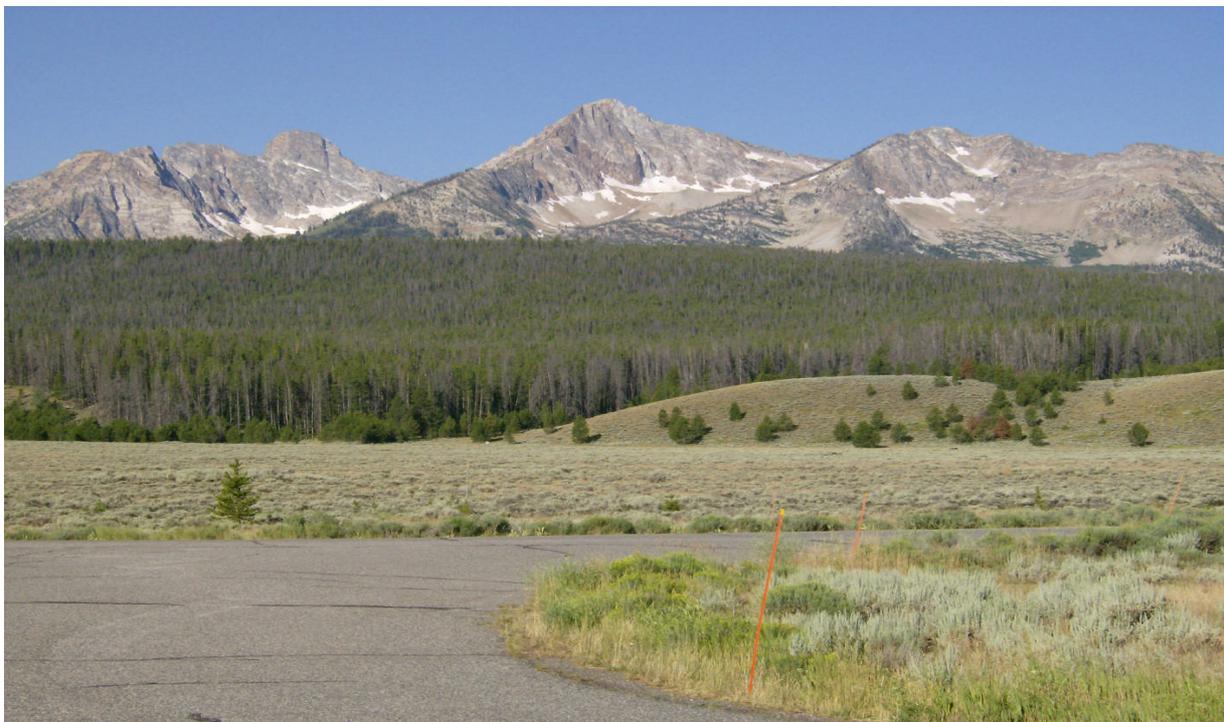

Idaho 2008 Interagency Forest Practices Water Quality Audit

Rule Compliance and Stream Crossing Assessment



November 2009



Department of Environmental Quality
1410 North Hilton Street
Boise, Idaho 83706

**Idaho 2008 Interagency
Forest Practices Water Quality Audit
Rule Compliance and Stream Crossing Assessments**

Prepared by

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Table of Contents

Executive Summary	v
The 2008 Idaho Forest Practices Water Quality Audit: Rule Compliance Assessment.....	1
Introduction.....	1
Background.....	1
Purpose and Objectives.....	1
Rule Compliance Component of the Audit.....	3
Scope of Application.....	3
Methods.....	3
Audit Team	3
Timber Sale Selection	3
Rules Included in the Rule Compliance Assessment.....	5
Rule Compliance Audit Process	5
Rule Compliance Data Assessment	6
Rule Compliance Results	6
Overall Rule Compliance.....	6
Compliance By Rule Group.....	8
Compliance By Individual Rule.....	9
Discussion of the Rule Compliance Assessment	13
Overall Observations Regarding Rule Compliance.....	13
Noncompliance with Four Individual Rules	13
Miscellaneous Observations Regarding Rule Compliance.....	15
Stream Crossings Component of the Audit.....	17
Background.....	17
Methods.....	17
Fish Passage Rule (040.02.e.i.).....	18
Fifty-Year Peak Flow Rule (040.02.e.ii.)	22
Results.....	22
Fish Passage Rule (040.02.e.i.).....	22
Fifty-year Peak Flow Rule (040.02.e.ii.)	24
Discussion of the Stream Crossings Audit Component.....	25
Rule Recommendations	27
Harvest and Stream Protection Rules	27
Fish Passage and Fifty-Year Flow Rules	27
Literature Cited	28

List of Tables

Table 1. Summary of 2008 overall rule compliance by landownership category.	7
Table 2. Comparison of overall rule compliance rates by landownership category among audit years.	7
Table 3. Summary of rule compliance rates by rule group.	8
Table 4. Summary of compliance with general rules.	9
Table 5. Summary of compliance with harvest and stream protection rules.	10
Table 6. Summary of compliance with road planning and construction rules.	11
Table 7. Summary of compliance with road maintenance and winter operation rules.	12
Table 8. Summary of compliance with chemical and petroleum product rules.	12
Table 9. Summary of attributes of the 10 stream crossings that simulate the stream channel.	23
Table 10. Summary of attributes for the 13 stream crossings with hydraulic design culverts.	24
Table 11. Fifty-year peak flow culvert assessment.	24
Table 12. Chart 1.	26

List of Figures

Figure 1. Locations of timber sales audited for rule compliance during the 2008 Idaho forest practices water quality audit.	4
Figure 2. Overall compliance rates by landownership category among audit years.	8
Figure 3. Locations of stream crossings at audit sites.	18

List of Appendices

Appendix 1: Timber sales audited for rule compliance.	31
Appendix 2: Individual rules audited for compliance.	33
Appendix 3: Compliance field form.	35

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Executive Summary

The seventh statewide forest practices water quality audit was conducted between July and October 2008. Our purpose was to conduct an on-site review of timber harvest and forest practice activities and assess the application and effectiveness of forestry best management practices as described in the 2007 administrative rules pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code. The 2008 Audit Team was comprised of representatives from the Idaho Department of Lands and the Idaho Department of Environmental Quality.

Timber sales to be audited were randomly selected based on the following criteria:

- Timber sale operations occurred or were completed in 2006/2007.
- The timber sale boundary must border or include at least 500 feet of a Class I stream.

Harvest and Stream Protection Rule Recommendations

The Audit Team makes the following recommendations for rule and administrative changes:

- Increase information provided to those in the NIPF landownership category when they submit notification of a potential forest practice.
- Define “wet draw” in rule 010 or add the phrase “as indicated by the presence of ‘water-loving vegetation’” following the words “wet draw” in rule 030.08.c.
- Remind operators that an outlet is necessary on water drainage BMPs.
- Suggest the Forest Practices Act Advisory Committee initiate a discussion of the feasibility of operators cleaning (spraying) all the equipment they use during both pre- and post-harvest activities in an effort to reduce the spreading of invasive species.

Fish Passage and Fifty-Year Flow Rule Recommendations

The following recommendations are based on the 2004 and 2008 water quality audit data and the stream crossing design and implementation experience of the ID team.

- Provide training regarding hydraulically-designed culvert installation and regulation, targeted to small private and industrial landowners.
- Adopt Chart 1¹ as guidance for hydraulic design of culverts and the regulation of the velocity criteria of the Stream Channel Alteration (SCA) rules.
- Recommend a revision of the SCA rule regarding minimum water depth to read: “The minimum required water depth for salmon and steelhead is at least 8 inches, and in all other cases 3 inches, or mimic the depth at an adjacent representative riffle.”

¹ From the Idaho Department of Lands Fish Passage Guidelines When Installing Stream Crossings (IDL 2009).

The 2008 Idaho Forest Practices Water Quality Audit: Rule Compliance Assessment

The 2008 Idaho Forest Practices Water Quality Audit (Audit) had three components: an audit of rule compliance, a determination of the effectiveness of rules regarding shade and large organic debris, and an audit of special issues pertaining to stream crossings. This report contains the findings and recommendations from the compliance and stream crossings components of the Audit. Findings from the effectiveness (shade and large organic debris) component will be submitted to the Forest Practices Act Advisory Committee in a separate report.

Introduction

Background

The administrative basis for the 2008 Idaho forest practices water quality audit (Audit) includes the Clean Water Act, the Forest Practices Water Quality Management Plan for the State of Idaho (Bauer et al. 1988), the Idaho Nonpoint Source Management Plan (Dailey et al. 1999) and the Memorandum of Understanding Implementing the Nonpoint Source Water Quality Program in the State of Idaho (Idaho Department of Environmental Quality 2008).

Purpose and Objectives

The purpose of the Audit was to assess the application and effectiveness of forestry best management practices (BMPs) as described in the forest practices rules (Idaho Department of Lands 2007). To accomplish this, the Audit had three objectives:

1. Assess the extent to which the rules were complied with.

2. Assess whether the rules are effective in protecting stream habitat; specifically shade, large organic debris (LOD), and fish passage at stream crossings.
3. Suggest text and administrative procedure revisions to the rules, as indicated by Audit findings.

The 2008 Audit had three components: an audit of rule compliance, a determination of shade and large organic debris rule effectiveness, and an audit of special issues pertaining to stream crossings. This report contains the findings and recommendations from the compliance and stream crossing components of the Audit. Findings from the shade and large organic debris component will be submitted to the Forest Practices Act Advisory Committee in a separate report.

Rule Compliance Component of the Audit

Scope of Application

The compliance component of the Audit was conducted as a statewide assessment of whether the forest practices rules (IDAPA 20.02.01) have been implemented and whether any such implementation has been maintained. Our recommendations are therefore statewide in scope. We make no recommendations concerning individual timber sales.

Methods

In this section, the Audit team is identified along with others who were invited to attend individual audits, and the selection of the timber sales audited is described.

Audit Team

The Audit team was comprised of representatives from the Idaho Department of Lands (IDL) and from the Idaho Department of Environmental Quality (DEQ). Additionally, two personnel from DEQ assisted the agency representatives by collecting stream protection zone (SPZ) data within or adjacent to audited sales. For each individual audit, the original compliance inspector was present to provide background information, but was not involved in rating the operation. Landowners, operators, and interested parties were invited to attend. Representatives of the Idaho Forest Owners Association joined the Audit team on occasion.

Timber Sale Selection

Candidate timber sales (harvests) for this audit were identified using the following criteria:

- Timber sale operations occurred or were completed in 2006/2007.
- The timber sale boundary must border or include at least 500 feet of a Class I stream.

This pool of timber sales was stratified by area of the state and landownership. From these, individual sales to be audited were selected based on access availability, proximity to other sales (because of logistical issues), and whether the sale contained a stream channel crossing structure installed on a Class I stream since 2006/2007. The 43 timber sales audited for compliance in this Audit are shown in Figure 1 and listed in Appendix 1.

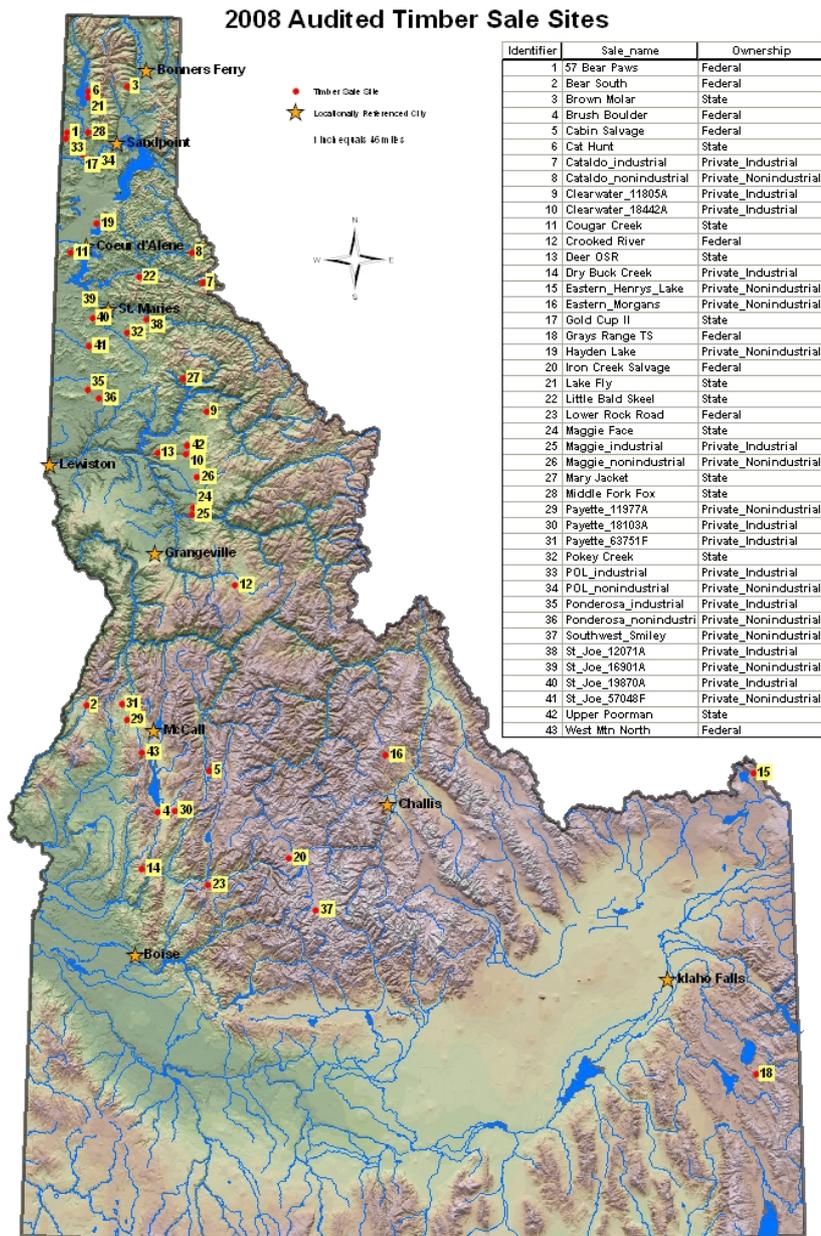


Figure 1. Locations of timber sales audited for rule compliance during the 2008 Idaho forest practices water quality audit.

Rules Included in the Rule Compliance Assessment

The Audit team assessed individual timber sales for compliance with the June 18, 2007, version of the forest practices rules (IDAPA 20.02.01). We assessed compliance with certain forest practices rules, which are intended to protect water quality, from the following rule groups (Appendix 2 contains the list of individual rules for which compliance was audited).

- Rule 020.01 – variance procedures
- Rule 030 – harvest and stream protection
- Rule 040 – road construction and maintenance
- Rule 060 – use of chemicals and petroleum products

Rule Compliance Audit Process

Upon arrival at a timber sale, the Audit team split into a compliance team and a stream team. The compliance team assessed compliance with descriptive rules by conducting a qualitative assessment based on visual observations. The stream team assessed compliance with the prescriptive rules contained in section 030.07.e.i – x. through a quantitative assessment of shade, large organic debris (LOD), and standing trees, along with visual observations. The stream team methods, results, and recommendations will be described in a separate report.

The compliance team, along with any observers (sale administrators and other interested individuals), toured a number of cutting units within the timber sale boundaries to inspect skid trails, roads, culverts, stream crossings, slash distribution, and any pre- and post-harvest erosion-control practices present. Following the inspection, the compliance team and the observers met as the compliance team completed the audit form (Appendix 3). As needed, the compliance

team solicited information from any or all of the observers. Ultimately, the rating of compliance was made by the compliance team.

Rule Compliance Data Assessment

Once all of the audits were completed, compliance ratings were compiled for individual rules. Compliance percentages for individual rules across all timber sales were calculated by dividing the number of times a rule was complied with by the total number of occasions the rule was applicable. Compliance was assessed across landownership categories, rule groups, and individual rules. Individual rules with less than 90% overall compliance and three or more instances of noncompliance are evaluated in this report (and are shown in red-highlighted cells in the compliance summary tables).

Rule Compliance Results

In this section, the results of the rule compliance component of the Audit are presented. The overall compliance results are reported first, then they are broken down by landownership and by rule group, and finally by individual rule. The section concludes with discussion of these results.

Overall Rule Compliance

We observed 1,796 instances in which the Idaho forest practices rules were applicable within the 43 timber sales we audited. Of these, 1,737 occasions were in compliance, resulting in an overall compliance rate of 97%. The overall compliance rates within each of the four landownership categories were above 90% (Table 1). Compared to previous audits (Bauer et al. 1985, Harvey et al. 1989, Hoelscher et al. 1993, Zaroban et al. 1997, Hoelscher et al. 2001, McIntyre et al.

2007), overall compliance rates for federal, industrial, and state forest practices remain relatively unchanged (Table 1 and Figure 2). A decline in the non-industrial private forest (NIPF) compliance rate since the 2000 audit (Hoelscher et al. 2001) is suggested by our data and the 2004 audit (McIntyre et al. 2007).

Table 1. Summary of 2008 overall rule compliance by landownership category.

Ownership	Occasions	Complied	Percent
Industrial	492	476	96
NIPF*	354	322	91
State	539	535	99
Federal	411	404	98
Overall	1,796	1,737	97

* NIPF -- non-industrial private forest

Table 2. Comparison of overall rule compliance rates by landownership category among audit years.

Audit Year	Federal	Industrial	NIPF*	State
1984	96	82	82	67
1988	94	95	86	97
1992	93	96	94	89
1996	100	98	95	93
2000	98	94	95	96
2004	100	99	93	99
2008	98	96	91	99

* NIPF -- non-industrial private forest

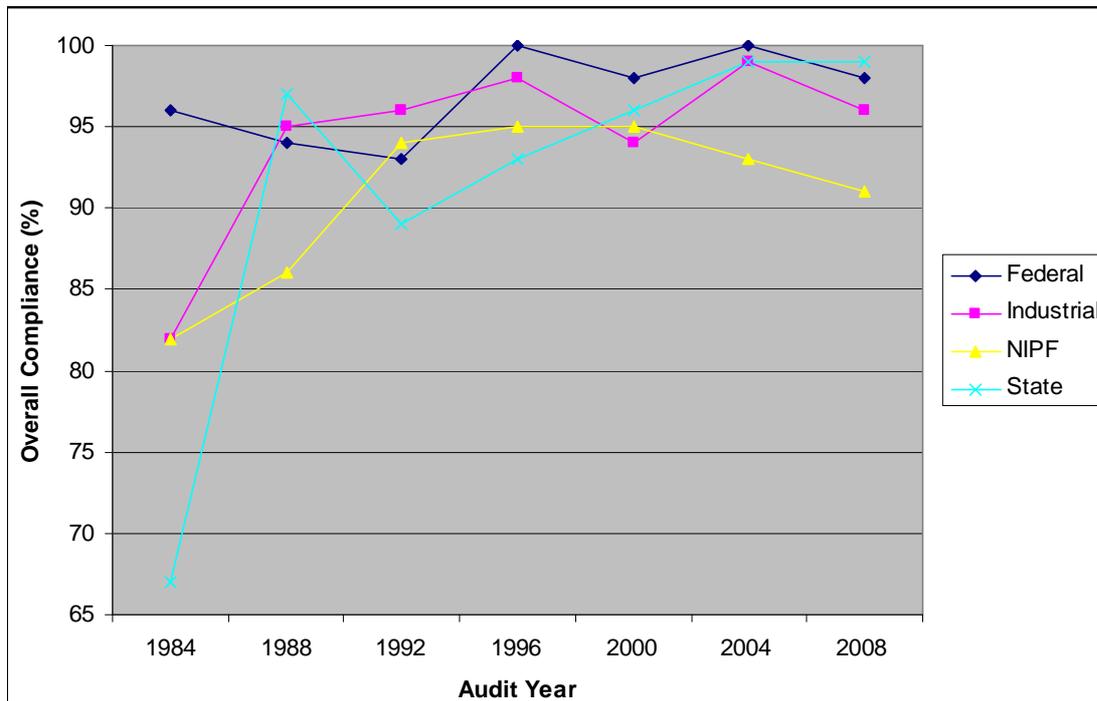


Figure 2. Overall compliance rates by landownership category among audit years.

Compliance By Rule Group

Compliance percentages ranged between 88 and 98% across rule groups (Table 3). With the exception of the general rule group, compliance percentages ranged between 95 and 98%. The compliance rate for the general rules (020.01 – variance procedures) was 88%.

Table 3. Summary of rule compliance rates by rule group.

Rule Group	Rule Group Description	Occasions	Complied	Percent
General (020.01)	rule variance procedures	42	37	88
Harvest and stream protection (030)	trails, slash and landings	1,020	980	95
Road construction (040.02-03)	plans and stability	315	310	98
Road maintenance (040.04-05)	active, inactive, abandoned, and winter operations	334	327	97
Chemicals (060)	chemicals and petroleum products	85	83	98

Compliance By Individual Rule

General rules (020.01) -

We assessed compliance with three variance rules and observed five instances of non-compliance. These instances of noncompliance involved the use of existing trails or roads within a stream protection zone (SPZ) without a variance (Table 4).

Table 4. Summary of compliance with general rules.

Rule	Occasions	Complied	Percent
020.01.a.i.	13	11	85
020.01.a.ii.	15	14	93
020.01.a.iii.	14	12	86

Harvest and stream protection rules (030) –

We assessed compliance with 29 harvest and stream protection rules and observed 40 instances of noncompliance involving 18 of these rules (Table 5). Nineteen of the 40 noncompliance instances involved just four of these rules, three of which are SPZ rules. These nineteen included six instances of noncompliance with rule 030.05.a. (inadequate skid and fire trail stabilization), five instances of noncompliance with rule 030.07.c. (operation of ground-based equipment within the SPZ), four instances of noncompliance with rule 030.04.a. (placement of landings, skid trails, or fire trails within the SPZ), and four instances of noncompliance with rule 030.07.f.ii. (mechanical piling of slash within the SPZ). Noncompliance with these four rules, indicated with red-highlighted rows in Table 5, is addressed in the Discussion section.

Table 5. Summary of compliance with harvest and stream protection rules. Red highlighting indicates noncompliance.

Rule	Occasions	Complied	Percent
030.03.a.	39	37	95
030.03.b.	35	35	100
030.03.c.	38	38	100
030.03.d.	26	26	100
030.04.a.	41	37	90
030.04.b.	42	42	100
030.04.c.	40	40	100
030.05.a.	39	33	85
030.05.b.	38	38	100
030.06.a.	41	39	95
030.06.b.	33	33	100
030.06.c.	41	40	98
030.07.a.	2	1	50
030.07.b.	37	36	97
030.07.c.	38	33	87
030.07.d.	23	23	100
030.07.e.i.	39	38	97
030.07.e.ii.	41	39	95
030.07.e.iii.	41	39	95
030.07.e.iv.	42	42	100
030.07.e.v.	41	39	95
030.07.e.vi.	42	40	95
030.07.e.vii.	41	41	100
030.07.e.viii.	13	12	92
030.07.e.ix.	14	14	100
030.07.f.	37	35	95
030.07.f.i.	37	36	97
030.07.f.ii.	40	36	90
030.08.c.	39	38	97

Road plans and construction rules (040.02 and 040.03) –

We assessed compliance with 13 individual road planning and construction rules and observed five instances of noncompliance involving five of these rules (Table 6). Four of these instances of noncompliance pertained to inadequate clearing of erodible construction debris, inadequate stabilization of erodible surfaces, or failure to postpone earth work or hauling during wet periods.

Table 6. Summary of compliance with road planning and construction rules.

Rule	Occasions	Complied	Percent
040.02.a.	30	30	100
040.02.b.	28	28	100
040.02.c.	30	30	100
040.02.d.	30	30	100
040.02.h.	28	27	96
040.03.b.	25	24	96
040.03.c.	25	24	96
040.03.d.	23	23	100
040.03.e.	22	22	100
040.03.g.	25	25	100
040.03.h.	21	20	95
040.03.i.	20	19	95
040.03.j.	8	8	100

Road maintenance and winter operation rules (040.04 and 040.05) –

We assessed compliance with 19 individual road maintenance and winter operation rules and observed seven instances of noncompliance involving five of these rules (Table 7). Four of these noncompliance instances involved just two of these rules. These four included two instances of noncompliance with rule 040.04.b. (inadequate stabilization of slumps or slides) and two instances of noncompliance with rule 040.04.f.ii. (long-term inactive roads inadequately blocked to vehicular traffic).

Table 7. Summary of compliance with road maintenance and winter operation rules.

Rule	Occasions	Complied	Percent
040.04.a.	38	38	100
040.04.b.	15	13	87
040.04.c.i.	31	30	97
040.04.c.ii.	32	32	100
040.04.c.iii.	32	32	100
040.04.c.iv.	28	27	96
040.04.c.v.	31	31	100
040.04.e.i.	18	17	94
040.04.e.ii.	15	15	100
040.04.f.i.	8	8	100
040.04.f.ii.	6	4	67
040.04.f.iii.	3	3	100
040.04.g.i.	7	7	100
040.04.g.ii.	7	7	100
040.04.g.iii.	8	8	100
040.04.g.iv.	6	6	100
040.04.g.v.	7	7	100
040.05.a.	21	21	100
040.05.b.	21	21	100

Chemical and petroleum product rules (060.02) –

We assessed compliance with four individual chemical and petroleum product rules (Table 8) and observed two instances of noncompliance involving rule 060.02.c. (failure to remove petroleum or non-biodegradable waste).

Table 8. Summary of compliance with chemical and petroleum product rules.

Rule	Occasions	Complied	Percent
060.02.	30	30	100
060.02.a.	11	11	100
060.02.b.	16	16	100
060.02.c.	28	26	93

Discussion of the Rule Compliance Assessment

This discussion is broken into overall observations, discussion of four rules that represented a significant portion of the noncompliance observed, and some miscellaneous observations.

Overall Observations Regarding Rule Compliance

The 2008 Audit data indicate that overall compliance rates remain high for state, federal, and industrial landownership categories. These data suggest the overall compliance rate for the NIPF landownership category may be declining since 2000 and that these compliance issues primarily involve the harvest and stream protection rules (rule 030.07). Of the 32 NIPF noncompliance instances, 27 involved the timber harvesting rules (rule 030). The NIPF noncompliance instances suggest that increased information concerning the forest practices rules may need to be distributed to NIPF applicants when they submit notification of a potential forest practice.

Noncompliance with Four Individual Rules

The following paragraphs discuss the four individual rules that represent almost half of the observed noncompliance involving 18 harvest and stream protection rules (rule 030).

Rule 030.04.a.

The four instances of noncompliance with rule 030.04.a. occurred on lands with three different ownership types. In three of the noncompliance instances, a single skid trail was found within the SPZ and in one instance it was uncertain whether the skid trail was from the sale being audited or a prior sale. No sediment delivery was noted in any of these instances. The instances of noncompliance with this rule were failures to completely implement the rule, not issues with the rule itself. No rule changes are recommended.

Rule 030.05.a.

The six instances of noncompliance with rule 030.05.a. occurred across all four types of landownership. Sediment movement occurred in one of these instances and the landowner was cited by IDL and had complied with the remediation prescription prior to the audit. Minor rilling was noted in three of these instances and in one instance, cross-drainage needed to be applied before the start of typically expected wet weather. No sediment had been delivered to streams or channels in any of these six instances. The instances of noncompliance with this rule were failures to completely implement the rule, not issues with the rule itself. No rule changes are recommended.

Rule 030.07.c.

The five instances of noncompliance with rule 030.07.c. occurred on lands with three different types of ownership. In one instance, it was uncertain whether the noncompliant skid trail resulted from the timber sale being audited or from a prior sale. No sediment delivery was noted from any of these instances. The instances of noncompliance with this rule were failures to completely implement the rule, not issues with the rule itself. No rule changes are recommended.

Rule 030.07.f.ii.

The four instances of noncompliance with rule 030.07.f.ii. occurred on lands with two types of ownership. In one instance, it was uncertain whether the slash in the SPZ resulted from the timber sale being audited or from a prior sale. No instances of slash delivery to a stream were noted. The instances of noncompliance with this rule were failures to completely implement the rule, not issues with the rule itself. No rule changes are recommended.

Miscellaneous Observations Regarding Rule Compliance

As we conducted the Audit, we observed some confusion concerning the term “wet draw” in rule 030.08.c. In our discussions with the audit participants, it was suggested that a definition of “wet draw” might be added to the definitions in rule 010 or the phrase “as indicated by the presence of ‘water-loving vegetation’” could follow the words “wet draw” in rule 030.08.c.

While conducting the audit, we occasionally observed cross-ditching of trails (skid and/or fire) where a drainage outlet was not provided. In these instances, water would pool on the trail rather than drain from it. Operators should be reminded that an outlet is necessary when installing water drainage structures.

Invasive plants (primarily knapweed and thistles) typically become established on disturbed ground. It was suggested that the Forest Practices Act Advisory Committee initiate a discussion of the feasibility of cleaning equipment during both pre- and post-harvest activities in an effort to reduce the spreading of invasive species.

The Audit team also observed a number of BMPs which were particularly effective in reducing soil erosion. We commend the use of slash mats on skid trails and the surfacing of roads, particularly at approaches to water crossings. These practices should be encouraged across the state.

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Stream Crossings Component of the Audit

This section discusses the stream crossings component of the 2008 Audit, which addressed the fish passage and 50-year peak flow rules.

Background

The stream crossing audit was conducted to assess compliance with the fish passage rule (040.02.e.i.) and the 50-year peak flow rule (040.02.e.ii.). The stream crossings audit was conducted in response to findings of the 2000 (Hoelscher et al. 2001) and 2004 (McIntyre et al. 2005, 2007) audits and observations of culvert installation issues by the Idaho Department of Lands interdisciplinary (ID) team during their cumulative watershed effects (CWE) analyses. Seventeen of the 26 culverts assessed in the 2000 and 2004 water quality audits (65%) did not comply with the fish passage rule. Data from six culverts observed in 2004 were modeled using the *FishXing* software (U. S. Department of Agriculture 1999) to assess fish passage. None of these six culverts were predicted to allow fish passage.

Methods

Different methods were used to assess stream crossings involving the fish passage rule in (040.02.e.i.) than to assess stream crossings involving the 50-year Peak Flow Rule (040.02.e.ii.), as described in the following sections.

Fish Passage Rule (040.02.e.i.)

The ID team evaluated stream crossings for provision of fish passage. The ID team consisted of four individuals: an engineering geologist, a fish biologist, a hydrologist, and a wildlife biologist. Twenty-three sites were audited (Figure 3).

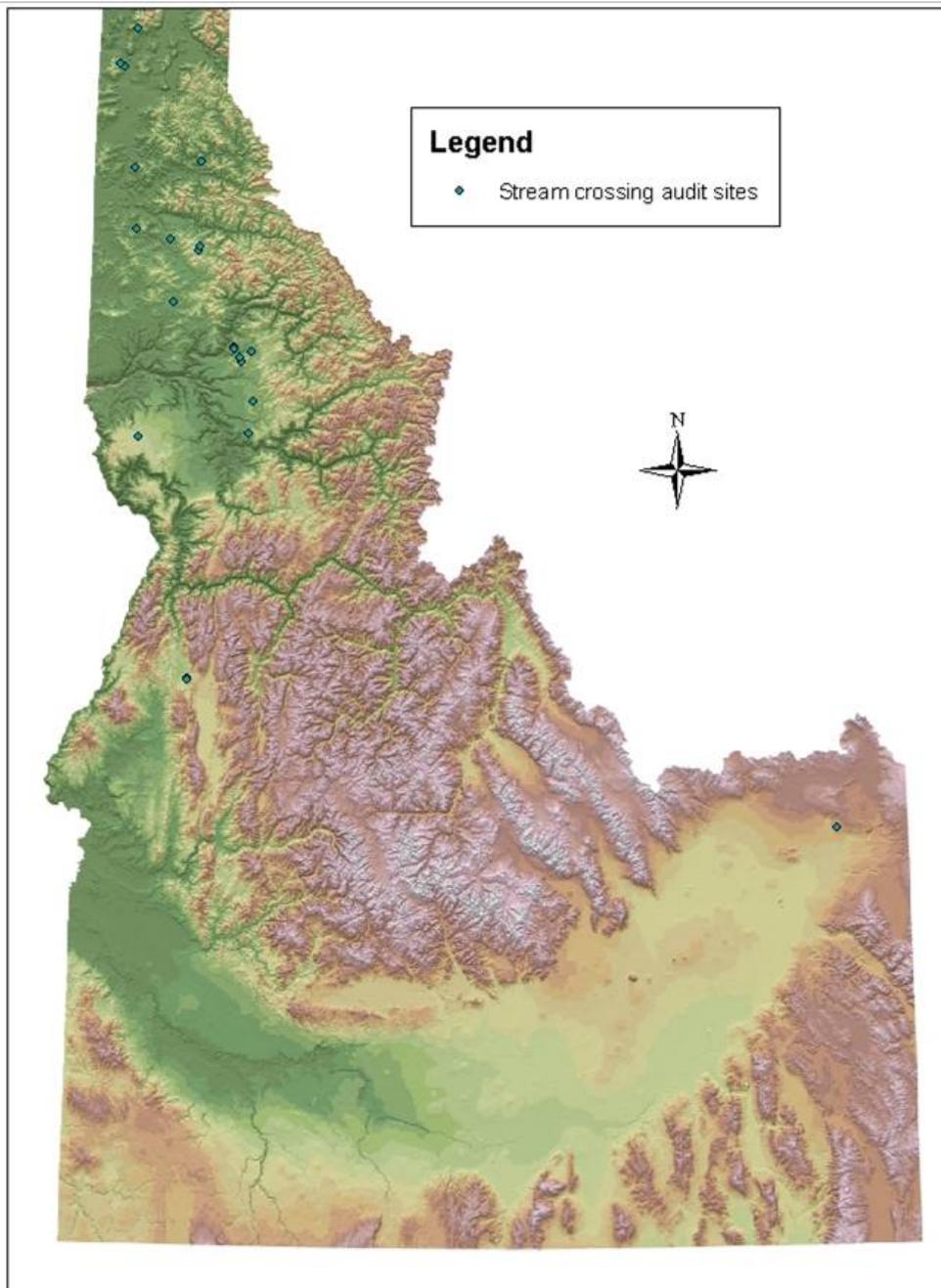


Figure 3. Locations of stream crossings at audit sites.

Stream crossings were selected based on the following criteria:

- The crossing is located on a Class I (fish-bearing) stream.
- The crossing was installed within the past 2 years (2006 or 2007).
- The operator had applied for a stream channel alteration permit with IDL.

Seven stream crossings occurred on State lands, ten occurred on private industrial lands, and six occurred on private non-industrial lands. No stream crossings from federal sites were audited by the ID team. Ten of the 23 stream crossings were not analyzed for fish passage due to their design. These ten stream crossings simulated the stream channel by retaining substrate within the structure or naturally on the stream bottom and were considered fish-passable. These stream crossings included one bottomless structure, five bridges, three fords, and one pipe-arch culvert. The bridges were analyzed against the Idaho Stream Channel Alteration (SCA) Rule (Idaho Department of Water Resources 1993; IDAPA 37.03.07.062.04.e.), which states: “Minimum clearance shall be at least one (1) foot on all bridges...” All five bridges met this requirement.

The 13 remaining stream crossings (hydraulic design) were analyzed for fish passage based on the criteria listed in the Stream Channel Alteration SCA Rules (Idaho Department of Water Resources 1993; IDAPA 37.03.07.062.04. g-h. and 05.a.), which require:

- minimum water depth for salmon and steelhead of at least eight inches, and in all other cases, three inches (rule 04.g).
- maximum flow velocities for streams shall not exceed those shown in the Alaska curve (Idaho Department of Water Resources 1993; IDAPA 37.03.07.062.04.h., Figure 17 in Appendix N, page 29) for more than a 48-hour period (rule 04.h). The curve used will depend on the species of fish to be passed. [For the purposes of this analysis, the trout

curve was used, which specifies a maximum flow velocity in the stream of approximately four feet per second (ft/s).]

- upstream drops at the entrance to a culvert (inlet drops) will not be permitted, and a maximum drop of one foot will be permitted at the downstream end of a culvert if an adequate (typically 1.25 times the height of the outlet drop) jumping pool is maintained below the drop (rule 05.a).

The 13 culvert crossings designed using hydraulic criteria were also assessed for FPA Rules 040.02.e.i., fish passage, having been installed in 2006 or 2007 and therefore subject to the 2006 version of the FPA Rules (IDAPA 20.02.01.040.02). Data measured on these 13 crossings were analyzed using the *FishXing 3* software (U. S. Department of Agriculture 2006), a widely used and accepted tool for analyzing stream crossings for fish passage. In order to run the *FishXing 3* software, certain physical and biological data were required. The ID team measured culvert length, culvert span, culvert height, outlet drop, inlet drop, water depth at the outlet, corrugation, and the elevation of the inlet and outlet inverts. Biological data required for the fish passage assessments were based on a selection of the species, age, and length of fish of concern. The Idaho Forest Practices Act Advisory Committee decided to assess stream crossings for their potential to allow passage of an adult (six-inch or greater) cutthroat trout (*Oncorhynchus clarkii*). Velocity and depth requirements were based on this species.

The required hydrologic information included an estimate for high and low design flows. The Audit team, in consultation with the ID team during the 2004 water quality audit (McIntyre et al. 2005, 2007), chose the 5% and 95% annual exceedance design flows to assess existing stream

crossings on Class I streams for fish passage. The 5% and 95% annual exceedance flows were chosen because these design flows are generally considered to be the bounds at which fish will use the crossing structure. The same annual exceedance flows were used for assessment during this audit.

Annual 5% exceedance is the high passage design flow and represents the mean daily average stream discharge that is exceeded 5% of the time during an average year. The 5% exceedance is used to compare the velocity requirements allowed for fish passage based on maximum swimming ability of the fish, 4 ft/s for a 6-inch cutthroat trout. Annual 95% exceedance is the low passage design flow and represents the mean daily average stream discharge that is exceeded 95% of the time during an average year. This exceedance flow is used in estimating the water depth allowable for passing fish, 3 inches for a 6-inch cutthroat trout.

To determine these design flows, daily stream flow data from 30 U.S. Geological Survey (USGS) gauging stations in Idaho, each with at least five complete years of historical data and a drainage area of less than 50 square miles, were analyzed. Flow-duration curves were then used to determine the 5% and 95% annual exceedance flows at each gauging station. These flows were fit to a line and the slope of the line was used to extrapolate an exceedance flow per drainage area for both the low and the high design flows. For the 13 analyzed culverts, these flows per drainage area were then multiplied by the drainage area to determine the 5% and 95% annual exceedance flows for each particular culvert. The values from this analysis were then entered into *FishXing 3*.

Fifty-Year Peak Flow Rule (040.02.e.ii.)

Thirteen stream crossings were measured and analyzed for 50-year peak flow. To assess whether the culverts were adequate to pass the 50-year peak flow, the ID team measured culvert dimensions and calculated culvert drainage area. The ID team measured culvert length, diameter, and height to estimate water delivery capacity (cubic feet/second). The drainage acreage above each culvert was calculated using the USGS/ ESRI StreamStats application for Idaho (Web site: <http://water.usgs.gov/osw/streamstats/instructions.html>). Culverts were considered in compliance with the 50-year peak flow rule when the actual culvert diameter was equal to or greater than the calculated diameter necessary to carry a 50-year peak flow or when the actual calculated open area (square feet) of the culvert was equal to or greater than the calculated open area needed to pass the 50-year peak flow.

Peak flow was determined using the Thomas method (Thomas et al. 1973). The Thomas method breaks the state of Idaho into eight regions (Thomas Regions) and gives a separate regression equation for each region to calculate the flood flow (peak flow) for a 10-year recurrence interval. In order to calculate peak flow, drainage area was needed for all Thomas Regions and percentage of forest cover was needed for specific regions, including Region 2. The peak flow for a 10-year recurrence interval was then multiplied by a specific ratio to estimate the 50-year flood flow.

Results

Fish Passage Rule (040.02.e.i.)

Of the 23 crossings the ID team inspected in 2008, 10 were stream channel simulation structures (bottomless, bridge, or buried) and 13 were hydraulic design, non-embedded culverts. The 10 stream channel simulation structures were on Mica Creek, Turner Creek, Mission Creek, Cabin

Creek, North Fork Big Creek, South Fork Big Creek, Soldier Creek, Happy Fork Big Creek and Little Creek (two crossings). All of these structures were in compliance with the fish passage rule and the findings of the ID team pertaining to them are summarized in Table 9.

Table 9. Summary of attributes of the 10 stream crossings that simulate the stream channel. No outlet or inlet drops were observed. Water velocity and depth in the culverts were the same as in the streams.

Site	Culvert Gradient (%)	Drainage Area (acres)	Outlet Drop (ft)	Inlet Drop (ft)	Length (ft)	Fish Passable due to Velocity	Fish Passable due to Depth	Fish Passable due to Outlet Drop	Fish Passable due to Inlet Drop	Fish Passable Overall
Mica Creek	n/a	6944	n/a	n/a	50	n/a	n/a	n/a	n/a	Yes
Turner Creek	n/a	1465	n/a	n/a	35	n/a	n/a	n/a	n/a	Yes
Mission Creek	n/a	9804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes
Cabin Creek	n/a	723	n/a	n/a	30	n/a	n/a	n/a	n/a	Yes
North Fork Big Creek	n/a	832	n/a	n/a	35	n/a	n/a	n/a	n/a	Yes
South Fork Big Creek	n/a	1337	n/a	n/a	35	n/a	n/a	n/a	n/a	Yes
Soldier Creek	2.7	620	n/a	n/a	36	n/a	n/a	n/a	n/a	Yes
Happy Fork Big Creek	n/a	2419	n/a	n/a	40	n/a	n/a	n/a	n/a	Yes
Little Creek 1	n/a	6579	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes
Little Creek 2	n/a	6528	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

The 13 hydraulic design culverts were located on Pierson Creek (two culverts), an unnamed tributary to Mica Creek, Loop Creek, an unnamed tributary to Curtis Creek (two culverts), Spring Creek, Lightner Creek, an unnamed tributary to Snake Creek (three culverts), an unnamed tributary to Benewah Creek, and an unnamed tributary to the Potlatch River. Results of the fish passage analysis of these 13 culverts indicate four (31%) are in compliance with the fish passage rule; the findings of the ID team are summarized in Table 10.

Table 10. Summary of attributes for the 13 stream crossings with hydraulic design culverts. UNT stands for unnamed tributary; red highlighting indicates noncompliance.

Site	Culvert Gradient (%)	Drainage Area (acres)	Outlet Drop (ft)	Inlet Drop (ft)	Length (ft)	Fish Passable due to Velocity	Fish Passable due to Depth	Fish Passable due to Outlet Drop	Fish Passable due to Inlet Drop	Fish Passable Overall
Pierson Creek 1	1.5	902	No	No	30	Yes	Yes	Yes	Yes	Yes
Pierson Creek 2	0.3	832	No	No	32	Yes	Yes	Yes	Yes	Yes
UNT Mica Creek	6.6	659	0.04	No	60	No	No	No	Yes	No
Loop Creek	-1.1	25	No	No	18.5	Yes	Yes	Yes	Yes	Yes
UNT Curtis Creek 1	2.7	876.8	No	No	40	No	No	Yes	Yes	No
UNT Curtis Creek 2	0.3	3056	0.2	No	40	No	No	Yes	Yes	No
Spring Creek	1.0	2944	No	No	27	No	Yes	Yes	Yes	No
Lightner Creek	1.4	819	.26	No	32	Yes	No	Yes	Yes	No
UNT Snake Creek 1	1.8	364	No	No	60	Yes	No	Yes	Yes	No
UNTSnake Creek 2	0.4	825	.76	0.2	40	Yes	No	No	No	No
UNT Benewah Creek	2.6	691	No	No	40	No	No	Yes	Yes	No
UNT Snake Creek 3	2.6	109	No	0.1	44	Yes	No	Yes	No	No
UNT Potlatch River	0.6	1273	No	No	36	Yes	Yes	Yes	Yes	Yes

Fifty-year Peak Flow Rule (040.02.e.ii.)

Results of 50-year peak flow analysis (Table 11) of 13 crossings analyzed show that one (Spring Creek) is inadequate for carrying a 50-year peak flow and is not in compliance with the criteria of rule 040.02.e.ii.

Table 11. Fifty-year peak flow culvert assessment. Red highlighting indicates noncompliance.

Site	Thomas Region	Drainage Area (Acres)	Forested Area (%)	50-Year Peak Flow (cfs)	50-Year Diameter (in)	Culvert Diameter/ dimensions (in)	Meets 50-year flow requirement
Pierson Ck 1	1	902	n/a	100.45	60	73x55	Yes
Pierson Ck 2	1	832	n/a	110.19	60	77x56	Yes
Trib to Mica Ck	1	659	n/a	76.61	54	62x48	Yes
Loop Ck	1	25.6	n/a	4.66	18	31	Yes
Trib to Curtis Ck 1	2	876.8	98.4	43.46	42	68x52	Yes
Trib to Curtis Ck 2	2	3056.6	87.1	144	60	68x54	Yes
Spring Ck	6	2944	n/a	68.57	54	47x38	No
Lightner Ck	1	819	n/a	92.40	60	70x38	Yes
Trib to Snake Ck 1	1	364.8	n/a	46.01	48	56x42	Yes
Trib to Snake Ck 2	1	825.6	n/a	93.04	60	72x49	Yes
Trib to Benewah Ck	1	691.2	n/a	79.82	54	72x47	Yes
Trib to Snake Ck 3	1	109	n/a	16.24	30	60	Yes
Trib to Potlatch River	1	1273.6	n/a	135.18	66	77x52	Yes

Discussion of the Stream Crossings Audit Component

There are two types of stream crossings, those that are said to simulate the stream channel by retaining a nearly natural channel (e.g., bridges, fords, bottomless structure, etc.) and those utilizing hydraulic design (i.e. non-embedded culverts). Structures that simulate the stream channel had 100% compliance in this audit and we accordingly consider the rule effective. Our results suggest that culvert design and installation are problematic. The SCA rule criteria apply to hydraulic design, non-embedded culverts.

The velocity criteria and the inlet and outlet drop criteria in the SCA rule are appropriate to stream crossing design and implementation. The SCA rules specify a minimum water depth of 3 or 8 inches in a culvert depending on species present. These criteria are impossible to meet if the stream does not contain 3 or 8 inches of water. This situation often occurs during the dry season. For example, if the water depth at a riffle in the creek adjacent to the culvert is 1 inch deep, then it is unreasonable to expect 3 inches of water in the culvert. It would be more logical for the rule to state the water depth in the culvert must be greater than or equal to the depth of water in representative riffles in the stream. The velocity criteria are effective but perhaps a little difficult to measure and enforce for the average forester, contractor, logger, or regulator. For this analysis, the *FishXing 3* software (U.S. Department of Agriculture 2006) was utilized to derive water velocity in the culverts for consistency and accuracy with the 2004 audit.

For simplistic design and regulation of the velocity criteria in streams with a gradient of 3% or less, we suggest the use of Chart 1 in the IDL Fish Passage Guidelines When Installing Stream Crossings (IDL 2009), shown here in Table 12. Chart 1 shows the maximum allowable gradient at which a traditional non-embedded culvert can be installed that will meet Idaho's hydraulic

design criteria for fish passage; it assumes the culvert is sized to pass the flow from a 50-year flood event. Chart 1 relates the area of the drainage above the culvert to the maximum allowable gradient of the culvert to be installed. The criteria from Chart 1 could be used to guide culvert installation and to evaluate compliance with the velocity criteria. Chart 1 (Table 12) is relatively simple and relies on the empirical relationship between 5% and 95% exceedance flows and the size of a round culvert sized specifically to pass the 50-year flood flow based on watershed drainage area. These relationships are constant and allow water velocity in the culvert to vary with its slope. To use Chart 1, the existing stream slope must be measured with survey equipment and the watershed area above the culvert must be known.

Table 12. Chart 1. This chart assumes the use of a round culvert sized for the 50-year flood event. From the Idaho Department of Lands Fish Passage Guidelines When Installing Stream Crossings (IDL 2009).

Drainage Area (acres)	Maximum Allowable Gradient (%) of Installed Culvert
< 201	3
201 - 350	2
351 – 1,000	1
1,001 – 2,600	0.5
2,601 – 8,200	0

Rule Recommendations

Harvest and Stream Protection Rules

- Provide more information concerning the forest practices rules to those in the NIPF landownership category when they submit notification of a potential forest practice.
- Define “wet draw” in rule 010 or add the phrase “as indicated by the presence of ‘water-loving vegetation’” following the words “wet draw” in rule 030.08.c.
- Remind operators that an outlet is necessary on water drainage BMPs.
- Suggest the Forest Practices Act Advisory Committee initiate a discussion of the feasibility of operators cleaning (spraying) their equipment they use during both pre- and post-harvest activities in an effort to reduce the spreading of invasive species.

Fish Passage and Fifty-Year Flow Rules

The following recommendations are based on the 2004 and 2008 water quality audit data and the stream crossing design and implementation experience of the ID team.

- Provide training regarding hydraulically-designed culvert installation and regulation, targeted to small private and industrial landowners.
- Adopt Chart 1² as guidance for hydraulic design of culverts and the regulation of velocity according to the criteria of the SCA rules.
- Recommend a revision of the SCA rule regarding minimum water depth to read: “The minimum required water depth for salmon and steelhead is at least 8 inches, and in all other cases 3 inches, or mimic the depth at an adjacent representative riffle.”

² From the Idaho Department of Lands Fish Passage Guidelines When Installing Stream Crossings (IDL 2009).

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Appendix 1: Timber sales audited for rule compliance.

Sale Name	Type	Date
57 Bear Paws	Federal	4-Sep
Bear North	Federal	6-Oct
Bear South	Federal	6-Oct
Between Creek	Industrial	23-Sep
BFI Anderson	Industrial	23-Jul
Brown Molar	State	2-Sep
Brush Boulder	Federal	12-Aug
Cabin Salvage	Federal	13-Aug
Cat Hunt	State	3-Sep
Charles Rogers	Non-industrial	26-Aug
Corral Reservoir	Industrial	28-Jul
Cougar Creek Salvage	State	17-Jul
Coyote Viewshed	Industrial	9-Sep
Crooked River Stewardship	Federal	24-Sep
Daryl Swanstom	Non-industrial	17-Sep
Dave Finley	Non-industrial	18-Aug
Deer OSR	State	22-Sep
Don Salisbury	Non-industrial	5-Aug
Dry Buck Creek	Industrial	14-Aug
Forest Capital	Industrial	20-Aug
Gold Cup II	State	25-Aug
Grays Range	Federal	6-Aug
Hubbard Timberland Corp.	Non-industrial	29-Jul
Iron Creek Parking Lot Salvage	Federal	31-Jul
Lake Fly	State	3-Sep
Little Bald Skeel	State	16-Jul
Lower Rock Road	Federal	11-Aug
Maggie's Face	State	22-Jul
Mary Jacket OSR	State	15-Sep
Middle Fork Fox Creek	State	25-Aug
Michael Bologna	Non-industrial	19-Aug
Pat Suchoski	Non-industrial	8-Sep
Peek-A-Boo Rock	Industrial	23-Sep
Phil Duff	Non-industrial	8-Aug
Pokey Creek	State	16-Sep
Richard Rorvig	Non-industrial	8-Sep
Ted Peterson	Non-industrial	24-Jul
Tunnel Creek	Industrial	26-Aug
Two Ponds	Industrial	19-Sep
Upper Poorman	State	22-Sep
Waddell Grazing	Industrial	9-Sep
West Middle Mud	Industrial	29-Jul
West Mountain North	Federal	30-Jul

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Appendix 2: Individual rules audited for compliance.

Rule	Rule Group	Description
020.01.a.i.	general	variance request
020.01.a.ii.	general	variance determination
020.01.a.iii.	general	equivalent or better results
030.03.a.	harvest	ground-based skidding
030.03.b.	harvest	maximum 30% gradient constructed skid trails
030.03.c.	harvest	minimum skid trail width and number
030.03.d.	harvest	downhill cable yarding limitation
030.04.a.	harvest	landings, trails on stable areas; sidecasting minimum
030.04.b.	harvest	minimum landing size
030.04.c.	harvest	landing fill free of loose stumps and slash
030.05.a.	harvest	stabilize skid and fire trails
030.05.b.	harvest	stabilize landings
030.06.a.	harvest	slash removal from class I streams
030.06.b.	harvest	slash removal from class II streams
030.06.c.	harvest	deposit landing and trail waste outside of SPZ
030.07.a.	harvest	lake riparian management prescription
030.07.b.	harvest	no skidding through streams without temporary crossing
030.07.c.	harvest	no ground based operations in SPZ
030.07.d.	harvest	minimize stream bank and channel disturbance
030.07.e.i.	harvest	leave trees for stream shade
030.07.e.ii.	harvest	leave 75% current shade over class I streams
030.07.e.iii.	harvest	leave LOD over class I streams
030.07.e.iv.	harvest	leave portions of naturally fallen trees over class I streams
030.07.e.v.	harvest	remove non-LOD slash from streams - 030.06 consistent
030.07.e.vi.	harvest	standing tree requirement
030.07.e.vii.	harvest	leave snags
030.07.e.viii.	harvest	standing tree, shade variance
030.07.e.ix.	harvest	opposite side standing tree requirement
030.07.f.	harvest	prescribed burns in SPZ
030.07.f.i.	harvest	hand piles 5 ft. from OHWM
030.07.f.ii.	harvest	no mechanical slash piles in SPZ
030.08.c.	harvest	avoid wet areas
040.02.a.	Road construction	plan to avoid roads in SPZ
040.02.b.	Road construction	plan roads no wider than necessary
040.02.c.	Road construction	plan roads to drain naturally
040.02.d.	Road construction	plan culverts and ditches to protect running surface
		avoid reconstruction of existing roads in SPZ; variance
040.02.h.	Road construction	required
040.03.b.	Road construction	clear road construction debris
040.03.c.	Road construction	stabilize exposed areas
040.03.d.	Road construction	compact road fill
040.03.e.	Road construction	retain out-slope drainage; remove berms

Rule	Rule Group	Description
040.03.g.	Road construction	minimize erosion of embankments
040.03.h.	Road construction	postpone earthwork or hauling during wet periods
040.03.i.	Road construction	minimize cut-slope sloughing
040.03.j.	Road construction	>60% grade roads full benched
040.04.a.	Road maintenance	prevent road maintenance debris from entering streams
040.04.b.	Road maintenance	repair/stabilize slumps and slides
040.04.c.i.	Road maintenance	active roads: culverts/ditches functional
040.04.c.ii.	Road maintenance	active roads: surface maintenance at end of season
040.04.c.iii.	Road maintenance	active roads: maintain proper drainage; minimize subgrade erosion
040.04.c.iv.	Road maintenance	active roads: postpone hauling during wet periods
040.04.c.v.	Road maintenance	active roads: prevent surface materials from entering streams
040.04.e.i.	Road maintenance	inactive roads: ditches/culverts cleared, surface maintained
040.04.e.ii.	Road maintenance	inactive roads: may be blocked
040.04.f.i.	Road maintenance	long term inactive roads: control erosion
040.04.f.ii.	Road maintenance	long term inactive roads: blocked
040.04.f.iii.	Road maintenance	long term inactive roads: remove or maintain bridges/culverts
040.04.g.i.	Road maintenance	abandoned roads: remove drainage structures, stream gradient restored
040.04.g.ii.	Road maintenance	abandoned roads: break up compacted areas
040.04.g.iii.	Road maintenance	abandoned roads: SPZ fill slopes pulled back to stable
040.04.g.iv.	Road maintenance	abandoned roads: side hill fills pulled back to stable
040.04.g.v.	Road maintenance	abandoned roads: control ditch line erosion
040.05.a.	Road winter operation	install drainage prior to operations
040.05.b.	Road winter operation	keep surface drained during thaws and breakup
060.02.	Chemicals/petroleum	containers >200 gal. more than 100' from open water
060.02.a.	Chemicals/petroleum	transfer operations shall be attended, should not be near open water
060.02.b.	Chemicals/petroleum	maintain petroleum equipment in leak proof condition
060.02.c.	Chemicals/petroleum	petroleum waste shall be removed and properly disposed

Appendix 3: Compliance field form.

Project Identification

Name: _____ Notification No: _____ Audit No.: _____

Federal () State () Private Industrial () Private Non-Industrial ()

Owner: _____

Operator: _____

Forester-in-charge: _____

Date evaluated: _____

Audit team members and observers: _____

Project Location (attach map)

FPA Region: North () South () County: _____

Legal Description: Section(s) _____ Township _____ Range _____

Latitude: _____ Longitude: _____

Physical Environment

Elevation (ft or m): Mean _____ Range _____

Climate: Annual Precipitation (in. or cm.) _____

Antecedent Conditions _____

Slope (%): Mean _____ Range _____ Aspect _____

Geology: Decomposed Granite () Alluvium () Lacustrine () Dredge Tailings ()

Other: _____

CWE Hazard Rating: _____Vegetation [indicate dominant

(D) and subdominant (S) stand composition]:

Upland Fir () Pine () Cedar () Hemlock () Hardwood ()

Riparian Coniferous () Hardwood () Shrub () Sedges/Grasses ()

Habitat Type: _____

BMP Compliance and Effectiveness Ratings (refer to scaling factors)

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
020.01. Compliance			
a.i. operator submitted variance request			
a.ii. IDL evaluated and notified			
a.iii. provided equal protection			
b. complied with all applicable rules			
030.03. Soil Protection			
a. no skidding-caused rutting nor erosion 45% skidding limitation adjacent to stream and notification			
b. 30% skid trail limitation			
c. minimum skid trail width and number tractor size appropriate			
d. no cable-yarding rutting nor erosion			
030.04. Location of Landings and Trails			
a. stable location and outside SPZ trail sidecasting minimum			
b. minimum landing size			
c. landing fill material and sidecast stable			
030.05. Drainage Systems			
a. trail drainage and			
b. landing drainage and stabilization			

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
030.06. Treatment of Waste Materials			
a. slash and debris out of Class I stream			
b. slash and debris out of Class II stream			
c. landings and trails waste outside SPZ			
030.07. Stream Protection			
a. lakes site-specific plan/prescription within SPZ			
b. stream skidding prohibited temporary crossings and stabilization			
c. no ground-based equipment or operations in SPZ			
d. cable yarding within SPZ			
e.i. vegetative shade and soil integrity			
e.ii. 75% current shade over Class I stream			
e.iii. SPZ LOD, shading and filtering characteristics maintained			
e.iv. leave leaning/down trees in SPZ			
e.v. SPZ slash removal for non-LOD			
e.vi. SPZ standing tree requirement			
e.vii. Snags—height and 50% limit			

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
e.viii. Variance for site-specific SPZ plan			
e.ix. Opposite-side SPZ lacking			
e.x.f. Prescribed burns in SPZ			
e.x.f.i Hand piles at least 5 ft. from OHW mark			
e.x.f.ii No mechanical piling in SPZ			
030.08. Maintenance of Related Values			
a. aesthetic values preserved			
b. critical aquatic/wildlife habitat preserved			
c. wetlands avoidance			
d. wildlife escape cover within ¼ mile			
031.02. Cumulative Watershed Effects			
d. review and approval of CWE BMPs			
031.03. CWE BMP implementation (describe fully below)			
a. CWE BMPs applied			
031.04. SS of C BMPs applied			
040.02. Road Specifications and Plans			

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
a. avoid roads in SPZ, leave/est. vegetation between roads and streams			
b. plan road width for safe access plan minimum cut and fill, compact fill			
c. plan road drainage			
d. plan ditches and culverts to prevent erosion of fill, min discharge to streams			
e.i. culvert provides fish passage			
e.ii. culvert 50 year design adequate			
e.iii relief, wet area culvert 12" area 12" minimum stream crossings			
f. replacement of existing culverts			
g. SCPA compliance			
h. avoid reconst. of SPZ roads variance for reconst. required			
040.03. Road Construction			
a. road const plan followed plans			
b. debris cleared from drainage, excess mat on stable sites			
c. stabilized exposed materials			

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
d. compacted road fill near streams, minimize wood in fills, slash filter OK			
e. retain outslope drainage, protect fill			
f. provide quarry drainage			
g. drains and culverts minimize fill erosion, install drainage prior to runoff, relief culverts < 1%			
h. earthwork, hauling suspended during wet periods			
i. minimize cut slope slumping, remove material subject to sloughing			
j. full bench roads on slopes > 60%			
040.04. Road Maintenance			
a. sidecast material so no entry to streams			
b. repair and stabilize sediment hazards, slumps, slides			
c.i. Active Roads. Culverts and ditches functional on active roads			
c.ii. road surface drained and berms removed on active roads.			

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
c.iii. minimal subgrade erosion on active roads			
c.iv. postpone hauling			
c.v. surface-stabilizing materials out of streams			
e.i. inactive road drainage, minimized erosion, functional ditches and culverts			
e.ii. roads blocked to seasonal traffic			
f.i. long-term inactive roads are left in a condition to control erosion.			
f.ii. long-term inactive roads are blocked to vehicular traffic			
f.iii. on long-term inactive roads, bridges or culverts left must be maintained			
g.i. on permanently abandoned roads, drainage structures removed, stream grades restored			
g.ii. road system treated to break up compacted areas			
g.iii. SPZ fill slopes pulled to stable configuration			
g.iv. Unstable sidehill fills pulled back to stable			
g.v. ditch line erosion controlled			

Forest Practices Act Administrative Rule	Rating		Comments
	Compliance	Effectiveness	
040.05. Winter Operations			
a. surface and cross drainage installed on roads and constructed skid trails prior to winter operations			
b. maintained road surface and adequate drainage installed			
060.02. Petroleum Products			
petroleum more than 100 feet from water catchment contains 110% of volume IDL notified in event of entry into water			
a. fueling operations not near water			
b. maintained in leak-proof containers			
c. oil and waste removed from operation			

Describe any designated site-specific BMPs (former SSOC or CWE) implemented.

FP and BMP COMPLIANCE AND EFFECTIVENESS SCALES

COMPLIANCE SCALES

- Y Compliance with the rule
- N Noncompliance with the rule

EFFECTIVENESS SCALES

Sediment Delivery

1. Major and prolonged¹ quantity of sediment delivered to a Class I stream or delivery imminent, including from a Class II stream.
2. a. Major and temporary² or minor and prolonged³ quantity of sediment delivered to a Class I stream or delivery imminent, including from a Class II stream.
b. Major and prolonged quantity of sediment delivered to a Class II stream or delivery imminent.
3. a. Minor and temporary⁴ quantity of sediment delivered to a Class I stream or delivery imminent, including from a Class II stream.
b. Major and temporary or minor and prolonged sediment delivery to a Class II stream or delivery imminent.
4. Minor and temporary sediment delivery to a Class II stream or delivery imminent.
5. Significant erosion and delivery of sediment to draws, channels, or floodplain. No sediment delivered to either Class I or Class II streams.
6. Soils do not reach draws, channels, or floodplain.

Slash or Debris Treatment

1. Major quantity of slash or debris in a Class I stream.
2. Minor quantity of slash or debris in a Class I stream or slash or debris in a Class II stream in sufficient quantity to depress dissolved oxygen concentration of downstream Class I waters or with potential for transport to and blockage of downstream drainage structures.
3. Slash or debris removed from stream but likely to become entrained and transported to downstream drainage structures during stormflow.
4. Slash or debris removed or otherwise situated that entrainment and transport are unlikely.

Water Protection

1. Stream, lake, or wet area exposed to midday sunlight over substantial reach(es) or major and prolonged quantity of sediment delivered to stream, lake, or wet area or delivery imminent.
2. Stream, lake, or wet area exposed to midday sunlight for short reach(es) or major and temporary or minor and prolonged quantity of sediment delivered to stream, lake, or wet area or delivery imminent.
3. Stream, lake, or wet area exposed to midday sunlight occasionally minor and temporary quantity of sediment delivered to stream, lake, or wet area or delivery imminent.
4. Little exposure to midday sunlight or no sediment delivered to stream, lake, or wet area.

Hydrocarbons or Hazardous Waste

1. Hydrocarbons or hazardous waste in stream.
2. Hydrocarbons or hazardous waste in draws, channels, or floodplain or other locations where it could readily contaminate waters.
3. Hydrocarbons or hazardous waste isolated from stream.
4. Hydrocarbons or hazardous waste not present.

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1. More than five (5) cubic yards of material delivered in multiple years.
 2. More than five (5) cubic yards of material delivered in a single year.
 3. Less than five (5) cubic yards of material delivered in multiple years.
 4. Less than five (5) cubic yards of material delivered in a single year.

Project Summary

To what extent were the BMPs applied?

Were the BMPs effective in preventing soil erosion?

Have pollutants been delivered to the stream(s) or potentially could they be?

Are there any BMP implementation problems?

Does this practice suggest any rule changes?

Does this practice suggest any administrative changes?

Are shading and minimum leave tree requirements met?

Number and type of Class I structures; are there fish passage restrictions?

What other nonpoint activities or other factors affect water quality?

General comments on meeting the intent of the FPA: