APPENDIX K

RESPONSES TO COMMENTS ON THE DRAFT EIS

Introduction

In March 2000, the Draft EIS on Alternatives for Forest Practices Rules, under consideration by the Washington Forest Practices Board, was released to the public. During the comment period over 1,800 individual comments from approximately 175 separate letters, emails, and oral testimonies were received. This appendix presents a summary of the comments and provides responses to them.

Following an initial review of the comments and a general analysis of the issues by the DNR, the following approach was implemented for responding to the comments: 1) delineate and number each individual comment; 2) categorize all comments into subject areas; 3) based on a review of the comments in each subject area, identify individual issues within each subject area and assign each comment to an issue; 4) prepare a summary of the comments for each issue, based on the individual comments; and 5) prepare a response to each comment summary. This was somewhat of an iterative process and involved identifying new issues and/or lumping issues as the comment summaries and responses were prepared. A custom database, described in the following section, was developed to implement this approach.

Database Description

The Comment/Response database was developed using Microsoft Access 97. The basic structure of the database was a set of four linked data tables (Figure 1):

- Names- Includes the names and addresses of entities that provided comment letters. The table structure and data were based upon the database developed during DNR's initial review of comments.
- Comments- Data on each individual comment including subject area (field: issue), issue (field: sub-issue), response assignment, notes, and other attributes.
- Subject Area- Table of subject area categories.
- Issues – Table of issue titles, comment summaries (field: descriptions), responses, notes, and other attributes.

The initial step in populating the database was to code and categorize each of the individual comments in the letters according to subject area and issue and make appropriate assignments to project staff. The database was then placed on a Local Area

Network so that multiple project staff could work on assignments simultaneously. One advantage to a database approach was that staff could reassign the issue for a comment or split and combine comments following a more thorough review. A form and various ad hoc queries, filters, and reports were created as necessary to allow staff to efficiently locate their assignments, enter the appropriate text, and to summarize comment categories and follow the progress of completing responses.

Summary of Comments

A listing of the names of the commenters for each letter, email, or oral testimony received is provided in Table 1. These documents contained over 1,500 individual comments, which were categorized into 25 subject areas and 202 issues. In many circumstances, comments were directed towards the Forest and Fish Report rather than Alternative 2. For example, the report by the Independent Science Review Committee (2000) was submitted by reference in several comment letters. Other comment letters attached comments directed towards the timber-related 4(d) limitation to be implement by the NMFS. In some cases it was not clear whether the commenter recognized differences between the Forests and Fish Report and Alternative 2. Consequently, the context of comments was taken broadly. If a commenter referred to the Forests and Fish Report, but the comment was also appropriate to Alternative 2, it was considered for response. Several comment letters (e.g., Washington Forest Protection Association and Washington Environmental Council) included supporting documents as attachments or by specific reference that were also categorized and entered as comments into the database. However, many comments from the supporting documents were categorized as "other" issues because they represented literature review that was not directed specifically towards the Draft EIS analysis and consequently did not always require a response. The subject areas and issues that were identified are summarized in Table 2.

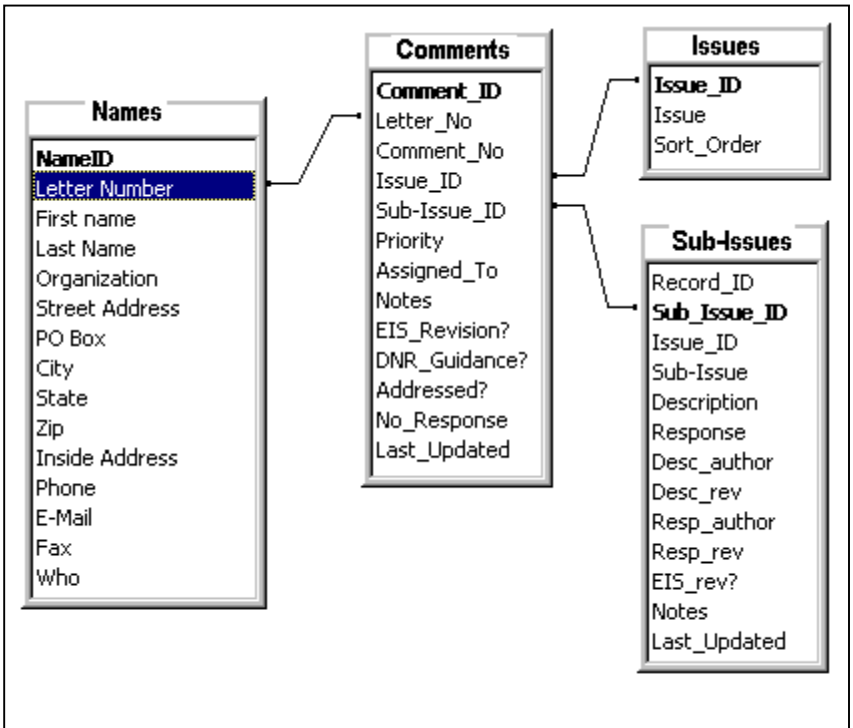

Figure 1. Structure of the Comment/Response Database

Table 1. Listing of Commenters Who Submitted Comments on the Draft EIS

Letter No.	Name of Commenter	Organization	Format	# Cmts
74	Rodd Premble	N/A	E-mail	1
77	Bill & Carole Woods	N/A	E-mail	1
78	Lincoln Post	Methow Valley Citizens Council	Letter	1
79a	Debbie Garrison	N/A	E-mail	1
79B	Karen Kotansky	N/A	E-mail	1
79c	Mark Quire	N/A	E-mail	1
82	Mardel Chowen	N/A	Oral Test.Notes	5
83	Joan M----	N/A	Photos	1
84	Colleen Lee	Hoh Indian Tribe	Letter	18
85	Laura Bienen	SWIFT	Letter	1
87	Anonymous	Society for Ecological Restoration	Letter	60
88	Guy Parsons	N/A	Letter	13
90	Peter Goldman	Washington Forest Law Center	Letter	10
91	Doreen Johnson	Wash. Environmental Council	Letter	13
117	David Sweitzer	Washington Hardwoods Commission	Letter	1
118	Ramon Vanden Brucce	Washington Trout	Letter	8
119	John Browne	N/A	Comment Form	1
120	No Name	Independent Science Review Committee	Web Page copy	1
121	Howard Johnson	Federation of Fly Fishers	Letter	4
122	Nels Hanson	Washington Farm Forestry Assoc.	Letter	1
123	Kelly McCaffrey	N/A	Letter	3
124	Dean Schwickerath	N/A	Letter	1
125	Jack Scharbach	N/A	Letter	1
126	Duane Vaagen	Vaagen Bros Lumber Co.	Letter	1
127	Jessica McNamara	N/A	Letter	1
128	Bill & Carole Woods	N/A	E-mail	1
129	Sue Chickman	N/A	E-mail	14
130	Dave Colavito	N/A	E-mail	5
131	Nancy Farr	N/A	E-mail	1
132	Adam Rissien	Native Forest Network, Last Refuge Roadless Campaign	E-mail	1
133	Renee Still Daay	N.A.T.I.V.E.S.	E-mail	1
134	Diane Kendy	Save The woods on Saratoga	E-mail	5
135	Donna Kostka	Private citizen, Certified Ecologist	E-mail	6
136	Shirley Willeiksen	N/A	Letter	2
137	David Warren	Vason-Maury Island Land Trust	E-mail	1
138	Sharone Shumate	Ferry County Natural Resource Board	Letter	8
139	Marilyn Dinger	N/A	E-mail	15
140	Kent Heuer	N/A	Letter	4

Table 1. Listing of Commenters Who Submitted Comments on the Draft EIS (continued)

Letter No.	Name of Commenter	Organization	Format	# Cmts
141	Joel Kuperberg	Loomis Forest Fund steering committee	E-mail	1
142	John Thompson	Carbon River Enterprises	Letter	3
143	Rodd Pemble	Private citizen (same as 00-74)	E-mail	1
144	Tom White	League of Women Voters of Washington	E-mail	11
145	Freida Fenn	N/A	Letter	7
146	Byron Rot	Jamestown S'Klallam Tribe	Letter	6
147	Bill and/or Carole Woods	N/A	E-mail	1
148	Margo DeVries	N/A	Letter	2
149	Jim DiPeso	Rainier Audubon Society	Letter	11
150	Megan White	WA Dept of Ecology	Letter	5
151	Robert Meier	Rayonier	Letter	10
152	Bruce Alber	N/A	Letter	6
153	David Whipple	WA Dept of Fish & Wildlife	Letter	5
154	Don Wallace	Hampton Affiliates	E-mail	15
155	Wade Boyd	Longview Fibre Company	Letter	11
156	Allyson Brooks	Wash Office of Archaeology & Historic Preservation	Letter	8
157	Roger Garrett	N/A	Letter	8
158	J. Steve Hansen	Longview Fibre Company	Letter	11
160	Donald Sampson	Columbia River Inter-Tribal Fish Commission	Letter	35
161	Carroll Palmer	Confederated Tribes and Bands of the Yakama Indian Nation	Letter	30
162	Glen Nenema	Kalispel Tribe of Indians	Letter	3
163	Katherine Johnson	Pilchuck Audubon Society	Letter	8
164	Christopher Mendoza	Aquatic Restoration Consultants	Letter	6
165	Toby Thaler	Washington Forest Law Center	Letter	15
166	Tanya Sanerib	Northwest Environmental Defense Center	Letter	29
168	N/A	WA Friends of Farms and Forests	Letter	1
169	Ted Labbe	Point No Point Treaty Council	Letter	25
170	Jeff Pitts	Arden Tree Farms Inc.	Letter	1
171	Maurice Williamson	Maurice Williamson Consulting Forestry	Letter	1
172	Lisa McShane	Northwest Ecosystem Alliance	Letter	40
173	Eric Espenhorst	Friends of the Earth	Letter	9
174	David Robinson	Kettle Range conservation Group	Letter	17
175	Joan Crooks	Washington Environmental Council	Letter	221
176	Bill Wilkerson	Washington Forest Protection Association	Letter	248
177	Allan Felsot	WA State University-Forest Practices	Letter	1
178	Kevin Godbout	Weyerhaeuser	Letter	38

Table 1. Listing of Commenters Who Submitted Comments on the Draft EIS (continued)

Letter No.	Name of Commenter	Organization	Format	# Cmts
179	Chantal Stevens	Muckleshoot Indian Tribe	Letter	81
180	Kelly Armstrong	N/A	Letter	1
181	Ron Hirschi	N/A	E-mail	1
182	Karen Kotansky	N/A	E-mail	1
183	Debbie Garrison	N/A	E-mail	1
184	Mark Quire	N/A	E-mail	1
185	Joel Kuperberg	N/A	E-mail	1
186	Don Wallace	Hampton Affiliates	E-mail	1
187	Blake Rowe	Longview Fibre Company	E-mail	14
189	Stephanie Johns	N/A	E-mail	1
190	Edward Henderson, Jr.	The Mountaineers	E-mail	21
191	Mary Schroeder	N/A	E-mail	1
192	Wesley Schlenker	Longview Fibre Company	E-mail	13
193	David Crooker	Plum Creek	E-mail	4
195	Val Schroeder	N/A	E-mail	1
196	David Baumchen	N/A	E-mail	11
197	Patricia MacRobbie	N/A	E-mail	1
198	Mary Scurlock	The Pacific Rivers Council	Letter	45
199	James Chapman	Alpine Lakes Protection Society	E-mail	21
200	Douglas Soehl	N/A	E-mail	1
201	Steve Koehler	N/A	E-mail	1
202	Robert Roth	Longview Fibre Company	E-mail	12
203	Harry Bell	N/A	E-mail	1
204	Bob & Sue Marett	N/A	E-mail	1
205	Donald Combs	N/A	E-mail	1
206	Norm Schaaf	Merrill & Ring	E-mail	5
207	Polly Dyer	Olympic Park Associates	E-mail	21
209	Lisa McShane	Northwest Ecosystem Alliance	Letter	40
210	Alan Soicher	N/A	E-mail	4
211	Tim McNulty	N/A	E-mail	4
212	Bill Hinely	N/A	E-mail	3
213	Michael Colfer	N/A	E-mail	1
214	David Chapin	Society for Ecological Restoration-NW	E-mail	1
214	Lea Mitchell	Washington PEER	E-mail	9
216	Cavin Richie	N/A	E-mail	1
217	Todd McGuire	N/A	E-mail	2
218	Tim Stearns	National Wildlife Federation	E-mail	8
219	Larry Mitchem	Longview Fibre Company	E-mail	1
220	Kimberly Burkland	Central Cascades Alliance	E-mail	15

Table 1. Listing of Commenters Who Submitted Comments on the Draft EIS (continued)

Letter No.	Name of Commenter	Organization	Format	# Cmts
221	Matt Ellison	N/A	Petition	1
222	Suzanne McGragar	N/A	Petition	1
223	Kelly Todd	N/A	Petition	1
224	Gail Rahy	N/A	Petition	1
225	Lisa Cooper	N/A	Petition	1
226	Carol Eubanks	N/A	Petition	1
227	Dermit Livingston	N/A	Petition	1
228	Cynthia Koroma	N/A	Petition	1
229	Darrell Nelson	N/A	Petition	1
230	Suzanne Hampter	N/A	Petition	1
231	Linda Albert Young	N/A	Petition	1
232	Jennifer Robbins	N/A	Petition	1
233	Omar Susewind	N/A	Petition	1
234	Elizabeth Brenner	The News Tribune	Article	1
235	Jeffrey Thomas	Puyallup Tribe of Indians	Letter	18
236	Rodd Pemble	N/A	Letter	1
237	N/A	Forest Practices Board Rules Coordinator	Letter	1
238	Toby Thaler	N/A	E-mail	3
268	Judy Turpin	N/A	Letter	7
272	Anne Mosness	Trustee-Puget Sound Gillnetters	Oral Testimony	1
273	Joan Miller	N/A	Oral Testimony	1
274	Janet Strong	N/A	Oral Testimony	1
275	Becky Kelly	WEC	Oral Testimony	88
276	John Price	N/A	Oral Testimony	1
277	Doreen Johnson	WEC	Oral Testimony	89
278	Kelly McCaffrey	Citizen	Oral Testimony	1
279	Tim Stearns	National Wildlife Federation	Oral Testimony	1
280	Daniel Foster	Farm & Forest Helicopter Service	Oral Testimony	1
281	Marcy Golde	N/A	Oral Testimony	3
282	Kevin Geraghty	N/A	Oral Testimony	1
283	Peter Goldman	WFLC	Oral Testimony	11
284	Alan Soicher	N/A	Oral Testimony	5
285	Christopher Mendoza	Aquatic Restoration Consultants	Oral Testimony	7
286	Guy Parsons	N/A	Oral Testimony	12
287	Enid Dolstad	N/A	Oral Testimony	1
288	Heather Hansen	WA Friends of Farms & Forests	Oral Testimony	1
289	Norm Winn	Mountaineers	Oral Testimony	22
290	Frances Troje	N/A	Oral Testimony	1
291	Ann Goos	WFPA	Oral Testimony	22

Table 1. Listing of Commenters Who Submitted Comments on the Draft EIS (continued)

Letter No.	Name of Commenter	Organization	Format	# Cmts
292	Tom White	League of Women Voters	Oral Testimony	12
293	Peggy Bruton	Sierra Club	Oral Testimony	1
294	Dave Sweitzer	WA Hardwoods	Oral Testimony	2
295	Ramon Vanden Brulle	WA Trout	Oral Testimony	9
296	Glen Spain	The Institute for Fisheries	Oral Testimony	22
297	Mary Scirloce	Pacific Rivers Council	Oral Testimony	46
298	Jill Silver	HOH Tribe	Oral Testimony	19
299	David Chapin	Society for Ecological Restoration-NW	Oral Testimony	2
300	Eric Espenhorst	Friends of the Earth	Oral Testimony	10
301	John Browne	N/A	Oral Testimony	2
302	Diane Kendy	Save the Woods on Saratoga	Oral Testimony	3
303	Robert Meir	Rayonier	Oral Testimony	1
304	Berry Pfundt	N/A	Oral Testimony	1
305	Carole Woods	N/A	Oral Testimony	1
306	Peter Heide	WFPA	Oral Testimony	23
307	Peter Goldman	WFLC	Oral Testimony	16
320	Cynthia Pratt	WA Dept of Fish and Wildlife	Letter	19
323	Bill Hinely	Bellingham Co-Housing, Whatcom	Oral Testimony	1
324	Mardel Chowen	N/A	Oral Testimony	6
325	Darl Krasager	N/A	Oral Testimony	1
326	Kenneth Currens	Independent Science Panel	Letter	4
327	Jt. Nat. Resources Cabinet	WA Governor's Salmon Recovery Off.	Letter	0

Table 2. Number of Comments Within Each Subject Area and Issue

Subject Area	Issue	Number of Comments
Adaptive Management	Cumulative effects	3
Adaptive Management	General	31
Adaptive Management	Funding.	7
Adaptive Management	Monitoring	7
Adaptive Management	The decision-making structure is flawed.	11
Alternatives	Support for Alternative 1	3
Alternatives	General Concern about Alternative 1	2
Alternatives	Clarification of Alternative 2	2
Alternatives	General concern about Alternative 2	43
Alternatives	General support for Alternative 2	16
Alternatives	Cultural resources.	1
Alternatives	Clarification of Alternative 3	4
Alternatives	General support for Alternative 3	35
Alternatives	Clarification of Alternative 3	4
Alternatives	Insufficient range of Alternatives	21
Cultural Resources	Classification system	1
Cultural Resources	Cultural resources module	4
Cultural Resources	Current protection	1
Cultural Resources	Definitions	1
Cultural Resources	National Historic Preservation Act	1
Cultural Resources	Protection from RMZs	1
Cumulative Effects	Adaptive management	5
Cumulative Effects	Watershed analysis.	3
Cumulative Effects	Other.	6
Cumulative Effects	General.	9
Cumulative Effects	Editorial	5
Cumulative Effects	Risk analysis	11
Economics	Economic information and viability pertinent to the timber industry.	12
Editorial	General.	8
Editorial	Missing citations/references.	2
EIS Chapters 1&2	General.	33
EIS Chapters 1&2	Editorial.	7
Enforcement	General.	1
Enforcement	Rules based on Forests and Fish Report are too complicated.	31
Enforcement	Forest Practices Board manual is guidance only.	1
Fire	General.	7
Fish	Type N streams.	3
Fish	Bull trout.	3
Fish	Fish passage.	4

Table 2. Number of Comments Within Each Subject Area and Issue (continued)

Subject Area	Issue	Number of Comments
Fish	Refugia.	4
Fish	Turbidity/fine sediment.	3
Fish	Large woody debris.	6
Fish	External factors	4
Fish	Other.	13
Fish	Coarse sediment.	1
Fish	Literature summarization	4
Fish	Target conditions.	3
Fish	Temperature.	8
Fish	Miscellaneous comments	3
Fish	Stream flows.	4
Forest Chemicals	Riparian/pesticide benefits	11
Forest Chemicals	Risk over-estimated	28
Forest Chemicals	Available data/data incorporated	7
Forest Chemicals	Source of data	2
Forest Chemicals	Disturbed channels	1
Forest Chemicals	Scope	7
Forest Chemicals	Chemical toxicity	4
Forest Chemicals	Seasonal stream protection	5
Forest Chemicals	Erosion focus	1
Forest Chemicals	Model use	3
Forest Chemicals	Other chemicals	1
Forest Chemicals	Miscellaneous comments	20
Forest Chemicals	Purpose and goal of EIS	4
Forest Chemicals	Model use	3
Forest Chemicals	Other regulations	7
Forest Chemicals	Nozzle brand	2
Forest Chemicals	Effects on domestic water supplies	1
Hydrology	Peak flow.	21
Hydrology	Beneficial hydrological effects	1
Hydrology	Hydrologic effect of timber harvest and roads	2
Hydrology	Adaptive management	2
Hydrology	Stream flow.	3
Hydrology	Rain-on-snow.	1
Hydrology	Watershed analysis.	2
Hydrology	General.	14
Hydrology	Cumulative effects.	4
Hydrology	Alternative 3	2
Hydrology	Groundwater.	5
Hydrology	Roads.	1
Other	The Forest and Fish Report was negotiated/not science-based.	15

Table 2. Number of Comments within Each Subject Area and Issue (continued)

Subject Area	Issue	Number of Comments
Other	Miscellaneous comments.	37
Other	Risk analysis.	23
Other	Independent science review.	31
Other	The Draft EIS is incomplete.	7
Other	Funding.	1
Other	Summary of/conclusions from detailed comments	45
Other	Shorelines Management Act	3
Other	The Forest and Fish Report is incomplete	7
Other	Small landowners.	16
Other	General introductory/closing comments.	66
Other	Comment unrelated to EIS scope.	18
Other	Hardwood conversion.	3
Other	Other.	33
Riparian	Type N streams.	28
Riparian	Leaf and needle litter.	14
Riparian	Watershed analysis.	3
Riparian	Small landowners.	4
Riparian	Thinning below the floor.	1
Riparian	Blowdown.	10
Riparian	Comparison to other plans.	12
Riparian	DFC/Site potential tree height.	28
Riparian	Riparian EBAI.	3
Riparian	Microclimate.	9
Riparian	Yarding and road corridors	14
Riparian	Large woody debris – functional wood Size.	4
Riparian	Large woody debris – performance targets.	3
Riparian	Large woody debris – protection levels.	29
Riparian	Large woody debris – recruitment from upstream.	7
Riparian	Large woody debris – mitigation..	1
Riparian	Literature summarization	12
Riparian	Down wood	1
Riparian	Other.	1
Riparian	Miscellaneous comments	44
Riparian	Shade.	28
Riparian	Risk analysis.	6
Roads	Mass-wasting.	8
Roads	Monitoring.	2
Roads	Road Management Plans.	26
Roads	Hydrology.	2
Roads	Culvert sizing and replacement.	8
Roads	Clean Water Act.	1
Roads	Orphan roads.	6
Roads	Risk evaluation criteria	1

Table 2. Number of Comments within Each Subject Area and Issue (continued)

Subject Area	Issue	Number of Comments
Roads	Road density	2
Roads	Adaptive management.	1
Roads	Enforcement/monitoring	2
Roads	Interception of surface and subsurface flow	2
Roads	Fish passage	1
Roads	Orphaned roads – amount of sediment	1
Roads	Surface erosion.	8
Roads	Other.	15
Roads	Culvert spacing	5
Roads	Citations	1
Sediment	Surface erosion - road related.	4
Sediment	Surface erosion - harvest related.	2
Sediment	Cumulative sediment delivery risk	3
Sediment	General.	8
Sediment	Citations	3
Sediment	Risk evaluation criteria	1
Sediment	Sediment delivery risks overstated.	1
Sediment	Adaptive management	1
Sediment	Type N streams not protected.	4
Stream Channels	Other.	4
Stream Channels	Bank stability criteria inappropriate	2
Stream Channels	Bank stability.	3
Stream Channels	Type N streams.	3
Unstable Slopes	Risk assessment of unstable slopes.	12
Unstable Slopes	Road-related landslides	2
Unstable Slopes	Deep-seated landslides	3
Unstable Slopes	Alternative 3	2
Unstable Slopes	Proposed Forest Practices Rules allow logging on high risk slopes	22
Unstable Slopes	Effect of landslides on riparian zones	1
Unstable Slopes	Improving trend criteria is insufficient	1
Unstable Slopes	Risk analysis.	5
Unstable Slopes	Mapping and DNR review of unstable slopes.	16
Unstable Slopes	Risk of sediment delivery	1
Unstable Slopes	LWD contribution	1
Unstable Slopes	Adaptive management.	2
Unstable Slopes	General.	4
Unstable Slopes	Variability across the state.	1
Unstable Slopes	Blowdown.	2
Unstable Slopes	The Forest and Fish Report is incomplete.	3
Unstable Slopes	Watershed analysis.	3
Unstable Slopes	Mass wasting from timber harvest vs. roads.	1

Table 2. Number of Comments within Each Subject Area and Issue (continued)

Subject Area	Issue	Number of Comments
Water Quality	Clean Water Act.	3
Water Quality	Risk levels over- or underestimated.	2
Water Quality	Forest chemicals	1
Water Quality	Turbidity measurement	1
Water Quality	Forestry perspective	2
Water Quality	Temperature – general	16
Water Quality	Supporting water quality information.	9
Water Quality	General.	5
Water Quality	Temperature - effects on aquatic species	2
Water Quality	Turbidity/sediment.	3
Water Typing	EIS analysis.	1
Water Typing	General.	4
Water Typing	Model validity and verification.	23
Watershed Analysis	Cumulative effects.	9
Watershed Analysis	Other.	15
Wetlands	General.	7
Wetlands	Buffers.	2
Wetlands	Other.	3
Wetlands	Site class.	1
Wetlands	Forested wetlands, microclimate, groundwater, and water temperatures.	15
Wetlands	Risk levels over- or underestimated.	3
Wetlands	Editorial comments.	3
Wetlands	Mitigation ratios.	3
Wetlands	Incomplete analysis.	2
Wildlife	Alternative 3	1
Wildlife	Riparian leave trees	1
Wildlife	Review of Forests and Fish Report	2
Wildlife	General.	1
Wildlife	Other.	5
Wildlife	Analysis too general/superficial/incomplete.	4
Wildlife	Literature cited.	1
Wildlife	Microclimate.	2
Wildlife	Cumulative effects.	2
Wildlife	Species-specific comment.	9
Wildlife	Risk levels over- or underestimated.	6

Appendix K

Comments and Responses

The comment summaries and responses are presented in this section. For each comment, the subject area, issue, number of individual comments making up the issue, comment summary, and response are presented. The comments are organized by subject area, which are listed alphabetically.

Subject Area: Adaptive Management
Issue: Cumulative effects.
Number of Individual Comments: 3

Comment Summary:

One commenter suggested that the adaptive management program under Alternative 2 is unlikely to be effective because it will not avoid significant adverse cumulative effects. It was also suggested that the conclusion in the Draft EIS that adaptive management under Alternative 2 would result in cumulative effects being "more fully addressed" is unwarranted. Another commenter suggested that any risk associated with assessing cumulative effects under Alternative 2 should be removed from the EIS discussion because many research programs are already underway to assist in assessing cumulative effects, including research on temperature/heat inputs, large woody debris, sediment, and hydrology.

Response:

Comments noted. All potential cumulative effects, must be analyzed and discussed in a SEPA EIS. Cumulative effects are addressed in Alternative 2 through the establishment of the overall performance goals listed in Schedule L-1. Under these overall performance goals Forest Practices Rules, either singly or cumulatively, will not significantly impair the capacity of aquatic habitat to: a) support harvestable levels of salmonids; b) support the long-term viability of other covered species; or c) meet or exceed water quality standards. Appendix I has been revised to clarify these points which were also considered in the EIS analysis.

Subject Area: Adaptive Management
Issue: Funding.
Number of Individual Comments: 7

Comment Summary:

Several commenters suggested that the Alternative 2 Adaptive Management program is unlikely to be effective due to lack of funding. In contrast, one

commenter suggested that the Adaptive Management program is likely to have a larger and more stable funding level for conducting research and monitoring than is present under Alternative 1. Others suggested the EIS should describe the basic groundwork that has been established to secure long-term funding for Alternative 2.

Response:

SEPA allows, but does not require, consideration of funding sources in environmental documents. The Forest Practices Board is directed by statute to develop rules that guide forest practices. Funding for developing and implementing Forest Practices Rules is provided by the legislature, which has played an active role in the adoption of the Forest and Fish Report and has directed the Forest Practices Board to develop and adopt permanent Forest Practices Rules.

Forests and Fish collaborators have committed to spending approximately $17 million over the next 5 years on the implementation of the permanent rules.

Subject Area: Adaptive Management
Issue: General.
Number of Individual Comments: 31

Comment Summary:

Several commenters suggested that based on the past performance of TFW, the ability of the TFW program to conduct research and monitoring that adequately supports the adaptive management program is questionable. Commenters also suggested the adaptive management program under Alternative 2 is unlikely to be effective because it is not fully developed and some crucial elements are missing. It was suggested the EIS should reference more research supporting the development and implementation of an adaptive management program.

Response:

Comments noted. It is unclear, what "crucial elements" of the adaptive management program the comment is referring to since these elements are not identified. The decision-making structure of TFW is greatly modified under Alternative 2. The overall purpose of Alternative 2 is to provide more formal, effective, and efficient processes and systems by which to do business. For example, Alternative 2 provides a more formal process for soliciting scientific peer review and for dispute resolution for caucuses. In general, adaptive management under Alternative 2 was designed to tighten up the system so that there is less chance for failure.

Subject Area: Adaptive Management
Issue: Monitoring.
Number of Individual Comments: 7

Comment Summary:

Several commenters suggested the adaptive management program under Alternative 2 is unlikely to be effective because of lack of compliance monitoring, disincentives created by the "start low" approach and because of failure to take into account the impacts of past forest management practices when monitoring the effectiveness of new practices. Other commenters suggested the adaptive management program under Alternative 2 would be more effective if the research was prioritized to address uncertainties in the current assessments of risk to aquatic communities and cumulative effects. One commenter indicated the performance target for riparian condition in the Forests and Fish Report was too vague and inadequate to evaluate riparian condition and function.

Response:

Compliance monitoring is the responsibility of DNR and not part of the adaptive management program. However, under Alternative 2, one compliance monitoring study will be completed each biennium, starting with the 2001-2003 biennium (See Appendix K of the Forest and Fish Report). Whether the rules under Alternative 2 are a "start low" approach is a matter of perspective, and not necessarily fact. The adaptive management program under Alternative 2 makes effectiveness monitoring priorities based upon areas where there is the greatest uncertainty and the possibility of substantial risk to resources. Schedule L-1 of the Forest and Fish Report outlines the research priorities under Alternative 2. Appendix I of the EIS has been revised to clarify these points which were also considered in the EIS analysis.

Subject Area: Adaptive Management
Issue: The decision-making structure is flawed.
Number of Individual Comments: 11

Comment Summary:

Several commenters suggested the adaptive management program under Alternative 2 is unlikely to be effective due to a flawed decision-making structure because of:

a) the Forest Practices Board's inability to act independently, constraints on what changes the timber industry will be required to make.

b) the timber industry dominates the Timber Fish and Wildlife (TFW) Policy Committee and critics of the Forest and Fish Report will not be allowed to participate.

c) the commitment to maintain a viable timber industry.
d) the consensus requirement in the TFW Policy Committee which results in some critical decisions having not been resolved in a timely manner.

Response:

The legislature has directed the Forest Practices Board to develop a scientific-based adaptive management process described in the forest and fish report which will be used to determine the effectiveness of the new rules in aiding the state's salmon recovery effort. The adaptive management process is required to incorporate the best available science and information, include protocols and standards, regular monitoring, a scientific and peer review process, and provide recommendations to the board on proposed changes to meet timber industry viability and salmon recovery. The adaptive management process in Alternative 2 is designed to implement this directive and address some of the criticism raised in the comments. The Forest Practices Board is required by state law to maintain a viable timber industry when considering Forest Practices Rules, including modifications that may be developed via the adaptive management program. The adaptive management program includes a process for dispute resolution when consensus cannot be achieved. The process for dispute resolution includes specific time limits.

Subject Area: Alternatives
Issue: Clarification of Alternative 2.
Number of Individual Comments: 2

Comment Summary:

The Muckleshoot Indian Tribe was concerned that Alternative 2 may not represent the alternative defined by the Forests and Fish Report as supplemented by ESHB2091. They presented a detailed comparison between the Forests and Fish Report and the Emergency Rules of 3/20/00.

Response:

The comment implies that the Emergency Rules represent Alternative 2. This is not the case. There are a number of differences between the Emergency Rules and the Forests and Fish Report, while Alternative 2 is consistent with the Forests and Fish Report, as modified by ESHB 2091 and the rule-making process. The Emergency Rules implement the aspects of the Forests and Fish Report that can be implemented quickly, but not items like stream typing, which require time to implement and depend on the alternative that is ultimately selected. The permanent rule proposal is more complete and further developed. Alternative 2 has been clarified in the Final EIS.

Subject Area: Alternatives
Issue: Clarification of Alternative 3.
Number of Individual Comments: 4

Comment Summary:
Several commentors pointed out the specific differences between Alternative 3 and the WEC/Audubon, Muckleshoot, Puyallup, and Yakama Proposals. They noted that all elements of Alternative 3 were not clear in the Draft EIS.

Response:
The elements included in Alternative 3 have been clarified in the Final EIS. Elements of the WEC/Audubon, Muckleshoot, Puyallup, and Yakama Proposals that are not included in Alternative 3 are identified in the next response.

Subject Area: Alternatives
Issue: Cultural resources.
Number of Individual Comments: 1

Comment Summary:
The Puyallup Tribe believed that the Cultural Resource Management and Protection Plan they proposed should be included with Alternative 3 or with a modified Alternative 2 in the Final EIS.

Response:
Comment noted. Please see our response to Alternatives/Insufficient Range of Alternatives below.

Subject Area: Alternatives
Issue: General concern about Alternative 2.
Number of Individual Comments: 43

Comment Summary:
A number of commenters noted that they had general concerns about the risks associated with Alternative 2 or the Forests and Fish Report. They indicated that they believed that Alternative 2 was not protective enough to provide for meeting the Board's goals. Several commenters cited the Independent Science Review Committee (2000) and Pollock (1999) as support for their general concerns. Many comments dealt more directly with the Forests and Fish Report rather than Alternative 2. Several comments suggested a number of additional prescriptions that they believe would improve Alternative 2. Some commenters provided a bulleted list of general concerns about Alternative 2 including:

1) arbitrarily abandons prescriptions and guidelines based on best available scientific evidence for a set of recomendations that lack any scientific support;
2) provides no rationale and cites no evidence to support claims, assertions and prescriptions;
3) relies on prescriptions that are of unprecedented complexity and nearly impossible to enforce or monitor;
4) fails to relate goals and prescriptions to the ecological requirements of the threatened fish populations subject to rule making;
5) lacks precision, accuracy, and consistency in terminology;
6) relies on prescriptions that appear optional and not mandatory;
7) relies on performance targets that do not assure attainment of the Forests and Fish Report's goals;
8) is not adequately funded for proper implernentation; and
9) Lack of legal recourse in case of abuse.

Response:

Comments noted. These general comments were considered in the reanalysis conducted for the Final EIS and were more specifically addressed in responses to specific comments.

Subject Area: Alternatives
Issue: General Concern for Alternative 1.
Number of Individual Comments: 2

Comment Summary:

Two commenters noted general concern for Alternative 1.

Response:

Comments noted.

Subject Area: Alternatives
Issue: Support for Alternative 1.
Number of Individual Comments: 3

Comment Summary:

Several commenters noted general support for Alternative 1. One commenter noted support for Alternative 1 relative to Forest Chemicals and the analysis in Appendix J.

Response:

Comment noted.

Subject Area: Alternatives
Issue: General support for Alternative 2.
Number of Individual Comments: 16

Comment Summary:
A number of commenters noted general support for Alternative 2. They indicated that this alternative should be selected for a wide variety of reasons.

Response:
Comments noted.

Subject Area: Alternatives
Issue: General support for Alternative 3.
Number of Individual Comments: 35

Comment Summary:
A number of commenters noted general support for Alternative 3. They indicated that this alternative should be selected because of the lower risks it would have for meeting the requirements of the Endangered Species Act and the Clean Water Act. However, some commenters that generally supported Alternative 3 also suggested Alternative 3 could be improved by including additional protection for air temperature and humidity in riparian areas, or including additional prescriptions from the Environmental or Tribal caucas proposals.

Response:
Comments noted.

Subject Area: Alternatives
Issue: Insufficient range of alternatives.
Number of Individual Comments: 21

Comment Summary:
A number of commenters noted that they believed that the WEC/Audubon, Muckleshoot, Puyallup, and Yakama Proposals should be analyzed separately in the EIS, rather than being used to form one alternative (Alternative 3). They noted that there are a number of proposed elements identified in these other proposals that are not included in Alternative 3 or that some elements were modified from the WEC/Audobon or tribal proposals. Some commenters also pointed out other alternatives that were not proposed directly to the Board.

Response:

The Forest Practices Board held a detailed public discussion on the proposed alternatives and directed DNR staff to develop Alternative 3, which was designed to capture the range of reasonable alternatives. Alternative 3 included elements from the WEC/Audubon, Muckleshoot, Puyallup, and Yakama Proposals, as well as some additional features that came from other sources. Each of these proposals was not analyzed separately because they were similar in many respects, a number of their unique elements were not considered reasonable, and therefore were outside the scope of this EIS, and analyzing them separately would have greatly complicated the evaluation and comparison of the alternatives. The Board excluded elements that it did not have authority to implement, required statutory changes, or did not attain the proposal's objectives and were, therefore, outside the scope of the EIS.

Subject Area: Cultural Resources
Issue: Classification system.
Number of Individual Comments: 1

Comment Summary:

The Washington State Office of Archaeology and Historic Preservation (OAHP) expressed concern about the classification system for forest practices that affect cultural resources (i.e., Class III or Class IV-special) and the potential for misclassification. The OAHP also was concerned that for Class III applications, protection of cultural resources was highly dependent upon voluntary landowner cooperation.

Response:

As stated in the EIS, a Class IV-special application is required for forest practices on lands containing sites registered with the OAHP and protected under RCW 27.44 and/or 27.53. Since sites that are listed on or found potentially eligible for listing on the National Register of Historic Places are automatically registered with the OAHP, the existing Class IV-special classification does already include all known National Register-listed or potentially eligible sites.

While DNR acknowledges OAHP's concerns regarding potential confusions related to the existing forest practices application (FPA) classification system, this EIS is limited to analyzing the effects of the proposed changes to the Forest Practices Rules. The proposed changes do not include any changes to the forest practices classification system based on the presence of cultural resources. The Board has created a cultural resources committee to examine some tribal issues and reccomend whether the Board should take some future action.

OAHP is correct that, under a Class III FPA, while DNR may enforce a landowner's voluntary agreement to protect cultural resources, in the absence of a voluntary agreement, DNR has no authority to impose protection for cultural resources. Section 3.10.3 has been revised to clarify this point.

Subject Area: Cultural Resources
Issue: Cultural resources module.
Number of Individual Comments: 4

Comment Summary:

The Washington Environmental Council and others noted surprise that Alternative 3, which was developed from a combination of environmental and tribal caucus members, does not include the cultural resouces module for watershed analysis. The OAHP noted an inconsistancy among EIS sections on whether the watershed analysis program under Alternative 3 includes a cultural resources module. The OAHP stated it could not determine whether the cultural resources module would provide additional protection to cultural resources because a description of the module was included in the EIS. Other comments indicated support for the cultural resource module as a means to protect cultural resource sites. One commenter was concerned how legal requirements for cultural resource protection would occur in areas that do not have watershed analysis.

Response:

This issue was inconsistently addressed in the Draft EIS. Alternative 3 was intended to include the addition of a cultural resources module in watershed analysis. The text of the Final EIS has been revised to clear up the inconsistencies.

Subject Area: Cultural Resources
Issue: Current protection.
Number of Individual Comments: 1

Comment Summary:

The OAHP expressed concern that the EIS presents a false picture of a proactive effort of cultural resource protection under existing permanent Forest Practices Rules.

Response:

Comment noted. Section 3.10.3 has been clarified to reflect that the Forest Practices Rules offer protection for those cultural resources that have been previously recorded within an area and do not require systematic surveys to identify cultural resources as part of a forest practices application.

Subject Area: Cultural Resources
Issue: Definitions.
Number of Individual Comments: 1

Comment Summary:

The Washington State Office of Archaeology and Historic Preservation (OAHP) requested that precise definitions of cultural resources and other terms be addded to the Glossary.

Response:

The definition of cultural resources provided in the EIS text is from WAC 222-16-010. This definition and additional definitions for archaeological resources, historic resources, and other related terms have been added to the glossary.

Subject Area: Cultural Resources
Issue: National Historic Preservation Act.
Number of Individual Comments: 1

Comment Summary:

The OAHP indicated that two goals of the Forests and Fish Report were to comply with the Clean Water Act and the Endangered Species Act. However, both the CWA and ESA also require compliance with the National Historic Preservation Act (NHPA) of 1966 (as amended). The OAHP does not believe that the prescriptions detailed under the action alternatives would provide a substantive basis for compliance with the NHPA.

Response:

The NHPA requires federal agencies to take into account the effect of their undertakings on sites that are either included in or are eligible for inclusion in, the National Register of Historic Places. The requirements are procedural and are the requirements of the federal agencies.

Subject Area: Cultural Resources
Issue: Protection from RMZs
Number of Individual Comments: 1

Comment Summary:

The OAHP was concerned about the assumption in the Draft EIS that increasing the RMZ width will produce a de facto increase in protection to cultural resources.

Response:

While there is evidence supporting the statements regarding the prevalence of sites along salmon-bearing streams, we have deleted speculative statements from the text in Section 3.10.3.

Subject Area: Cumulative Effects
Issue: Adaptive management.
Number of Individual Comments: 5

Comment Summary:

Weyerhauser suggested that there would be no risk of cumulative effects under Alternative 2 because of the adaptive management program. The WFPA outlined some of the hypotheses that would be tested under the Adaptive Management Program.

Response:

The EIS recognizes that an effective adaptive management program will decrease the risk of cumulative effects in the long-term. However, if the prescriptions proposed under Alternative 2 are, in fact, inadequate, then some level of cumulative effect would likely occur until the Adaptive Management program resulted in corrective actions.

Subject Area: Cumulative Effects
Issue: Editorial.
Number of Individual Comments: 5

Comment Summary:

Several comments pointed out minor errors or editorial concerns.

Response:

These errors and concerns will be addressed during preparation of the Final EIS.

Subject Area: Cumulative Effects
Issue: General.
Number of Individual Comments: 9

Comment Summary:

Many commenters suggested Alternative 2 does not adequately address the cumulative effects of timber harvesting. Commenters cited several reasons for this conclusion including:

1) Elimination of the prescriptive phase of the riparian function, mass wasting, and surface erosion modules in Watershed Analysis;

2) The threshold for significant effect during SEPA review is based upon comparison of the protectiveness of prescriptions rather than overall protection of the resource (i.e., an effect is not signficant as long as the prescriptive rule is more protective than the previous prescriptive rules).

3) There are no limitations on the amount of land in a watershed that can be in early seral stage.

4) The interaction of mulitple factors (e.g., flow and sediment) are not considered.

5) Past effects of timber harvest are not considered.

Response:

The EIS in Chapter 3.11 recognizes substantial uncertainty under Alternative 2 for addressing cumulative effects primarily because incentives for conducting Watershed Analysis are reduced and prescriptive phases are eliminated for several modules. Both Alternative 2 and Alternative 3 assume that cumulative effects will be addressed using standard prescriptions. However, if this assumption is false cumulative adverse effects could occur. Under Alternative 2, the adaptive management program will investigate the effectiveness of standard prescriptions for addressing cumulative effects. The EIS recognizes the risk of adverse cumulative effects would be lower under Alternative 3 in the short-term compared to Alternative 2 because many standard prescriptions have a lower risk of adverse effects relative to Alternative 2.

Two existing rules (WAC 222-30-025 and WAC 222-22-100) place limitations on the size of clearcuts under certain conditions.

Subject Area: Cumulative Effects
Issue: Other.
Number of Individual Comments: 6

Comment Summary:

One commenter was concerned about the cumulative effects of additional road building under Alternative 2 on habitat fragmentation. The WDFW suggested that cumulative harvest or other impacts were not addressed in the Draft EIS and referred to page S-10 of the Draft EIS. Weyerhauser suggested that cumulative effects should also be analyzed at statewide or regional scales in addition to the watershed and landscape scales included in the Draft EIS. The Washington Forest Protection Association suggested the Draft EIS should also recognise the

cumulative effects of Alternative 3 on the timber industry's ability to invest in preparation of watershed analyses and long-term forest productivity. The Washington Forest Law Center suggested that Alternative 2 severely reduces the likelihood that the SEPA process would be initiated, and consequently prevent cumulative effects, because the definition of a "significant effect" has been modified such that it limits the triggering mechanism.

Response:

The EIS recognizes the fact that road densities are not capped under Alternative 2. Cumulative effects are addressed in the EIS in Chapter 3.11 (Cumulative Effects). The landscape-level analysis in Chapter 3.11 is intended to cover the entire state. The EIS has given additional consideration and discussion to the triggering mechanisms for SEPA review.

Most of the SEPA triggers were not modified under Alternative 2. Exemptions were made for HCP's and other conservation agreements, but the likelihood that the SEPA process would be initiated, would probably stay the same under Alternatives 1 and 2. Also note that the SEPA triggers have been broadened.

Subject Area: Cumulative Effects
Issue: Risk analysis.
Number of Individual Comments: 11

Comment Summary:

The Muckleshoot Indian Tribe (MIT) suggested the cumulative effects analysis in the Draft EIS was incomplete because it did not include detailed analysis on plans and regulations mentioned in the section, particularly the Northwest Forest Plan and the various HCPs in the state. They also desired more quantification of the lands managed under the various plans and regulations. Several commenters suggested the list of completed or in-progress HCPs and description of other management areas was incomplete or in error. Several commenters suggested that the Cumulative Effects section does not adequately describe the risk of cumulative effects under either Alternative 1 (based upon Collins and Pess, 1997) or the expected cumulative effects under Alternative 2. The MIT generally disagreed with the conclusions stated in the cumulative effects section of the Draft EIS.

Response:

The amount of federal and state lands are quantified in the EIS for each of the regions in Section 3.7.3.3. This section also describes which regions are generally included in the NW Forest Plan and the DNR's HCP. The EIS analysis team does not believe it is necessary to include details of all of the various plans being

implemented in Washington to address cumulative effects. In particular, detailed descriptions of the numerous HCPs would be extremely lengthy and to a large extent superfluous because the regulatory agencies have already determined that these plans, and their prescriptions, meet the requirements of ESA and are adequately protective of listed species. Of the approximately 16 million acres that would be subject to the Forest Practices Rules, a substantial percentage are covered under some type of HCP, which also cover multiple species of wildlife, making them more inclusive than Alternative 2. The EIS analysis of cumulative effects (Section 3.11) includes an entire sub-section on the NW Forest Plan. Also, as described in Section 3.11 of the EIS, each of the approved HCPs have addressed cumulative effects in their NEPA analyses and have been found by the agencies to meet the requirements of ESA. Nearly all of the plans and programs listed in Section 3.11 have goals to at least maintain and usually to improve water quality or salmonid habitat and populations to meet the requirements of the ESA or the CWA. Consequently, improvements in Forest Practices Rules under Alternatives 2 and 3 are expected to further reduce cumulative effects relative to Alternative 1.

The list of HCPs has been revised. Information from Collins and Pess (1997) is presented in Appendix H. Additional information from Collins and Pess (1997) have been incorporated into the analysis.

The EIS analysis team would like to clarify a few issues that were raised in the MIT's comments. For instance, the Draft EIS points out that under Alternative 1, the major means to address cumulative impacts is through watershed analysis rather than "minimum standards". Consequently, under Alternative 1 those watersheds that have not had watershed analysis and corrective prescriptions, if necessary, are at a higher risk of cumulative effects. The reduced incentives to perform watershed analysis, the reduction in the ability to adjust prescriptions following watershed analysis when it is performed, and the uncertainty surrounding the effectiveness of some of the proposed prescriptions (particularly related to Type N streams) is one of the principle reasons the Draft EIS concludes there is some uncertainty that Alternative 2 will effectively address cumulative effects in the short-term. Also, the Draft EIS suggests that all of alternatives have some level of risk of cumulative effects when current watershed conditions are not considered prior to implementing forest practices.

The EIS distinguishes between the relative short-term and long-term risk of cumulative effects under Alternatives 2 and 3. The EIS concluded that the risk of cumulative effects in the short-term are lower with Alternative 3 compared to Alternative 2 because it has generally more protective prescriptions and a shorter schedule for completing Road Maintenance and Abandoment Plans. However, the EIS does conclude the long-term risk of cumulative effects is about the same

under each of the Alternatives 2 and 3, assuming that the adaptive management approaches under the alternatives are effective.

Subject Area: Cumulative Effects
Issue: Watershed analysis.
Number of Individual Comments: 3

Comment Summary:

One comment expressed concern that more protective riparian prescriptions developed through previously prepared Watershed Analyses would now be replaced by potentially less protective standard prescriptions under Alternative 2. One commenter suggested that it was the results of Watershed Analyses that led to the development of prescriptions in Alternative 2 and will be useful for developing monitoring plans. One commenter also requested a more detailed discussion of the positive benefits that previously completed Watershed Analyses have had on development of the Alternative 2 prescriptions.

Response:

Comments noted. The first sentence of the comment summary is correct in that prescriptions under Alternative 2 supercede prescriptions developed during Watershed Analysis. A more detailed discussion of Watershed Analysis is present in Appendix H.

Subject Area: Economics
Issue: Economic information and viability pertinent to the timber industry.
Number of Individual Comments: 12

Comment Summary:

Several commenters were interested in how economic viability of the timber industry is measured. Several commenters were concerned that economic viability was not addressed in the EIS. Some wanted to know how it is defined in the fourth goal of the Forest Practices Board. One comment suggested that exclusion of economic factors in the EIS results in less-than-full disclosure of the legal requirements under the Forest Practices Act to balance environmental and economic considerations and all of the considerations present in the development of Alternative 2. Several commenters desired that specific factors be included in a cost benefit analysis. Two commenters provided information on the economics of the timber industry.

One commenter suggested Alternative 2 is "weighted too heavily towards 'the business of making money'" and questioned why the timber industry was provided

a tax cut. One commenter described the "Forest and Fish Rules" (sic) as saying no money was available for easements on no-harvest and limit harvest buffers.

Response:

Comments noted. RCW 76.09 of the Forest Practices Act requires the Forest Practices Board to maintain a viable timber industry. Economic information is not considered in this EIS, but economic issues are addressed by the Small Business EIS and the Cost-benefit Analysis preparted by the DNR. The Forest Practices Board will consider economic information in their decision on the implementation of new Forest Practices Rules. Neither the Forest and Fish Report or the proposed rules under Alternative 2 provide for easements.

Subject Area: Editorial
Issue: General.
Number of Individual Comments: 8

Comment Summary:

Commenters noted that Alternative descriptions within different sections of the EIS did not always agree. Also, a few miscellaneous errors were also noted.

Response:

Modifications were made in the Final EIS to maintain consistency between sections and correct errors.

Subject Area: Editorial
Issue: Missing citations/references.
Number of Individual Comments: 2

Comment Summary:

Two commenters requested additional citations and references for statements made in the EIS.

Response:

Additional citations and references have been added to the EIS where appropriate.

Subject Area: EIS Chapters 1 & 2
Issue: Editorial.
Number of Individual Comments: 7

Comment Summary:

Several comments recommended editorial changes including requests for revised wording, or changes in grammar or spelling.

Response:

The recommended changes were considered during revision of the EIS and incorporated where appropriate.

Subject Area: EIS Chapters 1 & 2
Issue: General.
Number of Individual Comments: 33

Comment Summary:

Many comments requested clarification or expansion of discussions in Chapters 1 and 2 or noted errors. Other comments noted inconsistencies between the alternatives described in Chapter 2 and descriptions in other sections of the EIS. Some comments described their perspective of the regulatory context for forest practices or their evaluation in the EIS.

The Muckleshoot Indian Tribe believed their scoping comments were mostly ignored in the Draft EIS.

The WDFW recommended that Hydraulic Project Approval (HPA) be added to Section 1.4.3 of the EIS.

Response:

Recommendations for clarification or expansion of alternative descriptions in Chapters 1 and 2 were considered during revision of the EIS and changes made where appropriate. Inconsistencies were corrected between the Draft and Final EIS.

A discussion of HPAs was added to Section 1.4.3.

Subject Area: Enforcement
Issue: Forest Practices Board manual is guidance only.
Number of Individual Comments: 1

Comment Summary:

The Washington Environmental Council was concerned that under Alternative 2 many Best Management Practices were eliminated from the Forest Practices Rules and could only be found in the Forest Practices Board Manual which is only guidance and not required practices.

Response:

The manual is an advisory technical supplement to the rules. As long as policy goals in the WAC are being met, the landowner has sole discretion on how the goals will be met. Although it is a guidance document, the DNR can use it to evaluate whether the requirements in the rules have been met.

Subject Area: Enforcement
Issue: General.
Number of Individual Comments: 1

Comment Summary:

A comment suggested that compliance to the Forest Practices Rules would be inadequate because of insufficient funding for compliance monitoring. The comments also suggested that past performance for compliance has been poor and consequently would be poor in the future.

Response:

Comment noted. The EIS analysis team and Forest Practices Board recognize that there are concerns with the past performance and funding levels for compliance monitoring. However, the EIS analysis assumed that funding for compliance monitoring would be adequate and that a reasonably high level of compliance to proposed rules under all the alternatives would occur. The EIS recognizes that low compliance and insufficient funding for compliance monitoring can reduce the level of protection to natural resources.

Subject Area: Enforcement
Issue: Rules based on Forests and Fish Report are too complicated
Number of Individual Comments: 31

Comment Summary:

Many commenters suggested the prescriptions under Alternative 2 are too complex, that landowners (especially small landowners) would have difficulty implementing the prescriptions appropriately, and that DNR would have difficulty ensuring that landowners were complying to the rules.

Response:

Comments noted. The Forest Practices Board will consider these comments when making their decision. The DNR recognizes that the rules under Alternative 2 are complex and that implementation and enforcement will be more difficult relative to Alternatives 2 and 3. However, the EIS analysis assumes that prescriptions will be implemented as required under the rules proposed in all of the alternatives. A Small Forest Landowner Office has been established to provide assistance to small forest landowners in implementing the rules under Alternative 2.

Subject Area: Fire
Issue: General.
Number of Individual Comments: 7

Comment Summary:

One commenter indicated that criteria used in the fire analysis were not explicitly defined. In addition the commenter suggested that fire suppression costs should not be included in the analysis because costs were not considered for any other resources. It was also suggested the analysis should consider how the alternatives would affect deviations from normal fire regimes. The comment suggested that benefits of Alternative 2 for maintaining healthy forest patterns and fire regimes were not discussed. One comment suggested that the effects of past fire suppression on forest condition should be more fully described in the Affected Environment Section. One comment expressed confusion about how logging causes fires, and whether that included both prescribed fires and wildland fires.

Response:

The discussion of fire effects has been expanded in the EIS, including the factors considered in the analysis. Suppression costs have been dropped as a factor in the analysis. The discussion of the Affected Environment has been expanded to consider the effects of past fire suppression and the role of commercial logging operations in causing fires.

Subject Area: Fish
Issue: Bull trout.
Number of Individual Comments: 3

Comment Summary:

Some commenters were concerned that Alternative 2 did not have adequate protection for bull trout in westside watersheds and that Draft EIS analysis was incomplete. The Columbia River Inter-tribal Fish Commission (CRITFC) thought protection for bulltrout would be inadequate on the east side because bull trout habitat could be eliminated from the bull trout overlay map based upon potential future meetings and agreements between a landowner and the WDFW. The CRITFC also expressed doubt that bull trout habitat could be effectively modeled. The Muckleshoot Indian Tribe suggested that bull trout protection standards to be implemented in eastside watersheds would also be implemented on the west side since bull trout are also listed in Puget Sound.

Response:

Comments noted. Additional discussion of bull trout risks in westside watersheds has been included in the Final EIS. Bull trout habitat can be both added and eliminated from the bull trout overlay based upon information available during potential future meetings that includes affected Tribes and federal agencies in addition to landowners and the WDFW. Alternative 2 does not include added bull trout protection on the west side of the cascades.

Subject Area: Fish
Issue: Coarse sediment.
Number of Individual Comments: 1

Comment Summary:

One commenter inquired if differences in risk of coarse sediment delivery between Alternatives 2 and 3 would be significant to fish.

Response:

Under all of the alternatives, any specific area that has increased coarse sediment delivery to Type S or F streams resulting from forest practices could have an adverse effect to fish habitat in the area by increasing embeddness, filling pools, or increasing channel instability. Alternative 3 was determined to have higher protection (i.e., lower risk of adverse effects) relative to Alternative 2 because it included an accelerated schedule for RMAPs, no net increase in road density, and riparian buffers on all streams. Consequently, the frequency and magnitude of events that deliver coarse sediment to Type S or F streams is likely to be lower under Alternative 3 than Alterntive 2. Where these events occur under Alternative 2, but would have been avoided under Alternative 3, a significant effect could occur to the local fish habitat. For example, a culvert/road failure that occurs during year 12 of the plan under Alternative 2 that would have been fixed earlier (and consequently avoided failure) under Alternative 3 could represent a significant adverse effect to the local fish habitat.

Subject Area: Fish
Issue: External factors.
Number of Individual Comments: 4

Comment Summary:

It was requested that additional discussion occur on the uncertainties resulting from ocean conditions, fish harvest, and other external factors that are not the focus of the EIS, but may contribute to the continued decline or recovery of listed salmonid populations.

Response:

Detailed discussion of external factors that affect salmonid population viability is not necessary for decision-makers to make an informed decision concerning the alternatives. A general discussion of these factors is present in the EIS to provide a context for placing the effects of forest practices within the complete life cycle of salmon and trout. However, the focus of the EIS is on the effects of the three alternatives on meeting salmonid freshwater habitat requirements (i.e., a properly functioning aquatic ecosystem) regardless of how external factors in combination with freshwater habitat conditions ultimately result in the overall viability of listed stocks. Consequently, the EIS evaluates how the alternatives will affect fish habitat and not fish population numbers per se.

Subject Area: Fish
Issue: Fish passage.
Number of Individual Comments: 4

Comment Summary:

One commenter disagreed with the EIS conclusion that little difference would be present among the alternatives for fish passage. One comment pointed out that the Draft EIS appeared inconsistent concerning culvert replacement between Chapter 2 and Section 3.7. Some commenters provided general information and references on fish passage. The WDFW requested that the EIS clarify its role and responsibility for regulating fish passage. One comment indicated that Table 3.7-7 inaccurately portrayed the amount of fish-bearing and nonfish-bearing streams under Alternative 3.

Response:

The EIS states there is little difference in protection among the alternative for fish passage under ***new roads*** because all new roads will require Hydraulic Permit Approval (HPA) and need to meet the rules and standards developed by the WDFW. The EIS also states that differences do exist among the alternatives for fixing existing road culverts that have passage problems or are too small to pass a 100 year flood event. Chapters 2 and 3 have been checked and edited to remove inconsistencies in the Final EIS. Additional information and references provided by commenters will be considered during revision of the Draft EIS.

Text has been added to the EIS to clarify the issue of agency responsibilities related to fish passage. The WDFW issues Hydraulic Project Approvals for new stream crossings, while DNR policy (particularly under Alternatives 2 and 3) includes fish passage as an objective and the rules developed for forest practices must be consistent with WDFW requirements. The role of WDFW for regulating fish passage has been clarified in Chapters 2 and 3, and Appendix F of the EIS.

Under Alternative 3, not all streams less than 20 percent gradient are fish-bearing. Table 3.7-7 only includes estimates of fish-bearing stream crossings that would be pertinent to passage issues.

Subject Area: Fish
Issue: Large woody debris.
Number of Individual Comments: 6

Comment Summary:

Some commenters felt that the Draft EIS did not address the potential negative impacts of the incentive based large woody debris placement program in Alternative 2. They suggested that the loss of 10 trees/acre in exchange for wood placement was a trade of short-term gains for long-term losses. Other commenters stated it was not clear whether the criteria for "full protection" (i.e., a no-harvest buffer one site potential tree height in width) was applied to all streams in the entire stream network, or just to the areas buffered under Alternative 2. They also felt that the 100-year SPTH that was used in the Equivalent Buffer Area Index (EBAI) analysis was an inadequate measure of the maximum amount of recruitable wood for "full protection" of fish habitat formation. These commenters suggested that the EBAI analysis should be re-run in order to determine if there are significant differences in the level of protection provided by each alternative. A few commenters stated that the yardstick for "properly functioning" was based on a standard developed by the BLM for rangeland habitats and was therefor not appropriate for application to forested areas. Other commenters stated that the analysis did not focus enough on fish, and that wood from nonfish-bearing streams rarely reached fish-bearing streams and thus were not significant to fish.

Response:

The discussion of the advantages and disadvantages of the wood placement programs is expanded in the Final EIS in Sections 3.7.2 and 3.7.3.3.

The measure of "full protection" from a buffer width equal to one site potential tree height was applied to all streams within the stream network and not just the areas deliniated for buffer protection under Alternative 2. This criteria was used to evaluate all three alternatives. The lack of protection for those streams in Alternative 2 that do not have a buffer width equal to one site potential tree height is reflected in the risk ratings for those areas. The 100-year SPTH is being re-evaluated as an adequate measure of the "fully functional" width for stream buffers. See the response to comments under the Riparian subject area, Site Potential Tree Height/Desired Future Condition issue for additional information.

The results of this re-analysis are reflected in the Final EIS in Sections 3.4.2, 3.7.3.3 and Appendix D.

Criteria for a properly functioning aquatic ecosystem are defined by the National Marine Fisheries Service in their guidance document for the preparation of Biological Assessments (NMFS, 1996). The criterion include average levels of LWD needed to maintain fish habitat on the east and west sides of the Cascade Mountains. These levels are directly applicable to forested areas and are intended to be used as a guide to monitor the ability of programs to provide adequate LWD for fish habitat. Use of the adaptive management process would incorporate these criterion to evaluate the performance of forest management practices.

The fish analysis in the Draft EIS incorporates fish as one of the critical species groups used to evaluate the health of stream systems. The evaluation of the impacts of each alternative to fish habitat include an assessment of LWD recruitment. Potts and Anderson (1990) and Prichard et al. (1998) both found that first and second order streams (nonfish-bearing streams) can provide important habitat protection and enhancement to fish-bearing streams by storing fine sediment and delivering some amount of LWD.

Subject Area: Fish
Issue: Literature summarization.
Number of Individual Comments: 4

Comment Summary:

Many commenters supplied citations, references, and summaries of fish-related literature.

Response:

This information will be considered during revision of the EIS.

Subject Area: Fish
Issue: Miscellaneous comments.
Number of Individual Comments: 3

Comment Summary:

One commenter wanted additional rationale for including or excluding components (such as wildlife) from other sections of the EIS in the fish evaluation. Another commenter suggested Alternative 2 would only slow the rate of habitat degradation on private lands and that listed salmonid populations will only recover when degradation stops and recovery plans are implemented.

Several commenters attached, cited, or referenced additional information to consider when revising the EIS, but were not specific criticisms of the analyses in the EIS.

Response:

Comments noted. Additional information provided by commenters will be considered during EIS revision.

As explained in Section 3.7.3.1 habitat components in the fish evaluation were drawn from the NMFS matrix of pathways and indicators (NMFS, 1996). One objective of the fish assessment was to avoid un-necessary repetition in the evaluation of habitat components that were included in other sections of the EIS (e.g., riparian function, coarse and fine sediment, etc.). However, not all components were covered in other sections, but appeared only in the fish section (i.e., fish passage barriers and off-channel habitat). In addition, not all of the detailed indicators within the matrix could be effectively analyzed. Wildlife are an important component of the forest ecosystem, but are not included in the NMFS matrix as either a pathway or indicator and were therefore not included in the fish evaluation.

Subject Area: Fish
Issue: Other.
Number of Individual Comments: 13

Comment Summary:

One comment suggested a different general wording for stream types rather the "fish-bearing" or "nonfish-bearing" because the new typing system would be based upon fish habitat. One commenter suggested that habitat conditions would gradually improve under Alternative 1 based upon the Plum Creek Native Fish HCP EIS (USFWS et al., 2000). One commenter suggested the Draft EIS "failed to identify the appropriate sensitivity level of fish to excessive coarse sediment delivery". One commenter desired additional clarification on that state agencies, local agencies, and private parties are only prohibited from take under ESA and not required to provide for recovery of listed species. One commenter disputed the statement in the EIS that fish are less likely to be found in stream gradients greater than 20 percent. One commenter suggested the EIS failed to mention the importance of water temperature and dissolved oxygen on pre-spawning mortality.

Several commenters suggested discussion should be expanded about the protection provided to beaver habitat under Alternative 3 and its relationship to fish habitat.

The Muckleshoot Indian Tribe suggested that RMZs were represented as no harvest buffers on page 3-138. They also noted that chum salmon do not spawn just in the lower portion of the Green River.

One comment indicated a general concern on how Forest Practices Rules will effect fish passage, fish habitat, water quality, channel conditions, and watershed conditions relative to roads, but was not specific to any of the alternatives or the EIS in general.

Response:

Section 3.7 was revised to be more specific in using Types N, F, and S, where appropriate.

Text will be added to reflect the enhanced protection of beaver habitat provided under Alternative 3.

The Plum Creek Native Fish HCP EIS (USFWS et al., 2000) states that "The net effect of the No Action Alternative on fish habitat quality is unknown, but could potentially be a slight improvement". The No Action Alternative in the Plum Creek EIS would be similar to Alternative 1 of the current EIS. The Plum Creek EIS also states that these improvements may "not be large enough to adequately preserve the Permit Species throughout the Project Area". The Plum Creek EIS also suggests that some watersheds could experience continued degradation for some habitat features. The conclusions for the No Action Alternative in the Plum Creek EIS appear compatible with the conclusions for Alternative 1 in the current EIS.

The EIS does not quantify a "sensitivity level" for coarse sediment delivery because the appropriate level would be reach and watershed specific. Nevertheless, the discussion of coarse sediment in the fish and sediment sections of the EIS have been expanded to clarify the physical and biological effects of excessive coarse sediment delivery to streams.

The EIS has been clarified on the point that private parties and state and local agencies are only required to avoid take of listed species, not recover them.

The DNR recognizes that fish have been observed in streams with average gradients greater than 30 percent. The EIS does not dispute this possibility, but does suggest that the likelihood of observing fish in steep gradient streams is substantially less than lower gradient streams. The statement was made with the intent of providing non-technical readers with a general understanding of salmonid biology. Water temperature (and its relationship to dissolved oxygen)

was cited as an important factor for stream and fish productivity, including prespawning and spawning activities, on pages 3-116 and 3-117 of the Draft EIS. The EIS analysis team agrees with the Muckleshoot Indian Tribe that the Green River represents an exception to the general statement made in the EIS about chum spawning locations.

Harvest buffers on page 3-138 (paragraph 1) of the Draft EIS are correctly described as including thinning and that other harvest can occur within inner and outer zones of RMZs.

Subject Area: Fish
Issue: Refugia.
Number of Individual Comments: 4

Comment Summary:

Some commenters criticized Alternative 2 for not considering the need for refugia.

Response:

The concern over the need for refugia for salmon and trout is noted. However, this large-scale land use management issue cannot be addressed via Forest Practices Rules which address specific practices used during timber harvest and related activities.

Subject Area: Fish
Issue: Stream flows.
Number of Individual Comments: 4

Comment Summary:

Several commenters suggested that potential increases in the frequency and severity of peak flows would result in significant decreases in the egg to fry survival of listed species due to increased scour. Some commenters suggested egg to fry mortality might increase by as much as 54 percent. Other commenters suggested that changes in peak flows would not necessarily result in significant geomorphic changes to streams because storm and flood flows are the primary influences rather than peak flows.

Response:

Scour, deposition, and other channel-forming processes are related to stream discharge and occur primarily at bankfull or higher flows (Leopold et al., 1992)) and the highest level of bed mobilization will occur during peak flows. The EIS discusses the effects of peak flows and scour on egg to fry survival on pages 3-114, and 3-136 to 3-137 and identified a moderate risk of peak flow effects to

salmonids under Alternatives 1 and 2 and low risk under Alternative 3. While the effects of scour on egg to fry mortality has been demonstrated to be significant in some logged watersheds (e.g., Carnation Creek; Holtby and Healey, 1986), quantifying the level of effect throughout all areas affected by Forest Practices Rules is speculative. The degree to which the alternatives can affect the frequency and severity of peak flows is discussed primarily in Section 3.3 (Hydrology)

Subject Area: Fish
Issue: Target conditions.
Number of Individual Comments: 3

Comment Summary:

Several commenters requested a more detailed description of "target conditions" for the aquatic ecosystem and a comparison of current conditions to these targets using HCPs, completed watershed analyses, and other documents. Several commenters desired more quantification in the analysis.

Response:

The target condition for aquatic resources is a properly functioning aquatic ecosystem as described by the USFWS and NMFS in their respective matrices of pathways and indicators (NMFS, 1996; USFWS, 1998). Additional discussion has been included in Section 3.7.3 and Appendix B of the EIS. However, summarization of data included in HCPs, watershed analyses, and other reports was not included in the EIS because such detailed site-specific information would not provide decision-makers a means to distinguish among the alternatives. Furthermore: 1) many of the (few) completed watershed analysis have occurred in areas of highest concern and might not be representative of other areas; and 2) many of the watershed analyses have been performed in areas covered by HCPs which may require different prescriptions than those considered for new Forest Practices Rules. Status reviews of the listed and candidate species have already been conducted by the NMFS and USFWS, which concluded that many distinct population segments were in need of federal protection and forest practices, among other factors, have contributed to degraded habitat conditions in many parts of the Pacific Northwest. It would be extremely difficult, if not impossible, to quantify outcomes throughout the state under each of the alternatives for measures included in the agencies matrices of pathways and indicators. However, the riparian and sediment EBAIs have allowed some level of quantification using indices for comparison of prescriptions provided in the alternatives to protect the function of several ecosystem components.

Subject Area: Fish
Issue: Temperature.
Number of Individual Comments: 8

Comment Summary:

Many comments suggested the Draft EIS did not include sufficient discussion on the affects of air temperature on water temperature. One commenter suggested that regulatory and other targets for stream temperature are inappropriate for assessing the effectiveness of riparian prescriptions because they are largely based upon laboratory experiments. A commenter also suggested that prescribed buffers for Type N streams under Alternative 2 would provide adequate protection to Type S and F streams because results from Caldwell et al. (1991) suggest that any temperature increases in Type N streams would be mitigated by shading along the Type S and F streams and the lower portions of Type N stream which would allow temperatures to equilibrate to ambient conditions. One comment implied the fish effects section should have more discussion on the influence of air temperature on stream temperature in addition to the effects of shade. One comment suggested that Alternative 2 is not sufficiently protective of small (< 15 feet wide on the east side, <10 feet on the west side) fish-bearing streams and that it was inappropriate to have different buffer widths for different size streams.

Response:

The EIS does not directly address water temperature effects to fish quantatively because effects would be highly site-specific. Instead, the EIS evaluated the level of shade each alternative would provide to streams (Page 3-129).

Caldwell et al. (1991) suggested that increased temperature effects to Type 4 streams had negligible effects on Type 3 streams because temperatures equilibrated rapidly (within about 500 feet) to shaded conditions found in the Type 3 reach. The ISR (2000), in its review of the Forests and Fish Report, disputes the general applicability of the findings in Caldwell et al. (1991) because:

1) the studied streams had extremely low flows averaging 0.02 cfs which is substantially less than the maximum 0.3 cfs criteria for a Type 4 stream; and

2) lands adjacent to the Type 3 receiving waters were not mature unmanaged stands and consequently the streams may have represented elevated temperatures (i.e., the differences in temperatures between the Type 3 and 4 streams should have been larger prior to equilibration).

In selecting study sites, Caldwell et al. (1991) attempted to use 3 criteria: a) Type 4 streams that provided at least 15 percent of the Type 3 stream flow, b) the Type

4 stream crossed an area with timber harvest less than 5 years old, and c) homogeneous riparian and stream conditions for 1500 feet above the confluence for both of the Class 3 and 4 streams or the transition from Type 4 to Type 3. However, they found it impossible to meet all of these criteria. In particular, they found that most Type 3 streams were much larger than the Type 4 streams.

It is unknown how representative the sizes of the Type 3 and Type 4 streams in the Caldwell et al. (1991) were for all commercial timber lands in western Washington, but their difficulty in finding streams that met their criteria may suggest that most Type 4 are relatively small compared to the Type 3, 2, or 1 streams into which they drain. In addition, the combined canopy and brush shade levels in the Caldwell et al (1991) for the Type 3 receiving waters ranged from 20 to 98 percent. Given the uncertainty in the degree of representiveness for the study sites in Caldwell et al. (1991), additional literature review has been conducted to evaluate the extent to which adverse temperature effects in Type N streams can be of transported to Type S and F streams.

Additional text has been included about the effectiveness of the shade screening tool to meet state water quality standards. In addition, more discussion has been presented in the EIS about the effects of air temperature on stream temperature, and the role of stream size in conserving heat in water. Related comments and responses can be found categorized under Water Quality/Temperature and Riparian/Shade.

Small streams have a tendency for water temperature to equilibrate to environmental conditions more rapidly than large streams due to the lower heat capacity associated with smaller volumes of water. However, as described in Appendix B, small streams may receive effective shading from shrubs and young trees, relatively soon after harvest, compared with large streams (Beschta et al., 1987, and others). Consequently, it is logical that smaller streams are effectively shaded by smaller buffers.

Subject Area: Fish
Issue: Turbidity/fine sediment.
Number of Individual Comments: 3

Comment Summary:

In reference to fine sediment, one commenter inquired why uncertainty on the effectiveness of protection along Type N streams under Alternative 2 would effect fish since Type N streams, by definition, do not have fish. The Independent Science Review Committee (2000) suggested that increases in sediment load of about 100 percent over background would occur under Alternative 2 and that this

increase would likely result in suspended sediment exposure durations that could have moderate or higher adverse effects from these increases.

Response:

Fine sediment can be rapidly transported out of Type N reaches and deposited in Type S or F reaches. Consequently, the high uncertainty in the effectiveness of Type N stream protection in areas that will not have RMZs means that if the protection measures (i.e., equipment limitation zone (ELZ) and mitigation for greater than 10 percent soil disturbance of the ELZ area) prove to be not as effective as expected, then fine sediment delivered to Type N streams could be transported to Type S or F streams and result in adverse effects to fish habitat.

The ISRC (2000) report accurately reported the results of Newcombe and Jensen (1996), but the analysis suggesting that physiological stress would occur is faulty. First, it is not clear how the ISR estimated that sediment loads would increase 100 percent other than their professional judgement. Second, their manipulation of the data from Rothacher et al. (1967) is inappropriate; merely doubling the sediment concentration values from a cumulative frequency plot would not necessarily depict an accurate exposure duration curve even if loads did increase by 100 percent. Finally, the graph based upon Rothacher et al. (1967) suggests that peak sediment levels occur at most for 1 to 3 days, and these are likely not continuous exposures. Based upon Newcombe and Jenson (1996) for a continuous two-day exposure period, suspended sediment levels would need to be 20 mg/l for moderate physiological stress, but would need to be 403 mg/l for major physiological stress. Even the crude extrapolation by the ISRC (2000) to 80 mg/l is substantially lower than this amount. Even if reduced feeding did occur for a two- or even 3-day period it is unclear how this would affect the overall condition of fish.

Subject Area: Fish
Issue: Type N streams.
Number of Individual Comments: 3

Comment Summary:

One comment indicated there was no citation provided to support the statement that narrow type N_p streams would receive some shade protection from overhanging shrubs and young trees within about 10 years of harvest. The Yakama Indian Nation noted that the EIS concluded moderate to high risk of adverse effects to downstream fish habitat might occur from protection levels prescribed to Type N streams under Alternative 2.

Response:

The literature on shade protection requirements along small streams is not robust. Therefore, conclusions regarding shade protection along Type Np streams were based on the literature cited in Appendix B and professional judgment. The discussion of shade in Type N_p streams, and transport of heated water and LWD from Type N to Type S and F streams has been expanded in Appendix B and the riparian and water quality sections of the EIS including additional citations. Related responses and comments can be found under the Riparian/shade, Riparian/Type N streams, and Water Quality/Temperature categories.

Subject Area: Forest Chemicals
Issue: Available data/data incorporated
Number of Individual Comments: 7

Comment Summary:

Chapter 3 of the draft EIS states that there are no readily available data that focus on forest pesticide applications. A few comments challenge that statement directly and do provide references to some available studies (some outside of Washington State however), which have been incorporated in the Final EIS. In addition, the applicability of information from groundwater contamination studies referenced in the Draft EIS is questioned. The comments state that the chemicals detected in these studies usually are common agricultural or urban chemicals and should not be assumed to have originated from forest applications.

Response:

The Final EIS text has been modified to reflect additional information that has been gathered and reviewed since publication of the Draft EIS. The statement that "there are no readily available data" has been modified accordingly. However, sufficient data are not available to fully assess the impacts of current forest practices on water quality across all regions for all application scenarios. The new information incorporated into the Final EIS (including some data cited in the comment letters) sheds additional light on the expected risk of impacts from forest applications but is not comprehensive enough to support a statewide quantitative impact assessment. Such an all-inclusive assessment is beyond the scope of this EIS.

Likewise, although the Draft EIS cites studies that detected significant levels of chemicals commonly associated with agricultural practices, the discussion of these data also makes it clear that most of the chemicals detected were not chemicals typically used in forest practices. Moreover, the text explains that the few chemicals detected that are used for multiple purposes (e.g., forestry, agriculture, urban lands) should not be assumed to have originated entirely or

even in part from forest applications (see Draft EIS, Appendix J, pages J-10 and J-11). This section of the Draft EIS simply evaluates the potential for chemicals to contaminate water resources and does not evaluate any of the alternatives specifically. The Final EIS text has been modified to make these points clearer.

Subject Area: Forest Chemicals
Issue: Riparian/pesticide benefits
Number of Individual Comments: 11

Comment Summary:

Several comments raise issues regarding the benefits of forest chemical use on riparian communities, stating that chemical use generally is necessary to help manage riparian areas by sustaining desirable species and suppressing invasive species. The comments stress that riparian areas may need special attention because they provide specific benefits to aquatic systems. Thus, forest chemical applications may be necessary or even preferred (over mechanical thinning, for example) to help establish and maintain healthy riparian communities and reduce both short-term and long-term water quality impacts.

Response:

Chapter 2 of the Draft EIS (Alternatives Including the Proposal; specifically, pages 2-29 and 2-32, as well as Appendix J, page J-3), explains that each alternative includes measures to help ensure proper riparian growth and function while minimizing the risk of chemical contamination. Although Alternatives 2 and 3 place more stringent restrictions on chemical applications within riparian management zones (compared to Alternative 1), both alternatives are designed to enable forest managers to effectively manage riparian areas to maximize riparian health and function while protecting water quality. Specifically, Alternative 2 allows for the application of pesticides for hardwood or noxious weed control, while Alternative 3 requires alternative plans in cases where forest pesticides are necessary to help restore riparian management zone function. The alternative plans will be defined on a case-by-case basis, with the dual purpose of protecting riparian areas as well as minimizing water quality impacts. Finally, the text of the Final EIS has been modified to further emphasize the benefits of riparian areas, the need for effective management procedures, and the potential impacts of alternative management plans (e.g., mechanical thinning).

Subject Area: Forest Chemicals
Issue: Chemical toxicity
Number of Individual Comments: 4

Comment Summary:

Specific data and ratings regarding the toxicity of a few of the chemicals discussed in detail in the Draft EIS are questioned. Comments also point out the complexity of determining true toxicity in the field due to the variability in exposure time, method of exposure, concentration, etc.

Response:

Some of the information on chemical toxicity has been modified in the Final EIS to reflect more recent studies or to clarify where toxicity data were not consistent or clear across studies. However, the Draft EIS states in several places that the information presented for specific chemicals (in particular, Table 4, Appendix J) represents general statements about the expected impacts on most species of fish and wildlife. The information presented was compiled from a variety of sources using a variety of study designs and test organisms, and is not intended as a comprehensive statement on the absolute toxicity to all fish and wildlife (because toxicity can vary greatly among different species). Moreover, the Draft EIS acknowledges that laboratory results often cannot be directly applied to field conditions because environmental factors can significantly influence toxicity. Instead, the specific information presented in the draft EIS on a few of the more common chemicals is of a general nature and is intended to illustrate the range of chemical properties among some of these more common chemicals.

In addition, the Draft EIS does not state that the results are entirely laboratory-based. Rather, the summary information is a compilation of study data including both field and laboratory tests. Note also that the nature and scope of the EIS do not require or even warrant a detailed analysis of all possible chemicals and scenarios.

Subject Area: Forest Chemicals
Issue: Disturbed channels.
Number of Individual Comments: 1

Comment Summary:

This comment suggests that disturbances to Type N streams from forest practices and the application of forest chemicals to dry streambeds would result in efficient transport of these chemicals and significant adverse water quality effects.

Response:

A discussion of effects of forest practices on erosion and sediment production along Type N streams is provided in Section 3.2 of the EIS. Note that dry streambeds cannot be disturbed under any of the alternatives and therefore cannot be left in a disrupted state. The different alternatives do allow for varying levels of ground disturbance, which result in varying degrees of erosion and sediment transport. The impacts of varying erosion and sediment transport under each alternative are discussed in the sediment sections of the EIS (Section 3.2). Any decreases in contaminated sediment loading to surface waters among the alternatives will also result in minor decreases in forest chemical contamination in streams.

Subject Area: Forest Chemicals
Issue: Model use.
Number of Individual Comments: 3

Comment Summary:

Comments suggest that the EIS should apply the AgDRIFT model, not merely the results from studies performed by the Spray Drift Task Force.

Response:

A Washington Department of Agriculture representative specifically recommended against using the spray drift model for this EIS and instead recommended and provided the documents produced by the Spray Drift Task Force in 1997, referenced in the EIS. These documents provide extensive information on spray drift under a wide variety of application methods and conditions, and hence are applicable to the range of conditions under consideration in the EIS.

Subject Area: Forest Chemicals
Issue: Effects on domestic water supplies.
Number of Individual Comments: 1

Comment Summary:

The comment points out that domestic water supplies serving 9 residences or fewer do not get the same amount of protection as salmonids. There is concern over the amount of protection given to streams that supply water to small domestic users. The definition of small domestic users (domestic water supplies serving less than 10 residences) is also considered to be arbitrary.

Response:

Because domestic water supplies need to be perennial, it is unlikely that they would be located on Type N streams. The regulations regarding forest chemicals

on Type N and S streams proposed under Alternative 2 would be more stringent, and thus more protective, than under current conditions. The analysis of risk to small domestic water supplies has been expanded in the Final EIS.

Subject Area: Forest Chemicals
Issue: Erosion focus
Number of Individual Comments: 1

Comment Summary:
The comment implies that the Draft EIS is deficient because it incorporates an "erosion-centric" focus in evaluating the fate and transport of forest chemicals.

Response:
The EIS text has been modified to further address and clarify this issue. The EIS does not assume or imply that erosion is the major pathway of chemical transport following chemical applications. When viewed with the supporting text in the EIS (Appendix J), the sections specifically referenced in this comment are clearly part of larger statements about chemical transport that also include the effects of runoff in transporting forest chemicals.

Subject Area: Forest Chemicals
Issue: Nozzle Brand.
Number of Individual Comments: 2

Comment Summary:
The comments suggest that the rule should not specify a name brand, implying that the state endorses a particular brand of product.

Response:
The EIS text has been modified to also describe the essential features of the preferred spray nozzle types.

Subject Area: Forest Chemicals
Issue: Miscellaneous comments.
Number of Individual Comments: 20

Comment Summary:
Several comments address very specific items or items that were misunderstood or taken out of context.

Response:

Text has been modified in the Final EIS to reflect additional information where applicable.

Subject Area: Forest Chemicals
Issue: Other applicable regulations
Number of Individual Comments: 7

Comment Summary:

The comments suggest that the Draft EIS fails to consider related local, state, and federal regulations regarding pesticide use and application. The comments also imply that the Department of Natural Resources does not have the authority to regulate forest chemical applications.

Response:

Page J-3 of the Draft EIS acknowledges the potential overlap with other applicable regulations and cites sections of the Washington Administrative Code for specific details. However, the EIS does not consider all applicable regulations, because many apply to specific scenarios or specific chemicals, whereas the alternatives under consideration apply statewide to all forest chemicals. The EIS focuses on an evaluation of each alternative with the purpose of making comparisons among the three alternatives and is not intended to include a discussion of all forest chemical regulations. The Draft EIS also acknowledges that the Forest Practice Rules do not override other more restrictive regulations. However, the Washington Department of Natural Resources does have the authority to regulate pesticide applications on lands subject to the Forest Practices Act. The Final EIS text has been modified to clarify some of these issues.

Subject Area: Forest Chemicals
Issue: Other chemicals.
Number of Individual Comments: 1

Comment Summary:

The comment questions why performance targets listed in the draft EIS for chemical contamination consider only the effects of pesticides and not other [unspecified] sources of chemical contamination.

Response:

As the Draft EIS explains on page J-1 and J-7, the EIS discusses the potential impacts of pesticide applications only, because no changes are proposed to other chemical application rules under any of the alternatives. Thus, the EIS focuses specifically on the relative risk of impacts resulting from alternative pesticide application guidelines considered under the three alternatives, with limited

discussion of other chemical contamination issues that are the same for all alternatives (e.g., fertilizers).

Subject Area: Forest Chemicals
Issue: Risk over-estimated.
Number of Individual Comments: 28

Comment Summary:

The comments question the level of risk or impacts identified, in particular for Alternative 1. Several references are made to past studies that found generally low levels of contamination following forest applications. The comments assert that the relatively infrequent application of forest chemicals (on the order of decades) should prevent much in the way of significant cumulative impacts. The common implication of these comments is that the impacts associated with Alternative 1 are overstated and that deficiencies in the Draft EIS have led to this conclusion. In addition, several comments present data for a specific chemical or situation in order to challenge a statement of potential risk in the EIS.

Response:

Based on further research on forest chemical applications (including studies cited in several comment letters), the EIS has been revised to expand the analysis and to clarify and further detail the level of risk associated with Alternative 1. In general, the statements regarding the risk of impacts in the Draft EIS are accurate and are not significantly altered in the Final EIS. Much of the discussion of impacts in the Draft EIS acknowledges that in general, impacts are low. However, due to the limited protective measures and BMPs specified under Alternative 1 (as discussed in the Draft EIS), Alternative 1 does allow for a potential risk of contamination or impacts on water resources.

The specific studies cited by the comment letters, as well as those cited in the Draft EIS, indicate a general (but not complete) absence of data that correlate forest chemical applications with impacts on surface waters. However, a lack of data identifying actual impacts does not guarantee that the risk is negligible, nor does it refute information indicating the presence of a risk of impacts. In other words, it is uncertain whether forest chemical applications have, or have not, resulted in actual adverse effects to surface waters. Likewise, studies that have found no impact on aquatic resources using specific chemicals under specific conditions do not support a conclusion that application of any chemical under similar (but not identical) conditions would also have no impact. Thus, such findings of specific studies do not necessarily have general implications for the wide range of environmental conditions and chemicals being considered in the

EIS. The EIS must consider the broader risk associated with each alternative and evaluate the potential risks or benefits associated with each.
The text of the final EIS has been modified to include new information gathered from additional studies on pesticide impacts and to clarify the level of risk for each alternative. The revised text suggests a lower risk of impacts under Alternative 1 (compared to the draft EIS conclusions) but still a smaller risk of potential impacts under Alternatives 2 and 3 (compared to Alternative 1).

Subject Area: Forest Chemicals
Issue: Purpose and goal of EIS.
Number of Individual Comments: 4

Comment Summary:

The comments suggest that the EIS must demonstrate that Alternative 1 does not currently meet the goals of the EIS and that Alternatives 2 and 3 would meet those goals. One comment letter states that Appendix J fails to show any deficiencies in the ability of Alternative 1 to meet the desired goals, and that Alternatives 2 and 3 are ultimately no better at meeting the goals.

Response:

The EIS does not establish "goals" for pesticide use. The purpose and need of the EIS is outlined on pages 1-3 and 1-4 of the EIS. In general, the purpose of the EIS is to provide impartial analysis of significant environmental impacts and to inform decision-makers and the public of reasonable alternatives, including mitigation measures, that would avoid or minimize adverse impacts or enhance environmental quality (WAC 197-11-400(2)). Appendix J in particular is designed to evaluate the relative degree of protection of water resources from forest chemical applications provided under three alternative rule scenarios. It is not incumbent upon the EIS to "show that Alternative 1 is not now meeting the goals in addition to showing that Alternative[s] 2 and 3 would meet those goals" (Comment No. AF-1). The EIS evaluates the potential impacts or risk of impacts associated with each alternative and makes comparisons among the alternatives to assist the Forest Practices Board in determining "whether and how to modify the current rules through amending or repealing current rules, or adopting new rules" (Page 1-4, EIS).

Subject Area: Forest Chemicals
Issue: Scope.
Number of Individual Comments: 7

Comment Summary:
Several comments question the level of detail of the analysis presented in the EIS suggesting that a more detailed quantitative evaluation is warranted.

Response:
As stated in the EIS, a detailed analysis of all possible scenarios is beyond the scope of the EIS. Likewise, it would be inappropriate to rely only on the most common scenarios or studies of specific chemicals, without considering the less likely but potentially higher-impact chemicals or scenarios.

Studies that have found no impact on aquatic resources using specific chemicals under specific conditions do not support a conclusion that application of any chemical under similar (but not identical) conditions would also have no risk of impact. Thus, such findings of specific studies do not necessarily have general implications for the wide range of environmental conditions and chemicals being considered in the EIS. The EIS relies on a more general analysis supported by applicable data to evaluate and compare the risk of impacts among the alternatives. Moreover, in order to facilitate decision-making, the evaluation is focused on the differences between the alternatives rather than on the full range of potential impacts associated with forest chemical applications statewide, many of which are the same or similar for all of the alternatives.

Subject Area: Forest Chemicals
Issue: Seasonal stream protection
Number of Individual Comments: 5

Comment Summary:
The comments express concern regarding the practice allowing forest chemical applications over dry portions of some ephemeral streams. One concern is that persistent chemicals will remain on the dry streambed long enough to be present in runoff when flows return to the stream. In addition, several comments stress that other valuable aquatic organisms may still reside in the damp substrate or subsurface flows of temporarily dry ephemeral stream segments.

Response:
Several sections of the EIS discuss the potential risks of applying pesticides over dry segments of ephemeral streams. In addition, the Final EIS has been modified

to further elaborate on the variety and extent of the risks associated with applications over dry streambeds. However, none of the alternatives under consideration provide any greater or lesser degree of protection for dry stream segments; therefore the issue does not influence the selection of a preferred alternative.

Subject Area: Forest Chemicals
Issue: Source of data.
Number of Individual Comments: 2

Comment Summary:

The commenters questioned the sources of the pesticide information presented in Appendix J. The commenters interpreted a footnote to suggest that a limited number of sources were contacted for information used in the analysis.

Response:

The comments incorrectly assumed that the table note in Table 4 represents all personnel contacted. Rather, the note is used to specifically indicate the sources of information regarding those products identified as making up a large majority of the applications. Additional contacts that were not listed, either qualitatively confirmed these statements or referred to the listed contacts for specific information, or requested not to be cited. Moreover, not all contacts are cited in the text, as specific information from each contact is not included in the text. No information was found to challenge the generally high use identified for the products highlighted in Table 4, as substantiated by the three specific references listed.

Subject Area: Hydrology
Issue: Adaptive management
Number of Individual Comments: 2

Comment Summary:

These comments state that the hydrologic evaluation should take into account the fact that hydrology is a high priority for adaptive management.

Response:

Comment noted. The ability of the adaptive management program to identify needed changes in the rules through feedback from research and monitoring is considered in developing conclusions.

Subject Area: Hydrology
Issue: Alternative 3
Number of Individual Comments: 2

Comment Summary:
These comments expressed support of Alternative 3 as the preferred alternative, noting that it has much more stringent requirement meant to prevent increased peak flows during rain-on-snow events.

Response:
Comments noted.

Subject Area: Hydrology
Issue: Beneficial hydrological effects.
Number of Individual Comments: 1

Comment Summary:
This comment states that the "beneficial" hydrological effects of timber harvest are ignored.

Response:
It is true that increased base flow and increased overall water yield are documented effects of vegetation management in some ecoregions of the United States and this effect is sometimes considered “beneficial” However, the significance of these effects in Pacific Northwest watersheds is not well understood, and thus their status as "beneficial" from the perspective of aquatic habitat is not assured.

Chapter 3 (Hydrology) of the EIS (3.3.2.1 and 3.3.2.2) acknowledges that increased lowflows in summer months may sometimes benefit the aquatic system (3.3.2.2). However, increased water yield indicates a fundamental change in the hydrologic regime (with associated changes in in-channel erosion and sediment transport rates), which could be detrimental to some life stages of aquatic organisms, and is thus not necessarily beneficial.

Subject Area: Hydrology
Issue: Cumulative effects.
Number of Individual Comments: 4

Comment Summary:

These comments express the following concerns over the treatment of cumulative hydrologic effects under Alternative 2: (1) because the hydrology module in watershed analysis exclusively focuses on the effect of timber harvest on snowmelt rates (without consideration of the hydrologic maturity of forest stands outside the rain-on-snow zone), it does not provide an adequate method for assessing harvest-related cumulative hydrologic effects at the basin scale; (2) Alternative 2 would remove DNR's authority to limit the size of clearcut logging causing damaging increases in peak flows.

Response:

The EIS recognizes that development of an effective adaptive management program will be necessary to reduce the risk of cumulative hydrologic effects in the long-term. The commenter is correct that if the prescriptions proposed under Alternative 2 are, in fact, inadequate, then some level of cumulative hydrologic effects are likely in the short-term until feedback from the adaptive management program results in corrective actions. The EIS in Chapter 3.11 recognizes substantial uncertainty under Alternative 2 for addressing cumulative effects primarily because incentives for conducting Watershed Analysis are reduced and prescriptive phases are eliminated for several modules.

The adaptive management program under Alternative 2 makes areas where there is the greatest uncertainty the first priority. Appendix I has been revised to clarify these points which were also considered in the EIS analysis. Additionally, it has been recognized that current hydrologic assessments could be strengthened. In light of this, systematic hydrologic investigations are a priority for adaptive management research. Long-term, scientifically rigorous studies are required to adequately assess cumulative effects during widely varying hydrologic conditions.

In addition to adaptive management's role in addressing cumulative effects, it should be noted that under many circumstances, cumulative effects must be analyzed and discussed as a requirement of the SEPA. Cumulative effects are also addressed in Alternative 2 through the establishment of the overall performance goals listed in Schedule L-1. Appendix I has been revised to clarify these points which were also considered in the EIS analysis.

In response to the comment, the EIS has been modified to discuss the potential for timber harvest to cause increased peak flows in rain- and snowmelt-dominated watersheds.

Contrary to what was stated in the comments, DNR does maintain its authority to limit the size of harvest units under Alternative 2 in some cases: "The department shall condition the size of clearcut harvest applications in the significant rain-on-snow zone where the department determines, using local evidence, that peak flows have resulted in material damages to public resources." (WAC 222-22-100).

Subject Area: Hydrology
Issue: General.
Number of Individual Comments: 14

Comment Summary:

These comments discuss various aspects of hydrologic processes in relation to timber harvest activities. These comments do not comment directly on the Draft EIS, but merely provide information that pertains to various discussions contained within it.

Response:

Comments noted.

Subject Area: Hydrology
Issue: Groundwater.
Number of Individual Comments: 5

Comment Summary:

Several comments expressed concern about the effects of timber harvest on groundwater temperature.

Response:

It is unlikely that timber harvest increases the temperature of groundwater. There is no known study documenting this occurrence.

St-Hilaire et al. (2000) extended a mechanistic water temperature model, CEQUEAU, by including the effects of soil heating on interflow (horizontal movement of water above the water table) that results from removing upslope canopy cover (i.e., from a clearcut). Their model has been calibrated using existing data from a small New Brunswick, Canada, watershed (12,864 acres), but its predictive ability has not been tested against independent data (St-Hilaire et al.,

2000). It is unclear to what extent their results are applicable to Pacific Northwest conditions. Nevertheless, under assumptions for a severe tropical storm event during August, the model predicted small increases in stream heating (<0.5°C) when canopy cover is reduced about 10 percent over the watershed. Under 50 percent and 100 percent canopy removal assumptions, temperatures were predicted to increase 0.9°C and 4.0°C, respectively (St-Hilaire et al., 2000). Consequently under the conditions and assumptions used, their model suggests that relatively large levels of canopy removal are necessary to cause substantial increases in water temperature.

Subject Area: Hydrology
Issue: Hydrologic effect of timber harvest and roads.
Number of Individual Comments: 2

Comment Summary:

These comments concerned the various potential hydrologic effects of timber management, including the base flow increase, decrease, peak flow increases, and road-related changes.

Response:

As stated in the Draft EIS, the most well understood effect of timber harvest is increased peak flows during rain-on-snow events. Other potential harvest-related (e.g., harvest timing or unit size) effects were not discussed due to poor understanding of the processes involved.

The comment suggests that because there are conflicting results regarding road-related effects on peak flows, that other factors are responsible. Other watershed or storm event parameters are likely involved, but that does not mean that roads do not have an effect.

Subject Area: Hydrology
Issue: Peak flow.
Number of Individual Comments: 21

Comment Summary:

The primary issues with this set of comments is the risk of increased peak flow during rain-on-snow events, and whether the proposed Forest Practices Rules in Alternative 2 are stringent enough to deal with this issue. Many of the comments refer to the Forests and Fish Report, and not specifically to the Draft EIS. One comment related to the lack of guidelines for the east side.

In addition, one comment stated that the Draft EIS did not consider that some studies have suggested timber harvest has little or no effect on peak flows (the

comment cites Thomas and Megahan, 1998; Duncan, 1986; and early work by Rothacher and Harr).

Response:

Some comments refer to a performance goal (peak flows no greater than 20 percent above background) identified in the Forests and Fish Report that is to be measured through adaptive management in Alternative 2. The goal of Alternative 2 is to disconnect the road system from the stream system. The rules would also address peak flows related to timber harvest by allowing conditioning of the size of clearcut harvests in the significant rain-on-snow zone of a watershed where peak flows have resulted in material damages to public resources and watershed analysis has not been performed.

The Draft EIS concludes that the risk of increased peak flows related to timber harvest under Alternative 2 is similar to that under Alternative 1. This takes into account the changes in watershed analysis, which is expected to result in a lower rate of implementation under Alternative 2. The level of uncertainty is such that it is not possible to refine this statement further at this point.

It is recognized that there is a slightly greater risk of increased peak flows under each of the alternatives on the east side.

While it is true that some research has provided conflicting results in documenting the link between timber harvest and increased peak flows, the EIS analysis team has concluded through its review of the literature that there are sufficient data to support a cause and effect relationship in some watersheds.

Subject Area: Hydrology
Issue: Rain-on-snow.
Number of Individual Comments: 1

Comment Summary:

This comment mentions that current DNR guidelines on rain-on-snow are "applied rigorously".

Response:

Text will be added to discuss the rain-on-snow guidelines and their implementation (see WAC 222-22-100).

Subject Area: Hydrology
Issue: Roads.
Number of Individual Comments: 1

Comment Summary:
This comment states that Alternative 3 would not necessarily reduce road density, but require no net increase in roads.

Response:
With the completion and enforcement of the road maintainenance and abadonment plans, it is likely that some amount of roads would be decommisioned, thereby effectively decreasing road density, although potentially only slightly.

Subject Area: Hydrology
Issue: Stream flow.
Number of Individual Comments: 3

Comment Summary:
These comments point out that studies (specifically, Cheng, 1989; and Beaudry and Sagar, 1995) have shown there may be signficant hydrologic effects in rain-dominated and snowmelt-dominated watersheds, which are not addressed in the Draft EIS analysis which focuses exclusively on impacts associated with timber harvest in the rain-on-snow zone.

Response:
Additional references regarding increased peak flows in rain-dominated and snowmelt-dominated watersheds were reviewed and this information was incorporated into the EIS (see 3.3.2.3).

Subject Area: Hydrology
Issue: Watershed analysis.
Number of Individual Comments: 2

Comment Summary:
These comments concerned how Alternative 2 would prevent changes to hydrologic processes.

Response:
While the comments imply that landowners would be just as inclined to conduct watershed analysis (and thus design prescriptions for hydrology), it presents no reasoning or evidence to support this. With only 10 percent of WAUs having completed and approved watershed analysis, and since these are quite costly, it

appears unlikely that landowners would be inclined to conduct them without the current incentives available under Alternative 1. Additional rationale for concluding that watershed analysis is less likely to be performed in the future under Alternative 2 is provided in Section 3.11 of the EIS.

Subject Area: Other
Issue: Funding.
Number of Individual Comments: 1

Comment Summary:
One commenter expressed concern about adequate funding to implement Alternative 2.

Response:
The evaluation of the alternatives was based upon the assumption that all components would be funded adequately for full implementation of the proposed rules. It is recognized that incomplete funding could delay or reduce the effectiveness of any of the alternatives, especially pertaining to implementation of the adaptive management program.

Subject Area: Other
Issue: Miscellaneous comments.
Number of Individual Comments: 37

Comment Summary:
Many commenters provided general thoughts, perspectives, or information about forested lands, streams and aquatic fauna, the timber industry, and forest management that were not specific to the alternatives considered in the EIS. Some commenters provided specific examples of habitat degradation to provide context to their comments.

Response:
Comments noted.

Subject Area: Other
Issue: Independent Science Review (ISR).
Number of Individual Comments: 31

Comment Summary:
Many commenters suggested the EIS should consider the comments contained in the report by the Independent Science Review Committee (ISRC, 2000). One comment noted that clarification was needed in the role of the Society for

Ecological Restoration and the American Fisheries Society in preparation and support of this report (ISRC, 2000).

Response:

The Society for Ecological Restoration (SER) used funds from various grants to sponsor an independent science review of the Forest and Fish Report. Both the SER and the American Fisheries Society (AFS) Western Division provided names to a committee (within the SER) that selected the anonymous ISR team. Neither the SER nor the AFSWD officially endorse the findings contained in the independent review report (ISRC, 2000).

The report (ISRC, 2000) was released shortly (about one month) before distribution of the Draft EIS and it was not possible to give full consideration to their comments in the time available. The report by the ISRC (2000) has been considered during the revision of the Draft EIS and preparation of the Final EIS. The report included a main body of comments on the Forest and Fish Report, as well as a substantial appendix of notes and individual comments. The EIS analysis team assumed the appendix was incorporated into the main body of the report and has only provided responses to the main body of the report.

In addition, it should be recognized that the ISR was a review of the Forest and Fish Report and not all of the components included in Alternative 2.

Subject Area: Other
Issue: Risk analysis.
Number of Individual Comments: 23

Comment Summary:

One commenter (WFPA) suggested the EIS should include evaluation of more than just the environmental effects (e.g., economic viablility) because the Forest Practices Act requires the Forest Practices Board to consider a variety objectives during rulemaking. In addition, the comment suggested that limiting the EIS to environmental effects would result in less-than-full disclosure of considerations used to develop the Forests and Fish Report.

One commenter suggested the EIS should recognize that all potential effects from forest practices are not equal in severity (i.e., surface erosion from harvest are generally less severe than surface erosion from roads).

Perspectives on the appropriateness of risk calls were varied. Some commenters suggested the EIS generally over-estimated the risk of environmental effects of Alternative 2 while other commenters suggested the EIS generally under-

estimated the risk of environmental effects of Alternative 2. Some comments were simple recapitulations of risk calls made in the Draft EIS.

One commenter was concerned about how the term "risk" was used in the EIS and desired more complete definitions on their usage in the document.

The Muckleshoot Indian Tribe suggested that some protection level calls were made without much information supporting the conclusion, but were not specific about where this occurred in the EIS.

One commenter suggested that the baseline for comparing the alternatives should be pre-Euro-American settlement conditions.

Response:

Comments noted. The scope of this EIS is restricted to the environmental effects of the alternatives. Economic effects are analyzed in the Small Business EIS and Cost Benefit Analysis. The EIS has been revised in Chapter 3.1 to explain how the terms "risk" and "uncertainty" are used in the EIS. Risk calls were made based upon the available data, the analytical tools described in the EIS, peer-reviewed and "gray" literature, and professional judgement. The fact that comment perspectives on risk calls often fell on both sides of a call suggests, at least partially, that the calls may be appropriate.

The DNR recognizes that some mechanisms for adverse effects are more dominant than others when viewed at a coarse scale. However, on a reach or site specific basis this general scale of severity may be false. For example, a stream reach that is experiencing harvest-related surface erosion and sediment delivery may not necessarily be experiencing any road-related surface erosion. In such a scenario, it is irrelevant that road related surface erosion more generally has larger adverse effects than harvest related surface erosion. Forest Practices Rules are required to address all sources of sediment delivery that may significantly degrade water quality.

Subject Area: Other
Issue: Summary of/conclusions from detailed comments
Number of Individual Comments: 45

Comment Summary:

Some oral comments referred to written comments previously submitted. Many comments were conclusions based upon other detailed comments or sections of attachments or provided an overall conclusion about the level of risk provided by one of the alternatives.

Response:
Comments noted.

Subject Area: Other
Issue: The Draft EIS is incomplete or inadequate.
Number of Individual Comments: 7

Comment Summary:
Several commenters suggested the EIS should have considered management recommendations in other plans such the NMFS 1998 draft proposal for upgrading Oregon's Forest Practices Rules and the WDFWs Wild Salmonid Policy. Several comments suggested specific types of data should be included in the EIS so that readers could better evaluate the alternatives. One commenter suggested the EIS ommitted a discussion of the uncertainties of Alternative 2 prescriptions. One commenter suggested that the Draft EIS was selective in its use of references to support statements. The Washington Environmental Council (WEC) suggested the Draft EIS anlaysis was not complete because the Forest and Fish Report was incomplete and vaguely worded. The WEC was also suggested that the EIS should address comments made on portions of the NMFS 4(d) rule and provided a list (their Appendix A) of analyses they believed were incomplete. One commenter suggested the Draft EIS was incomplete because the rationale for defining "long-term" as a 50-year period and "short-term" as a 10-year period was not provided.

Response:
Comments noted. The information contained in these plans will be considered during revision of the EIS. Additional data requests will be considered during revision of the EIS. However, some of the requests were for data that is not readily available throughout the state (e.g., stream widths). The EIS notes the uncertainties of the effectiveness of Alternative 2 prescriptions throughout the EIS where appropriate. The use of references was reviewed during revision of the EIS. As explained in a comment summary and response below (subject area: Other, Issue: The Forests and Fish Report is incomplete), the EIS analysis was conducted on Alternative 2, not just the Forest and Fish Report. Consequently, the completeness of the EIS analysis should be based upon Alternative 2. Each of the items listed by the WEC in their Appendix A are addressed in either the body of the EIS document or as a response to comment, The rationale for defining "long-term" and "short-term" has been added to Section 3.1 of the EIS.

Subject Area: Other
Issue: The Forest and Fish Report was negotiated/not science-based.
Number of Individual Comments: 15

Comment Summary:
Many commenters were concerned that Alternative 2 (the Forests and Fish Report) resulted from negotiations. Some viewed this as inadequate because other factors than science may have been incorporated. Other commenters viewed this as adequate because a balance could be achieved between forest industry viability and meeting ESA and CWA requirements. Some commenters suggested the Forests and Fish Report was not science-based because it included little documentation of the scientific rationale behind prescriptions.

Response:
It is the purpose of this EIS to analyze the significant environmental effects of the proposal and its alternatives. This process is based on science. In addition, the scientific basis of the Forests and Fish Report was reviewed in reports by Ch2M Hill (2000) and by ISRC (2000).

Subject Area: Other
Issue: Comment unrelated to EIS scope.
Number of Individual Comments: 18

Comment Summary:
These comments were unrelated to the EIS scope.

Response:
Comments noted. No response was needed for these comments.

Subject Area: Other
Issue: The Forest and Fish Report is incomplete.
Number of Individual Comments: 7

Comment Summary:
Many commenters were concerned that the Forest and Fish Report was incomplete.

Response:
The EIS evaluated Alternative 2 not the Forests and Fish Report. Alternative 2 is based upon the Forest and Fish Report, ESHB 2091, and refinements introduced during the rule-making process. Alternative 2 is described in Chapter 2 of the EIS.

Subject Area: Other
Issue: General introductory/closing comments.
Number of Individual Comments: 66

Comment Summary:
Many comment letters included general opening or closing remarks.

Response: Comments noted.

Subject Area: Other
Issue: Hardwood conversion.
Number of Individual Comments: 3

Comment Summary:
One commenter suggested there should be more incentives provided for landowners to convert hardwood dominated riparian areas to conifers. Several commenters suggested the EIS does not adequately describe the beneficial effects of hardwood conversion under Alternative 2.

Response:
A discussion of the hardwood conversion option under Alternative 2 has been added to the Riparian chapter of the EIS.

Subject Area: Other
Issue: Miscellaneous comments.
Number of Individual Comments: 37

Comment Summary:
One commenter suggested the EIS needs to bear in mind that the ESA only requires federal agencies to have activities that help to recover listed species, private entities are only prohibited from take.

Several commenters suggested the Forest Practices Board should also consider the effects of timber harvest on the use and aesthetics of public hiking trails.

Several commenters suggested that 50 years is too long to be locked into the plan proposed under Alternative 2.

Several commenters were concerned about the potential for Alternative 2 to become a Habitat Conservation Plan.

Several commenters were concerned that existing approved Timber Practice Applications (TPAs) would be implemented under the old rules.

One commenter was concerned that fewer opportunities to review and comment on TPAs would be available under Alternative 2.

One commenter suggested the Forest and Fish Report does not meet the requirements of the ESA and CWA because it did not include scientific documentation.
One commenter asked which section of ESA the Forest Practices Rules are intending to comply with.

One commenter suggested the NMFS needs to better define "harvestable" (how many fish and by whom) to understand Goal 2 of the EIS Purpose and Need.

One commenter suggested Forest Practice Rules should include requirements for conducting biological surveys such as the Benthic Index of Biotic Integrity or surveys similar to those required for "Survey and Manage Species" on Federal lands included under the Northwest Forest Plan.

The Muckleshoot Indian Tribe disagreed with statement on page 3-125 of the Draft EIS states that "the forest practice rules are designed to protect public resources to an acceptable level while maintaining an economically viable commercial forest industry", and suggested it conflicts with the purpose statements on page 1-4.

Several commenters provided interpretations on standards (e.g., ESA or CWA) to which the Forest Practices Rules should comply.

One commenter suggested the Forest Practices Board goals should be expanded to include avoidance of future ESA listings and maintenance of biodiversity for both aquatic and terristrial species.

One comment suggested that the potential benefits (assumed to be environmental) of Alternative 2 would be realized more rapidly than those under Alternative 1.

The Yakama Indian Nation (YIN) were concerned that under Alternative 2 stream widths for small versus large streams are defined differently for eastern and western Washington. The YIN implied that streams on the east side greater than 10 feet wide rather than greater than 15 feet should be used to define large streams having the wider inner zone no-harvest buffers. The YIN also requested an additional 60 days to review and provide comments on the Draft EIS.

Response:

Comments noted. These comments will be considered during revision of the EIS and by the Forest Practices Board while making their decision.

Chapter 1 describes ESA sections pertinent to the EIS. One purpose of the Alternatives is to avoid the "Take" prohibition of the ESA (Section 9, Prohibited Acts).

The effects of timber harvest on public hiking trails were not considered in the EIS because these trails were not part of the goals stated in the purpose and need described in Section 1.3. In addition, the effects of timber harvest on public hiking trails were not identified as a significant issue during the scoping process (Section 1.5.2).

The details of a Habitat Conservation Plan (HCP) for State Forest Practices Rules will be negotiated by the state in the future. When an HCP is developed, a federal EIS is required for that plan and its associated Incidental Take Permit and Implementation Agreement which are expected to last for a term of 50 years. The current EIS does not evaluate Alternative 2, or any of the alternatives, as the basis of an HCP. Currently, the NMFS has incorporated Washington State Forest Practices Rules (so long as they are as protective as the Forests and Fish Report prescriptions) within the ESA 4(d) Rule take limits. The Forest Practices Rules are represented by Alternative 2 in the EIS. Consequently, from the perspective of the NMFS, Alternative 2 would meet the requirements of ESA. Alternative 2 and the future HCP will both include adaptive management programs that will provide mechanisms for the modification of Forest Practices Rules.

Unless site specific information indicates there is likely to be unmitigated material damage to public resources, approved harvest applications are entitled to proceed. Most existing applications did not raise resource protection issues because they were processed under the emergency water typing and salmonid rules.

The statement on page 3-125 of the Draft EIS is consistent with the goals on page 1-4. The phrase "protect public resources to an acceptable level" is intended to encompass the first three goals on page 1-4.

Under Alternative 2, riparian prescriptions were developed separately for eastside and westside streams. The stream sizes are not intended to mean "large" or "small" streams, but are stream widths negotiated under the Forests and Fish Report as regulatory devices for implementing specific eastside or westside riparian prescriptions. The rationale for these stream widths has been added to the EIS.

Subject Area: Other
Issue: Shorelines Management Act (SMA)
Number of Individual Comments: 3

Comment Summary:

One comment suggested the EIS mis-interpreted, or inaccurately described the SMA requirements concerning allowed selective harvest amounts. One commenter suggested that inconsistances between SMA requirements and Alternative 2 will result in lower protections to riparian areas and wetlands adjacent to Type S waters.

Response:

The EIS analysis team believes the general description of the SMA in Chapter 1 is consistent with the SMA. The Forest Practices Board and the DNR are not responsible for implementation of the SMA. The Forest Practices Rules apply to forest practices regardless of whether the activity is also subject to the SMA. The activity would need to comply with both programs, and the more protective requirement would control.

Subject Area: Other
Issue: Small landowners.
Number of Individual Comments: 16

Comment Summary:

One commenter suggested that one class of small landowners, those converting forested lands zoned as residential property, should be required to follow county rules rather than Forest Practices Rules when logging their land. One commenter suggested that small landowner concerns should be remedied by financial incentives rather than rule exemptions. Other commenters also suggeted that smaller landowner viability should be considered in the analysis. One commenter suggested the Draft EIS did not have a complete description of small landowner prescription requirements under all alternatives. Several commenter were concerned that the small landowner exemption would result in watershed degradation in areas with a large proportion of small landownership.

Response:

Comments noted. Accurate data on the demographics of small landowners is currently not available. For example, it is unclear what proportion of small landowners are planning to implement forest practices on their lands within the lifespan of Alternative 2. Consequently, a quantitative assessment of the potential cumulative effects resulting from the small landowner exemption under Alternative 2 is difficult. The Small Forest Landowner Office in DNR's Forest

Practices has initiated preliminary work to compile a database to fulfill the legislative intent for nonindustrial private forestland demongraphics, cumulative effects analysis of Alternative Plans and serving as a focal point on nonindustrial private forestland issues. Nevertheless, a qualitative discussion of the effects of the small landowner exemption has been expanded in several resource sections of the EIS and in Appendix A. Included in this expanded discussion is a rough estimate of the proportion of forest lands subject to Forest Practices Rules that would qualify for the small landowner exemption. Similar to commercial landowners, the economics of small landowners are not considered in this EIS, but are considered in the the small business economic impact statement and cost benefit analysis and will play a role in rule implementation decisions by the Forest Practices Board.

Also, the legislature has provided a process for local government assumption over the regulation of certain forest practices (RCW 76.09.240) and direction on conversions (RCW 76.09.050). However, local governments must meet or exceed the standards in the Forest Practices Rules.

Subject Area: Riparian
Issue: Blowdown.
Number of Individual Comments: 10

Comment Summary:

Many commenters expressed concern about the need for windfirmness of riparian buffers. One commenter suggested that over 50 percent of trees left in riparian buffers under the Forests and Fish Report could blow down or be cut for yarding corridors. The commentor also provided references suggesting that up to one-third of trees with stream buffers could experience windthrow within 10 years of an adjacent clearcut harvest. The Independent Science Review (2000) suggested that blowdown of riparian buffers could lead to "boom or bust" cycles of LWD loading to streams.

Response:

Yarding corridors, when needed, could remove up to 20 percent of an RMZ, but yarding corridors across fish-bearing RMZs often reduce the need for riparian roads (See Comment/Response Riparian/Yarding and Road Corridors). Further, trees cut for yarding corridors provide a good opportunity for placement of LWD in streams to provide for short-term LWD needs. Under Alternative 2, basal requirements must still be met in an RMZ, regardless whether yarding corridors are present or not.

Blowdown is a natural event that can occur even in pristine forests. RMZs can have a higher exposure to wind that increases the risk of blowdown. However,

under the proper conditions RMZs can remain windfirm (Moore, 1977). In some areas, blowdown can be significant in RMZs (Andrus and Froehlich, 1991; Grizzel and Wolf, 1998) and in Oregon the level of blowdown was related to the level of bogginess and conifer vegetation in the buffer, the orientation of the buffer, and the shape of the hillslope (Andrus and Froehlich, 1991), but buffer width was not included in the statistical analysis. Neither of these studies (Andrus and Froehlich, 1991; Grizzel and Wolf, 1998) were intended to compare the level of blowdown in buffers to stream reaches without any adjacent clearcut harvest. Consequently, it is not clear to what extent the blowdown observed was in excess to what would be present in a pristine stand. While the statement (suggesting 50 percent riparian tree loss) may represent possible occurrances of blowdown and yarding in RMZs, it appears to considerably over-estimate the general risk of riparian loss which averages about 15 percent or less based upon studies reported in Grizzel and Wolf (1998). The DNR believes that the ISR (2000) perspective on blowdown is extreme. The ISR (2000) suggests that extreme LWD loading cycles will occur on a general basis. While the DNR agrees that increased blowdown and LWD loading to streams may occur at some locations, it is inaccurate to portray these circumstances as occuring on a general basis. In some situations, blowdown may actually improve short-term levels of LWD, but at the expense of long-term supply.

Nevertheless, the discussion of blowdown effects has been expanded in Section 3.4.3.2 of the EIS.

Subject Area: Riparian
Issue: Comparison to other plans.
Number of Individual Comments: 12

Comment Summary:

Several commenters suggested that the amount of riparian protection provided under Alternative 2 (the Forests and Fish Report) is substantially lower than recently proposed or enacted state or federal plans (e.g., Option 8 of the President's Forest Plan, WDFW's Wild Salmonid Policy) in the Pacific Northwest. It was implied that since scientists gave Option 8 only a 28 percent chance of ensuring salmonids would be well distributed across federal lands, the Forests and Fish Report was unlikely of ensuring salmonids would be well distributed across state and private forests.

Response:

Comments noted.

The fact that some state and federal conservation plans include buffers on all streams should not necessarily be a standard for comparing Alternative 2 because different plans usually have different goals. For example the President's Northwest Forest Plan was designed for the protection of more than endangered salmonids. It included spotted owls, salmonids, amphibians, and numerous other fauna on National Forest lands. Spence et al. (1996) recognized that different levels of protection could be provided under different conservation plans with different goals. For example, Spence et al. (1996) does not specifically recommend buffers of any particular size for all streams. Instead, Spence et al. (1996) recommends: "that habitat conservation plans and other conservation agreements ***include a comprehensive plan*** (emphasis added) for protecting riparian areas along all fish-bearing and nonfish-bearing streams, including ephemeral channels". Furthermore, Spence et al. (1996) also recommends that "The effectiveness of riparian buffers can be best evaluated within the context of specific protection goals. For example, riparian standards desgned to protect only salmonid habitats would likely differ substantially from standards to protect other riparian-dependent species, including amphibians, birds, mammals and reptiles. Consequently it is reasonable to expect more conservative riparian protection strategies for a mult-species HCP than for one designed for protecting only salmonids." Although Alternative 2 does not include no-harvest buffers on all stream reaches, it does require some level of protection via an equipment limitation zone when no buffers are present and mitigation when soil disturbance exceeds 10 percent of the area in that zone.

Subject Area: Riparian
Issue: DFC/Site potential tree height.
Number of Individual Comments: 28

Comment Summary:

Many commenters attached, cited, or referenced additional information about the rationale for selecting a particular DFC (including those in Alternative 2), but were not specific criticisms of the analyses in the EIS.

One commenter was concerned that the description of DFC for the east side was vague in the Forests and Fish Report. Several commenters suggested it was inappropriate for the Forests and Fish Report to utilize a Desired Future Condition (DFC) for mature forest stands to be represented by trees 140 years old and to utilize Site Potential Tree Heights for trees at 100 years old to determine buffer widths in Alternative 2 and for determining risk within the EIS. Some commenters were confused about whether multiple entries can be made to harvest trees within the inner or outer zone.

The Independent Science Review (ISR, 2000) noted that based upon McArdle et al. (1930) basal area for westside stand requirements under Alternative 2 (Forests and Fish Report Schedule B-2) were for 80 year old trees rather than 140 year old trees. The ISR (2000) suggested that the resolution of Site Class maps may be too coarse to accurately identify changes in Site Class that might occur near medium-sized streams. The ISR (2000) suggested that inner zone widths would tend towards the minimum as older core zones increasingly accounted for the bulk of the basal area needed to meet stand requirements.

Response:

Stand characteristics for the west side that define Desired Future Condition (DFC) and Site Potential Tree Height (SPTH) were negotiated and agreed upon by parties to the Forests and Fish Report (see Section 1.2.1) as adequate for meeting the goals of the Forests and Fish Report. The DFC was defined as a 140 year-old stand because it was midpoint between an 80 year-old and 200 year-old stand agreed to be the range for a mature riparian forest. Eighty years represents the approximate age for the peak number of Douglas fir trees per acre greater than 12 inches in diameter on Site Class III (McArdle, 1930). A 200 year-old stand was chosen for the upper range because it is near the age when old-growth characteristics start to become more prevalent.

The 100-year SPTH was chosen because most riparian functions are met with over 90 percent of total effectiveness. For example, according to the model and observations reported within McDade et al. (1990), old-growth conifers would reach 100 percent of debris pieces at a distance of about 55 m (180 feet) from the stream bank. In that study, tree heights in old-growth forests ranged from 50 to 80 m (164 to 262 feet) and averaged 57.6 m (189 feet). The understanding of the NMFS is that 80 year-old stands begin to show functional riparian components.

The ISRC (2000) incorrectly assumed that the DFC basal areas are inconsistent. The McArdle (1930) information on Douglas fir stand characteristics was based upon ***fully stocked stands***. Examination of plot data during development of the Forests and Fish Report prescriptions suggested that stands were about 20 percent below what could be considered fully stocked because of the presence of unsuitable land, such as rock outcrops, and the presence of hardwoods. Consequently, DFC basal area requirements reflect empirical measurements that stands are ***not fully stocked***. It is coincidental that the basal area values for a less-than-fully-stocked stand are about the same as an 80 year-old fully stocked stand.

The Forest Practices Rules under Alternative 2 do not limit the number of entries for the harvest of trees in the inner and outer RMZs, so long as stand requirements

are met or exceeded. However, for practical purposes, it is unlikely that RMZs will be re-entered during the 50-year lifespan of the new rules.

Additional information provided by commenters was considered during EIS revision.

Subject Area: Riparian
Issue: Down wood.
Number of Individual Comments: 1

Comment Summary:

The Columbia River Inter-Tribal Fish Commission expressed concern that Alternative 2 included no down wood requirements for the west side.

Response:

Under Alternative 2, down wood guidelines for the east side and west side, in addition to requirements stated in Appendix B of the Forests and Fish Report, are present in Schedule B-4. For the west side, down wood requirements are 194 logs/acre distributed over a range of size categories.

Subject Area: Riparian
Issue: Large woody debris - Functional wood size.
Number of Individual Comments: 4

Comment Summary:

Some commenters suggested that Alternative 2 is inadequate because it does not provide protection for all trees that may provide wood to streams. One commenter suggested that the definition of functional LWD should be broader than that used in the EIS and include any piece large enough to provide cover for fish. One comment suggested that for small streams, functional wood could be delivered within 25 to 40 years due to the small size (Hall et al., 1985). One comment suggested that the scientific literature indicates that timber harvest results in smaller LWD with reduced function.

Response:

The Draft EIS states that smaller streams will require shorter periods of time to achieve minimum size pieces for "functioning" LWD. The lengthy period of time needed before the potential for active recruitment of functioning pieces of LWD to fish-bearing streams is acknowledged and is one reason that Alternative 2 includes wood placement strategies that can be used to enhance existing fish habitat (Section 3.7.3.2). The focus of the EIS analysis was on long-term sources of LWD and consequently the EIS chose to use a definition of functional LWD as pieces large enough to form pools. While small woody debris may provide some

level of cover for fish, particularly when clumped with other small and large pieces, they tend to be short-term because they can be more easily transported downstream and degrade faster than large pieces. Sediment storage can be a significant function of LWD in large streams even if the frequency of storage sites declines with increasing stream size. The statement concerning the length of time that streams might be deficient in wood has been modified for clarity.

Subject Area: Riparian
Issue: Large woody debris - Performance targets.
Number of Individual Comments: 3

Comment Summary:

Several commenters suggested that performance targets should be based upon more than stand basal area requirements. Commenters were concerned that the performance standard for in-stream LWD under Alternative 2 is not related to the amount of LWD in-stream or the specific amounts needed to provide salmon and trout habitat. Commenters also suggested that 85 percent of recruitment potential is not enough, it should be 100 percent. It was also suggested that reference conditions for expected levels of LWD should be used.

Response:

Comments noted.

Under Alternative 2, performance targets (Schedule L-1) are present for riparian basal area, instream LWD recruitment potential (west side only), and litter fall. The effectiveness of these performace targets are priorities of the adapive management program.

Subject Area: Riparian
Issue: Large woody debris - Protection levels.
Number of Individual Comments: 29

Comment Summary:

Many commenters suggested that the EIS conclusion on level of protection for LWD recruitment was inadequate under Alternative 2. Reasons for their conclusion included:

1) SPTH based on 100 years is too young.

2) Yarding corridors could remove up to 20 percent of long-term LWD sources and stream parallel roads prevent wood from getting into streams.

3) Analysis uses maximum buffer width (not a range as is allowed) and does not account for any harvest within buffer (as is also allowed.)

4) Wood provided will be far below natural rate (41 percent) and will take centuries to be delivered.

5) 50-foot buffers on nonfish-bearing streams would provide less wood than the Draft EIS suggests.

6) McDade is inappropriate for most of these streams and overestimates the needed buffer width by only counting wood from sources that could be identified.

7) The functional definition of wood was too narrow.

8) Does not consider the fact that most riparian stands are currently in early seral stage.

However, other commenters suggested protection levels would be greater under Alternative 2 than predicted under the EIS because fish distribution is greater, and sensitive areas are more common that what is detectable by the Draft EIS assessment tool. It was also suggested that Type N streams are adequately protected in terms of LWD recruitment to Type S and F streams because the most likely sources, the lower reaches, have 50 foot no-harvest buffers and small streams do not have sufficient stream power to float large logs downstream. One commenter suggested the EIS should not imply that there is an "optimal" level of LWD number and size within a stream. It was also suggested that the Draft EIS did not adequately consider stream bank erosion and mass wasting as sources of LWD.

Many thought that Alternative 2 would allow older riparian forest to be replaced with dense young trees that would meet basal area standards, but with little or no LWD recruitment potential. Other commenters felt that the analysis overestimated the necessary buffer width, and that the assessment tools were not sensitive enough to include all buffers that would exist for areas with fish distribution and sensitive areas. The Washington Environmental Council suggested that the EIS was using a flawed LWD threshold criteria of 50 percent of natural levels.

Response:

The EIS was designed to evaluate the alternatives for long term management of private and state timberlands. Alternative 2 represents the requirements in House Bill 2091 and the Forest and Fish Report which resulted from negotiations between members of the Timber, Fish and Wildlife Group (composed of

Washington Department of Natural Resources, timber industry representatives, tribal representatives, and other groups) to formulate plans that would be acceptable to a wide range of perspectives. However, the environmental caucas walked out of the negotiations and did not approve or sign the Forest and Fish Agreement. The DFC was also a negotiated assessment level that was deemed appropriate for a management plan with a 50-year effectiveness.

Harvest in the RMZ was dealt with extensively in Appendix D, Table 5 and was the impetus behind developing the EBAI. The McDade (1990) curves are commonly used in LWD recruitment analyses within the Pacific Northwest. In addition, they are near the mean curve reported by the ISRC (2000). Windthrow and streambank erosion are the two main mechanisms for LWD recruitment observed in McDade et al. (1990) and are therefor included in the curve used to assign recruitment potential. Mass wasting or debris flows were not mechanisms observed by McDade et al. (1990) during their study. The analysis figures in the Draft EIS are based on models of representative map sections for comparison of the alternatives and are not designed to capture site specific information on state and private forested lands that is not broadly available in GIS layers.

The majority of LWD recruited to streams originates from an area within one SPTH from the stream edge (Pollock, 1999). Yarding and road corridors were not considered in the analysis because: 1) GIS data layers on road locations are often incomplete and 2) yarding corridors across Type S and F streams are atypical situations and would require site specific information (see comment/response category Riparian/Yarding and Road Corridors). The EIS acknowledges that there will be a significant time lag before the majority of the protected areas will deliver functionally sized LWD to streams because many riparian areas are currently in early seral stage. The conclusion of the Large Woody Debris component of Section 3.7.3.2 states that wood placement strategies are recommended for areas lacking in LWD with early seral stage riparian zones. The risk ratings for LWD recruitment, and fine sediment storage include high uncertainty statements about the potential lack of protection for nonfish-bearing streams. Text was added to the Final EIS to address the issue of roads blocking wood delivery to streams.

Subject Area: Riparian
Issue: Large woody debris - Recruitment from upstream sources.
Number of Individual Comments: 7

Comment Summary:

Many commenters expressed concern about the effects of the alternatives on the recruitment potential of LWD from Type N streams to Type S and F streams and the sediment storage potential within nonfish-bearing streams. Comments

suggested that the number of Type N upstream sources cumulatively make a significant contribution to downstream LWD loading. Many commenters cited studies suggesting that nonfish-bearing streams were more important for providing LWD (Veldhuisen, 1990), and storing sediment behind LWD (Heede, 1972; Montgomery and Buffington, 1993) to benefit downstream fish-bearing streams than was identified in the Draft EIS. On the other hand, some commenters stated that LWD inputs from nonfish-bearing streams were insignificant to fish-bearing waters.

Response:

The Draft EIS recognized the role of nonfish-bearing streams in providing sediment storage and LWD to downstream fish-bearing streams and it is incorrect to suggest that the Draft EIS did not consider upstream LWD recruitment in its analysis. Upstream recruitment was not considered quantitatively in the EBAI analysis, but was considered as a qualitative factor in the overall conclusion. In section 3.7.3.2 it is acknowledged that there is considerable uncertainty about the level of importance of wood from nonfish-bearing streams to fish-bearing streams, as is reflected by the conflicting references cited in the above comments. For example, the analysis reflects this ambiguity by stating that there is "high uncertainty regarding the impact of low LWD recruitment along small nonfish-bearing streams to downstream fish habitat."

Subject Area: Riparian
Issue: Leaf and needle litter.
Number of Individual Comments: 14

Comment Summary:

Some commenters stated that there was no definition provided for "full protection" of leaf and needle litter and that there was no information on requirements for the character of the litterfall. Some commenters suggested the EIS overestimated the risk of reduce leaf and litter input because buffers on Type N streams were designed to provide riparian function (including leaf and litter inputs) at locations that would most influence fish-bearing waters and because vegetative recovery in areas of timber harvest would rapidly offset any negative effects of timber harvest. However, other commenters suggested risk was high because of concerns about the potential impacts of decreases in allocthonous inputs to nonfish-bearing streams, including reductions from herbicide use on ephemeral streams, and the resultant effects on fish-bearing streams. A few commenters suggested a larger difference in risk was present between Alternatives 2 and 3 than stated in the Draft EIS. Many commenters attached, cited, or referenced additional leaf and needle litter information to consider when revising the EIS, but were not specific criticisms of the analyses in the EIS.

Response:

FEMAT (1993) defined full protection for leaf litter inputs to be reached with buffers out to 0.5 SPTH from the stream. Their professional judgement of full protection was based primarily upon the benthic invertebrate work of Erman et al. (1977) because no direct leaf and litter recruitment data was available. Erman et al. (1977) reported that the composition of benthic invertebrate communities in northern California streams with riparian buffers greater than 100 feet were similar to those in streams flowing through unlogged watersheds. Erman et al. (1977) suggested that differences in the composition and volume of organic debris from vegetation was one of the most important factors contributing to differences in invertebrate communities observed in buffered and unbuffered streams. These criteria were used in the Draft EIS to define the width of riparian buffers required for full protection of leaf litter inputs. The one-half 100-year SPTH ranges from 45 to 100 feet on the west side and 30 to 65 feet on the east side depending on the site class. The one-half 250-year SPTH ranges from 50 to 124 feet on the west side and 43 to 98 feet on the east side.

Many studies describe inputs of leaf and needle litter as a single group that provides nutrient inputs for aquatic systems (Knutson and Naef, 1997; Beschta et al., 1987). The analysis in the Draft EIS does not require the differentiation of litter and leaf inputs into separate vegetative groups.

Concerns about the lack of complete protection for nonfish-bearing streams in Alternative 2 are reflected in the Draft EIS risk rating of moderate for perennial nonfish-bearing streams and high for seasonal nonfish-bearing streams. Gregory et al. (1987) reported that annual litterfall to streams from a mature forest decreases from 300-400 g/m2 to less than 100 g/m2 following removal of the forest canopy and these effects may last 10 to 20 years after harvest. In addition, retention of coarse particulate organic matter (from litter) may be less than 30 percent of that deposited during a season and transported to downstream reaches or deposited in floodplains (Richardson, 1992). The lack of required buffers on 50 percent of nonfish-bearing streams is noted as a key feature in the EIS analysis. Transport of nutrients downstream from these reaches and retained in fish-bearing streams can be important for nutrient cycles involving aquatic and riparian primary productivity. The EIS analysis recognizes the potential for risk of changes in leaf and needle litter recruitment to downstream fish-bearing waters if reductions occur in leaf and needle litter inputs to nonfish-bearing waters.

Differentiation is made in the Draft EIS between the level of protection provided by Alternatives 2 and 3 in the form of the risk ratings for each alternative. Alternative 3 provides greater protection for leaf and needle litter recruitment for all streams and is given a very low risk rating. Alternative 2 provides adequate

direct protection for fish-bearing streams, which is reflected in the low risk rating, but less protection for nonfish-bearing streams, as shown by the moderate and high risk ratings (Section 3.4.3.2 Leaf and Needle Litter Production, p. 3-65).

The Draft EIS contains relevant data supporting the importance of leaf and needle litter delivery to streams, including nonfish-bearing streams. Shrub and forb vegetation will return rapidly to the streamsides, however, the inputs of conifer litter provide a longer-lasting, more consistent input source, and tree crowns supply most of the litter to stream systems.

Additional information provided by commenters will be considered during EIS revision.

Subject Area: Riparian
Issue: Literature summarization.
Number of Individual Comments: 12

Comment Summary:
Many commenters supplied citations, references, and summaries of literature about riparian function.

Response:
This information will be considered during revision of the EIS.

Subject Area: Riparian
Issue: Large woody debris – mitigation.
Number of Individual Comments: 1

Comment Summary:
One comment suggested the discussion of the LWD enhancement strategies should both beneficial and adverse effects.

Response:
The discussion of LWD enhancement strategies has been expanded in Section 3.7.

Subject Area: Riparian
Issue: Microclimate.
Number of Individual Comments: 9

Comment Summary:
Some commenters suggested that the effects of changes in microclimate on the aquatic system (if any) are poorly understood and that any assignment of risk within the Draft EIS is highly speculative and should be deleted. The WDFW

indicated microclimate effects were a topic to be investigated under the adaptive management program and that a low risk call for Type F and S streams was premature. Other commenters suggested it is logical to expect changes in the aquatic ecosystem as a result of microclimate changes documented in several studies (Brosofske et al., 1997; Chen, 1991; Chen et al., 1993).

Response:

Of the three papers (Brosofske et al., 1997; Chen, 1991; Chen et al., 1993), only Brosofske et al. (1997) specifically examined microclimates in riparian zones while Chen (1991) and Chen et al. (1993) examined microclimates upslope from streams. Notably, Brosofske et al. (1997) observed statistically significant changes between pre- and post-harvest for several microclimate variables (air temperature, soil temperature, relative humidity), but no significant relationship between stream water temperature and stream buffer width was observd except at the site with the smallest (nearly non-existent) buffer. However, significant positive linear correlations between water temperature and upslope soil temperatures were documented and Brosofske et al. (1997) suggested the results indicated a causal relationship because their study occurred along 1st order streams that received groundwater that passed through upslope soils. However, the focus of the paper by Brosofske et al. (1997) was not water heating and hydrology; neither interflow or groundwater temperatures were measured. Overall, the results from Brosofske et al. (1997) and Chen (1991) and Chen et al. (1993) are provocative and suggest effects that may be important to amphibians and other riparian-dependent species, but the strength of an effect, if any, on aquatic ecosystems is unclear. For this reason, the determination of risk to fish in the EIS did not rely on the microclimate analysis from the Riparian Section, but focused on the effects from changes in level of shade. Because microclimate was not considered, some level of uncertainty is present in the risk analysis. If future research demonstrated a strong relationship between adverse riparian microclimate changes and stream temperatures, then risks to the fishery resource would be higher than presented in the EIS. The EIS has been modified to further discuss this uncertainty in both the Fish, Riparian, and Water Quality Sections.

Subject Area: Riparian
Issue: Miscellaneous comments.
Number of Individual Comments: 44

Comment Summary:

Many commenters referred to the buffers under Alternative 2 as "phantom buffers" because many riparian areas are currently in early-seral stage and do not provide adequate riparian function. Many also suggested that Alternative 2 is high risk because not all streams receive no-harvest buffers and thinning is

possible within the riparian management zone (RMZ) along Type S and F streams. The Independent Science Review (2000) suggested it was inappropriate to allow salvage of trees that blow into the core zone.

Several commenters made general statements that riparian buffers were inadequate or that they were concerned that various riparian functions would not be adequately protected under Alternative 2. Some commenters suggested riparian buffer widths different than those within the three alternatives should be implemented.

One commenter suggested that the EIS should provide recognition that riparian stands can benefit from forest practices throughout a watershed by reducing the risk of wildland fire and the creation of multi-aged stands across the landscape. One commenter suggested that forest practices have increased riparian vegetation diversity in some locations. Several commenters suggested the alternatives should be discussed in light of the current condition of riparian stands (i.e distribution of seral-stages).

One commenter suggested the use of early-, mid-, and late-seral stages oversimplified the ecological function of managed forests, especially on the east side where uneven-aged management is often used. In addition, it was suggested that early- and mid-seral stages also provide valuable ecological function.

Several comments suggested riparian stand requirements should be based upon more than basal area.

Many commenters attached, cited, or referenced additional information to consider when revising the EIS, but were not specific criticisms of the analyses in the EIS. Other comments restated information already present in the EIS. One commenter provided additional information on salvage logging, downed wood retention, the LWD placement strategy, and sensitive sites that was not a specific comment on the EIS analysis.

One commenter was concerned that no height or basal area requirements are present under Alternative 2 for the minimum 20 trees/acre (10 trees/acre if LWD placement occurs) to be left in the outer zone. The comment also suggested some confusion existed over clumping/dispersion strategies in outer zones and around sensitive sites.

Several commenters stated preferences for Alternative 3 riparian prescriptions and/or rejection of Alternative 2 riparian prescriptions. One commenter expressed concern about the complex nature of the riparian prescriptions under Alternative 2.

Response:

Comments noted. Additional information provided by commenters was considered during EIS revision.

A concluding section to the riparian chapter has been added to the EIS and discussion of the alternatives in light of the current seral stage distribution in riparian zones has been included in that section. However, the proposed rules under any of the alternatives are not intended to provide compensation for any perceived lack of protection or degraded conditions from past harvesting. New forest practice rules are only intended to regulate future forest management.

Under Alternative 2, riparian leave trees in the outer zone may be dispersed or clumped, must be conifers a minimum of 12 inches dbh and remain uncut throughout all future harvests. Leave trees for sensitive sites are to be clumped, may be conifers or hardwoods, and must be a minimum of 8 inches dbh.

For analytical reasons, seral stage information was necessarily simplified to three seral stages. However, the EIS team recognizes the ecological function of all seral stages and the discussion of seral stages has been expanded.

The prescriptions under Alternative 2 allow salvage logging, however this can only occur if fallen logs were from trees that were not counted as part of the original riparian stand requirements and are surplus to down wood requirements.

The riparian prescriptions under Alternative 2 include minimum leave tree requirements (trees per acre) for the inner and outer zones. In addition, Option 1 requires that smaller trees be preferentially harvested, thus allowing the largest trees as to remain as leave trees.

A comment/response discussion on the complexity of the rules can be found under the Enforcement Subject Area.

Subject Area: Riparian
Issue: Other.
Number of Individual Comments: 1

Comment Summary:

One commenter suggested specific riparian buffer widths that should be implemented different than those within the three alternatives.

Response:

The DNR recognizes there is a range of buffer sizes recommended by various stakeholders, interested groups, and individuals. The EIS only evaluates the riparian prescriptions contained with the three alternatives developed during the scoping process and approved by the Forest Practices Board.

Subject Area: Riparian
Issue: Riparian EBAI.
Number of Individual Comments: 3

Comment Summary:

One commenter criticized the EBAI model because it has not been peer reviewed. It was also suggested that the EBAI underestimated LWD recruitment potential under Alternative 2 because it did not account for nonuniformity of fish and aquatic habitat distribution throughout the stream system. Commenters suggested the use of McDade et al. (1990) to define the relationship between distance and LWD recruitment potention was inappropriate because it overestimated LWD recruitment. One commenter suggested McDade et al. (1990) underestimated LWD recruitment. One commenter suggested use of the ORGONON model was inappropriate because it has not been validated for riparian stands.

Response:

A previous version of the EBAI model for LWD recruitment has been used successfully in an EIS considering alternative management scenarios for a Habitat Conservation Plan and land exchange between the Pacific Lumber Company and federal agencies in California (U.S. Fish and Wildlife Service and the California Department of Forestry and Fire Protection, 1999). The model received considerable scrutiny from state and federal agencies and the public during the preparation of that EIS. However, the EBAI has been modified to specifically meet the needs of the current EIS (e.g., incorporating channel migration zones). As pointed out in the comment, fish and aquatic habitat is not uniformly distributed across the landscape. However, it is not possible to accurately model (nor is the EBAI designed to consider) site specific characteristics over a large landscape basis because site specific data is not available. As explained in Appendix D, the EBAI model is designed to be used as a tool to determine the relative effectiveness of different riparian management strategies. Assumptions used to describe each of the strategies within the model are explained in Appendix D and the rationale for using the McDade curve. While the EBAI was an important component to the riparian analysis, other factors (e.g., the location of buffers on Type N streams) were considered when making risk calls. A discussion of the ORGANON model and its limitations and assumptions has been added to Appendix D.

Subject Area: Riparian
Issue: Risk analysis.
Number of Individual Comments: 6

Comment Summary:

Several commenters suggested that the risks to riparian function were overestimated while several others suggested that the risks were underestimated. The Pacific Rivers Council suggested that the level of risk concluded in many sections of the Draft EIS means that Alternative 2 will not meet the goals of the Forest Practices Board.

One commenter suggested it is inappropriate to use FEMAT riparian function curves as a basis for drawing conclusions on the likelihood of adverse affects of the alternatives because they were 1) generalized and 2) not based on real data.

Response:

Comments noted.

The FEMAT riparian function curves were based upon a combination of the available scientific literature and scientific knowledge of the Aquatic Ecosystem Team for FEMAT. Construction of generalized curves from numerous studies is a common scientific practice. Those curves, based more on the professional judgement of the FEMAT team, could be considered hypotheses. However, the functional relationships displayed have generally withstood scrutiny by independent reviews (e.g., Spence et al., 1996).

Subject Area: Riparian
Issue: Shade.
Number of Individual Comments: 28

Comment Summary:

Many commenters suggested that the riparian buffers proposed in the Forests and Fish Report will supply less shade (as much as 25 percent less) to fish-bearing streams relative to natural levels and that maximum effective shade is a desirable target condition. Other comments suggested that the Forests and Fish Report was inadequate because only sensitive sites with perennial flows would be identified for protection and no sensitive site would be identified for the east side. Some commenters were also concerned about the effect of yarding corridors and roads on shade. One commenter suggested the performance target for stream shade was inadequate because it does not consider any existing stream water quality degradation or cumulative effects. Some commenters were concerned that state water quality standards would not be met for all waters of the state. Some

commenters agreed with the Draft EIS finding that most riparian areas are in early seral stages and unlikely to provide complete effective shade in the near-term. Some commentors suggested that risk levels under Alternative 2 for adverse effects to water temperatures resulting from shade levels on Type N streams were underestimated. In contrast, others commenters suggested that the risk of adverse effects should be low or nil because Type N streams don't require buffers everywhere to protect fish-bearing waters. Some comments suggest the EIS should provide more discussion and consideration on the role of air temperature in determining water temperature. The WDFW noted that implementation of the shade rule was inaccurately described in the EIS and one commenter suggested there was no discussion of the shade rule in Section 3.4.3.2. Many commenters attached, cited, or referenced additional shade and heat energy information to consider when revising the EIS, but were not specific criticisms of the analyses in the EIS.

The Columbia River Intertribal Fish Commission (CRITFC) requested more description of the shade rule and also disputed the effectiveness of the shade rule and the methods for its implementation. The CRITFC also questioned why anadromous fish were provided less shade protection than bull trout. They also noted that the bull trout rules did not preclude removal of trees less than 75 feet from the stream if they did not provide shade.

The WDFW agreed with the low risk call for shade on the west side, but suggested the level of risk was higher on the east side.

Response:

The Draft EIS analyzed the level of shade protection using a 0.75 SPTH as the criteria for full protection along perennial streams. This criteria was based upon a figure provided in FEMAT (1993) and recommended in Spence et al. (1996). As noted in FEMAT (1993) and Beschta (1987) buffers of 100 feet or more have been found to provide as much shade as an old growth stand (i.e., about 90 percent complete shade).

Under Alternative 2 in western Washington, the 50-foot core zone widths along Type S and F streams, the 50-foot no-harvest zones for sensitive sites (headwall seeps, side-slope seeps, side-slope springs, stream initiation points) that have perennial flows, and the 50-foot no-harvest zones along at least 50 percent of Type N_p streams would provide roughly between 66 percent and 85 percent of the shade that might be possible from an old-growth stand, depending upon site class.

In addition, under Option 1 for the west side, the inner zones for Type S and F streams, that would allow some selective harvest would meet the 0.75 SPTH criteria for streams greater than 10 feet, but would be 0.66 SPTH for streams less

than 10 feet. As indicated in the EIS there is some uncertainty concerning the added shading effectiveness from a zone containing selective harvest outside of a no-harvest core zone. The EIS also points out that additional stream shading would occur from trees and vegetation within a CMZ and that small streams (assumed to be <5 feet) can be effectively shaded by overhanging shrubs and other small woody vegetation. Beschta (1987) notes: "Whereas small streams may be quickly overtopped by brush and effectively shaded from direct-beam solar radiation, larger streams, which require the canopies of tall conifers for shade protection, require longer periods." In addition, under Alternative 2, shade is measured at the edge of the CMZ, if present, which provides a higher level of protection than Alternative 1, if the channel location moves. Furthermore, under the shade rule only trees that provide shade are considered. Consequently, along Type S and F streams any shade provided by shrubs and small woody vegetation would be in addition to that provided by trees.

The risk analysis for shade considered both the proposed buffer widths and implementation of the shade rule WAC 222-30-040 for maintanence of stream temperature along fish-bearing streams (as discussed in Section 3.4.3.2 of the EIS). This requirement must be met even with the presence of yarding corridors and roads. A method for implementation of the shade rule is described in the Forest Practices Board Manual which can be found on the Internet at http://www.wa.gov/dnr/htdocs/fp/fpb/fpbmanual/fpbmintro.html. The discussion on its implementation has been corrected in the Final EIS.

The EIS states that Alternative 2 would not provide 100 percent effective shade at all locations and that there was a moderate to high level of risk associated with loss of shade on Type N streams. Although risk calls were moderate to high (west side) or very high to high (east side) for shade loss and increased water temperatures on Type N streams, risk calls for water temperature for fish were low (west side) and low to moderate (east side). The EIS (Page 3-106, Box) states that there is some uncertainty about how loss of shade along Type N streams would effect downstream Type F and S stream temperature, but goes on to state that cumulative effects could be important in watersheds already experiencing elevated stream temperature. Nevertheless, the EIS has been modified to further clarify the level of risk to Type N streams and the level of uncertainty of downstream effects. Discussion has also been expanded on the role of air temperature in determining water temperature and use of the shade rule.

Alternative 2 provides more shade protection to areas with bull trout because bull trout require cooler temperatures than salmon and steelhead. The CRITFC is correct in stating that the bull trout rules only protect trees providing existing shade. Consequently, for eastside riparian areas, trees that lie between 30 feet

(the core zone) and 75 feet which do not provide shade to the stream may potentially be harvested under some circumstances.

Additional information provided by commenters was considered during EIS revision.

Subject Area: Riparian
Issue: Small landowners.
Number of Individual Comments: 4

Comment Summary:

Several commenters suggested that exemptions to small landowners (parcels <20 acres owned by landowners with less than 80 acres statewide) under Alternative 2 would contribute to cumulative riparian degredation and loss of effective shade.

Response:

The Draft EIS has been modified to further address the effects (and the level of uncertainty) of the small landowner exemption on riparian function.

Subject Area: Riparian
Issue: Thinning below the floor.
Number of Individual Comments: 1

Comment Summary:

In Appendix A of the Washington Environmental Council's (WEC) comments it is suggested that the following analysis is missing from the EIS: "Impacts of thinning below the floor: no agreement on "thinning below the floor: amongst Forests and Fish parties. No analysis of the resulting risks."

Response:

The WEC is referring to statements in Schedule B-2 indicating that discussions that may occur between parties to the Forests and Fish Report to allow thinning in the area between the core zone and the floor. The floor is described in Chapter 2 of the EIS. Thinning in the "floor" area is not part of Alternative 2. Consequently, it was not included in the risk analysis.

Subject Area: Riparian
Issue: Type N streams.
Number of Individual Comments: 28

Comment Summary:

Several commenters suggested that all streams should have buffers (some comments specified a particular width) because they are included in several

unidentified federal and state plans and because it is recommended within the Mantech Report (Spence et al., 1996). It was suggested there is no technical justification for differentiating perennial and seasonal streams for riparian protection. In addition, one comment suggested that "sensitive sites" should not be limited to areas with perennial flows. It was suggested that insufficient buffers on Type N streams would prevent the development of stable, well distributed fish populations across watersheds. Other commenters suggested that large trees were not critical near small, confined seasonal channels and that adequate LWD could be provided from normal mortality of a managed stand plus the debris generated during harvest operations.

Several commenters suggested that 75 percent of streams (i.e., portions of Type N_p and 100 percent of Type N_s) in watersheds would receive no buffers while 25 percent (Type S and F) would receive buffers. Several commenters also suggested that leave tree requirements on the east side would be inadequate to maintain bank stability and shade in partial cut areas.

The Columbia River Inter-Tribal Fish Commission noted that a potential loophole exists in the Alternative 2 rules for prescriptions along Type N_p streams on the east side. They indicated that the rules under the clear-cut strategy which require a no-cut zone along the stream equal in size to the clear-cut area do not specify the current condition of the no-cut zone. That is, the no-cut zone could have been previously harvested prior to implementation of new rules.

Many commenters attached, cited, referenced, or stated without reference, additional information to consider when revising the EIS, but were not specific criticisms of the analyses in the EIS.

Response:

Comments noted. Please see comment/response categorized under Riparian/Comparison to Other Plans for additional discussion of other state and federal plans.

Most conservation plans in the Pacific Northwest (including the FEMAT Option 9) make a destinction between fish-bearing streams, perrenial nonfish-bearing streams, and ephemeral or intermittant streams because these stream types have different functions within the stream network. Consequently, there appears to be considerable evidence of technical justification for considering these stream types separately in terms of protection needs.

A substantial amount of Type N_p and Type N_s streams will not receive a buffer under the Forests and Fish Report. However, the proportion of the stream

network that will not receive a buffer is unclear. Furthermore, the statement that "75 percent of streams would receive no riparian protection" is simplistic because it provides no context for the level of protection that is needed to meet the goals of the Forests and Fish Report.

All streams receive some level of riparian disturbance protection. Type N_s and Type N_p streams as a minimum, have a 30-foot equipment limitation zone and requirements for mitigation for disturbance of more than 10 percent of the stream width.

The percentages presented in the comments were based upon a draft 1999 analysis prepared by M. Pollock while at the 10,000 Year Institute. The analysis utilized a GIS model to delineate stream channels within two westside watersheds. The GIS model used by the commenter for delineating a stream network is unlikely to be the same as that under development by the DNR. No evidence was provided to demonstrate that the GIS model used accurately depicted fish-bearing and nonfish-bearing stream networks although the commenter claimed the model underestimates stream length. Consequently, the basis for the buffer analysis conducted and its results are also unverified.

The analysis by Pollock (1999) included several assumptions that could bias the results.

First, the analysis assumed that all fish-bearing streams would include yarding corridors that occupy 20 percent of their length. While the Forests and Fish Report does provide flexibility for yarding corridors within RMZ's to include up to 20 percent of the RMZ length, the assumption that all fish-bearing streams will have the maximum amount of yarding corridors is unreasonable. In addition, yarding across streams may result in a reduction in the need for roads and stream crossings within riparian areas.

Second, the analysis was only conducted on two western Washington watersheds (Tolt River and Squire Creek). The author implied that these watersheds were representative of those throughout western Washington. No evidence was supplied that would indicate that these watersheds totaling 312 km^2 were representative of the more than 32,000 km^2 of forested land in western Washington.

The scientific literature supports the hypothesis that the size of functional LWD is related to stream size (Bilby and Ward, 1989; Bisson et al., 1987). Timber harvesting operations can contribute a large pulse of small woody debris that can provide some level of function to small Type N streams. However, smaller wood also degrades more quickly than larger wood and is more likely to be transported,

even in small streams (Harmon et al., 1986). Degradation rates will also be higher in Type N_S streams for LWD that is wet for only a portion of the year compared to woody debris that is submerged year-round. Type N streams that do not receive buffers will grow new trees that will eventually supply recruitable LWD, however, a young forest stand along a small Type N stream would have a lower in-stream woody debris recruitment rate than an older stand that is more susceptible to branch or bole breakage resulting from senescence (Franklin and Spies, 1991). Mature stands that exhibit more breakage and fallen trees (age 80 - 140 years, FEMAT, 1993) are also those approaching their next harvest cycle. Consequently, Type N streams without buffers are likely to experience short-term inputs of woody debris from harvest operations followed by losses due to downstream transport and decay. This suggests there is some long-term risk of loss of woody debris function in Type N streams without buffers.

The language described by the Columbia River Inter-Agency Fish Commission would not exist in the final rules. The exact wording of the rules goes through several revisions prior to being finalized. The draft proposed rules do not contain this language.

Additional information provided by commenters was considered during EIS revision.

Subject Area: Riparian
Issue: Watershed analysis.
Number of Individual Comments: 3

Comment Summary:

Some commenters were concerned that some riparian areas protected by prescriptions developed under a completed watershed analysis would be available for harvest under Alternative 2.

Response:

Comments noted. With the exception of exempt 20-acre parcels, prescriptions prepared as part of watershed analysis would be superceded by new riparian prescriptions under Alternative 2. In some cases this would result in smaller riparian buffers being implemented. However, in most cases the riparian prescriptions under Alternative 2 would provide greater protection than those resulting from watershed analysis (M. Hunter, WDFW, personal communication, January 2, 2001).

Subject Area: Riparian
Issue: Yarding and road corridors
Number of Individual Comments: 14

Comment Summary:

Several commenters were concerned about the effects of yarding and road corridors in RMZs on LWD recruitment and shading to streams. One commenter suggested that the discussion of existing roads in the Riparian Affected Environment section was confusing and should be dropped from the EIS. Many commenters attached, cited, or referenced additional information about yarding and road corridors to consider when revising the EIS, but were not specific criticisms of the analyses in the EIS.

Response:

All three alternatives allow yarding and road corridors through RMZs to provide flexibility to landowners to harvest and transport timber from their lands. Consequently, this issue will not provide any substantial distinction among the alternatives for decision-makers. These practices are sometimes necessary due to variation in topography, landing and stream location, forest condition, etc., and can reduce the need to build roads. Yarding across a Type S or F stream requires an HPA from WDFW and logs generally must be fully suspended unless the HPA has different requirements. New roads cannot always avoid crossing streams which would necesitate at least a road corridor perpendicular to the stream. New stream-adjacent parallel roads cannot be built in RMZs unless alternative routes are demonstrated to have a greater risk of resource damage (Forests and Fish Report Section D.2(c)). Trees cut for yarding corridors must remain on site unless the site exceeds stand requirements; they provide a good opportunity for placement of LWD from the yarding corridor in the stream to provide for short-term LWD needs. However, no compensation is made for shade lost as a result of creating yarding or road corridors.

Under Alternative 2, the minimum stand basal area must be met even if stream-parallel roads are present with the inner or core zone, unless the landowner chooses to implement an instream LWD placement strategy. Except under the LWD placement strategy, the tree basal area within inner or core zones that would have been present in areas occupied by existing stream-parallel roads would be included as leave trees elsewhere in the inner or outer zone (Sections B.4(a)(iv) and B.4(b)(ii)(D) of the Forests and Fish Report). However, these riparian leave trees may contribute less to riparian function than trees that would exist in the road location if they are further from the stream than the road because riparian function declines in a non-linear fashion at increasing distance from the stream (see Section 3.4). Consequently, the strategy to account for riparian trees lost

from roads is equitable from a basal area standpoint, but may not provide complete compensation for lost riparian function.

The EIS has been modified to provide a greater explanation of the likely effects of yarding and road corridors that could result from each of the three alternatives.

The scientific literature shows that historically, road building in riparian areas has been detrimental (Knutson and Leaf, 1997; Beschta et al., 1995; Furniss et al., 1991) even if gradual improvements occur in road maintenance and construction practices.

Additional information provided by commenters will be considered during EIS revision.

Subject Area: Roads
Issue: Adaptive management.
Number of Individual Comments: 1

Comment Summary:
This comment states that adaptive management, as provided for in Alternative 2, would assess the effectiveness of surface erosion and road prescriptions.

Response:
The commenter correctly points out that the adaptive management program will investigate the effectiveness of surface erosion and road prescription.

Subject Area: Roads
Issue: Citations
Number of Individual Comments: 1

Comment Summary:
This comment noted that a publication cited in the text was not included in the reference list.

Response:
The EIS has been modified.

Subject Area: Roads
Issue: Clean Water Act.
Number of Individual Comments: 1

Comment Summary:

This comments questions the compliance of Alternative 2 with the Clean Water Act. The comment states that there is no mechanism for complying with this Act.

Response:

The overall goals of meeting water quality standards would drive the DNR to work within the framework of the Forest Practices Rules to meet these goals. However, some temporary exceedances of water quality standards could occur, until the DNR works to adjust and improve each landowner's RMAPs. The text was modified to reflect the short-term risk. It is possible that some waterbodies will not meet standards even after implementation of RMAPs because non-timber related sources also contribute to water quality. The Department of Ecology is required to develop Total Maximum Daily Load requirements for 303(d) listed waters that do not meet water quality standards. Under Alternative 2, adjustments to Forest Practices Rules to meet TMDL requirements in mixed-use watersheds (other than through the adaptive management process) will not occur before July 1, 2009 (Schedule M-2 of the Forest and Fish Report). The adaptive management program will be used to identify necessary changes in the Forest Practices Rules to meet the needs of TMDL requirments when they are developed.

Subject Area: Roads
Issue: Culvert spacing
Number of Individual Comments: 5

Comment Summary:

These comments concern culvert spacing under Alternative 2. There were several aspects of the comments: (1) Weaver and Hagans (1994) guidelines, used in Appendix E, are not valid because they were not developed in Washington State; (2) a paper published on work in Washington State (Montgomery, 1994) should be used; (3) culvert spacing in the Forest Practices Rules fail to meet the guidelines in Weaver and Hagans (1994); and (4) culvert spacings in Weaver and Hagans (1994) are designed for the 25-year storm event.

Response:

Weaver and Hagans' (1994) guidelines were developed in northern coastal California which has many unstable soils and a climate similar (slightly warmer temperatures, similar precipitation) to that in western Washington. Unlike Montgomery (1994), Weaver and Hagans' (1994) guidelines have already been implemented at the watershed scale (e.g., PALCO) and have received agency

approval. However, Montgomery (1994) and other proposed guidelines for culvert spacing were consulted as part of this EIS assessment.

The proposed spacing of culverts is based on consideration of the parameters that are understood to be most important to ditch-related erosion. These include ditch slope, side-slope, distance above stream, precipitation zone, road surface condition and use, and soil erosion potential. In the majority of cases, the culvert spacings in the proposed Forest Practices Rules do in fact fall within the Weaver and Hagans (1994) recommended spacings.

Subject Area: Roads
Issue: Culvert sizing and replacement.
Number of Individual Comments: 8

Comment Summary:

These comments concern various aspects of culvert sizing and replacement under Alternative 2: (1) lack of consideration of erosion at culvert outfalls; (2) failure of the Forest Practices Rules to require replacement/repair of existing culverts that can pass fish but otherwise represent a signficant risk to fish; (3) adequacy of culvert sizing, given the lifespan of the typical culvert; (4) the planned life of stream crossings contributing to increased risk of failure; and (5) the length of time allowed (15 years) to correct sediment problems.

Response:

The Draft EIS specifically stated that consideration of slope stability at culvert outfalls would not be required under Alternative 2. The Draft EIS acknowledged that road drainage to unstable slopes is not addressed in the new rules and that this represents a risk of sediment delivery. Because the RMAPs are intended to address all road-related erosion, this potential sediment source is addressed indirectly through the assessment of RMAPs and was taken into account in the risk assessment.

Under Alternative 2, an existing culvert must pass the following three requirements in order to not be replaced now: (1) pose "little risk to public resources"; (2) "have been properly maintained"; and (3) be "capable of passing fish" (WAC 222-24-050). The RMAPs to be implemented under Alternative 2 are intended to prevent failure of existing culverts by requiring maintenance and replacement of culverts that pose a significant threat to public resources. It should be noted that not all existing culverts are on type S & F streams. There are many existing culverts on type N_p and N_s streams. If the public resources threat is imminent, the existing culvert must be replaced sooner, rather that later.

The fish passage replacement timing will be negotiated with DNR, WDFW and the landowner with the RMAP. With active road haul for an application, existing culverts will be brought up to standard before the hauling begins (Terry Ruff, DNR, personal communication February 23, 2001).

One comment cites (but did not include a complete reference to) a USFS (1998) study that reported that culverts intended to last 30 years and designed to pass a 100-year flood have more than a 20 percent chance of failure during the design life. The EIS analysis team could not evaluate the applicability of the failure rate referred to in the report (USFS, 1998). However, due to recent improvements in design standards for culverts intended to pass significant flood events (e.g., design must include ability to pass debris likely to be encountered during a 100-year event), it is anticipated that the risk of failure will be less than 20 percent for new culverts. A quantitative risk level for culvert failure has not been calculated given the standards required under Alternative 2. This uncertainty is something that could be addressed through research performed as part of the adaptive management program. Additional text has been added to the EIS to discuss risk of culvert failure more fully than was discussed in the Draft EIS

With regard to the 15-year time frame for implementation of RMAPs, the EIS recognizes an inherent short-term risk of sediment delivery associated with Alternative 2 compared to the shorter time frame requirement proposed under Alternative 3. However, it is important to note that Alternative 2 does require that road improvement work performed to meet the new standards be prioritized to achieve the largest benefits to public resources early in the period (WAC 222-24-010). With this prioritization requirement, the 15-year time frame balances critical resource needs with a realistic understanding of how quickly large landowners would be able to address culvert and other road-related sediment issues on thousands of miles of roads.

Subject Area: Roads
Issue: Enforcement/monitoring
Number of Individual Comments: 2

Comment Summary:

The comments point out that there would be a heavy reliance on policy goals, not enforcement, and that there are no monitoring criteria, and that while the point is raised in the Draft EIS that drainage onto unstable slopes is not addressed by any alternative, there is no discussion of the impact.

Response:

The Draft EIS did consider the fact that drainage onto unstable slopes is not addressed by any alternative in the risk assessment in the Sediment section.

Additional text has been added to the EIS to further discuss both the potential impacts, as well as the differences between performance-based rules and prescription-based rules.

Subject Area: Roads
Issue: Fish passage
Number of Individual Comments: 1

Comment Summary:

The comment states that WDFW regulates fish passage (an HPA is required for culvert installation, removal and maintenance) and that DNR policies on fish passage must be consistent with existing WDFW regulations. Additionally, the comment notes that trash racks (screens designed to keep debris from clogging culverts) can present a barrier to fish and their use should not be encouraged.

Response:

Text has been added to the EIS to clarify the issue of agency responsibilities related to fish passage. It is true that WDFW regulates fish passage on individual crossings through the HPA process; however, DNR is also involved in the regulatory process through establishment of basin-wide performance-based rules that include specific objectives for fish passage that must be consistent with WDFW requirements.

The Draft EIS acknowledges that trash racks may have harmful effects to fish (Appendix F) and that proper maintenance is needed to avoid these effects. Additional text was added to the EIS that specifically acknowledges that trash racks may present a barrier to fish in some settings; however, their use was not discouraged.

Subject Area: Roads
Issue: Hydrology.
Number of Individual Comments: 2

Comment Summary:

These comments concern how the Forests and Fish Report protects against increased peak flows due to roads.

Response:

The issue of peak flows due to roads is a priority topic that will be addressed under adaptive management program. The ability of adaptive management to address this issue is considered in the EIS. The proposed Forest Practices Rules do not use a specific threshold to regulate timber harvest activities, except in some

situations for the rain-on-snow zone. The overall objective of maintaining natural hydrologic patterns and meeting water quality standards is the primary basis of protection under the Alternative 2.

Subject Area: Roads
Issue: Interception of surface and subsurface flow
Number of Individual Comments: 2

Comment Summary:

These comments state the road surface erosion section of the Draft EIS did not include consideration of how roads affect hydrology through (1) the interception of subsurface flow at road cuts, and (2) diversion of water from one drainage to another ("drainage piracy").

Response:

The interception of subsurface flow by the road prism was discussed in the Draft EIS (3.3.2.3). The effect of the alternatives was evaluated with regard to the overall requirement in Alternative 2 to eliminate the hydrologic connection between forest road systems and drainage networks. Additional text has been added to discuss the impact of diverting water from one drainage to another.

Additionally, interception of subsurface flow and diversion of water result primarily in hydrologic effects, with little road surface erosion attributed to this process. Although local increases in flow may cause increased channel erosion, very little work has been conducted to date that specifically documents increased road surface erosion as a significant secondary effect of these processes.

Subject Area: Roads
Issue: Mass wasting.
Number of Individual Comments: 8

Comment Summary:

These comments discuss various issues associated with road-related mass wasting. Several of the comments (or portions of them) provide general statements of support of Alternative 2 or 3 in the context of road-related mass wasting, without directly commenting on the DEIS. One of the comments concerns the lack of consideration under all alternatives of road drainage onto unstable slopes as a cause of mass wasting.

Comments directed at the DEIS include: 1) road density limitations under Alternative 3 are accepted as reducing landslide potential without justification; 2) Alternative 2 does not depict a clear standard that will prevent or avoid damage to public resources; 3) Alternative 2 does not specify the level of expertise upon

which the DNR will rely to determine whether slopes are unstable and the DNR may not have adequate funding to provide technical experts; 4) disagreement with the DEIS conclusion that recent research (Toth, 1991 and Robison et al., 1999) suggests that upgraded roads have lower rates of failure; and 5) disagreement with the risk call in the DEIS for road-related landslides under Alternative 2.

Response:

Comments noted.

The EIS specifically states that consideration of slope stability at culvert outfalls would not be required under the proposed FPRs (please see response to Roads - Culvert Sizing and Replacement).

The EIS analysis team acknowledges that in some locations there may not be a significant correlation between road density and sediment delivery, that an existing correlation may be subject to change due to improved construction techniques, and that the functional relationship, if present, may vary from watershed to watershed. However, for a programmatic analysis such as this, the assumption that road density is correlated with sediment delivery is appropriate and supported by the literature (e.g., Cederholm and Reid, 1996).

As stated elsewhere, the goal for road management under Alternative 2 is to disconnect the road system from the stream system, including the effects of roads on mass wasting. Research undertaken as part of the adaptive management program will investigate whether the proposed rules are sufficient to achieve this goal.

The DNR would use qualified experts to map unstable slopes. The DNR employs scientists that are 'qualified experts' under the FPRs and considers funding of this effort to be a high priority (please see additional notes on the topic under Unstable Slopes - Mapping).

Available research supports the hypothesis that recent improvements in road construction techniques are linked to decreased failure rates (Toth, 1991 and Robison et al. 1999). While it is true, as stated in the comment, that these studies do not have the benefit of a long study period to test this assertion; the EIS analysis team concluded that available research supports the hypothesis that failure rates are likely to decrease, even over long time periods, with improved construction techniques.

Two comments dispute the risk call made in the DEIS for sediment delivery from road-related landslides under Alternative 2, suggesting that despite a stated goal

of reducing landslide rates to natural levels, landslides from forest roads alone are expected to remain several 100 to 1000s of percent over levels in unmanaged forests. The review of the available information by the EIS analysis team supports the risk call made in the EIS. As stated previously, the goal for road management under Alternative 2 is to disconnect the road system from the stream system, including the effects of roads as linked to mass wasting events that deliver sediment to streams.

Subject Area: Roads
Issue: Monitoring.
Number of Individual Comments: 2

Comment Summary:

These comments concern the adequacy of monitoring of roads in terms of RMAP implementation and water quality.

Response:

Section 3.2.3.2 describes how monitoring is a necessary part of sediment control. It notes that there is a risk of sediment delivery due indirectly to the lack of clear monitoring strategies. However, the EIS analysis team concludes that the evolving adaptive management process coupled with the legislative directive [RCW 76.09.370(7)] to include regular monitoring will be sufficient to ensure that policy objectives related to roads are achieved through RMAPs over time.

Subject Area: Roads
Issue: Orphan roads.
Number of Individual Comments: 6

Comment Summary:

These comments deal with the adequacy of treatment of orphan roads.

Response:

The risk of sediment delivery from orphaned roads is recognized in the EIS (but also see additional responses to comments concerning orphaned roads below).

Subject Area: Roads
Issue: Orphaned roads - amount of sediment
Number of Individual Comments: 1

Comment Summary:

This comment cites Robison et al. (1999) to suggest that landslides associated with "old" roads are typically smaller than landslides triggered by active roads,

implying orphan roads would not contribute significant volumes of sediment to streams.

Response:

A study by Brunengo and Bernath (1990) of roads in Washington State concluded that orphaned roads represent a significant threat to public resources. This study is more specific in its treatment of orphaned roads in Washington State than the study cited in the comment and thus is assumed to better reflect local conditions.

Subject Area: Roads
Issue: Risk evaluation criteria
Number of Individual Comments: 1

Comment Summary:

This comment refers to Table 1 (page F-9) in the Draft EIS which reports the "overall risk of sediment delivery" for Alternative 2 as moderate. The commenter assumes that "overall delivery" includes surface erosion and landslide sediment and implies that, if this is indeed the case, there is a contradiction about what the actual risk is under Alternative 2 that is not resolved in the DIES.

Response:

A note has been added to the table in the EIS and to the mainbody of the document to resolve this apparent inconsistency.

Subject Area: Roads
Issue: Road density
Number of Individual Comments: 2

Comment Summary:

These comments suggest that road density and sediment are not correlated.

Response:

There are several studies that have linked road density with sedimentation of spawning gravels (e.g., Cedarholm and Reid, 1996). However, the functional relationship between road density and measures of adverse effects (such as sedimentation) may vary among different regions because of diffences in soil types, precipitation, and topography. Nevertheless, for a programmatic analysis such as an EIS, road density is often one of the few variables that can be used as a criterion. Note that the reference cited in the comment did not actually measure sediment delivery, but estimated based on road surveys.

Subject Area: Roads
Issue: Road Management and Abandonment Plans.
Number of Individual Comments: 26

Comment Summary:

These comments address the adequacy of the implementation of the RMAP aspect of Alternative 2.

Response:

There are thousands of miles of forest roads that would need to inventoried; the length of time for submission of RMAPs, along with the 10 years to implement the RMAPs provides a reasonable time frame for achieving the Forest Practices Rule goals. The additional requirement that 20 percent of all roads on ownerships greater than 500 acres would ensure timely progress.

Although there are no explicit requirements to immediately fix unstable portions of roads (or other features identified in the RMAPs), it is important to note that Alternative 2 does require that road improvement work performed to meet the new standards be prioritized to achieve the largest benefits to public resources early in the period (WAC 222-24-010). With this prioritization requirement, the 15-year time frame balances critical resource needs with a realistic understanding of how quickly large landowners would be able to address multiple road management issues on thousands of miles of roads.

Additionaly, the DNR is charged with the overall goals of meeting water quality standards, and so can make such requirements of landowners during the review of RMAPs. The proposed Forest Practices Rules do not present a specific road inventory technique; rather that it left to the landowner. It would be the responsibility of the DNR to review the adequacy of the methods used.

Note that the Draft EIS concludes that there would be a risk of sediment delivery in the short term (see Water Quality, p. 3-92).

Subject Area: Roads
Issue: Surface erosion.
Number of Individual Comments: 8

Comment Summary:

This set of comments concerns the delivery of road-related sediment to streams, and how the road surface runoff is handled in the Forest Practices Rules and how this issue is analyzed in the Draft EIS. Several comments state that the requirement of 50 percent reduction in sediment is not scientifically based and likely to be insufficient to protect water quality.

One comment states that hydrologic decoupling of the road and drainage systems is only possible for streams located more than 200 feet from a culvert because WFPB (1997) indicates at least 10 percent sediment delivery is expected when culvert outfall occurs within 200 feet of the stream.

Response:

The requirement of 50 percent reduction in sediment was present in the Forests and Fish Report, but is not part of Alternative 2. The standard of meeting state water quality objectives remains the overall goal.

While the new rules cannot guarantee complete decoupling of the road system from the drainage network, the objective of the rule is to meet water quality standards. Unless water quality standards are measured on very small streams, the effect of runoff that is diverted to vegetated, unchanneled hillsides will be negligible. Water quality is typically monitored at locations on streams where the upstream area is large. Thus, a small amount of sediment that does not settled out on a hillslope will not likely diminish water quality significantly.

The EIS analysis team agrees that the issue of protection from sediment delivery within 200 feet of culvert outfalls is not addressed under any of the alternatives.

Subject Area: Roads
Issue: Other.
Number of Individual Comments: 15

Comment Summary:

These comments do not directly comment on the Draft EIS, but merely provide information that pertains to various discussions already contained within it.

Response:

Comments noted.

Subject Area: Sediment
Issue: Adaptive management
Number of Individual Comments: 1

Comment Summary:

This comment states that the adaptive management program would address the effectiveness of road surface erosion control measures under Alternative 2.

Response:

The ability of the adaptive management program to address the effectiveness of these measures was considered in the EIS evaluation.

Subject Area: Sediment
Issue: Citations
Number of Individual Comments: 3

Comment Summary:

These comments discuss various aspects of the literature cited in the Sediment section.

Response:

Although it is true that many of the papers cited in the Draft EIS refer to research conducted in other states, the results are relevant and applicable to Washington State. In most cases, the climate and watershed processes are similar to those in Washington state. Additionally, regional scale studies are appropriate for a programmatic analysis of activities which are regional and general in nature.

Please note that several additional citations (e.g., Montgomery et al., 1998; Paulson, 1997; Reynolds and Paulson, 1999) have been added to the EIS to include relevant local research and to more fully reflect the fact that results of many sediment-related studies have been inconsistent.

With some notable exceptions, the information provided by individual watershed analyses is generally descriptive in nature with "results" that are largely conjectural and are not derived through use of the scientific method. Although thorough analysis of results of selected invidual watershed analyses might provide valuable data for incorporation into process oriented studies, it was beyond the scope of the EIS to undertake this task.

Subject Area: Sediment
Issue: Cumulative sediment delivery risk
Number of Individual Comments: 3

Comment Summary:

Several comments relate to the additive effect of various sediment sources, which individually may be acceptable, but which combined may make achieving water quality standards difficult or impossible.

Response:

The proposed Forest Practices Rules have a two-pronged approach. The first and foremost is the goal of achieving water quality standards. The second is the

regulation of individual sediment sources, such as road surface erosion and timber harvest related mass wasting. The overall goal of achieving water quality standards requires additional limitations on factors contributing sediment to streams.

There is a risk that if cumulative sediment delivery exceeds expectations, water quality standards for turbidity would not be met; however, there is sufficient feedback that actions causing sedimentation could be addressed by further DNR actions.

The Cumulative Effects section of the Draft EIS acknowledges that there is a risk of cumulative effects in the short term due to the effects of recent high timber harvest levels.

Subject Area: Sediment
Issue: General.
Number of Individual Comments: 8

Comment Summary:

These comments discuss various aspects of sediment production related to timber harvest activities. However, most of these comments do not comment directly on the Draft EIS, but merely provide information that pertains to various discussions contained within it. One comment suggested the sediment affected environment section was too cursory and overemphasized papers with a regional scope.

Response:

Comments noted. The alternative Forest Practices Rules will affect timber practices throughout the state. Consequently, broad-based, regional approach is appropriate.

Subject Area: Sediment
Issue: Risk evaluation criteria
Number of Individual Comments: 1

Comment Summary:

This sub-issue deals with risk assessment related to sediment delivery. This comment states that risk evaluation criteria for sediment are based on overly simplistic ecological relationships that emphasize the presence of no-harvest buffers and widths of RMZs but fail to account for other variables that are influenced by alternative forest practices.

Response:

The Final EIS will include risk assessment specific to road surface erosion. The Final EIS has been altered to include risk assessment specific to road surface erosion (3.2.3.2).

Timber harvest area and buffer width were selected as appropriate predictive tools available for a complex programmatic analysis. Site-specific factors could not be used because of the high variability. Additionally, other references have concluded that these two factors are the most significant factors affecting surface erosion and sediment delivery.

Subject Area: Sediment
Issue: Sediment delivery risks overstated.
Number of Individual Comments: 1

Comment Summary:

This comment states that forest management decreases sediment delivery.

Response:

We are not aware of any studies documenting decreases in sediment load due to timber harvest. Most studies on the subject, in fact, indicate the opposite, that timber harvest increases sediment delivery. While proper implementation of BMPs may decrease sediment load due to timber harvest, no study has shown that these measures reduced sediment delivery to zero. Another issue is which BMPs are used, and the amount of enforcement. These factors were considered when evaluating the alternatives.

Subject Area: Sediment
Issue: Surface erosion - harvest related.
Number of Individual Comments: 2

Comment Summary:

These comments concern aspects of the timber harvest-related erosion analysis of Alternative 2. One coment specifically states that the selected evaluation criteria (i.e., timber harvest area and buffer width) are not appropriate. The comment refers to several specific harvest-related site factors thought to more strongly influence harvest-related surface erosion (e.g., sediment transport distance below erosion sources, such as roads and skid trails; volume of sediment transported; volume and concentration of runoff; and the density of sediment trapping obstructions on the forest floor) (Megahan and Ketcheson, 1996; Packer, 1967; Burroughs and King, 1989; Haupt, 1959a and 1959b).

Another comment discusses other factors influencing sediment delivery from harvested areas, highlighting the benefits of timber harvest on sediment reduction through reduction in fire risk.

Response:

Timber harvest area and buffer width were selected as appropriate predictive tools available for a complex programmatic analysis. Site-specific factors could not be used because of the high variability. Additionally, other references have concluded that these are the two most significant factors affecting surface erosion and sediment delivery.

While the comment discussing the effects of fire on sedimentation correctly notes that active forest management may reduce the risk of wildfire in some instances, the significance of the benefit associated with reduction in fire risk may not be high relative to the impacts of harvest and associated road construction and use. Historically, wildfire in unmanaged watersheds of Washington typically resulted in large episodic pulses of sediment for a discrete time period. Aquatic species evolved within this natural system. Current and past forest practices often result in chronically elevated sediment levels within a watershed. These chronically elevated levels have been shown to be harmful to fish.

The text was modified to explain more fully the factors involved in harvest-related erosion. However, this did not change the evaluation of alternatives.

Subject Area: Sediment
Issue: Surface erosion - road related.
Number of Individual Comments: 4

Comment Summary:

These comments concerned several aspects of delivery of road-generated sediment. One comment concerned a threshold mentioned in the Forests and Fish Report which stated that sediment from roads must be reduced by 50 percent. Another comment concerned how Alternative 2 would meet water quality standards, particularly the way roads are connected to the drainage network.

Response:

The requirement of 50 percent reduction in sediment was present in the Forests and Fish Report, and is a measure to be used in adaptive management. However, the standard of meeting state water quality objectives remains the overall goal.

The objective of the rule is to meet water quality standards by decoupling the road system from the drainage network. Unless water quality standards are measured

on very small streams, the effect of runoff that is diverted to vegetated, unchanneled hillsides will be negligible. Water quality is typically monitored at locations on streams where the upstream area is large. Thus, a small amount of sediment that does not settle out on a hillslope will not likely diminish water quality significantly.

Subject Area: Sediment
Issue: Type N streams not protected.
Number of Individual Comments: 4

Comment Summary:

These comments concerned the vulnerability of type N streams to sediment under Alternative 2. The concern was that type N_s streams (seasonal) do not receive a buffer that would filter sediment from adjacent eroding areas. The comments also mention that these streams form a substantial portion of the drainage network.

Response:

Under Alternative 2, the overall goal of meeting water quality standards would serve as a mechanism for additional sediment control measures, should they be needed. A maximum of 10 percent of the equipment limitation zone, which extends 30 feet from the bankfull stream channel edge within the unbuffered portion of a harvest unit, would be allowed to be disturbed; any greater amount would require erosion control measures. Because timber harvests are spread out over time and space within a given watershed, the actual amount disturbed at any given time would be relatively small, particularly with larger watersheds size.

Section 3.2.3.2 of the EIS states that there would be a moderate level of risk of sediment delivery under this alternative.

Subject Area: Stream Channels
Issue: Bank stability criteria inappropriate
Number of Individual Comments: 3

Comment Summary:

These comments concerned the discussion of bank stability, including the characterization of nonfish-bearing streams, use of the FEMAT root strength curve, the use of 100 versus 250-year site potential tree heights (SPTHs) for measuring buffer widths, and the effectiveness of no-harvest buffers at protecting streambank stability.

Response:

The comments state that "protective measures" are present along the full length of nonfish-bearing streams. However, protective measures that do not retain

sufficient root strength to maintain bank stability increase the risk of streambank failure. The equipment limitiation zones (ELZs) provided under Alternative 2 do not protect for root strength, even though they decrease direct streambank disturbance, relative to normal logging operations under Alternative 1.

The process of bank failure is similar to that of a debris avalanche, althougth the triggering mechanism is usually removal of lateral support by stream erosion; the role of root strength is similar. Therefore the FEMAT curve is applicable.

The discussion of bank stability is now based on SPTHs in the range of 100 to 250 years. Conclusions in the Final EIS are valid for buffer widths based in SPTHs in this range.

One comment suggests that second growth forests would enhance bank stability. There is no known study which documents increased root strength after harvest. In fact, nearly all studies on the subject show that landslide occurrence increases after harvest. Should bank stability be enhanced to the point where it is armored relative to natural conditions, secondary channel effects could theoretically result. The optimum case for bank stability would be one where the natural rate of bank failure is maintained or restored.

Subject Area: Stream Channels
Issue: Bank stability.
Number of Individual Comments: 3

Comment Summary:

These comments concern the protection given to ephemeral stream channels. They state that there is a risk of sedimentation due to the lack of stream bank protection.

Response:

Given the size of watersheds at which water quality is measured (on the order of 50,000 acres), it is unlikely that six percent of the stream channel network would be directly disturbed. Additionally, this level of disturbance is not likely to cause a violation of water quality standards. The 10 percent maximum disturbance level for equipment limitation zones would be superceded by the overall objective of achieving water quality standards.

Subject Area: Stream Channels
Issue: Other.
Number of Individual Comments: 4

Comment Summary:

These comments discuss various aspects of stream bank stability related to timber harvest activities. However, These comments do not comment directly on the Draft EIS, but merely provide information that pertains to various discussions contained within it.

Response:

Comments noted.

Subject Area: Stream Channels
Issue: Type N streams.
Number of Individual Comments: 3

Comment Summary:

These comments concern the amount of protection afforded Type N streams by Alternative 2. One comment concerned the protection given to Type N streams from debris flows. It stated that the buffers at the confluence of two Type N streams are not adequate to protect against sediment delivery from debris flow events.

Response:

Although forested buffers are not required for Type N_s streams or all portions of Type N_p streams (unless specific conditions are present such as unstable slopes) , Alternative 2 does require that no more than 10 percent of the area adjacent to these streams be left in a disturbed or untreated state. Erosion control methods will be required to treat disturbed areas. If less than 10 percent of the Equipment Limitation Zone is disturbed, these disturbed areas would occur in small areas relative to large drainage basins. Notably, there are no guidelines for the actual treatment of disturbed slopes. DNR staff would have the responsibility of reviewing and enforcing the measures used.

The EIS analysis team recognized the risk of debris flows reaching Type N, S, and F streams, as well as the risk of sediment delivery to Type N streams, in its analysis.

Subject Area: Unstable Slopes
Issue: Adaptive management.
Number of Individual Comments: 2

Comment Summary:
These comments infer that adaptive management would have various research priorities that would help deal with unstable slopes.

Response:
The ability of adaptive management to address any necessary changes in Forest Practices Rules concerning unstable slopes was considered in the EIS evaluations.

Subject Area: Unstable Slopes
Issue: Alternative 3
Number of Individual Comments: 2

Comment Summary:
These comments state that Alternative 3 should be the preferred alternative, and that it best addresses those process which impact fish habitat.

Response:
Comments noted.

Subject Area: Unstable Slopes
Issue: Blowdown.
Number of Individual Comments: 2

Comment Summary:
These comments point out that buffers left for many functions, including to maintain slope stability, may be compromised by short-term wind losses. The comments suggest that because the Forest Practices Rules do not require provisions for windfirm mass wasting leave areas, buffer functions are at risk of being impaired.

Response:
The Final EIS has been revised to incorporate descriptions of the risk of windthrow affecting unstable slope buffers.

Subject Area: Unstable Slopes
Issue: Deep-seated landslides
Number of Individual Comments: 3

Comment Summary:
Deals with the omission of this type of landslide from the "unstable landforms" list in the new Forest Practices Rules.

Response:
Deep seated landslides are specifically included in the proposed Forest Practices Rules.

Subject Area: Unstable Slopes
Issue: Effect of landslides on riparian zones
Number of Individual Comments: 1

Comment Summary:
This comment suggests that the Draft EIS failed to consider the influence of landslides on riparian vegetation.

Response:
Text has been added (see 3.2.2.2) to include this impact in the discussion of sediment inputs related to timber harvest and the effects of debris torrents on riparian areas.

Subject Area: Unstable Slopes
Issue: The Forest and Fish Report is incomplete.
Number of Individual Comments: 3

Comment Summary:
These comments state that without a wind-protection buffer, buffers for unstable slopes could be affected, rendering 50 percent ineffective.

Response:
Text has been added to Section 3.2 to address this issue.

Subject Area: Unstable Slopes
Issue: General.
Number of Individual Comments: 4

Comment Summary:
These comments point out that mass wasting may contribute at least as much sediment as roads, which previously have been thought to be the main source of anthropogenic sediment inputs.

Response:
The EIS has been revised to include references relevant to this discussion (e.g., Montgomery et al., 1998; Paulson, 1997).

Subject Area: Unstable Slopes
Issue: Improving trend criteria is insufficient
Number of Individual Comments: 1

Comment Summary:
This comment was concerned with the Forest and Fish Report's performance criteria for mass wasting. They point out that simply having an "improving trend" is insufficient to protect salmon habitat

Response:
Comment noted. This is a subject that would be addressed through adaptive management.

Subject Area: Unstable Slopes
Issue: LWD contribution
Number of Individual Comments: 1

Comment Summary:
This comment concerns the contribution of landslides to LWD in streams, stating that LWD recruitment would be maintained, provided enough landslides occur.

Response:
Very little is known about the contribution of LWD from landslides. The vast majority of studies show that most, but not all LWD comes from the riparian area adjacent to the stream, and not from upstream.

Subject Area: Unstable Slopes
Issue: Mapping and DNR review of unstable slopes.
Number of Individual Comments: 16

Comment Summary:

There were a number of comments regarding the status of mapping of mass wasting potential. Concern was expressed that mapping would either be insufficient, or DNR was not qualified to do it. Several commenters expressed concern about the level and type of review given unstable slopes by the DNR.

Response:

The new rules do not prohibit use of existing watershed analyses for prescriptions. Rather, the existing prescriptions that specifically deal with unstable slopes in an approved watershed analysis are exempt from the Class IV special review. Any modification of existing prescriptions in an approved watershed analysis would have to go through the Class IV special review.

Additionally, under the proposed rules, broad classes of potentially unstable landforms are used as a screen which would automatically trigger a detailed review (Class IV-special and SEPA review); this in turn would provide somewhat greater protection from unstable landforms than is currently provided

The slope triggering special review is appropriately set at 70 percent. This is approximately the angle of repose, above which slopes are unstable. Modification of a 70 percent slope, for example, by removing timber, and thus root strength, would decrease the factor of safety. Some landslides could be triggered on slopes less than 70 percent, but the mechanism of failure in debris avalanches, the most common type of mass wasting in inner gorges, is more closely tied to the angle of repose.

Additionally, the standard of protection of public resources is actually higher in the draft Forest Practices Rules. The proposed Forest Practices Rules state: "Timber harvest, or construction of roads, landings, gravel pits, rock quarries, or spoil disposal areas, on potentially unstable slopes or landforms… that has the potential to deliver sediment or debris to a public resource or that has the potential to threaten public safety...", will be considered a Class IV-special application. Previously, as the commentors point out, the phrase "significant impact to public resources" was used. Under the new rules, potential delivery of sediment or debris, no matter what the significance of impact is, triggers a Class IV special review.

DNR would use qualified experts to map unstable slopes. DNR employs scientists that are 'qualified experts' under the Forest Practices Rules.

Subject Area: Unstable Slopes
Issue: Mass wasting from timber harvest vs. roads.
Number of Individual Comments: 1

Comment Summary:
Montgomery et al. (1988) is cited as saying the timber harvest related landslides are at least as frequent as road-related landslides.

Response:
Text will be added to reflect the results of this study.

Subject Area: Unstable Slopes
Issue: Proposed Forest Practices Rules allow logging on high risk slopes
Number of Individual Comments: 22

Comment Summary:
These comments describe the proposed Forest Practices Rules as allowing logging on highly unstable slopes. Additionally, some comments state that exempting current watersheds that have mass wasting prescriptions from the proposed mass wasting review would allow timber harvest related mass wasting on these watersheds.

Response:
By screening each timber harvest application for unstable landforms such as inner gorges, Alternative 2 would allow for greater review than under Alternative 1, and as such represents a decrease in the risk of timber harvest-induced mass wasting.

Those watersheds with completed watershed analysis (about 10 percent) have already undergone detailed, regionally tailored analysis. A review of the watershed analyses already conducted is scheduled for every 5 years. This provides the opportunity to modify prescriptions based on additional data. However, as stated in the Draft EIS, it is unclear how many watershed analyses, or reviews, would be completed in the future, given that under Alternative 2, there would be fewer incentives for incuring the cost of completing them. This uncertainty represents a risk in itself.

Subject Area: Unstable Slopes
Issue: Risk analysis.
Number of Individual Comments: 5

Comment Summary:
These comments address the analysis of slope stability under the three alternatives, particularly the potential identification of unstable areas.

Response:
Table 1 in Appendix E was used as a tool to determine if there would be significant incidental protection of unstable areas through RMZs. It was determined that only a slightly higher protection would be gained through this indirect measure, under Alternative 2.

The main criteria of the Draft EIS for determining mass wasting risk was the degree of analysis conducted by the DNR. It was determined that due to the higher level of scrutiny of unstable areas under Alternative 2, that the risk of sediment delivery due to mass wasting would be low.

Subject Area: Unstable Slopes
Issue: Risk assessment of unstable slopes.
Number of Individual Comments: 12

Comment Summary:
These comments discuss the various means of avoiding risk of sediment delivery under the proposed alternative.

Response:
Comments noted.

Subject Area: Unstable Slopes
Issue: Risk of sediment delivery
Number of Individual Comments: 1

Comment Summary:
This comment points out that in Appendix F, the "overall" risk of sediment delivery is moderate, while on page 3-16, the risk of sediment delivery is "low to moderate".

Response:
Actually, the "overall" risk mentioned in Appendix F, Forest Roads, refers to risk of sediment delivery from roads. Additionally, on page 3-16, the Draft EIS states that there would be a slight to moderate risk of sediment delivery from timber

harvest related landslides. The two section are discussing different sediment sources, and do not contradict each other.

Subject Area: Unstable Slopes
Issue: Road-related landslides
Number of Individual Comments: 2

Comment Summary:

This set of comments relates to landslides due to roads. Specfically, these comments concern road location as a cause of mass wasting; and the DNR's ability to identify and adequately define unstable areas.

Response:

The Draft EIS uses road siting as an evaluation criterion. Alternative 2 provides sufficient review of road location that the effect would be a decreased risk of road-related landslides. Unstable areas (including inner gorges) would automatically be included for review under SEPA, including site-specific stability review. It is true that there is no standard procedure for stability review presented in Alternative 2. However, WAC 222-10-30 provides some guidance to DNR for evaluating potentially unstable slopes or landforms.

Subject Area: Unstable Slopes
Issue: Variability across the state.
Number of Individual Comments: 1

Comment Summary:

This comment states that the Draft EIS' analysis of Alternative 2 did not take into account natural variation in landslides across the state, citing Everest et al. (1987) and data from several watershed analyses to conclude that landsliding is a relatively low risk in eastern Washington.

Response:

The fact that there is regional variability in landslide rates was acknowledged in the Draft EIS (see Appendix E's reference to "regional variations in physiography around the state"). The claim that the total volume of sediment delivered from eastside landslides is lower than west side is probably reasonable. However, it does not necessarily follow that the risks from sediment impacts are also lower on the east side. The EIS team concluded that within the scope of this programmatic analysis, the risk associated with regional variations of landslides have not yet been well enough defined for incorporation into the formal analysis.

Climatic and geologic differences make landslide prediction based on landform variables alone more difficult in eastern Washington. To address this, DNR is reconfiguring SMORPH to model eastside slope stability (Laura Vaugeois, DNR, personal communication, 1/24/01).

Note that the reference cited in the comment (Everest et al., 1987) does not discuss the relationship of landslides to geographic area.

Subject Area: Unstable Slopes
Issue: Watershed analysis.
Number of Individual Comments: 3

Comment Summary:

These comments state that the new Forest Practices Rules would supercede prescription for unstable slopes developed under watershed analysis.

Response:

Existing prescriptions from a watershed analysis for unstable slopes would remain in effect under Alternative 2. However, if a prescription from watershed analysis for unstable slopes is not location-specific, a Class IV-special application would be triggered. Otherwise, the specific unstable slope prescription from the watershed analysis would remain in effect.

Subject Area: Water Quality
Issue: Clean Water Act.
Number of Individual Comments: 3

Comment Summary:

These comments concern the list of impaired water bodies.

Response:

Text will be added to reflect the relevant changes made to the 303(d) list by EPA, and that some streams are not monitored.

One comment noted that there are no specific plans for dealing with 303(d) listed streams. The overall goals of Alternative 2 are to meet water quality standards. One of the primary goals of the Forests and Fish process has been to help remove streams from the 303(d) list. The proposal is a specific plan for doing this.

Subject Area: Water Quality
Issue: Forest Chemicals
Number of Individual Comments: 1

Comment Summary:
The comment concerns the use of forest chemicals (herbicides and pesticides, mainly). It includes the concern that characterization of use of these chemicals is incorrect.

Response:
Text will be added to reflect the studies presented.

Subject Area: Water Quality
Issue: Forestry perspective
Number of Individual Comments: 2

Comment Summary:
These comments concern the EPA's 305(b) report on sources of water quality violations.

Response:
The context of the report cited is a national water pollution study. More important is how timber practices affect water quality in salmon-bearing regions of the Pacific Northwest.

Subject Area: Water Quality
Issue: General.
Number of Individual Comments: 5

Comment Summary:
These comments address a variety of issues, including the affected environment description of water quality.

The EIS analysis team appreciates the suggestions for improving the text and additional literature to be reviewed as part of the water quality sections, and these were considered during revision.

Response:
New references were added, including the draft review of the temperature water quality standards for Washington State by Hicks (2000).

Subject Area: Water Quality
Issue: Risk levels overestimated.
Number of Individual Comments: 2

Comment Summary:
These comments state that the Draft EIS is too overestimates the level of risk in the evaluation of effects on water quality.

Response:
The Type N streams are shown to comprise a major portion of the stream network in large basins. The risk calls were based in part on this fact. The basis for this determination is the fact that a large amount of stream channel would be affected; there would be minimal protection against sediment delivery on significant portions of Type N_p streams and all of Type N_s streams.

Subject Area: Water Quality
Issue: Supporting water quality information.
Number of Individual Comments: 9

Comment Summary:
These comments are grouped together because each discusses various aspects of water quality without directly commenting on the Draft EIS. Rather, they provide information that pertains to various discussions already contained within the Draft EIS.

Response:
Comments noted. This information was considered in the development of the Final EIS.

Subject Area: Water Quality
Issue: Temperature - effects on aquatic species
Number of Individual Comments: 2

Comment Summary:
One comment noted that the temperatures at which various aquatic species are susceptible to harm is higher than DOE figures. Another comment suggested that current Water Quality Standards may not be sufficiently protective of all species and life stages and that a water temperature performance target under Alternative 2 based on these standards was inadequate.

Response:
The draft review of water temperature effects on salmonids by Hicks (2000) was consulted and text modified in Section 3.6 to reflect any discrepancies found. The

performance target for water stream temperature under Alternative 2 includes allowances for future changes in the Washington State stream temperature criteria.

Subject Area: Water Quality
Issue: Temperature - general
Number of Individual Comments: 16

Comment Summary:

One comment includes a description of the factors affecting stream temperature. Several comments suggested the EIS analysis did not adequately consider air temperature and groundwater effects on water temperature. Other comments refer to the risk of stream temperature increases on fish-bearing streams due to increases on nonfish-bearing streams and the lack of cumulative effects analysis that considers current water temperature conditions prior to harvesting riparian trees.

Response:

Comments noted.

The EIS discussion on air temperature and groundwater effects on water temperature is present in Appendix B, Section 3.4, and Section 3.6.

Section 3.6.3.2 of the Draft EIS points out that under Alternative 2, there would be a risk of elevated stream temperature in streams due to lack of shade on nonfish-bearing streams. According to Caldwell et al. (1991), elevated temperatures in Type N streams are expected to revert to background levels within 500 feet of entering the RMZ below the junction of the two streams. However, the ISR (2000) disputes the general applicability of Caldwell et al. (1991). Given the existing lack of shade in many watersheds, and the uncertainty of cumulative effects of N_s streams with potentially elevated temperatures, there remains a low to moderate risk of increased stream temperatures. The discussion of water temperatures in Type N streams and the transport of heat to Type F and S streams has been expanded in the EIS.

Under Alternative 1, the RMZs do not meet the criteria for adequate shade protection; additionally, the documented violations of water quality standards occur under existing Forest Practices Rules. Therefore the risk of impairment under Alternative 1 is high.

Related comments and responses can found categorized under Riparian/Shade and Fish/Temperature.

Subject Area: Water Quality
Issue: Turbidity measurement
Number of Individual Comments: 1

Comment Summary:
This comment regards the proper definition of NTUs.

Response:
Text will be added to reflect necessary changes in the definition used.

Subject Area: Water Quality
Issue: Turbidity/Sediment.
Number of Individual Comments: 3

Comment Summary:
These comments have to do with the goals of the Forest and Fish Report for turbidity/sediment.

Response:
It is not established that sediment loads would increase by 100 percent. The criteria that allows a 50 percent increase in sediment over background, from roads, is present in the Forest and Fish Report, but is not part of the proposed Forest Practices Rules or Alternative 2. Additionally, the outcome-based goal of achieving water quality standards would allow for additional DNR oversight, and feedback in the review of forest practices applications.

The risk to water quality under Alternative 2 is pointed out in the Draft EIS, and includes moderate risk in the short term and low risk in the long term. Best Management Practices presented in RMAPs would be subject to the review by DNR.

Subject Area: Water Typing
Issue: EIS analysis.
Number of Individual Comments: 1

Comment Summary:
One commenter disagreed with the use of emergency water typing rules in developing the alternative analysis.

Response:
The use of the emergency water typing rules to delineate stream types under the Forest Practices Rules proposed in the Forests and Fish Report was necessary because the water typing model is not available or sufficiently complete for use in

the EIS analysis. The proceedure to convert the existing stream typing system to the system proposed in the Forests and Fish Report is fully described in Appendix C. The modeling approach for defining fish-bearing streams in the EIS probably over-estimates the amount of fish-bearing waters and under estimates the Type N perennial streams. Nevertheless, this approach is reasonable given the available information. The Final EIS has been revised to discuss the effects this bias might have on the results of the analysis.

Subject Area: Water Typing
Issue: Model validity and verification.
Number of Individual Comments: 23

Comment Summary:

Several commenters suggested the typing system proposed under Alternative 2 does not provide a rational basis for justifying different riparian prescriptions based on different water types. Several commenters noted that the proposed stream typing model will be based upon existing fish presence data that could be incomplete or erroneous, does not consider geomorphic function or resource sensitivity, and will have too high of a potential for mis-typing. In addition, it was suggest there is no mechanism is specified for correcting fish typing errors. Several commenters expressed concern that stream typing would be inaccurate because streams that are currently nonfish-bearing, historically had fish but habitat degradation such as loss of LWD has eliminated usable habitat. One commenter suggested the level of protection to fish-bearing could not be analyzed because the stream typing model was incomplete under Alternative 2 and that the amount of streams identified as fish-bearing could not be determined.

Response:

The most important criteria in the proposed typing system will be the presence or absence of a sensitive resource (fish habitat). In fact, the presence of fish habitat is intimately tied the geomorphic function of the stream. In addition, the model currently under development will likely include several geomorphic parameters such as drainage area and channel gradient that are factors related to geomorphic function. Finally, riparian prescriptions are not exclusively driven by the proposed stream typing system. For example, the lower portions of Type N_p streams and alluvial fans include riparian prescriptions.

The stream typing model is currently under development and will include cooperation with the Washington Department of Fish and Wildlife and Department of Ecology, and consultation with affected Tribes. Consequently, it is not possible at this time to determine its overall adequacy for identifying fish and nonfish-bearing streams. Development of the stream typing model is a priority

for Adaptive Management under Alternative 2 and will include review by the In-stream Scientific Advisory Group, a subcommittee of Cooperative Monitoring, Evaluation and Research (CMER). The model will not necessarily be based on just existing data and the quality of the data used to develop the model will be considered during the developmental process. The model, when fully developed, is intended to be the standard method when no existing data is available, but can be adjusted by in-field observations of fish (through non-lethal means) or observations of a natural blockage to access (Appendix B, Section II, B.1(b)).

The potential for error in the model is not known at this time, but the negotiated target for the fish/habitat model is to correctly identify the demareation between fish and nonfish-bearing streams with 95 percent accuracy, and to ensure that errors will be equally likely to over- and under-estimate the demareation location.

The commenter is correct in stating that the actual amount of fish-bearing streams under Alternative 2 can not be known until the water typing model is complete. However, the level of protection can still be estimated in the EIS based upon the available information and the assumptions made to estimate stream miles under the different stream typing systems proposed under the alternatives. The EIS analysis team believes these are reasonable estimates.

Subject Area: Watershed Analysis
Issue: Cumulative effects.
Number of Individual Comments: 9

Comment Summary:

These comments expressed concern that the proposed modifications to watershed analysis under Alternative 2 would result in insufficient cumulative effects analysis.

Response:

Section 3.11.1.2 of the Draft EIS raises this concern also. Although there would be no systematic way of analyzing cumulative effects on a watershed scale, the assumption is that cumulative effects will be satisfactorily addressed under the upgraded set of rules. Watershed analysis is only part of the cumulative effects approach within WAC 222-12-046. Additionally, long-term scientifically rigorous studies would likely be initiated to further address this issue statewide and changes could be made through adaptive management. Systematic long-term studies are required to adequately assess cumulative effects during widely varying hydrologic conditions. The watershed analysis process is still available on a voluntary basis to private landowners, and DNR will continue to complete them as funding is available.

Subject Area: Watershed Analysis
Issue: Other.
Number of Individual Comments: 15

Comment Summary:

Some commenters disagreed with the Draft EIS conclusion that watershed analysis was less likely to occur under Alternatives 2 and 3 than Alternative 1, pointing out that some landowners have HCPs that require preparation of watershed analyses. Others suggested that the implementation and completion of watershed analyses has declined in some regions such as the South Puget Region and that the likelihood for starting new watershed analyses in the near future under Alternative 2 was low. The WFPA suggested the Draft EIS calculation of how long it will take to complete watershed analyses is in error and should be 87 years.

Response:

The EIS recognizes that watershed analysis would continue under Alternatives 2 and 3. On some lands, implementation of watershed analysis would probably continue at the same rate as before because landowners are required to complete them as part of their HCP agreements. In addition, the DNR would continue, as required under law, to perform watershed analysis as funding is available. However, funding is uncertain and other efforts may be higher priorities.

The EIS also recognizes that a major assumption under Alternatives 2 and 3 is that most cumulative effects would be prevented by implementation of standard rules, the major exception being hydrologic effects. Consequently, watershed analysis under Alternatives 2 and 3 is primarily a tool for documenting current watershed conditions. Considering the costs (about $150,000 per watershed according to the Washington Forest Protection Association) and benefits to landowners for conducting watershed analysis under Alternatives 2 and 3, and the recent decline in the preparation of voluntary watershed analyses for lands without HCP or other requirements, the EIS analysis team believes there is little incentive for landowners to voluntarily conduct watershed analysis.

Although there appears to be little incentive for landowners to voluntarily conduct watershed analysis, except where required by HCP agreements, landowners are likely to voluntarily use portions of the methodology that can efficiently guide effective forest management (e.g., mass wasting hazard zonation, road inventory and sediment modeling, and westside hydrology modeling). Thus, partial assessments are more likely to occur.

Subject Area: Wetlands
Issue: Buffers.
Number of Individual Comments: 2

Comment Summary:

Two commenters disagreed with the risk ratings as applied to wetland buffers.

Response:

Low, moderate, and high risk ratings are necessarily broad categories. However, the attempt was made to categorize risks to the environment based on key evaluation criteria. Both quantitative (acreage impacted and protected) and qualitative evaluations and best professional judgment were used to produce a risk rating. Evaluation criteria for wetlands included fish and wildlife habitat, water quality, and hydrological support functions.

For non-forested wetlands Alternatives 1 and 2 were rated low to moderate risk. However, they do allow impacts to all wetlands less than 0.25 acre and Type B wetlands from 0.25 to 0.50 acres would receive no buffers. However, because Alternatives 1 and 2 provide buffers for most Type A and Type B wetlands, Alternatives 1 and 2 did not justify a moderate risk rating but were rated slightly lower, low to moderate risk.

In contrast, Alternative 3 provides protection of all non-forested wetlands with relatively large buffers. This comprehensive protection would constitute a low risk to wetland functions.

The Draft EIS and public comments highlight the fact that buffer width determination is not an exact science. A recent study (McMillan, 2000, The Science of Wetland Buffers and Its Implications for Management of Wetlands, Masters Thesis, Evergreen State College, Washington Department of Ecology) completed after the Draft EIS was published provides a comprehensive review of wetland buffer science. The review of numerous studies identified the general variability of buffer widths reported in the literature. The author summarizes that buffer effectiveness generally increases with width, but that the law of diminishing returns applies to the effectiveness of removing pollutants somewhere in the range of 30-50 meters.

The author proposes a new "advance buffer determination method" to prescribe a buffer width that is more tailored to specific site characteristics rather than relying on standard buffer widths. This type of buffer determination methodology may be an appropriate adaptive strategy under Alternative 2. This methodology would likely provide larger buffers than those proposed for non-forested wetlands in Alternatives 1 and 2.

Subject Area: Wetlands
Issue: Editorial comments.
Number of Individual Comments: 3

Comment Summary:
Several commenters suggested specific editorial changes or noted errors in the text.

Response:
Suggested editorial changes were considered during revision of the EIS and noted errors were corrected.

Subject Area: Wetlands
Issue: Forested wetlands, microclimate, groundwater, and water temperatures.
Number of Individual Comments: 15

Comment Summary:
Several commenters suggested that in addition to the direct effects to small forested wetlands that receive no buffers, timber harvests would cumulatively affect forested wetland water temperature and hydrology indirectly which would in turn affect Type N, S and F streams and microclimate features important for amphibian habitat. Other commenters suggested there is little evidence to suggest significant degradation of forested wetlands on commercial forestlands. One commenter suggested that one of the few benefits under Alternative 2 for forested wetlands is that the filling threshold for the requirement of a Class IV-special permit has been lowered.

Response:
Several commenters suggested that harvesting will increase surface and groundwater temperatures. In the cited studies, soil temperatures were measured only at 5 or 10 cm below the surface in clearcuts and stream buffers. This data does not necessarily translate to higher shallow groundwater temperatures, because the majority of subsurface groundwater flow, or interflow, occurs in a deeper portion of the ground profile. In fact one of the papers cited, Brosofske, et al. (1997) stated that their results for comparing effects of soil temperature to stream temperature "is highly variable depending on site specific conditions, so extreme caution should be used in applying these results generally". Although harvesting may affect soil microclimate, this affect is not likely to be significant to forested wetlands. Additional information is presented in Appendix D.

It is acknowledged that there is a paucity of studies that document significant degradation of forested wetlands on commercial forestlands in Washington.

However, this lack of information does not imply that there are no effects from harvesting forested wetlands.

Comments were made on the cumulative effects on basin-level hydrology from harvesting forested wetlands. This comment is based on the supposition that by removing the forest canopy evapotranspiration rates will decrease and result in increased surface runoff and peak flows. This statement is accurate if applied to an entire watershed. However, there is little documentation specific to management of northwestern-forested wetlands. This highlights the need for an adaptive management process. The adaptive maangement process in Alternative 2 and the functional classification method in Alternative 3 would decrease the likelihood of an adverse effect on stream flows because these methods can be used to understand the hydroperiod of a different wetland types or complexes prior to developing harvest plans.

For example, a primary function of wetlands is to store and attenuate flood waters. This function is important in riverine impounding and in depressional forested wetlands in western Washington (Hruby et al., 1998). These wetlands have storage capacity that varies with the season and precipitation events. Riverine-impounding wetlands are wetlands along stream and rivers that are subject to frequent-flooding but retain floodwaters long after the flood event. Depressional wetlands occur in topographic depressions that have closed contours and elevations that are lower than surrounding landscapes (Hruby et al., 1998).

In western Washington, most precipitation occurs from November to March. These are times of peak stream flows and when wetland storage capacity is high or full. Riverine impounding wetlands will provide some flood storage during significant events. Depressional wetlands will discharge surface water in excess of their storage volume. During this period, interflow, or shallow subsurface flows, are recharged. It is also a time of cool temperatures and low evapotranspiration. During this time of the year, the removal of the forest canopy will have little effect on wetland hydrology, wetland discharge, and in turn on surface water temperatures in streams.

At some point in spring impounding or depressional wetlands will cease to discharge surficially. Harvesting of the canopy will increase solar radiation into wetland surface water. This effect will only occur during the warmer months and will occur only until the shrub canopy has increased sufficiently to shade open water and saturated soils. At some point the detained water will evaporate to a point where water levels cannot provide sufficient hydrostatic pressure to cause infiltration, or interflow, into the surrounding soil. This point in time will vary depending on many factors, including geomorphic setting, aspect, precipitation regime, soil type, and vegetation type, among others. Beyond this point many

wetlands in western Washington will dry up by the time dry season stream flows need to be maintained (Hruby et al., 1998).

Other forested wetland types in western Washington include riverine flow-through and slope wetlands. Riverine flow-through wetlands are closely associated with the active stream or river channel. These wetlands do not contribute significant groundwater; rather their hydroperiod tends to reflect stream or river levels. This type of wetland would be afforded protection by the riparian management zone.

Slope wetlands are discharge wetlands that do not store water nor do they have obvious surface water inflows. These wetlands are the equivalent of seeps. Because these are groundwater discharge wetlands, canopy removal should have no effect on groundwater. However, surface discharge may warm somewhat depending on the time period this flow is exposed to the solar radiation before it either reinfiltrates or enters a surface channel.

It is noted that not all forested wetlands associated with Type N streams or isolated, forested wetlands are protected under all alternatives.

Subject Area: Wetlands
Issue: General.
Number of Individual Comments: 7

Comment Summary:
Several commenters indicated a preference for a particular alternative. One commenter suggested there was need for more wetlands research in forested areas.

Response:
Comments noted.

Subject Area: Wetlands
Issue: Incomplete analysis.
Number of Individual Comments: 2

Comment Summary:
Two commenters suggested that wetland protection was not adequately addressed in the Draft EIS.

Response:
Comment noted.

Subject Area: Wetlands
Issue: Mitigation ratios.
Number of Individual Comments: 3

Comment Summary:

Three comments suggested that proposed mitigation in Alternative 2 was insufficient.

Response:

Mitigation sequencing will be applied for all alternatives. The mitigation sequence is hierarchical and begins with the avoidance of wetlands by roads and landings where possible. If impacts are unavoidable they will be minimized through reduction of the road or landing profile in the wetland. Disturbed wetland areas will be restored where feasible. Wetlands will be replaced, or the impacts will be compensated by creating or enhancing wetlands so that there is no net loss of wetland function. Alternative 1 specifies a 1:1 replacement. Alternatives 2 and 3 specify 2:1 replacement. This mitigation ratio is an increase over current practices (Alternative 1). A 2:1 replacement to impact ratio is regularly used as a mitigation ratio in many Western Washington counties and cities for impacts to forested wetlands, and it has been used by the US Corps of Engineers in their mitigation requirements.

Subject Area: Wetlands
Issue: Other.
Number of Individual Comments: 3

Comment Summary:

Three commenters suggested the EIS underestimated wetland acreages within forested areas.

Response:

Wetlands were mapped using the DNR database including wetland and hydric soil layers. The wetland layer was based on NWI mapping which can be inaccurate in forested wetlands. The Draft EIS methodology included the hydric soil layer to refine the NWI layer. The Draft EIS acknowledged that this methodology was not as accurate as field methods. However, a recent study, Evaluation of National Wetland Inventory Maps In A Heavily Forested Region In The Upper Great Lakes (Wetlands Vol. 20:4; Kudray and Gale, 2000) reported that almost 91 percent of forested wetlands were accurately identified by NWI. It is acknowledged that field delineation of wetlands using the 1987 Corps Wetland Delineation Manual would increase the accuracy of wetland mapping, but it would be time and cost prohibitive.

Subject Area: Wetlands
Issue: Risk levels over- or underestimated.
Number of Individual Comments: 3

Comment Summary:

Several commenters suggested the EIS over- or underestimated the actual level of risk to wetlands.

Response:

For non-forested wetlands, Alternatives 1 and 2 were rated low to moderate because harvesting activities could still occur up to 30 feet of all stream types, except N_s streams. Also small wetlands are not protected. In contrast, Alternative 3 would preclude harvesting within 70 feet, and would be rated a low risk to the resource.

Alternative 2 only requires those forested wetlands 3 or more acres in size are mapped. These wetlands would then be subject to the mitigation guidelines for no net loss of wetland functions. Therefore, forested wetlands under 3 acres would have little protection.

Alternative 3 does propose a new classification system, but it is proposed to be based on the hydrogeomorphic approach that is becoming widely accepted. This system could be appropriate for state and private forestlands. However, it would be time consuming and expensive to type all the wetlands on these lands. Additional response concerning timber industry viability under the three alternatives is provided in the Economics section.

The comment that Alternative 3 would be, in effect, a no harvest alternative for forested wetlands is noted.

Subject Area: Wetlands
Issue: Site class.
Number of Individual Comments: 1

Comment Summary:

One commenter suggested that timber harvests in forested wetlands would change the site class.

Response:

Removal of the trees from a wetland is not expected to change the site class. Site class is based on the growth potential of the site in accordance with USDA soil surveys.

Subject Area: Wildlife
Issue: Alternative 3
Number of Individual Comments: 1

Comment Summary:
Commenter expresses the opinion that Alternative 3 would provide better protection of riparian habitat than Alternative 2

Response:
Comment noted.

Subject Area: Wildlife
Issue: Analysis too general/superficial/incomplete.
Number of Individual Comments: 4

Comment Summary:
Several commenters noted that the Draft EIS failed to address all wildlife species with the potential to be adversely affected by forestry practices within riparian areas. Some comments questioned the risk evaluation process for species other than the six identified target amphibians.

Response:
Table 3.8-1 identifies wildlife species that are strongly associated with riparian habitats, and whose population viability in Washington State is presently a matter of concern. This concern is reflected by their inclusion in various lists that confer regulatory or other protection to these species. Many other species may be affected by changes in the quality and quantity of suitable riparian habitats that would result from implementation of any of the alternatives. However, these other species are not considered to have the potential to be significantly affected by the alternatives because (1) they are associated with, but not dependent upon, riparian habitats, and/or (2) their populations are either stable or increasing, or have not been studied enough to differentiate among the effects of the alternatives. Thus, Table 3.8-1 identifies all wildlife species that may be subject to significant effects of forestry practices in and near riparian areas.

With regard to risk evaluation for riparian-associated species, the Draft EIS states that risk determinations were based on a qualitative comparison of the protections proposed under Alternatives 2 and 3 versus the current level of protection under existing Forest Practices Rules (page 3-166). Substantially more riparian habitat would receive protection under Alternatives 2 and 3 than under Alternative 1, thus these alternatives would result in a substantially lower risk to populations of riparian-associated species. The intent of the Draft EIS is to provide a general indication of the effects of the alternatives to a wide variety of species. Thus,

although the effects of the alternatives may vary from species to species, the assessments in the Draft EIS serve as an overall indication of the risks anticipated under each alternative.

Subject Area: Wildlife
Issue: Cumulative effects.
Number of Individual Comments: 2

Comment Summary:
Two comments noted that the Draft EIS does not account for the increased level of risk to riparian-associated amphibian species resulting from the current small amount of late-seral forest within riparian areas on state and private lands.

Response:
The Cumulative Effects section (3.11) of the Draft EIS acknowledges the risk of cumulative effects in the short term due to the effects of recent high timber harvest levels.

Subject Area: Wildlife
Issue: General.
Number of Individual Comments: 1

Comment Summary:
One commenter noted that existing Forest Practices Rules provide adequate protection to fish and wildlife, and that implementation of new rules would threaten that protection.

Response:
Comment noted.

Subject Area: Wildlife
Issue: Literature cited
Number of Individual Comments: 1

Comment Summary:
One commenter stated that the Draft EIS failed to use WDFW management recommendations for riparian habitats

Response:
Both the Riparian and Wildlife sections of the Draft EIS cite WDFW Management Recommendations for Riparian Habitats (Knutson and Naef, 1997).

Subject Area: Wildlife
Issue: Microclimate.
Number of Individual Comments: 2

Comment Summary:
Two commenters noted that site-specific microclimatic conditions may not follow generally anticipated trends in all cases.

Response:
Comment noted.

Subject Area: Wildlife
Issue: Other.
Number of Individual Comments: 5

Comment Summary:
Several comments pointed to a need for clarification of statements made in the Draft EIS. For instance, one commenter noted that none of the six target amphibian species is associated with wetlands, thus wetland buffers should not be assessed in the unique habitat feature discussion. Another pointed out that torrent salamanders are associated with high-gradient streams, while the Draft EIS emphasizes effects of sedimentation in low-gradient streams. Another comment stated that the Draft EIS overestimates the risk of the alternatives to Van Dyke's salamanders, because this species is not limited to nonfish-bearing streams.

Response:
Benefits to target amphibians of wetland protection measures - The Final EIS has been revised to clarify the unique habitat associations of the target amphibian species.

Torrent salamanders - The Final EIS has been revised to clarify the potential for timber harvest to imapct torrent salamander populations.

Van Dyke's salamander - The potential effects of forest practices on Van Dyke's salamander populations deserves considerably more study than has occurred to date. As is stated on page 3-158 of the Draft EIS, "exactly how disturbance types, timber harvest prescriptions, or potential RMZ prescriptions may affect persistence of Van Dyke's salamanders in the landscape is unknown." It is true that Van Dyke's salamanders are not restricted to nonfish-bearing streams, and that some populations may benefit from buffers along small, fish-bearing streams. However, the historically low level of protection of nonfish-bearing streams has likely had negative impacts on populations that do occur in such streams.

Subject Area: Wildlife
Issue: Review of Forests and Fish Report
Number of Individual Comments: 2

Comment Summary:

These comments appear as part of a timber industry review of the Forests and Fish Report, but were not specific comments on the EIS. One comment suggests that discontinuous stream buffers located where groundwater is expected can provide high quality habitat and refugia for amphibians.

Response:

Comments noted.

Subject Area: Wildlife
Issue: Riparian leave trees
Number of Individual Comments: 1

Comment Summary:

This comment observes that none of the alternatives provides for the retention of Wildlife Reserve Trees in riparian zones in eastern Washington.

Response:

All of the alternatives provide for the retention of all Wildlife Reserve Trees (WRTs) within Riparian Management Zones (RMZs) in eastern Washington timber harvest units. Consequently, the level of protection to WRTs is dependent upon the RMZ width provided in each alternative. Consequently, streamside no-harvest buffers under Alternatives 2 and 3 would be expected to result in the retention of more WRTs than under Alternative 1. Because no logging activity would occur within no-harvest buffers, Alternatives 2 and 3 would reduce the number of potential WRTs that would have to be removed to comply with state safety regulations, compared to Alternative 1. In addition, no-harvest buffers would be applied along more stream miles than would receive RMZs under Alternative 1. Based on the sample data presented in Appendix C, Tables 2 and 3, approximately 19 percent of streams on state and private lands in eastern Washington would be classified as Type 1, 2, or 3 under Alternative 1, and would thus require RMZs. In contrast, approximately 35 percent of such streams would be classified as Type S or F under Alternative 2, and would thus be protected by 30-foot no-harvest buffers plus additional areas with specific leave tree requirements. Under Alternative 3, all streams would receive no-harvest buffers.

Subject Area: Wildlife
Issue: Risk levels over- or underestimated.
Number of Individual Comments: 6

Comment Summary:

Several commenters took issue with the determinations of risk to the six target amphibian species under each of the alternatives. Some said the Draft EIS overestimated the risk, because site-specific microhabitat conditions may not always follow generally anticipated trends after timber harvest in riparian areas. Others said the Draft EIS underestimated the risk, because buffers on streams would not provide sufficient protection of the habitat conditions on which these species depend. One comment also observed that only about 30 percent of any given watershed is likely to consist of open-canopy forest at any given point in time, and that the Draft EIS therefore overestimates the risk to amphibians from the different stream buffering proposals.

Response:

The Draft EIS and public comments highlight the fact that buffer width determination is not an exact science. Clearly, post-harvest microclimate at any particular site may not always follow trends observed within the context of large-scale studies. However, prudent land management dictates that application of management standards over an area as large as the state and private forestlands of Washington State should depend on observations with the widest possible applicability. Thus, the Draft EIS relies on studies conducted at a larger scale than the four nest sites documented by Blessing et al. (1999) or unpublished data from Port Blakely Tree Farms.

The risk assessments in the Draft EIS take into account the fact that the potential impacts of timber harvest are dispersed through the landscape at any given time. However, the patchy distribution of some amphibian species, as well as the potential long-lasting effects of LWD loss and fine sediment input, necessitate a conservative assessment of the potential risks posed by the alternatives. Thus, Alternative 1 is characterized as posing a high risk to target amphibian populations, and Alternatives 2 and 3, with increasingly wider riparian buffers on most streams, are characterized as posing a moderate and low risk, respectively.

Subject Area: Wildlife
Issue: Species-specific comment.
Number of Individual Comments: 9

Comment Summary:

Comments include observations about habitat requirements of target amphibian species, but were not specific comments to the EIS. One commenter also

observed that literature regarding the sensitivity of target amphibian species to timber harvest is variable and inconclusive, and that different species may react differently to various practices.

Response:

Comments noted.