OREGON DEPARTMENT OF FORESTRY

Forest Practices Compliance Audit: 2016 Annual Report

Jon Laine
Forest Management Technician

John Hawksworth
Monitoring Specialist

Paul Clements
Compliance and Training Specialist

Daniel Olson
Monitoring Specialist

Terry Frueh
Monitoring Coordinator

Acknowledgements

Private landowners and Oregon Department of Forestry (ODF) field staff helped design and implement this project. ODF thanks 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.

The external review committee continues to provide valuable input. The authors 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

COMMITTEES AND COORDINATORS

This study has periodic oversight by an external review committee. The committee'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 committee met throughout the development of the project, and will continue to meet as needed.
Additionally, study design received input from department field staff, and the study coordinating group has conversed with field staff on an ad hoc basis throughout the project.

External Review Committee

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

Oregon Department of Forestry – State Forests Program

Stimson Lumber Company

Oregon Small Woodlands Association

Oregon Forest Industries Council

Olympic Resource Management

Weyerhaeuser Company

International Paper

Collins Pine

Oregon Department of Environmental Quality

Associated Oregon Loggers

Project Coordinators

Marganne Allen, Manager, Forest Health and Monitoring Manager
Paul Clements, Compliance and Monitoring Specialist
W. Terry Frueh, Monitoring Coordinator

COMPLIANCE AUDIT REPORT: 2016

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 and 2016 ODF employed a private contractor to collect data according to same protocols, on 100 sites. This report contains the 2016 results.

The compliance audit focuses on harvest and road rules, and a subset of the water protection rules. Contractors collected data at sites harvested between 2012 and 2014, and provided ODF with these data, photographs, and notes. ODF used 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 FPA rules and potential or actual impacts to resources. Without a full enforcement investigation and legal decision on compliance, outcomes are 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 represented governmental entities, including state and county forests.

The 2016 study revealed a 97% compliance rate when analyzed at the rule-level (Table ES1).

The highest compliance rates were with Division 625 (Road Construction and Maintenance; 98%), Division 640 (Water Protection Rules: Vegetation Retention along Streams; 99%) and Division 660 (Water Protection Rules: Specific Rules for Operations near Waters of the State; 99%).

The compliance rate for Division 655 (Water Protection Rules: Protection Measures for "Other Wetlands, Seeps and Springs) improved from 72% in 2013 to 98% in 2016.

The findings of the 2013 and 2014 studies are in use as topics for training efforts by agency and industry alike. Third party certification systems also use the findings in their process. Rates of compliance with the FPA rules are also a legislative key performance measure (KPM) for ODF.

Table ES1. Compliance rates for Areas and Ownership Class.

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

Compliance rates greater than 95% were found with all rule divisions tested. The lowest compliance rates at a Division level (92%) were found with rules involving Written Plan requirements, primarily on lands of Private, Non-Industrial ownerships.

Table ES2. Compliance rate for rule divisions.

Rule Division		Compliance Rate
Several	Written plans	92%
625	Road Construction and Maintenance	98%
630	Harvesting	96%
640	Vegetation Retention Along Streams	99%
655	Protection for “Other Wetlands”	98%
660	Operations Near Waters of the State	99%

INTRODUCTION

ODF regulates forestry operations on non-federal forest land by means of the FPA. Landowners and operators are subject to the FPA Rules when they conduct any commercial activity related to the growing or harvesting of trees. The purpose of the FPA is to:

> [E]ncourage 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)

FPA rules were developed to achieve the objective of FPA statutes, and are contained in Oregon Administrative Rules Chapter 629. The ODF Private Forests Program administers FOA rules, and monitors their implementation. The findings of the 2013 and 2014 compliance monitoring efforts (ODF 2013, 2014) are in use as topics for training efforts by agency and industry alike. Third party certification systems also use these findings in their process. Rates of compliance with the FPA rules are also a KPM for ODF.

History of Compliance Monitoring

Between 1998 and 2000, the ODF Forest Practices Monitoring Program implemented the Best Management Practice Compliance Monitoring Project (BMPCMP). The project was designed to identify the level of forest operations in compliance with FPA rules. Statistical rigor was a feature of the study, which was conducted by ODF employees. Results were summarized in a 2002 report (ODF, 2002).

In 2011, the Oregon Legislature directed ODF to audit rates of compliance with FPA rules[1]. In contrast with the BMPCMP study, the legislature stipulated that this work was to be conducted by contractors. ODF designed the program to have contractors responsible for collecting field data, but ODF retained responsibility for

[1] 2011 Legislative Session-Budget Note #1

interpreting field data and estimating compliance rates. Results from the first year efforts were summarized in the 2013 Compliance Audit Report (ODF, 2013).

Continuity in Sampling and Analysis 2013 -2016

In the 2016 study, ODF used the same contractor, and criteria for data collection as in the 2013 and 2014 studies. Rule compliance was assessed by ODF staff using the same methods as in the 2013 and 2014 efforts after the data were collected and submitted by the contractor.

The study design was prepared to answer the following monitoring questions at a broad spatial scale:

1. How often did operators comply with the 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 study was also intended 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 - 2016

In 2016 the contractors collected data at 100 sites spread across all three 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 January 1, 2013 to November 5, 2014). The process resulted in 46% of units being chosen in the Northwest Oregon Area; 35% of units were chosen in the Southern Oregon Area; 19% of units were chosen from the Eastern Oregon Area (Table 1).

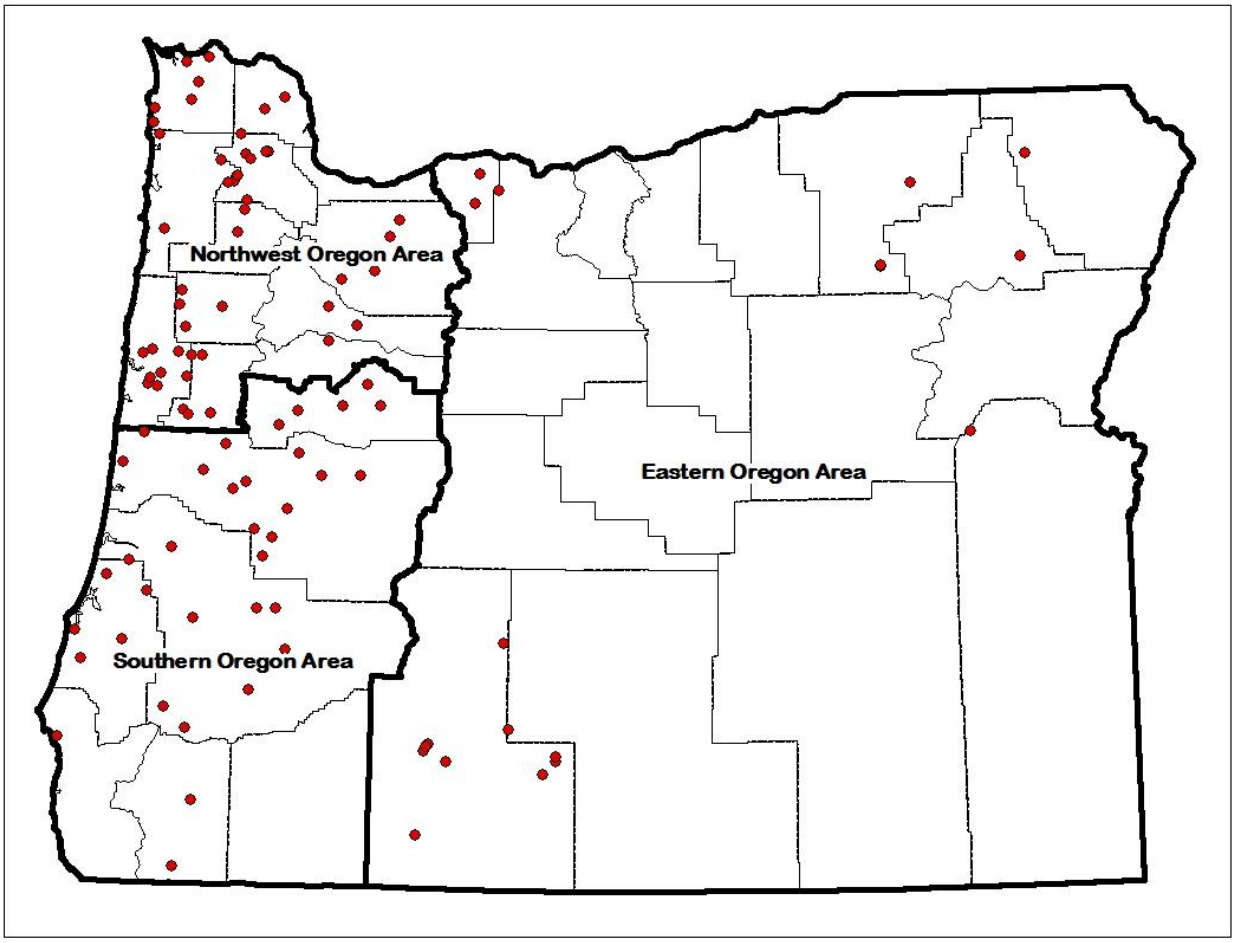

Figure 1. Locations of units surveyed for Oregon Department of Forestry 2016 Forest Practices Act compliance audit.

Ownership of sample sites was classified into three groups[2]:

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.

Note that federal and tribal ownerships are not covered by the FPA, and thus are not included in this study. The number of sites chosen from each Area was also stratified by ownership class 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	Landowner Class		
		PI	PNI	Other
Eastern Oregon	**19**	9	9	1
Northwest Oregon	**46**	32	12	2
Southern Oregon	**35**	18	13	4
Total	**100**	**59**	**34**	**7**

Notification numbers (i.e., an ODF-generated number identifying a forest operation) were randomly chosen from the Department's Forest Activities Notification System (FACTS) database for each Area and ownership class, stratified as previously mentioned. Landowners were then contacted by telephone and electronic mail for permission to access the site.

Sites were deemed 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 conversions to other land uses. There were 220 suitable sites in an initial draw of 418 (Table 2).

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

Table 2. Suitability for study of 418 sites selected at random from FACTS database.

		Suitable		Unsuitable			Unknown
Ownership	**Inquiries**	**Permission Granted**	**Permission Refused**	**Did Not Operate**	**Active Harvest**	**Other**	**No Response**
PI	180	135 (75%)	3 (2%)	6 (3%)	5 (3%)	3(2%)	28 (16%)
PNI	204	38 (19%)	19 (9%)	19 (9%)	10 (5%)	34 (17%)	84 (41%)
Other	34	24 (71%)	1 (3%)	1 (3%)	3 (9%)	1 (3%)	4 (12%)
Total	418	197 (47%)	23 (6%)	26 (6%)	18 (4%)	38 (9%)	116 (28%)

Twenty-eight percent (28%) of landowners did not respond to our request, primarily from the Private Non-Industrial and Other ownership classes (Table 2). Six percent (6%) of landowners refused to participate. Landowners who did respond, and whose lands were suitable, granted permission in 47% of the queries. Permission was sought on 204 Private Non-Industrial sites to get 38 sites for study, and thus a rate 19% of requested permissions were suitable and permission granted.

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. We do not have data as to whether or not there would be a difference in compliance results if the sites for which we did not obtain permission were included in the analysis (i.e., is there bias in the data due to our method for determining which sites are selected?)

Data Collection

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 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 database and GIS software to analyze the data to assess compliance rates. The software performed logical queries to determine the number of locations (e.g., landings, stream segments, road segments) at which rules applied, at which rules were met, and whether resource impact (sediment into streams, primarily) occurred or was likely

to occur. Metrics identified in ODF guidance for administration of FPA rules are the predominant measure of compliance or non-compliance for the purpose of the study.

A list of the assumptions used in determining apparent noncompliance and applicable rule applications is given in Appendix III. Without a full enforcement investigation and legal decision on compliance, outcomes are apparent rates of compliance or non-compliance, although for readability the word "apparent" is not used but implied.

Once the list of applications of rules and associated noncompliant sample points was determined, compliance rates were summarized 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

State-wide compliance rates by Area are given in Table 4. Rules in this case were pooled together, with the total number of noncompliant applications over all sites and rules being divided by the number of total number of rule applications. On this basis, compliance is 97%. This year, rule level compliance is highest in the Northwest Oregon Area (NWOA; 98%), yet the lowest compliance level, for Eastern Oregon and Southern Oregon Areas, is still above 96%.

Table 3. Rule level compliance based on pooled data (total number of times a rule applied).

Rule Applications			
	Non Compliance	Applicable	Compliance Rate
Overall	**675**	**25,611**	**97%**
Eastern Oregon Area	195	5,012	96%
Northwest Oregon Area	257	14,169	98%
Southern Oregon Area	223	6,430	97%

Compliance rates are broken down by ownership class in Table 5. Aggregate rule level compliance is highest for the Private Industrial ownership class. 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	**675**	**25,611**	**97%**
Private Industrial	384	17,354	98%
Private Nonindustrial	219	5,774	96%
Other	72	2,483	97%

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[3].

		Number of Rule Applications		
Rule Division	**Description**	**Noncompliance**	**Total**	**Compliance Rate**
625	Road Construction and Maintenance	234	11,369	98%
630	Harvesting	403	10,607	96%
640	Vegetation Retention Along Streams	5	562	99%
655	Protection for "Other Wetlands"	1	50	98%
660	Operations Near Waters of the State	29	2,986	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 eleven quarries sampled. Of the 9 rules dealing with road drainage, 8 exceeded 98% compliance. The exception was OAR 629-625-330(4),

[3] There was also one application of Rule Division 645, dealing with significant wetlands. No compliance issues were found.

where road segments near stream crossings were found to have adequate filtration structures in 83% of the rule applications.

Drainage structures were often less functional than the 98% statistic implies. Gullies were found on 18% of road segments and 27% of drainage culverts were partially or completely blocked. Note that only those road segments and culverts that drained to streams were considered in the compliance rates.

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=9; OAR 629-625-0430(5)) and the construction of sediment barriers (2%; OAR 629-630-0800(6)). Seventy-three percent of culverts were adequately sized to pass the 50-year peak flow (OAR 629-625-0320(2)(a)). A compliance rate of 75% was measured for (OAR 629-625-0310(2)), the rule dealing with end hauling of waste material.

Rules in Division 630, Harvesting, had a compliance rate of 96%. Complete compliance was found for rules dealing with keeping waste metal out of waters of the state (OAR 629-630-0400(4)). There was little evidence that skid trails on steep slopes were contributing sediment to streams based on compliance for the applicable rules (OAR 629-630-0150(7) and (8), 100% compliance on each rule).

Like roads, the lowest compliance for skid trails involved temporary crossings. Rules dealing with construction of sediment barriers at these crossings (2%; OAR 629-630-0800(6)); design to minimize sedimentation (76%; OAR 629-630-0800(4)(a)), and crossing removal (88%; OAR 629-630-0800(4)(e)) all exhibited compliance rates well below the average for rule Divisions.

Rules in Division 640, Vegetation Retention along Streams had a compliance rate of 99%. The only instances of noncompliance with this division were observed for retention of trees within 20 feet of Type F streams (OAR 629-640-0100(2)(b)).

Rules in Division 655, Protection for Other Wetlands had a compliance rate of 98%. This was higher than was observed in prior years. This may point to increased awareness of the presence of these small wetlands.

Rules in Division 660, Operations near Waters of the State had a compliance rate of 99%, and the sample size is large. Whereas there were 29 sample points of small N streams that had been relocated or had soil material added or removed (OAR 629-660-

040(1 and 2)), these points were less than 0.1% of all surveyed stream segments (cumulative n=2986 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 had a given compliance level. For example, 46 of 100 units ranged from 99-100% compliance.

Compliance rates for individual units ranged from 75%-100%, averaged 97.5%, and had a median compliance rate of 98.8%. Sixty percent of units complied with all applicable rules in at least 99% of sample points.

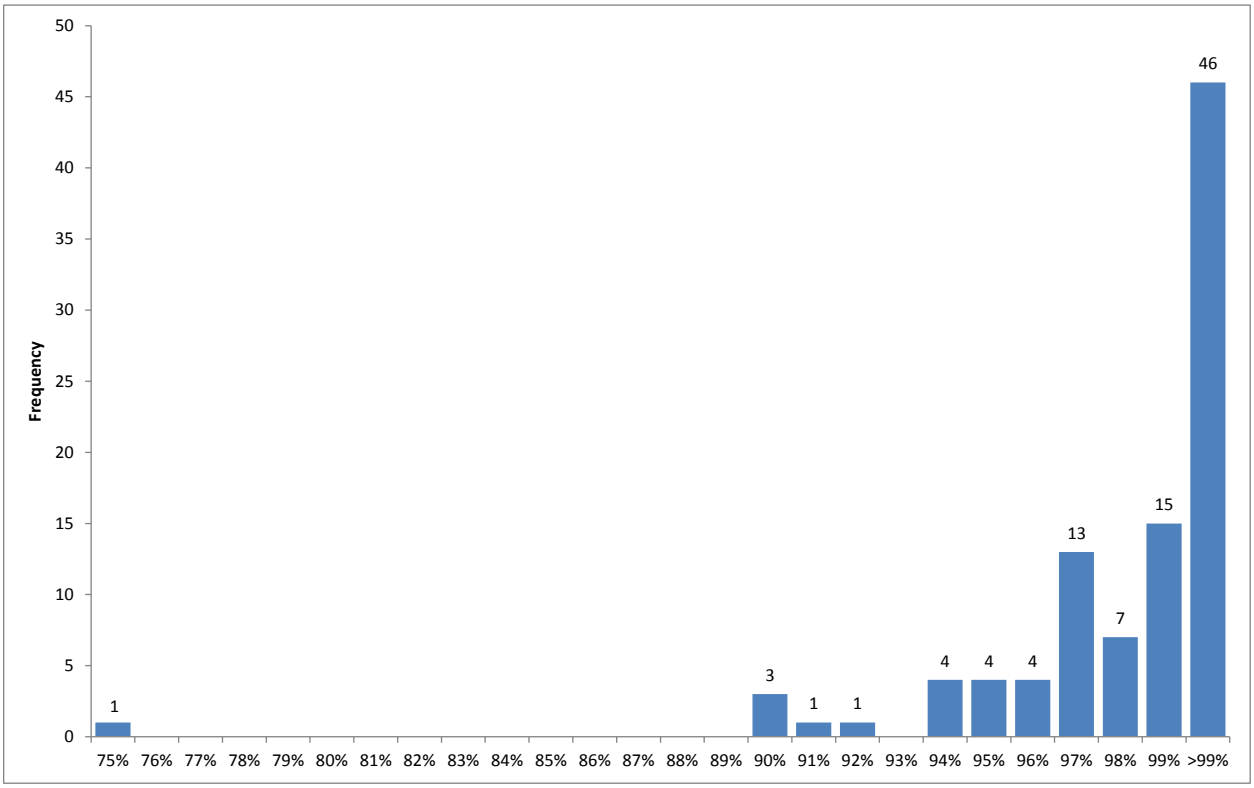

Figure 2. Frequency distribution of unit compliance rates

Scale of Estimated Resource Impacts

Contractors provided visual estimates of the amount of actual or potential sediment delivery at or to streams. Of the 139 recorded sample points where sediment was contributed, or potentially contributed, to waters of the state, 55% 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 five

sample points exceeding 10 cubic yards of sediment delivery were associated with roads. In three of these cases, sediment contribution exceeded 100 cubic yards and was associated with erosion below ditch culverts. These cases resulted twice in sediment contribution to small N streams, and once to a medium F stream. Note that RPA rules regarding stabilization of road fills, road cross drainage, and road surface maintenance mandate practices that would prevent the conditions observed at these three sites.

Sediment delivery was unevenly distributed among harvest operations. Two harvest units accounted for all five cases of sediment delivery exceeding 10 cubic yards, all of which were associated with roads. Thirty units delivered smaller amounts of sediment. The remaining 44 units that contained waters of the state did not deliver sediment to those waters, and 24 units had no waters of the state.

The bulk of this sediment delivery was to small water bodies. In 71% of these cases, sediment was delivered to Small Type N streams. Small and Medium F streams were responsible for another 25%. Delivery to wetlands <8 acres, Medium N streams, and Large F streams accounted for the remaining 4%.

The cases of sediment delivery noted in Figure 3 were associated with noncompliance with a variety of rules and a wide range of compliance rates (2-99%).

This indicates that even rules with high compliance rates can be associated with instances of significant sediment delivery.

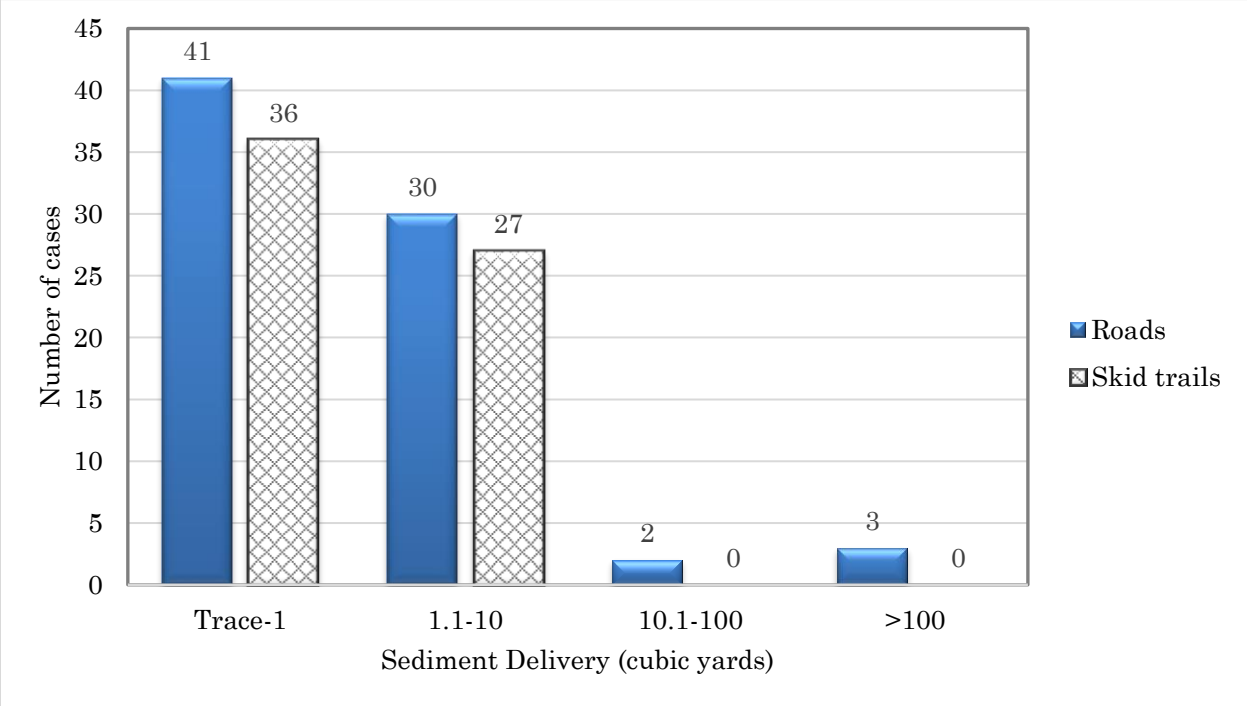

Figure 3. Number of cases of sediment delivery to waters of the state by bin of sediment volume and source of sediment (roads or skid trails).

Like sediment delivery, impacts from organic material in streams were concentrated in smaller water bodies. One hundred six of the 113 compliance issues related to slash in or near waters of the state occurred on Small Type N streams. Many of these streams were seasonal and steep. Wetlands less than 8 acres were responsible for another four slash events. On three occasions slash was observed in a fish-bearing body of water.

Grease tubes and other petroleum containers were found on 16% of landings. Operators are required to remove all petroleum product related waste material associated with the operation by an FPA rule (OAR 629-630-0400(3)).

COMPARISON WITH PREVIOUS RESULTS

In 2016, compliance rates for most rule divisions have increased from 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 and skid trail crossings.

In 2016, the recorded effects of temporary stream crossings upon waters of the state, while still a problem, have improved from prior years (44% (2013), 48% (2014), and 76% (2016)).

Table 6. Compliance rate for rule divisions, 2013-2016.

Rule Division		2013	2014	2016
Several	Written plans	75%	83%	92%
625	Road Construction and Maintenance	97%	98%	98%
630	Harvesting	95%	93%	96%
640	Vegetation Retention Along Streams	98%	99%	99%
655	Protection for "Other Wetlands"	72%	83%	98%
660	Operations Near Waters of the State	99%	98%	99%

Overall Division level compliance rates for harvesting rules (Div. 630) in 2016 were 96%. This represented a slight improvement over both prior years.

Again, we found compliance rates of 98-99% with the vegetation retention rules (Division 640 and Division 660) governing operations near the waters of the state.

Compliance with the rules involving the protection of Other Wetlands (Division 655) increased over prior years, from 75% in 2013, to 83% in 2014, to 92% in 2016 (sample sizes were above 35 for all years). This 2016 compliance rate is now comparable to other rule divisions, and may be the result of increased ability to detect these wetlands.

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, 2016 figures give compliance rates of 92% and 100%, respectively. Sample size in 2016 was 26 for both rules.

Compliance with culvert sizing requirements (OAR 629-625-0320(2)(a)) has varied over the three years of study. Compliance rates were less than 90% in 2013 (85%) and 2016 (73%), but compliance was 96% in 2014.

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

Table 7. Compliance rate by Ownership Class, 2013-2016.

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

There were no apparent trends by Area between 2013 and 2016 (Table 9), with all compliance rates of at least 94%.

Table 8. Compliance rate by Area, 2013-2016.

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

DISCUSSION

Overall 2016 compliance at the Area and ownership level are high (≥95%), as were 5 out of the 6 rule divisions assessed. Improved compliance rates since 2013 with written plan requirements and protection of small ("other") wetlands were also welcome results. Compliance rates are above 95% for 36 out of the 49 rule applications assessed[4]. 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 rules for which increased compliance can be achieved. Four rules had compliance rates between 80% and 90% and another five rules are below 80% compliance. Based on these findings, ODF will work with partners and both internal and external opportunities to emphasize and address these results.

Training and education efforts will continue to cover areas of high compliance in order to maintain this good performance. The following rules had either low

[4] Note: while this audit was designed to assess 57 rule, 8 rules had no sample points and are thus omitted from this discussion.

compliance rates or significant negative resource impacts, and warrant consideration for further attention:

- Identifying and protecting 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. Seventy-one percent (71%) of cases of sediment delivery to waters of the state were associated with Small Type N streams. 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: Measured compliance rates with rules concerning wetlands less than a quarter acre continuously improved over the 2013, 2014, and 2016 audit years (72%, 83%, and 98%, respectively). ODF plans to continue education and awareness about these small wetlands to minimize their susceptibility to mechanical entry.
- Properly removing temporary stream crossings on roads: Compliance has improved considerably over previous years, yet still 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 are required on remaining fill materials. Perhaps greater understanding of appropriate erosion control techniques is necessary.
- Treating skid trails near streams: Skid trails often were constructed near, or crossed, 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, where skid trails crossed streams, at the completion of operations the crossing was not adequately removed.. 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 BMPs for skid trails near streams.
- Installing drainage and filtration for roads near stream crossings: In many cases, efforts at installing drainage ditches and waterbars were made, but these installations were often improperly constructed and maintained.

- Effective road maintenance and construction techniques on steep terrain: In the 2016 audit, compliance with road design rules to minimize landslide risk (OAR 629-625-0310) was lower than the average of previous years. Compliance was lowest with end-hauling ((OAR 629-625-0310(2)); 75%) and construction of stable fills ((OAR 629-625-0310(4)); 87%). Training focused on these practices could reduce sidecast failures in steep terrain. This must include proper culvert placement in these steep settings, as erosion below culverts was responsible for some of the largest cases of sediment delivery to streams.

- Removing 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 have detrimental long-term impacts.

- Maintaining roads: Gullies in roads and blocked drains were frequently observed on the forest. Although these features usually did not contribute sediment to streams, properly maintaining roads prevents resource degradation.

- Designing culverts for 50 year flows: lack of compliance can lead to flooding and road failure.

- Sediment delivery to streams, from roads and skid trails: most instances (55%) of sediment delivery were less than 1 cubic yard but five cases exceeded 10 cubic yards, three of which were greater than 100 cubic yards. Sediment delivery was associated with noncompliance with a variety of rules and a wide range of compliance rates (2-99%). This indicates that even rules with high compliance rates can be associated with instances of significant sediment delivery.

In October 2014, a spatially-explicit online notification system (Forest Activity Electronic Reporting and Notification System, "FERNS") was implemented by ODF. This system has improved the management of notification information for statewide projects like the Compliance Audit. FERNS helps landowners and stewardship foresters to share information about protected resources, and remind them when a written plan or certain measures are required. Compliance studies after 2016 will draw from notifications of operation that began in the FERNS program, which affects the mechanics of identifying the sample sites.

REFERENCES AVAILABLE UPON REQUEST

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

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

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