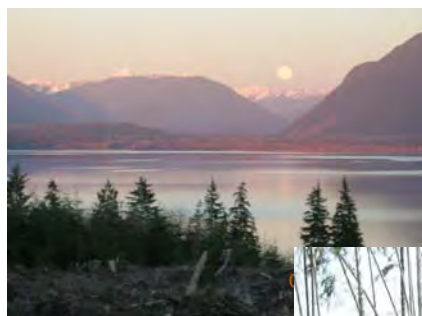


Washington State Department of Natural Resources Forest Practices Division

Biennium 2006-2007 Compliance Monitoring

SUMMARY REPORT
March 2009



Compliance Monitoring Summary Report: Biennium 2006-2007

April 2009

Leslie Lingley and David Gregory
Forest Practices Division
Washington State Department of Natural Resources

Alice Shelly – TerraStat Consulting Group

Acknowledgements

All contributors are DNR staff unless otherwise indicated.
Copies of this report may be obtained from Mary McDonald, DNR.

Gary Graves, Forest Practices Division Assistant Manager for Operations, provided continual guidance, historical insight, and valuable rule interpretation to the Compliance Monitoring program.

Stakeholder Representatives who collated their caucus comments regarding this report:
Pete Heidi: Washington Forestry Protection Association
Michelle Stevie, John Heimburg, and Jeff Davis: Washington Department of Fish & Wildlife
Mark Hicks: Washington Department of Ecology
Nancy Sturhan: Northwest Indian Fisheries Commission
Chris Mendoza: Conservation Caucus.

Data entry of field information

Lisa Renan
John Heimburg
Craig Graber

This program would not be successful without the continued participation of the field review teams including:

- Tribal representatives
- Biologists and geologists from Washington State Departments of Ecology, and Fish and Wildlife
- Forest Practices Foresters who have incorporated Compliance Monitoring into their work requirements and who have been a continued source of knowledge of Forest Practices

Contents

Summary	1
Introduction	5
Program Design Elements	7
What is an activity?	
Sampling and Field Protocols	
Compliant and Non-Compliant Decisions	
Landowner Types	
Rule Groups Not Reported for this Summary Report	
Misuse of Compliance Monitoring Data	
Stream typing for Riparian Activities	
Results	11
Results for Riparian Activities	
Riparian Activity Questions	
Spatial Distribution of the Compliance Monitoring Results for Riparian Activities	
Professional Judgment and Non-Compliant Ratings for Riparian Activities	
Results for Road Activities	
Road Activity questions	
Spatial Distribution of the Compliance Monitoring Results for Road Activities	
Professional Judgment and Non-Compliant Ratings for Road Activities	
Conclusions	45
Opportunities for improving rule implementation	47
Future intentions	51
References	52
Appendix A – Statistical methods	53
Appendix B – Compliant and Non-compliant Definitions from the 2006-2007 Program Design Status of Compliance Professional Non-compliance Ratings	57

Appendix C – Details of stream inconsistencies with the approved FPA	61
Appendix D – Did the information on the FPA provide adequate means to evaluate the activities on the ground?	67

Figures

Figure 1. Spatial Distribution of the 2006 - 2007 Forest Practices Applications Reviewed	4
Figure 2. Distribution of Statewide Compliant Ratings for Riparian and Road Activities for the 2006 - 2007 biennium	13
Figure 3. Percent Compliant for all 2006 - 2007 Riparian Activities	16
Figure 4. Pacific Cascade and Olympic Regions Type F and Wetland Riparian Activities	21
Figure 5. Pacific Cascade and Olympic Regions Type N Riparian Activities	22
Figure 6. Northwest and South Puget Sound Regions Type F and Wetland Riparian Activities	23
Figure 7. Northwest and South Puget Sound Regions Type N Riparian Activities	24
Figure 8. Northeast and Southeast Regions Type F and Wetland Riparian Activities	25
Figure 9. Northeast and Southeast Regions Type N Riparian Activities	26
Figure 10. Non-compliant ratings for Riparian Activities Based on Professional Judgment of the Field Review Teams	27
Figure 11. Distribution of Statewide Non-Compliant Ratings for Riparian Activities	28
Figure 12. Percent Compliant for all 2006 - 2007 Road Activities	31
Figure 13. Pacific Cascade and Olympic Regions Road Construction, Maintenance, and Abandonment Activities	36
Figure 14. Pacific Cascade and Olympic Regions Landings and Type N Crossings	37
Figure 15. Northwest and South Puget Sound Regions Road Construction, Maintenance, and Abandonment Activities	38

Figure 16. Northwest and South Puget Sound Regions Landings and Type N Crossings	39
Figure 17. Northeast and Southeast Regions Road Construction, Maintenance, and Abandonment Activities	40
Figure 18. Northeast and Southeast Regions Landings and Type N Crossings	41
Figure 19. Non-compliant Ratings for Road Activities Based on Professional Judgment of the Field Review Teams	42
Figure 20. Distributions of Statewide Non-Compliant Ratings for Road Activities	43
Figure 21. Type F Stream Segments not Consistent with the Approved FPA	62
Figure 22. Type N Stream Segments not Consistent with the Approved FPA	64

Tables

Table 1.	Distribution of FPAs for the 2006-2007 Field Seasons	3
Table 2.	Compliance Results for All Statewide Activities 2006 - 2007 Biennium	12
Table 3.	Compliance Status for 2006 - 2007 Riparian Harvest Activities	15
Table 4.	Western Washington No Inner Zone Harvest Questions	17
Table 5.	Western Washington DFC Option 1 “Thinning from Below” Questions	18
Table 6.	Western Washington DFC Option 2 “Leaving Trees Closest to the Water” Questions	18
Table 7.	Statewide Wetland Questions	19
Table 8.	Eastern Washington Mixed Conifer Habitat Questions	19
Table 9.	Statewide Type N Harvest Questions	19
Table 10.	Compliance Status for 2006 - 2007 Road Activities	30
Table 11.	Statewide Road Construction Questions	32
Table 12.	Statewide Road Maintenance Questions	33
Table 13.	Statewide Road Abandonment Questions	33
Table 14.	Statewide Landing Questions	34
Table 15.	Statewide Permanent and Temporary Crossing Questions	34
Table 16.	Statewide Fords Questions	34
Table 17.	Field Review Comments Relating to the Inconsistencies with Type F Stream Segments and the Approved FPA	63
Table 18.	Field Review Comments Relating to the Inconsistencies with Type N Stream Segments and the Approved FP	65

Summary

The Compliance Monitoring Program is an important element in the Forests and Fish Report (1999) and later adopted as a requirement by the Legislature during its 2000 session. In response to this legislation, the Forest Practices Board directed the Department of Natural Resources (DNR) to implement a compliance monitoring program (WAC 222-08-160(4)).

The DNR Forest Practices Division completed a Compliance Monitoring Study Design and implemented an initial phase of its program in the spring of 2006. The results of this initial phase and the first year of field reviews are given in the 2006 Field Season Interim Report which was presented to the Forest Practices Board during its February 2007 meeting. This report can be found on the DNR website at:

http://www.dnr.wa.gov/BusinessPermits/Topics/ComplianceandEnforcement/Pages/fp_cm_program.aspx

Following submission of the Interim Report, DNR re-evaluated its protocols and Study Design using two third-party statisticians, an independent technical review, and a stakeholder comment process.

This report describes the findings of the Forest Practices Compliance Monitoring Program for the 2006/2007 Biennium. Except where stated otherwise, the results presented herein are presented with scientifically appropriate treatment of uncertainty. The results are not, however, comprehensive; we intend to build on the 2006/2007 findings in order to provide progressively more detailed analyses of compliance data with the Forest Practices Rules and associated Forest Practices Applications (FPAs).

Work during the 2006/2007 field seasons encompassed an assessment of 289 riparian and 234 road activities contained in 174 approved Forest Practices Applications (FPAs) (Fig. 1). FPAs are submitted for forest practices activities on all private and public forest land not owned by the federal government. Approved applications were reviewed by Forest Practices field foresters and were available to our sister agencies, the Washington Department of Ecology (WDOE), Washington Department of Fish and Wildlife (WDFW), Native American Tribes (Tribes), and other interested parties during the designated comment period prior to approval. The FPAs are submitted to DNR as a vehicle to convey the landowner's intent to implement a forest practice which in approximately 75percent (Linda Chiles, personal communication)¹ of the time includes timber harvesting and/or road activities. By signing the FPA the landowner acknowledges that they "understand that this proposed Forest Practice is subject to the Forest Practices Act and Rules"

http://www.dnr.wa.gov/Publications/fp_form_wwfpan.pdf Therefore, using approved applications provided the best starting point for Compliance Monitoring field reviews.²

¹ Query of the Forest Practices Application Review system Oracle database.

² The versions of FPAs selected for 2006-2007 field reviews had different wording: "I/We are familiar with the requirements of the Forest Practices Act, RCW 76.09 and Forest practices rules, WAC Title 222". Both of these statements indicate that the landowner is aware of the rules associated with the approved FPA.

Specific rules are associated with each of the forest practices FPAs and these rules define the procedures to follow in order to complete the forest practices. The rule package is extensive and prescriptive, so DNR attempted to sensibly choose the sections of the rules that best afforded direct measurement to determine compliance. Currently we measure Riparian Management Zones (RMZs) and specific leave tree requirements from WAC 222-30-021 “Western Washington Riparian Zones” and WAC 22-30-022 “Eastern Washington Riparian Zones.” However there are rule requirements that can be added every year to expand the compliance effort. For example; we may add other questions from WAC 222-30-060 “Cable yarding” for the 2009 field season if stakeholders deem this a priority.

The Study Design uses a rigorous random sampling procedure to select FPAs from those submitted for a single year. Then a typical field investigation consists of five experienced forest practice professionals making 75 repeatable measurements and numerous carefully-defined observations. The data is recorded on forms largely developed verbatim from the Forest Practices (WAC 222-24 Road Construction and Maintenance and WAC 222-30 Timber harvest) rules.

Results of the 2006/2007 Biennium are:

1. Eighty percent of all activities surveyed (419 out of 523; ± 5 percent) are in compliance.
2. Seventy-five percent of riparian activities (216 out 289; ± 7 percent) are in compliance
3. Eighty-seven percent of road activities (203 out of 234; ± 7 percent) are in compliance

Some opportunities for improving rule implementation include training in and/or clarification of the following:

1. Determining bankfull stream width using physical characteristics consistent with WAC 222-16-031 and Forest Practices Board Manual Section 2;
2. Determining the appropriate number of leave trees at intersections of streams where Riparian Management Zones overlap;
3. Assuring that applicants provide shade documentation when harvesting within 75 feet of a fish stream (Type F and S streams);
4. Identifying associated wetlands along Type F streams; and
5. Identifying and protecting Channel Migration Zones consistent with Forest Practices Board Manual Section 2.

Table 1 shows the distribution by DNR Region, landowner type and year of the FPAs selected for field review.

Table 1. Distribution of FPAs for the 2006-2007 Field Seasons

Forest Practices Applications by Region and Landowner Classification								
DNR Region	2006 field season			2007 field season			Totals	
	Small Forest Landowners	Industrial Landowners	Total	Small Forest Landowners	Industrial Landowners	Total	Grand Total	Total percent of FPAs selected
Pacific Cascade	13	36	49	8	26	34	83	48%
Olympic	1	9	10	0	11	12	22	12%
South Puget Sound	6	5	11	1	9	10	21	12%
Northwest	1	4	5	1	4	5	10	6%
Southeast	2	5	7	0	4	4	11	6%
Northeast	9	6	15	2	11	13	28	16%
Totals	32	65	97	12	65	78	175	100%

Spatial distribution of these FPAs by Small Forest and Industrial Landowners is displayed on Figure 1. FPAs submitted from 2001 to 2007 as background. There is usually more than one activity associated with each FPA and spatial information on riparian and road rule activities are shown in the Results section of this summary report.

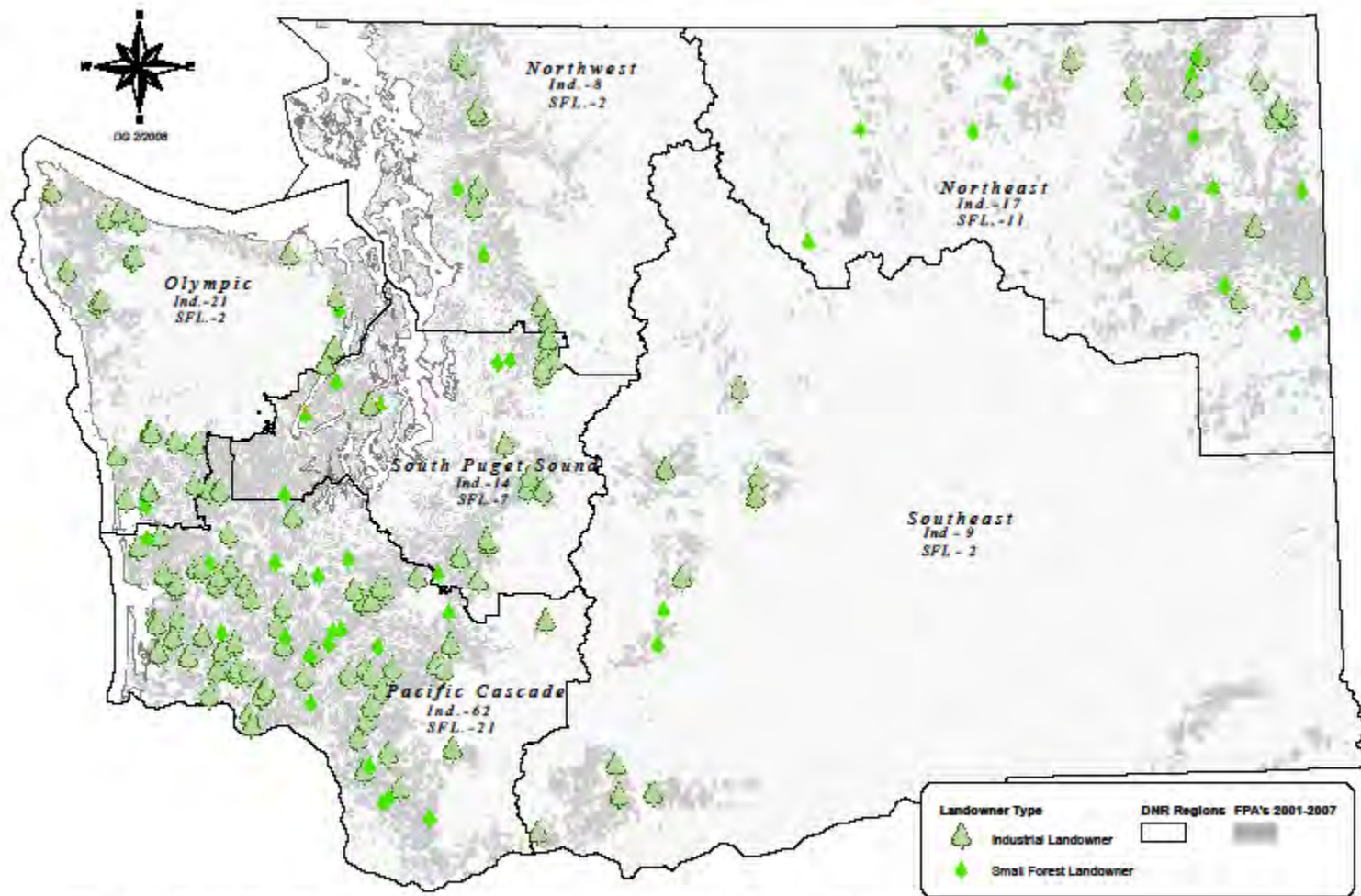


Figure 1. Spatial Distribution of the 2006-2007 Forest Practices Applications Reviewed

Introduction

The initial Compliance Monitoring Program Study Design (Study Design) found on the DNR website at

http://www.dnr.wa.gov/BusinessPermits/Topics/ComplianceandEnforcement/Pages/fp_cm_program.aspx was developed, and reviewed by Timber Fish and Wildlife (TFW) stakeholders (WAC 222-12-045 (2) (b) (ii))³ in May 2006. The Washington Legislature appropriated proviso funds for DNR to conduct Compliance Monitoring in the 2006/2007 Biennium, and provided pass-through funding for the WDOE and WDFW so these agencies can participate in this effort. Affected tribes provided their own funding to participate. Seventy-three participants were trained and field reviews were performed from May to November of 2006. In 2007, refinements were incorporated into the Study Design in response to comments on the *Compliance Monitoring, 2006 Field Season Interim Report* (Interim Report) (reference location as above). A second round of field reviews commenced in March 2007

In May 2007, the Forest Practices Board directed the Forest Practices Adaptive Management Program Manager to oversee an independent technical review of the Study Design. Details of this review were presented to the Forest Practices Board in February 2008. As a recommendation of the review, DNR has contracted with a statistician to write the sampling and statistical methods for the Study Design and to provide the proper level of statistical representation of results presented in this report. Recommendations regarding the Study Design have been submitted and DNR intends to work collaboratively with WDOE, WDFW, and other stakeholders to further adjust and refine the program in response to the review.

Most technical background information is contained in the Study Design and in the Specifications and Guidelines,

http://www.dnr.wa.gov/BusinessPermits/Topics/ComplianceandEnforcement/Pages/fp_cm_program.aspx, but the following topics are provided for clarity:

³ Stakeholder groups include the Washington Department of Fish and Wildlife, the Washington Department of Ecology, the Washington Forest Protection Association, the Washington Farm Forestry Association, United States Fish and Wildlife, the Association of Counties, the Conservation Caucus, and the Northwest Indian Fisheries Commission,

Program Design Elements

What is an “activity”?

In the context of Compliance Monitoring, an activity is a forest management option included in an FPA and analyzed under the Study Design and field protocols. For 2006/2007, activities include riparian harvest options selected on Type F and S streams (fish bearing streams), Type Np (non-fish bearing perennial streams), Type Ns (non-fish bearing seasonal streams), and wetlands.

Road work needed for harvesting such as construction, abandonment, landings, and all N stream crossings are other FP rules that apply, but are evaluated with a more qualitative approach. Maintenance activities were no longer included on an FPA after 2006, so maintenance questions and forms were not addressed unless the FPA was a renewal of an older application. Crossings on all Type F waters are regulated by WDFW and are not examined as part of the Forest Practices compliance monitoring. In 2006, we included a few subjective questions from the rules such as, “Was sediment delivery minimized?” The field teams determined that these questions could not be answered definitively, so we did not include these subjective questions in the 2007 field season.

A mandatory statewide program requires all forest landowners to submit Road Maintenance and Abandonment Plans (RMAP)⁴ with specific reporting elements to the Regional RMAP specialists. However, small forest landowners and large industrial landowners have different reporting requirements, work schedules, and annual reporting of accomplishments. The Compliance Monitoring Program does not assess the obligations for RMAP reporting because this is beyond the scope of the program.

Habitat Conservation Plans (HCPs) plans do not have specific provisions for conducting road activities; therefore, DNR reviews road activities on FPAs with HCPs. The U. S. Fish and Wildlife Service carries out compliance for riparian activities on applications under approved HCPs.

Sampling and field protocols

Numerous activities are generally included in a single FPA. Our protocols state that we will conduct field reviews on one of every type of riparian activity on an approved FPA. For example, if an FPA has three “No Inner Zone Harvest” stream segments and two “Desired Future Condition Option 1” stream segments, we will review one of each of these riparian activities on the FPA. This is called cluster sampling and we will report the compliance on

⁴ Maintenance activities are addressed only on versions of FPAs used for the 2006 field season. After 2006, all forest roads will address maintenance through the RMAP requirements, so compliance for maintenance only occurred during the 2006 field season.

the individual rule activities associated with the FPA. FPA compliance will not be reported. Road activities described in the FPA are also reviewed.

All Compliance Monitoring decisions are made **in the field** with all participants. Defined protocols are essential to maintaining consistency in gathering field data necessary to assess the status of compliance for each activity. After measurements and observations are recorded for each activity, field forms containing questions derived directly from WAC 222-30 Timber Harvest (riparian) and WAC 222-24 Road Construction are completed. Field Forms, Field Note Templates, and Standards and Guidelines can be found at http://www.dnr.wa.gov/BusinessPermits/Topics/ComplianceandEnforcement/Pages/fp_cm_program.aspx

Compliant or non-compliant decisions

The activities on each FPA are reviewed with no special considerations for landowner type, Region, or other circumstances. The answers to the form questions along with the field observations and measurements are used to determine if the activity is compliant or non-compliant with the rules within the approved application.

Activities are classified as compliant or non-compliant in the field. If consensus exists among the field review team that a compliant activity meets certain criteria⁵, that activity may be determined to 'Exceed' the standards established in the approved FPA and associated rules, and such determinations are shown on Figure 10 Distribution of Statewide Compliant Ratings for Riparian and Road Activities. Exceeds determinations are included in the compliant category for reporting purposes.

Landowner types

Results are given separately for Small Forest Landowners and Industrial Landowners in response to stakeholders' requests, but it is important to note that estimates of statewide compliance for these categories are less precise, given the limited sample size. When FPAs are selected they are landowner blind. The Program Design will allow data analyses with greater certainty as additional information is collected.

Rule groups not reported for this summary report

The 2006/2007 Compliance Monitoring Program addresses the two rule groups that encompass a preponderance of all possible forest practice activities which are WAC 222-24 Road Construction and Maintenance and WAC 222-30 Timber Harvesting. However, activities that occur rarely cannot be included in a random sample set because of the very

⁵ Criteria in Standards and Guidelines include twice as many leave trees in RMZs as required or RMZs that are 20% greater than required.

limited conclusions that can be drawn from that data. Some other rules groups such as Conversions (WAC 222-16-060), Aerial Sprays (WAC 222-38), and Cultural Resources definitions in WAC 222-16, are not covered because these require third party expertise and/or defy quantitative measurement requirements for Compliance Monitoring. Other activities that may be evaluated in subsequent years include Class II Applications (WAC 222-16-050 (3)) and Unstable Slopes (WAC 222-16-050 (d) (i)). A Cooperative Monitoring, Evaluation, and Research Committee (CMER) study of Unstable Slope Accuracy and Bias is currently proposed by the Upland Scientific Advisory Group. That particular CMER study may be helpful in answering questions to direct Compliance Monitoring to investigate methods for field reviews on unstable slopes in the future.

Small Forest Landowners have the option of using a “20-Acre Exempt” rule (WAC 222-30-023), and all landowners can use an “Alternate Plan” (WAC 222-12-0401) but these rules are applied in about 1.5 percent of all FPAs. Compliance Monitoring is currently conducting on-going field reviews for these rules and data will be reported in the 2008/2009 biennium report.

Misuse of compliance monitoring data

The Compliance Monitoring Program data are unsuitable for use in effectiveness monitoring or direct water quality monitoring. However, CMER may use Compliance Monitoring results as a starting point for effectiveness monitoring projects if based on the assumption that the rules are being implemented as intended. This would only work in areas that have baseline data in place. The sample sets are currently too small for stratification by DNR Regions or landowner group. DNR may include analysis of regional compliance when data are sufficient to allow for this stratification.

Compliance Monitoring is not an enforcement program. Data on non-compliant activities are available to DNR Regions because FPFs are part of the review teams. Finally, this project is solely a product of DNR and is not a CMER project.

Stream typing for riparian activities

Stream type is a fundamental aspect of determining which rules apply to any given FPA when riparian protection strategies are employed and cannot be determined without a protocol [fish] survey or measurement of stream physical characteristics as defined in WAC 222-16-031. Physical characteristics rely on bankfull width (BFW) and stream gradient. Instances exist where stream typing based on physical characteristics is questioned and not resolved with all the reviewers on a review team. There are issues of inter-agency and intra-agency inconsistency in identification of these measurements. A simple difference of six inches on either side of a stream on every measurement to determine stream width can be the difference in a determination of a fish or non fish bearing stream when fish were not visually observed.

Stream typing is assumed to have been reviewed by multiple agencies and other interested parties before the application is approved. Stream typing on FPAs is indeed a point of high interest for interest groups in Compliance Monitoring. DNR has created a separate field form to gather data on stream discrepancies with the approved FPA for the 2008/2009 biennium field reviews. The “Supplemental Stream Evaluation Form” will allow us to gather information on most of the possible scenarios encountered in the field. See Appendix B for further information on stream segments that were inconsistent with the FPA.

The Compliance Monitoring Study Design does not incorporate stream-typing as an element of compliance. Four out five of the Technical Review responses to the question “Should Compliance Monitoring focus efforts on verifying water types before proceeding to prescription compliance surveys?” were “no”. Suggestions from the reviewers pointed to the need for determining the magnitude of the stream typing issue. Some reviewers suggested a separate but related project be established (by which agency is undetermined) to address this issue.

Results

These results provide a response to the question posed in WAC 222-08-160(4), “Are forest practices being conducted in compliance with the rules?” To examine this question, we evaluated only approved Forest Practices Applications. Data compiled from Forest Practices Application Reviews System (FPARS) shows that 78 percent of FPAs submitted from 2002 to 2007 included road and /or riparian activities.. (Linda Chiles, personal analysis). Our field reviews results estimate that 75 percent of Riparian and 87 percent of Road activities are currently in compliance with the rules.

Table 2 displays the statewide compliance results for riparian and road activities for the combined 2006 and 2007 field seasons. Confidence intervals⁶ (CI), expressed as lower and upper limits (percentages), are displayed for each compliance estimate in Table 2. Methods used to estimate confidence intervals are described in Appendix A. (See Appendix B for the working definitions for compliant and non-compliant status that were included in the Program Design for the 2006-2007 Biennium.

⁶ A 95% confidence interval is a range of values that would contain the true population proportion 95% of the time, if repeated sampling of the population were performed. A smaller range indicates an estimate that is more precise.

Table 2. Compliance Results for All Statewide Activities 2006 - 2007 Biennium

Statewide All Activities 2006/2007 Biennium				
	Status of Compliance	Riparian	Road	Totals
Small Forest Land-owners	Compliant	50	50	100
	Non-compliant	17	7	24
	Percent Compliant	75%	88%	81%
	95% CI	(63, 86)	(77, 100)	(72, 89)
	Activity Totals	67	57	124
Industrial Land-owners	Compliant	166	153	319
	Non-compliant	56	24	80
	Percent Compliant	75%	86%	80%
	95% CI	(68, 81)	(80, 93)	(75, 85)
	Activity Totals	222	177	399
All Land-owner Types	Compliant	216	203	419
	Non-compliant	73	31	104
	Percent Compliant	75%	87%	80%
	95% CI	(69, 80)	(81, 92)	(76, 84)
	Grand Totals	289	234	523

Figure 2 (on following page) shows the distribution of all compliance results for both 2006 and 2007 riparian and road activities statewide. Landowners wanted DNR to at least acknowledge that at times the riparian and road activities have been executed beyond the requirements of the rules on their FPA. The “star” symbol depicts an “exceeds” designation within the compliant group of activities. This shows that the field teams designated these activities as exceeding the requirements for their activities. Even though there were no definitive criteria for exceeds in 2006, the teams generally agreed. In 2007, we developed prescriptive guidelines to arrive at an “exceeds” designation. (See Appendix B) It is important to recognize that for reporting purposes, exceeds and compliant are combined.

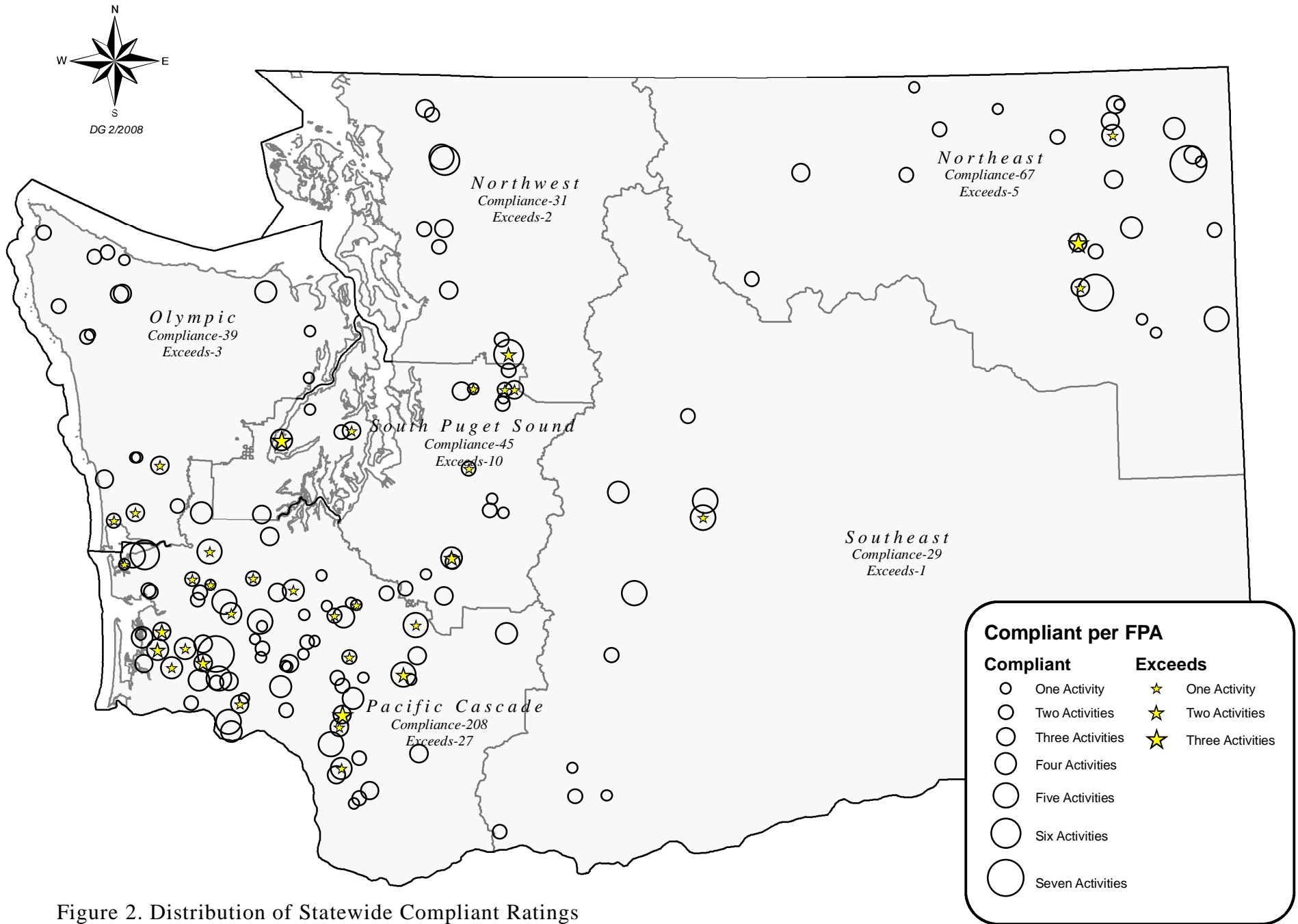


Figure 2. Distribution of Statewide Compliant Ratings For Riparian and Road Activities for 2006/2007 Biennium.

Results for riparian activities

The following riparian activities were reviewed for Compliance Monitoring:

Western Washington

No Inner Zone Harvest
DFC Option 1-Thinning from Below
DFC Option 2- Leaving Trees
Closest to the Water
Type N Streams

Eastern Washington

Ponderosa Pine Habitat Type
Mixed Conifer Habitat Type
High Elevation Habitat Type⁷
Type N Streams

Statewide

Wetlands

Table 3 shows the statewide compliance status of the riparian activities for Type F (fish-bearing streams), Type N (non fish bearing streams, both perennial and seasonal), and wetlands. Each activity option has a unique set of harvest requirements and requires use of a corresponding set of protocols and questions to determine compliance status. Requirements for Type N streams can be different for Eastern and Western Washington, but we do not separate these results herein. Wetland rules are consistent across the state. Small Forest Landowners and Industrial Landowners requested that DNR show results for their respective landowner status.

⁷ No 'High Elevation Habitat Type' riparian activities were actually field reviewed as none were submitted in Eastern Washington. It appears that many of these areas are on lands owned by the U.S. Forest Service or covered by HCPs.

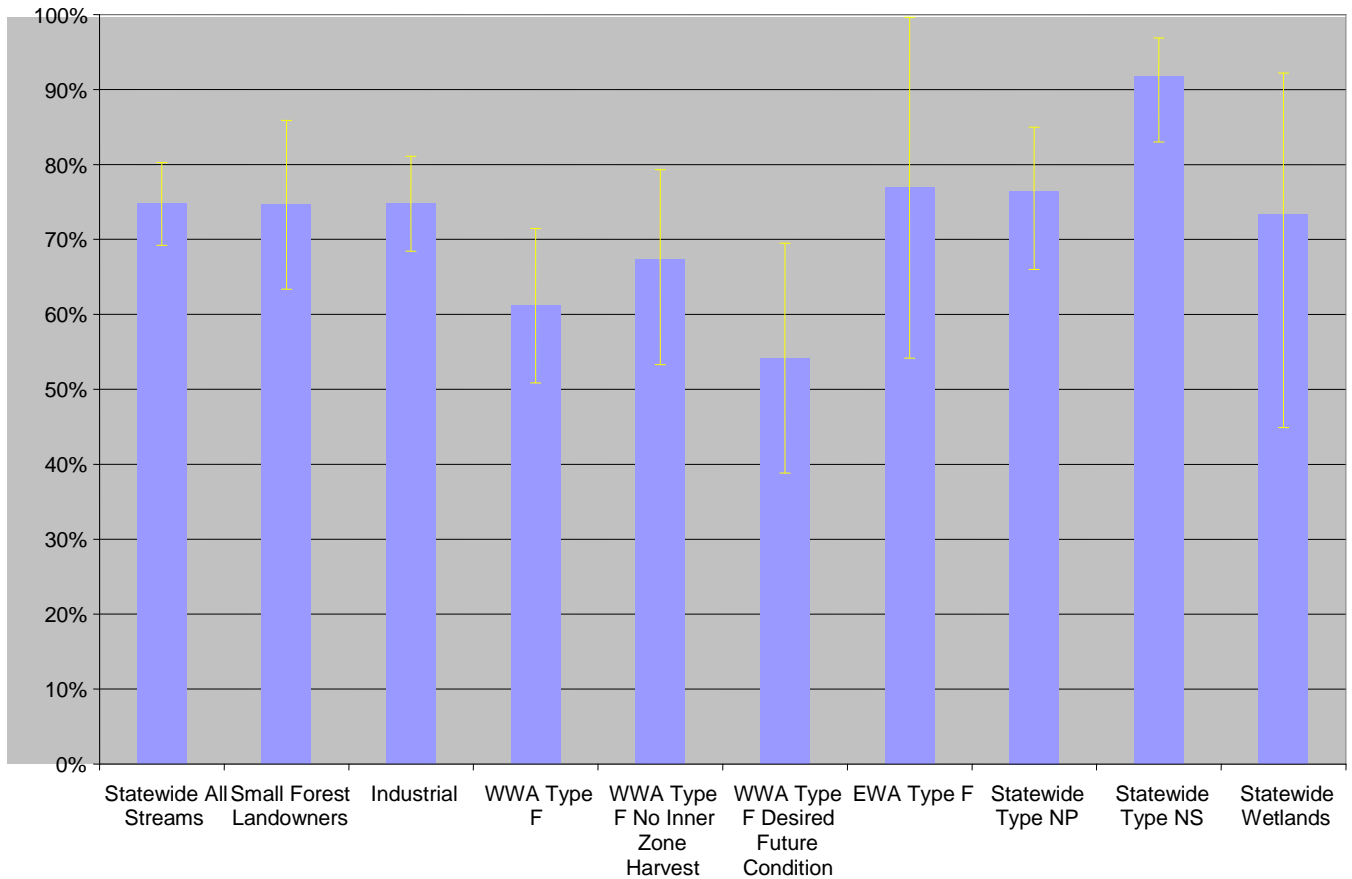
Table 3. Compliance Status for 2006 - 2007 Riparian Harvest Activities

Eastern and Western Washington Riparian Activities 2006/2007 biennium										
Landowner Type	Status of Compliance	Statewide Type F Activities					Statewide Type N		Statewide	
		Western WA			Eastern WA				Wetlands	
		No Inner Zone Harvest	DFC Option 1	DFC Option 2	Ponderosa Pine	Mixed Conifer	Type Ns	Type Np		Totals
	Compliant	8	0	2	1	3	21	11	4	50
Small Forest Landowners	Non-compliant	5	1	2	0	1	3	3	2	17
	Percent Compliant	62%	0%	50%	100%	75%	88%	79%	67%	75%
	95% Confidence Interval	(32, 86)	na	(7, 93)	n/a	(19, 99)	(68, 97)	(49, 95)	(22, 96)	(63, 86)
	Activity Totals	13	1	4	1	4	24	14	6	67
Industrial Landowners	Compliant	29	3	21	3	3	46	54	7	166
	Non-compliant	13	10	9	0	2	3	17	2	56
	Percent Compliant	69%	23%	70%	100%	60%	94%	76%	78%	75%
	95% Confidence Interval	(53, 82)	(5, 54)	(51, 85)	n/a	(15, 95)	(83, 99)	(64, 85)	(40, 97)	(68, 81)
	Activity Totals	42	13	30	3	5	49	71	9	222
All Landowners	Compliant	37	3	23	4	6	67	65	11	216
	Non-compliant	18	11	11	0	3	6	20	4	73
	Percent Compliant	67.00%	21%	68%	100%	67%	92%	76%	73%	75%
	95% Confidence Interval	(53, 79)	(5, 51)	(49, 83)	n/a	(30, 93)	(83, 97)	(66, 85)	(45, 92)	(69, 80)
	Grand Totals	55	14	34	4	9	73	85	15	289

Note: n/a indicates that confidence intervals could not be estimated due to sample size.

Figure 3 displays compliance percentages for Riparian activities for grouped categories. Statewide, Small Forest landowner and Industrial Landowners show that the overall compliance is fairly consistent for these groups. All Western Washington Type F and S Riparian activities were then grouped by the “No Inner Zone Harvest” and “Desired Future Condition” activities to show the difference in the compliance as compared to the total “F” or fish bearing stream compliance. The error bars displayed in Figure 2 reflect the lower and upper limits of a 95 percent confidence interval. Methods for estimating these intervals are described in Appendix A-Statistics.

Figure 3. Percent Compliant for all 2006/2007 Riparian Activities. The yellow bars show the lower and upper limits of a 95 percent confidence interval.



Riparian activity questions

Field forms were developed for each riparian activity and contain questions predominantly derived from WAC 222-30-021 and 022. Some questions (Tables 5 and 6) pertain to the specific requirements of the Desired Future Condition (DFC) worksheet results that

accompany those particular harvest options. Field forms can be reviewed at http://www.dnr.wa.gov/BusinessPermits/Topics/ComplianceandEnforcement/Pages/fp_cm_program

Answers to the form questions along with the field observations and measurements are used to determine the status of compliance. All Compliance Monitoring decisions are made in the field with all participants. Some questions from 2006 were deleted and are so noted in these tables.

A negative response may not indicate non-compliant results. We have found that questions such as “Was there a Channel Migration Zone (CMZ) not reported on the FPA?” may not always indicate a non-compliant result. Conditions on the ground after flooding, or beaver activity, or windthrow may alter conditions present when harvesting.

Tables 4 through 9 include the specific questions from the Field Forms that indicated non-compliant responses questions. Some questions did not elicit a non-compliant determination on that activity if it was a stream typing issue. Stream size and Channel Migration Zones may or may not have affected the RMZ widths ⁸

Table 4. Western Washington No Inner Zone Harvest Questions.

Questions	Number of times the question could have an effect on non-compliance
Was there a CMZ not reported on FPA?	3
Was the stream size reported on the FPA consistent with the field observation?	5
Was there harvest in the Core Zone?	2
Did stream size change Inner Zone width?	1
Did the stream discrepancy (width) influence the Inner Zone buffer width?	2
Were 20 conifer trees per acre ≥ 12 " diameter at breast height (dbh) or next size available left in the Outer Zone?	4
Was there harvest in the Inner Zone?	18

⁸ Stream size and stream length for Type F streams can indicate non-compliant activities. Refer to the section “Stream Typing for Riparian Activities” on page 14 and Appendix B

Table 5. Western Washington DFC Option 1 “Thinning from Below” Questions.

Questions	Number of times the question could have an effect on non-compliance
Was the stream length reported on the FPA’s DFC worksheet within 10% of the measured value in the field?	6
Was there harvest in the Core Zone?	3
Was there harvest in the Inner Zone of any trees larger than the thinning strategy allows?	4
Was there a CMZ not reported on the FPA?	1
Were 20 conifer trees per acre \geq 12 inches dbh or next size available (Outer Zone)?	6
If conifer wasn't present, are trees clumped around sensitive features and at least 8 inches dbh, mixed conifer and/or deciduous, and representative of the trees around the sensitive feature?	3

Table 6. Western Washington DFC Option 2 “Leaving Trees Closest to the Water” Questions.

Questions	Number of times the question could have an effect on non-compliance
Was the stream length reported on the FPA’s DFC worksheet within 10% of the measured value in the field?	6
Was the stream size on FPA consistent with field observations? And if no see next question	3
Did the discrepancy influence the Inner Zone width?	3
Was there harvest in the Core Zone? (yes)	1
Was there any harvest in the Floor Zone?	4
Were 20 conifer trees per acre \geq 12 inches dbh or next size available in the Outer Zone?	2
If conifer wasn't present, are trees clumped around sensitive features and at least 8 inches dbh, mixed conifer and/or deciduous, and representative of the trees around the sensitive feature?	1

Table 7. Statewide Wetland questions.

Questions	Number of times the question could have an effect on non-compliance
Were wetlands typed and sized appropriately on the ground?	1
When WMZs overlap and RMZ, was the requirement that best protects the resource applied?	1

Table 8. Eastern Washington Mixed Conifer Habitat Type Questions

Questions	Number of times the question could have an effect on non-compliance
Was there harvest within the 75-foot bull trout overlay buffer?"	2
Was the stream size reported on the FPA consistent with the field observation?	1

Table 9. Statewide Type N Harvest Questions

Questions	Number of times the question could have an effect on non-compliance
If greater than 10% of soil is exposed (in the ELZ), were mitigation conditions employed and completed?	4
Was all harvest greater than 56 feet from the uppermost extent of Np water or the confluence of two Np streams?	9
Was the reported stream length within 10% of that measured in the field?	8
Was all harvest away from seeps and springs?	4
Was all harvest away from alluvial fans?	1
Was the appropriate length of 50 ft no harvest buffer left on the stream?	10
For no harvest within RMZ, were any trees cut in this area?	6
Is the stream consistent with the type reported on the FPA?	10
* Other reason: Operator skidded downstream channel and left slash in channel	1

Spatial distribution of the compliance monitoring results for riparian activities

Figures 4 through 9 show the spatial distributions of the sampled FPAs and compliance status for the various riparian activities. Representation and clarity of the information are improved by grouping the regions in pairs geographically: Olympic and Pacific Cascade, Northwest and South Puget Sound, and Northeast and Southeast. The legends are self explanatory; however, when there are multiple layered symbols this indicates that there were multiple activities on one FPA. Due to scale and complexity, once in a while it may mistakenly appear that multiple FPAs are in the same location.

Note that while DNR Regions are shown in these figures, the sample size is too small to make comparisons of Region performance or other geographic stratification. Data does not support conclusions regarding differences in compliance among DNR regions due to high variance. We may be able to present this data when sample sizes increase per region to be able to achieve tighter confidence intervals.

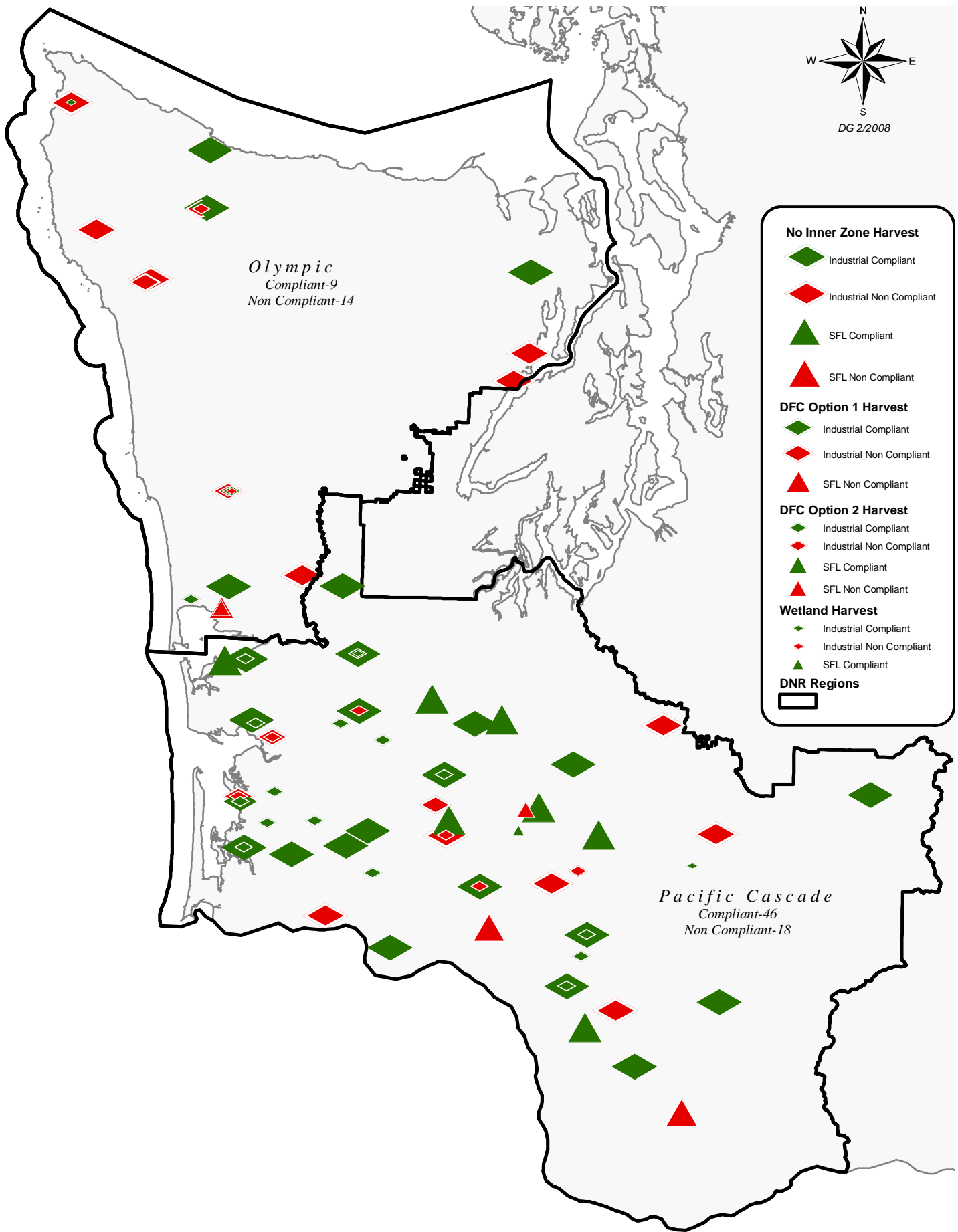


Figure 4. Pacific Cascade and Olympic Regions Type F and Wetland Riparian Activities

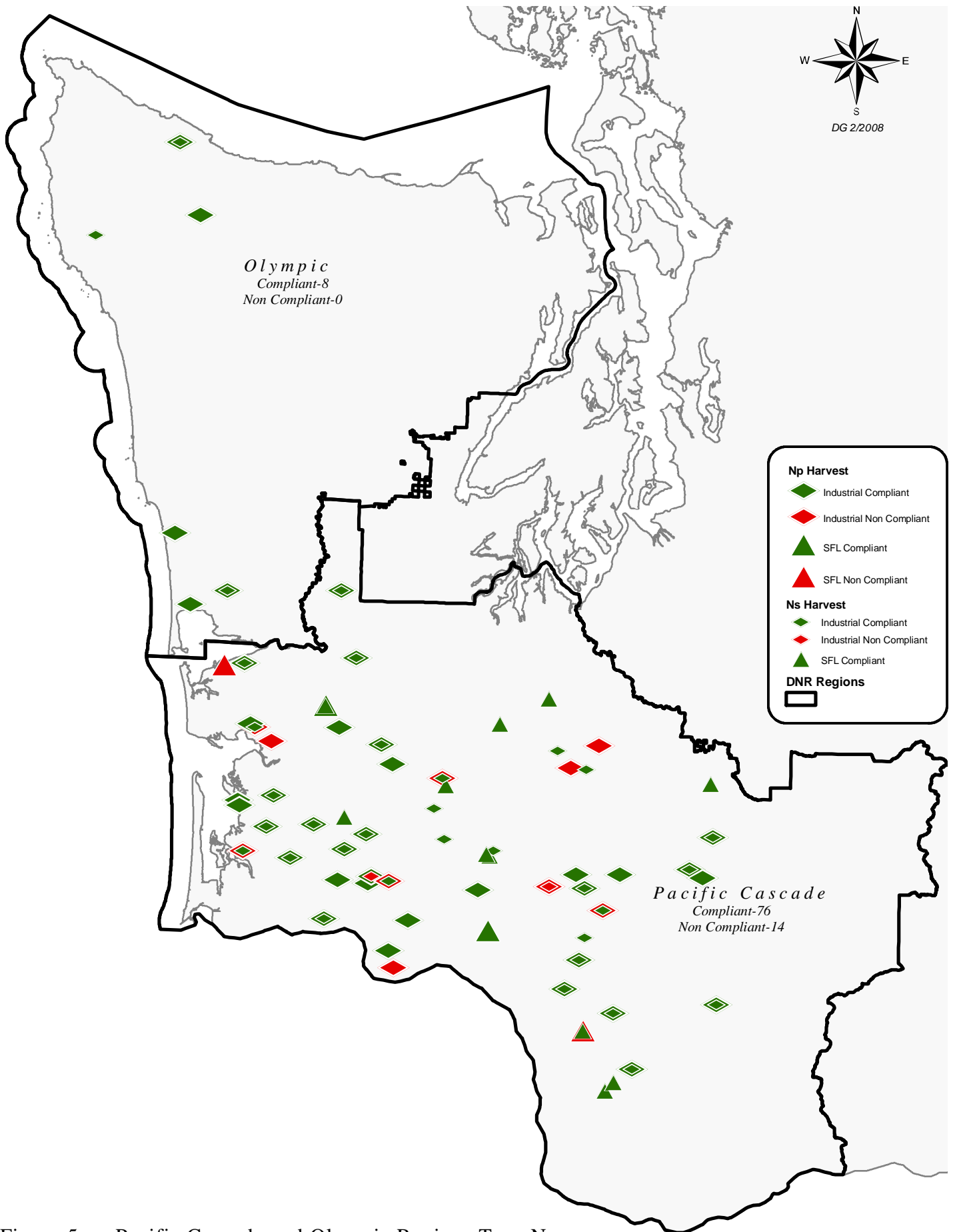


Figure 5. Pacific Cascade and Olympic Regions Type N Riparian Activities

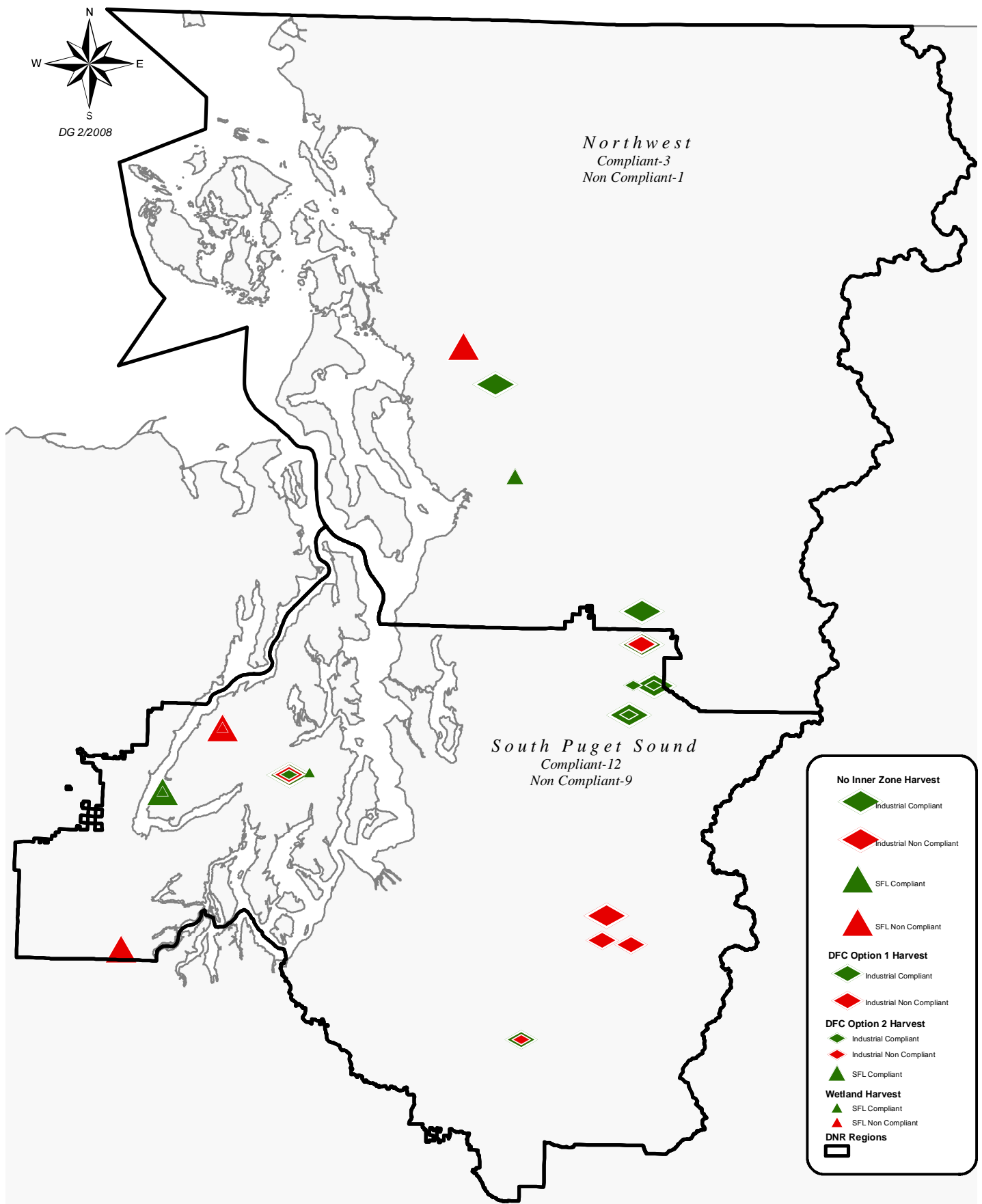


Figure 6. Northwest and South Puget Sound Regions Type F and Wetland Riparian Activities

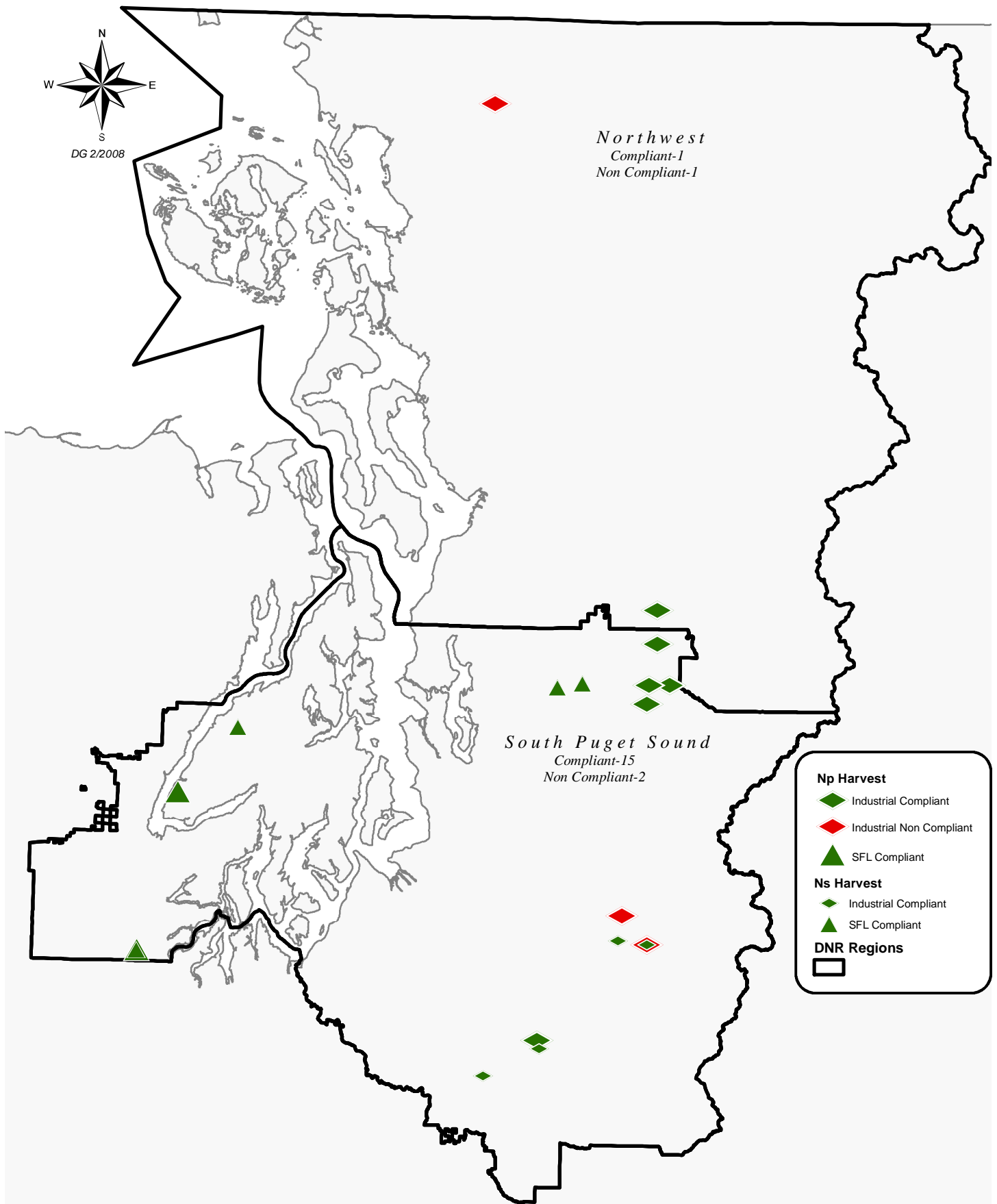


Figure 7. Northwest and South Puget Sound Regions Type N Riparian Activities

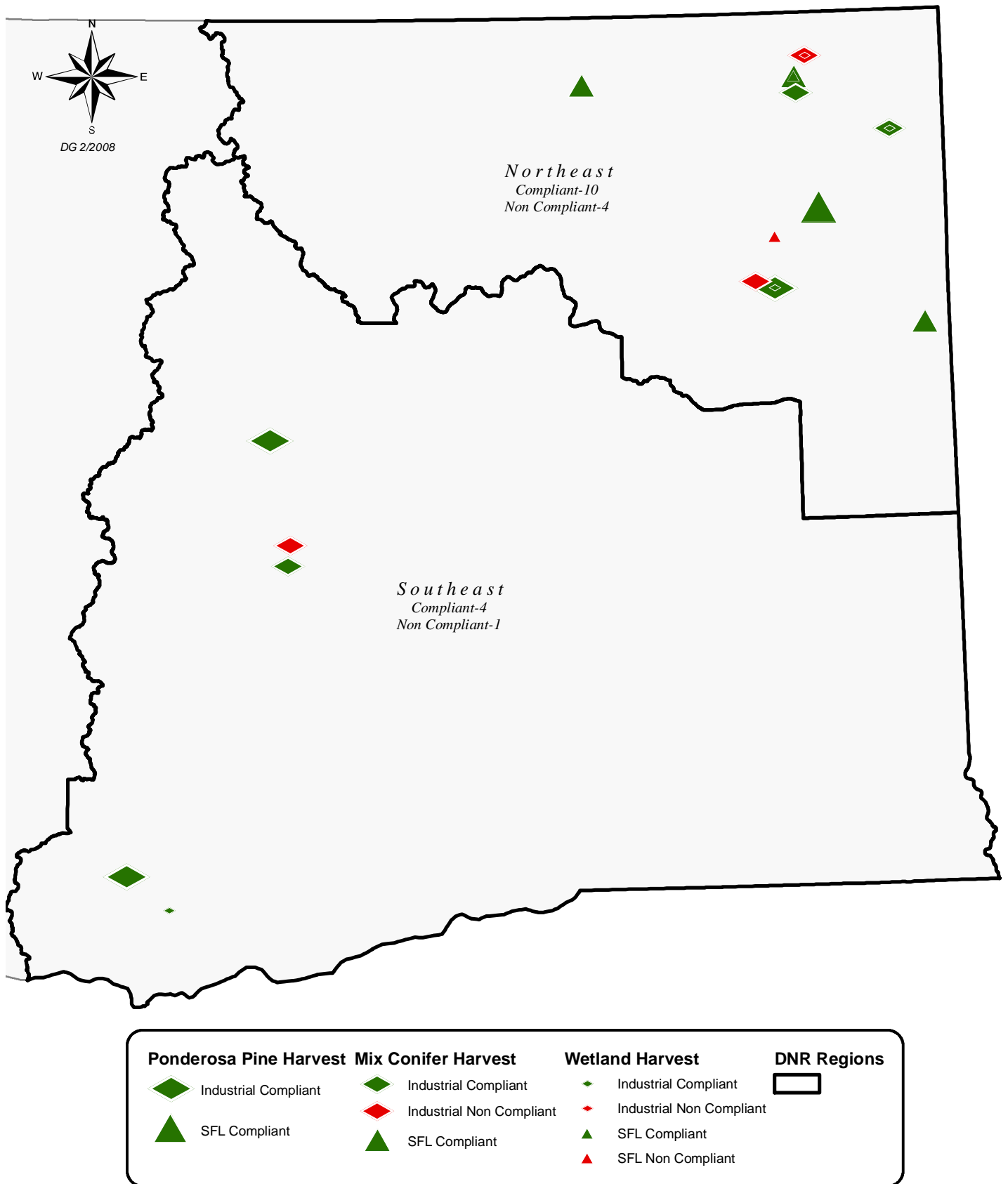


Figure 8. Northeast and Southeast Regions Type F and Wetland Riparian Activities.

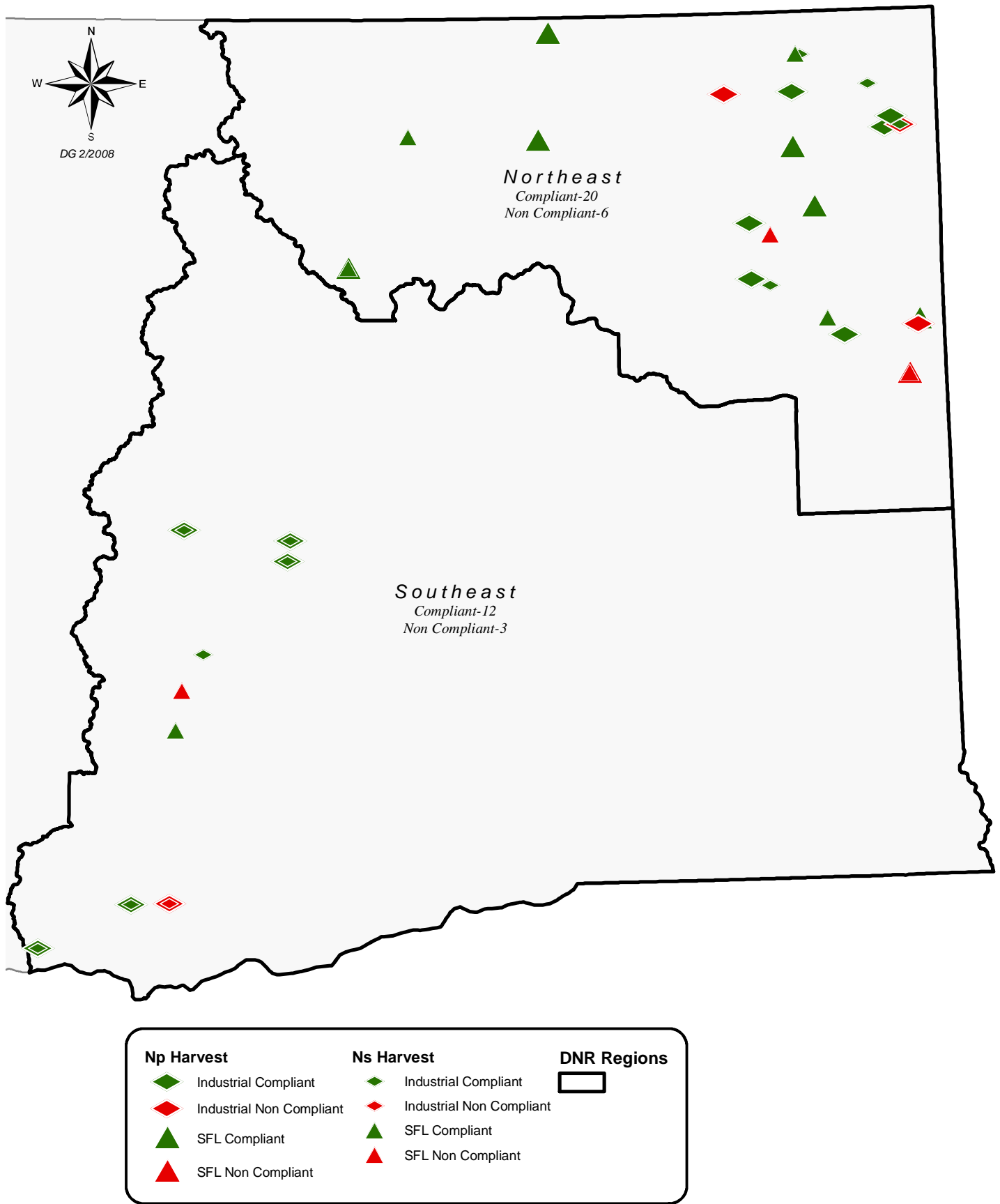


Figure 9. Northeast and Southeast Regions Type N Riparian Activities

Professional judgment and non-compliant ratings for riparian activities

It is beyond the scope of this program to quantify resource damage. In a qualitative sense, however, not all infractions of the Forest Practices rules have the same effect on public resources. For instance, cutting half the trees in the Core Zone of a RMZ usually causes significantly more environmental damage than removing one tree from an Outer Zone. The field teams were able to generate consensus qualitative non-compliance ratings for a majority of all activities in the sample set. It is important to note that these qualitative non-compliance ratings have limited statistical application as to the level of analysis that can be performed on these qualitative data. These ratings should not be used to excuse Forest Practices activities that violate the rules or the terms of the approved application.

Although the process was qualitative, these ratings suggest that professional judgment calls of a “major” non-compliant level are not common. Figure 10 shows the number of riparian activities in each of the non-compliant rating categories. There were 73 non-compliant riparian activities out of 289 riparian activities reviewed.

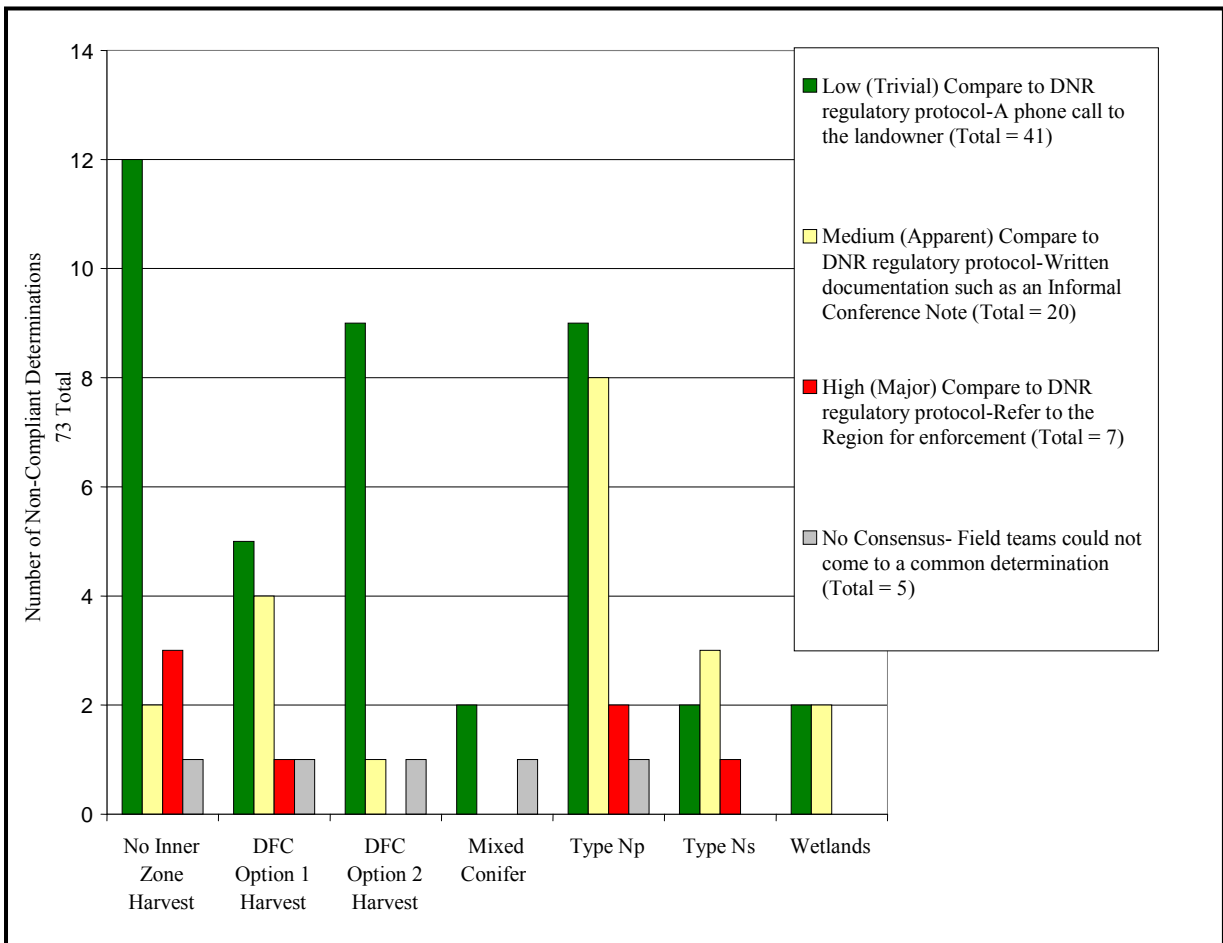


Figure 10. Non-compliant ratings for Riparian Activities Based on Professional Judgment of the Field Review Teams

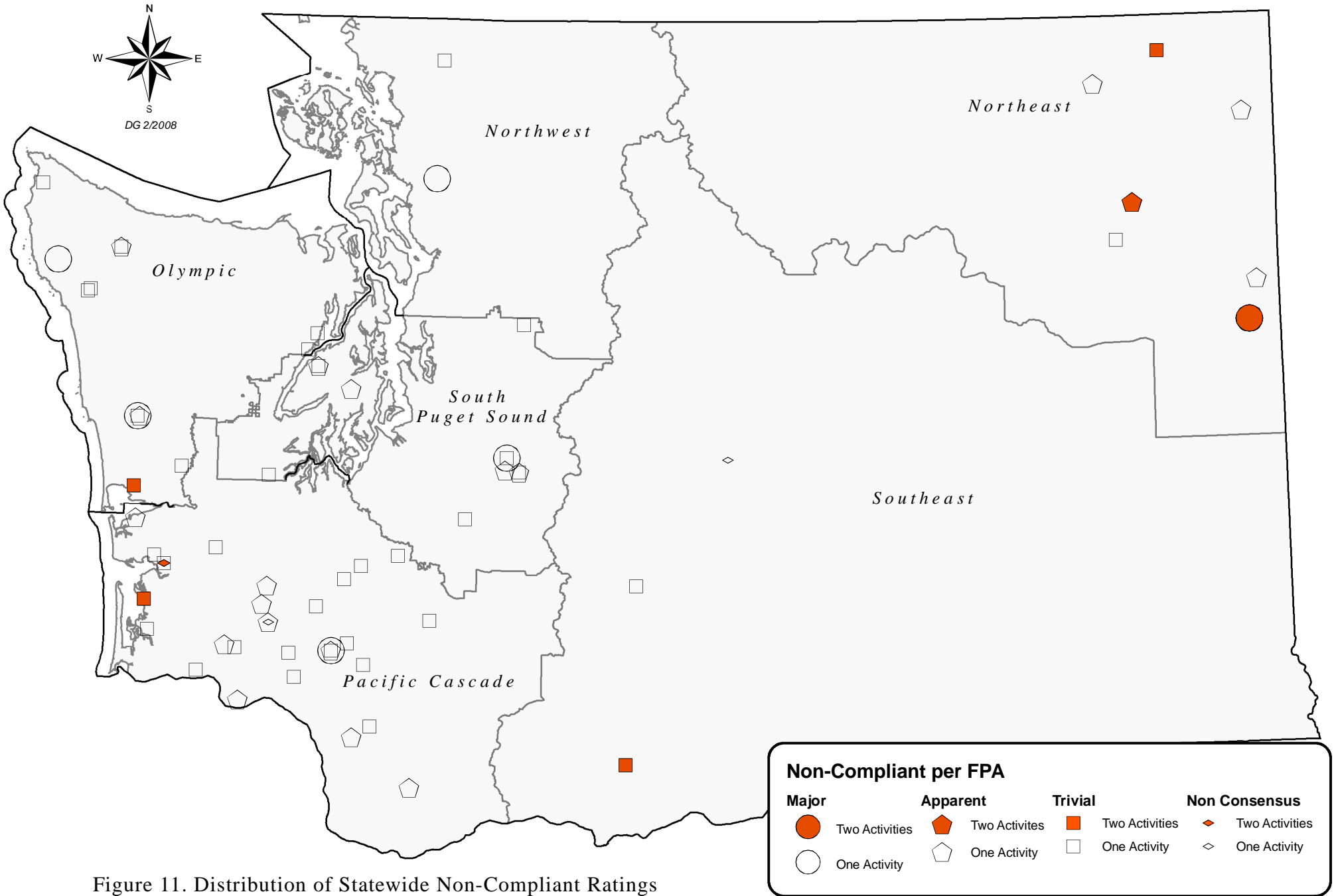


Figure 11. Distribution of Statewide Non-Compliant Ratings For Riparian Activities

Figure 11 (on previous page) shows the statewide distribution of the information in Figure 10. If an FPA had two non-compliant activities the symbol is red, one would be clear. There were no FPAs with more than two non-compliant riparian activities

Results for road activities

Road activities consist of road construction, maintenance, landings, abandonment, and Type N stream crossings including fords that are identified on the approved FPA. Maintenance was not included on FPAs for the 2007 sample set of FPAs as Road Maintenance and Abandonment Plans were required and this activity is now an element of those plans. Each of these activities requires a unique set of rules with corresponding sets of protocols to determine compliance. The Compliance Monitoring Program reviews crossings on Type N streams only. Each activity has a corresponding field form with a unique set of questions from WAC 222-24 defining the requirements for these activities.

Table 10 displays the statewide compliance results for road activities for the combined 2006 and 2007 field seasons. Confidence intervals⁹ (CI), expressed as lower and upper limits (percentages), are displayed for each compliance estimate in the table. Methods used to estimate confidence intervals are described in Appendix A. (See Appendix B for the working definitions for compliant and non-compliant status.)

⁹ A 95% confidence interval is a range of values that would contain the true population proportion 95% of the time, if repeated sampling of the population were performed. A smaller range indicates an estimate that is more precise.

Table 10. Compliance Status for 2006 - 2007 Road Activities

Statewide Road Activities 2006/2007 Biennium								
	Status of Compliance	Road Construction	Road Maintenance	Road Abandonment	Landings	Permanent and Temporary Crossings N Waters	Fords	Totals
Small Forest Land-owners	Compliant	12	8	6	22	2	0	50
	Non-Compliant	1	2	1	2	0	1	7
	Percent Compliant	92%	80%	86%	92%	100%	0%	88%
	95% Confidence Interval	(64, 100)	(44, 97)	(42, 100)	(73, 99)	n/a	n/a	(77, 100)
	Activity Totals	13	10	7	24	2	1	57
Industrial Land-owners	Compliant	51	9	18	52	23	0	153
	Non-Compliant	10	3	1	2	8	0	24
	Percent Compliant	84%	75%	95%	96%	74%	n/a	86%
	95% Confidence Interval	(72, 92)	(43, 95)	(74, 100)	(87, 100)	(55, 88)	n/a	(80, 93)
	Activity Totals	61	12	19	54	31	0	177
All Land-owner Types	Compliant	63	17	24	74	25	0	203
	Non-Compliant	11	5	2	4	8	1	31
	Percent Compliant	85%	77%	92%	95%	76%	0%	87%
	95% Confidence Interval	(75, 92)	(55, 92)	(75, 99)	(87, 99)	(58, 89)	n/a	(81, 92)
	Grand Totals	74	22	26	78	33	1	234

Note: n/a indicates that confidence intervals could not be estimated due to sample size.

Figure 12 displays compliance percentages for Road activities for grouped activities to see the results from a different perspective. The error bars in the figure reflect the lower and upper limits of a 95% confidence interval. Methods for determining these intervals are described in Appendix A- Statistics.

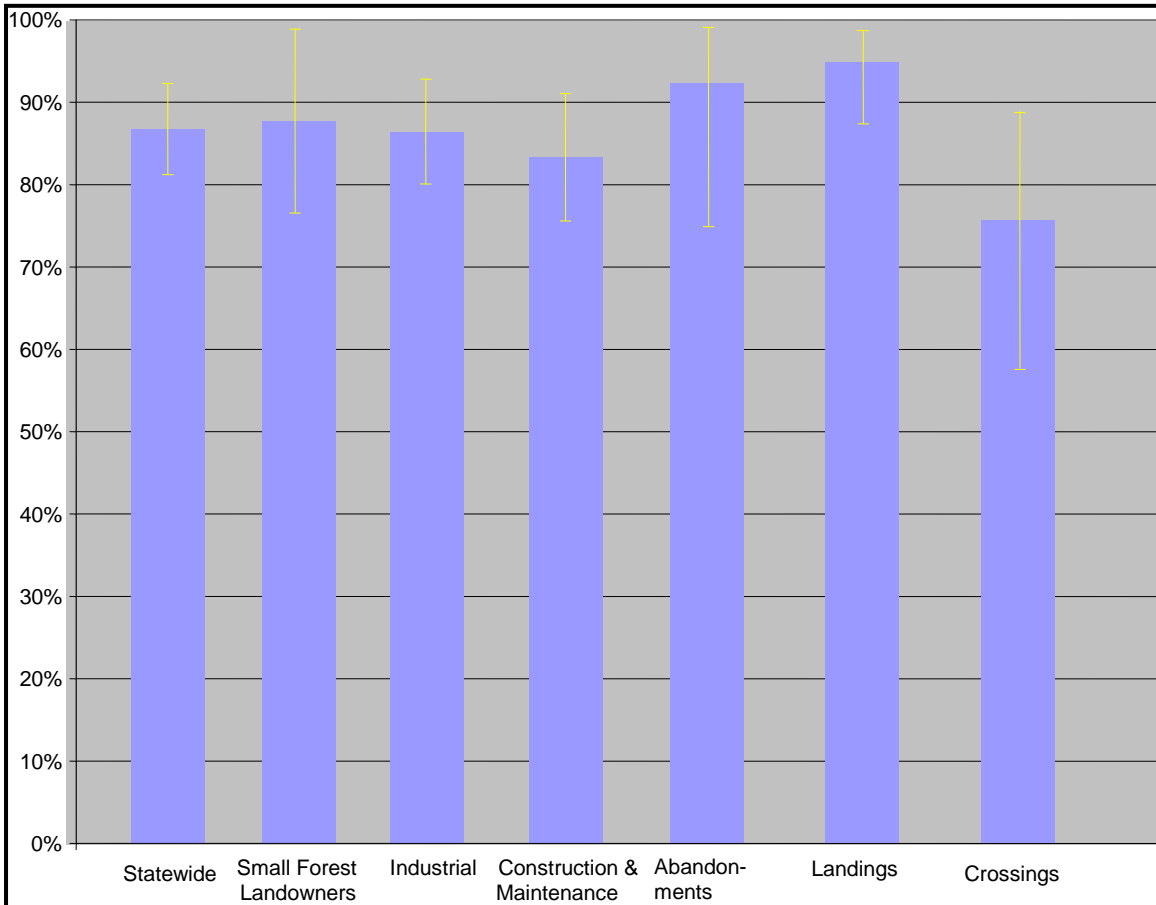


Figure 12. Percent Compliant for all 2006 - 2007 Road Activities

Road activity questions

Situations occur where more than one rule element produced a non-compliant determination for a single activity. This is especially the case for road activities. There may be more than one ditch-out or culvert location to review for each road. If any of these structures are out of compliance, then that road activity is non-compliant. For comparison to riparian activities, if any part of a RMZ is non-compliant such as harvest in the Inner Zone, the entire RMZ is non-compliant. Over time, we will be able to identify specific rule elements that are consistently associated with non-compliant activities. Questions like “Were erodible soils disturbed during construction stabilized to prevent sediment delivery to Typed Waters?” are a challenge. We do the best we can to determine compliance in these instances. If there is

evidence that any channeling appears to enter streams, we can discuss among ourselves and come up with the best answers based on the evidence observed for this snapshot in time.

Field forms were developed for each road activity and contain questions derived from WAC 222-24 Road Construction and maintenance. Field forms can be reviewed at http://www.dnr.wa.gov/BusinessPermits/Topics/ComplianceandEnforcement/Pages/fp_cm_program.aspx. All Compliance Monitoring decisions are made in the field with all participants. The answers to the form questions along with the field observations and measurements are used to determine the status of compliance. Questions in the following tables are taken directly from our field forms based on sections in WAC 222-24, Road Construction and Maintenance rules. Over time we can evaluate rules that most commonly indicate non-compliant activities.

Note that the first two questions in Table 10 show that even though there was road construction in a wetland, this did not constitute a non-compliant determination, when the second part of the question was asked.

Table 11. Statewide Road Construction Questions

Questions	Number of times the question could have an effect on non-compliance
Was there any road construction in a wetland? And answer the next question	2
Was the road prism and road length minimized in the wetland? (This question showed that the road length was minimized in the wetland, so this rule element was in compliance with the rule.)	0
Was water typed correctly on all waters using either physical criteria or a water type change?	6
Was all diverted water returned to the basin from which it came?	2
Were structures installed at seeps and springs to route water under the road prism to the forest floor?	1
Does new road construction minimize the number of stream crossings?	1
Do roads run across typed water at a right angle?	2
When crossings were required, were alterations to natural features minimized?	2
Do relief structures efficiently capture and pass ditch-line flow?	3
Was sediment delivery minimized? (Question deleted in 2007)	5
Were erodible soils disturbed during construction stabilized to prevent delivery to Typed waters?	8
If > .5ac of a wetland were filled or drained, was required enhancement completed?	2

Were roads out-sloped, in-sloped, crowned, ditched or bermed, to prevent sediment delivery?	1
Were BMPs utilized to prevent sediment delivery? Question deleted in 2007	6
Were diversion structures close enough to the stream to divert sediment to the forest floor?	5
Were relief culverts appropriately armored and/or vegetated to minimize scour?	3
Were end haul materials placed in areas to prohibit entry of material to 100-year flood plain?	2
Were rock armor headwalls ditchblocks installed on erodible soils for roads with a gradient > 6%?	3
For temporary roads, was the road abandoned by the proposed date?	3

Table 12. Statewide Road Maintenance Questions

Maintenance was only reviewed in 2006 due to RMAP requirement reporting. There were no maintenance activities included on FPAs in 2007.

Questions	Number of times the question could have an effect on non-compliance
Is the road surface maintained to direct groundwater onto stable portions of the forest floor?	4
Is groundwater in the ditchline diverted onto stable portions of the forest floor?	5
Is road grade maintained to minimize erosion of the surface and subgrade?	6
During and on completion of road activities, has the road surface been shaped or water barred?	4
Were berms removed except those designed for fill protection?	2
Is the road surface maintained to minimize direct sediment entry to typed water?	8

Table 13. Statewide Road Abandonment Questions

Questions	Number of times the question could have an effect on non-compliance
Were ditches left in a suitable condition to reduce erosion?	1
Was the road blocked so that four-wheel highway vehicles cannot pass the point of closure?	2

Table 14. Statewide Landing Questions.

Questions	Number of times the question could have an effect on non-compliance
Was the location of the landing outside of natural drainage channels, CMZs, RMZs, (both Core Zone and Inner Zone Type A or B WMZs)?	6
Are there any piles of debris that are perched and pose a risk of delivering to typed waters?	3

Table 15. Statewide Permanent and Temporary Crossing Questions.

Questions	Number of times the question could have an effect on non-compliance
Do the culvert, its embankments and fills have erosion protection to withstand a 100-year flood?	2
Was sediment delivery minimized? (Question deleted in 2007)	5
Do the entrances to all culverts have adequate catch basins and headwalls to minimize the possibility if erosion or fill failure?	2
Were erodible soils disturbed during construction stabilized to prevent delivery to typed waters? (Question deleted in 2007)	4
Was slash that may be expected to plug the culvert cleared for 50 feet above the culvert?	3
Were alterations to the stream bed, bank or bank vegetation limited to that necessary for construction of the project?	2
Is the alignment and slope of the culvert on grade with the natural flow of the streambed?	1

Table 16. Statewide Fords Questions.

Questions	Number of times the question could have an effect on non-compliance
Do the ford, its embankments and fills have erosion protection to withstand a 100-year flood?	3
Is the alignment and slope of the ford on grade with the natural flow of the streambed?	1
Was sediment delivery minimized?	3
Were disturbed erodible soils stabilized to prevent the potential to deliver to typed waters?	1
Were BMPs implemented for construction, maintenance, or use as required by on the approved Application?	3

Spatial distribution of the compliance monitoring results for road activities

Figures 13 through 18 show the spatial distributions of the sampled FPAs and compliance status for the various road activities. Representation and clarity of the information are improved by grouping the regions in pairs geographically: Olympic and Pacific Cascade, Northwest and South Puget Sound, and Northeast and Southeast. The legends are self explanatory; however, when there are multiple layered symbols this indicates that there were multiple activities on one FPA. Due to scale and complexity, once in a while it may mistakenly appear that multiple FPAs are in the same location.

Note that while DNR Regions are shown in these figures, the sample size is too small to make comparisons of Region performance or other geographic stratification. Data does not support conclusions regarding differences in compliance among DNR regions due to high variance. We may be able to present this data when sample sizes increase per region to be able to achieve tighter confidence intervals.

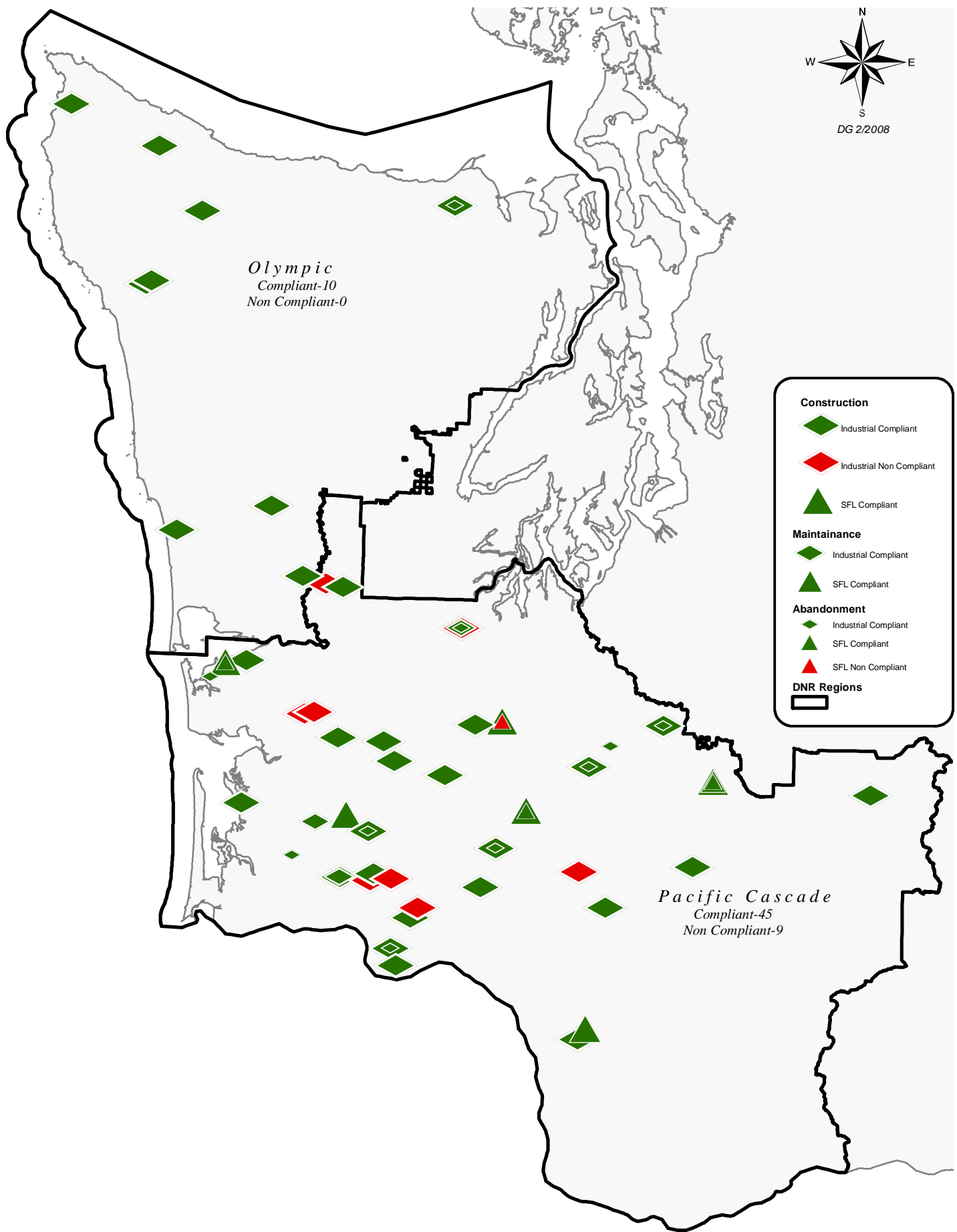


Figure 13. Pacific Cascade and Olympic Regions Road Construction, Maintenance, and Abandonment Activities

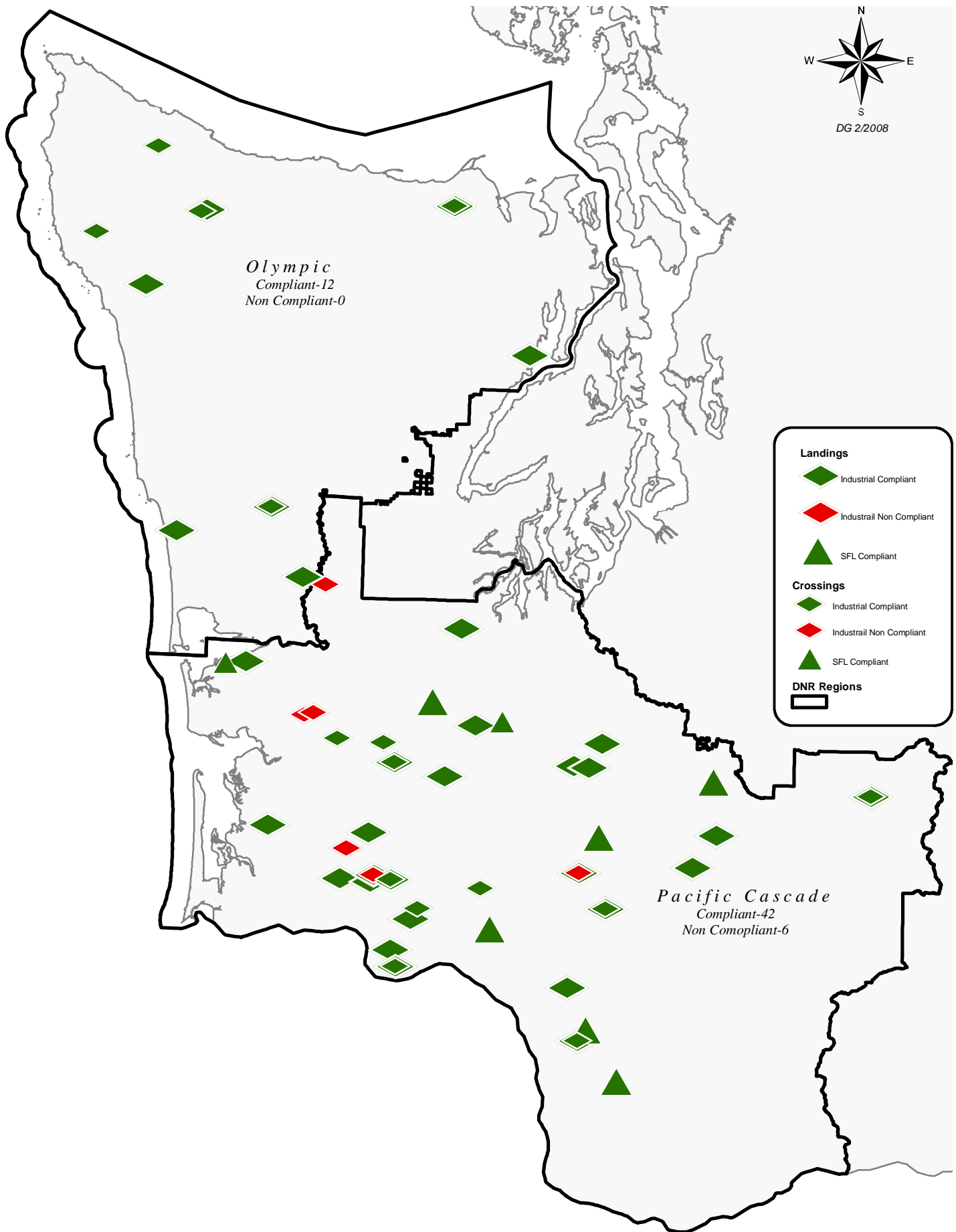


Figure 14. Pacific Cascade and Olympic Regions Landings, Type N Crossings

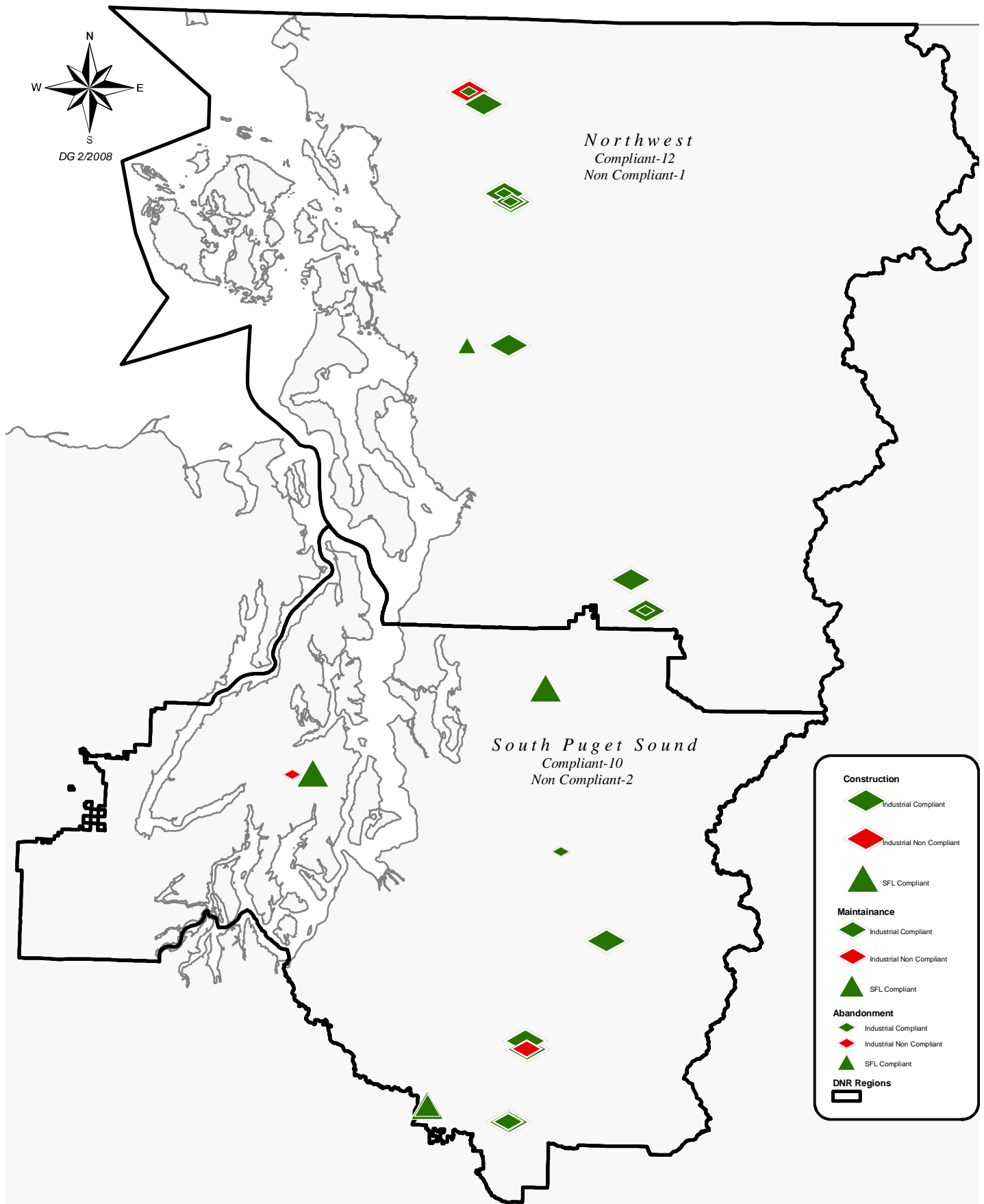


Figure 15. Northwest and South Puget Sound Regions Road Construction, Maintenance, and Abandonment Activities.

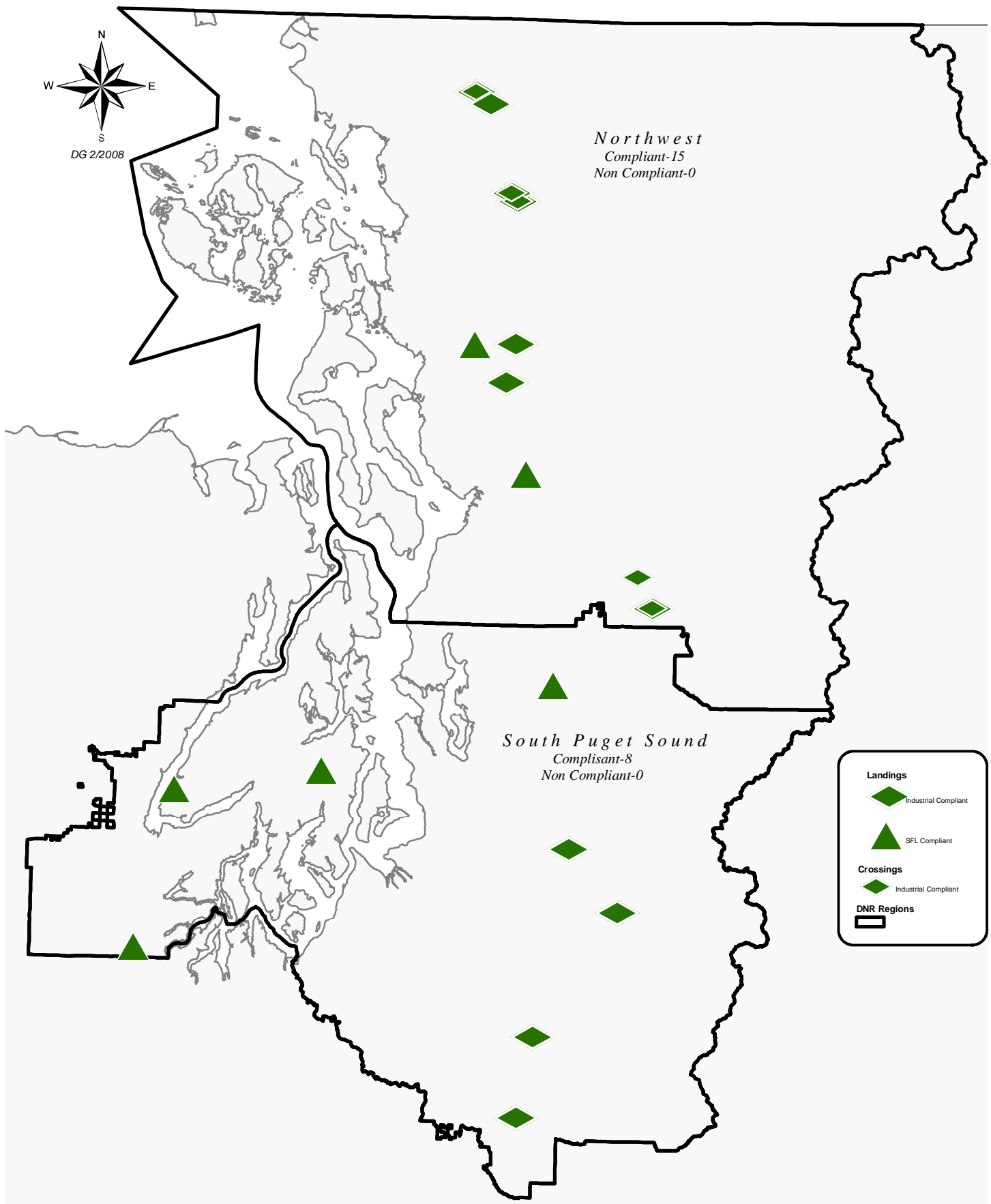


Figure 16. Northwest and South Puget Sound Regions Landings and Type N Crossings

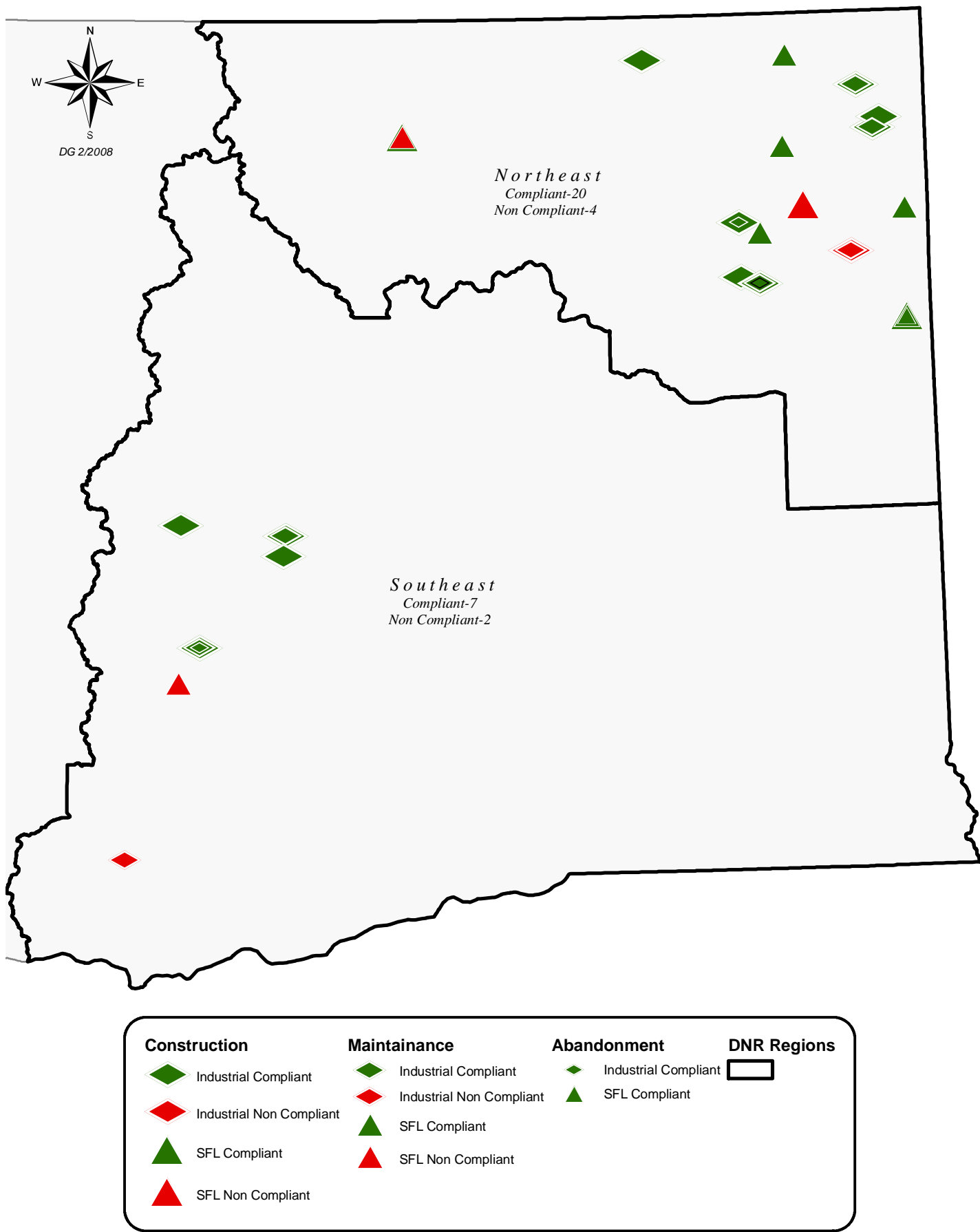


Figure 17. Northeast and Southeast Regions Road Construction, Maintenance, and Abandonment Activities

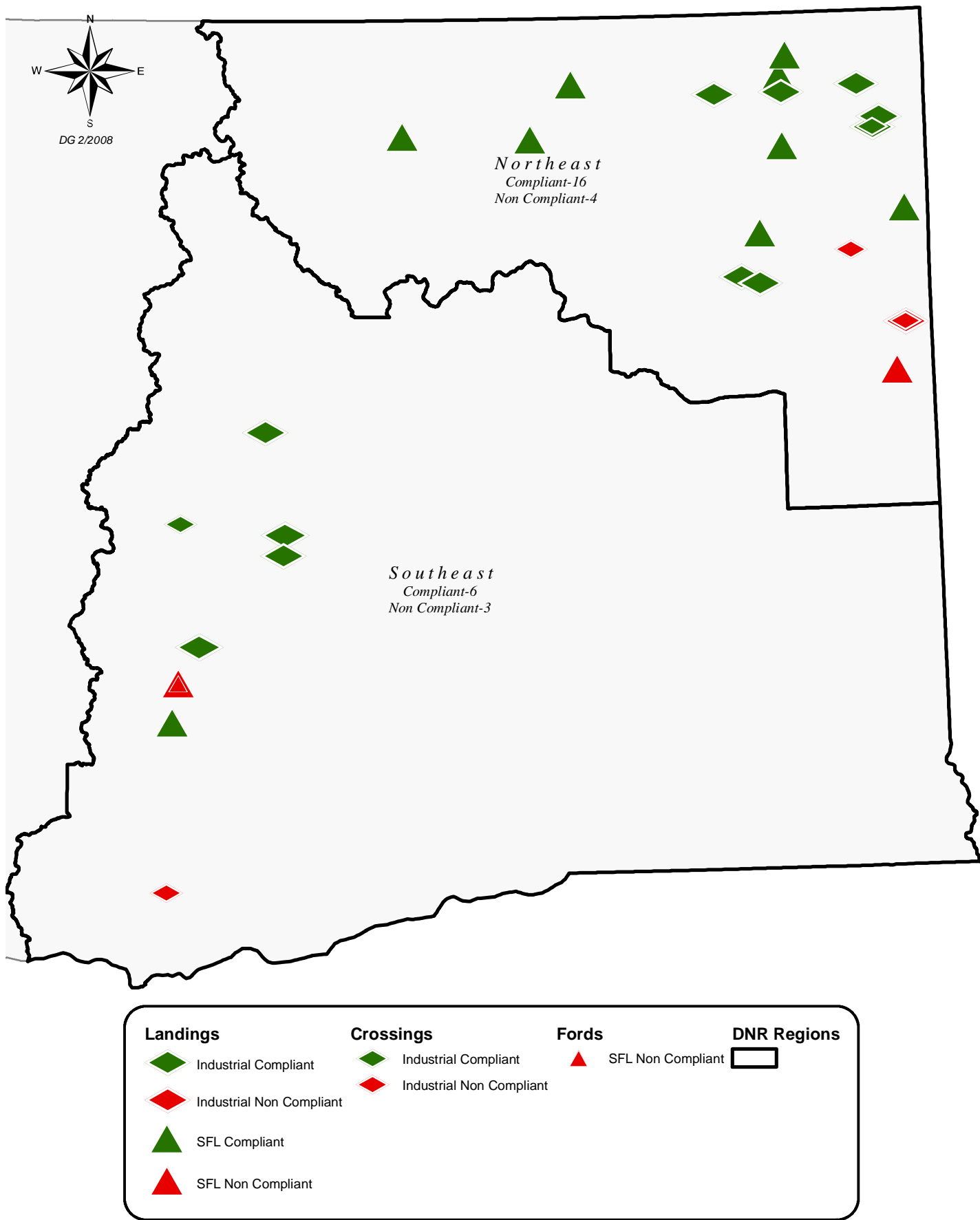


Figure 18. Northeast and Southeast Regions Landings, and Type N Crossings

Professional judgment and non-compliant ratings for road activities

Figure 19 shows the professional judgment of the field review teams on the level of non-compliant determinations for road activities. There were a total of 31 non-compliant road activities out of 234 total road activities. The field teams were able to generate qualitative non-compliance ratings for a majority of the road activities. It is important to note that these qualitative non-compliance ratings have limited statistical application as to the level of analysis that can be performed on these qualitative data. These ratings should not be used to excuse Forest Practices activities that violate the rules or the approved application.

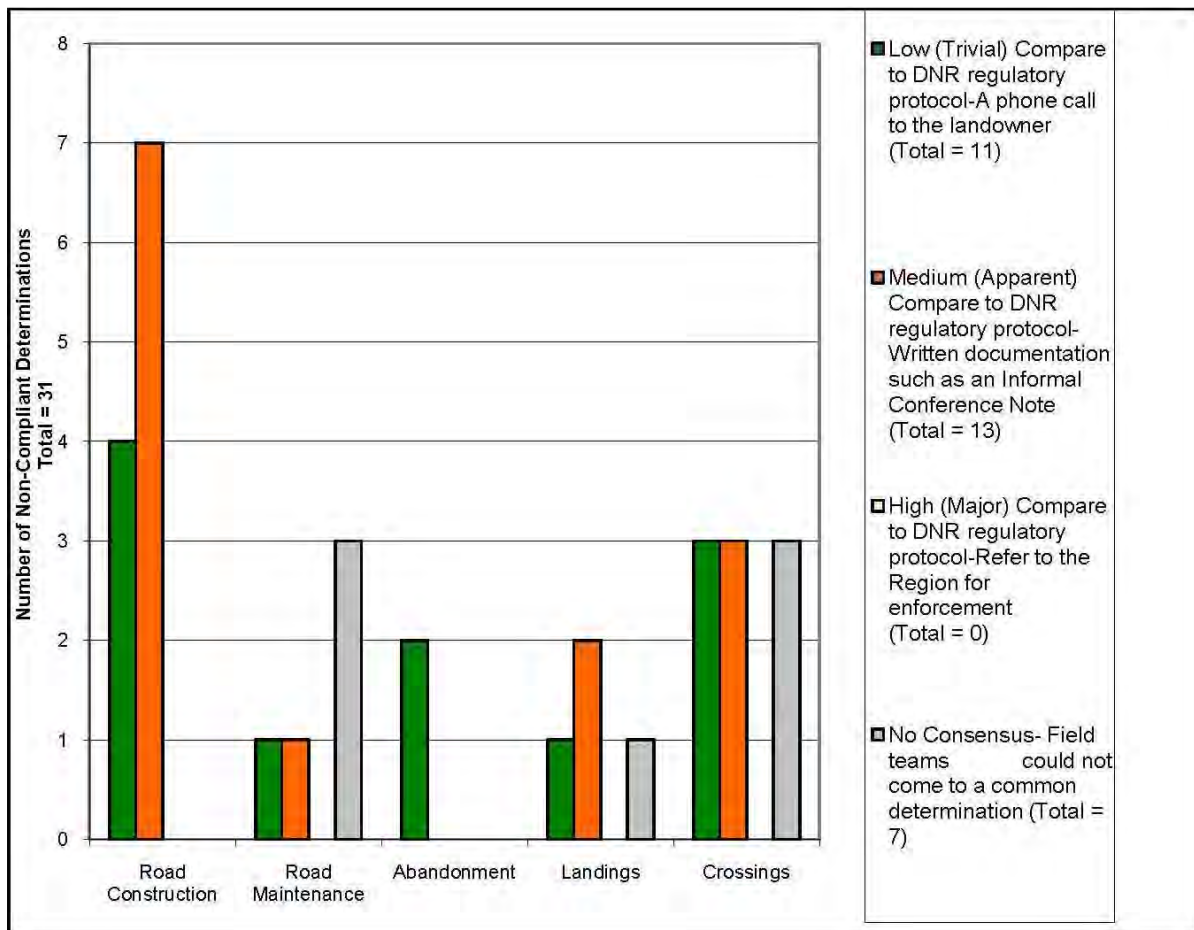


Figure 19. Non-compliant Ratings for Road Activities Based on Professional Judgment of the Field Review Teams. Note there were no High-Major ratings for roads.

Spatial Distribution of the Compliance Monitoring Results for Road Activities

Figure 20 (following page) shows the statewide distribution of non compliant road activities.

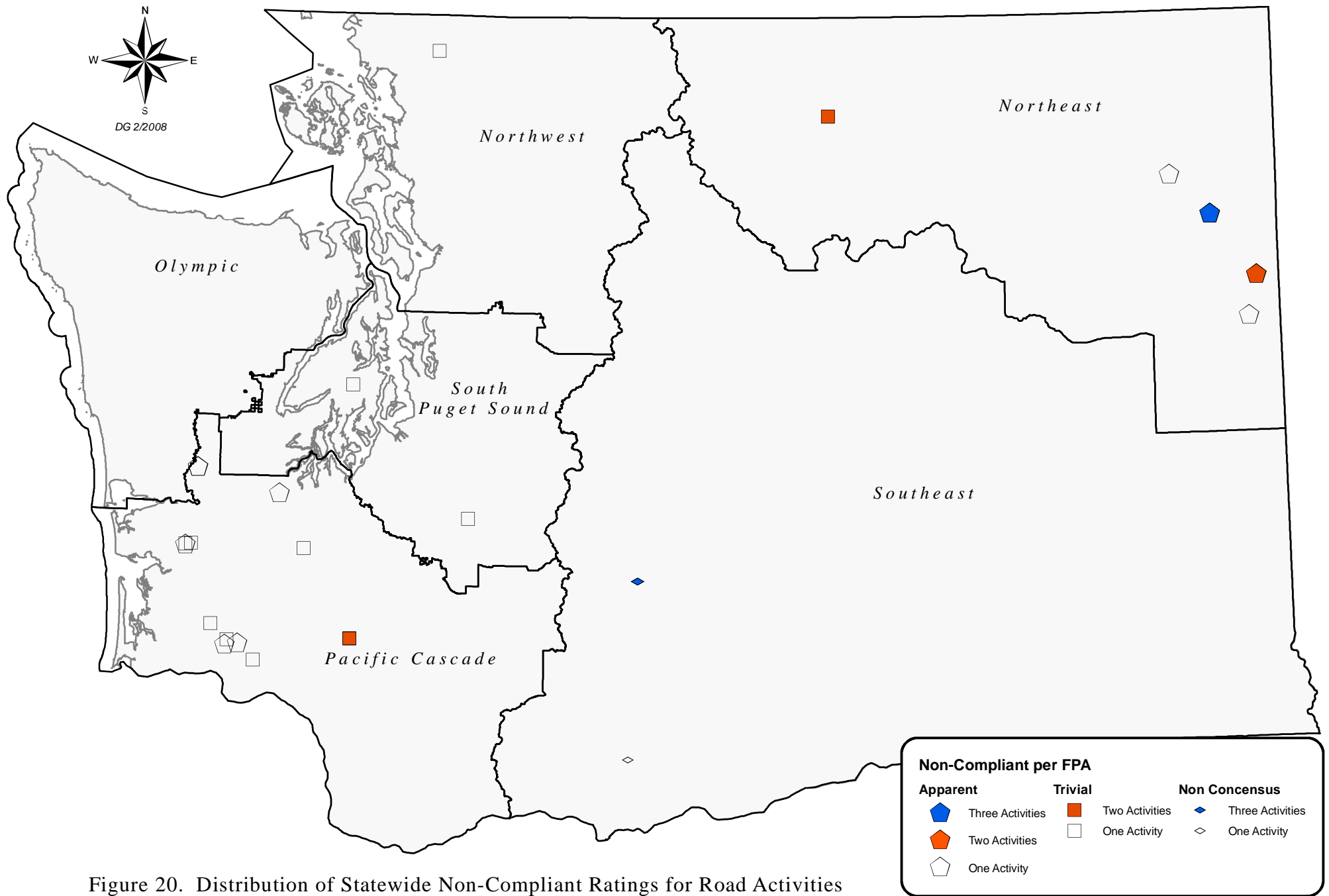


Figure 20. Distribution of Statewide Non-Compliant Ratings for Road Activities

Conclusions

The forest practices rules are complex, and at times the teams found that it was difficult to determine compliance. On many occasions, landowners, forest scientists and foresters had difficulty understanding the meaning or exact requirements of some rules even after lengthy discussions. In many cases, the teams required an entire field day to measure a single riparian buffer.

Statewide compliance during the study period was 87 percent for road activities, and 75 percent for riparian activities. Average compliance for all activities was 80 percent with a lower confidence limit of 75 percent and an upper confidence limit of 86 percent.

The sampling methods, field procedures, and statistical treatment of the collected data used herein are believed to be sound and have gone through an independent Technical Review process. The professional judgment determinations of non-compliant ratings are subjective, but are based on a consensus of opinions of experienced and trained natural resource professionals in the field.

Harvest within the prescribed no harvest Riparian Management Zones and inadequate leave-trees in the Outer Zones for Type F (fish) streams, were the most common causes of non-compliance determinations. Four of the non-compliant fish-stream activities were referred to the DNR Regions for enforcement consideration.

For Type N (non-fish) streams, harvest within the 50-foot no harvest portions of Riparian Management Zones and (or) inadequate leave-trees around perennial initiation points and stream confluences were the cause of many of the non-compliant determinations. Three of the Type N stream infractions were referred to Regions for enforcement consideration.

Inadequate stabilization of erodible soils or prevention of sediment delivery was the cause of non-compliance for road activities. No road activities were referred to Regions for enforcement consideration.

Opportunities for improving rule implementation

An important finding from the 2006/2007 field season is that some rules are in need of clarification in order to assist regulators and/or landowners to implement the rules correctly the ground. This can be addressed by DNR through continued training or information sharing at various forums, such as the Stakeholder or quarterly meetings held in every DNR Region. If Compliance Monitoring shows that training and rule clarification aren't improving compliance levels in future years, DNR can propose rule changes to increase compliance. Opportunities exist for training and clarification on the following topics:

Bankfull width issues

1. Identifying bankfull width (BFW) is a key factor in several compliance determinations. Exact BFW locations can be somewhat subjective and difficult to measure. Our field reviews have shown that groups of experienced scientists from multiple agencies working with optimum cooperation sometimes have difficulty in achieving consensus of locating BFW on difficult sites. There are varying interpretations of the vegetation indicators, and locations of bankfull width locations along with intra and inter-agency interpretations that are not consistent.
2. Clarification and training topics:
 - a. How to determine BFW in problem sites: heavy brush, blow down, or obscured banks that prevent exact BFW measurements.
 - b. Identification of stream associated wetlands and intermittent side channels.
 - c. How to average BFW for streams of varying widths.
 - d. Bankfull width can vary tens of feet in short distances in multi-channel, highly sinuous, or low-gradient streams.

Type S or Type F riparian management issues

1. Guidance for implementation of DFC requirements.
 - a. How to account for required leave trees in areas of overlapping RMZs.
 - b. Type S or F stream junctions with other Type S or F streams.
 - c. Type S or F stream junctions with Type Np streams.
 - d. Overlap due to sharp bends in stream segments.
 - e. How to determine stream segments.
 1. Multiple, non-connecting streams were entered into the same DFC worksheet.

- 2. Unclear if required leave trees were on one or both streams.
 - f. Two sided RMZs entered into same DFC worksheet.
 - 3. Unclear if required leave trees were on one or both sides of the RMZs.
 - g. Differing stream lengths and widths affected leave tree requirements and RMZ widths.
 - h. Stream segment delineation difficult to find in the field due to lack of marking.
 - i. Locations of required leave trees difficult to find due to lack of information in FPA.
 - j. Entire DFC printouts not included with FPAs.
2. Clarification and training topics:
- a. Double counting Outer Zone trees for overlapping RMZs.
 - b. What constitutes a stream segment?
 - c. Importance of accurate stream length and bankfull measurements.
 - d. Field marking should include ends of stream segments subject to DFC calculations where FPA mapping or description is insufficient.
 - e. Include detailed description and/or mapping of leave trees in FPA when they aren't evenly spaced throughout RMZs.
 - f. Include entire DFC printout with FPAs.

Road maintenance responsibility issues

1. There were numerous questions raised as to landowner responsibility for road maintenance on roads with multiple operators, different forest practices activities, and adjacent landowners. It is difficult to tie out-of-compliance calls to the FPA being reviewed for road maintenance. The review indicates road maintenance compliance levels are 77 percent. Road maintenance field reviews were not conducted unless road maintenance was explicitly stated on the FPA. Administration of RMAP requirements is the responsibility of the regional RMAP specialists. The Compliance Monitoring program will not conduct compliance reviews on RMAP work.
2. Clarification and training topics:
 - a. A review of landowner responsibility and road use.
 - b. DNR's responsibilities and enforcement on this issue.
 - c. Maintenance associated with an approved FPA that is not part of an RMAP scheduled maintenance needs clarification.

Stream typing

1. Verification:
 - a. Landowner's responsibilities to correctly identify their streams.
 - b. There are issues of either presence or absence of streams in Eastern and Western Washington with the new stream typing maps.

- c. There are varying interpretations of the vegetation indicators, and locations of bankfull width locations.
 - d. There are stakeholder interpretations that are not consistent.
2. Clarification and training topics:
 - a. Clarification on measuring BFW to establish stream type or submit water type modification form.
 - b. Clarification on when to submit a water type modification form and refer to the Regions for verification of stream typing.
 - c. DNR: update or correct water type model.

Type N riparian management zones

1. The 50 foot no cut buffer is difficult to assess for compliance in the field.
 - a. Difficult to verify percent of system length subject to the 50 foot no cut RMZ when only a portion is within FPA area being reviewed.
 - b. It is difficult to verify the percent of Type N system length subject to the 50 foot no cut RMZ. This is due to variability of RMZ widths on the remainder of the system that isn't subject to a 50 foot no-cut RMZ.
 - c. Difficult to verify upper most point of perennial flow when it changes from year to year or review does not occur during the dry season
 - d. Use of the Type N worksheet will help determine required buffer lengths.
2. Clarification and training topics:
 - a. Include in FPA: copies of maps of adjacent units within same Np stream system.
 - b. Provide more detail in FPA as to which segments are subject to a 50 foot no cut RMZ when there are also portions that have less than 50 foot no cut buffers.
 - c. Clarification on how to review situations of a flagged location of the uppermost point of perennial flow for one year that changes the next year.
 - d. DNR is currently looking at changes to the N rules.

Future Intentions

DNR intends to continue Compliance Monitoring in the future in part to attain the data necessary to project trends in compliance rates for a number of areas of interest. Some of these interests voiced by our stakeholders include:

1. The Department of Ecology is interested in Regional Compliance in order to gather more data for Clean Water Act reporting requirements. We may be able to sub-sample regions with the objective of increasing sample sizes to better answer the compliance questions with more certainty.
2. There has been some interest in wetland compliance. We have not selected many wetland Forest Practice Applications in our random samples. An analysis of the Forest Practice Application Review System is needed to assess the percent of submitted applications per year with wetland activities. Results indicate that FPAs with wetland activities comprise less than 10 percent of the submitted FPAs. A statewide special emphasis project for sampling wetlands will be completed in the 2009 field season.
3. Class II applications contain “certain forest practices that have been determined to have a less than ordinary potential to damage a public resource” WAC 222-16-050 (4). There are other provisions for this FPA classification; however DNR has been approached to create a separate compliance effort to determine if there are any resource issues associated with this class of applications.
4. Washington Department of Ecology has contracted with DNR to develop draft protocols for evaluating compliance with forest haul roads. This project is an initial phase as of January 2009. New road construction and road abandonment are already a part of the compliance monitoring program. Haul roads are not currently assessed as part of the compliance monitoring program. The goal of DOE’s project is to develop and test a pilot project for haul route that will include implementation protocols. There is a potential of adding this element to compliance monitoring in the future.
5. DNR will solicit other possible additions or deletions to the Program in the near future.

References

Ice, George, 2007. Nationwide Trends in Implementation of Best Management Practices (BMPS) for Forestry. American Institute of Hydrology, proceedings of Spring Meeting 2007. (Paper available from Leslie.Lingley@dnr.wa.gov)

Appendix A

Statistical Methods

Methods for confidence intervals

There are two types of compliance proportions estimated in this report, simple proportions and ratio proportions. Estimation for both types is described below with examples.

Simple Proportions

The first type of compliance proportion is a simple proportion. For example, the proportion of FPAs with road construction activities that was compliant for these activities. One and only one road construction activity is measured on each FPA that has a road construction activity. This is a binomial proportion, and 95 percent confidence intervals were estimated using the F-distribution as described in Zar (1996; p524):

$$LCL = \frac{X}{X + (n - X + 1) * F_{\alpha(2), \nu 1, \nu 2}},$$

$$UCL = \frac{(X + 1) * F_{\alpha(2), \varpi 1, \varpi 2}}{n - X + (X + 1) * F_{\alpha(2), \varpi 1, \varpi 2}},$$

where

LCL = Lower Confidence Limit

UCL = Upper Confidence Limit

X = The number of compliant activities

n = the total number of activities,

F = the F-distribution critical value for the given alpha and degrees of freedom,

$\nu 1 = 2(n - X + 1)$

$\nu 2 = 2X$

$\varpi 1 = 2(X + 1)$

$\varpi 2 = 2(n - X)$.

These binomial confidence intervals are not symmetric.

Example

The proportion of road construction activities that are compliant is an example of a simple proportion. For this biennium, there were 74 FPAs containing road construction activities that were tested for compliance.

n = 74

X = 63

63/74 = 0.851 (85% compliant)

$$v1 = 24$$

$$v2 = 126$$

$$\sigma1 = 128$$

$$\sigma2 = 22$$

$$LCL = \frac{63}{63 + (74 - 63 + 1) * 1.754} = 0.750(75\%)$$

$$UCL = \frac{64 * 2.072}{74 - 63 + (64) * 2.072} = 0.923(92\%)$$

Ratio Proportions

The second type of proportion is actually a ratio of two random variables, with the denominator being the total number of activities (within a subcategory) sampled. For example, when we look at compliance for all riparian activities, there are often multiple riparian activities on a single FPA. Because this number varies across FPAs (i.e., some FPAs have 1, some have 2 or more activities in the subcategory), it is a random variable. This is true for any displayed subcategory that represents multiple activity types, such as “Western Washington Type F Streams” (up to three activity types), as well as for total compliance rates (e.g., all riparian activities.) In this case, the estimated proportion of activities that are compliant is:

$$\hat{p} = \frac{\sum_{i=1}^n y_i}{\sum_{i=1}^n x_i},$$

which is the total number of compliant activities divided by the total number of activities that were sampled across all FPAs (n is the number of FPAs sampled).

A 95 percent confidence interval for the proportion compliant is formed as follows:

$$\hat{p} \pm t_{.025, (n-1)} \cdot SE(\hat{p}),$$

where $t_{.025, (n-1)}$ is the 97.5th percentile of the student- t distribution with $(n-1)$ degrees of freedom, n is the number of sampled FPAs, and

$$SE(\hat{p}) = \frac{\sqrt{n \cdot (1 - \frac{n}{N}) \cdot \sum_{i=1}^n (y_i - \hat{p}x_i)^2}}{\sqrt{(n-1) \cdot \sum_{i=1}^n x_i}} \quad (\text{Cochran, 1977, p32}).$$

In the above equation, N is the total number of FPAs submitted in the two-year period that contain road and riparian activities. This number was not known, but was estimated based on the proportions of sampled FPAs containing road and riparian activities for each year. These confidence intervals are symmetric.

Example:

Out of 174 FPAs reviewed, there were 234 road activities tested for compliance. Of these, 203 activities were in compliance with relevant rules.

$$\hat{p} = \frac{\sum_{i=1}^n y_i}{\sum_{i=1}^n x_i} = \frac{203}{234} = 0.868(87\%)$$

The population size, N is estimated as follows. In 2006, there were 4671 total FPAs submitted. Of the FPAs opened, 104/201 (52 percent) had activities in our population. Applying the 52 percent to 4671 yields an estimate of 2417 FPAs with road/riparian activities in 2006. In 2007, there were 4588 total FPAs, and 60 percent of the 341 FPAs that were opened had road and/or riparian activities. This yields an estimate of 2758 FPAs with road/riparian activities. Therefore, we estimate a total population size of 5175 FPAs with road/riparian activities. Note that this estimate is only being used as a finite population correction factor. Since the sampling proportion is fairly small (100/5000), this estimate does not have a large affect on the final result.

N = 5175
n = 174

The quantity $\sum_{i=1}^n (y_i - \hat{p}x_i)^2$ is calculated for each FPA, so cannot be easily displayed.

However, note that for each FPA, it is simply the number of compliant road activities minus 0.868 times the total number of road activities.

$$SE(\hat{p}) = \frac{\sqrt{174 \cdot (1 - \frac{174}{5175}) \cdot 44.24}}{\sqrt{(174-1) \cdot 234}} = 0.028$$

$$t_{.025,173} = 1.974$$

$$\begin{aligned} & 0.868 \pm 1.974 \cdot 0.028 \\ & = 0.868 \pm 1.974 \cdot 0.028 = 0.868 \pm 0.055 \end{aligned}$$

Thus, the 95 percent confidence interval is (81, 92 percent).

References

- Cochran, William G. (1977). *Sampling Techniques*. John Wiley & Sons, New York.
- Zar, Jerrold H. (1996). *Biostatistical Analysis*. Third Edition. Prentice Hall. Upper Saddle River, New Jersey.

Appendix B

Compliant and Non-compliant Definitions from the 2006-2007 Program Design

These definitions were in use during the 2006 and 2007 field seasons. Refinements to these definitions may be made as changes to the Compliance Monitoring program occur. Comments included in this biennium report will be forwarded to the revision process of the Program Design. Hence, no changes are included herein in order to present the Program language used at the time. There have not been changes to these definitions as these were available to all participants throughout the 2006/2007 field seasons. Any revisions incorporated into the Program Design for the 2008/2009 biennium will be presented to participants.

Status of compliance

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

- *Compliant*: Forest practices activities meets protection identified in the FPA and rules.
 - .
- *Exceeds Rule*: Landowners conducted their Forest Practices activities above the minimum requirements of the rule. Examples from the Specifications and Guidelines include:
 - Type S or F: Twice as many leave trees as required by the rule or DFC worksheet in the Inner and Outer Zones of RMZs.
 - No harvest zones are preserved in areas the applicant originally had planned to harvest.
 - Type S, F, or Np: 20 percent greater no harvest buffer width than what is required by rule.
 - Type Np: 20 percent greater length of no cut buffer on Np stream system.
 - This length must be a 50 foot no cut buffer to count as exceeds when it is 20 percent longer than what is required.
 - No harvest zones that otherwise could have been harvested under the rules.
 - Road improvements beyond those required by rule were employed.
 - Road abandonment that included more than required such as mulching, distribution of trees and woody debris along the road prism to deter off road vehicle travel.
 - Swales, erroneously defined as typed channels that were protected.
- *Non-compliant*: Non-compliance with the Rules. Examples include:

- Harvest in Riparian Management Zones (RMZs) beyond the pre-determined 5 percent measurement uncertainty protocol. See the DNRFCMP. Document.
- Leave tree requirements not met.
- Water-crossing structures inadequate for stream protection standards.
- Stream size or stated length as reported on the Desired Future Condition (DFC) worksheet that deviated more than 10 percent of the distance measured in the field.

Professional non-compliant ratings

Does non-compliance findings reflect significant resource damage, or are many FPAs only slightly non-compliant and cause little resource damage? How does one address the problem of defining the impact from removal of one or two trees at the outer edge of the inner zone? The short answer to these inquiries is that, in order to be meaningful and to avoid agenda-driven outcomes, compliance determinations must be rigorously objective. The findings are reported as compliant or non-compliant calls. Making a determination as to whether a single tree removed from a no-cut zone is di minimus, or is representative of widespread ‘fudging’ on a buffer will require a full blown assessment of the impacts on riparian function for each FPA activity. (Creating a methodology to accomplish this task is beyond the scope of Compliance Monitoring). Such detailed work is beyond the biennial budget for this project. Furthermore, these considerations overlap with effectiveness monitoring, an entire separate discipline and one that will be addressed by DNR with assistance of the Cooperative Monitoring, Evaluation and Research Committee (CMER).

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

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

Not all infractions of Forest Practices regulations have the same effect on public resources. For instance, cutting down half the trees in the Core Zone of a RMZ generally has the potential to cause significantly more environmental damage than removing one or two trees from the Outer Zone. It is beyond the scope of the compliance monitoring program to quantify resource damage or assume we are conducting effectiveness monitoring. However, DNR wants to have some indication of the relative seriousness of non-compliance activities which could help focus the agency's future day-to-day compliance work. The field teams comprised of experienced professional hydrologists, foresters, geologists, and biologists

demonstrated that the use of professional judgment that is used in our everyday evaluations of both the natural variability of nature and how to manage the environment in relation to forestry can be useful in putting non-compliant decisions in perspective. We are committed to utilizing our professional expertise and judgment to make these evaluations on the relative level of non-compliance for each non-compliant determination.

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

There were several suggestions as to how to rate practices that were non-compliant. We could have used levels with descriptors of 1, 2, or 3; Low, Medium or High; or any other similar labels. We decided to attach the following “categories” for the level of non-compliance. An attempt to set strict definitions to this process becomes an effort that cannot be quantified. The following definitions may help in determining a level of non-compliance; however, the decision is really 3 tiered scale of “Low”, “Medium” or “High”. For example, each circumstance is different, and strict definitions just don’t capture the variability of a 500 foot RMZ segment or a 12,000 foot RMZ segment.

- a. *Low or trivial:* Minor impacts of short duration over a small area. This category could be compared to the first level of DNR regulatory protocol which would include a phone call or to the landowner to let him/her know that we found a couple of trees harvested in an Inner or Outer Zone. Examples include:
 - i. Evidence of slight sediment delivery that Does not appear to be persistent.
 - ii. A few trees cut in the Inner or Outer Zone of the RMZ of the same or lesser ecological significance as the remaining RMZ trees.

- b. *Medium or Apparent:* Potential impacts to resources, but generally of moderate effect. The level of DNR regulatory protocol would consist of a Notice to Comply which would indicate to the landowner that there could be some mitigation required for this level of non-compliance. Examples include:
 - i. Required leave trees for the Outer Zone trees not attained.
 - ii. Culvert sizing is questionable, but potential impact to resources is not readily apparent.
 - iii. Soil stabilization has not occurred and there may be a potential for future impacts.

- c. *High or Major:* Damage to public resources is evident or the potential for damage is high. (These include situations normally referred to the Region). The comparative DNR regulatory protocol would most probably consist of a Stop Work Order or perhaps a Civil Penalty. Examples include:

- i. Harvest in the Core Zone. Harvest in areas not delineated on the FPA.
- ii. Roads built without an FPA.
- iii. Evidence of direct sediment delivery to typed water that appears to have been persistent.

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

Implementing this system requires the following assumptions:

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

Appendix C

Details of Stream Inconsistencies with the FPA

The Compliance Monitoring program has developed Supplemental Stream Evaluation forms to gather more data on stream inconsistencies with the approved FPA and the field observations we gather in the field. DNR is interested in gaining information on the magnitude of stream discrepancies. Teams began using the form in 2008. This form was ~~not~~ used in 2008. During the 2006/2007 biennium some data were collected on the stream segments that did not correspond with the information on the approved FPA.

Type F Streams

A total of 116 Type F riparian activities were reviewed statewide and 16 stream segments (14 percent) were found that have issues with stream consistency with information provided by applicants on their FPA. These 16 segments reflect failure on the part of the applicants to recognize any number of characteristics of the channel, which may include Channel Migration Zones or erroneous stream size. Activities on six of the segments (4 percent) with inconsistent stream characteristics were in compliance with the approved harvest options on the FPA and two included Riparian Management Zones (RMZs) wider than required under the approved FPA. Ten (9 percent) of these segments were out of compliance for other various reasons (See Figure 21).

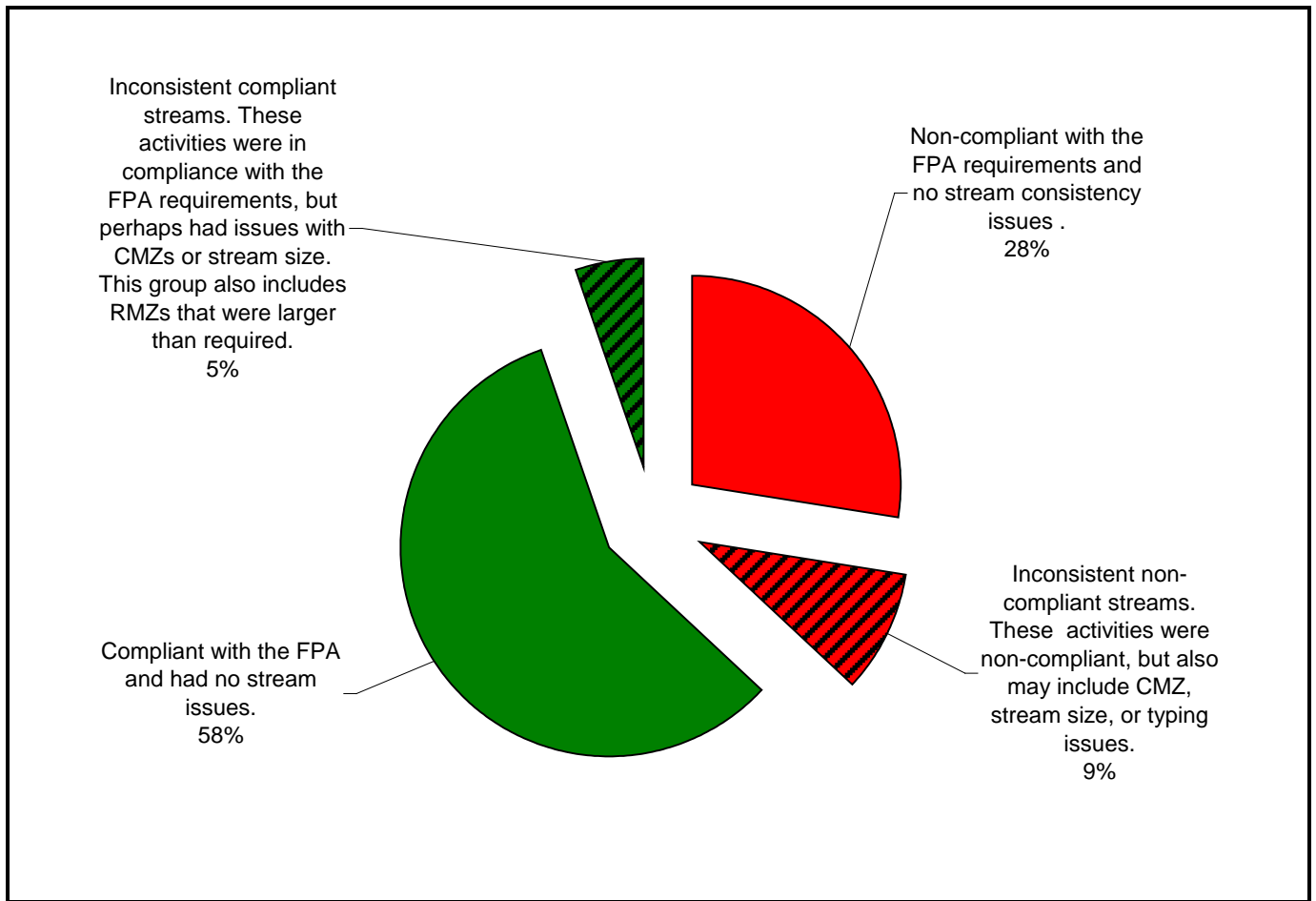


Figure 21. Type F Stream Segments not Consistent with the Approved FPA.

Table 17 shows the comments details of the field reviews for those stream segments that were not consistent with the FPA stream designations. DNR has created a Supplemental Stream Evaluation Form in order to gather details on these stream issues in order to determine the magnitude of the issue. More data will inform the need for further study or not.

Table 17. Field Review Comments Relating to the Inconsistencies with Type F Stream Segments and the Approved FPA

FPA	Stream Issue	Status	Rating	Field Review Comments
1	Stream Size on Type F	Non-compliant	M	No Inner zone harvest. There was harvest in the core and the Inner Zone
2	Stream Size on Type F	Compliant	NA	No Inner Zone Harvest. RMZ harvest buffer 132 feet when it should have been 110 feet
3	Stream Size on Type F	Non-compliant	A	Type F streams was not a Type F in the upper reach (approximately 400 feet). No Inner Zone harvest: two Core Zone trees: cedar ~ 36 in DBH, 3 Inner Zone trees cut: alder (18"), hemlock (16") and one alder (8") One Outer Zone tree cut.
4	Stream Size on Type F	Compliant	NA	No Inner Zone harvest. The activities were in compliance with the FPA, however the consistency for CMZ and for stream size was in question.
5	Stream Size on Type F	Compliant	NA	No comments
6	Stream Size on Type F	Non-compliant	T	Option 1 harvest: one 8" Western Hemlock cut within 3 feet the Core Zone RMZ.
7	Stream Size on Type F	Non-compliant	T	Option 2 harvest. Stream >10' FPA; reported as <10'. However, this would have a minimal effect on the Inner Zone floor width. Additionally, excess leave trees were found in both the Inner and Outer zones.
8	CMZ in Question	Compliant	NA	No defined channel in this area. Landowner would have had to submit a WTM Form because the F/3 stream shows on the hydro layer (DNR) this area is forested wetland and non-merchantable timber. Measurements across this leave area? RMZ are greater than 200 feet wide. This area is site class V
9	CMZ in Question	Compliant	NA	No Inner zone harvest. The LO left more trees than required.
10	CMZ in Question	Non-compliant	T	No Inner Zone harvest. There were 2 stumps found at 105-108 feet along a segment of stream where the bank slumped ~ 10 feet towards/into the RMZ.
11	Stream Size	Non-compliant	T	Harvest was good but the stream size was 10.9 BFW feet so it was called OC
12	CMZ in Question	Non-compliant	A	Three type F streams were reviewed. Option 1 harvest: nine out of 20 Outer Zone trees were left and the unit was 90% blowdown. No Inner Zone harvest and the Option 2 harvest were in compliance.
13	CMZ in Question	Non-compliant	T	No Inner Zone harvest. Eleven trees cut in 6450 feet of stream.
14	CMZ in Question	Compliant	NA	No comments
15	Stream Distance	Non-compliant	M	Option 1 harvest. Stream distance in great error, correct distance fails DFC thus only a "No Inner Zone Harvest" option would have been allowed. Resource damage resulted. Failed to meet OZ tree tally even for the ~ 6,300' stream distance. Option 2 harvest. Four trees cut in floor at station 2+75 of the northern stream segment. Many areas of the southern stream segment exceeded the required 80' no harvest.
16	CMZ in Question	Non-compliant	T	Option 2 harvest. The LO was 4 trees shy of the 82 trees required in the Outer Zone.

Type N Streams

A total of 158 Type Np and Ns (non fish bearing) streams was field reviewed. Fifteen (10%) of these segments were possibly mis-typed relative to the approved stream designation on the FPAs. Nine (6 percent) segments were in compliance with the approved harvest options. The other six stream segments (4 percent) were non-compliant (See Figure 22). Sometimes inconsistencies provided either more or inadequate protection.

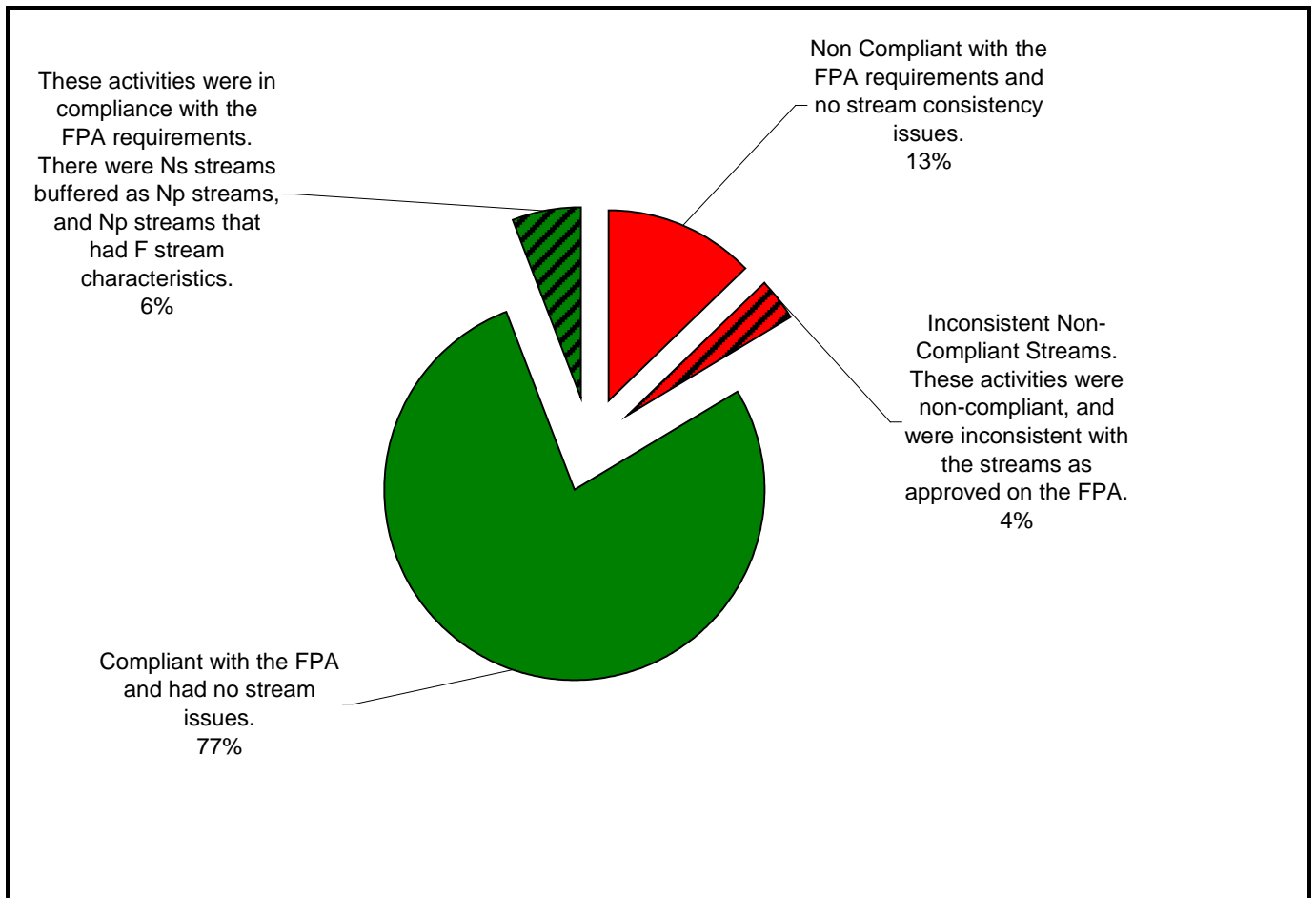


Figure 22. Type N Stream Segments not Consistent with the Approved FPA. This figure shows the relationship between the status of compliance for N streams and the 9 percent of streams determined to be inconsistent with the FPAs.

Table 18. Field Review Comments Relating to the Inconsistencies with Type N Stream Segments and the Approved FPA

FPA	Status	Rating	Comments
1	Compliant	NA	Ns stream labeled "C" on attached map was not shown on FPA map. Stream was dry during approved period. < or = 10% soil exposed, was in compliance. Np shown on FPA map along west edge was in full compliance.
2	Compliant	NA	Type F by characteristics, follow-up with the landowner confirmed that they had conducted a protocol survey that did not get submitted with the FPA and no fish were found during the survey.
3	Compliant	NA	Ns stream not identified on map. Np segment not identified above stream "B" junction. It should have been labeled segment "C" and as an Np. No WTM forms that were previously approved were included in the FPA packet. Information in FPA does not correspond with features on the ground.
4	Compliant	NA	Np compliant
5	Compliant	NA	Np streams called Ns on FPA map but buffered as Nps
6	Compliant	NA	Compliant as per FPA, however stream met physicals of Type F. Stream was typed by field forester as a 4, but stream measurements at time of review were over 3 feet and less than 16% slope. BFW measurements were moved slightly to minimize the influence from cattle. All agreed that any harvest in buffer was from wood cutters as al stumps were flush cut.
7	Compliant	NA	Typed stream as a Type 5 on FPA. Stream met physical criteria of a type F. WDFW stated habitat existed. Unit was harvested and would be in compliance with Type F because no activity occurred in Inner or Outer Zone
8	Compliant	NA	Field notes indicate fish seen at station 15+50. Average RMZ width was 20% larger than required.
9	Compliant	NA	Np streams were not listed In FPA, but they were on the map and buffered. BFW was in question in areas due to extreme blowdown that influenced the stream with root wads.
10	Non-compliant	A	Type Np started at PIP. Type Ns was non existent as shown on map- No defined channel. Type Np had partial cut harvest for the entire length of stream reach in unit.
11	Non-compliant	M	See notes for bankfull width measurements on Np segment. Np channel meets physical characteristics of a type F stream. Np channel has been modified by neighboring landowner to the north.
12	Non-compliant	M	Operator used existing skid trail within RMZ of Np for a distance of 260 ft. out of 950 ft. on one side of the stream. Operator used a skid trail on west side of Ns within the 30 ft. Equipment Limitation Zone along the entire length of stream.

FPA	Status	Rating	Comments
13	Non-compliant	A	Ns stream had slash piled over stream, no mitigation done and ~40% soil exposed to activities. The Np stream is accessible to Type F stream low flow, forming small steps, and stream was greater than 5 feet BFW. Upper stream gradient was >20%. Fish could use stream in winter as refugia habitat. Np compliant, Ns out-of-compliance and apparent due to slash piles over Ns.
14	Non-compliant	M	700 ft at the lower end of the Np stream had a 50 ft buffer. The upper 500 ft of the Np stream did not have a buffer and should have been classified as a forested wetland. A majority of this segment had been disturbed from the building the Great Wall of Toutle (large very extensive 10 ft high and long). The Np PIP would be located somewhere in the wetland.
15	Non-compliant	T	2 trees cut in buffer at 46 and 46.5 feet.

Appendix D

Comments Regarding FPA Content, Clarity, and Information Needs

In addition to assessing regulatory compliance, field crews were asked if the information included in the FPA was sufficient to evaluate activities on the ground. While a lack of information does not mean that work was not completed according to regulation, this information is essential for regulatory agencies to review and approve applications for timber harvest.

During the 2006 and 2007 field reviews, 50 out of 176 FPAs contained a “No” to Question #1 on the Post Survey Evaluation Form, “Did information on the FPA provide adequate means to evaluate the activities completed on the ground?” The comments were generated by the field review team. Comments are provided only as an aid for Landowners, DNR Division, and Region staff to identify topics to improve FPA clarity and content. The comments are not to be construed as scientific observations, reflections on rule content, or criticism of landowners or regulators. This information relates to topics such as:

- Was all information included on FPARs or was additional documentation required?
- Were activities accurately described?
- Were all exchanges, management options and deviations outlined?

These comments (edited for grammar etc.) are broken into five different categories based on similar content. Comments regarding *desired* information but not *required* for the FPA have been deleted. Comments that did not pertain to the question as “*LWD is not considered fish blockage*” is not pertinent to whether the FPA was adequate to evaluate activities on the ground. The number in parentheses is the number of FPA’s that fell into the respective category. One FPA can be represented in multiple categories.

1. Mapping inconsistency, (18 of 50) (not mapped, mis-mapped, labels missing, illegible from FPARS etc.)

Landings were not shown on activity maps, however we assessed 3 landings.

Map was very confusing and left reviewers to question external boundaries of this FPA verses previous FPA nearby.

CMZ was not mapped well enough to identify its location north of Creek 5.

Little Type N west of Stream A was not identified on the FPA map, but was protected in the field with a 50 foot RMZ. Two streams (A&B), identified on the map were not present after field review.

Not all streams or roads within road maintenance segment and harvest area are included on FPA map or application.

Legend for road type activity should be included; may have used standard Forest Practice legend, but no copy included with FPA and we don't have it committed to memory.

The road location was not accurately depicted.

Map difficult to read.

Map was difficult to decipher. Needed to blow it up to determine activities. Not clear in labeling. Labeling was inaccurate at the fish habitat change.

Maps were not accurate and roads did not match what was shown on the map.

Two streams were not shown on the FPA.

DFC along this stream was approx. 303'. Map did not clearly show the 303' segment.

Stream labels were missing and DFC areas were not mapped.

Np streams were not listed under Question 18 but they were on the map and buffered. Clumped outer zone trees were not shown on the map or described in the application.

Np stream was mis-identified on map. Stream segments A&B confusing as to where one started and one stopped.

The map is inadequate, unable to locate type Ns stream.

Flagging at segment break between #1 and #2 mentioned clumping, but did not show on map. No indication of where unit started next to other harvest unit but we made the best guess.

The stream designation was clear on (color) map on file, but not on FPARS copy.

2. Water typing issues, (10 of 50) (Misidentified water classification, no WTMF in FPA, No stream found, etc.)

Little Type N west of Stream A was not identified on the FPA map, but was protected in the field with a 50 foot RMZ. Two streams (A&B), identified on the map were not present after field review. Stream C did have a channel.

All stream typing not included with the FPA. (i.e. stream crossings included in road construction).

An Np on the SE side of unit was not identified on FPA.

No information on seep protection. No information on determination of Ns stream and perennial initiation points.

Labeling was inaccurate at the fish habitat change.

Two streams were not shown on the FPA. Stream "B" is an F/N and needs a protocol survey to determine F/N break; meets physical of an F Stream.

CMZ and wetlands were not identified.

Stream non-existence was not explained in the application; no water or stream found on site.

Stream location was poorly explained; unable to locate type Ns stream. Needed better explanation for Type 3 associated with a wetland. Also discovered a mis-typed stream; Np actually a Type F.

3. FPA info does not match conditions on the ground. (20 of 50)

FPA identified 5,280 feet of maintenance but it is not clear which part of the 20 mile haul this is.

General question section indicates no harvest in RMZ. Question 6 in riparian harvest section says they will harvest in the Outer Zone. Stream chart was not filled out. On the ground only about 100 linear feet was thinned in Outer Zone.

Road distances states 8,550 feet, but the map measured out approximately 5,100 feet

We had difficulties finding the southern boundary of the harvest area. There was also a road that was not on the FPA that appears to be used for hauled (although whether it was on this harvest is unclear).

The road location was not accurately depicted. Road table indicated no road activity, but there was information on culvert/water crossings indicated in #14 of FPA. Approximately 800 feet of temporary road construction (see abandonment). There was an Np on the SE side of unit not identified on FPA. The FPA indicated no cutting within the total RMZ, however, the site review revealed that at least 18 trees were cut and removed from the RMZ.

Confusion on construction, abandonment dates as abandoned roads were definitely older than the life of this application. Alders in abandoned roadway were 6 to 8 inches dbh.

Only the Option 2 DFC printout was included with the FPA. There was no cruise info so couldn't determine what the landowner checked for stand composition or stream length.

There appears to be an error on the Type 4 RMZ worksheet which creates some confusion. The leave tree strategy needs to be described a bit better.

Couldn't determine where Inner Zone or Outer Zone leave trees were supposed to be for segments 1 and 2, because these 2 stream numbers were combined into one DFC printout, but the streams are a ridge apart. Also difficult to determine where segments begin and end on the ground because of stream junctions and overlapping RMZs.

Np streams were not listed under Question 18 but they were on the map and buffered. Clumped outer zone trees were not shown on the map or described in the application

There was a violation from previous right-of-way harvest within stream 1B. No road mentioned for this FPA.

Outer Zone harvest code incorrect; the landowner didn't cover all Outer Zone options.

Unsure if buffer on stream was for Np or F stream.

Np segment not identified above stream "B" junction. It should have been labeled segment "C" and as an Np. No revised forest practices activities were submitted to record actual activities. Information in FPA does not correspond with features on the ground.

Type Ns stream #5 headwaters originates from a Type B wetland at 1/4 acre +. No wetlands stated on FPA.

Stream non-existence was not explained in the application. No water or stream found on site.

No flagging at segment break between #1 and #2. Clumping was mentioned but did not show on the map. No indication where unit started next to other harvest unit..

Stream adjacent parallel road existed for approx. 200 ft. inside an equipment limitation zone. Application classified as "new construction" because we don't have "reconstruction" in rules. Aerial photos from 2000 revealed an existing road. Vegetation on fill slopes supported this.

Activities were not accurately described as there was no harvest identified in the RMZ on the FPA.

FPA was very confusing about Type Np RMZ width.

4. Inaccurate RMZ Buffers (14 of 50)

Breaks between DFC Options should have been shown on the application. Option 2 should have been split into 2 runs for separate sides of the creek.

General question section indicates no harvest in RMZ. Question 6 in riparian harvest section says they will harvest in the Outer Zone. Stream chart was not filled out. On the ground only about 100 linear feet was thinned in Outer Zone.

Creek 4 did not identify which harvest option was used. Timber cutting was conducted within the RMZ of Lake Creek. The FPA indicated no cutting within the total RMZ. On site review revealed that at least 18 trees were cut and removed from the RMZ.

There was no cruise info so couldn't determine what the landowner checked for stand composition or stream length.

There appears to be an error on the Type 4 RMZ worksheet which creates some confusion. The leave tree strategy needs to be described a bit better.

There was also no DFC input; so stream lengths etc. were hard to determine.

Couldn't determine where Inner Zone or Outer Zone leave trees were supposed to be for segment 1 and 2 especially because these 2 stream numbers were combined into one DFC printout, but the streams area ridge apart.

It isn't apparent that entire unit was covered with trees. It looked like part was agriculture, as part of ground was disked.

Activities along segment S-1, Option 2 was unclear. Stream labels were missing and DFC areas were not mapped. DFC distances for streams #3 and #5 were in error.

Outer Zone harvest code incorrect, they didn't cover all Outer Zone options.

Unsure if buffer on stream was for Np or F stream.

Stream typing was not correct. The landowner identified Np that did not exist. Type F stream not a Type F in upper reach (approximately 400 ft)

Activities were not accurately described as there was no harvest identified in the RMZ on the FPA.

5. FPA lacking other information (1 of 50)

Landowner information was complete; however, not all info was scanned to FPARs because application was a renewal. Main file was consulted to complete review.

