen from each Area were proportional to the total acreage for which notifications were received during the sample interval (Unit End Dates November 1, 2014 to October 31, 2015), with a slight modification due to logistical constraints. The process resulted in 39% of units being chosen in the Northwest Oregon Area; 43% of units were chosen in the Southern Oregon Area; 18% of units were chosen from the Eastern Oregon Area (Table 1).

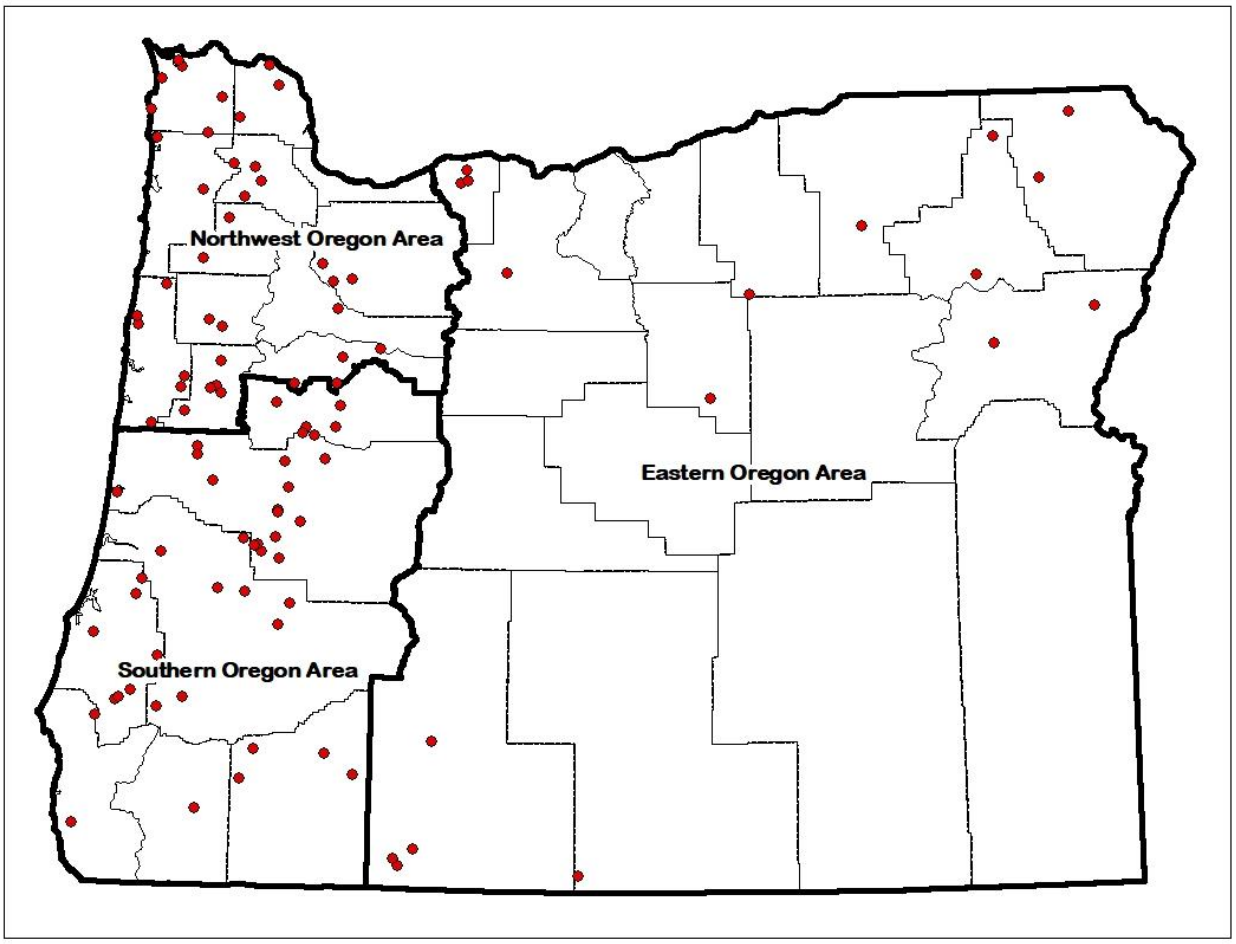

Figure 1. Locations of units surveyed for the 2017 FPA compliance audit.

Ownership of sample sites was classified into three groups[3]:

1. Private Industrial (PI): private entities owning greater than 5,000 acres of land;
2. Private Nonindustrial (PNI): private entities owning less than 5,000 acres of land; and
3. Other (OTH): generally public entities such as state and county forests.

The FPA does not cover federal and tribal ownerships, and thus they are not included in this study. We also stratified by ownership class for each Area as shown in Table 1.

Table 1. Units surveyed by Area and ownership class. PI – private industrial, PNI – private non-industrial, Other – public entities such as state or county.

Area	Total units visited	Landowner Class		
		PI	PNI	Other
Eastern Oregon	**18**	7	9	2
Northwest Oregon	**39**	20	12	7
Southern Oregon	**43**	27	14	2
Total	**100**	**54**	**35**	**11**

Staff sent postcards about the study to all landowners in the potentially affected population. This was designed to create awareness of the study prior to formal request for permission to access private lands.

Staff randomly chose notification numbers (i.e., an ODF-generated number identifying a forest operation site) from the department's Forest Activity Electronic Reporting and Notification System (FERNS) database for each Area and ownership class. We then contacted landowners by telephone and electronic mail for permission to access the sites.

Staff deemed sites unsuitable if harvest did not occur or was presently underway, or other reasons, based on input from landowners and ODF field staff. Other reasons included non-commercial harvests, ownership changes, and land use conversions,

[3] Note that when landowners notify for harvest, they self-select into the categories as per these criteria.

such as when forest land becomes a vineyard. There were 155 suitable sites in an initial draw of 345 (Table 2).

Table 2. Suitability for study of 345 sites selected at random from FERNS database.

		Suitable		Unsuitable			Unknown
Ownership	**Inquiries**	**Permission Granted**	**Permission Refused**	**Did Not Operate**	**Active Harvest**	**Other**	**No Response**
PI	89	61 (69%)	7 (8%)	4 (4%)	5 (6%)	6(7%)	6 (7%)
PNI	231	37 (16%)	33 (14%)	34 (15%)	12 (5%)	46 (20%)	69 (30%)
Other	25	17 (68%)	0 (0%)	0 (0%)	1 (4%)	3 (12%)	4 (16%)
Total	345	115 (33%)	40 (12%)	38 (11%)	18 (5%)	55 (16%)	79 (23%)

Twenty-three percent (23%) of landowners did not respond to our request, primarily from the PNI and Other ownership classes (Table 2). Landowners who did respond, and whose lands were suitable, granted permission in 33% of the queries. Permission was sought on 231 PNI sites to get 37 sites for study, and thus 16% of requested permissions were both suitable and permission granted.

Twelve percent (12%) of landowners refused to participate (Table 2). When a site was found to be unsuitable, or landowner permission could not be obtained, replacement sites were chosen using the random process described previously.

Data Collection and Analysis

The use of contractors for fieldwork affected project design. ODF selected a subset of quantifiable FPA rules for evaluation, and then designed a field protocol that emphasized quantitative measurements and identification of specific conditions. This protocol was used by the contractors to collect the field data (see Appendix I – "Field Guide"). The contractors submitted these raw data to ODF. Department personnel applied a quality control check to the data (See Appendix I, Section 6, page 52). Once data quality met agency standards, ODF used a database and GIS software to analyze the data. The software performed logical queries to determine the number of locations (e.g., landings, stream segments, road segments) at which rules applied, at which standards for rules were met, and whether resource impact (sediment into streams, primarily) occurred or was likely to occur. Metrics identified in ODF guidance for FPA Administration are the predominant measure of compliance or non-compliance for the purpose of the study.

Appendix II lists of the assumptions used in determining apparent noncompliance and applicable populations. Without a full enforcement investigation and legal decision on compliance, outcomes are considered apparent rates of compliance or non-compliance, although for readability the word "apparent" is not used but implied.

After determining the list of applicable rules, number of rule applications and associated noncompliant applications, staff summarized compliance rates by total number of applications and by unit. Compliance rates were calculated based on the total number of potential rule applications for a given stratification (e.g., by Area, ownership class).

RESULTS

Compliance by Area, Ownership Type & Rule Division

Table 3 lists state-wide compliance rates by FPA Administrative Area. This table combines all rules, with the total number of noncompliant applications over all sites and rules being divided by the number of total applications. On this basis, overall compliance is 98%, varying +/- 1% by ownership class.

Table 3. Rule level compliance, by FPA Administrative Area, based on pooled data (total number of times a rule applied).

Rule Applications			
	Non Compliance	**Applicable**	**Compliance Rate**
Overall	**625**	**25,600**	**98%**
Eastern Oregon Area	113	4,654	98%
Northwest Oregon Area	266	11,227	98%
Southern Oregon Area	246	9,719	97%

Table 4 lists compliance rates by ownership class. The PI class has the highest aggregate rule level compliance. Compliance with individual rules varied between ownership classes. Sample size for certain individual rule applications may bear on comparisons between ownership classes.

Table 4. Rule level compliance by ownership class.

Rule Applications			
	Non Compliance	**Applicable**	**Compliance Rate**
Overall	**625**	**25,600**	**97%**
Private Industrial	366	17,196	98%
Private Nonindustrial	214	5,640	96%
Other	45	2,764	98%

Table 5 shows compliance totals broken down by rule division (note: Division 605 is assessed separately in the section devoted to Written Plan rules and administrative compliance). Compliance rates are generally high for all rule divisions. Results for individual rules assessed in this study are listed in Appendix III. Sample size (n) equaled or exceeded 50 sample points for all of the individual rules discussed in the following paragraphs, except as noted.

Table 5. Compliance by rule division.

		Number of Rule Applications		
Rule Division	**Description**	**Noncompliance**	**Total**	**Compliance Rate**
625	Road Construction and Maintenance	176	11,384	98%
630	Harvesting	384	10,582	96%
640	Vegetation Retention Along Streams	24	535	96%
645	Protection for Significant Wetlands	1	17	94%
655	Protection for "Other Wetlands"	12	111	89%
660	Operations Near Waters of the State	18	2,940	99%

Rules in Division 625, Road Construction and Maintenance, had a compliance rate of 98% (Appendix III). Rule subsection 500 dealing with rock pits had perfect compliance for the four quarries sampled. Of the 9 rules dealing with road drainage,

8 exceeded 98% compliance. The exception was OAR 629-625-330(4), where road segments near stream crossings were found to have adequate filtration in 85% of the rule applications. In this case, full implementation occurs when a road drainage feature has been installed and diverts road drainage to the forest floor, allowing water to be filtered before entering waters of the state.

Whereas compliance was 99% for road drainage structures, additional information is helpful to understand the larger picture of road drainage. Only roads and culverts that connected to streams were considered in the compliance rates. Reviewers found that 35% of drainage culverts were either partially or completely blocked. Gullies were also found on 22% of road segments.

The lowest compliance within Division 625 involved the rules dealing with stream crossing construction and the removal of temporary stream crossings on roads. The lowest compliance involved the removal of temporary stream crossings on roads (0%, n=8; OAR 629-625-0430(5)).

A notable finding with Division 625 rules centers around culvert sizing and 50-year peak flows. The official ODF guidance states that culvert sizing should be performed using the methods expressed in Forest Practices Technical Note Number 5 (Tech Note 5, 2002). Size is based upon the contributing drainage area to the stream crossing mi^2, and mapped 50-year peak flow at the location of the stream crossing (cfs/mi^2). Sixty-two percent of culverts were adequately sized to pass the 50-year peak flow (OAR 629-625-0320(2(a))).

Rules in Division 630, Harvesting, had a compliance rate of 96%. The rule dealing with cable yarding across specified Waters of the State ((n=42; OAR 629-630-0700(4)) had 100% compliance. There also was little evidence that skid trails on steep slopes contributed sediment to streams based on compliance for the applicable rules ((OAR 629-630-0150(7) and (8))).

Like roads, the lowest compliance for skid trails involved temporary crossings. Rules dealing with construction of sediment barriers at these crossings (5%; OAR 629-630-0800(6)) and design to minimize sedimentation (68%; OAR 629-630-0800(4(a)) had compliance rates well below the average for this rule Division.

Rules in Division 642, Vegetation Retention along Streams had a compliance rate of 96%. Compliance rates were lower for retention of trees near Medium Nonfish (Type N) streams (90%; OAR 629-642-0100(2(b))) than near Fish (Type F) streams (96%; 629-642-0400(2(b))). There was only one rule application along a Small Type

N stream (OAR 629-642-01002(b)). Operations along Small Type N streams generally occur along stream reaches where this rule does not apply, because of contributing basin size, stream seasonality, or FPA geographic region.

Rules in Division 645, Protection for Significant Wetlands had a compliance rate of 94%. Machinery was found to have entered a significant wetland on one occasion (n=17; OAR 629-645-0030(1)). Whereas assessing this Division has been a part of the 2013-2016 compliance audits, previous to this year only one site had a significant wetland.

Rules in Division 655, Protection for Other Wetlands had a compliance rate of 89%. Almost all compliance issues involved wetlands less than ¼ acre (OAR 629-655-0000(3)).

Rules in Division 660, Operations near Waters of the State had a compliance rate of 99%, and the sample size is large. There were a small proportion of sample points where road construction or temporary stream crossings resulted in some length of small N streams being relocated or some volume of soil or rock being added or removed (n=18, OAR 629-660-040(1 and 2)). These were a small proportion of all surveyed stream segments (cumulative n=2940 for the two rules).

Unit-level Compliance

Compliance rates were summarized for each of the surveyed harvest units. Unit compliance rates were calculated as the total number of times a unit complied with the rules divided by the total number of rule applications. Figure 2 shows the number of units that achieved a given compliance level. For example, 43 of 100 units ranged from 99-100% compliance. Compliance rates for individual units ranged from 83%-100%, with both average and median rates of 98%.

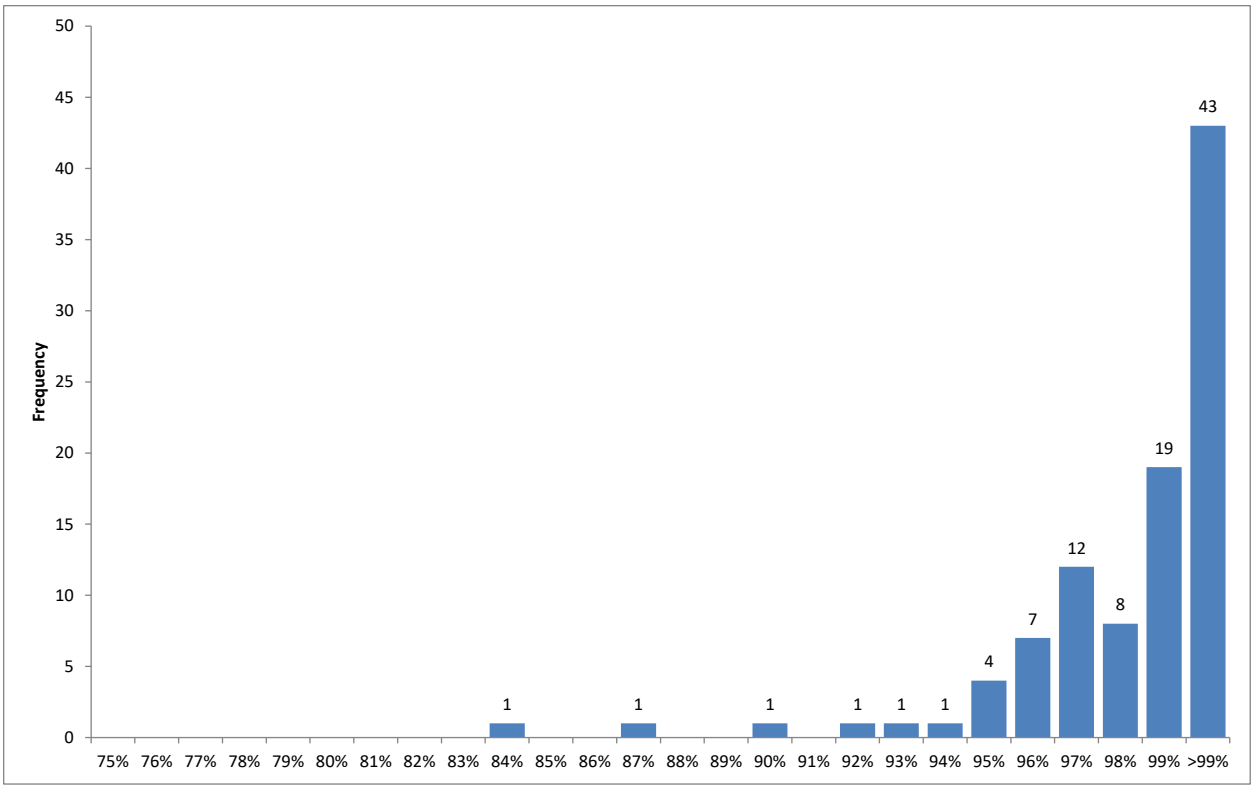

Figure 2. Frequency distribution of unit compliance rates. Numbers on x axis represent upper limit of compliance bin.

Scale of Estimated Resource Impacts

Contractors provide visual estimates of the amount of actual or potential sediment delivery at or to streams. Of the 114 recorded sample points where sediment was contributed, or potentially contributed, to Waters of the State, 85% involved less than 1 cubic yard of sediment (Figure 3). These frequently involved trace amounts of sediment found in direct conveyance to, and within 10 feet of, streams. The one sample point exceeding more than 10 cubic yards of sediment was associated with roads. No cases of sediment contribution exceeded 100 cubic yards.

Sediment delivery to Waters of the State was unevenly distributed between harvest operations. Thirty-six units delivered sediment. The remaining 35 units that contained Waters of the State did not deliver sediment to those waters, and 29 units had no Waters of the State.

The bulk of this sediment delivery was to small water bodies. In 65% of these cases, sediment was delivered to Small Type N streams. Small F streams were responsible for another 12%. Delivery to wetlands <8 acres accounted for 18%. Medium N streams, Large and Medium F streams, Significant Wetlands, and Lakes accounted for the remaining 5%.

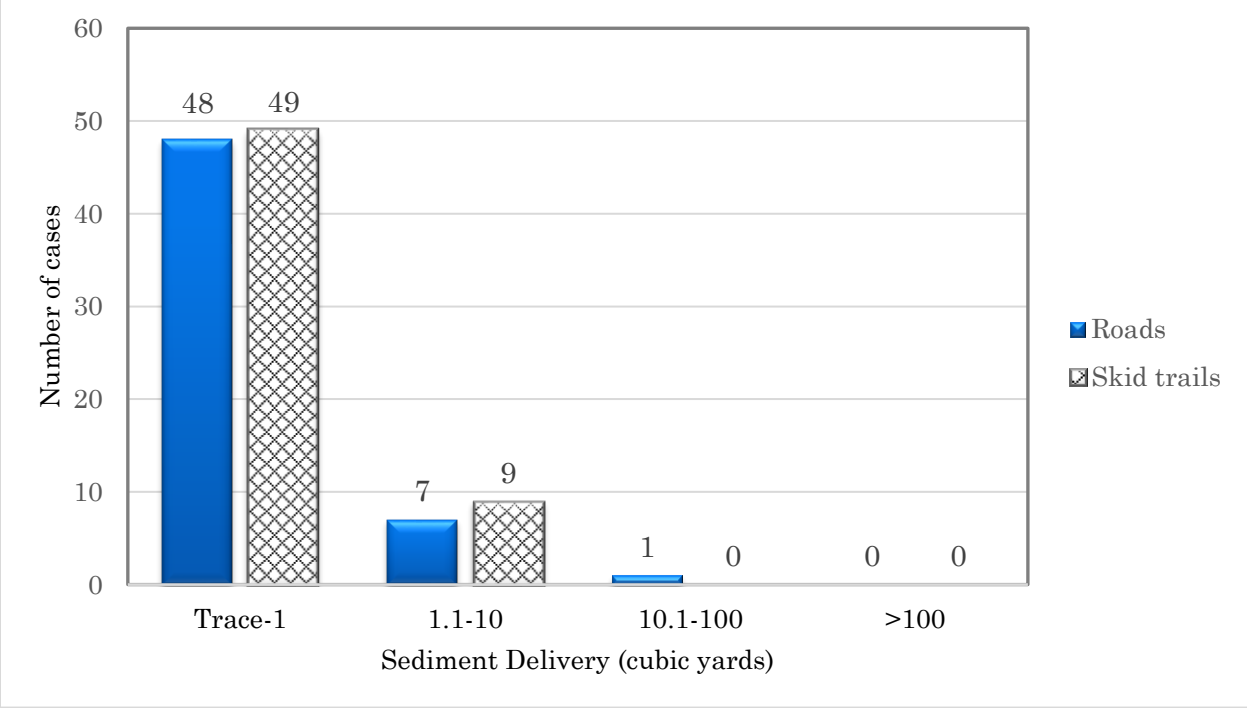

Figure 3. Number of cases of sediment delivery to Waters of the State by bin of sediment volume and source of sediment (roads or skid trails).

Like sediment delivery, impacts from organic material in streams were concentrated in smaller water bodies. Seventy-two of the 92 compliance issues related to slash in or near Waters of the State occurred on Small Type N streams. Many of these were seasonal streams with high gradients. Wetlands less than 8 acres were responsible for another 13 slash events. On four occasions slash was observed in a fish-bearing body of water, and three times in a Significant Wetland or lake.

Grease tubes and other petroleum containers were found on 15% of landings. These landings were generally away from Waters of the State. Potential short-term impacts to these Waters were of low concern. Nevertheless, these containers are considered petroleum waste and their removal is required by the FPA rules (OAR 629-630-0400(3)).

COMPARISON WITH PREVIOUS RESULTS

In 2017, compliance rates for most rule divisions are similar to prior years (Table 6). Road construction and maintenance rules (Div. 625) again had compliance rates

over 95%. Road drainage rules exceeded 98% compliance. The lowest compliance rates in all years were observed for rules related to drainage barriers at temporary stream crossings.

Table 6. Compliance rate for rule divisions, 2013-2017.

Rule Division		2013	2014	2016	2017
Several	Written Plans	75%	83%	92%	68%
625	Road Construction and Maintenance	97%	98%	98%	98%
630	Harvesting	95%	93%	96%	96%
640/642[4]	Vegetation Retention Along Streams	98%	99%	99%	96%
645	Protection of Significant Wetlands	NA	NA	100%	94%
655	Protection for "Other Wetlands"	72%	83%	98%	89%
660	Operations Near Waters of the State	99%	98%	99%	99%

Compliance with Written Plans (Div 605; individual rules in other Divisions) apparently decreased from prior years. As noted in the Discussion section, this may be the result of lack of direction in draft guidance for Div 605 to document waivers granted.

Overall Division level compliance rates for harvesting rules (Div. 630) in 2017 were 96%. This was similar to 2016, and represented a slight improvement over the first two years.

In 2017, the recorded sedimentation effects of temporary road and skid trail crossings upon waters of the state improved considerably from the earliest years of the study, although compliance rates did not achieve the high results of 2017. Compliance with OAR 629-630-0800-4(a) for these years is 44% (2013), 48% (2014),76% (2016), and 68% (2017).

Compliance with vegetation retention rules (Division 642, formerly Division 640) decreased from prior years, although it still exceeded 95%. Reduced compliance was observed for both Fish and Nonfish streams. Vegetation was compliantly retained along 99% of Type F stream segments in all prior audit years, but was 96% in 2017

[4] In July 2017, Division 640 became Division 642.

(OAR 629-640-100-2(b); n>300 in all years). Corresponding compliance rates for Large and Medium Type N stream segments varied between 92% and 100% in prior years, but was 90% in 2017 (OAR 629-640-200-2(b); n>60 in all years but 2014). The lowest prior compliance rate of 92% was observed in 2014, when only 12 rule applications were reported.

Compliance trends could not be determined for rules applying to Significant Wetlands (Division 645). No Significant Wetlands were reported in the 2013 and 2014 audits, while only one rule application was reported in 2016.

Compliance with the rules involving the protection of Other Wetlands (Division 655) was 89%. This represented an increase over 2013 (75%) and 2014 (83%), but did not match the 2016 results (92%) . The lowest compliance rate continued to be with wetlands <1/4 acre (OAR 629-655-000-3; 88%).

Again, we found very high compliance (99%) with the rules (Division 660) governing operations near the waters of the state. The rules that were examined in this division restrict changes to stream channels (OAR 629-660-0040).

Prevention of fill erosion at stream crossings (75%; OAR 629-625-0320(1)(c)) and the stabilization of fill material at crossings (86%; OAR 629-625-0310(5)) were issues identified in 2014. However, compliance for OAR 629-625-0320(1)(c) has increased since that time, with 2016 and 2017 compliance rates at 92% and 100%, respectively. After increasing in 2016 (100%), compliance with OAR 629-625-310(5) decreased to 84% in 2017. Sample size in 2017 was 19 for both rules.

Compliance with culvert sizing requirements (OAR 629-625-0320(2(a))) has varied over the four years of study. The calculated compliance rate in 2017 was 62%. For comparison, this rate was less than 90% in 2013 (85%) and 2016 (73%), but compliance was 96% in 2014. This variability may be affected by sample size. In 2017, thirteen stream culverts were assessed for the ability to pass the 50-year flow.

Compliance rates for ownership classes are both high (≥94%) and moderately stable, with increases of about 2% since 2013 for both PI and PNI classes. The "Other" ownership class had compliance rates in the 97-98% range.

Table 7. Compliance rate by Ownership Class, 2013-2017.

	2013	2014	2016	2017
Private Industrial	96%	96%	98%	98%
Private Nonindustrial	94%	96%	96%	96%
Other	98%	98%	97%	98%

Differences between Areas decreased between 2013 and 2017 (Table 9). There appeared to be small increases in compliance rates in the Eastern and Southern Oregon Areas.

Table 8. Compliance rate by Area, 2013-2017.

	2013	2014	2016	2017
Eastern Oregon Area	96%	94%	96%	98%
Northwest Oregon Area	98%	96%	98%	98%
Southern Oregon Area	95%	97%	96%	97%

DISCUSSION

Overall 2017 compliance at the Area and ownership level was high, as were 4 out of the 7 rule divisions assessed (>95%). Improved compliance rates since 2013 with protection of small ("other") wetlands is also a welcome result. Compliance rates were above 95% for 35 out of the 51 rules assessed[5]. Particular areas of high compliance include but are not limited to rules relating to rock pits, road drainage, keeping waste metal out of waters of the state, and skid trails on steep slopes. Compliance rates were between 90% and 95% for another four rules.

The goal of the compliance audit is not only to demonstrate areas of success but areas where improvements can be made. Five rules had compliance rates between 80% and 90% and another five rules are below 80% compliance[6]. Based on these findings, training is underway that targets agency personnel, forest landowners, and operators. ODF will utilize existing partnerships with Oregon State University, Associated Oregon Loggers, Oregon Small Woodlands Association, and other

[5] Note: while 57 rules were included in this audit, 6 rules had no sample points and are thus omitted from this discussion.

[6] Three Written Plan rules were grouped together because they used the same code in the data sheets.

professional groups to provide training on the priority areas identified in this report.

NEXT STEPS

Training and education efforts will continue to cover areas of high compliance in order to maintain this good performance. The following rules had low compliance rates, and warrant further analysis and attention:

- Identification and protection of small water bodies: While there has been considerable improvement on this front (as noted in the previous section), this should remain a point of emphasis.
    - Small Type-N streams: Many operations occur near stream initiation points. These streams may not be recognized by operators and foresters, particularly under dry conditions. Improved standardization of methods for determining stream initiation is important.
    - Small wetlands: Increased education and awareness of the presence of wetlands less than ¼ acre may reduce their susceptibility to mechanical entry.
- Effective removal of temporary stream crossings on roads: This has improved considerably over previous years, yet compliance remains below 90%. Although attempts were usually made to remove these crossings, they generally retained some steep fill, or the post-removal banks had over-steepened side slopes. Improvements could be made where erosion control measures were warranted on remaining fill materials. Perhaps greater understanding of appropriate erosion control techniques is warranted.
- Effective treatment of skid trails near streams: Skid trails often were constructed near, or crossed, very small Type N streams. As noted in the Results section, these skid trails were generally considered to have inadequate barriers to keep sediment out of streams. Often, skid trails that crossed streams were not removed, or did not have appropriate practices applied upon removal. While these crossings did not necessarily result in observed sedimentation at the time of the survey, it did increase the risk of sediment delivery to streams. This risk might be mitigated by training that emphasizes Best Management Practices for skid trails near streams.

- Effective drainage and filtration techniques for roads upslope of stream crossings: In many cases, efforts at drainage ditches and waterbars were made, but these installations were often ineffectively constructed and maintained.

- Effective road maintenance and construction techniques on steep terrain: In the 2016 audit, compliance with certain road design rules to minimize landslide risk (OAR 629-625-0310) was lower than the average of previous years. Compliance in 2017 was lowest with construction of stable fills (((OAR 629-625-0310(4)); 83% and ((OAR 629-625-0310(5)); 84%). Increased training emphasis on these practices could reduce sidecast failures in steep terrain.

- Removal of petroleum products from the forest: Grease tubes, oil jugs, and oil filters were commonly found at landings, which is against the rules. Although they did not pose an immediate water quality hazard, they could potentially have detrimental long-term impacts.

- Road maintenance: Gullies in roads and blocked drains were frequently observed on the forest. Although these features usually did not contribute sediment to streams, effective road maintenance is necessary to prevent future resource impacts.

- Culvert sizing for 50 year flows: lack of compliance here can lead to flooding and road failure. Forest Practices Technical Note #5 should be reviewed to ensure that the best available methods are used for culvert sizing.

- Written Plans: In 2014, OAR 629-605-170 was revised to allow for the waiver of Written Plans when an operation would take place within 100 feet of a Type F or Type D stream, but not within the actual Riparian Management Area. Lack of direction about waiver documentation may have led to a drop in compliance with this rule.

On a final note, the department would like to thank those private forest landowners that graciously gave us permission to use their timber harvest sites for this survey. The Compliance Audit is an entirely voluntary program and would not be possible without their cooperation.

REFERENCES AVAILABLE UPON REQUEST

Oregon Department of Forestry, 2002a. Best Management Practices Compliance Monitoring Project: Final Report. April 2002. 75 pp. http://www.oregon.gov/ODF/Documents/WorkingForests/BMPComplianceReport.pdf

Oregon Department of Forest, 2002b. Determining the 50-Year Peak Flow and Stream Crossing Structure Size for New and Replacement Crossings. Forest Practices Technical Note Number 5. Version 1.0. Effective May 10, 2002.

Oregon Department of Forestry, 2013. Forest Practices Compliance Audit Final Report.

Oregon Department of Forestry, 2014. Forest Practices Compliance Audit Final Report.

Oregon Department of Forestry, 2016. Forest Practices Compliance Audit Final Report.