



**DEPARTMENT OF  
NATURAL RESOURCES**

**FOREST REGULATION DIVISION**

1111 WASHINGTON ST SE  
MAIL STOP 47012  
OLYMPIA, WA 98504-7012

**360-481-9838**

mary.murdock@DNR.WA.GOV  
WWW.DNR.WA.GOV

MEMORANDUM

DATE: 23 October 2024

TO: Forest Practices Board

FROM: Mary Murdock, Compliance Monitoring Program Manager

SUBJECT: Compliance Monitoring Program 2022-2023 Biennium Report

Attached is the 2022-2023 Forest Regulation Compliance Monitoring biennium report, including data analysis, interpretation, and trend analysis of eight standard samples and two periodic samples. All data was collected during 2022 and 2023 across Washington State. Trend analysis was conducted to understand how 2022-2023 compliance rates fit with the previous years of data analysis, from 2010-2023.

Sincerely,

*Mary Murdock*



# Compliance Monitoring Biennial Report 2022-2023

November 2024

Mary Murdock  
Compliance Monitoring Program  
Forest Regulation Division  
Washington State Department of Natural Resources



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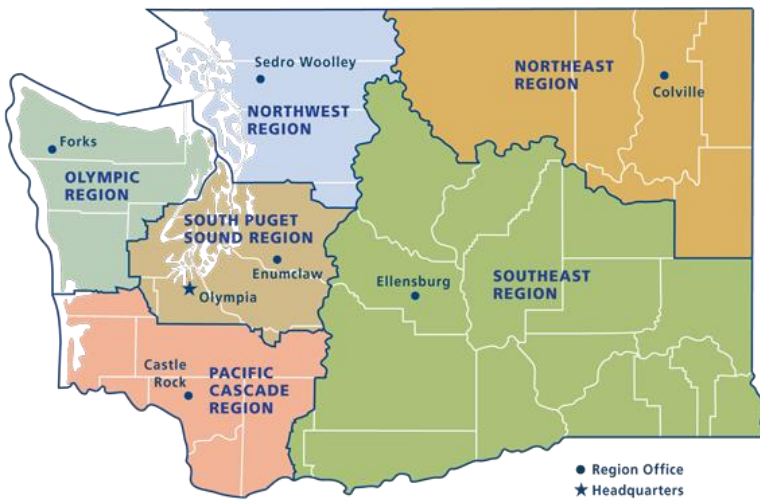


## Section 1 - Executive Summary

Table 1A: Standard Sample FPA, Prescription, and Rule Totals

Total FPAs Visited	Total Prescriptions Assessed	Total Rules Assessed
111	8	790

The Compliance Monitoring Program (CMP) monitors Forest Practices Rules (hereafter FP Rules) compliance to provide vital feedback and opportunities for growth and development to the Forest Practices Program and Forest Regulation Division. CMP uses an objective assessment of FP Rule compliance (WAC 222-08-160(4)) to assist the division in identifying implementation areas that may benefit from additional training, guidance, or clarification. CMP reports on compliance around timber harvest near fish waters, non-fish perennial and seasonal waters, and wetlands, as well as non-harvest forest practices activities such as road construction, culvert replacements, and road abandonment, in a post-harvest environment. FP Rule compliance focuses on those FP Rules that are considered to have the greatest potential to prevent adverse impact on public resources including water, fish, and wildlife. FP Rules are grouped for analysis according to the type of resource protection (more can be found on this topic below).



### Statewide Surveys

CMP visits all six DNR regions across the state. Visits are focused in areas where timber harvest is more concentrated, and where the highest proportion of Forest Practices Applications/Notifications are submitted. Each year CMP works with region staff and interagency collaborators throughout the state.

### Sampling Methodology and Prescription Sizes

Individual FP Rules are grouped into categories of FP Rules surrounding protection of a particular type of resource, called prescriptions. Forest Practices Applications (FPAs) are randomly selected from the total population of FPAs submitted until the required number of prescriptions (varies by prescription, refer to Appendix A) is met. This is a random selection from the sampling population for

each prescription, which consists of FPAs expiring in the previous year that contain the prescription. FPAs are selected from each region such that the number of selected field sites in each region are proportional to the number of FPAs including a respective prescription in each region. Data collection includes assessment of all applicable FP Rules within a prescription.

**Table 1B: Prescriptions, Associated WAC(s), and Totals Assessed**

Prescription Type	WAC Citations	Sites Assessed	FPA Population
Desired Future Condition Option 1 (DFC1)	<a href="#">222-16-010</a> <a href="#">222-16-031</a> <a href="#">222-30-020</a> <a href="#">222-30-021</a> <a href="#">222-30-040</a>	11	51
Desired Future Condition Option 2 (DFC2)	<a href="#">222-16-010</a> <a href="#">222-16-031</a> <a href="#">222-30-020</a> <a href="#">222-30-021</a>	9	332
No Inner Zone Harvest (NIZH)	<a href="#">222-16-010</a> <a href="#">222-16-031</a> <a href="#">222-30-020</a> <a href="#">222-30-021</a> <a href="#">222-30-022</a> <a href="#">222-30-040</a>	19	1,788
Non-Fish Bearing Perennial Waters (Np)	<a href="#">222-16-031</a> <a href="#">222-30-021</a> <a href="#">222-30-022</a>	33	1,998
Non-Fish Bearing Seasonal Waters (Ns)	<a href="#">222-16-031</a> <a href="#">222-30-021</a> <a href="#">222-30-022</a>	33	2,050
Non-Forested (Type A and B) Wetlands	<a href="#">222-16-035</a> <a href="#">222-30-020 (8)</a>	37	498
Forested Wetlands	<a href="#">222-16-035</a> <a href="#">222-16-036</a> <a href="#">222-30-020 (7)</a>	27	436
Roads (construction/abandonment)	<a href="#">222-24</a>	16	2,494
Haul Routes for sediment delivery	<a href="#">222-24</a>	15	NA
Potentially Unstable Slopes	<a href="#">222-16-050</a>	26	355

CMP assesses each standard sample prescription in the field for compliance with FP Rules and with FPA documentation, and details FP Rule and FPA compliance in this report. CMP also conducts periodic samples every other year. In odd-numbered years, CMP samples a potentially unstable slopes prescription with help from the FP Science Team Licensed Engineering Geologists (LEGs). Potentially unstable slopes are assessed only for FPA compliance. CMP reviewed the potentially unstable slopes prescription in spring of 2023. Potentially unstable slopes findings are included in this report.

**Study Design**

Sampling of completed FPAs occurs annually, and findings are presented in a biennial report format as required by [WAC 222-08-160\(4\)](#). The data collected over two years have been combined to

produce the desired sample sizes based on statistical estimates of variance in historical CMP data. FP Rules that are similar in scope of forest practices activities, such as those surrounding non-fish perennial streams, are grouped for sampling and analysis, and presented within such groups – considered prescriptions – within this report. Groupings are based on function and the feature being protected, such as water quality of fish streams. The groupings will be referred to as prescriptions for the rest of this report. This system allows CMP to understand compliance within prescriptions, giving an individual compliance rating for each prescription rather than the overall compliance rate for all evaluated FP Rules. With more specificity about individual FP Rules within prescriptions, CMP can assist the Statewide Forest Practices Training Manager to better evaluate where education and training opportunities might improve individual FP Rule compliance. The study design creates flexibility for future sampling to add or remove different prescription types from the sample as needed, while still providing the desired precision for compliance estimates<sup>1</sup> for each prescription. Trend analysis is also included in this report, to assess how compliance ratings have changed over the past decade through linear regression analysis.

### ***2022-2023 Rule Compliance Findings***

The 2022-2023 FP Rule prescription compliance rates range from 93.8-99.5%. The highest compliance rate was in the roads prescription. The lowest compliance rate was in the Desired Future Condition 2 (DFC2) prescription, with four deviations found out of a total of 64 applicable FP Rules across nine FPA sites assessed. A discussion of areas of low compliance, as well as further exploration of 2-year trends for large and small forest landowners can be found in further report sections. Overall, trends showed high FP Rule compliance for the biennial period, with most prescriptions above 96% compliance and five prescriptions demonstrating FP Rule compliance rates between 97-100%. (Note: Potentially unstable slopes are evaluated only for FPA compliance, so are not included in Rule Compliance Table 1C.)

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<sup>1</sup> Desired width of 95% confidence interval is less than or equal to +/- 6% for all prescriptions. The estimated number of samples needed to meet the confidence interval width is updated each year for each prescription. For a more in-depth discussion of confidence intervals, refer to Appendix A.

Table 1C: Rule Compliance by Prescription

Prescription Type	Rules with Deviation	Compliant Rules	Evaluated Rules	Compliance Rate (%)
Western WA RMZ — Type S or F Inner Zone Harvest DFC1	3	88	91	96.7
Western WA RMZ — Type S or F Inner Zone Harvest DFC2	4	60	64	93.8
RMZ — Type S or F No Inner Zone Harvest	3	90	93	96.8
RMZ — Type Np Prescriptions	2	118	120	98.4
RMZ — Type Ns Prescriptions	2	33	35	94.3
Forested Wetlands	1	57	58	98.3
Non-Forested Wetlands	4	138	142	97.3
Roads	1	186	187	99.5
Haul Routes*	0.57 miles	53.7 miles	54.3 miles	99.0

\*The haul routes prescription does not use rule count as do other prescriptions; rather it uses mileage of potential sediment delivery. More details can be found in the Haul Route Analysis further on in this report.

### 2022-2023 FPA Compliance Findings

While FP Rule compliance refers to whether the approved forest practices activities were conducted in compliance with FP Rule, FPA compliance refers to whether the approved forest practices activities were conducted in compliance with what the proponent stated on the FPA. The compliance ratings for FPA compliance ranged from 89.2-100%, with the lowest compliance rates found in the DFC2 prescription. The highest compliance rates were found in the Ns and roads prescription at 100% FPA compliance. As shown in Table 1D below, while FPA and FP Rule compliance differed slightly, both showed similar trends – when FP Rule compliance was high for a prescription, FPA compliance also tended to be high. All FPA compliance ratings were above 94%, apart from DFC2, and most hovered between 97-100%.

Table 1D: Rule Compliance and FPA Compliance Comparison by Prescription

	RMZ Prescription	Rule Compliance Rate(%)	FPA Compliance Rate(%)
<b>Statewide</b>	No Inner Zone Harvest	96.8	94.7
	Type Np Prescriptions	98.4	96.6
	Type Ns Prescriptions	94.3	100.0
	Non-Forested Wetlands	97.3	99.1
	Forested Wetlands	98.3	97.0
	Roads	99.5	100.0
<b>Western WA only</b>	Inner Zone Harvest DFC1	96.7	95.0
	Inner Zone Harvest DFC2	93.8	89.2

### Report Highlights

- For FP Rule compliance, the highest rates were found in the non-forested wetland (97.3%), roads (99.5%), and non-fish perennial stream (98.4%) prescriptions; this is an overall increase over the previous biennial period for all three prescriptions, with the largest compliance



increase in the non-forested wetlands prescription (88% compliance in 2020-2021 up to 97.3% compliance in 2022-2023). *All FP Rule compliance rates were above 90% for the biennial period.*

- For FPA compliance, trends followed FP Rule compliance to a large extent, with the highest rates found in non-forested wetlands (99.1%), non-fish seasonal streams (100%), and roads (100%). This also represented an increase for non-forested wetlands from 2020-2021 (93.8% to 99.1%).
- Compliance rates decreased slightly from the previous biennial period for forested wetlands and DFC2 prescriptions for FPA compliance; non-fish seasonal streams and DFC2 prescriptions decreased from the previous period for FP Rule compliance; all other prescriptions increased in FPA and FP Rule compliance from the previous biennial period.
- CMP field staff alongside representatives from the Department of Ecology, Department of Fish and Wildlife, tribal representatives, and landowners visited 169 riparian sites including fish streams, wetlands, and non-fish perennial and seasonal streams over the two-year data collection period.
- Numerous prescriptions showed statistically significant increases in compliance since 2010; no statistically significant decreases in compliance rates were determined for any prescription.
- Potentially unstable slopes compliance was conducted in 2023, assessing 26 sites statewide with a compliance rate of 96.1%, with three questions about FPA documentation found to have deviations and 73 questions about FPA documentation found to be compliant out of 76 FPA compliance questions assessed statewide.
- Trend analysis<sup>2</sup> found evidence of increasing compliance trends for DFC1, DFC2, and No Harvest Inner Zone (NIZH) prescriptions with an average increase in compliance rate from 0.4-0.9% over the 2010-2023 period; compliance rates have increased for both DFC1 and DFC2 prescriptions since 2010, though rates have been relatively stable near 95% for the past ten years. The NIZH prescription has had a stable increase in compliance since 2010 and is now close to 100%. The Np prescription has had variable compliance while generally increasing over the past 8 years (trend is not statistically significant). Compliance with Ns rules has been at 100% for six out of the past eight years, although it was close to 90% in 2020 and 2023. Compliance with roads and wetlands FP Rules appears to be stable with an average compliance around 98.5% for roads and forested wetlands and 95% for non-forested wetlands, although compliance was lower for both forested and non-forested wetland prescription types in 2021.

### ***Proposed Changes Based on 2022-2023 Results***

An important goal of the CMP is to identify gaps in FP Rule compliance and to try to understand why they may exist. Issues may arise from administrative discrepancies, layout prior to harvest, or

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<sup>2</sup> Refer to Appendix A for detail on statistical analysis.

operational mistakes during harvest, among other reasons (refer to Table 2A for deviation category descriptions). Understanding why deviations occur helps direct CMP to recommend training and education initiatives to improve the understanding around FP Rules and to increase compliance in future timber harvests. The following summarizes established and proposed changes, recommendations for future training, and recommendations for necessary education based on the 2022-2023 data collection period.

### **Provide Learning Opportunities for Landowners and DNR Staff About Fish-Associated Wetlands**

CMP found three instances of deviations<sup>3</sup> associated with fish water wetlands, which require a higher level of resource protection than non-fish associated wetlands. Because wetlands appear to be a confusing section of the FP Rules, further education and training for Forest Practices Foresters, region staff involved in FPA approval, and landowners would likely lower the number of deviations due to fish-associated wetlands. It should be noted that while administrative deviations did occur in correctly identifying these wetlands as fish waters, all three wetlands were protected correctly to Type F water requirements, meaning that overall resource protection still occurred for these sites.

### **Changes to Appendix G: Type Np RMZ Worksheet**

Currently, the Appendix G Type Np RMZ Worksheet is used by landowners to determine the length of buffer required along an Np stream system. However, the worksheet includes a statement requiring the landowner to assess the stream without regard to ownership, but also refers to using the length of the Np stream within the harvest unit to determine the required buffer (Point A; Point C, iii). Because FP Rule requires that the length of the buffer on an Np stream be determined using the entire length of the stream system, regardless of ownership, CMP proposes the language in Appendix G be altered to reduce confusion.

### **Inclusion of Periodic Samples in Spring Sampling**

Due to the increasing intensity, length, and severity of wildfire season projected for the future and demonstrated over the past few years, fall season sampling for more than two full weeks is becoming difficult to schedule. Regional staff, FP Foresters, and Division staff are typically deployed to wildfire response duty during July and August, and in the last few years this has extended through October. To avoid scheduling sampling field work during the most active wildfire response months, samples that are typically completed in fall were rescheduled to the spring for 2023 sampling. The CMP Field Coordinator collaborated with the FP Science Team to incorporate potentially unstable slopes sampling into the standard sample schedule. CMP proposes that whenever possible, fall periodic samples be scheduled in the spring to reduce conflicts with late-season scheduling.

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<sup>3</sup> One out of these three deviations were from renewal of a prior version of the FPA before form revisions that altered the language on the FPA to describe situations of inundated and associated wetlands and where those resources should be listed on the application. Though this does not alter the deviation determination, the FPA language change was designed to improve compliance rates for typing wetlands inundated and associated with fish waters.

### **Development of Potentially Unstable Slopes Sampling Protocols by FP Science Team Licensed Engineering Geologists**

CMP developed and regularly updates its protocols for sampling each prescription in the standard sample. Periodic samples are relatively new to the program. The current protocol is still in the early stages and lacks instruction that would assist new FP Science Team staff in implementing the process of compliance monitoring review specifically. To ensure consistency from year to year, CMP proposes the development of clearly defined protocols for data collection and compliance determinations for the periodic potentially unstable slopes prescription. CMP enlists the assistance of the FP Science Team's Licensed Engineering Geologists familiar with the sample to expand upon the current protocol, due to their familiarity and experience with compliance monitoring reviews specific to geology-based concerns.

### **Comparative Visitation to Non-fish Seasonal Streams and Wetlands in Different Seasons**

Numerous field staff cited concerns around scheduling CMP evaluations of non-fish seasonal streams and wetlands in the spring, when heavy rain, transpiration, and seasonal snow melt are occurring, in comparison to late summer and fall dry spells during which FPAs may have been originally approved and typed for water. To assess the pertinence of the concern around comparing spring flow to fall flow, CMP proposes that a small study be conducted in which sites that were previously visited in spring are examined again in fall to identify differences in vegetation and stream channel. The study should focus on areas of high seasonal variability, such as DNR's Olympic, Southeast, and Northeast Regions.

### **Sample a Larger Proportion of Wetlands**

Wetlands have historically shown lower compliance rates than most other standard sample prescriptions monitored by CMP. Over the 2022-2023 sample period, CMP performed a case study and sampled a higher number of wetlands (both forested and non-forested) than required to meet the target confidence interval. More on this case study can be found later in this report. To further investigate how education and training could be deployed to improve compliance rates, it is recommended that CMP continue to sample a larger proportion of the forested and non-forested wetlands each year to better capture areas for improvement.



## Section 2 - Background and Study Design

Compliance monitoring is a component of the Washington State Forest Practices Program. Later sections of this report provide a brief history about the genesis and development of the Compliance Monitoring Program (CMP) and explain key factors and concepts regarding compliance monitoring and the FP Rules monitored by the program. For a more in-depth history of CMP, refer to a previous report (all reports dating back to 2006 are available [online](#)).

### ***History of the Compliance Monitoring Program***

The 1974 Forest Practices Act (FP Act) and its corresponding FP Rules ([Washington Administrative Code \[WAC\], Title 222](#)) regulate forest practices activities on state and private forestlands in Washington State and are designed to both protect public safety, public resources- including water, fish, and wildlife - and ensure that Washington continues to support a viable forest products industry ([WAC 222-16-010 \[Public Resources\]](#)). The FP Rules are administered by the Department of Natural Resources (DNR) (with input and consultation from other entities when directed by statute or rule).

The Compliance Monitoring Program, a requirement of the [1999 Forests and Fish Report](#), along with other components of the Forest Practices Program, provides a critical function by monitoring adherence and compliance with FP Rule. When funding for the CMP was allocated by the Legislature in 2006, DNR, with input from other stakeholders, developed a program design and implemented an initial sampling effort in the spring of that year. The CMP has conducted annual compliance monitoring sampling every year since 2006. Additionally, the program has produced biennial reports starting with the [2006–2007 CMP Biennium Report](#) (as directed by [WAC 222-08-160\(4\)](#)) for consideration and support of Forest Practices Rule and guidance analysis. All completed reports are available on the CMP webpage: [dnr.wa.gov/programs-and-services/forest-practices/rule-implementation](http://dnr.wa.gov/programs-and-services/forest-practices/rule-implementation).

*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 FP 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. ([WAC 222-08-160\(4\)](#))*

### **Program Background, Sample Protocols, and Deliverables**

CMP program staff includes a full-time program manager and a full-time field coordinator, along with funded participation for the equivalent of a 0.65 full-time staff person from the Washington State Department of Ecology (ECY). Full-time duties for ECY are split amongst regional agency representatives, who assist with field reviews. Washington Department of Fish and Wildlife (WDFW), tribal staff, and other Forest Practices Program staff provide additional assistance in the field.

Sampling of completed FPAs occurs annually, and findings are presented in a biennial report format as required by [WAC 222-08-160\(4\)](#). The data collected over two years have been combined to produce the desired sample sizes based on statistical estimates of variance for historical CMP data. FP Rules that are similar in scope of forest practices activities, such as those surrounding non-fish perennial streams, are grouped for sampling and analysis, and presented within such groups – considered prescriptions – within this report. Groupings are based on function and the feature being protected, such as water quality of fish streams. The groupings will be referred to as prescriptions for the rest of this report. This system allows CMP to understand compliance within prescriptions, giving an individual compliance rating for each prescription rather than the overall compliance rate for all FP Rules. With more specificity about individual FP Rules within prescriptions, CMP can better evaluate where education and training opportunities might improve individual FP Rule compliance.

Available funding and associated staffing levels constrain the CMP's ability to monitor with statistical precision all FP Rules that might affect the habitat of aquatic, riparian, and upland species. The CMP therefore prioritizes rule sampling based on the potential to adversely impact [public resources](#). These include:

- Riparian FP Rules — Western Washington and Eastern Washington RMZ rules ([WAC 222-16-010](#), [222-16-031](#), [222-30-020](#), [222-30-021](#), [222-30-022](#), and [222-30-040](#))
- Road construction, maintenance, and abandonment FP Rules ([WAC 222-24](#))
- Wetland FP Rules ([WAC 222-16-035](#), [222-16-036](#), and [222-30-020 \[7\] and \[8\]](#))
- Haul routes ([WAC 222-24](#)) for sediment delivery

### **Rule Compliance versus FPA Compliance**

Each standard sample prescription is observed for compliance with two elements, FP Rule and FPA documentation. FP Rule compliance refers to whether the approved forest practices activities were conducted in compliance with FP Rule. FPA compliance refers to whether the approved forest practices activities were conducted in compliance with what the proponent stated on the FPA. It is possible for a landowner to be compliant with FP Rules, but deviate from FPA compliance, and vice versa. These situations are typically described in the report, to highlight avenues for improvement.



CMP includes both large and small forest landowners in the sample, aiming to ensure that the population sampled in the field by CMP is reflective of the range of landowner size statewide. CMP identifies FPAs to be assessed based on the FPAs submitted and approved for each region; therefore, samples are typically representative of landowner sizes within the region. Compliance rates are reported separately for small and large forest landowners, as well as a total combined compliance rate for all landowner types combined. CMP covers all regions of the state, visiting a proportional number of sites in each region according to the total number of FPAs approved for that region during the sampling period (i.e., Pacific Cascade [PC] region has the most FPAs approved yearly, and CMP visits the highest number of samples across all prescriptions in PC region). CMP does not track FP Rule violations, nor are CMP staff responsible for enforcement actions. Enforcement action is the responsibility of region staff and is delivered at their discretion. Identifying information such as the landowner, geographic location of the sample, and individuals associated with field reviews are removed when data are input into the CMP database.

### ***Trend Analysis and Periodic Sampling***

Trend analysis provided in this report gives an understanding of how current compliance rates compare to the previous decade or more of compliance rates for each prescription. For all data collected between 2010-2023, FP Rule compliance was carefully tracked to ensure that the compliance determination was consistently applied in all years. Specifically, within the 2010-2015 data, if compliance for a particular FP Rule was not assessed in accordance with current protocols, attempts were made to convert the original assessment to the current compliance protocol. When this was not possible, the FP Rule was not included in the trend analysis dataset. Data are combined and compared through time within each corresponding prescription type. Trends in average compliance within prescriptions and individual FP Rule compliance are tracked based on current methods.

In certain circumstances, additional prescriptions are added to the sample. These prescriptions include Forest Practices Hydraulics Project (FPHP), potentially unstable slopes, and aerial chemical herbicide applications (a pilot study proposed by the legislature to examine "*including herbicide applications in the larger biennial forest practices rules compliance monitoring sampling.*"<sup>4</sup>). These samples are considered periodic samples, due to lower sampling frequency compared to the standard sample prescriptions. The smaller population size and larger variance within these populations usually leads to CMP sampling a comparatively higher proportion of the total periodic sample population than is sampled in the yearly standard samples. During the 2022-2023 sampling period, the pilot study of aerial chemical herbicide applications was performed in 2022, and potentially unstable slopes were sampled in 2023.

### ***Study Design and Methodology***

The CMP study design was developed to be consistent and repeatable. Details can be found in the document [Washington State Department of Natural Resources Forest Regulation Compliance](#)

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<sup>4</sup> The results of the aerial spray pilot study can be found [here](#).

[Monitoring Program Design and Compliance Monitoring Protocols](#). More on sample selection and strategy procedures can be found in Appendix A.

### **Population and Sample Selection**

The potential population of CMP field review sites is the total number of approved Forest Practices Applications (FPAs) that have completed all Forest Practices activities and expired between April 1 and March 31 of the previous year<sup>5</sup>. Each FPA states all the forest practices activities the landowner proposes to implement and the approval of the FPA authorizes those forest practices activities to occur. This information allows the CMP team to screen all possible FPAs for applicable prescriptions and build a sample population of possible field review sites. The total sample population for each prescription type is the subset of completed FPAs that contains the prescription to be evaluated.

Although the program has not been designed to estimate compliance for different types of forest landowners (e.g., stratified sampling), the CMP does provide separate riparian and road compliance estimates for small forest landowners and large forest landowners. Because there are fewer FPAs from small forest landowners, the precision of these estimates is generally quite low, and conclusions of differences in compliance should be avoided. Confidence intervals are provided for compliance based on all landowners, and sample sizes are estimated to meet precision goals on this estimate only.

Average compliance for a prescription (for all its included FP Rules) across FPAs is used instead of the proportion of completely compliant FPAs (all FP Rule groups combined). Data is collected from samples for each individual prescription on an FPA. The prescription types for this report are listed below.

- No Inner Zone Harvest (NIZH)
- Desired Future Condition Option 1 (DFC1)
- Desired Future Condition Option 2 (DFC2)
- Non-fish Bearing Perennial Waters (Np)
- Non-fish Bearing Seasonal Waters (Ns)
- Non-forested Wetlands (Types A and B)
- Forested Wetlands
- Roads
- Haul Routes<sup>6</sup>
- Potentially Unstable Slopes

### **Field Review and Data Collection**

The CMP staff collects observations and measurements in the field for each prescription. These methods determine whether the landowner met the requirements of FP Rules while implementing forest practices activities. Field observations include visual assessments and instrument-driven data

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<sup>5</sup> Landowners with HCPs that cover rules that are sampled by the CMP are excluded from the population and are not considered for sample since they follow a different set of standards.

<sup>6</sup> Although haul routes are technically covered under the road maintenance section of the Forest Practices Rules ([WAC 222-24-052](#)), which are co-signed by ECY in addition to the federal *Clean Water Act*, haul routes results are reported separately in this report.

collection that help provide answers to the questions asked on CMP [Field Forms](#), each of which relates back to at least one FP Rule. CMP field staff direct data collection by field team members. Data are recorded on attributes such as leave tree and stump counts by location, riparian management zone (RMZ) length, RMZ width, and bankfull width (BFW). Other observations may include the presence of sensitive sites such as alluvial fans, headwall seeps and springs, the location of uppermost point of perennial flow, and the presence of potentially unstable slopes and channel migration zones (CMZs).

### ***Roads and Haul Routes***

Roads are assessed for proper design, construction, culvert placement, and abandonment meant to limit their potential to deliver sediment to typed water<sup>7</sup>. CMP assesses road work in accordance with FP Rules (FP Rule-referenced questions are found on the [Roads Field Form](#)). Haul routes - a prescription originating from *Clean Water Act* (CWA) milestones required of DNR by Washington Department of Ecology as state regulators of the federal CWA - are assessed in two ways: (1) observation of fulfillment of haul road maintenance requirements to prevent potential or actual damage to public resources, and (2) professional judgment from CMP participants in collaboration with ECY staff. Observations are used to rate potential or actual sediment delivery levels resulting from each haul route under normal precipitation conditions. Haul route compliance is calculated by distance. Compliance rate is calculated as the haul route length compliant divided by the total length sampled.

### ***Compliance Assessment and Ratings***

For each question on the CMP field forms relating back to one or more FP Rules, there are three possible determinations for applicable rules:

- Compliant,
- Deviation from compliance (known simply as deviation)<sup>8</sup>, and
- Indeterminate.

While compliant and deviation are self-explanatory, the indeterminate classification is used when there is not enough information to make a call in the field at the time of the review. Samples with indeterminate classifications are effectively removed from the population and do not count as sampled FP Rules. Indeterminate ratings, when given, require ample explanation on the field form, as well as input from non-CMP members of the field team.

It should be noted that indeterminate findings are not indicative of error on the part of the landowner – they simply indicate there was not enough information or data to make a confident determination of compliant or deviation. Indeterminate ratings do not reflect poorly upon landowners or DNR staff. In this report, indeterminate ratings include a description of the situation that resulted in the call. Deviations from FP Rule compliance also include a description of the severity of the deviation, for example the number of outer zone leave trees mistakenly cut along the length of a fish stream buffer.

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<sup>7</sup> It is important to note that many roads are not located near typed water.

<sup>8</sup> See also historical versions of this report for a more in-depth explanation for the use of ‘deviation’ in place of ‘non-compliant’)

Rule deviations require explanation, as stated above, and may fall into one of three possible categories: layout, operational, or administrative. Table 2A describes and provides examples of these categories. For an in-depth discussion of possible deviations illustrated in the FP Rules, please refer to a past report ([2021-2022](#)) or the [Forest Practices Illustrated](#).

**Table 2A: Deviation Categories**

<b>Deviation Type</b>	<b>Description</b>	<b>Example</b>
Layout	The arrangement of the harvest unit did not meet specifications of the FP Rule.	A stream meander is unaccounted for in the RMZ layout.
Operational	The harvest activities did not follow the arrangement of the harvest unit.	Designated leave trees were harvested within a no-cut inner zone.
Administrative	Information provided on the FPA and its associated documents deviates from the observed conditions on the ground.	An incorrect site class is recorded on the FPA.

### ***Background on “Exceeds” Category***

In previous reports, a subjective category for quantifying compliance was used for harvests in which the landowner protected a resource beyond the protection required by FP Rule. Given the subjective nature of the call, current CMP staff have chosen to exclude the “exceeds” category. If FP Rules are followed and accurately administered in the field, there is no reason or requirement to report whether those buffers are in excess of the FP Rules. Should this become a topic for further study, CMP recommends a separate study be conducted on excess buffers.

### ***Deviation Severity System Suspension***

It should be noted that during data collection in prior years, a subjective severity “rating system” of high, medium, and low were applied to each deviation. Due to a lack of basis for this determination, a lack of connection for those qualifiers back to individual FP Rules, and the possibility of under- or overrepresentation of a deviation, use of this system has been paused for this report and the previous report. CMP plans to resume these ratings once a system has been established to understand the impact of these severity ratings in the program’s understanding of FP Rule compliance. CMP continues to evaluate in the field for severity levels of deviation relative to the prescription being assessed in the unit but does not currently report these findings because of reasons mentioned above.

### ***Prescription Compliance Evaluation***

CMP utilizes cluster sampling for analysis. Prescriptions are made up of multiple FP Rules, each of which has an associated binary compliance call to make up the total cluster. Previously, the CMP assessed compliance based on the entire FPA, so a single FPA could be either compliant or have a deviation from compliance. This model masked individual FP Rule deviations and did not allow CMP staff to make recommendations for specific changes such as training or education on specific FP Rules. The current sampling design evaluates multiple applications of FP Rules on a single FPA (i.e.,

the number of FP Rules under prescription A on a single FPA = 0, 1, 2, etc., up to the maximum total number of FP Rules under one instance of that given prescription), so the FPAs are treated as clusters.

*A Note About Bias Adjustments: If a prescription has 17 FP Rules that apply (across all sampled FPAs), and 16 of those FP Rules are compliant with FP rule requirements, the average compliance for that prescription is 94% (16 compliant FP Rules/17 total FP Rules = 94%). As a result of the Independent Scientific Peer Review (ISPR), this average compliance rate is then adjusted for potential bias using a jackknife estimation process (see Appendix A for further explanation). In some cases, the bias adjustment has been large enough to change the compliance rate by up to one percentage point (e.g., 86% is adjusted to 87%). In most cases, the bias adjustment is extremely small and not noticeable in the results tables.*

The final estimated average compliance for a prescription or FP Rule cluster among FPAs is a bias-adjusted estimate of compliance with all prescription rules (Appendix A). If a single FP Rule is of interest, the compliance proportion for that FP Rule is a simple binomial proportion — FPAs that do not apply the rule are not included in the population. When groups of FP Rules (or prescriptions) are of interest, all FPAs that contain at least one of the constituent FP Rules for the given prescription type are part of the population (from a random sample). Refer to Appendix A for an in-depth description and detail on average compliance calculations.

*For example, if CMP examined 10 wetlands statewide and assessed each wetland for 10 possible applicable FP Rule questions, each given a binary “compliant” or “deviation” rating (say there were no indeterminates for the sake of this example), the total FP Rules assessed would be 10 (wetland sites) x 10 (FP Rules per site assessed), equaling 100 FP Rules examined. If 9 out of 10 wetlands were compliant for every FP Rule question, and on the 10th wetland one FP Rule out of the 10 assessed deviated from the FP Rule, the rating for wetlands statewide would be 99/100 = 99% compliant. That’s 99 FP Rules found to be compliant across 100 total FP Rules assessed for 10 sites.*

### **Haul Route Compliance Assessments**

Haul routes are not sampled in proportion to regional population sizes. A stratified<sup>9</sup> mean ratio compliance estimate is therefore used to estimate statewide compliance. The stratified mean ratio is the ratio of the stratified mean length of *compliant* haul routes divided by the stratified mean length of *total* haul routes sampled.

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<sup>9</sup> The strata for haul routes samples are the six DNR regions of the state.



The sample size for haul routes is not based on statistical precision<sup>10</sup>, in part due to its origin from the *Clean Water Act* assurances milestones. Historically, haul routes were a non-random subset of randomly selected FPAs for the Roads prescription, with sample size not based on statistical precision. Thus, there is a potential for bias in haul route results, and confidence intervals may be wider than for other prescriptions.

### ***Sampling Error, and Seasonal Sampling***

Sampling error is a potential issue when an FP Rule or a component of Board Manual guidance specifies that average values are to be used during the layout of a specific prescription type. This is because sample averages vary depending on where measurements are taken, and initiation points of measurements are not typically easy to locate in the field up to three years post-harvest. It is unlikely that the CMP field team can duplicate the exact same 10 measurements made along a stream to calculate width as were measured by a landowner when preparing their FPA. The CMP resolves this potential discrepancy by assigning a 5% measurement error tolerance. This measurement error tolerance applies for three measurements:

- Leave tree distance to the edge of bankfull width.
- RMZ buffer widths and lengths.
- Bankfull width of Type N and F/S waters.

When a landowner's average potential error is within 5% of the field team's finding for the rule requirements, the landowner's values are considered accurate. If the landowner's average value falls outside the 5% error tolerance, the field team value is assumed to be correct and the landowner's average value incorrect.

Seasonal conditions are another challenge that can impact the CMP's ability to accurately determine water typing between non-fish perennial and seasonal stream segments. In the spring, when FPA-typed Ns segments have observed water flow, it can be difficult to differentiate between seasonal and perennial water flow. The CMP field team examines the FP Forester's field notes, landowner-provided documentation, vegetative indicators, and uses professional judgement to make typing decisions. When there is not enough information to make an accurate decision, CMP field team marks the typing as indeterminate. If new information becomes available later, the CMP may reconsider the indeterminate decision.

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<sup>10</sup> Several causes contribute to the lack of statistical precision regarding haul route data. The population is unknown because: (a) submitted FPA/Ns do not always include haul route information or location, (b) multiple FPA/Ns may use the same haul route, and (c) total haul route length is unknown. Also, there are no FP Rules sampled for haul routes (distance of sediment delivery along haul routes is measured). Without knowing if a FPA/N has a haul route it cannot be reliably selected. Therefore, FPA/Ns that were originally selected for another prescription are selected for the haul route sample. Additionally, monitoring of haul routes were not always a CMP responsibility, previously Department of Ecology was responsible; because the CMP was already sampling FP Rules it made sense to include them into CMP sampling.



### Section 3 - Rule Compliance Results for Riparian and Wetland Zones

FP Rules are intended to protect aquatic resources and related habitat adjacent to typed waters and wetlands when subject to Forest Practices Act and Rule jurisdiction. Riparian and wetland areas provide valuable habitat and protect water quality for aquatic species. The regulated area adjacent to Types S, F, or Np waters is a riparian management zone (RMZ), where trees are retained to support functions required by aquatic and riparian species, maintain water quality, and provide protection from disturbance. A wetland management zone (WMZ) is the area located around the perimeter of a wetland and varies in width based on wetland type and size. Trees are retained to support functions required by wetland species, to maintain water quality, and to provide shade, nutrients, and protection from disturbance. Both types of buffers provide for bank stability, recruitment of woody debris, leaf litter fall, sediment filtering, and shade. Regarding shade – inclusion of shade compliance for Type S and F waters began during the 2018-2019 biennial period, using the shade documentation attached to the FPA. Sufficient documentation, which included the landowner noting that shade was adequately maintained during timber harvest, has been a point of conversation within the Forest Regulation Division during the current biennial period. More on this topic is included in the results.

An equipment limitation zone (ELZ) established in FP Rule protects Type Np and Ns waters. The ELZ is a 30-foot-wide zone adjacent to Type Np and Ns waters. There are limitations on equipment use within the ELZ, and mitigation measures are required if activities expose soil across more than 10% of the zone. The FP Rule protection measures that guide timber harvest options within RMZs depend on the water type, the width of the stream, the site class (soil productivity), and sometimes the basal area of the RMZ pre-harvest. For more information as to the specific elements that CMP examines and the questions CMP answers in the field, refer to the appropriate field forms posted on the [CMP webpage](#).

#### ***Water Type Observations in Compliance Monitoring Field Reviews***

The width and length of riparian buffers – as well as the “type” or category that each water or wetland sorts into is based on several factors ([WAC 222-16-030](#), [-031](#), and [-035](#)) – as required under FP Rules, are included as part of the data collection performed by CMP on water and wetland prescriptions. CMP checks the accuracy of the typing of water and wetlands in the field against what was submitted on the approved FPA. Typing is the first step to understanding what FP Rules apply to approved forest practices activities adjacent to water/wetlands – specific FP Rules only apply to specific water and

wetland types. This is because different types of water and wetlands fulfill unique and cumulative functions for aquatic and riparian species, as well as water quality.

### ***Water Types and Categories for Compliance Monitoring***

CMP examines FP Rules covering four types of streams – from highest to lowest protection level: shorelines of the state (S), fish water (F), non-fish perennial (Np), and non-fish seasonal (Ns) waters – as well as three types of wetlands – forested, non-forested type A (including bogs at least 0.25 acres in size), and non-forested type B. CMP typically examines streams in the categories F, Np, and Ns as part of monitoring FP Rule activities. For more detailed information regarding typed water protections and classification details, refer to [WAC 222-30](#). Importantly, fish waters dictate usage by fish, as well as humans, and can be perennial or seasonal, while non-fish-bearing perennial waters have persistent flow of water (during a normal rainfall year) and sometimes intermittently dry portions downstream of perennial reaches. Type Ns streams are seasonal in that surface flow is not present year-round (during a normal rainfall year). Wetlands are classified into two broad categories: forested and non-forested. Non-forested wetlands are further divided into two classifications, Type A and Type B. Type A wetlands have open water covering at least a half-acre that is present for at least 7 consecutive days between April 1 and October 1. Additionally, all forested and non-forested bogs greater than 0.25 acres are considered Type A wetlands. Type B wetlands cover all other non-forested wetlands greater than a quarter acre. Forested wetlands must have a crown closure of at least 30% if trees are mature (and non-forested have less than 30% crown closure).

The CMP field team collects data on physical criteria such as stream width, gradient, length, and typing based on channel and vegetation, as well as laying out the areas of managed zones adjacent to the stream where applicable. In some situations, an approved Water Type Modification Form (WTMF) or supporting interdisciplinary review documentation is attached to an FPA to demonstrate that the water type has been changed from previous documentation. Such documentation can assist CMP in making typing calls in the field. In the absence of supporting documentation, the initial CMP review is based on physical criteria. Determinations based on physical criteria can be changed if supporting documentation is provided shortly after the field visit. The CMP field team does not conduct formal water typing (e.g., fish protocol surveys) to update water types on hydrologic maps. Water and wetland typing has a defined process beyond the scope of CMP field reviews. Landowners are responsible for ensuring that the water or wetland types on the FPA have been field-validated.

### ***Previous Use of SWIFs in CMP Data Collection***

Before the 2022-2023 biennial period, CMP staff used a form to record water or wetland type discrepancies, as well as other water-related discrepancies, called a *Supplemental Water Information Form*, or SWIF. A SWIF was completed when the CMP field team measurements or observations in the field did not match what was described in the FPA. However, the same information noted in SWIFs was also documented as part of the standard CMP data collection process, still reported as a deviation from FP Rule and reported in the biennial report for that period. If a deviation from FP Rule occurred in the field, Forest Practices Foresters and regional staff were on site to manage any enforcement deemed appropriate because of any deviation. Since the information in SWIFs was

duplicated in the data and the report, in 2022 the CMP ended the use of SWIF forms to reduce redundancy. Documentation previously recorded on SWIFs, including the under-, over-, or indeterminate classification of waters, is recorded in field review notes and presented in this report. No effect on documentation of deviations has been found due to the discontinued use of SWIFs. Refer to the data later in this report for an in-depth examination of how many typed waters were under- or over-classified or considered indeterminate.

### **Discussion of Small Forest Landowner Versus Large Landowner Results**

In total, 111 FPAs were visited across large and [small forest landowners \(SFLOs\)](#) properties for the 2022-2023 biennial period, 30 SFLO properties and 81 large landowner properties. The results for compliance for large landowners was high overall, ranging from 93.8-99.4%, matching the overall trends across all landowners due to the high number of samples visited for large landowner sites.

**Table 3A: FPAs Visited by Landowner Type**

Landowner Type	FPAs Visited 2022	FPAs Visited 2023	Total Field Review Sites
Small Forest Landowners (SFLO)	14	16	<b>30</b>
Large Landowners	56	25	<b>81</b>
All Landowners	<b>70</b>	<b>41</b>	<b>111</b>

Note: This table does not include periodic sample for 2023 of potentially unstable slopes field reviews.

With higher numbers of samples, actual trends and variation are displayed more clearly, and data are more representative of the statewide compliance rates for large landowners. Numerous prescriptions had zero deviations from FP Rule during the sample period, including non-fish perennial streams (Np), non-fish seasonal streams (Ns), and forested wetlands. The highest deviations were found in the DFC2 prescription, with four deviations out of 60 samples (93.8% compliance).

**Table 3B: Large Landowner Compliance Results with Estimates (of 142 prescriptions assessed)**

Prescription	Number of FP Rules Compliant	Number of FP Rules with Deviation	Biased Compliance Estimate (%)	Bias-Corrected Compliance Estimate (%)
DFC1	88	3	96.7	96.7
DFC2	60	4	93.8	93.8
NIZH	68	3	95.8	95.8
Np	108	0	100.0	100.0
Ns	30	0	100.0	100.0
Non-Forested Wetland	72	3	96.0	96.3
Forested Wetland	39	0	100.0	100.0
Roads	175	1	99.4	99.4

Fewer samples were collected for SFLOs, in part due to a lack of randomly selected FPAs pulled for SFLOs versus large landowners. Fewer samples being assessed for SFLOs is representative of the



smaller number of SFLOs statewide, and not a reflection of poor random selection. However, it should be noted that since fewer overall samples are assessed for SFLOs, actual trends and variation is less clearly identified by the results, and data are not necessarily representative of the statewide compliance rates for SFLOs. To truly understand more realistic compliance trends for SFLOs, a higher number of SFLO samples would need to be added to the assessments to increase sample sizes.

The results for compliance for SFLOs ranged from 60-100%. The lowest rate was associated with a low sample size, in non-fish seasonal (Ns) streams, with two FP Rules with deviations and three compliant FP Rules out of a total of five assessed prescriptions (3/5 = 0.60 compliance rate). Deviations occurred only on 2023 Ns streams, inflating variance for the overall prescription statewide (variance was 86.2-100% for 95% confidence intervals). Excluding Ns streams, numerous prescriptions had zero deviations from FP Rule during the sample period, including NIZH and roads, with only a single deviation for forested and non-forested wetlands each. While the low rates of compliance by SFLOs may present concern, CMP urges that these rates are not taken out of context in comparison to statewide trends inclusive of both large and SFLOs, and that small sample size be considered the main reason for the low compliance rates without further information or study.

**Table 3C: Small Forest Landowner Compliance Results with Estimates (of 42 prescriptions assessed)**

Prescription	Number of FP Rules Compliant	Number of FP Rules with Deviation	Biased Compliance Estimate (%)	Bias-Corrected Compliance Estimate (%)
DFC1	-	-	NA	NA
DFC2	-	-	NA	NA
NIZH	22	0	100.0	100.0
Np	10	2	83.3	83.7
Ns	3	2	60.0	60.0
Non-Forested Wetland	66	1	98.5	98.5
Forested Wetland	18	1	94.7	94.8
Roads	11	0	100.0	100.0

The remainder of this chapter of the report details the data and findings of the CMP field reviews conducted from 2022-2023. The following pages cover all eight prescriptions assessed by CMP as part of the standard sample conducted every year, as well as the periodic sample for this period, and haul routes.

***RMZ Thinning (Desired Future Condition Options)***

There are some options for landowners if they choose to harvest timber within the inner zone of a fish water (Type F or S). Landowners use growth models to project the amount of board feet they will obtain from an area of land using a commercial thinning harvest strategy. In the area adjacent to a fish stream, there are multiple zones, including the core, inner, and outer zone moving outward from the stream.



**Desired Future Condition 1**

Thinning from below, known as Desired Future Condition 1 (DFC1), is a commercial thinning option that is available to landowners if they meet requirements, including:

- A minimum of 325 square feet basal area per acre left at 140 years post-harvest.
- A minimum of 57 conifer trees per acre must be left in the inner zone.
- A minimum of 20 trees per acre must be left in the outer zone (with exceptions in certain circumstances) – these are known as “leave trees.”
- Leave trees may be dispersed evenly, or clumped around sensitive features such as seeps, springs, and forested wetlands. Outer zone leave trees may also be exchanged for excess basal area included within a channel migration zone (CMZ), if present.

Table 3D: Number of DFC1 Reviews Per Sample Year

Year	Population of DFC1 FPAs	DFC1 Field Reviews Conducted
2022	32	8
2023	19	3

The objective of a DFC1 harvest strategy is to distribute stand requirement trees in such a way as to accelerate the stand to the desired condition required to meet large wood, fish habitat, and water quality needs. This is achieved by increasing the potential for leave trees to grow faster than they otherwise would without thinning (WAC 222-30-021).

Table 3E: Compliance Results for DFC1 Prescription 2022-2023

Rule Assessed	Compliant	Deviation	Indeterminate
Dominant tree species matches species listed on DFC worksheet	11	0	0
Site class is correct, not under-represented	11	0	0
Stream size (width) is correct	11	0	0
No harvest was conducted in core zone	11	0	0
Inner zone meets diameter leave tree requirements	10	1	0
Correct number of trees per acre left in inner zone	10	1	0
Shade documentation included if necessary	10	1	0
Channel Migration Zone (CMZ) accounted for in RMZ layout (if applicable)	3	0	0
Correct number and size of trees left in outer zone	11	0	0
<b>Total number of sites reviewed for each category</b>	<b>88</b>	<b>3</b>	<b>0</b>
<b>Total number of sites assessed for all reviews in this prescription</b>		<b>91</b>	
<b>Bias-Corrected Compliance Percentage (%)</b>		<b>96.7</b>	
<b>95% LCL</b>		<b>92.1</b>	
<b>95% UCL</b>		<b>100.0</b>	

The three deviations found are outlined below:

- Four stumps averaging 20" diameter in inner zone floor, potentially due to layout error, operational error, or a combination of both.
- Four leave trees less than required in inner zone, potentially due to layout error, operational error, or a combination of both.
- Documentation of adequate shade within 75' of CMZ/BFW not included with FPA. Line was flagged within Inner Zone and ample shade appears to be present. Administrative error.

### ***Desired Future Condition 2***

Another commercial thinning option landowners can use in shoreline of the state or fish stream RMZs is leaving trees closest to the stream. This option is known as a Desired Future Condition 2 (DFC2) harvest strategy. DFC2 may be used only within specific settings, including:

- Riparian Management Zones (RMZ) on site classes I, II, or III along streams that are  $\leq 10$  feet wide
- Riparian Management Zones on site classes I or II that are adjacent to streams  $> 10$  feet wide

If the landowners meet any of the requirements listed above, they may use this strategy. The requirements of the DFC2 prescription include:

- A minimum of 20 trees per acre with a minimum of 12 inches diameter at breast height (DBH) must be left in the inner zone.
- For requirement #1 above, a 30-foot no-harvest area, known as the inner zone floor, is extended outward from the outer edge of the core zone.
- For requirement #2 above, a 50-foot no harvest inner zone floor must be left at the outer edge of the core zone.
- Leave tree requirements for the harvestable portion of the inner zone are determined by pre-harvest stand conditions and calculated by the [Desired Future Condition Worksheet program](#).
- A minimum of 20 trees per acre must be left in the outer zone (with some exceptions), either evenly dispersed or clumped, with preference for protection of sensitive features.

Most landowners find that DFC2 systems are easier to implement compared to DFC1, and this strategy is used more often than DFC1.

Table 3F: Compliance Results for DFC2 Prescription 2022-2023

Rule Assessed	Compliant	Deviation	Indeterminate
Dominant tree species matches species listed on DFC worksheet	9	0	0
Site class is correct, not under-represented	9	0	0
Stream size (width) is correct	9	0	0
No harvest was conducted in core zone	9	0	0
No harvest was conducted in inner zone floor <sup>11</sup>	7	2	0
Correct number of trees per acre left in outer portion of inner zone	9	0	0
Channel Migration Zone (CMZ) accounted for in RMZ layout (if applicable)	1	0	0
Correct number and size of trees left in outer zone	7	2	0
<b>Total number of compliant/deviation/indeterminate calls</b>	<b>60</b>	<b>4</b>	<b>0</b>
<b>Total number of rules assessed for all reviews in this prescription</b>		<b>64</b>	
<b>Bias-Corrected Compliance Percentage (%)</b>		<b>93.8</b>	
<b>95% LCL</b>		<b>86.0</b>	
<b>95% UCL</b>		<b>100.0</b>	

Compliance rates for the DFC2 prescription were influenced in part by low sample size in comparison to previous years. The recommended sample size for development of the field schedule was 12, but only nine samples were visited in 2022-2023. All sites were located on large ownerships, and due to a lack of potential samples and scheduling complications, nine field reviews were conducted across both years, resulting in lower field reviews than needed to meet required confidence intervals.

The four deviations found are outlined below:

- One stump 16-18" diameter in inner zone floor, likely due to operational error.
- Three stumps averaging 14" in inner zone floor, likely due to layout.
- Less than required number of outer zone leave trees (21 required, 5 actual), likely due to layout.
- Less than required number of outer zone leave trees (6 required, 1 actual). Confirmed due to layout.

#### ***Indeterminate Discussion for DFC1 and DFC2 Prescriptions***

A total of zero indeterminate ratings were given for DFC1 or DFC2 prescriptions covering all field reviews conducted during the research period.

#### ***No Inner Zone Harvest***

When DFC harvests are not preferred or applicable due to the required conditions, landowners typically choose to use the No Inner Zone Harvest (NIZH) harvest strategy for Type F or S waters. NIZH includes the requirement of shade documentation to ensure that where harvest occurred within

<sup>11</sup> The inner zone floor is the no-harvest portion of the inner zone adjacent to the no-harvest core zone.

75 feet of the bankfull width of the stream, shade requirements were still met following harvest. NIZH is the most frequently used harvest strategy for timber harvest adjacent to fish streams.

Table 3G: Compliance Results for NIZH Prescription 2022-2023

Rule Assessed	Compliant	Deviation	Indeterminate
Stream size is correct	18	0	0
Site class is correct, not under-represented	18	0	0
No harvest was conducted in core zone	19	0	0
No harvest was conducted in inner zone	17	2	0
CMZ properly accounted for in RMZ layout (if applicable)	1	0	0
Appropriate shade documentation included with FPA (if applicable)	0	0	0
Correct number and size of outer zone leave trees	17	1	0
Total number of compliant/deviation/indeterminate calls	<b>90</b>	<b>3</b>	<b>0</b>
<b>Total number of rules assessed for all reviews in this prescription</b>		<b>93</b>	
<b>Bias-Corrected Compliance Percentage (%)</b>		<b>96.8</b>	
<b>95% LCL</b>		<b>91.9</b>	
<b>95% UCL</b>		<b>100.0</b>	

The three deviations found are outlined below:

- Five stumps averaging 12" diameter in inner zone. Wetland lobe affected layout in one spot.
- Three stumps averaging 15" diameter in inner zone, likely due to layout.
- Less than required number of outer zone leave trees (12 required, 11 actual), likely due to layout.

**Indeterminate Discussion for NIZH Prescription**

A total of zero indeterminate ratings were given for the NIZH prescription covering all field reviews conducted during the research period.

**Non-Fish Perennial Streams**

Non-fish perennial streams (Np) are important to the life cycle of aquatic species. While typically smaller in size and scale than fish waters, Np streams are still protected with full or partial 50-foot buffers. The FP Rules surrounding Np streams are complex. For westside streams, the total buffer length required for an Np stream varies depending on the length of the stream from the confluence with shoreline of the state or fish streams. Double-sided no harvest buffers on an Np stream must protect at least 50% of the stream length. If the Np stream in the harvest area is located more than 500 feet upstream from the confluence of shoreline of the state or fish water, and if the Np stream system is more than 1,000 feet in length, the minimum percentage buffer required varies (the table of buffer required on streams >1000 feet can be found in [WAC 222-30-021\(2\)\(b\)\(vii\)](#)).

The following guidelines apply to all Np streams in western Washington. The uppermost point of perennial flow (UMPPF) on Np streams must be protected with a radial 56-foot buffer, and sensitive

sites adjacent to the stream must also be protected with a 56-foot buffer. Sensitive sites include the confluence of multiple Np streams, perennially saturated side-slope seeps, and headwall seeps. No harvest is permitted on alluvial fans. Np streams also require a 30-foot-wide equipment limitation zone (ELZ) and mitigation if activities expose >10% of the soil within the ELZ.

In eastern Washington, the ELZ is the same as in western Washington, and sensitive sites must be protected with a 50-foot buffer. Landowners must identify either a partial-cut (thin) or clearcut (partial) strategy for each unit within 50 feet of the outer edge of bankfull width on the Np stream. Basal area requirements must be met for each type of harvest strategy – for clearcut (partial), a two-sided 50-foot buffer is required that is at least equal in total length to the clearcut portion and no more than 30% of the stream's total length (and must meet the upper end of basal area requirements for the habitat type [\(WAC 222-30-022\(2\)\(b\)\(i\)&\(ii\)\)](#)); for partial cut (thin), leave trees must be of size to meet basal area targets. Landowners also have the option to leave a 50-foot no-harvest buffer.



Table 3H: Compliance Results for Np Stream Prescription 2022-2023

Rule Assessed (Statewide & Western WA)		Compliant	Deviation	Indeterminate
Statewide	Stream typed correctly (not under-typed)	33	1	0
	If greater than 10% disturbance to ELZ, was mitigation implemented	1	0	0
	No harvest within required 50-foot buffer	24	0	0
Western WA	Appropriate length and configuration of 50-foot no harvest buffer	32	0	0
	No harvest on alluvial fans	2	0	0
	No harvest less than 50 feet from headwall and side slope seeps	8	0	0
	All harvest greater than 56 feet from UMPPF/confluence of 2 Np streams	19	1	0
Eastern WA	Equal distance of no-cut buffer designated and retained by landowner	0	0	0
	Clearcut RMZ less than 300 feet in continuous length	0	0	0
	Length of clearcut RMZ less than or equal to 30% of reach length in unit	0	0	0
	Clearcut RMZ is greater than 500 feet from confluence of F or S water	0	0	0
	10 largest trees per acre were retained	0	0	0
	Up to 40 additional trees per acre > 10 in. DBH retained as needed	0	0	0
	If necessary, 10 additional trees per acre > 6 in. DBH left	0	0	0
	Side slope seeps protected with a 50-foot partial cut buffer that meets leave tree & basal area requirements	0	0	0
	Uncut portion of the Np RMZ meet the upper end of the stocking level requirements for the habitat type	0	0	0
Total number of compliant/deviation/indeterminate calls		<b>118</b>	<b>2</b>	<b>0</b>
Total number of FP Rules assessed for all reviews in this prescription				<b>120</b>
<b>Bias-Corrected Compliance Percentage (%)</b>				<b>98.4</b>
95% LCL				<b>96.0</b>
95% UCL				<b>100.0</b>

All Np streams visited on the eastern side of Washington state utilized the no-cut harvest strategy, resulting in no eastside-specific applicable FP Rules relating to partial-cut (thin) or clearcut (partial) management strategies. Therefore, a rating was not determined for eastern Washington alone. Instead, all results are reported as the combined Np prescription compliance rate.

The two deviations found are outlined below:

- Stream was typed incorrectly, met physical criteria for a fish stream and was type-verified as a fish stream upstream of the activity area.
- Ten stumps averaging 9" diameter within UMPPF sensitive site buffer.

**Indeterminate Discussion for Np Prescription**

A total of zero indeterminate ratings were given for the Np prescription covering all field reviews conducted during the research period.

**Non-Fish Seasonal Streams**

Non-fish seasonal streams (Ns) are also important to the life cycle of aquatic species in Washington, but do not have continuous flow throughout the year. Ns streams have a 30-foot ELZ, and mitigation measures are required if more than 10% of the soil in the ELZ is exposed during harvest activities. However, there are no leave tree requirements for Ns streams.

Table 3I: Compliance Results for Ns Stream Prescription 2022-2023

Rule Assessed	Compliant	Deviation	Indeterminate
Ns Stream typed correctly (not under-typed)	31	2	0
If > 10% disturbance to the ELZ, mitigation was implemented	2	0	0
<b>Total number of compliant/deviation/indeterminate calls</b>	<b>33</b>	<b>2</b>	<b>0</b>
<b>Total number of FP Rules assessed for all reviews in this prescription</b>	<b>35</b>		
<b>Bias-Corrected Compliance Percentage (%)</b>	<b>94.3</b>		
<b>95% LCL</b>	<b>86.2</b>		
<b>95% UCL</b>	<b>100.0</b>		

As noted in the discussion of the landowner type specific results above, the results for Ns streams were highly influenced by rare deviations on SFLO streams in the 2023 samples, lowering results statewide and widening confidence intervals statewide (86.2-100%). The two deviations found in 2023 are outlined below:

- Ns stream surveyed was typed incorrectly, met physical criteria for a fish stream; buffer was thinned only in inner and outer zone, resulting in minimal impact to natural resource protections, and no harvest was observed in the core zone.
- Ns stream surveyed was typed incorrectly, met physical criteria for an Np stream and landowner confirmed the stream was an Np- they did not realize it had been listed as an Ns stream on the FPA; stream was properly buffered and protected as an Np stream, administrative error.

Both streams were relatively protected, with one only showing cut trees in the RMZ for water type F, and the other only incorrectly noted as Ns on the FPA documentation with adequate protection as

required by FP Rule for an Np stream. While compliance rates were reduced by these two samples, breaking down the site-specific scenarios is important to understanding on-the-ground findings in relation to the statewide compliance rates.

***Indeterminate Discussion for Ns Prescription***

A total of zero indeterminate ratings were given for the Ns prescription covering all field reviews conducted during the monitoring period.

***Forested and Non-Forested Wetlands***

For wetlands, both forested and non-forested, FP Rules are the same in western and eastern Washington. Wetland Management Zones (WMZs) have variable widths based on the size and type of wetland, as detailed in the table below.

Table 3J: Wetland Management Zones Based on Type and Size of Wetland

Type of Wetland	Size of Wetland	Maximum WMZ Width	Average WMZ Width	Minimum WMZ Width
Type A (including bogs)	Greater than 5 acres	200-foot	100-foot	50-foot
Type A (including bogs)	0.5-5 acres	100-foot	50-foot	25-foot
Type A (bogs only)	0.25-0.5 acres	100-foot	50-foot	25-foot
Type B	Greater than 5 acres	100-foot	50-foot	25-foot
Type B	0.5-5 acres	No WMZ required	No WMZ required	25-foot
Type B	0.25-0.5 acres	No WMZ required	No WMZ required	No WMZ required

Forested wetlands do not have WMZ or leave tree requirements. For non-forested wetlands, FP Rules require leave trees when harvest occurs within WMZs, restrict the width of openings created by harvesting within a WMZ, and require written approval from the FP Forester before using ground-based harvesting systems within the minimum WMZ width. For detailed information regarding definitions and classifications of wetlands, see the section above titled *Water Types and Categories for CMP Monitoring*. Non-forested wetlands have more potential applicable FP Rules due to their WMZs.

## Non-Forested (Type A and B) Wetlands

Table 3K: Compliance Results for Non-Forested (Type A and B) Wetlands Prescription 2022-2023

Rule Assessed	Compliant	Deviation	Indeterminate
Wetland typed and sized appropriately	34	3	1
Variable buffer width is appropriate for size and type of wetland	26	0	0
Openings from harvest less than 100 feet wide where applicable	4	0	0
Openings from harvest less than 200 feet apart where applicable	4	0	0
Leave tree species representative of pre-harvest dominant species	14	0	0
Ground-based harvest conducted in WMZ had FPF approval	14	0	0
Where WMZ and RMZ overlap, best protection was applied	5	0	0
75 trees per acre > 6 in. DBH, > 4in. DBH in eastern WA	12	0	0
25 trees per acre > 12 in. DBH, where they existed	12	0	0
5 trees per acre > 20 in. DBH, where they existed	8	1	0
38 trees per acre > 6 inches DBH, > 4 inch. DBH in eastern WA	2	0	0
13 trees per acre > 12 in. DBH, where they existed	2	0	0
3 trees per acre > 20 in. DBH, where they existed	2	0	0
<b>Total number of compliant/deviation/indeterminate calls</b>	<b>139</b>	<b>4</b>	<b>1</b>
<b>Total number of FP Rules assessed for all reviews in this prescription</b>		<b>144</b>	
<b>Bias-Corrected Compliance Percentage (%)</b>		<b>97.3</b>	
<b>95% LCL</b>		<b>94.4</b>	
<b>95% UCL</b>		<b>100.0</b>	

For non-forested wetlands, the most common deviation was in typing. Further information and detail of deviations can be found below in the section titled *2022-2023 Case Study of Wetland Compliance*.

### Indeterminate Discussion for Non-Forested Wetlands Prescription

A total of one indeterminate rating was given out of 37 field reviews conducted during the research period (2022-2023). The table below describes the rule for which the indeterminate rating was assigned, and the reason for the rating.

Table 3L: Indeterminate Explanations for Non-Forested Wetlands

Rule Description	Year Surveyed	Reason for Indeterminate Rating
<b>Wetland typed and sized appropriately</b>	2022	Type F stream adjacent to wetland off applicant ownership. Unable to definitively determine whether wetland was inundated/associated with the Type F stream due to lack of access.

**Forested Wetlands**

Table 3M: Compliance Results for Forested Wetlands Prescription 2022-2023

Rule Assessed	Compliant	Deviation	Indeterminate
Wetland typed and sized appropriately	27	0	0
If harvest occurred, was low impact method used	16	0	1
If wetland was greater than 3 acres, was it mapped	14	1	0
<b>Total number of compliant/deviation/indeterminate calls</b>	<b>57</b>	<b>1</b>	<b>1</b>
<b>Total number of FP Rules assessed for all reviews in this prescription</b>		<b>58</b>	
<b>Bias-Corrected Compliance Percentage (%)</b>		<b>98.3</b>	
<b>95% LCL</b>		<b>94.8</b>	
<b>95% UCL</b>		<b>100.0</b>	

**Indeterminate Discussion for Forested Wetlands Prescription**

A total of one indeterminate rating was given out of 27 field reviews of forested wetlands (FW) conducted during the monitoring period (2022-2023). Table 3N below describes the FP Rule for which the indeterminate rating was assigned, and the reason for the rating.

Table 3N: Indeterminate Explanations for Non-Forested Wetlands

Rule Description	Year Surveyed	Reason for Indeterminate Rating
If harvest occurred in FW, was low impact method used?	2023	Rutting in wetland, but tracked equipment was used for this harvest. Unable to determine whether rutting was from harvest activity under review or from previous harvest activity.

**2022-2023 Case Study of Wetland Compliance**

As part of an attempt to identify specific FP Rules that are more likely to have deviations from FP Rule, the CMP field team evaluated more than the minimum required samples necessary for statistical significance for a biennial assessment. In total, CMP visited 12 forested wetlands in 2022 and 15 forested wetlands in 2023. CMP visited 25 non-forested wetlands in 2022, and 12 non-forested wetlands in 2023. A short discussion of trends identified as part of this miniature focused study are summarized below.



### **Forested Wetland Results Discussion**

Compliance rates were high for forested wetlands surveyed during the biennial period statewide. Only one deviation was reported for all field reviews over the 2-year period:

- Forested wetland identified with text symbol on the FPA map but missing an associated polygon showing approximate boundaries (administrative error)

No other deviations were found for forested wetlands surveyed during any field reviews conducted between 2022-2023.

### **Non-Forested Wetland Results Discussion**

Overall, compliance rates were high for the number of field reviews conducted statewide, and the total number of rules assessed. The most incorrectly applied FP Rule for non-forested wetlands was correct typing and size (3 deviations), with all three deviations resulting from inundation and association of the wetland with fish water. In these conditions, a wetland should be identified as Type F water rather than a forested or non-forested wetland.

- Non-forested wetland inundated and associated with a fish stream; no resource issues observed on site and layout was compatible with fish water classification (administrative error)
- Wetland was identified as Type B but was inundated and associated with a fish stream; no resource issues observed on site and layout was compatible with fish water classification (administrative error)
- Wetland had Water Type Modification Form (WTMF) from 2012 noting wetland as Type F and is inundated and associated with fish stream, no resource issues observed on site; inner zone was not harvested (administrative error)
- Non-forested wetland WMZ incorrectly harvested. Three stumps averaging 24" diameter were required to be retained as WMZ leave trees (at least 5 trees per acre greater than 20 inches DBH, where they exist) were not retained.

Table 30: Number of Wetland Reviews Per Sample Year

<b>Year</b>	<b>Forested Wetland Field Reviews</b>	<b>Non-Forested Wetland Field Reviews</b>
2022	12	25
2023	15	12
<b>Total</b>	<b>27</b>	<b>37</b>

No other deviations were found for non-forested wetlands during any field reviews conducted between 2022-2023.

### ***Summary of Case Study Findings***

Considering the increased number of field reviews conducted to increase sample size for this study, CMP expected to be able to identify clear trends in the most common deviations over the 2-year period. However, the highest number of deviations for wetlands occurred for non-forested wetlands, specifically for those found to be inundated and associated with fish waters. All deviations were classified as administrative, meaning that the FPA indicated wetlands were not associated with fish water, but harvest boundaries were laid out and harvested correctly, indicating correct identification and protection as fish waters as required by the FP Rules. For forested wetlands, which are not required to be mapped if 3 acres or less in size, a total of 15 out of the 27 reviewed were 3 acres or less and mapped.

Though wetlands have historically shown lower compliance rates than other prescriptions annually surveyed by CMP, the case study over the past 2 years does not present any indication that wetlands as a resource are not being adequately protected according to the FP Rules. The most consistent issue faced was administrative errors in identifying fish waters on FPAs and other forms. The FP Rule surrounding typing of wetlands was the only rule applicable to all wetlands (forested and non-forested) surveyed by CMP. Most non-forested wetland FP Rules regarding trees per acre are not applicable for surveyed sites, either due to lack of trees per acre present or lack of harvest within the WMZ. Overall, CMP concludes that further training for administrative staff and landowners would go far in lifting compliance rates for wetlands overall. It should be noted that even by capturing more of the population, it is possible that the samples surveyed were not representative of situations that caused lower compliance ratings in previous biennial sample periods.



## Section 4 - Rule Compliance Results for Roads and Haul Routes

Well-designed, properly located, constructed, and well-maintained forest roads are essential to timber harvest, forest management, and protection of public resources and public safety. Washington state FP Rules, including those for construction, maintenance, and abandonment of roads are among the most stringent in the country. The FP Rules are designed to ensure that forest roads prevent mass wasting, divert water and sediment runoff to the forest floor, and limit delivery of sediment and surface runoff to typed waters that would potentially endanger fish and other aquatic species. The FP Rules also aim to avoid pirating surface water or ground water, provide for passage of woody debris, protect stream bank stability, and assure no net loss of wetland function. Finally, FP Rules addressing culverts (along with many other FP Rules) are meant to provide fish passage on fish streams for all fish species at all their life stages.

CMP collects data annually on sites with road construction, landing construction, typed water crossings (typically Np and Ns streams), drainage structures, road abandonment, and haul routes (forest roads used to move timber to market). The haul route prescription is sampled differently than other roads prescriptions. The haul routes prescription is reviewed in accordance with *Clean Water Act* requirements, which are [regulated by the Department of Ecology](#) (ECY). The publication of haul route data represents a collaborative effort between DNR and ECY in compliance monitoring. Haul routes are sampled in 0.1-mile segments of forest road to determine if they meet FP Rule maintenance standards established to protect typed waters from sediment delivery that would negatively impact public resources.

For a deeper dive into the background and specific questions and assessments performed by CMP, please refer to a previous report, or to WAC Chapter 222-24 in its entirety. Finally, refer to the [Roads Field Form](#) posted on the [CMP webpage](#). The following are some of the questions found on the Roads Field Form:

- Road location: *"Does new road construction minimize stream crossings?"* ([WAC 222-24-020\[5\]](#))

- Road design: *"Where the potential for sediment delivery existed, was full bench construction utilized for roads built on slopes greater than 60%?"* ([WAC 222-24-020\[8\]](#))
- Road construction: *"Were erodible soils disturbed during construction stabilized to prevent the potential to deliver to typed waters?"* ([WAC 222-24-030\[4\]](#))
- Type N water crossings: *"Are the alignment and slope of all culverts on grade with the natural streambed?"* ([WAC 222-24-040\[2\], \[3\], \[4\], and \[5\]](#) and [222-24-042\(2\)](#))
- Road abandonment: *"Was the road blocked so that four-wheel highway vehicles cannot pass the point of closure at the time of abandonment?"* ([WAC 222-24-052\(3\)](#))

**Roads**

For roads prescriptions, compliance with a single FP Rule is the percentage of applications of each road rule that were compliant. For applications with multiple road segments, each segment is assessed separately. Thus, for roads only, compliance with a single FP Rule can be a percentage or a ratio.

**Roads Compliance Results**

Table 4A: Rule Compliance Rates for Roads Prescription

Status of Compliance	Road Activities Rule Compliance
Total Number of Rules Sampled	187
Number Compliant Rules	186
Number Rules with Deviation	1.0
Bias-Corrected Compliance Percentage (%)	99.5
95% LCL	98.3
95% UCL	100.0

Compliance rates were high for roads surveyed during the biennial period statewide. Only one deviation (0/2 for one FP Rule) was reported for all field reviews over the 2-year period:

- Ditch line flows water to Type B wetland, and ditch line flows water through inundated/associated forested wetland that connects to Type F water. Potentially layout or operational error.

No other deviations were found for roads surveyed during any field reviews conducted between 2022-2023.

**Indeterminate Discussion for Roads Prescription**

A total of zero indeterminate ratings were given for the Roads prescription covering all field reviews conducted during the monitoring period.

## Haul Routes

Haul route segments are randomly selected from 0.5-mile segments on roads that are greater than five miles long totaling ten 0.5-mile-long segments selected from the entire length. If the entire route is only five miles or less, the entire haul route is assessed. Within each 0.5-mile segment, every 0.1-mile is assessed as to its actual or potential delivery of sediment to typed water. Table 4D describes the primary causes for delivery recorded for haul routes assessments this biennium (for more information, refer to the [2009 Clean Water Act Assurances Review of Washington's Forest Practices Program](#)).

The following table defines each of the five possible delivery level categories for haul routes.

Table 4B: Haul Route Delivery Levels

Delivery Level	Description
No Delivery	Complete disconnection of sediment delivery to typed water.
De Minimis	Overland flow from roads reaches typed waters, but sediment delivery is indistinguishable from background levels of turbidity.
Low	Low chronic or temporary delivery. Effects are observable at the site of entry (distance downstream less than one channel width) only and are not expected to magnify over time given the existing activity.
Medium	Measurable, but noncritical, levels of delivery. Visible plume at the reach scale.
High	Extensive or critical levels of delivery. Substantial violations of turbidity criteria or significant visible plumes that occupy the channel and go beyond the reach scale (for example, around multiple bends in a stream).
No Consensus	The observers do not agree on the classification. Comments are essential to determine the scope of the difference, recording each observer's classification and the basis of disagreement.



## Haul Route Compliance Results

Table 4C: Haul Routes Compliance Results (Stratified Mean Ratio)

Compliant		Deviation		
99% (98-100%) <sup>12</sup>		0.77% (0-1.8%)		
No Delivery	De Minimis	Low	Medium	High
96%	2.7%	0.60%	0.18%	0.36%

Table 4D: Haul Route Deviation by Cause

Primary Cause	Mileage	Percentage of Deviation (%)
Seep into ditches	0.19	33
Inadequate erosion control measures	0.16	29
Sediment from stream-adjacent parallel roads	0.13	22
Driven on/squashed berm	0.08	13
Stream/spring intercepted water	0.01	3
<b>TOTAL</b>	<b>0.57</b>	

A total of 15 haul routes were assessed during the biennial period, totaling 54.29 miles.

<sup>12</sup> Note: The parenthetical value is the 95% confidence level.



## Section 5 - Periodic Sample Results for Potentially Unstable Slopes

Each year, CMP commits to a periodic sample typically performed in the fall following spring standard sample field reviews. The periodic sample may be any number of FP Rule prescriptions, including potentially unstable slopes, Forest Practices hydraulic projects, or a study assigned by the legislature or division management within DNR. In 2023, the potentially unstable slopes prescription was performed alongside the spring standard sample due to a lack of time in the fall (see proposed changes in the beginning of this document).

The potentially unstable slopes sample was designed to evaluate whether forest practices around Rule Identified Landforms (RILs, as defined in [WAC 222-16-050\(1\)\(d\)\(i\)](#)) are avoiding or mitigating the potential adverse effects of timber harvest in potentially unstable areas. The potentially unstable slopes prescription is comprised of only FPA compliance questions because the sample prescription was designed to evaluate FPA compliance only. Potentially unstable slopes field reviews require the signature of a licensed engineering geologist (LEG), who is either present at all field reviews or sends a geologist-in-training (GIT) to collect the data and provides a responsible charge signature in a timely manner. Similar to standard sample reviews, each applicable question on the field form is answered in a binary compliant/deviation format, or with an indeterminate rating and a description of indeterminate findings.

To review potentially unstable slopes in the activity area expiring between 2022-2023, a query was conducted to identify all FPAs containing such slopes. LEGs (or Qualified Experts as per WAC 222-10-030(5)) oversaw examining the relevant elements, usually the RILs, before conducting field reviews. It is recommended that the current protocol be updated and expanded upon to guarantee consistency and efficiency between field reviewers.

The questions covered during field reviews include:

- Did the landowner identify all potentially rule identified unstable features in/around the harvest/activity area?
- Did the landowner apply mitigation for all potentially rule identified unstable features as identified on their FPA?

- Did NO harvest occur within the no-harvest mitigation area associated with rule identified unstable features?

**Potentially Unstable Slopes Results**

Table 5A: FPA Compliance Results for Potentially Unstable Slopes Prescription

Potentially Unstable Slopes Prescription Totals	Results
Total FPAs Assessed	26
FPA Compliant Questions	73
FPA Deviation	3
Total Questions Assessed	<b>76</b>
<b>Bias-Corrected Compliance Percentage (%)</b>	<b>96.1</b>
<b>95% LCL</b>	<b>90.3</b>
<b>95% UCL</b>	<b>100.0</b>

**Indeterminate Discussion for Potentially Unstable Slopes Periodic Prescription**

A total of one indeterminate rating was given covering 26 field reviews conducted during the monitoring period (2023). The table below describes the question of FPA compliance for which the indeterminate rating was assigned, and the reason for the rating.

Table 5B: Indeterminate Explanations for Potentially Unstable Slopes

Form Question	Reason for Indeterminate Rating
Landowner identified all Rule-Identified potentially unstable features in/around the harvest area	Possible groundwater recharge area (GWRA) for a glacial deep-seated landslide (DSL). No harvest occurred in mitigation area as laid out in the FPA (i.e., no GWRA because landslide (LS) is noted as bedrock). FPA Appendix D described area as a possible bedrock deep-seated LS. Based on limited CoMo field review, a glacial DSL cannot be ruled out. Glacial material was observed throughout the landslide body and in shallow test pits and root wads. The only bedrock observed was in a shallow test hole in a stream bank along the lateral margin of the landslide. Based on these observations, a likely interpretation is that the landslide failure plane is at or above the bedrock-glacial interface. Therefore, a GWRA for a glacial DSL MAY have been harvested.

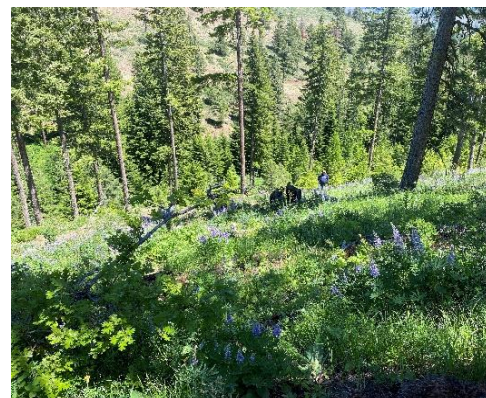
**Deviation Discussion for Potentially Unstable Slopes Periodic Prescription**

The table below outlines the deviations found during field reviews for the potentially unstable slopes sample. Note: Comments made by geologists are recorded to the best of the CMP staff’s ability, and shorthand was broken down as much as possible for ease of understanding by readers.

Table 5C: Deviation Explanations for Potentially Unstable Slopes

Form Question	Reason for Deviation Rating
Landowner identified all Rule Identified potentially unstable features in/around harvest area or activity area	<u>Administrative deviation:</u> GWRA for glacial deep-seated landslide (DSL) not included on FPA Appendix D. FPA is right-of-way (ROW)-only harvest and very small percentage of GWRA.
Landowner applied mitigation for all Rule-Identified potentially unstable features as identified on the FPA	<u>Layout/Operational deviation:</u> The qualified expert (QE) report described the impacts of harvest in Rule-Identified Landforms (RILs) in accordance for a Class IV-Special FPA only for yarding corridors at creeks Ck1b, Ck2b, Ck2cb, and Ck2ca. Per the QE report, the proposed mitigation for all other RILs was avoidance. At least 3 trees were cut and apparently harvested in the bedrock hollow at creek Ck2cc. Therefore, the FPA is not compliant with the proposed mitigation at this location.
No harvest occurred within the no-harvest mitigation area associated with Rule-Identified potentially unstable features	<u>Layout/Operational deviation:</u> At least 3 trees within a bedrock hollow were cut and apparently harvested. A shallow landslide was also observed within the same bedrock hollow and appears to have occurred post-harvest. Since harvest occurred in a RIL, the FPA is not compliant. A shallow landslide consistent with bedrock hollow mass wasting processes was also observed at this location and appears to have occurred post-harvest. Roadside ditches also appear to have the potential to direct water into this bedrock hollow. Please note that due to the time elapsed since layout and harvest, the flagging and paint used to mark approved harvest boundaries has faded and is no longer visible in many locations. It is not possible to determine whether the harvest is in compliance with the approved, field-verified harvest boundary.





## Section 6 - FPA Compliance Results

Compliance with FPAs generally tends to mirror FP Rule compliance on individual FPAs. However, occasionally a prescription may be compliant with the FP Rule, but not compliant with what was submitted and approved in the FPA. The proponent’s stated commitments in the FPA may have been inaccurate, or actual harvest may have been altered due to a safety or layout issue. CMP records deviations from what was stated on the FPA, but sample sizes are not based on FPA compliance and cluster sizes for sample selection.

### Comparison of Rule Compliance and FPA Compliance

The results of the 2022-2023 sampling period show a similar trend to previous biennial reports, with FPA compliance generally following the same trends as FP Rule compliance. Where FP Rule compliance rates were high, FPA compliance also tended to be high. Compliance rates for FPA compliance ranged from 89.2% (DFC2) to 100% (Ns).

Table 6A: Comparison of Rule and FPA Compliance Rates by Prescription Type

	RMZ Prescription	Rule Compliance Rate (%)	FPA Compliance Rate (%)
<b>Statewide</b>	No Inner Zone Harvest	96.8	94.7
	Type Np Prescriptions	98.4	96.6
	Type Ns Prescriptions	94.3	100.0
	Type A and B Wetlands	97.3	99.1
	Forested Wetlands	98.3	97.0
	Roads	99.5	100.0
<b>Western WA only</b>	Inner Zone Harvest DFC1	96.7	95.0
	Inner Zone Harvest DFC2	93.8	89.2

The most common difference in FP Rule versus FPA compliance is a result of under-typing of waters. In these cases, a deviation would be recorded for the first rule question and all following rule questions would not be applicable. However, the sample would still be assessed for FPA compliance



(i.e., whether the resource was properly protected according to the water type designated on the FPA). This situation occurred for six samples during the 2022-2023 biennial period.

Another case of difference in FP Rule versus FPA compliance is harvest in a planned no-harvest buffer, where harvest is allowed by rule. In this case there would be a deviation for FPA compliance because there was no planned harvest, but if the resource was protected properly by rule, there would be no deviation for FP Rule compliance. This occurred once for the 2022-2023 biennial period.



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## **Acknowledgements**

The contributions of numerous agencies and individuals were critical to the completion of this biennial report, including Washington State Departments of Natural Resources, Ecology, and Fish and Wildlife staff who assisted with planning and execution of field reviews in all types of weather and terrain, and with special thanks to tribal representatives and regional Forest Practices staff who assisted in data collection and compliance determinations.

Special thanks to Lila Westreich, Mary McDonald, Kelly Childers, Martin Pillow, Garren Andrews, Chris Briggs, Jason Lenz, Jason Graham, Wendy Neet, Dave Parks, and Ross Fenton. The CMP deeply appreciates the interest, patience, and assistance of landowners across the state. The Compliance Monitoring Program would not exist without the support of the Forest Regulation Division.

All data collected for the 2022-2023 season are encompassed in this report. For more information on how the CMP selects samples, assembles field review teams, and collects data in a wide variety of sites across Washington state, please check out the ArcGIS Storymap available on the Compliance Monitoring Program's public DNR [website](#).

### **Contact**

Mary Murdock  
Compliance Monitoring Program Manager  
[Mary.murdock@dnr.wa.gov](mailto:Mary.murdock@dnr.wa.gov)

## Appendix A. Trend Analysis of Forest Practices Rules

Alice Shelly, Kleinschmidt Associates

Forest Practices Rule compliance has been monitored since 2006. In that time, there have been multiple changes to the methods for monitoring compliance. The current monitoring methods include tracking compliance with individual FP Rules, while sampling the FP Rule applications in clusters. One of the goals of the current analytical methodology is to track trends in prescription and individual FP Rule compliance. The sample size for each year is determined based on achieving a specific precision level (+/- 6%, 95% confidence interval) for average compliance with a set of FP Rules (a prescription) over a 2-year period. Because the population of FPAs available in any given year is finite and variable, and variance estimates vary, the estimated sample size necessary to achieve a specific precision level also varies by year. Differing priorities, compliance estimation methods, and natural variability have caused differences in precision levels through time. In addition, methods for determining compliance with some individual FP Rules have changed since the monitoring program started. While these differences create challenges in evaluating trends through time, this report includes an analysis aimed at seeking to discern statistically meaningful patterns of changes in compliance rates over time.

### Methods

For the 2010-2023 dataset, FP Rule compliance was carefully tracked to ensure that compliance determination was consistently applied. The compliance data from 2006-2009 have not yet been matched to current FP Rules, although this data may be included in future reports. Results were reviewed to ensure consistent application of compliance determinations across the dataset. Certain data were removed from the trend analysis dataset including:

- data not collected in accordance with current field protocols,
- FP Rules no longer included in compliance estimates, and
- current FP Rules for which longer term results were not available.

Data for the remaining FP Rules were combined and compared through time within each corresponding prescription type. The 2014-23 results were calculated using the jackknifed form of the ratio estimator. Differences in compliance estimates used for trends versus reported annual compliance are due to the reduction in data used for trends as discussed above. Trends in average compliance with prescriptions and individual rule compliance for this subset are tracked to maintain a long-term dataset consistency with current methods.

Linear regression analysis is used to estimate general linear trends in average compliance through time. Because of the varying precision levels among years, the regression assumption of homogeneous variance in average compliance was not satisfied. Generally, higher sample sizes (number of FP Rules assessed in a given year) as a proportion of the population result in lower variance. Because average compliance is a ratio, the standard error of the average is a function of the proportion of the population sampled in each year and the number of FP Rules within the prescription applied on each FPA.

Weighted least squares linear regression was employed to correct for the non-homogeneous variance (where the average compliance is weighted by the inverse of the estimated mean standard error of compliance for each year). The result is that years with better estimates of average compliance receive more weight in the regression, which compensates statistically for unequal variance. Statistical significance was determined with  $\alpha = 0.10$ . Residuals from regressions were tested for approximate normality using Shapiro-Wilks test with  $\alpha = 0.05$ . P-values for significance of regressions (Wald t-tests) were reported, as well as 95% confidence intervals for linear regression coefficients for the weighted regression.

The relative weights used for weighted linear regression were used to size the points in the regression plots (larger points were weighted heavier based on variance estimates). Since no individual rules are measured or tracked for Haul Routes, trend analysis was not conducted for the Haul Routes prescription.

*Example: A higher proportion of the population sampled (that is more FP Rules per FPA/N) in any given year reduces the variance and more heavily weights that point in the regression analysis. Slope estimates (that is average change in compliance per year) are given for weighted and unweighted regressions with p-values for significance tests, and a 90% confidence interval for the weighted regression slope.*

## Results

There is evidence of increasing compliance trends in DFC1, DFC2 and NIZH prescriptions, with estimated average increases in compliance rates from 0.4 to 0.9% per year over the 2010-2023 period.

### Desired Future Condition 1

Trend analysis results for the DFC1 prescription type revealed varying compliance rates for the prescription, and the individual FP Rules, from year to year. Annual prescription compliance rates varied from 84% to 100% over the course of the evaluation period. As a result of increasing prescription compliance rates, significant trend results ( $p = 0.012$ ) were observed for the DFC1 prescription type (weighted regression). A year-over-year increase of 0.8% for the overall prescription compliance rate was observed. Note that the increase in compliance occurred mainly in the 2010-2014 period, and the compliance rates have been stable over the 2014-2023 period (blue dashed line).

### Desired Future Condition 2

Trend analysis results for the DFC2 prescription type showed increasing compliance rates for the prescription, and the associated FP Rules from year to year. Prescription compliance rates varied from 88% to 100% over the course of the evaluation period. As a result of the increasing prescription compliance rate, significant trend results ( $p = 0.035$ ) were observed for the DFC2 prescription (weighted regression). A year-over-year increase of 0.4% for the overall prescription compliance rate was observed. Note that the increase in compliance occurred mainly in the 2010-2014 time period, and the compliance rates have been stable over the 2014-2023 period (blue dashed line).

### No Inner Zone Harvest

Trend analysis results for the NIZH prescription type revealed consistently increasing compliance rates for the prescription, and the associated FP Rules from year to year. Prescription compliance rates varied from 88% to 100% over the course of the evaluation period. As a result of the increasing prescription compliance rate, significant trend results ( $p = 0.0014$ ) were observed for the weighted NIZH prescription. A year-over-year increase of 0.7% of the overall prescription compliance rate was observed. Note that the increase in compliance over the 2014-2023 period is similar to the full 2010-2023 trend for NIZH prescriptions (blue dashed line).

### Non-Fish-Bearing Perennial Waters

Np data collected from 2010 and 2011 were excluded from current trend analysis results because of data conversion issues. Trend analysis results for the Np prescription type revealed varying compliance rates for the prescription, and the associated FP Rules from year-to-year. Prescription compliance rates varied from 77% to 99% over the course of the evaluation period. No significant trend ( $p = 0.43$ ) was observed for the Np prescription.

### Non-fish Bearing Seasonal Waters

Trend analysis results for the Ns prescription type revealed increasing compliance rates for the prescription. Prescription compliance rates varied from 89% to 100% over the course of the evaluation period. No significant trend results (weighted  $p = 0.61$ ) were observed for the Ns prescription.

### Non-Forested Wetlands

Trend analysis results for the A and B Wetlands prescription type revealed varying compliance rates for the prescription, and the associated FP Rules from year-to-year. Prescription compliance rates varied from 82% to 100% over the course of the evaluation period. No significant trend results (weighted  $p = 0.67$ ) were detected for the weighted A and B Wetlands prescription.

### Forested Wetlands

Trend analysis results for the Forested Wetlands prescription type revealed 100% compliance rates for the prescription, and the associated FP Rules, in 9 out of 14 years from 2010 to 2023, with compliance rates varying from 90% to 97% in the remaining 5 years. No significant trends ( $p = 0.85$ ) were observed for the Forested Wetlands prescription (weighted regression).

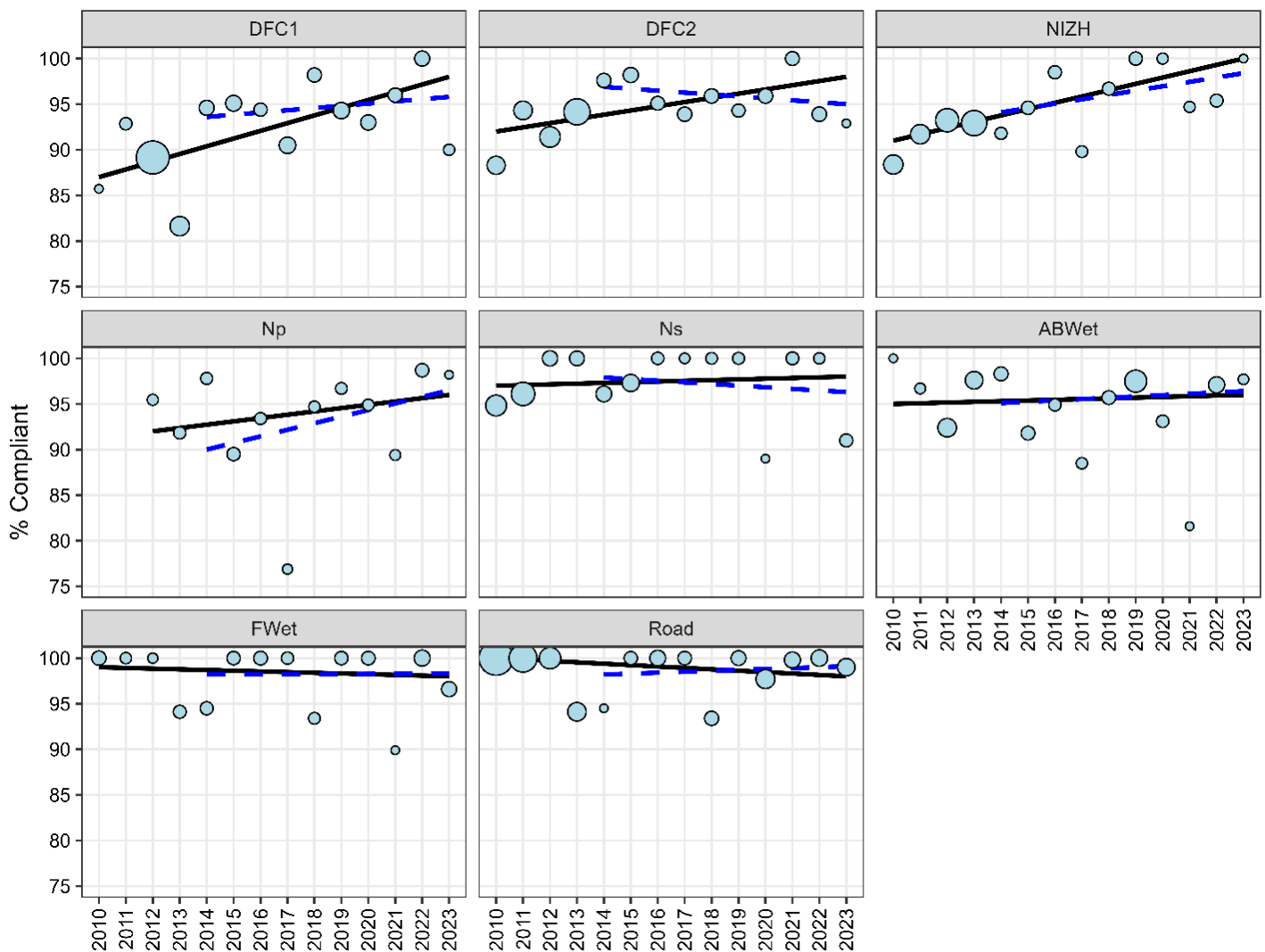
### Roads

Due to the large number of individual FP Rules that comprise the Roads prescription (42), only prescription compliance is visually represented in the report. Trend analysis results for the Roads prescription type revealed 100% compliance rates for the prescription in 8 out of 14 years from 2010 to 2023, with compliance rates varying from 93% to 99.8% in the remaining 6 years. No significant trend ( $p = 0.37$ ) was observed for the Roads prescription.

## Discussion

There have been statistically discernable linear or monotonic increases in compliance since 2010 for some prescriptions and, equally notable, no significant decreases in rates of compliance with FP Rules. Compliance rates for both DFC1 and DFC2 prescriptions have increased since 2010, most apparent in the first five years (2010-2015), and rates for both prescriptions are relatively stable near 95% in the past ten years. The NIZH prescription has had a stable increase since 2010 and is now close to 100%. The Np prescription has variable compliance but appears to be increasing over the past 8 years (trend is not significant). Ns FP Rule rate has been at 100% for six out of the past eight years, although it was close to 90% in 2020 and 2023. Compliance with roads and wetlands rules appears to be stable with an average of about 98.5% for roads and forested wetlands and 95% for non-forested wetlands, although compliance was lower for both wetland prescription types in 2021. Compliance with non-forested wetlands rules has been more variable across years.

## Graphic Results of Trend Analysis of Forest Practices Rule Compliance

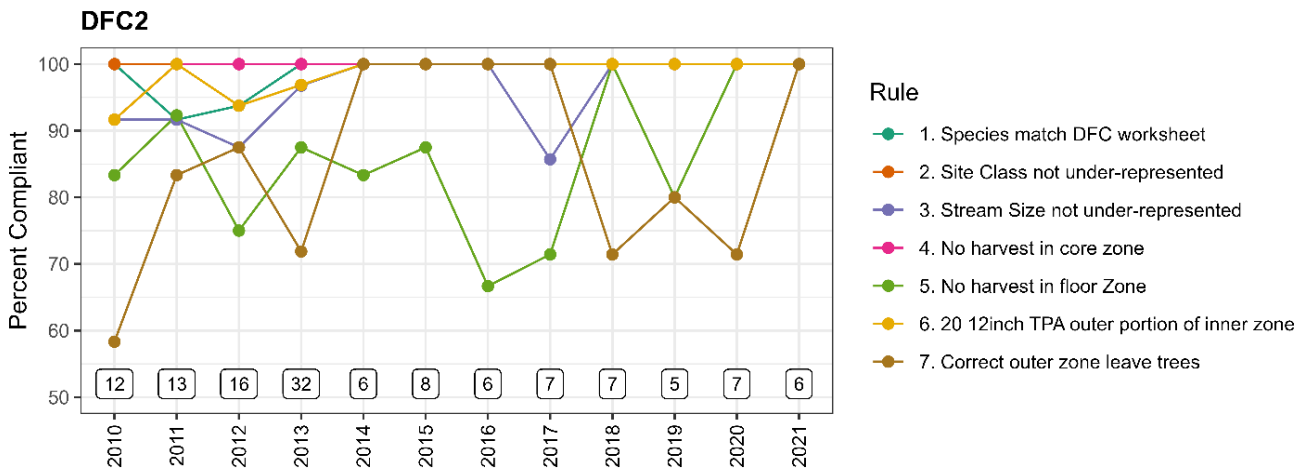
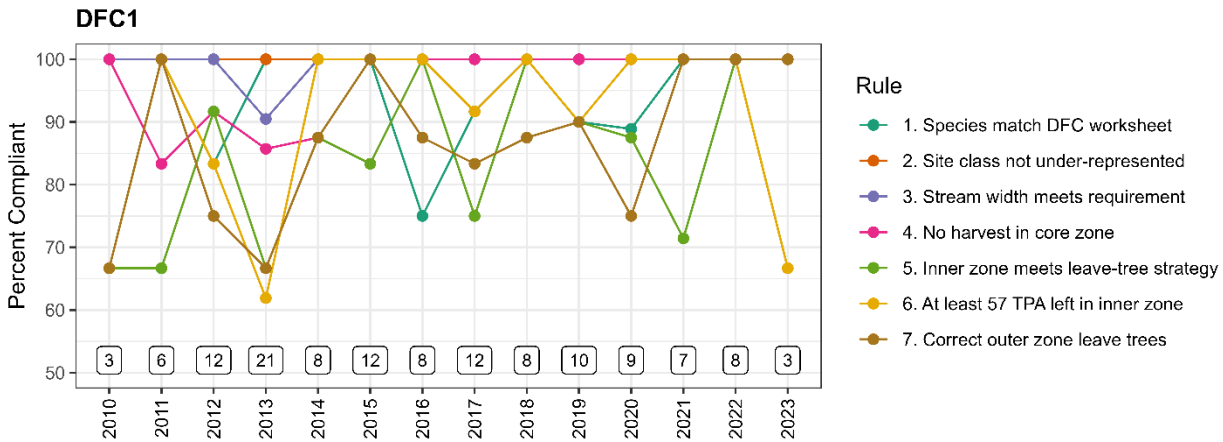




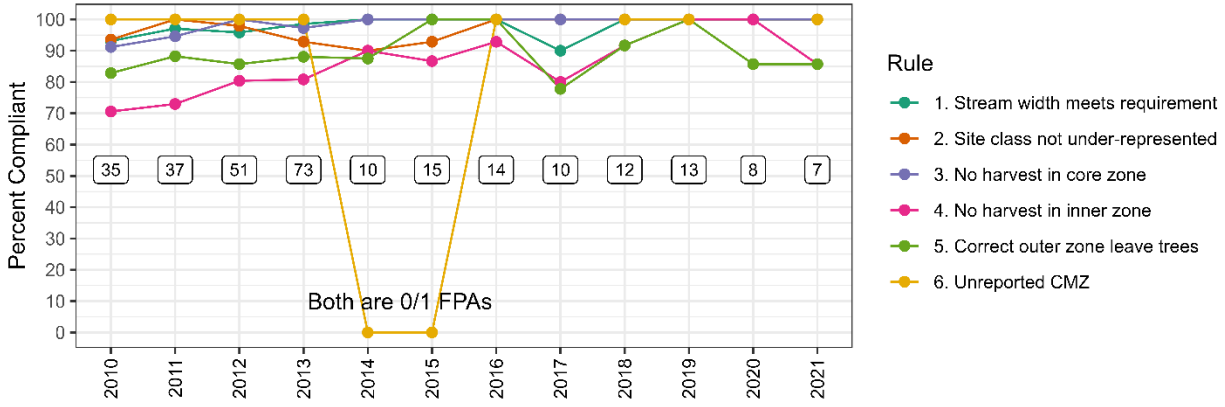
The figure above represents the results described in the Trend Analysis of Forest Practices Rules section above. Individual prescriptions are labeled accordingly, with their representative acronym. For a short description of trend results for each prescription, see the section immediately preceding this one.

### Long-Term Individual Rule Trend Analysis

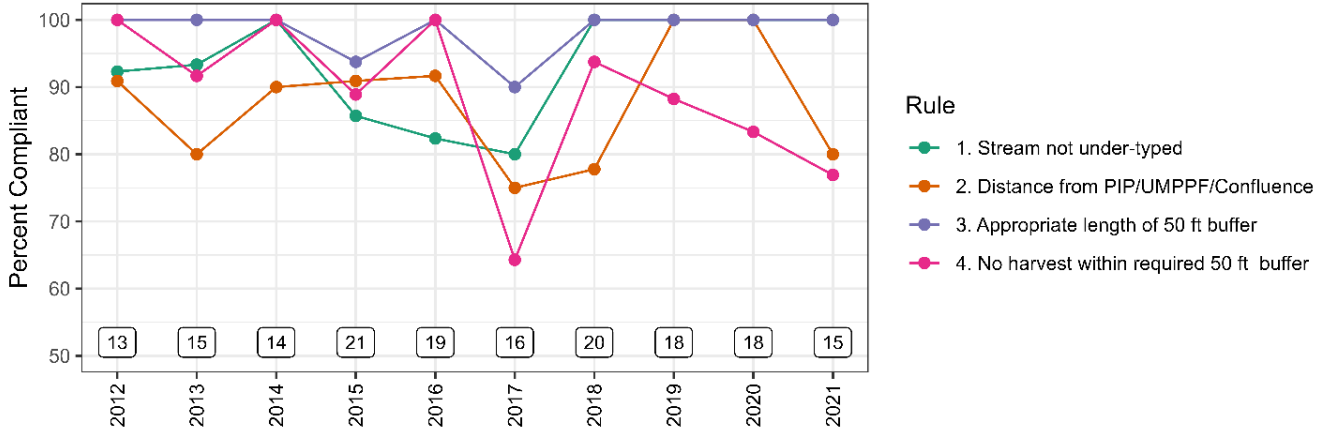
Note: Numbers in boxes at the bottom of each plot are the number of FPAs reviewed for the prescription type in each year.



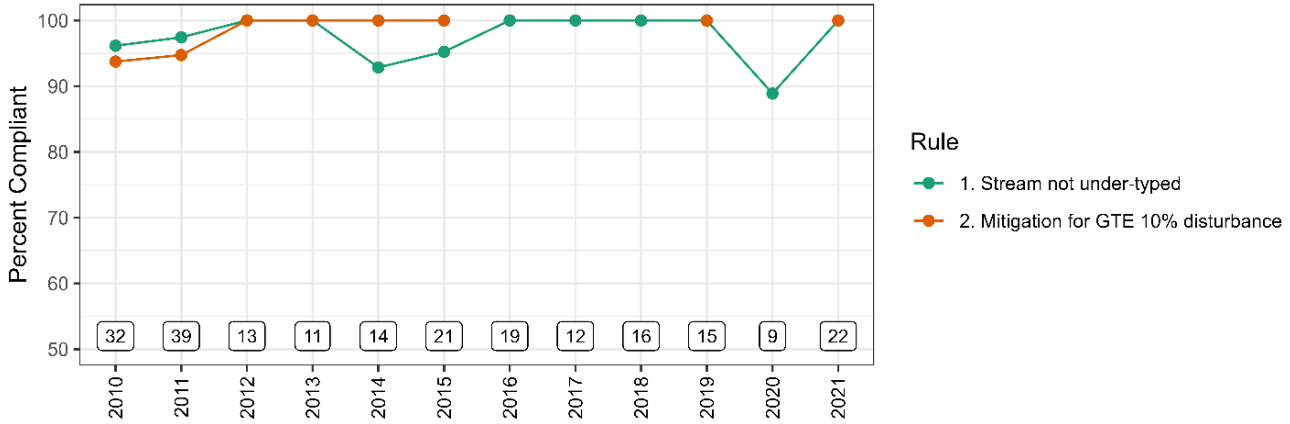
**NIZH**

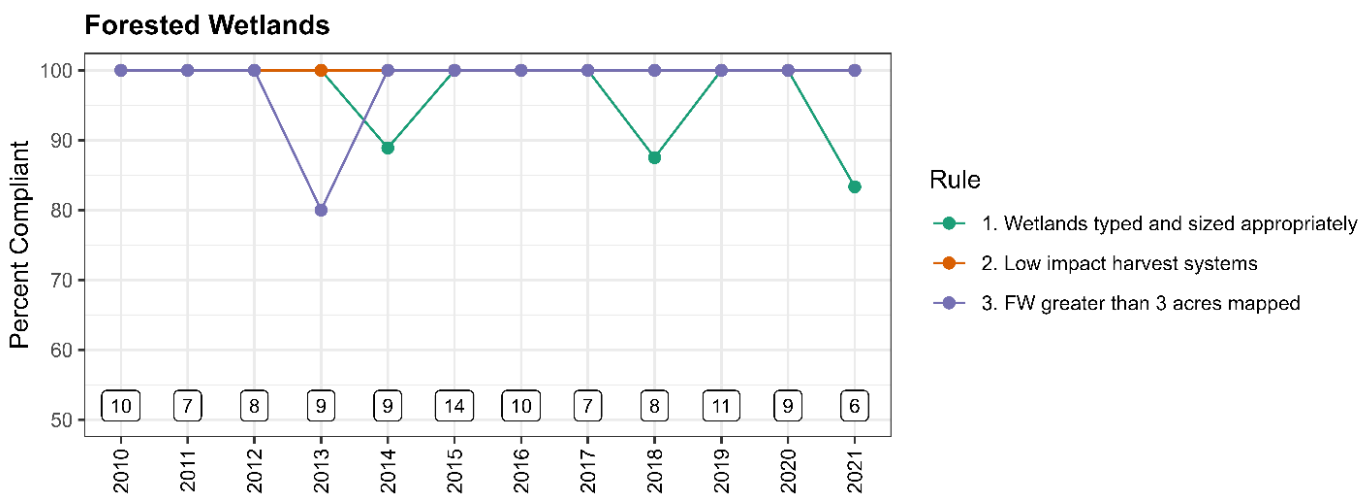
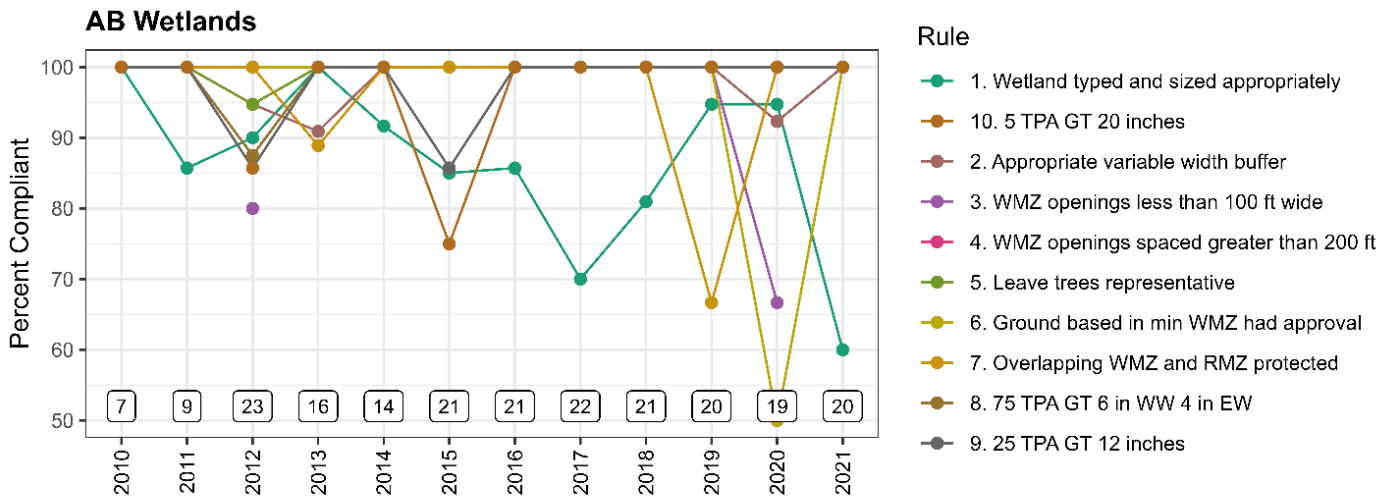


**Np**



**Ns**





## Appendix B. Glossary

### Bankfull width (BFW)

- (a) For waters — the measurement of the lateral extent of the water surface elevation perpendicular to the channel at bankfull depth. In cases where multiple channels exist, bankfull width is the sum of the individual channel widths along the cross section (see Board Manual, Section 2).
- (b) For lakes, ponds, and impoundments — the line of mean high water.
- (c) For tidal water — the line of mean high tide.
- (d) For periodically inundated areas of associated wetlands — the line of periodic inundation, found by examining the edge of inundation to ascertain where the presence and action of waters are so common and usual, and of so long a duration in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland.

### Basal area

The area in square feet of the cross section of a tree bole measured at 4.5 feet above the ground.

**Channel migration zone (CMZ)**

The area within which the active channel of a stream is prone to move, resulting in a potential near-term loss of riparian function and associated habitat adjacent to the stream, except as modified by a permanent levee or dike. For this purpose, "near-term" means the time scale required to grow a mature forest. (See Board Manual, section 2, for descriptions and illustrations of CMZs and delineation guidelines.)

**Clearcut**

A harvest method in which the entire stand of trees is removed in one timber harvesting operation (except for trees required by FP Rule or law to be left unharvested).

**Confidence interval**

A type of interval estimate of a population parameter, used to indicate the reliability of an estimate.

**Crown closure**

The percentage of canopy covering the forest floor.

**Desired future condition (DFC)**

The stand conditions of a mature riparian forest at 140 years of age, the midpoint between 80 and 200 years. Where basal area is the only stand attribute used to describe 140-year-old stands, these are referred to as the "target basal area." The DFC is a reference point on a pathway and not an endpoint for forest stands.

**Diameter breast height (DBH)**

The diameter of a tree at 4.5 feet above the ground measured from the uphill side.

**Dominant trees**

Trees with crowns receiving full light from above and partly from the side. Typically larger than the average trees in the stand, with crowns that extend above the general level of the canopy and are well developed but possibly somewhat crowded on the sides.

**Equipment limitation zone (ELZ)**

A 30-foot-wide zone measured horizontally from the outer edge of the bankfull width of Type Np or Ns waters. ELZ rules apply to all perennial and seasonal non-fish-bearing waters.

**Finite population correction factor**

A formula frequently used in statistics and probability that allows adjustment to a population from larger to smaller or to indicate no change in the population. The result of the formula's calculation is called the "z-factor."

**Forest Practices Application/Notification (FPA/N)**

The DNR form used by forest landowners to apply for approval of a Class III or IV forest practice or to notify DNR that they are conducting a Class II forest practice.

**Forest road**

Since 1974, lanes, roads, or driveways on forestland used for forest practices. "Forest road" does not include skid trails, highways, or local government roads except where the local governmental entity is a forest landowner. For road maintenance and abandonment planning purposes only, "forest road" does not include forest roads used exclusively for residential access located on a small forest landowner's forestland.

**Full bench road**

A road constructed across a slope without using any of the material removed from the hillside as part of the road. This construction technique is usually used on steep or unstable slopes.

**Jackknife analysis**

A resampling technique for variance and bias estimation. Each observation is systematically omitted from the dataset and the ratio estimate is recalculated, then the mean is determined from the recalculations.

**Laser hypsometer**

An instrument that measures the distance to the top and bottom of an object and that measures the angle between the lines from the observer to each top and bottom to calculate height of the object, typically used in forestry to measure tree heights.

**100-year flood level**

A "100-year" event means a calculated flood event flow based on an engineering computation of flood magnitude that has a 1% chance of occurring in any given year.

**Partial cut strategy**

The removal of a portion of the merchantable volume in a stand of timber to leave an uneven-aged stand of well-distributed residual, healthy trees.

**Prescription**

A grouping of similar FP Rules by forest practices activity type.

**Public resources**

Water, fish, and wildlife; also, capital improvements of the state or its political subdivisions.

**Riparian function**

Includes bank stability, the recruitment of woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features important to both riparian forest and aquatic system conditions.



**Riparian management zone (RMZ)**

The area located on each side of a Type S, F, or N water, where trees are left to provide protection from disturbance when forest practices activities, such as timber harvests, are conducted.

**Rule Identified Landforms (RILs)**

Inner gorges, convergent headwalls, bedrock hollows, toes of deep-seated landslides, groundwater recharge areas for glacial deep-seated landslides, outer edges of meander bends along valley walls or high terraces of an unconfined meandering stream, and any areas containing landforms indicating the presence of potential slope instability that cumulatively indicate the presence of unstable slopes.

**Seep**

A moist or wet place where water reaches the earth's surface.

**Sensitive sites**

Areas near or adjacent to Type Np water. These include headwall and side-slope seeps, confluence or type Np intersections, alluvial fans, and the uppermost point of perennial flow or headwaters spring.

**Sidecast**

The act of moving excavated material to the side and depositing such material within the limits of road construction or dumping it over the downhill side and outside the limits of a road prism.

**Significance level**

A fixed probability of wrongly rejecting the null hypothesis ( $H_0$ ) when the hypothesis is in fact true. The smaller the significance level, the better the protection for the null hypothesis. Including a significance level prevents the investigator, as far as possible, from inadvertently making false claims.

**Site class**

A growth potential rating for trees within a given area based on soil surveys. The designated site class along Type S or F waters will determine the width of the RMZ.

## Site index

An index based on ranges of site classes. For example:

50-Year Site Index Range (State Soil Survey)	
Site Class	Years
I	137+
II	119–136
III	97–118
IV	76–96
V	< 75

## Stand requirement

The number of trees per acre, the basal area, and the proportion of conifers in the combined core and inner zone such that the growth of the trees would meet the desired future condition.

## Stream-adjacent parallel roads

Roads (including associated right-of-way clearing) in an RMZ on a property that have an alignment parallel to the general alignment of a stream, including roads used by others under easements or cooperative road agreements. Also included are water crossings where the alignment of the road continues to parallel the stream for more than 250 feet on either side of the water. Not included are federal, state, county, or municipal roads not subject to Forest Practices Rules, or roads of another adjacent landowner (unless Np).

## Uppermost point of perennial flow (UMPPF)

The highest point in the stream where water begins to flow perennially (year-round).

## Wetland management zone (WMZ)

The area located around the perimeter of a wetland where trees are left to provide protection from disturbance, as well as shade and nutrients for the wetland.

## Yarding corridor

A narrow, linear path through an RMZ to allow suspended cables necessary to support cable logging methods, or to allow suspended or partially suspended logs to be transported through these areas by cable logging methods.

## Appendix C. References

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