

Agencies and Persons Consulted

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Federal, State, and Local Agencies

Federal Highways Administration

Federal Emergency Management Agency

Snohomish County

National Oceanic and Atmospheric Administration

National Marine Fisheries Service

Washington State Department of Fish and Wildlife

US Fish and Wildlife Service

State Historic Preservation Office

Tribes

Sauk-Suiattle Indian Tribe

ID Team Members, Consultants, and Preparers

Phyllis Reed – Team Leader

Kerensa King – Wildlife Biologist

Jesse Plumage – Wildlife Biologist

Karen Chang – Fisheries Biologist

Jim Doyle – Fisheries Biologist

Megan Impson – Recreation Specialist

Carol Gladsjo – Public Services Manager

Ron Hausinger – Hydrologist

Gary Ketcheson – Hydrologist

Wayne Hamilton – Engineer

Ann Risvold – Botanist

Stephanie Swain – Cultural Resources Technician

Linn Gassaway – Forest Archaeologist

Phil Kincare – Wild and Scenic Rivers Coordinator

Cindy White – Writer-Editor



(Blank Page)

Appendix A – Comments and Issues Identified throughout the Analysis Process

Table 23: Public Comments Received During the Scoping Period

Comments are summarized and grouped by issues or area of interest (see the Index of high-interest topics and their location of discussion within the document.	Significant Issue	Within the Scope of Decision	Already Decided by Law, Regs. Forest Plan	Relevant to the Decision	Tangible, Supported by Science
With no repairs to the bridge and road, public and commercial boaters would not be able to launch from that location.	Issue #1 – General Access	Yes	No	Yes	No
Access to White Chuck Bench Trailhead --a low-elevation multi-seasonal trail is cut off.	Issue #1 – General Access	Yes	Yes	Yes	No
Dispersed Recreation: If Road 22 is not repaired, dispersed recreational activities along the road would change (see Page 57 for dispersed recreation discussion). In turn, people would go elsewhere to recreate, potentially adding increased crowding and natural resource damage in other areas.	Issue #1 – General Access	Yes	No	Yes	No
If the bridge and repairs are not made on Road 22, access to the area by Road 24 would lengthen the time needed to travel to recreational, administrative sites, and Matrix.	Issue #1 – General Access	Yes	Yes	Yes	No
If the bridge is not repaired, and access to Road 22 is only by way of Road 24, remaining portions of Road 22 between Site #1 and Site #6 could be decommissioned and made into a trail that would accommodate bikes and hikers.	Issue #1 – General Access	No	Yes	Yes	No
Fire, law enforcement, and search-and-rescue personnel response time would be impacted by changing the access to the Road 24.	Issue #1 – General Access	Yes	No	Yes	No
Road 22 and Road 24 provide drivable access to timber production lands (Matrix). If access changes are made to Road 24, the Matrix would not be as easily or expediently accessed.	Issue #1 – General Access	Yes	No	Yes	Yes
The bridge provides an emergency route for residences of the Sauk Prairie if the main Sauk River Bridge should become undrivable.	No	No	No	No	No



Comments are summarized and grouped by issues or area of interest (see the Index of high-interest topics and their location of discussion within the document.	Significant Issue	Within the Scope of Decision	Already Decided by Law, Regs. Forest Plan	Relevant to the Decision	Tangible, Supported by Science
A temporary boat launch site should be established in order to continue interim launching before any repairs are made. If repairs are not made, a new permanent boat launch may need to be established on the south side of the Sauk River	No	No	No	Yes	No
State listing of Chinook went from "healthy" to "depressed" for fish stocks in the Sauk River from Darrington upriver. Sediment delivery from damaged or weakened road systems could impact fish habitat. Road repairs including culverts and fish passages should protect and restore salmon habitat.	Issue #2 – Potential Impacts to Fish and Fish	Yes	No	Yes	Yes
The Sauk River is a Tier 1 watershed. The 1994 ROD (page B-19) recommendations include no net increase in road mileage in Tier 1 watersheds (USDA, USDI 1994, page B-19).	No	Yes	Yes	Yes	Yes
Repairs could impact old forest habitat (spotted owls and marbled murrelets) Repairs in the Riparian Reserves could impact wildlife species in low elevation areas where human use is currently high.	No	Yes	Yes, ESA	Yes	Yes
Sauk River should not be constrained by roads along both banks of the Sauk River (Wild and Scenic River designation)	Issue #3-Wild and Scenic River	Yes	Yes	Yes	Yes
Construction within bed or bank of Sauk River would need a Section 7 consultation (WSR Act) and Regional Forester approval.	Issue #2 – Potential Impacts to Fish and Fish Issue #3-Wild and Scenic River	Yes	Yes	Yes	No
There are known historical and cultural resource sites in the project area. Evaluation and monitoring of the sites are needed for protection.	Issue # 4 -Cultural Resource – Potential Effects to Historic District	Yes	Yes, National Historic Preservation Act	Yes	No



Appendices

Comments are summarized and grouped by issues or area of interest (see the Index of high-interest topics and their location of discussion within the document.	Significant Issue	Within the Scope of Decision	Already Decided by Law, Regs. Forest Plan	Relevant to the Decision	Tangible, Supported by Science
There is a need to treat known noxious weed sites prior to ground-disturbing activities, and a need to prevent further infestations.	No	No	Yes	Yes	Yes
Vandalism incidents may be influenced by a dead-end road as opposed to a "loop" road. (County Road resident concern)	No	No	No	No	No
Snohomish County is repairing a portion of Road 22 that is in their jurisdiction. There could be an opportunity to work with the county to repair the entire length of Road 22 and change the access to the north side of the Sauk River by using the "old" Sauk Road.	No	No	No	No	No
The Forest Service needs to consider both immediate and long-term fixes and the impacts on soils, and mature forest stands.	No	Yes	Yes	Yes	Yes
Upslope roads could cause run-off or block culverts creating a problem on the mainline road down slope.	No	No	No	No	No
Repair work should provide local economic benefits.	Yes	Yes	No	Yes	No
Economy: Tourism in the local community depends upon recreational opportunities on the National Forest.	Yes	Yes	No	Yes	No
Road Maintenance Funds: Selective decommissioning would help conserve limited maintenance funds so they can be targeted at the remaining road networks. Road repairs including culverts and fish passages should protect and restore salmon habitat.	Issue #1 – General access with and without the White Chuck Bridge and repairs to Road 22, 2210, and 2211: Issue #2 – Potential Impacts to Fish and Fish	Yes	Yes	Yes	No
Project should be reviewed as an EIS along with all the other Sauk River repair sites.	No	Yes	No	No	No



Substantive Comments Considered by The Responsible Official

A preliminary EA was circulated for a 30-day public comment period from April 30 until May 31, 2005. The EA was mailed to 28 individuals and organizations that appeared on the list of potentially affected parties that include local, state, and Federal entities, Tribal representatives, and environmental organizations.

Copies of the Preliminary EA were made available at the Darrington Ranger District and an electronic version available on the Mt. Baker-Snoqualmie National Forest website. Legal notice of the availability of the EA was published in the Everett Herald, on April 30, 2005.

Seven comment letters/emails were received during the 30-day comment period. The Responsible Official is considering all substantive comments that were submitted (36 CFR 215.6(b)). **Substantive comments are defined as “comments that are within the scope of the proposed action are specific to the proposed action, have a direct relationship to the proposed action, and include supporting reasons for the Responsible Official to consider” (36 CFR 215.2).**

Table 24 displays the substantive comments received during the 30-day comment period, with the Forest Service’s response and/or reference to the EA.

A keyword index follows the substantive comments table. This section should help guide the reader to pages within the EA where key subject matter is discussed or analyzed in the final EA. Refer also to the table of contents for guidance.



Table 24 - Substantive Comments from the 30-Day Comment Period

Respondent	Comment	Page # Where Topic is Discussed in Analysis	Remarks
1) American Rivers (Letter – May 31, 2005)	<p>Alternative B and C achieve objectives while remaining sensitive to conservation issues.</p> <p>Moving the road away from Site #2 reduces future interaction between river and road. Alternative C would further increase the distance between the river and the road</p> <p>Fish passage issues should be addressed at stream crossings when replacing culverts.</p>	77-93, 135, 136	Comments noted.
2) Devin Smith– Skagit River Systems Cooperative (Letter – May 31, 2005)	<p>The proposed bridge to be constructed in the 100-year flood zone is not consistent with previous field visit discussions. The option of placing the bridge in the 500-year floodplain was discussed, yet it was not fully analyzed.</p> <p>The lack of piers in the channel is an improvement over the existing bridge.</p> <p>There is a concern that the river is likely to migrate downstream toward the southern bank (Mountain Loop side), which would put pressure on the proposed new bridge abutment.</p> <p>A longer bridge span or constructing riprap by including large logs and complex structures would provide better habitat conditions if the river were to migrate to that side.</p> <p>Use the trees that are removed from the Riparian Reserves to allow bridge construction should be used for habitat in the White Chuck downstream from the bridge.</p> <p>Skagit Cooperative would support Alternative B as long as culvert crossings are properly designed.</p> <p>Skagit Cooperative can financially support decommissioning work in Alternative C.</p>	7, 26, 29, 32, 36, 37, 69, 90, 135, 136, 138, 147	Regional standards are to accommodate 100-year flows so due to the additional expense of placing the bridge in the 500-year floodplain, this option was not further pursued.
			Comment Noted
		63, 66-77, 87, 136	Over an unknown duration, the river meander will migrate downstream and could potentially affect the new bridge. The current collection of large wood along the southern bank may deflect some of the pressure exerted on the riverbank. In addition the new bridge design would allow that even if the entire bridge approach were to wash away, the bridge would still remain undamaged using the 100 year flood and anticipated debris flows.
		7, 26, 29, 31, 32, 37, 69, 90, 135, 136, 138, 147, 89, 90	Regional standards to accommodate 100-year flood events will be met with the proposed bridge span (longer than previous bridge). The collection of large wood along the southern bank may provide fish habitat as well as deflect erosion pressure of the river.
		36	The Conservation Measures to be employed dealing with large wood have been specifically added to the EA in "Mitigation Measures for All Action Alternatives."
		16, 26, 33, 58, 75, 76	All replaced culverts will meet Plan standards to pass at least a 100-year flood and debris (Forest Plan, as amended S&G RF-4)
			Comment noted.



Appendices

	<p>Alternative C provides greater benefits for fisheries, free flow, and scenery for the Sauk River, and fewer net road miles which could reduce maintenance costs.</p> <p>There is confusion as to why Alternative B is the preferred alternative considering the financial support and greater benefit to resources.</p>	<p>29-37, 44, 95-99</p>	<p>See EA and Decision Notice. Alternative B and C had comparable benefits to fisheries, free flow and scenery for the Sauk River. Alternative C has higher total costs than Alternative B, more road on the upper elevation slopes so there is less year round access. Alternative C has steeper grades than Alternative B, and is a more complex road to drive and maintain. Alternative C has a slightly longer access route (0.2 miles) with the upslope roads and correspondingly a higher maintenance cost than Alternative B.</p>
	<p>Culverts should be large enough to sufficiently handle water, wood, and sediment during large flow events.</p>	<p>7, 26, 29, 32, 36, 37, 69, 90, 135, 136, 138, 147</p>	<p>All replaced culverts will meet Plan standards to pass at least a 100-year flood (S&G RF-4) Culverts are not sized to pass the 100 year flood but are not sized to pass debris torrents. (Forest Plan, as amended S&G RF-4 The streams are too steep for fish passage concerns.</p>
<p>(3) Washington Recreational River Runners (e-mail 5/31/2005)</p>	<p>Decommissioning Road 22-110 would improve habitat conditions for Hyachuck pond and Tiny Kisutch Creek without significantly reducing access to these roads.</p>		<p>Comment noted.</p>
<p>(4) Tina and Eric Myren Private Individuals (e-mail 5/31/2005)</p>	<p>Alternative B would restore the White Chuck Boat Launch and allow private boaters safe and convenient access to the middle Sauk River run.</p>		<p>Comment noted.</p>
<p>(5) Kevin Geraghty (e-mail 5/31/2005)</p>	<p>Alternative B would restore the White Chuck Boat Launch and allow private boaters safe and convenient access to the middle Sauk River run.</p>	<p>66-77, 87, 99, 136,</p>	<p>Over time, river meander is expected to migrate downstream and shift channels. Bridge abutments are placed at approximately at the 100-year flood elevation, on natural ground rather than fill in order to accommodate flows and not be a constraint. Flood events, debris movement, and lodging within the channel are expected to play a major part in the configuration of channel morphology, both up and own stream. The bridge will have more effect to the upstream flow which will be a considerable improvement over the old bridge. Additionally, the new bridge location will have less back water under flood flows and have 1 foot of free board at the low cord during a 500 yr event (Pacific Water Resources Inc., 2005)</p>
<p>(6) Plichuck Audubon Society-Katherine Johnson (Letter- May 30, 2005)</p>	<p>Gold Mountain repair is one of many proposed actions initiated after the 2003 flood. An EIS would allow a more comprehensive and holistic analysis/overview of significant cumulative effects. The statement that the flood repair projects are similar in scope but not connected actions is incomprehensible.</p>	<p>2, 14</p>	<p>The agency is not required to analyze similar actions in the same document, unlike connected actions. In response to this comment, the exact wording from the CFR has been included in Chap. 1.</p> <p>The rationale for analyzing the road damage separately, rather than in a single analysis and document is: the actions are similar in scope but are not considered to be connected actions or have cumulative actions that cause significant impacts. No significant effects were identified during preliminary effects analysis, nor during the full analysis of this or other proposed projects within the Sauk River watershed. If significant effect(s) had been identified, the Forest Service would have completed an EIS.</p>



	<p>This and other proposed actions (Min. Loop, White Chuck, and Suittie River Road 26) would have adverse effects on the free-flowing characteristics of the Sauk Wild and Scenic River, and should be discussed in an EIS.</p>	<p>45, 96, 97, 99, 136.</p>	<p>Note that the text in this section of the EA Chap. 3 has been re-organized slightly to clarify estimates effects on the Sauk (part of the National W&S River System) and the White Chuck (a recommended W&S River, Forest Plan).</p>
<p>The EA doesn't include a full range of alternatives as required by 40 CFR 1500.2(e) and 1502. EA should include an action alternative that includes: 1) decommission the entire length of Road 22, to improve fish habitat and water quality by reducing future washouts; 2) remove the damaged bridge & replace with a small foot bridge; 3) establish an alternative boat launch site on the Mountain Loop Highway.</p> <p>If access to Road 2210 system really needed, study an upslope connection with the Road 2420 system, providing access via Road 24.</p>	<p>2, 14 25-37</p>	<p>40 CFR 1500.2 (e) and 1502 do require a full range of reasonable alternatives. The Forest Service supports that the Alternatives considered in the Gold Mtn. Road Repair EA were reasonable solutions to restoring year-around access for administrative and public use to the project area. The Alternatives considered, but not further analyzed in detail were rigorously analyzed before being dropped from consideration. One public comment was that the Forest Service did not consider repairing the bridge in its current location. This Alternative was analyzed, and added to the EA, however, it is not being considered for further analysis because hydrologic analysis of the bridge sites supports moving the bridge downstream as a more stable location than the current site.</p>	
<p>Decommissioning the entire length of Road 22 would improve fish and wildlife habitat and water quality.</p> <p>It would also increase opportunities for non-motorized recreation.</p> <p>Decommissioning Road 22 would provide the same benefit from "reduction of potential noise disturbance from vehicles within suitable spotted owl and murrelet nesting habitat and eagle foraging areas" as with the No-Action Alternative. This would benefit other species as well (e.g. deer, elk, grizzly bear, bats, neotropical birds).</p>	<p>4, 5, 25-37, 85-93, 103-113</p>	<p>Decommissioning does not meet the need of returning vehicle access to the area. Road 22 is considered a viable road to keep on the NFS Road system. With both action alternatives, Road 22-110 is being decommissioned. See EA, Chapter 2, Alternative descriptions. This 1.1 mile of road is near a streams that are used for salmon spawning, as well as crosses a fish bearing stream that is frequented by bald eagles. (Observations from 2004 – District staff).</p>	
<p>Evaluate the removal of the damaged White Chuck Bridge and replacement by a pedestrian bridge or a modification to provide access to the White Chuck Bench Trailhead. A small-scaled pedestrian bridge could be constructed with far less impacts than a vehicle bridge.</p>	<p>4-5</p>	<p>Does not meet need of returning vehicle access to the area.</p>	
<p>Consideration should have been given to establishing an alternative boat launch along the Mountain Loop Highway.</p>	<p>4, 54, 87, 98, 24, 27, 28, 45, 98, 137</p>	<p>Analyzing a new boat launch is outside the scope of this proposal (Emergency Repair of Federally Owned roads). If the No Action Alternative were chosen, it is documented that a new boat launch site would likely be established along the Mountain Loop Highway. At that time, an environmental assessment of the possible sites would be completed.</p>	
<p>Accessing Road 2210 by way of Road 24 was not adequately evaluated.</p>	<p>26-28</p>	<p>This Alternative was considered, but eliminated from further detail.</p>	
<p>The Forest Service did not adequately explain the necessity of Road 22. The need for maintaining motorized access along the northeast bank of the Sauk River is not supported by the EA.</p>	<p>4-5</p>	<p>The need of this project is to restore access for public and administrative use. The reasons for this needed/desired access is outlined throughout the EA.</p>	



Appendices

	<p>Timber resources can be accessed via the Road 24 system. The EA should more fully evaluate the necessity of the Road 22 system, and the resource impacts of new construction associated with it.</p> <p>The proposed project would not adequately utilize ERFO funding. The use of ERFO funding is not fully explored in terms of use of funds for decommissioning.</p> <p>The Forest Service did not consider the longevity of repairs and the history of flood damage. Repairs to Road 22 would be temporary, based on the data provided showing the pattern of past flood events. The EA also states that "Over time...the river meander will migrate downstream and affect the new bridge. Weather conditions, debris movement and lodging within the channel can play a major part in the configuration of channel morphology and the pressure it exerts on the river bank".</p> <p>Information regarding the availability of trails is inaccurate. Current trail mileage is about 50 percent unavailable due to the October 2003 flood. These trails are probably available, by walking along roads that access them which increases hiking opportunities.</p> <p>The Forest Service did not adequately display environmental and economical effects of dispersed recreation. The Sauk River watershed has many sites that have trash, human waste, fire rings, and associated wood and charcoal. Trash dumping on open roads leads to release of toxins detrimental to salmonids. Roads are associated with human-caused wildfire.</p>	<p>4-5, 26-36</p> <p>4-5</p> <p>66-77, 87, 136</p> <p>60, 138</p> <p>59</p>	<p>The value of Road 22 to timber management and other uses is provided in the EA. Timber sale Contracts often restrict logging operations for seasonal periods. Road 22 offers more consistent access to Matrix lands. Access by Road 24 has more road miles in lower road maintenance standards and is at a higher elevation, which may deter accessing timber during relegated timeframe.</p> <p>There is the opportunity to use ERFO to decommission roads if a road is no longer needed. ERFO funds are available up to the amount of the qualified damage to use for decommissioning. In this case, decommissioning the road did not meet the purpose and need and therefore we would ask Federal Highways for permission to decommission roads.</p> <p>The culvert replacement along Road 22 will use larger culverts and hardened dips to accommodate 100 year flood events. This is an improvement over the previous structures and road design. Yes the wavelength of the White Chuck channel, as with all channels that have the ability to function naturally, will propagate down stream and eventually will be at the abutment of the new bridge. However, the new bridge will have a longer span and the abutments will implement a improved and stronger design to coexist with large magnitude events. The Hydraulic Engineering report calculated that even during a 500-year flood event only 3 feet of backwater behind the bridge would be generated. The constriction of the new bridge would be far less than the old bridge and have stronger abutments. Even the old bridge lasted 47 years with the designs that were available then.</p> <p>Recreation Cumulative Effects has additional clarification added: The Darrington District Trail Inventory has 367 miles of existing trail and about 50 percent (188 miles) of those trail miles are affected due to inaccessibility by vehicles to the trailheads and damaged trail. Some people walk along the roads and cross the damaged hazardous areas.</p> <p>Dispersed Recreation describes six dispersed campsites near the White Chuck Bridge and Boat Launch and one on Road 22-110. Additional information on toilets, trash, and wildfires has been added: Two toilets are located at the White Chuck Boat Launch for use by dispersed campers. Forest users are encouraged to bury their waste, which decomposes. Forest Recreation staff and Snohomish County crews had been removing garbage and dumps. In the past ten years there have been no wildfires started from roads or dispersed recreation as two were related to logging and the rest have been lightning strikes.</p>
--	--	---	--



Appendices

	<p>Chinook and Bull Trout Habitat Indicators. Several indicators that are functioning at unacceptable risk for lower Sauk summer Chinook, upper Sauk spring Chinook, and Sauk bull trout, and many more, are functioning at risk for those populations. For the White Chuck River, the indicator of road density and location was identified as functioning at risk. All of these indicators would be adversely affected by the proposed project.</p>	77-93	<p>USFWS and NMFS concurred that the project "May Affect, [but is] Not Likely to Adversely Affect" bull trout or Puget Sound Chinook for all activities besides the White Chuck Bridge removal/ replacement.</p> <p>USFWS and NMFS anticipate harm and harassment from activities associated with the White Chuck Bridge removal/replacement; they estimated and granted the FS incidental take for these activities.</p>
	<p>The effects of using explosives were not adequately analyzed; the effects on fish populations were dismissed without adequate consideration, claiming the effects as insignificant without supporting evidence. Mitigation measures for blasting are listed, but their use is not required. Mitigation measures for construction activities should be mandated, as well as monitored [for] effects.</p>	77-93, 95, 106, 139,	<p>Analysis of the effects of using explosives has been done in greater detail as designs have developed and since the preliminary was mailed. Text has been added to the EA. Terms and conditions of consultation related to activities associated with the White Chuck Bridge removal/replacement have been added to the EA, as has monitoring activities.</p>
	<p>The effects of instream bridge work on juvenile fish was not adequately analyzed or mitigated. Serious actions such as "smashing of juveniles in the substrate" are deemed insignificant and "will not be monitored".</p>	77-93	<p>Construction designs have been more fully developed since the preliminary was mailed. Text was added to the EA under "Effects to Federally Listed Fish" to more fully discuss potential effects to juvenile fish from concussive activities and dewatering. Measures to be taken to avoid detectable stranding of fish in areas around the removal of the existing bridge have been added to "Mitigation Measures for All Action Alternatives."</p>
	<p>Protection of ESA species is inconsistent with the law and other documents. The proposed action's unacceptable risk elevation for ESA listed species in the Sauk and White Chuck Rivers is inconsistent with the Tier 1 Key watershed designation and the ESA.</p>		<p>USFWS and NMFS concurred that the project "May Affect, (but is) Not Likely to Adversely Affect" bull trout or Puget Sound Chinook for all activities besides the White Chuck Bridge removal/replacement.</p> <p>USFWS and NMFS anticipate harm and harassment from activities associated with the White Chuck Bridge removal/replacement; they estimated and granted the FS incidental take for these activities. Mitigations have been incorporated into the project design to limit impacts and incidental take.</p>
	<p>The Forest Service does not adequately analyze effects on spotted owl and marbled murrelet habitat. New road construction would create an edge effect extending 250 feet or more into the adjacent mature forest on either side of the road, impacting spotted owls and marbled murrelets through reduction of nesting (and spotted owl foraging).</p>	44, 103-113	<p>Alternative B has no new road construction in mature or old growth forests. Repair of roads in forested area with suitable habitat for spotted owl or marbled murrelet will have limited tree removal. Retention of residual tree canopy adjacent to repair sites will limit edge effect from extending into the adjacent forest. Road repair and reconstruction will not reduce the stand characteristics for nesting or owl foraging.</p>



(Blank page)



- 100-year
 - culvert design, 56
 - culverts, 32, 73, 74
 - culverts, bridges, and other stream crossings, 16
 - floodplain, 121
 - road design, 26
 - 100-year flood
 - large wood, 36
 - 500-year
 - bridge span, 129
 - 500-year flood
 - bridge span, 67, 132
 - 500-year floodplain
 - bridge span, 88
 - abutment
 - Alt A channel migration, 85
 - Alt B and C channel migration and bridge survivability, 130
 - Alt B and C fisheries, old bridge removal, 88
 - Alt B and C new bridge, 31
 - Alt B and C old bridge removal, 30
 - Alt B channel migration, 97
 - Alt B wildlife, 102
 - channel morphology, 132
 - constrictions, 132
 - design, 132
 - grizzly bear core habitat, 99
 - hydrologic, 500-year floodplain, 67
 - new bridge design, 7
 - wildlife grizzly bear BMU, 99
 - access, 4, 5, 7, 19, 23, 26, 28, 29, 42, 43, 45, 51, 53, 54, 57, 58, 66, 81, 94, 95
 - access and road management
 - cumulative effects, 56
 - administrative, 47
 - Alt A, 29
 - Alt A access and road management administrative, 53
 - Alt A access and road management dispersed recreation, 52
 - Alt A access and road management environmental consequences, 52
 - Alt A access and road management matrix, 53
 - Alt A dispersed recreation, 57
 - Alt A environmental justice, 120
 - Alt A fisheries and recreation, 85
 - Alt A fisheries/boat launch environmental consequences, 85
 - Alt A heritage, 115
 - Alt A hydrologic, 65
 - Alt A hydrologic soil compaction overland flows, 65
 - Alt A wildlife, 101
 - Alt A, maintenance level, 29
 - Alt B access and road management year-round, 53
 - Alt B administrative, 55
 - Alt B and C boat launch, 96
 - Alt B and C environmental justice, 120
 - Alt B and C recreation, 57
 - Alt B and C tribal, 116
 - Alt B boat launch and trail, 54
 - Alt B hydrologic, 66
 - Alt B road maintenance, driving conditions, cost, 54
 - Alt B timber haul, 55
 - Alt B wildlife, 104
 - Alt B, Boat Launch and Trail, 29
 - Alt B, Matrix, 29
 - Alt B, route, 29
 - Alt C recreation, 55
 - Alt C route, 33
 - Alt C timber haul, 55
 - Alt C wildlife, 107
 - Alt C year-round, 55
 - alternate boat launch, 94
 - alternate routes and cost, 130
 - alternate routes, timber haul, 132
 - alternatives, 25
 - alternatives considered, 131
 - boat launch, 4, 94, 95
 - comparison of Alternatives, 42
 - emergency, 5, 47
 - fisheries affected environment, 81
 - fisheries cumulative effects, 92
 - issue, 23, 127
 - maintenance level, 48
 - other alternatives considered, 26, 28
 - proposed action, 5
 - purpose and need, 4, 5, 131
 - recreation, 4, 47
 - recreation affected environment, 57
 - recreation, trail, 4
 - road management affected environment, 47
 - scoping comments, 125
 - socioeconomics environmental consequences, 117
 - temporary boat launch, 94
 - trail, 132
 - travel time table, 51
 - travel times, 50
 - W&SR Affected Environment, 93
 - W&SR recreation, 94
 - Access and Travel Management
 - Alt A, 52
 - active channel
 - bridge design, 30, **31**
 - comparison of alternatives, **46**
 - current condition, 63
 - riparap, 75
 - work within the, 24
 - Adversely Affect
 - federally listed fish, 86
 - Alternative A
 - ESA, 46
 - riparian reserve, 45
 - Alternative B
 - driving distance, 34
 - Alternatives, 26
 - approach, 107
 - Alt A sedimentation, **85**
 - Alt A White Chuck River, 96
 - Alt B and C 500-year flood, **67**
 - Alt B and C bridge design, 29
 - Alt B and C channel migration, **63**
 - Alt B and C channel migration, bridge location, **67**
 - Alt B and C grizzly bear core habitat, 99
 - Alt B and C water quality, **66**
 - Alt B and C White Chuck River, 97
 - blasting bridge design, **36**
 - bridge design, 129
 - fish species of interest effects, **86**
 - geology, **59**
 - past flood damage, **49**
 - W&SR designation, **93**
 - water quality bridge design, **36**
 - wetlands and floodplains, 121
- bald eagle
 - affected environment, 98
 - Alt A disturbance, 102
 - Alt B and C effects, 131
 - Alt B disturbance, 104, 106
 - Alt C effects, 108
 - Alt C effects decommission, 106, 108
 - comparison of alternatives, 46
 - disturbance, 37
 - threatened and endangered, 99
 - bankfull
 - Alt A piers, 85
 - hydrologic affected environment, 61
 - beneficial
 - Alt B grizzly bear core habitat, 103
 - Alt B wildlife cumulative, 107
 - comparison of alternatives, 45
 - grizzly bear, 103
 - looting, 115
 - benefit
 - Alt A fish habitat, 85
 - Alt A marbled murrelet, 103
 - Alt B and C fish barrier removal, 86
 - Alt B and C fish species of interest, 86
 - Alt B and C long-term EFH, 88
 - Alt B and C routing of wood, 86
 - Alt B and C wood routing, 87
 - Alt B biodiversity, 107



- Alt B long-term hydrologic, 66
- Alt C benefit to fish, 130
- Alt C decrease in road, 74
- Alt C marbled murrelet critical habitat, 110
- Alt C spotted owl critical habitat, 110
- Alternative B cumulative marbled murrelet critical habitat, 105
- Best management practices fisheries cumulative, 92
- Best Management Practices, 35
 - Alt B hydrologic, 66
 - sedimentation, 68
 - soil/aquatic/fish, 35
 - soils/hydrology, 37
- biological assessment, 45
 - fisheries, 35, 84
 - USFWS, 98
 - wildlife, 101
- Biological Assessment, 25
 - programmatic, 156
- Biological Opinion, 25, 31, 35
 - bridge description, 7
 - detonation, 7
- blasting, 36, 86, 133
- Blasting, 102
- boat launch
 - Alt A permanent, 52
 - Alt A permanent boat launch, 85
 - Alt B maintenance level, 54
 - alternate cost, 23
 - alternatives considered, 26
 - comparison of alternatives, 43
 - issue, 23
 - scope, 131
 - temporary, 27
- Boat Launch
 - Alt B, 95
 - purpose and need, 4
- breeding, 82
 - Alt B marbled murrelets, 103
- alternatives considered, 26
 - comparison of alternatives, 46
 - timing restrictions, 37
 - wildlife biological opinion, 37
- bridge, 7, 30
 - 500-year flood, 129
- affects to fish species of interest, 86
- Alt A, 52
- Alt A bat roosting, 102
- Alt A fisheries**, 84
- Alt B and C bat roosting habitat, 104
- Alt B and C deer and elk, 104
- Alt B and C new bridge, 30
- Alt B and C seasonal restrictions, 30
- Alt B and C W&SR piers, 96
- Alt B and C wildlife effects, 102
- Alt B and C wildlife noise disturbance, 102
- Alt B meander affect to the new bridge, 67
- Alt B replacement, 30
- Alt B W&SR, 96
- alternatives considered, 27, 131
- Alts A - C botany surveys, 113
- breakers, 85
- damage description, 7
- decision framework, 13
- essential fish habitat, 88
- fisheries habitat affected environment, 81
- hydrologic condition, 61
- hydrologic cumulative effects, 69
- issue, 23
- juvenile fish, 133
- length, 30
- longevity, 67
- old bridge disposal, 7
- proposed bridge, 7, 31
- riparian reserve, 75
- river meander and wood flows, 129
- span, 66, 129
- upstream flow improvement, 130
- White Chuck recommended W&SR, 96
- year-round, 55
- Bridge
 - age, 61
 - Alt A, 29
 - Alt A recommended W&SR, 96
 - Alt A timber haul, 53
 - Alt B and C Hydrologic, 63
 - Alt B and C location, 53
- Alt B and C
 - recommended W&SR, 97
- Alt B and C recreation, 57
- Alt B old bridge removal, 30
- alternatives considered, 26, 28
- biological opinion, 133
- biological opinion incidental take, 133
- BMU, 99
- boat launch, 56
- chinook critical habitat, 88
- Chinook salmon, 133
- comparison of alternatives, 42
- cumulative effects, 69
- dispersed recreation, 132
- effects to federally listed fish, 86
- elevation, 61
- erosion control, 35
- explosives, 85, 133
- geology, 59
- issue, 23, 127
- large wood, 36
- mitigation measures, 36
- pool and riffle habitat, 87
- proposed action, 5, 6
- purpose and need, 4
- recreation, 47, 93
- riparian reserve, 75
- Sauk Prairie residences, 53
- scope, 13, 25
- sedimentation, 35
- soils/aquatics/fisheries, 35
- stranded fish, 37
- streambank conditions, 88
- timber haul, 53, 55
- timing-restrictions bald eagle, 37
- travel time, 55
- wetlands and floodplains, 121
- bull trout
 - Alt A, 84
 - Alt B and C, 88
 - critical habitat, 82
 - cumulative effects, 92
 - effects, 133
 - Federally listed, 86
 - federally listed species, 78
 - habitat, 76
 - habitat indicators, 80
- Puget Sound, 78
- timing restrictions, 30
- Bull trout
 - habitat conditions, 78
- Bull Trout
 - recovery plan, 78
- bull trout and Chinook incidental take, 86
- Bull Trout and Chinook biological assessment and opinion, 30
- channel morphology
 - Alt B and C, 64, 130
 - fisheries cumulative effects, 92
- chinook
 - fisheries conservation and management act, 20
- Chinook
 - Alt A, 84
 - baseline habitat lower Sauk, 80
 - Baseline habitat Upper Sauk, 80
 - Biological Opinion, 133
 - critical habitat, 82
 - critical habitat effects, 88
 - cumulative effects, 92
 - essential fish habitat, 82
 - federally listed fish, 77
 - fish species of interest, 76
 - flood effects, 79
 - habitat indicators, 80, 81
 - short-term effects, 88
 - spawning reduction, 80
- concussive, 45, 87, 92
 - cumulative effects, 89
 - sound, 36
- Concussive, 92
- connected action, 2, 13, 130
- Conservation, 82
- conservation measures
 - contaminants and nutrients, 88
 - fisheries cumulative effects, 91, 92
 - formulating alternatives, 25
 - issue measurement, 24
 - sedimentation, 87
- Conservation Measures
 - soils/aquatics/fisheries, 35
- constrain
 - bridge placement, 130
 - W&SR, 96
- construction
 - Alt B and C fish habitat, 85



- Alt B no suitable habitat, 133
- Alt B old forest, 102
- boat launch cost, 95
- old bridge compared to new, 67
- old forest second growth, 107
- riparian reserve, 75
- sediment, 70
- soils cumulative effects, 69
- vegetation removal, 107
- Construction**
 - scenic viewshed middle ground, 97
 - suspended sediment**, 72
- cost*
 - Alt A maintenance, 53
 - Alt B timber haul, 55, 117
 - Alt C timber haul, 55
 - alternatives, 130
 - alternatives considered, 28
 - boat launch, 27, 95
 - comparison of alternatives, 42, 44
 - issue*, 23
 - maintenance, 52
 - timber haul, 53
- Cost
 - comparison of alternatives, 43
 - economics, 23
 - previous floods, 49
- critical habitat
 - alt b, **46**
 - alt c, **46**
 - cumulative effects, **105, 111**
 - decommissioning, **103**
 - ESU, **82**
 - watershed scale, **80**
- Critical Habitat**
 - murrelet, **99**
 - owl**, **99**
 - owl and murrelet, **106**
- culvert, 5, 9
- culverts, 8
- cumulative effect
 - aquatic, **90**
 - bald eagles, **106**
 - Canada lynx, **105**
 - nesting, **106**
 - other projects, **111**
 - owl and murrelet, **110**
 - past timber harvest, **106**
 - road management, **56**
 - sedimentation, **89**
 - sensitive, **114**
- summary, **111, 141**
- suspended sediment, **69**
- wildlife table, **111**
- cumulative effects, 110
- Alt A fisheries***, 84
- hydrologic, 68
- recreation, 58
- scenic viewshed, 98
- tribal, 116
- water quality, 70
- wildlife, 98
- Cumulative effects
 - defined, 47
 - hydrologic, 71
- Cumulative Effects, 47, 56, 58, 67, 68, 69, 90, 105, 141, 154
- botany, 114
- fisheries, 89
- recreation, 132
- socioeconomic, 117
- wildlife, 109
- decommission, 107
- dipping
 - longevity, 5, 66
- edge effect
 - spotted owl and murrelet, 133
- ESA*
 - consistency*, 46, 148
- fire rings
 - dispersed recreation, 57, 58
- fish habitat, 82
- fish passage
 - Alt A, 84
 - culvert design, 129
 - Road 22-110 culvert, 86
 - streams too steep, 130
- fisheries
 - Sauk designation, 19, 43
- foraging
 - spotted owl and marbled murrelet, 99
 - spotted owl and murrelet, 133
- Forest Plan, 19, 38
- free flow
 - Alt B and C improvement, 96
 - comparison of alternatives, 43
 - improvement, 130
 - W&SR, 94
 - W&SR Act, 93
- full range
 - reasonable alternatives, 131
- functioning at risk
 - Sauk River watershed, 80
- White Chuck River watershed, 81
- habitat, 26, 99
- hardened
 - longevity, 8, 32
- hardened dips
 - longevity, 132
- Historic, 26
- human waste
 - dispersed recreation, 57, 58
- juvenile
 - crushing, 86
 - crushing of, 78
 - effects, 133
- Likely To Adversely Affect Chinook EFH*, 88
- Loop, 51
- may adversely affect* EFH, 20
- May Affect But Are Not Likely To Adversely Affect proposed activities affect on fish*, 88
- May Affect, (but is) Not Likely to Adversely Affect
 - concurrence, 133
- May Affect, [but is] Not Likely to Adversely Affect
 - concurrence, 133
- migrate
 - Alt A, 85
 - Alt B and C, 64, 129, 130
 - soils, 60
- murrelet
 - affected environment, 98
 - Alt A nesting, 101
 - Alt B, 30
 - Alt B habitat, 103
 - Alt B nesting, 102
 - Alt C nesting, 107
 - alternatives considered, 26
 - comparison of alternatives, 46
 - critical habitat, 107
 - cumulative effects, 110
 - decommissioning, 108
 - effects, 133
 - mitigation measures, 37
 - timing, 108
 - timing-restrictions, 103
- Murrelet**
 - Alt B noise-disturbance, 103
 - Alt C, 107
 - cumulative effects, 105, 110
- federally threatened species**, 99
- net loss, 99
- noise disturbance
 - Alt A, 101
 - Alt B, 103, 105
 - Alt C, 108
 - comparison of alternatives, 46
- Noise disturbance
 - Alt C, 109
- old forest
 - Alt B, 102
 - Alt C, 107
 - alternatives considered, 26
 - hydrologic condition, 62
- old growth
 - Alt B, 133
 - hydrologic condition, 62
- Old Growth
 - forest plan, 14
- piers
 - Alt A, 85
 - instream, 121
 - old bridge, 96
 - outside channel, 7, 30
 - proposed description, 30
 - removal of old, 85
 - time to remove old, 7
 - water diverted away from, 86
- Riparian Reserve
 - Alt C Sites #3 to #6, 75
 - alternatives considered, 26
 - comparison of alternatives, 45
 - cumulative effects, 111
 - decommissioning, 75
 - issue*, 24
 - sites #7 to #9, 75
 - soils/aquatic/fisheries, 35
 - standards and guidelines, 14
- riparian reserves
 - cumulative effects, 75
 - effects, 73, 74
 - native plants, 76
 - Skull/Funnybone. *See*
- Riparian Reserves
 - spotted owls and marbled murrelet habitat, 126
- riparap
 - alternatives considered, 27
 - fish habitat, 87
 - riparian reserve, 75
 - soils/aquatics/fisheries, 36
 - W&SR, 20



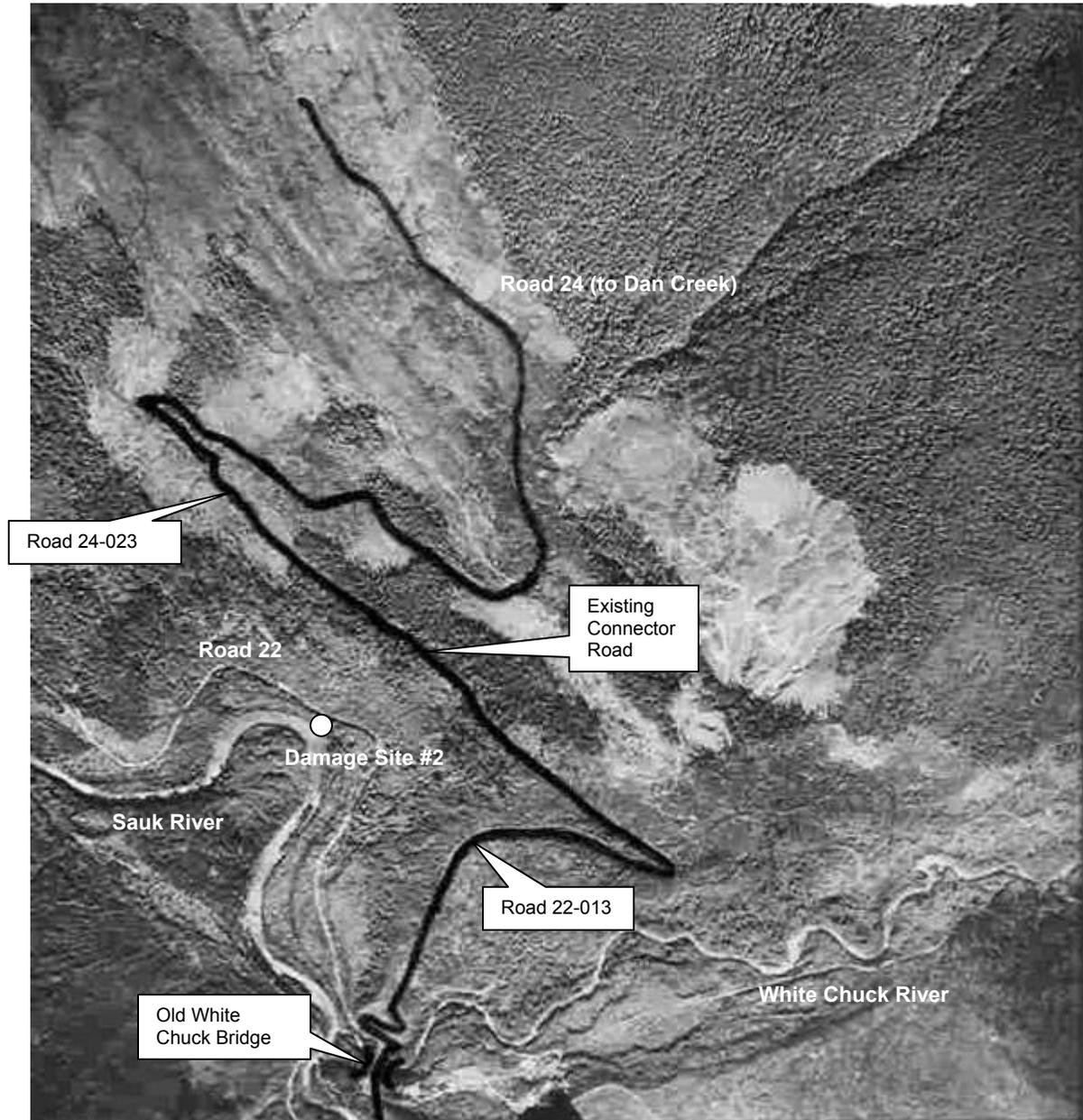
Riprap	spotted owl	100-year flood, 36	dispersed recreation, 57,
proposed action, 7, 31	affected environment, 98	Alt A Hyachuck Creek,	58, 132
Road 22, 65, 107	Alt A, 101	65	unacceptable risk
Road 2210, 65	Alt B, 103	Alt B, 66	bull trout baseline, 81
Road 22-110, 107	Alt B timing restrictions,	Alt B Road 22, 66	prior to flood, 80
scenery	103	Alt C riparian habitat,	vibration, 45, 85, 86, 87
comparison of	effects, 131	109	Vibration, 85
alternatives, 43	Spotted Owl	culvert size, 33	watershed, 19
Sauk designation, 95, 130	Alt B, 103	<i>Survey and Manage</i> , 14, 39,	White Chuck, 68, 107
scoping, 1	Alt C, 107	152	White Chuck Bridge, 107
section, 77	Alt C timing restrictions,	timing, 26	wildfires
sediment, 65, 68	110	Trail Inventory	dispersed recreation, 57,
Sensitive Species, 26, 100	cumulative effects, 105	availability, 58, 132	132
spawning, 82	stream crossings, 5	trash	



Appendix B 1949 Aerial Photo

Figure 17 1949 Photo of Old Road System Accessing South End of Gold Mountain.

This photo displays Alternative B and C reroute around Site #2 by using Road 22-013, the connector road, and 24-023, much as it was used in 1949.





(Blank Page)



Appendix C Cumulative Effects Review Process

Definition

Cumulative impact is the impact on the environment, which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor or collectively significant actions taking place over a period of time (40 CFR 1508.7).

Cumulative Effects Analysis

Refer to each resource discussion in Chapter 3 for the estimated cumulative effects.

To complete the analysis of cumulative effects for the Gold Mountain Road Repair project, the Interdisciplinary Team (ID Team) first considered the direct and indirect effects on the environment that are expected or likely to result from the proposed action and the alternatives it. Once these effects had been determined, the ID Team then assessed the residual (or still on-going) effects of past actions that are, in the judgment of the resource specialists, relevant and useful: there is the possibility they could add to the direct and indirect effects of the proposed Gold Mountain Road Repairs alternatives.

The team then assessed the spatial extent of the effects of the alternatives, resource by resource, to determine if they would add to modify or mitigate the on-going effects of the past actions/expected future actions³¹. For each resource, an “Area of Potential Effect” (APE) was determined for each subject; see project files for maps of activities and projects considered in the cumulative effects analysis. The resource specialists then determined if any potential, existing, or residual effects were present from the other identified projects. If there was no overlap in time (e.g. no remaining effects from past projects) **AND** in space (extent of effects), there was no cumulative effect.

The initial area is centered on the Sauk River from Darrington upriver to the confluence of the North Fork of the Sauk River with the Sauk River. The geographic area was bounded by the ridges above the Sauk River and confluences with major tributaries.

Table 25: Past, Present, or Reasonably Foreseeable Actions lists actions within the vicinity of the Gold Mountain Road Repair project that spatially and temporally overlap with the effects of the Gold Mountain repair and where cumulative effects could occur. Also, refer to Table 26 below for projects within the vicinity of the Gold Mountain Road Repair project that were reviewed and found to not contribute to cumulative effects.

³¹ The team was guided in this effort by the June 24, 2005 memo “Guidance on the Consideration of Past Actions in Cumulative Effects Analysis,” Executive Office of the President, Council on Environmental Quality.



Table 25: Past, Present, or Reasonably Foreseeable Actions

Note: The following activities spatially and temporally overlap with the effects of the Gold Mountain repair, and have potential for cumulative effects.

Activity	Extent	Comment	Miles from Project
Forgotten Thin Timber Sale	107-533 acres planned for thinning, upto 25 acres in riparian reserve.	Still in planning phase	0.5 mile to 4 miles
Funnybone portion of Skull/Funnybone Timber Sale	431 acres of timber thinned. 25% of acreage in riparian reserves with 70% canopy retention (upper Dan, Sauk)	2001, 15 acres thinned, and 2005 there was 416 acres thinned.	0.25 mile tfor Funnybone
Too/Rib Thin Timber Sales	360-480 acres thinned. 10 acres in riparian reserves with 70% canopy retention (upper Dan Creek, Sauk River near White Chuck River)	Completed in 1998 to 2000. Mitigation measures to prevent adverse affects to listed or special status species.	Within project area.
Miscellaneous ERFO culvert replacements	Culvert replacements that drains into the Sauk River.	Planned for 2006, pending funding and access.	Road 2081 -0.8 mi. Road 2435 – 4 mi.
White Chuck Road 23 Repair	2003 flood repairs to Road 23, at MP 1.9, 2.4, 3.5, and 5.7	Planning for 2006-2007.	1.9 mile to 4 miles
Mtn. Loop Highway ERFO Flood Repairs	Repairs at three sites washed out/damaged during 2003 flood event. MP 33.1, 33.6, 34.8, and 35.6	Planned for 2006-2007.	8 miles
Road Maintenance	Routine road maintenance activities on Roads 22 and 24.	Road 24: 12+ miles of grading in 2006. Approximately 13 additional miles on a rotation basis.	Within project area.
Sauk River Road Reconstruction (Snohomish Co.)	Damaged during 2003 flood at MP 0.5	Snohomish County owns road that access 20 private properties. Repair planned for 2006-2007	2.0 to 6.5 miles
Sauk Roads Erosion Control Project 1	Roads 2210-011, 2210-014, 2210, 2211, and 2210-011. Culvert removal, restoration, and removing unstable fill.	Funded by Skagit River cooperative. Fish habitat benefit. Some work completed, but remaining work delayed by lack of access due to 2003 flood	Within project area.



The following table lists projects that have been known to occur in and around the mainstem Sauk River that are ***not*** considered actions where the proposed Gold Mountain Road Repair project and alternatives would not measurably add to, modify, or mitigate on-going effects of these past actions.

The projects below were reviewed by ID team members for each resource area and the Gold Mountain Road repair project was found as **not contributing** to a cumulative effect because:

1. projects are too long completed with no remaining effects, do not overlap in time with the Gold Mountain repairs; would not measurably add to the residual effects of previous projects; or
2. the Gold Mountain project would not measurably add to the residual effects of previous projects, or
3. these projects' direct and indirect effects no longer exist; or
4. the projects were located far enough away from the Gold Mountain repairs so effects would not overlap or combine; or
5. The effects of the project(s) were only site-specific to the location of that project.



Table 26: Projects Reviewed and Found Not Contributing to Cumulative Effects

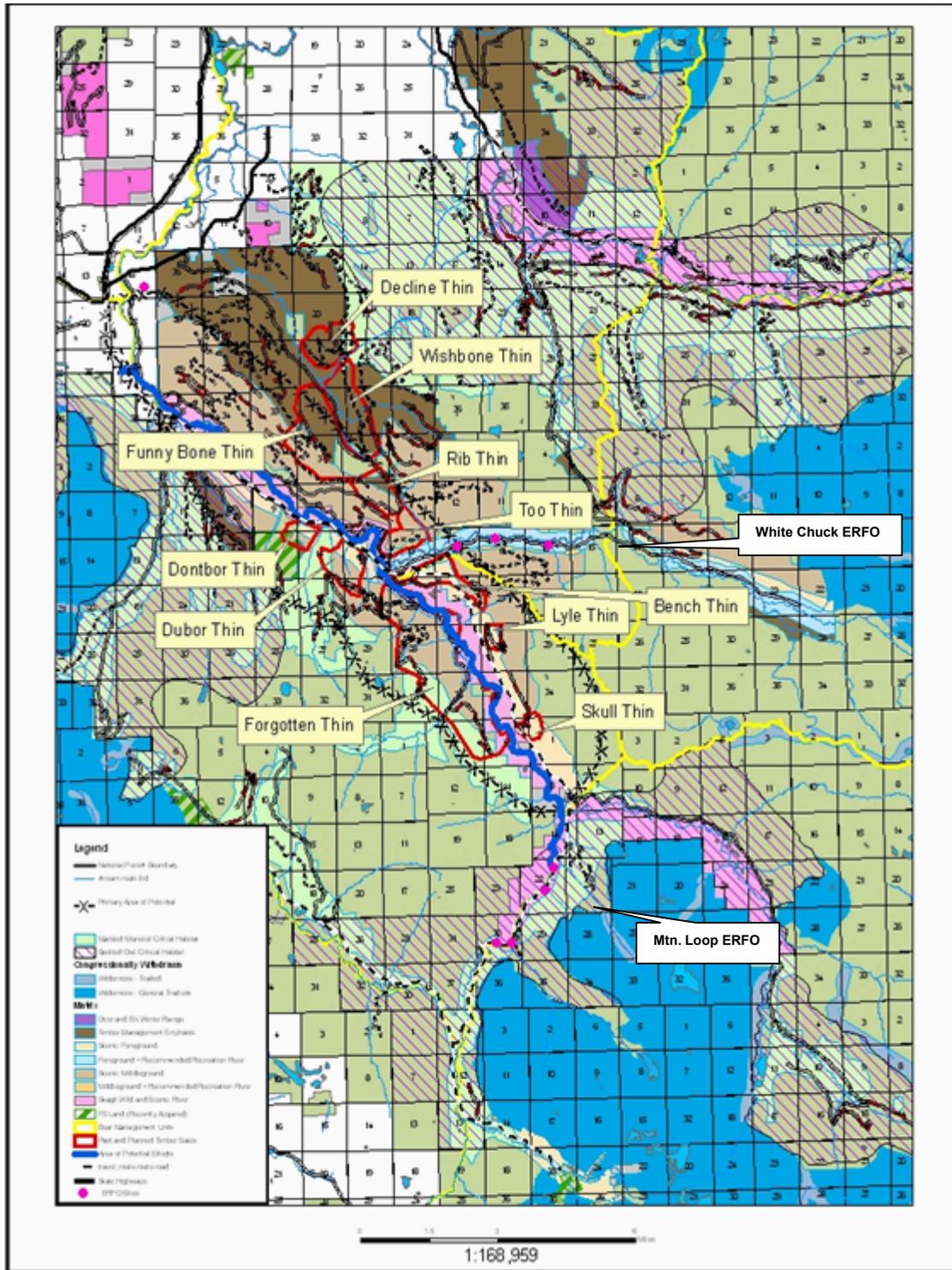
Project	Comments	Rationale for not contributing
Gold Hill Fire Supression	Blasting, handline, road reconstruction, helicopter dipping, retardant drops in 2003.	Actions were mitigated or minimize by localizing retardant drops, water dipping, and sediment delivery. No overlap in time
Gold Hill Fire Salvage Timber Sale	16 acres of fire salvage. This salvage has been completed and the area is to be replanted	No overlap in time.
Clearcut Timber Harvests	Past harvesting of 1,500 acres of timber in the Forgotten Thin analysis area (1950-1990)	Proposed project would not add to the residual effects from these activities (16 and 46 years ago) to hydrologic maturity or to spotted owl and marbled murrelet habitat, or to snag associated species.
Sauk River Timber Company Timber Sale(s)	These sales occurred from 1922-1954 on 20,000 acres of National Forest Lands.	Proposed project would not add to the residual effects from these past actions to spotted owl and marbled murrelet habitat, or to snag associated species
Timber cutting in the three 6 th field subwatersheds of the Forgotten Thin analysis area	These actions occurred from 1950-1990 on 1,500 acres of National Forest Lands.	Proposed project would not add to the residual effects from these past actions to spotted owl and marbled murrelet habitat, or to snag associated species
Bench, Lyle, Wishbone, Too, portions of Rib Thin Timber Sale	These actions occurred from 1992-1997 on 1,244 acres of National Forest Lands.	Mitigation measures to prevent adverse affects to listed or special status species, and to aquatic resources
Gold Mtn. Communications Tower	A special use authorization was issued to Snohomish County in 2005 to build and operate a radio tower on Gold Mountain.	Effects are limited and specific to the tower site.
Timber Stand Improvement (Pugh Ridge and Gold Mountain)	Hydrologic recovery of vegetation cover, and riparian and instream wood.	Effects are limited and specific to the TSI sites.



Project	Comments	Rationale for not being considered
Decline Thin Timber Sale	Proposed for 2006, 250 acre thinning.	Action is too far away from the proposed project, effects would not combine.
Past ERFO treatments on Road 22	Multiple repairs from past floods on Road 22 system in 1974, 1980, 1990, 1996, and 1999. Replacing fill, riprap, culvert replacements and cleaning, and slide removal.	Repairs took place in project area between 7 and 22 years ago. There is no remaining measurable residual effects that could be combined cumulatively with the effects from this project.
Reconstruction of Roads 24,2424,2420,2097, and 2097-010.	Reconstruction for access to Skull-Funnybone Thin Timber Sale	Proposed proeject would not measurably add to the residual effects of previous projects
Mountain Loop Scenic Byway Reconstruction and/or Companion Projects	Proposed project including trailhead improvements, toilets, interpretation, viewing, pullouts	These actions are too far away from the proposed project, effects would not combine.
Suiattle Road 26 ERFO Projects	Repair road damaged that occurred during the same 2003 flood event	These actions are too far away from the proposed project, effects would not combine.
Japanese Knotweed Eradication	District wide control efforts.	No infestations are present in the project area.
Mtn. Loop Noxious Weed Eradication	Treatment of noxious weeds on Mnt. Loop from Darrington to N.F. Sauk River, Peek-a-Boo Cr.	Effects are limited and specific to the treatment sites.
Old Sauk, Peek-a-Boo, White Chuck Bench, and Pugh Mountain Trail maintenance	Reconstruction of Old Sauk Trail after 2003 flood. Routine trail maintenance.	There are no residual or expected effects that could combine cumulatively with effects from this project
Skull Thin portion of the Skull/Funnybone Timber Sales	Ongoing 64 acre thinning (15 acres in Riparian Reserves with 70% canopy retention)	Action is too far away (10 miles) from the proposed project, effects would not combine.
Recreational Site Maintenance	White Chuck overlook, picnic area, toilets	Direct or indirect effects do not exist or are not measurable.
Temporary Boat Launch	A temporary boat launch was established on the Sauk River to accommodate commercial and public following the 2003 flood event made the White Chuck Boat Launch inaccessible	Direct or indirect effects are not measurable.
Instream Treatments and fish passage projects	Instream habitat projects and culvert removal to improve fish rearing and spawning	Tthere are no residual effects that could combine cumulatively with effects from this project
Road Decommissioning	Road 2080, road segements in Godman and Helena Creek drainages, Prairie mtn. – 10 miles	Completed in 1990 to 2004. Mitigation measures to prevent adverse affects to listed or special status species, and aquatic resources.
Sauk Roads Erosion Control Project 2	Roads treated in the Dan Creek drainage, on Road #24 system fill. Funded by Skagit River System Cooperative	Work completed. No overlap in time or space.



Figure 18: Potential Cumulative Activities Map





Appendix D - Glossary of Commonly Used Terms

Activity center: The core of an owl's territory and the focal point of protection measures. Most frequently located in or near the highest concentration of remaining suitable habitat.

Aggradation: Deposition in one place of material eroded from another. Aggradation raises the elevation of streambeds, flood plains, and the bottom of other water bodies.

Alluvial: Originate through the transport and deposition from running water.

Alluvial fan: A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes, shaped like an open fan or a segment of a cone, deposited by a stream at the place where it issues from a narrow mountain valley upon a plain or broad valley, or where a tributary stream is at its junction with the main stream. It is steepest near the mouth of the valley where its apex points upstream. Moreover, it slopes gently and convexly outward with decreasing gradient.

Anadromous fish: Fish that are hatched and rear in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon and steelhead are examples.

Carrying capacity: The maximum number of organisms that can be supported in a given area of habitat at a given time.

Closed road: A road that remains part of the transportation system, but motorized use has been eliminated, prohibited, or restricted during all or certain times of the year.

Concern species: Species whose populations are of concern to biologists on the Mt. Baker-Snoqualmie National Forest. An informal designation.

Critical habitat: (Endangered Species Act) defined as an area occupied by a species listed as threatened or endangered within which are found physical or geographical features essential to the conservation of the species, or an area not currently occupied by the species, which is itself essential to the conservation of the species. As defined in the ESA "conservation" means any and all methods and procedures, and the use of those, needed to bring a species to recovery—the point at which the protections of the ESA are no longer needed.

Cumulative effect: The effect on the environment that results from the incremental effect of the action, when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present, and reasonably foreseeable future actions, the effects may be significant. They can occur when small, incremental amounts of habitat are lost over time through a variety of management activities across a landscape.

Debris avalanche: A rapid moving mass of rock fragments, soil, and mud of various sizes not reaching a stream channel.

Debris fans: A gently sloping fan shaped mass of detritus formed as a result of upslope or upstream erosional events.

Debris flow: A rapid moving mass of rock fragments, soil, and mud with more than half the particles being larger than sand size.



Debris flows: (Lahar) a flowing mixture of water-saturated rock debris that forms on the slopes of a volcano, and moves downslope under the force of gravity, sometimes referred to as a mudflow.

Decommissioned road: On the MBSNF, a road that no longer is serving a current or planned future access need and has been removed from the transportation system maps and database. The ground occupied by the road corridor is managed according to the land allocation in which it is located.

Degradation: Erosional removal of materials from one place to another. Degradation lowers the elevation of streambeds and floodplains.

Depressed stock: A stock of fish whose production is below expected levels based on available habitat and natural variations in survival rates, but above the level where permanent damage to the stock is likely.

Discharge: Volume of water flowing past reference point per unit time (usually expressed as cubic meter/second).

Early seral (Regional Ecological Assessment Program [REAP]): An ecological age class designation. Early successional condition with open canopy generally with less than 60 percent overstory tree cover and less than 2 inches mean diameter breast height. Vegetation is typically some combination of graminoids, forbs, and shrubs, and can have tree seedlings or saplings.

Early seral (Terrestrial Vertebrate Habitat Condition Mode [TVHCM]): A structural or size-class designation referring to sparsely vegetated, non-forest stands with 60-90 percent bare ground, including grass-forb, shrub, open sap-pole, and sparse vegetation. These stands may be included in early, mid, or late seral as defined in the REAP.

Ecosystem management: A land management system that strives to maintain the natural processes and balances as well as provide for human use

Ecotone: Edge habitat. For the purpose of this analysis, the area within 400 feet of the edge between mid/late seral forested stands and early seral of non-forested stands.

Endangered species: A native species found by the Secretary of the Interior to be threatened with extinction.

Escapement: Those fish that have survived all fisheries and will make up a spawning population.

Ethnographer: One who studies or is proficient in ethnography, which is the branch of anthropology that considers man geographically and descriptively, treating of the subdivision of races, the causes of migration etc.

Extirpated: Eliminated from a local area.

Fifth Field Watershed: A hierarchical catalog system designed by the U.S. Geological Survey and the Water Resource Council comprised of Region, Subregion, Accounting Unit, and Cataloging Unit. The Forest Service has added two additional levels of finer resolution. The structures for these levels are called the Watershed and Subwatershed. The Fifth Field Watershed is the fifth of these resolutions, or the "Watershed".

Floodplain: Level lowland bordering a stream onto which the stream spreads at flood stage.

Fragmentation: The degree to which the landscape is broken into distinct patch types.

Guild: A group of species aggregated together based on similarities in habitat requirements and anticipated response to changes in landscape conditions.



Habitat Conservation Area (HCA): Part of a network of habitat proposed by the Interagency Scientific committee to protect spotted owls. A contiguous block of habitat to be managed and conserved for breeding spotted owl pairs, connectivity, and distribution of owls. Has been replaced by late successional reserves as the working management unit for protecting spotted owl habitat.

Healthy stock: A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

Hibernacula: Sites where hibernation occurs.

Human influence zone: Areas of human activity (recreation sites, roads, trails, buildings, mines, hydropower operations, etc.) buffered by 1/4 mile around trails and 1/2 mile around roads and other sites.

Inner gorge: Consists of steep (50 percent or greater), continuous slopes immediately above a channel.

Landslide: Any sudden movement of earth and rocks down a steep slope.

Large woody debris: Pieces of wood larger than 10 feet long and 6 inches in diameter located within a stream channel.

Late seral (REAP): An age class designation. Late successional condition with a single or multiple canopy structure, including mature, large sawtimber, and old growth stands.

Late seral (TVHCM): A structural of size-class designation referring to mature or old growth stands. These stands roughly correspond to the late seral forested stands as defined in the REAP.

Late-successional forest: Late-successional forests are those forest seral stages that include mature and old growth age classes. (ROD USDA-USDI, Standards and Guidelines 1994, B-1)

lava flows: Stream of molten rock that erupts relatively nonexplosively from a volcano and moves slowly downslope.

Road Maintenance Level 1 (ML1): Intermittent service roads managed as closed to vehicular traffic, and kept in storage until the next project access need; the closure period must exceed one year.

Road Maintenance Level 2 (ML2): Roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation or other specialized uses.

Road Maintenance Level 3 (ML3): Roads open and maintained for travel by a prudent driver in a standard passenger car. Roads are typically low speed, single lane with turnouts and spot surfacing.

Road Maintenance Level 4 (ML4): Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced; however, some may be single lane. Paved surfaces or dust abatement may be used.

Road Maintenance Level 5 (ML5): Roads that provide a high degree of user comfort and convenience. These roads are normally double lane and paved, although some may be aggregate surfaced and dust abated.

Mid-seral (REAP): An age class designation. Mid successional condition. Defined in FEMAT as that period in the life of a forest between crown closure and first merchantability.



Mid-seral (TVHCM): A structural or size-class designation referring to closed sap-pole, open mature, closed immature and residual stands. These stands roughly correspond to the mid seral forested stands as defined in the REAP.

Native resident fish: An indigenous stock of fish that has not been substantially impacted by genetic interactions with non-native stocks or by other factors, and is still present in all or part of its original range.

Neotropical migrants: Birds that migrate from North America to regions south of the Tropic of Cancer (latitude 23 1/2 degrees north) to winter.

Non-native fish: A fish stock that has become established outside of its original range.

Noxious weeds: Invasive non-native plant species, some of which are toxic to livestock and/or wildlife as designated by the State Noxious Weed Board under the Washington State Noxious Weed Law RCW 17.10.

Omnivore: Animal that feeds on both plants and animals.

pH: A measure of the hydrogen ion concentration in a solution.

Plant association (PA): The basic unit of vegetation including all its successional stages; a potential natural plant community of definite floristic composition and uniform appearance.

Plant association group (PAG): Groups of plant associations with similar floristic characteristics.

Pyroclastic flows: A hot (570-1470 degrees F), dry, fast-moving, and high-density mixture of ash, pumice, rock fragments, and gas formed during explosive eruptions or from the collapse of a lava dome.

Pyroclastic surges: Turbulent, low-density cloud of hot rock debris and gases that moves over the ground surface at high speed. Similar to a pyroclastic flow but of much lower density (higher gas to rock ratio).

Rendezvous sites: Temporary resting sites used for several days at a time by a wolf pack during summer months while pups are developing.

Riparian zone: Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables, and soils that exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs, and wet meadows.

River mile: Length of the river course extended from salt-water confluence to headwaters.

Road decommissioning treatment: Treatment (including obliteration) applied to some roads no longer needed, which if treatment is not performed, present an unacceptable hazard to habitats and watershed condition. It removes those elements of a road and reroute or impede hillslope drainage and present slope stability hazards.

Road maintenance levels: one of five levels assigned based on the maintenance required to provide the desired type of access.

Road Obliteration: Full physical site restoration that attempts to re-contour slopes with the intent to completely remove the road from the landscape.



ROD: Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Sometimes known as “The President’s Plan”, it is the guiding document for doing watershed analysis.

Salmonid: Any member of the taxonomic family Salmonidae, which includes all species of salmon, trout, and char.

Security habitat Habitat that is outside of human influence zones.

Sensitive species: A species that occurs on the Regional Forester’s Sensitive Species list (Forest Service Manual 2670). Includes species that are candidates for listing under the Federal Endangered Species Act.

Seral: Of or pertaining to the series of stages in the process of ecological succession.

Silt: A soil particle between 0.05 and 0.002mm in diameter.

Stock: Group of fish that is genetically self-sustaining and isolated geographically or temporally during reproduction. The following status descriptions are from SASSI (Washington State Department of Fish and Wildlife and Western Washington Treaty Indian Tribes 1992).

Stock status: The current condition of a stock, which may be based on escapement, run size, survival, or fitness level.

Suitable habitat: Habitat in which an animal or plant can meet all or some of its life history requirements.

“Survey and Manage Species”: Species to be protected through survey and management standards and guidelines on federal lands as identified by the Standards and Guidelines for Management of Habitat for Late-successional and Old-growth Forest and Related Species Within the Range of the Spotted Owl (ROD, Appendix J2).

Tephra falls: Materials of all sizes and types that are erupted from a volcano and deposited from the air.

Threatened species: A native species likely to become endangered within the foreseeable future.

Turbidity: An expression of the optical properties of a sample, which causes light rays to be scattered and absorbed rather than transmitted through the sample. Measured in nephelometric turbidity units (NTUs).

Ungulate: Hooved mammal.

Vegetation series: A group of habitat types having the same dominant canopy tree species at climax, i.e., western hemlock, silver fir, or mountain hemlock.

Vegetation zone: Elevational bands within which a certain vegetation series predominates, e.g., the western hemlock zone occurs between 1,400 and 3,500 feet elevation in the watershed

Wetland: Lands where saturation with water is the major factor in determining soil development and the types of plants that grow there



References

- Advisory Council on Historic Preservation 1997. Programmatic Agreement developed in consultation with the Advisory Council on Historic Preservation (ACHP) and the Washington Historic Preservation Office (SHPO) pursuant to Section 800.13 of the 1986 Regulations (36 CFR 800) implementing Section 106 of NHPA.
- Bennett, Jeff and Tonya. 1997. A Guide to the Whitewater Rivers of Washington. Swiftwater Publishing Company, Portland, OR.
- Brown, E.R., tech. ed. 1985. Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington. USDA Forest Service, Pacific Northwest Region, Portland, Oregon. 2 v. 332 pp.
- Burroughs, E. R., Jr. 1990. Predicting Onsite Sediment Yield from Forest Roads. USDA Forest Service, Rocky Mountain Research Station, Moscow, ID.
- Carey, A.B. 2003. Biocomplexity and Restoration of Biodiversity in Temperate Coniferous Forest: Inducing Spatial Heterogeneity with Variable-Density Thinning. *Forestry* 76(2):127-136.
- Carey, A.B., and S.M. Wilson. 2001. Induced spatial heterogeneity in forest canopies: responses of small mammals. *J. Wildlife Management* 65(4):1014-102
- Coffin, Bengt A., and R. Dennis Harr. 1992 Effects Of Forest Cover On Volume Of Water Delivery To Soil During Rain-On-Snow. Final report for project SH-1, submitted to Sediment, Hydrology and Mass Wasting Steering Committee of Timber Fish and Wildlife. Pacific Northwest Research Station, College of Forest Resources AR-10, University of Washington. Seattle, WA.
- Council on Environmental Quality. 2005. Memorandum providing guidance on the extent to which agencies of the Federal government are required to analyze...cumulative effects in accordance with section 102 of the National Environmental Policy Act.
- Courtney S.P., Blakesley J.A., Bigley R.E., Cody M.L., Dumbacher J.P., Fleischer R.C., Frankling A.B., Franklin J.F., Gutiérrez R.J., Marzluff J.M., Sztukowski L. 2004. Scientific Evaluation Of The Status Of The Northern Spotted Owl Sustainable Ecosystems Institute (SEI), Portland, Oregon.
- David Evans and Associates, Inc. (DEA). 1999. Environmental Baseline Assessment for Chinook Salmon (*Oncorhynchus Tshawytscha*) and Native Char (*Salvelinus Confluentus*, *Salvelinus Malma*) in the Sauk River and Sauk River Forks Fifth-Field Watersheds, Mt. Baker-Snoqualmie National Forest, Washington. Bellevue, WA.
- Doyle, J. 1999. Recommended Revisions to the Matrix of Diagnostics/Pathways and Indicators for Salmonids. Internal Forest Service document. Mt. Baker-Snoqualmie National Forest, Mountlake Terrace, WA. 2pp.
- Doyle, J. 2000. Cumulative Effects Assessment for the Upper Skagit River Basin (Baker Lake/River, Cascade, Sauk, White Chuck Suiattle Rivers). Internal Forest Service document. Mt. Baker-Snoqualmie National Forest, Mountlake Terrace, WA. 9pp.
- Doyle, J. 2005. Suspected Effects of Recent Flood Disturbance to the Aquatic Environmental Baseline Conditions in the Forest River Systems. Internal Forest Service document. Mt. Baker-Snoqualmie National Forest, Mountlake Terrace, WA. 3pp.



- Federal Register, Vol. 70, No. 170, September 2, 2005, 50 CFR Part 226. Endangered and Threatened Species; Designation of Critical Habitat for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead in Washington, Oregon, and Idaho; Final Rule. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, p. 52630-52858.
- Federal Register, Vol. 70, No. 185, September 26, 2005, 50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Bull Trout. Department of the Interior, Fish and Wildlife Service, p. 56212-56311.
- Hayman, R. 2004 (draft). Unpublished draft of the Upper Sauk Spring Chinook Constraints section for the Skagit Chinook Restoration Plan. LaConner, WA.
- Hearne and Hollenbeck 1996, A Cultural Resource Inventory Strategy for the Mt. Baker-Snoqualmie National Forest. Mt. Baker-Snoqualmie National Forest. USDA Forest Service, Pacific Northwest Region.
- Hollenbeck, Jan L. 1987. A Cultural Resource Overview: Prehistory, Ethnography, and History. Mt. Baker-Snoqualmie National Forest. USDA Forest Service, Pacific Northwest Region.
- Johnson, D. H., and T. A. O'Neil (Managing Directors.) 2001. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press, Corvallis, Oregon, USA, 722 pp.
- LaMay, Charles. 2005. Personal Communication. Mt. Baker-Snoqualmie National Forest, Mt. Baker Ranger District, Sedro Woolley, WA.
- Madej, M.A. 2001. Erosion and Sediment Delivery Following Removal of Forest Roads. *Earth Surface Processes and Landforms* 26:175-190.
- McPhail, J.D. and E.B. Taylor. 1999. Morphological and Genetic Variation in Northwestern Longnose Suckers, *Catostomus*: The Salish Sucker Problem. *Copeia* 1999: pp 884-893.
- Muir P.S., R.L. Mattingly, J.C. Tappeiner II, J.D. Bailey, W.E. Elliott, J.C. Hagar, J.C. Miller, E.B. Petersen, E.E. Starkey. 2002. Managing for Biodiversity in Young Douglas-Fir Forests of Western Oregon. U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Biological Science Report, USGS/BRD/BSR-2002-0006.
- Nagorsen, D.W. and R.M. Brigham. 1993. The Bats of British Columbia. University of British Columbia (UBC) Press. Vancouver, British Columbia. 164 p.
- National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470w-6.
- North, Douglas. 1999. Washington Whitewater. The Mountaineers, Seattle.
- Office of the Federal Register National Archives and Records Administration 1990. Code of Federal Regulations, 36 CFR Part 800, Advisory Council on Historic Preservation.
- Public Law 90-542, as amended. 1968. Wild and Scenic Rivers Act. 16 U.S.C. 1271-1287. Public Law 95-625, Section 703. 1978.
- Pyle, P., D.R. O'Grady and D. F. DeSante. 2000. The 1999 Annual Report of the Monitoring Avian Productivity and Survivorship (MAPS) program in Region 6 of the USFS Forest Service. The Institute for Bird Populations. Point Reyes Station, CA.
- Reed, P. 2005. Personal Communication. Mt. Baker-Snoqualmie National Forest, Darrington Ranger District. Darrington, WA.
- Stalmaster, M. and J.R. Newman 1978. Behavioral Responses of Wintering Bald Eagles to Human Activity. *Journal of Wildlife Management* 42:506-513.
- Stalmaster, M., S. Skagen, and J. Kaiser. 1991. Effects of Recreational Activity on Wintering Bald Eagles. Technical Report. 796 pp.



- Swift, L.W. 1984. Soil Losses From Road Beds and Cut and Fill Slopes in the Southern Appalachian Mountains. *Southern Journal of Applied Forestry* 8, (4): 209-213.
- USDA Forest Service. 1988. Best Management Practices Pacific Northwest Region. 11/88.
- USDA Forest Service. 1983. River Management Plan (Final) – Skagit River Volume II. USDA Forest Service, Pacific Northwest Region,
- USDA Forest Service. 1990. Land and Resource Management Plan. Mt. Baker-Snoqualmie National Forest. USDA Forest Service, Pacific Northwest Region
- USDA Forest Service/National Council for Air and Stream Improvement. January 1999. Scale Considerations and the Detectability of Sedimentary Cumulative Watershed Effects. Technical Bulletin # 776, Research Triangle Park, NC. Written by: Bunte, K and MacDonald, L, H., Colorado State University.
- USDA Forest Service/USDI Bureau of Land Management. April 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl Portland, Oregon.
- USDA 1995 South Fork Upper Stillaguamish Watershed Analysis. Mt. Baker-Snoqualmie National Forest, Pacific Northwest Region. Darrington, WA
- USDA 1995. Forest Wide Access and Travel Management Plan. Mt. Baker-Snoqualmie National Forest. Mountlake Terrace, WA.
- USDA Forest Service. 1996. Sauk River and Sauk River Forks Watershed Analysis. Darrington Ranger District. Mt. Baker-Snoqualmie National Forest, Pacific Northwest Region.
- USDA Forest Service/USDI Bureau of Land Management. January 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage Protection Buffer, and other Mitigation Measures Standards and Guidelines. Portland, Oregon.
- USDA Forest Service. 2003. Forgotten Thin Plus Commercial Thin EA. Mt. Baker-Snoqualmie National Forest, Pacific Northwest Region. Darrington, WA.
- USDA Forest Service. 2003. Mt. Baker-Snoqualmie National Forest Roads Analysis. Unpublished document and database. Pacific Northwest Region, Mt. Baker-Snoqualmie National Forest, Mountlake Terrace, WA.
- USDA Forest Service/USDI Bureau of Land Management. April 2004. Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines Portland, Oregon.
- USDA Forest Service. 2004. White Chuck Watershed Analysis. Pacific Northwest Region, Mt. Baker-Snoqualmie National Forest. Darrington, WA.
- USDA Forest Service. 2004a. Regional Forester’s Sensitive Species List, July 2004. Pacific Northwest Region, Portland, OR.
- USDA, Forest Service. 1999. Forest GIS Coverage Map. Pacific Northwest Region, Mt. Baker-Snoqualmie National Forest. Darrington, WA.
- USDA, Forest Service. 2002. Programmatic Biological Assessment for Forest Management on the Mt. Baker-Snoqualmie National Forest. Pacific Northwest Region, Mt. Baker-Snoqualmie National Forest Mountlake Terrace, WA
- USDA Forest Service, USDC National Marine Fisheries Service, USDI Bureau of Land management, USDI Fish and Wildlife Service. 1999. Streamlined consultation Procedures for Section 7 of the Endangered Species Act – Final. (Coverage for areas under the Northwest forest Plan and the Interior Columbia Basin Ecosystem Management Project).



- USDC National Marine Fisheries Service. 2005. Endangered Species Act—Section 7 Consultation Biological Opinion, Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation, White Chuck River ERFO Funded Bridge and Road 23 Repair Project, Puget Sound Chinook Sixth Field HUC 171100060106—Lower White Chuck River, Snohomish County Washington. Northwest Region, Seattle, WA
- USDI, Fish and Wildlife Service 1990. Determination of Threatened Status for the Northern Spotted Owl Final Rule. Federal Register (90 FR 26114, published June 26, 1990)
- USDI, Fish and Wildlife Service. 1992a. Determination of Critical Habitat for the Northern Spotted Owl. Final Rule. Federal Register (57 FR 1796, published January 15, 1992)
- USDI, Fish and Wildlife Service. 1992b. Recovery Plan for the Northern Spotted Owl. Portland, Oregon. 322 pp.
- USDI, Fish and Wildlife Service. 1992c. Determination of Threatened Status for the Washington, Oregon and California Population of the Marbled Murrelet Final Rule. Federal Register (57 FR 45328, published October 01, 1992)
- USDI, Fish and Wildlife Service. 1996. Final Designation of Critical Habitat for the marbled Murrelet Final Rule. Federal Register (61 FR 26255, published May 26, 1996).
- USDI, Fish and Wildlife Service. 1997a. Recovery Plan for the Threatened Marbled Murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, Oregon. 203 pp
- USDI, Fish and Wildlife Service. 1997b. Grizzly Bear Recovery Plan Supplement: North Cascades Ecosystem Recovery Plan Chapter. Missoula, MT. 29 pp
- USDI Fish and Wildlife Service. 1998. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale. Portland, OR.
- USDI, Fish and Wildlife Service. 2000. Final Rule to List the Contiguous U.S. District Population Segment of the Canada Lynx Final Rule. Federal Register (65 FR 16052, published March 24, 2000)
- USDI, Fish and Wildlife Service. 2002. Biological Opinion of the Effects of Mt. Baker-Snoqualmie National Forest Program of Activities for 2003-2007 (FWS Reference Number 1-3-02-F-1583). Lacey, WA
- USDI Fish and Wildlife Service. 2004. Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull trout (*Salvelinus confluentus*). Volume I (of II): Puget Sound Management Unit. Portland, OR. 389 + xvii pp
- USDI Fish and Wildlife Service. 2005. Biological Opinion and Conference Report for Effects to Coastal-Puget Sound Bull Trout and Proposed Bull Trout Critical Habitat from the 2005 Sauk River Subbasin Flood Repairs, Darrington Ranger District, Mt. Baker-Snoqualmie National Forest, Washington. Western Washington Fish and Wildlife Office, Lacey, WA.
- Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 1994. 1992 Washington State Salmon and Steelhead Stock Inventory. Appendix I, Puget Sound Stocks. North Puget Sound Volume. Olympia, WA.
- Washington Department of Fish and Wildlife (WDFW). 1998. Washington State Salmonid Stock Inventory. Bull Trout/Dolly Varden Appendix. Olympia, WA.
- Washington Department of Fish and Wildlife. 2000. Washington State Salmonid Stock Inventory. Coastal Cutthroat Trout. Olympia, WA.



- Washington Department of Natural Resources (WDNR). 2003. Washington Natural Heritage Program, March 2003 Partial List of Rare Animals in Washington. Olympia, WA.
- Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 2003 Draft Washington State Salmon and Steelhead Stock Inventory. Olympia, WA.
- Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI). Olympia, WA.
- Williams, R.W., R.M. Laramie, and J.J. Ames. 1975. A Catalog of Washington Streams and Salmon Utilization. Vol..., Puget Sound Region. Olympia, WA.
- Wright, D.G. and G.E. Hopky. 1998. Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters. Can. Tech. Rep. Fish. Aquat. Sci. 2107: iv + 34p.
- Washington State Crop Improvement Association (WSCIA). 2003. Certified Seed Programs and Prohibited Noxious Weeds. Washington State Crop Improvement Association, Yakima, WA.
- Wydoski, R.S. and R.R. Whitney. 2003. Inland Fishes of Washington. University of Washington Press, Seattle, WA. 322p
- CD-Rom:
- O'Neil, T.A., D.H. Johnson, C. Barrett, M. Trevithick, K. A. Bettinger, C. Kiilsgaard, M. Vander Heyden, E. L. Greda, D. Stinson, B. G. Marcot, P. J. Doran, S. Tank, and L. Wunder. Matrixes for Wildlife-Habitat Relationship in Oregon and Washington. Northwest Habitat Institute. 2001. In D. H. Johnson and T. A. O'Neil (Managing Directors) Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press, Corvallis, Oregon, USA. 2001
- Internet Resources:
- <http://www.washington.edu/uwired/outreach/cspn/curforest/documents.html>
- NOAA Fisheries Website. ESA Listing Maps. Available at URL = <http://www.nwr.noaa.gov/1salmon/salmesa/mapswitc.htm>.
- NPS (National Park Service). 2004. National Wild and Scenic Rivers System webpage: <http://www.nps.gov/rivers/index.html>. Accessed September 3, 2004.
- StreamNet Fish Data Website. <http://www.streamnet.org/pub-ed/ff/Species/index.html>
- StreamNet Website. Pacific NW Interactive Mapping Data. Available at URL = <http://map.streamnet.org/website/snetmapper/viewer.htm>.
- U.S. Census 2000. <http://www.census.gov>
- USFS Pacific Northwest Fisheries Program Website. http://www.fs.fed.us/r6/fishing/forests/fishresources/mtbsno_coldwater.html#dollybull
- USFS. 2004. Road conditions on internet at: http://www.fs.fed.us/r6/mbs/conditions/road_conditions_report.shtml.
- USFWS. 2004. Skagit Eagle Website. <http://www.skagiteagle.org/>
- USGS. 2004. Sauk River Flow Data <http://waterdata.usgs.gov/nwis/uv/>
- WDFW Skagit River Bald Eagles Website. 2004. Information on the Skagit River Bald Eagle Project. <http://wdfw.wa.gov/wlm/research/raptor/eagle/eagle.htm>
- WDFW Website. Species of Concern List including species listed as State Endangered, State Threatened, State Sensitive, or State Candidate, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. Available at URL = <http://wdfw.wa.gov/wlm/diversty/soc>.