Environmental Consequences

This section summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in Table 7: Comparison of Alternatives.

Each resource discussed throughout this analysis is broken out into individual sections starting with the Affected Environment, Environmental Consequences, and the Cumulative Effects of this proposed project. Cumulative effects are defined as impacts on the environment from the incremental impact of the proposed action [Gold Mountain Road Repair] when added to other past projects that still have residual, lingering effects, and to the estimated effects of other present and reasonable foreseeable future activities (Federal or non-Federal) (40 CFR Parts 1500-1508). Refer to Appendix C on page 140for more information and a list of projects considered for potential cumulative effects.

Access and Road Management Affected Environment

The White Chuck Bridge and the Road 22 system has been part of a highly used, year-around administrative and recreation route on the Mt. Baker Snoqualmie National Forest.

Visitors have used this route for driving pleasure and to access the White Chuck Boat Launch, which served both commercial and non-commercial boating uses. The route also provided access for hiking, viewing, dispersed camping, berry and mushroom picking, hunting and fishing, snowmobiling, skiing, and collecting special forest products.

On the Mt. Baker-Snoqualmie National Forest, there is a limited land base for production of commercial timber products. Approximately one-third of the Forest's total Matrix land base is in the Gold Mountain area. Much of this land is scattered in small parcels. The Gold Mountain and Prairie Mountain Matrix land is one of the largest contiguous Matrix areas on the Forest. Timber harvest provides wood products and supports jobs and income in the local and regional economy, and returns some funds to local counties for road and school improvements. Road 22 and Road 24 are both main haul routes for timber sales in the Gold Mountain area.

This easily accessed road has played an integral part in managing forest resource including vegetation (timber sales, thinning, stand exams, etc.) wildlife (survey efforts, habitat treatments), and aquatic species (surveys, riparian treatments, in-stream work). The road is important for responding to wildland fires (such as the recent 2003 Gold Hill fire), search-and-rescue (river access), and law enforcement emergencies.

Roads Analysis Findings, Maintenance Level

Forest-wide roads analysis, a process used to inform decisions related to road management, has been completed: *Mt. Baker-Snoqualmie National Forest Roads Analysis*, July 2003. The Roads Analysis of 2003 assessed Forest transportation management needs, long-term funding, and expected ecosystem, social, and economic effects. Each road segment on the Forest was assessed for both access need (e.g. needed for recreation, vegetation management, etc.) and by concern for resource damage. In the management matrix, Road 22 was rated as a *High Need* for access for recreation and administrative uses; the 2210 and 2211 roads are rated *High Need* for access to matrix land. The Road 22 system was rated as a *High Concern* for aquatics due to the road systems on the lower slope proximity to fish bearing waters and the potential for sediment delivery. The Road 22 system was rated as a High concern for wildlife due to the Prairie Bear Management Unit having limited amounts of core habitat

for grizzly bear. See the Environmental Consequences chapter for aquatics, hydrology and wildlife for more information on resource considerations in relation to Road 22, 2210 and 2211.

Current road management objectives and operational levels for the Gold Mountain road system come from the Forest INFRA database and were included in the Roads Analysis (and were also discussed in the 1996 watershed analysis for the Sauk-Sauk Forks) (database available at MBS offices). The current Operational Maintenance Level (ML defined below) of Road 22 is ML 3, maintained for passenger vehicles (though at low speed, and with single lane roads with turnouts). The future traffic service level (Objective) is for Road 22 is ML 3 from the Mountain Loop Highway to the junction with Road 24; the remainder of Road 22 has an objective of ML 2. Road 2210 is currently maintained and proposed for future use at an operational ML 2 (high clearance vehicles). Road 2211 is currently an operational ML1, closed at approximately the MP 0.2. Road 2211 was identified as an objective level ML2 for future silvicultural projects and fire access, but remains in ML 1 until those activities take place (WSA, Appendix G, page G-3-2 and 2003 Roads Analysis). Refer to the complete definitions below. The following table displays the road information, Sauk/Sauk Forks Watershed Analysis (USDA 1996) and roads analysis results.

Table 8: Road Segments Maintenance Level and Roads Analysis Results

Road No.	Road Name	MP	End MP	Miles	ML Obj.	ML Op.	Concern for Resource Damage	Need for Accesst
22	Snohomish County Road	0	3	3			Closed, washed out	Private Land-Homes/Timber
22	North Side Sauk River	3	6.97	3.97	2	3	High concern: wildlife, aquatics.	High need for recreation,
22	North Side Sauk River	6.97	10.9	3.93	3	3	High concern,:wildlife, aquatics	Low access need
22-012	Boat Launch	0	0.1	0.1	4	4	High concern: wildlife	High need for recreation
22-013	White Chuck Pit	0	0.3	0.3	3	2	High concern: wildlife	High need for recreation
22-013	White Chuck Pit	0.3	1.15	0.85	1	2	Resource Impact Concern	Trailhead Access Timber
22-014	White Chuck CG	0	0.1	0.1	3	2	Resource Impact Concern	Recreation Access
22-110	Hyakchuck CG	0	0.5	0.5	1	1	Resource Impact Concern	Dispersed Rec Access
2210	Goldhill	0	3.7	3.7	2	2	High concern; wildlife	High need, Timber/ And Adm. Access
2211	Sauk View	0	1.6	1.6	2	1	High concern: wildlife, aquatics	High need, Timber and Adm. Access
2220	Lowdown	0	1	1	1	1	High concern; wildlife	Low need for access.
222-011	2220011	0	0.2	0.2	1	1	High concern; wildlife	Low need for access.
24	Dan Creek	0	12.2	12.219	3	3	Low concern, wildlife	Mainline Access
24-023	Railroad Spur	0	1.5	1.5	1	1	High concern; wildlife	High need for timber. (matrix)
2420000	Dans Cr Divide	0	9.84	9.839	3	2	Low concern, wildlife	Dispersed Rec. Adm./Timber
2420-060	Tathum Spur	0	0.8	0.8	1	1	High concern; wildlife	High need for timber (matrix).

MP=milepost, ML=Maintenance Level, Obj=Objective, Op=Operational CG = Campground

Maintenance Level 1: Intermittent service roads managed as closed to vehicular traffic. They are kept in storage until the next project access need; the closure period must exceed one year.

Maintenance Level 2: 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.

Maintenance Level 3: 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.

Maintenance Level 4: 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.

Maintenance Level 5: 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.

Past Flood Damage

In response to the Preliminary EA, some commenters noted discussed the repeated washouts of sites along the Gold Mountain Road, and wrote that this type of erosion would happen again. Analysis indicates that repeated erosion has occurred because the road was previously rebuilt in the same place, with the same materials and specifications. In the case of this document, the proposed bridge would span the active channel. Site #1 would be revegetated and abandoned, Site #2 would be rerouted away from the active channel completely, and sites along Road 2210 and Road 2211 would be reconstructed with larger culverts that would be likely to withstand a 100-year flood event. Sites #3-#6 have no record of previous flood damage.

Past flood damage was reviewed for impacts to road systems within the project area. In the past, repairs were often made at the same location with in-kind repairs. Since 1995, there has been more opportunity with ERFO projects to design repairs to meet site conditions and resource considerations. Less flood damage to road systems in the area may be attributed to a decade of road restoration efforts (e.g. decommissioning, storm-proofing, and upgrading) in the Sauk River basin. The following table displays the past road damage repaired with ERFO funding.

Table 9: Past Flood Damages

Flood Year/Road No.	Repair	MilePost	Cubic Yards	Cost Estimate	Current Condition
1980-Road 22 (now County Road)	Replace road fill	0.8	200	$4,000.00	Road Closed,Unknown condition. Damage sustained in 2003 flood at MP 0.5, Road closed.
1980-Road 22 (now County Road)	Replace road fill	1.25	200	$4,000.00	
1980-Road 22 (now County Road)	Replace road fill	1.8	200	$4,000.00	
1980-Road 22 (now County Road)	Replace road fill	2.38	590	$6,000.00	
1980-Road 22 (now County Road)	Replace road fill	2.5	200	$4,000.00	
1980-Road 22 (now County Road)	Replace road fill	2.75	1300	$6,630.00	
1974-Road 22 (now County Road)	Replace road fill	2.85	200	$1,300.00	Closed, washed out
1980-Road 22	Clean culvert & ditch	5.12	320	$3,700.00	Good Condition
1974-Road 22	Replace road fill	6.9	1780	$6,000.00	Good Condition
1974-Road 22	Replace road fill	7.5	220	$1,250.00	Partially damaged 2003 flood
1980-Road 22	Replace culvert	9.2	1400	$24,360.00	Damaged in 2003 flood
1980-Road 22	Replace road fill	10.2	1000	$17,280.00	Rerouting (bridge approach)
1996-Road 22	Repair bridge approach	10.2	380	$26,125.00	Rerouting (bridge approach)
1980-Road 22	Repair bridge approach	10.3	2000	$71,380.00	Rerouting (bridge approach)
1974-Road 22	Replace culvert	12.6	1000	$4,750.00	Good (now Mtn. Hwy)
1974-Road 22	Replace culvert	13	220	$750.00	Good (now Mtn. Hwy)
1974-Road 22	Replace road fill	15.5	520	$2,950.00	Good (now Mtn. Hwy)
F90-Road 2210	Clean culvert & ditch	0.6	850	$7,650.00	Damaged in 2003 flood
F90-Road 22	Washout Not Repaired	3.0	7,000	(Barracaded Only)	(Barracaded Only)
1996-Road 2210	Clean culvert & ditch	0.7	900	$15,679.00	Good condition
1999-Road 2210	Replace road fill	0.2	180	$9,750.00	Damaged in 2003 flood
1999-Road 2211	Replace road fill	0.1	80	$4,075.00	Damaged in 2003 flood
1996-Road 2211	Clean culvert & ditch	0.3	1000	$18,350.00	Damaged in 2003 flood
1996-2210011	Clean culvert & ditch	0.1	50	$7,000.00	Work not completed
1996-2200014	Replace road	0.6	800	$21,875.00	Good condition

Access and Road Management Environmental Consequences

Access and Travel Times

The following table displays general mileages and travel times for the various routes to and in the project area. The starting point of all of the scenarios is at a four-way stop in the town of Darrington, which is at the junction of Highway 530 and MP 0.0 of Road 20 (the Mountain Loop Highway). Benchmarks along the route include Road 24 (Dan Creek) and Sauk Prairie Road junction, Road 24 (Seven-Mile) and Road 22 junction, Mountain Highway and Road 22 junction, and the Road 2210 (Four-Mile) and Road 22 junction (see Figure 13 below). These points are used to display mileage and time comparisons to the project area. Mileages and time are compared by pre-flood routes and by each alternative. The table is meant to portray an approximate range of scenarios to give the reader a basic idea of difference in time, speed, and distance to access the project area.

Figure 13: Site #6 Junction of Road 22 and 2210 (Four-Mile)

Travel speed variances are due to posted speed limits on the County roads that access Road 22 and Road 24 and the speeds recommended for the Forest Service roads. The recommended speed for Road 22 and Road 24 is 20 mph (Road Management Objectives Worksheets, 1983). Because of rough surface, steep grades and sharp turns on Road 24, a slower speed may be necessary for safety. For the purpose of comparison, the speed for Road 24 is shown as 15 to 20 miles per hours (mph). Alternative C includes Road 2210 (3.70 miles long) and the recommended speed is 10 mph. Actual driving speeds would vary by each driver's comfort and experience, type of vehicle, weather, and road conditions. The recommended speed for Road 22 is 20 mph. Because this road is not as steep or difficult to drive, 20 mph seemed a reasonable average speed of travel for that road.

Table 10: Comparison of Travel Time and Mileage

From	To	Miles	MPH	*Minutes Traveled[16]
Pre-Flood Route via Mountain Loop Hwy, White Chuck Bridge to Road 22 and Road 24 Junction				
Highway 530 (Darrington) Jct. with Road 20 (Mtn. Hwy)	Mtn. Hwy. Jct. with Road 22	10.00	**45	13
Mtn. Hwy jct. with Road 22	Road 22 and 24 Junction	3.45	20	10
Total Miles/Time		13.45	----	23
Alternative A No Action Route Over the top of Gold Mountain to Road 22 and Road 24 Junction				
Darrington Jct.	Road 24 Jct.with Sauk Prairie Road (Dan Creek Road)	2.30	**35	3
Dan Creek Road Jct.	Road 22 and 24 Junction	12.21	***15-20	36-50
Total Miles/Time		14.51	-----	39-53
Alternative B and Alternative C Across Bridge and Reroute Around Site #2 to Road 22 and 24 Junction				
Darrington Jct.	Mtn. Hwy. Jct. with Road 22	10.00	**35	17
Mtn. Hwy. Jct. with Rd. 22	Road 22 and 24 Junction	4.80	20	14
Total Miles/Time		14.80	------	31
Pre-Flood Route Across Bridge and Road 22 to Road 22/2210 Junction (No Action-no access)				
Darrington Jct.	Mtn. Hwy. Jct. with Road 22	10.00	**35	17
Mtn. Hwy. Jct. with Rd. 22	Road 22 and 2210 Junction	6.760	20	19
Total Miles/Time		16.76	------	36
Pre-Flood Route Over the Top of Gold Mountain to Road 22 /2210 Junction (No Action-no access)				
Darrington Jct.	Dan Creek Road Jct.	2.30	**35	3
Dan Creek Road Jct.	Road 22 and 2210 Junction	16.35	***15-20	49-63
Total Miles/Time		18.65	-----	51-66
Alternative B Across Bridge and Reroute Around Site #2 to Road 22 /2210 Junction				
Darrington Jct.	Mtn. Hwy. Jct. with Road 22	10.00	**35	17
Mtn. Hwy. Jct. with Road 22	Road 22 and 2210 Junction	7.09	20	24
Total Miles/Time		17.09	------	41
Alternative C Across Bridge, Reroutes Around Road 22 Sites #2-6 to Road 22/2210 Junction				
Darrington Jct.	Mtn. Hwy Jct. with Road 22	10.00	**35	17
Mtn. Hwy Jct. with Road 22	Road 22 and 24 Junction	9.60	10-20	28-58
Total Miles/Time		19.60	------	55-75

[16] *Travel time rounded to nearest minute.
**35 MPH = Speed limit on Sauk Prairie Road and paved portion of Mountain Loop Hwy. (Road 20)
*** 10-20 MPH=variables of driving on steep grades, poor surfacing, and sharp turns of Dan Creek Road.

Alternative A No Action

Year-round Access: Alternative A, if implemented, would not provide year-round vehicle access. Access would only be seasonal or weather dependent, and limited to the Road 24 route over the top of Gold Mountain. Alternative A, if implemented, would leave Roads 22, 2210, and 2211 in the current damaged state. There would be no bridge removal, bridge and road construction, reconstruction, repairs, or reroute. The White Chuck Bridge would be left in its current post-flood state.

Approximately 3.7 miles of Road 22, which is bordered on either side by damage Sites #2 and #3 may be seasonally available. The remaining areas beyond the section between Sites #2 and #3 would be blockaded. Road 2210 and Road 2211 would not be repaired or be accessible.

Road 22-013 would not be accessible by vehicle. The rock pit and trailhead located on this road would also be unreachable. This trail is a multi-seasonal use trail, and is the only one located within the project area. The segment (1.3 miles) northwest of Road 2210 and Road 22-110 would also be inaccessible to vehicles.

Some areas would be reachable by walking beyond washed out sections of the road. The bridge and roads would continue to be blockaded.

Driving over Gold Mountain on Road 24 could be limited to drivers that are comfortable with more rugged mountain routes. Vehicle type (passenger car compared to high-clearance vehicle) may also influence a driver's decision to travel on Road 24.

Travel Time and Distance: The increased mileage to drive Road 24 over the top of Gold Mountain to the junction of Roads 22 and 24 would only be about 1.6 miles, but would take twice as long to drive. The travel time is roughly 15 to 20 miles per hour because of the rough road surface, steep grades, and sharp turns and it would take 39 to 53 minutes. Prior to the flood, it took about 23 minutes to drive to the junction of Roads 22 and 24 on the Mountain Highway.

Road System Maintenance Levels, Driving Conditions, and Costs: Road repair costs for this alternative are $0.00 since it is a "No Action Alternative". Road 22 and Road 24 are both operational ML3, suitable for passenger cars at slow speeds. Most of the (spur) roads that branch off from Road 22 and Road 24 are operational ML2, maintained for high clearance vehicles. Driving conditions on Roads 22 and 24 would be rough but passable by passenger cars, as the surfacing is worn and has not been recently replaced. Much of the road maintenance on Road 24 would be preformed by timber purchasers for commensurate use.

Under the guidelines from the Forest-wide Access and Travel Management Assessment and Roads Analysis (USDA FS 1995, USDA FS 2003), if a road is not needed in the transportation system and has been closed for more than 10 years, it would be reviewed for future needs and analyzed for resource damage.

Recreation Access: White Chuck Boat Launch would be abandoned and inaccessible by vehicles. Boats would be launched from the south side of the river and people could use the abandoned site for camping, picnicking, and other dispersed uses. At some point, a permanent boat launch may need to be established along the southern side of the river (a separate environmental assessment would be necessary for this activity). The White Chuck Bench Trail would be inaccessible by vehicle from its trailhead. If 2003 flood damage repairs were completed on White Chuck Road 23, the trail could eventually be accessible from its trailhead located along Road 23.

Dispersed Recreation: Access may prove to be too difficult or unreasonable for some traditional public users. Vehicular access to dispersed recreational activities along Road 22 would be very

limited, and to only those accessible by Road 24. Dispersed recreation along Road 22 and the river would be inaccessible.

Timber Hauling: Road 24 could access 85 percent of the Matrix land and any timber or other forest products would be removed using Road 24 as a main haul-route. Approximately 15 percent (2,200 acres) of the 14,500 acres of Matrix land in the Gold Mountain area would no longer be accessible by road. New roads would need to be constructed or a helicopter used for timber harvesting. There would be an increase in hauling cost for timber harvested, as log loads would have to be hauled over the steeper, rougher, and slower Road 24.

Haul Cost Analysis: The haul route over Road 24 and the Sauk Prairie Road is only 1.1 mile longer (an estimated 14.3 miles) (source: Chuck LaMay, Forest Service Forester), but is twice as long in travel time. It is considerably slower because all but 1.9 miles are one-lane gravel roads. The common haul point for this haul analysis is the junction of Roads 22 and 24. The White Chuck Bridge Replacement Haul Analysis report is in the analysis file. There are two cost factors included in the analysis. Haul cost to transport the logs on a log truck is based on the total Round Trip Minutes (RTM) to drive the roads. The other cost assessed is the road maintenance cost.

Table 11: Haul Cost Analysis Summary

Haul over White Chuck Bridge	**RTM**	**85 per load**
	Haul Cost	$11.03 per CCF
	Road Maintenance	$2.10 per CCF
	Total Cost	$13.13 per CCF
Haul over Road 24 to Sauk Prairie	**RTM**	**105 per load**
	Haul Cost	$14.67 per CCF
	Road Maintenance	$6.84 per CCF
	Total Cost	$21.51 per CCF

CCF = Hundred Cubic Feet. MBF/CCF Conversion Ratio=.52

The timber volume to be hauled would come from approximately 2,600 acres for an estimated 251,232 CCF over an entire rotation (100 years) for an average of 2,512 CCF per year. The total net present value for construction (assumed $1 million) and hauling over the White Chuck Bridge over a 50-year period (discounted to present value) would be $1,709,384. The total net present value (discounted to present value) for no road reconstruction and just hauling over Road 24 to the Sauk Prairie would be a negative amount of $1,162,136.

Administrative Access: Law enforcement, fire patrols, firefighters, search-and-rescue, and administrative personnel would not be able to respond to incidences in the same timeframe as prior to the flood. Forest Service staff would be subjected to the same increased time, and seasonal access as others traveling over the top of Gold Mountain. The area accessed by Road 22 system that is being managed or monitored could be difficult or impossible to reach.

If the Sauk River Bridge (on Sauk Prairie Road) should become damaged, several hundred residences living across the bridge on the Sauk Prairie could be stranded without access to services.

Alternative B Access and Road Management Effects

Year-round Access: This Alternative, if implemented, would provide year-round access. The route for Alternative B would be by way of a new White Chuck Bridge located approximately 200 feet downstream from the old bridge site. A reroute around Site #2 would be made on Road 22-013, an old road/railroad grade, and Road 24-023 to Road 24. The entire length of Road 22–013 (1.15

miles) is a truck road that is in good condition and begins on Road 22, passes a large gravel pit and the White Chuck Bench Trailhead.

Road 24-023 is an old railroad grade (0.5 miles) converted to a truck road. It is now barricaded at its junction with Road 24. The condition of this part of the road is good with minimal brushing needed. The remainder of the route is an old railroad grade (0.5 miles) that was once converted to a truck road is not drivable due to brush, downed trees, and two washouts. The two washouts plus one other drainage would need culverts and fill repair. Field reconnaissance revealed this a viable location for the reroute around Site #2. It is then two miles on Road 24 to the junction with Road 22 (Seven-Mile Road).

Figure 14: Site #9 on Road 2211

Sites #3-9 would be repaired in place, returning access to the remaining Road 22 and Roads 2210 and 2211. Beyond the Road 2210 junction, Road 22 would be drivable to the northwest as far as the road washout on the County Road.

Alternative B includes 2.15 miles of reconstruction and 1.1 miles of road decommissioning (0.6 miles of Road 22 and 0.5 miles Road 22-110).

Travel Time and Distance: The new route would change the driving distance and time from Darrington to the junction of Road 22 and 24 (Seven-Mile) to approximately 14.8 miles and 31 minutes, compared to the pre-flood mileage of 13.45 miles and 27 minutes.

Road Maintenance Level, Driving Conditions, and Cost: Road maintenance objectives for the new Road 22 route would remain at ML4 from the Mountain Loop to the boat launch (over the bridge and about 0.25 miles to the boat launch parking lot). The new route around Site #2 would be managed as a ML3 to the junction with Road 24. The remainder of Road 22 would be managed as a ML2 road, high clearance only. Road 24 would be managed as a ML3 for its entire length. Road 2210 and 2211 would be managed as ML2. Driving conditions on Road 22 would be good from the Mountain Loop Highway to the boat launch. Conditions would then passable to passenger cars at slow speeds from there to the junction with Road 24. Road 24 would also be drivable by a passenger car at slow speeds for its entire length. The rest of the spur roads would require high clearance vehicles for access. Maintenance for Road 22 and 24 (Objective Level ML3) beyond the White Chuck Bench Trailhead, will have less brushing and blading, resulting in a rougher, narrower road corridor, which is more comparable to ML2 standards.

Recreation Access: Replacing the bridge would provide access to the White Chuck Boat and White Chuck Bench Trail by way of Road 22.Previously, Road 22-013 was a dead-end road with the trailhead parking for the White Chuck Bench Trail located on the opposite side of the road from the trailhead. Because of the anticipated increase in traffic, the road would be widened on

the trailhead side of the road, to provide for safe parking (see the Recreation and Wild and Scenic River sections).

Timber Hauling: Matrix land located in the project area would be accessible by Road 22 once again. This primary source of timber and main timber haul-route would be restored across the White Chuck Bridge to the Mountain Highway. The hauling cost would be about 50 percent less than hauling over Gold Mountain on Road 24

Administrative Access: The time to travel to the area would be comparable to the previous route providing for timely law enforcement search-and-rescue and fire emergency response time. The opposing distance from Road 24 over the top of Gold Mountain would not be as responsive to emergency access.

Alternative C Access and Road Management Effects

Year-round Access: This alternative would restore year-round access. If Alternative C is implemented, Road 22 would use the same route as Alternative B around Site #2, but instead of repairing the other sites on Road 22 there would be a reroute above Road 22 Sites # 3-5. The reroute would include Roads 2420-060; 0.6 miles of new road construction would connect to Road 2210-014. Road 2210-014 intersects with Road 2210. Roads 2210 and 2211 would both be repaired; and the route would continue to exit at Road 2210 (Four-Mile) junction with Road 22.

Alternative C includes 0.6 miles of new construction, 3.9 miles of reconstruction, and 3.4 miles of decommissioning. As a part of Alternative C, 2.29 miles of Road 22 would be decommissioned between Sites #3 and #6; additionally, 0.3 miles on either side of Site #2, and Road 22-110 would also be decommissioned.

Travel Time and Distance: The route from Darrington via the Mountain Highway, White Chuck Bridge Road 22 Site #2 Reroute and Sites 3-5 Reroute to Road 2210 (Four-Mile) junction would be approximately 19.6 miles and would take about 55 to 75 minutes (at 10-20 mph), as compared to the pre-flood mileage of 16.76 miles (at 20 mph), and 36 minutes travel time.

The pre-flood distance from Darrington to junction of Roads 24 and 22 (Seven-mile) was about 13.45 miles, and took about 27 minutes. With Alternative C, the distance to the same location would be about 14.8 miles and 31minutes (the same as Alternative B).

Road Maintenance Level, Driving Conditions, and Cost: Road maintenance levels would be the same as in Alternative B with the exception of the tie through road from 2210-014 to road 2420-060 which would also be maintained as a ML3 road, drivable with a passenger car at slow speeds.

Recreation Access: Replacing the bridge would facilitate year-around access to the White Chuck Boat Launch and White Chuck Bench Trailhead (same as Alternative B). See the Recreation and Wild and Scenic River sections.

Timber Hauling: Matrix land located in the project area would be accessible by Road 22 once again. This main timber haul-route access would be restored. Matrix land on the north side of Gold Mountain would continue to be accessed by Road 24 where considered practical. The hauling cost would be similar to Alternative B.

Administrative Access: The time to travel to the area would be similar to Alternative B except it would take longer to get to the junction of Roads 22 and 2210 as described above.

Access and Road Management Cumulative Effects

The repairs proposed in the Gold Mountain Road Repairs assessment are to assist in the re-establishment of safe and efficient vehicle access for recreation activities and the administration of a major portion of the MBS National Forests' Matrix lands. The repairs would contribute to the cumulative management of the MBS National System roads, which is consistent with the MBS Roads Analysis and better aligns the road maintenance levels with projected budgets for road maintenance.

There are several other projects in the Gold Mountain area that collectively, could have cumulative effects on access and road management. Proposed projects or ongoing activities in the area include the Mountain Loop National Scenic Forest Byway repair, the County Sauk Road repair, the White Chuck Road repair, and future thinning sales in the Sauk River drainage. Cumulatively, these activities would lead to re-establishment of the main road system and upgrade of the road system to Forest Plan standards, with new culverts, bridges, and other stream crossings improved to handle the 100-year flood, including associated bedload and debris. Thinning and salvage sales in the Gold Mountain have upgraded road; temporary roads have been treated and placed in storage (ML 1). The Forgotten Thin project proposes to treat Maintenance Level 2 (high clearance vehicle) roads for storage.

The cumulative effects of this project and the other ERFO projects (road repairs, upgrades of culverts, bridges and other crossings to current standard, etc.) would be a road system adequate to serve recreation traffic, administrative needs, emergency response, fire management, and timber management needs.

Recreation Affected Environment

Recreation: Recreation on or accessed by this portion of Road 22 includes dispersed camping hiking driving for pleasure scenic viewing, river rafting and boating, hunting, fishing, mushroom picking, berry picking, mountain biking, snow shoeing, cross country skiing, snowmobiling Christmas tree cutting and other dispersed activities. River recreation and launch sites are covered under the Wild and Scenic River section

Dispersed Recreation: Prior to the 2003 flood, Road 22 provided a portion of a loop drive and connected with several other roads. This loop drive started at Darrington and followed the Mountain Highway to Road 22, then proceeded to Dan Creek Road 24, which continued over the top of Gold Mountain and exited on the Sauk Prairie Road, which returned to Darrington.

Figure 15: Dispersed Campsite Destroyed by the Floodwaters.

Most of the White Chuck developed campground (Figure 15) washed away in 1995/96 flooding and the remainder of the campground was decommissioned There were six dispersed campsites in the area of the White Chuck Bridge and the White Chuck Boat Launch, but a couple of these sites may have been washed away in the 2003 flood. These campsites were frequently occupied during the summer. Another popular dispersed campsite is located on Road 22-110.

Two toilets are located at the White Chuck Boat Launch and are used by dispersed

campers. Forest users are encouraged to bury their waste, which decomposes.

Forest Recreation staff and Snohomish County crews have been removing garbage and dumps across the Darrington Ranger District.

In the past ten years, there have been no wildfires started from roads or dispersed recreation. Two fires were started in relationship to logging activity, and the others have been caused by lightning.

Seasonal and traditional activities that occur in this area include gathering wild mushrooms and berries. During the winter months, Road 22 provides access for Christmas tree and bough cutting, collecting seed cones, snowmobiling cross-country skiing, and other winter recreation, along with game hunting, trapping, and fishing.

Trails: The White Chuck Bench Trail 731 is affected by this road project. The trail starts from White Chuck Road 23 and ends on Road 22-013, which is between Sites #1 and #2. It has two trailheads, one at Crystal Creek on Road 23, (currently inaccessible due to washouts on Road 23) and one on Road 22-013. This low elevation trail provided an easily accessible hike that was available much of the year. It is about 6.5 miles long and was an easy hiking trail with low use (Forest Plan p. E-19). Volunteers maintained the trail prior to the 2003 flood and it was in adequate condition.

Recreational Environmental Consequences

Alternative A No Action

Under no action, no repairs would be made to the sites. There would be limited access recreation sites on Road 22

Dispersed Recreation: Much of Road 22 and its spur roads would continue to be unavailable for dispersed recreation activities. There would not be a broad spectrum of semi-primitive motorized, roaded natural, and roaded modified recreation opportunities along much of Road 22. Vehicle access for dispersed recreation would be available seasonally along Road 24 and between Site #2 (MP 9.4) and Site #3 (MP 5.7) on Road 22.

With Alternative A, effects caused by dispersed campsites, trash dumping, human waste, fire rings, and associated wood and charcoal would continue to be negligible in the project area.

Trails: White Chuck Bench Trail on Road 22-013 would remain inaccessible. If repairs on White Chuck Road 23 were completed, then the other trailhead at Crystal Creek could be used.

Alternatives B and C Recreational Effects

These Alternatives would replace the White Chuck Bridge and would reroute the road around Site #2 by reconstructing Road 22-013 and 24-023 and the old road between them and using Road 24. These Alternatives would restore recreational access similar to before the 2003 flood, but with less access along the Sauk River and more road upslope.

Dispersed Recreation: Driving for pleasure berry picking, mushrooming, and dispersed camping would return to near pre-flood use levels. Road 22-110 would be decommissioned which would eliminate the one dispersed camping site there. There would be a broad range of semi-primitive motorized, roaded natural, and roaded modified recreation opportunities.

The distance from the end of Road 22 to the junction with Road 24 would be about 4.8 miles and take about 14 minutes to drive at 20 miles per hour. Prior to the flood the distance was 3.45 miles, which took about ten minutes to drive.

Effects caused by dispersed campsites, trash dumping, human waste, fire rings, and associated wood and charcoal are negligible in the project area.

Trails: Access would be restored to the White Chuck Bench Trail on Road 22-013 from the Mountain Highway and Road 22 over the White Chuck Bridge. This route would use Road 22-013 as part of the Site #2 reroute and would bypass the White Chuck Bench Trailhead where parking is currently on the opposite side of the road from the trail. This situation would create a safety hazard for users of the trail when the road becomes a main through-route with increased traffic and logging trucks. The reconstruction in Alternative B and C would include constructing the parking turnout on the same side of the road as the trail. This would keep minimize hazards since the currently dead end Road 22-013 would become a major through-road.

Alternative C Recreational Effects

Road 22 decommissioning would be done in such a manner as to not preclude use by foot traffic. The distance from the end of Road 22 to the junction of Road 22 and 2210 (Four Mile Road) would be approximately 9.6 miles (28 minutes at 20 miles per hour) compared to the pre-flood distance of 6.76 miles (19 minutes at 20 miles per hour). There would be a broad range of roaded recreation opportunities along the road reroute upslope, but not along the decommissioned portion of Road 22 near the Sauk River.

Recreation Cumulative Effects

The many damaged roads and trails on the north side of the Darrington Ranger District have dramatically reduce recreation opportunities and use in the Sauk, Suiattle, and White Chuck areas of the District. Currently there is a loss of multi-day hikes as well as access to the Glacier Peak Wilderness area and many main roads are inaccessible for dispersed recreation due to flood damage. The Darrington District Trail Inventory has 367 miles of existing trail and about 50 percent (188 miles including the 6.5-mile long White Chuck Bench Trail) of those trail miles are inaccessible due to road or trail damage. Some people do walk along the damaged roads, and cross hazardous areas to access the trailheads.

Neither Alternative B nor Alternative C, if implemented, would contribute toward measurable dispersed recreation cumulative effects.

Geomorphology/Soils/Hydrology Affected Environment

In response to comments received during the 30-day comment period: A few respondents questioned the analysis and results for Geology, Soils, Hydrology, Water Quality, and Fisheries. Based on respondents' comments, the analysis for these segments of the document have been enhanced and refined. Though the analysis is different than was presented in the original document, this enhanced analysis confirms the conclusions of little or no effect as a result of these project activities.

The flood-damaged sites of Road 22 are located on the southwest flanks of Gold Mountain in the Sauk River drainage and at the confluence of the White Chuck and Sauk River. The roads involved with this project travel through two, sixth field subwatersheds. The Sauk River/Goodman Creek subwatershed (171100060401) has 75 percent of the sites, while the Lower White Chuck subwatershed (171100060106) is where the White Chuck Bridge and approach sites are located. These two watersheds cover about 12,815 and 29,935 acres, respectively.

Geology

Geology in the Gold Mountain project area consists primarily of Darrington Phyllite (low-grade metamorphic bedrock) overlain by Holocene-age landslide deposits (Sites #3-9). The southern portions of the project area include lahars and alluvium deposits (Sites #1, #2 and the White Chuck Bridge Site). The proposed north approach to the White Chuck Bridge is located along bedrock outcroppings of metamorphic rocks (adjacent to Site #1).

Soils

The FEMA report (2005) provided a review of the Snohomish County Soil Survey classification of the soils along the western flanks of Gold Mountain project area. Much of the surface soils were described as loose landslide deposits of sandy loam (Pilchuck sandy loam). The loose, granular soils of these historical landslide deposits are generally shallow along steep slopes (>45 percent) and exposed bedrock is evident in places.

"Shallow, loose granular soils of the project region formed from collapsed eroded faces of recessional outwash deposited into the expanding floodplain by retreating glacial ice. The age of deposition of these landslide deposits is thought to be late Pleistocene or early Holocene (10,000 to 13,000 years old). Although under existing climatic and geologic conditions, many of these landslide deposits remain stable (atop the underlying bedrock) changes and extremes in river geomorphology, surface hydrology, and surrounding land uses may result in slumping and slides." (FEMA report 2005).

Pilchuck sandy loam is formed in alluvium and is regionally found within floodplains, typically in long narrow bands existing along dynamic river systems. This soil is typically an excessively drained soil characterized by high permeability and low surface run-off rates. Included in this project area are pockets of soils that have a surface layer of loam, gravelly loam, or cobbly loam in the upper part of the substratum. The steeper slopes along the river are mapped as a complex of silt loan and gravelly loam, with intermingled classifications that are impractical for separate mapping. The complex is well drained but often shallow above bedrock (U.S. Soil Conservation Service 1983).

In addition to the Snohomish County Soil Survey in the FEMA report, the Mt. Baker National Forest Soil Resource Inventory, Pacific Northwest Region (1970)(SRI) was reviewed for the project area. The SRI displayed a variety of soil types at the various project sites for this ERFO project. Approximately 70 percent of the sites (Sites #3-#9) are within SRI mapping unit 743, a combination of units 074 (60%) and 023 (40%). Mapping unit 074 surface soils are generally gravelly silt loam to gravelly loam; and have weak very fine and fine sub angular blocky structures. This surface soil includes 35 to 50 percent angular gravel by volume. It is also slightly sticky; non-plastic to slightly plastic derived from residuum and till, and ranges from six to fifteen inches thick. This soil is well drained, and permeability is rapid. When shallow soils are perched on bedrock, saturation of even well-drained soils can result in surface runoff and slides. Concentrated surface runoff results in flushing of streams and the need for culverts to be sized to handle such flows.

Soils in mapping unit 023 are characterized as loams to silt loams, with weak, very fine sub-angular blocky structure. This surface soil is 15 to 35 percent angular and sub-Round gravel by volume. It is slightly sticky, non-plastic derived from glacial till, and ranges from twelve to fifteen inches deep. This soil is moderately well to well drained, and permeability is rapid in the surface soils, and moderate to slow in the subsoils.

Site #2 is located on Soil Unit 030. This soil is moderately well to imperfectly drained. Permeability is rapid in the surface soils, and moderate to slow in the subsoils. The 030 soil is a very non-plastic to plastic soil derived from interbedded, glaciolacustrine, alluvial and till deposits. The surface soils are generally thin loams or silt loams. Some soils are generally very thick, weakly to moderately compact, and consist of alternating sub-layers of sands, stilts, sandy loams, and silty clay loams. Some layers may range from non-gravelly to very gravelly.

The bridge site consists of erodable river and volcanic mudflow deposits (Federal Highway Administration, 2004). Surface soils are generally gravelly loamy sands. The subsoils are generally very thick, very gravelly, and cobbly sand. These soils are typically found on river flood plains. These soils are well to moderately well drained, and permeability is rapid. In addition, the FHA report stated that within the project area, these deposits vary from a poorly sorted mixture of sand, gravel, and boulders to well-sorted sands and gravels. The 1970 SRI shows this site as soil mapping unit 010 and is a very deep, non-plastic soil derive from alluvium. Unmapped along the rivers are also alluvial materials, which were also identified in the SRI. These materials have low cohesion and are susceptible to erosion by the river. The high sediment load of the river increases lateral channel migration as gravel bars form. Since the valley is broad and composed of erodable material, the river can migrate dramatically during floods (i.e. 2003 event). Channel migrations are limited in some locations by bedrock outcrops such as the rock outcrops at the north approach (near site #1) of the White Chuck Bridge.

The soils between Roads 22-013 and 24-023 consist primarily of soil mapping unit 011. This soil is excessively drained, and permeability is very rapid. This soil typically occurs on outwash plains and in glacial valleys on slopes of less than fifteen percent. This soil is 10 to 24 inches deep, with deep subsoils that are very gravelly sand. Mapping unit 011 is a deep non-plastic soil derived from glacial outwash. Surface soils are generally thin, gravelly loamy sands.

Other soil mapping units in the vicinity include mapping unit 074, as mentioned previously, associated with Road 22-013, and mapping unit 031 that is associated with Road 24-023. Mapping unit 031 is similar to mapping unit 30 (discussed above), but typically occurs on uneven, to moderately dissected toeslopes and side slopes of greater then 35 percent. The soil is moderately well drained and permeability is rapid in the surface soils and moderate to slow in the subsoils. This soil ranges from 10 to 36 inches deep. The MBS GIS coverage of the proposed project area did not show any unstable (S-8) soils at the flood damage sites nor were any detected during field reconnaissance.

Runoff from storm events would continue to be concentrated in the drainage features on the steep slopes of Gold Mountain, flushing debris downslope and adding to the alluvial deposits on the toeslopes and lower portions of drainages. Sites #3 through #8 (Road 22 MP 4.0- MP 7.0, and at MP 9.4) are characterized as having steep slopes with shallow bedrock overlain by till, fill, and/or colluvium/landslide deposits. Roads that exhibit erosional problems are most commonly found on steep, lower hillslopes (M.A. Madej 2001).

Hydrology

The hydrology of the Gold Mountain Road Repair project area is influenced by not only the geology and topography of the area but also the climatic and weather conditions of the North Cascades.

Hydrology Conditions

Precipitation: The annual average precipitation is approximately 90 inches for all the flood damaged sites with the exception of the proposed road reconnection (Road 24-023 and 22-013 junction), where the annual average precipitation ranges from 100 to 110 inches.

Storm Events: The expected 10-year, 24-hour precipitation ranges from 4 inches at the lower end of project areas, to 5 inches at the upper eastern end of project area. The October 2003 storm, which produced the flooding, reached about10 inches of rain in a 24-hour period in places.

Rain-on-Snow: The Department of Natural Resources (DNR) Rain-on-Snow Zone model categorizes the sites beginning at White Chuck Bridge as a rain-dominated zone and changing to a rain-on-snow zone at about the 1,600-foot elevation The project sites are located from about 600 to 2,300 feet elevation. This rain-on-snow model shows all but Roads 2210-014 and 2420-060 (Alternative C road reroute) in the rain-dominated zone. The proposed Alternative C reroute connecting the Road 2210 to Road 2420 road is in the Rain-on-Snow Zone. Even though the bulk of the project sites are located outside the Rain-on-snow zone the upper slopes of the project area can trigger large magnitude flushing actions that can develop into debris torrents effecting stream crossings along roads as seen from the 2003 flooding.

River Discharge: The Sauk River has a USGS gauge (12189500) located about midway between the Suiattle River and Skagit River confluences of the Sauk River. The gauging station has operated continuously from August of 1928 to the present. The daily mean flows over the 76-year period of record, range from 1,270 to 13,800 cfs, with a mean of 3,275 cfs. The highest flows typically occur during November through February and the lowest occur from July to September. The October 2003 flooding event surpassed any peak flows within this period of record (greater than 100,000 cfs).

The FEMA designated 100-year floodplain for this section of the Sauk River does not reflect recent channel movement. The designated floodplain appears to follow the main river channel prior to the October 2003 flood and subsequent channel movement. The hundred year surface water level would vary depending on floodplain terrace relief, irregular surfaces on the terrace, geometry of the channel, and depend on the type of formula used to establish this high water level, which can vary significantly. The White Chuck River channel has also had floodplain shifts over the last few decades, likely due to large flow events. The channel at the bridge site has down cut about 11 feet since the bridge was constructed in 1947 (FHA 2004, Hydraulic Engineering report). Over a 57-year period, the channel elevation was down-cut approximately four feet in the first 31 years compared to a larger seven-foot drop in channel elevation over the later 26-year period. This increase of down cutting over the last 26 years is concurrent with frequent large (bankfull and greater) high water flows. The down-cutting of the channel at the original bridge site has resulted in concentrated flows within a narrower channel, with more energy impacting less area before reaching an overflow stage into the floodplain. The damaged White Chuck Bridge has piers and debris within the bank-full flow level of the White Chuck River, in the bank-full flow level. Site #1 at MP10.1 is also within the 100-year floodplain of the White Chuck River.

Hydrologic Maturity: Gold Mountain has a mix of forest stand ages, from relatively recent timber harvest to old growth forests. Forest canopy conditions affect snow intercept and distribution, and influence the rate of snowmelt during rain-on-snow events (Harr and Coffin 1992). Forest stands less than 20 to 25 years of age have not reached hydrologic maturity; typically, they have not developed crown closure sufficient to provide adequate interception of precipitation or protection from runoff related to warm winds that often accompany rain-on-snow storms. The MBS stand-year-of-origin GIS coverage was reviewed for the two sixth field subwatersheds associated with the project: the Sauk River/Goodman Creek subwatershed (171100060401), and, the Lower White Chuck subwatershed (171100060106). These two subwatersheds together are mapped as having 11.4 and 3.5 percent of the forest cover in less than 25 year-old forest stands. At these levels, minor rain-on-snow effects would be expected to remain in the Sauk River/Goodman Creek watershed, but not in the Lower White Chuck watershed.

The Sauk River/Sauk River Forks Watershed Analysis (USDA FS 1996) reports that the vegetation disturbance level in the Sauk River above the project area had relatively high canopy disturbance during the 1980s. As forest stands have matured in the last 20 years, some areas are 20 to 25 percent vegetation disturbance while Gold Mountain drainages are between 10 and 15 percent (<25 years of age). While no assessment has been made, the Sauk River has likely experienced increased peak flows during rain-on-snow storms. The river has eroded into streambanks during each of the recent events (1990, 1995/96, and 2003).

Wetlands and Tributaries: In addition to the Sauk and White Chuck Rivers, a number of seeps, debris flow chutes, and small perennial and ephemeral streams flow down steep slopes and influence the roads. There is a pond and a wetland complex along Road 22-110. Ravines in the hillslope carry surface flows and landslide debris toward the bottom end of the ravines during the rainy season. Surface flows in many ravines are ephemeral (flowing only during rain events and snowmelt).

Channel Dynamics: The hillslope channel segments are on steep slopes and are classified, using the Rosgen stream classification method, as type AA+ when the grade is greater than ten percent slope, and the channels are totally confined (laterally contained). In the bench type topography of Gold Hill, hillslope channels can change grade rapidly. Where segments of these channels lessen in gradient to between four and ten percent grade, the streams are classified as Type A channels using Rosgen's method of classification. Type A streams are also entrenched and confined with cascading reaches. The transport of sizable amounts of bedload and debris in these streams requires proper location and sizing of culverts to transport the materials during high flows.

Less frequent, although still a feature on bench areas, are Type B streams. Type B stream reaches drop to a gradient between two and four percent. These lower gradient reaches are deposition zones, have infrequently spaced pools, and can change pool frequency and location abruptly from channel flushing during major storms. These streams also require adequate road culverts and sizing to transport accumulations of bedload and debris that become mobile during flushing flows.

The Sauk and the White Chuck Rivers are classified as Type C streams, because they are lower gradient. Type C streams are characterized by a meandering pattern with riffles and pools formed by channels, scour, or debris.

Sites #3 through #9 are influenced by steep hillslope streams. Sites #3 through #6 are also associated with small perennial streams located about 700 feet from the Sauk River. As these streams flow onto the Sauk River floodplain, gradients flatten and deposition occurs. These lower

reaches of streams flowing through the mainstem river floodplain usually are fish bearing. These channels may aggrade during storm events due to deposition of sediment. This can hinder proper function of culverts or lead to overbank flow, affecting roads. Erosion of the road carries road sediment directly into the Sauk River. Flow dynamics of the Sauk River also influence conditions at the mouths of the small tributary streams. Sediment deposition from floods on the main river may "bury" the lower reaches of the tributaries in sediment, causing flows to go subsurface in the deposits during low flow periods. This can strand fish and hinder migration. Over time, without flood conditions, the stream will cut down through the deposits of material usually reconnecting surface flow and restoring fish mobility.

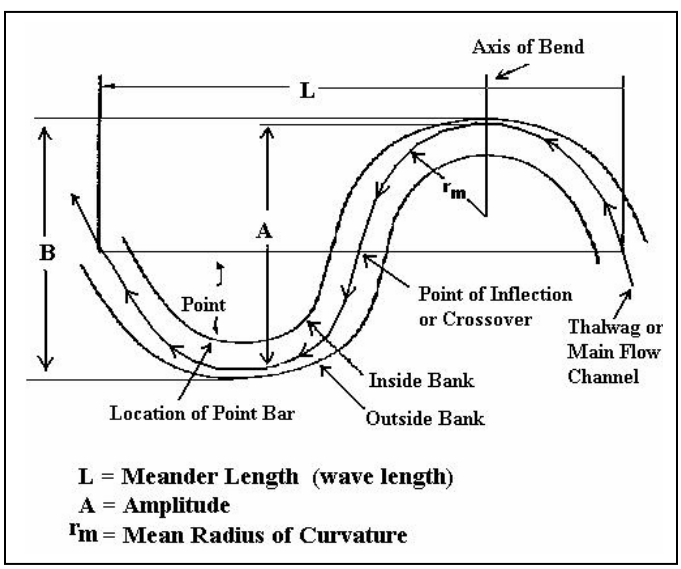
The White Chuck River, a glacier fed major tributary to the Sauk River has a natural high sediment budget during much of the year (May through October). Heavy rainfall in the months of October through March also contributes to high sediment loads accumulated from tributaries and the erosive action of high flows eroding unstable riverbanks. The 2003 flooding and river avulsions resulted in not only large amounts of large wood, but also three to five feet of sediment deposition in the flood plain and on the gravel bars within the river.

Since the 2003 flood, high water has mobilized sediment in the river channel and flood plain, contributing to high sediment transport within the river system. Currently (2006), the active channel has cut down through deposited materials and the riverbed consists of mostly sand and cobbles, material that takes higher energy flows to mobilize. Vegetation growth during the last two years in the riparian area is expected to assist in the stabilization of flood-deposited material.

The collapsed bridge in the White Chuck River channel continues to collect wood debris, and results in river flows being directed toward the Mountain Loop Highway during flooding conditions.

The flood damaged White Chuck Bridge is located about 700 feet above the confluence of the White Chuck and Sauk River. Above the original bridge site, the White Chuck River has straightened, and now is occupying two channels, with the bulk of the flow in the straightened channel. The new straightened channel is presently putting the largest part of the river pressure on the erodable south bank, and bridge approach.

Figure 16: Example of River Meander



This is because natural meandering, as seen in Figure 16, of streams and rivers propagate downstream. Over time, the outside meander bend and the point of deflection will move downstream, thus changing the position of the meander. This function of meandering is always changing, and when trying to propagate through a bridge location that does not span the full flood plain a constriction of flow can occur. With the removal of the old bridge, and construction of the new bridge downstream, the river would continue to cut through 2003 channel deposits and shift locations with high water events. Natural river processes are similar to a propagating sine wave. The

meandering channel configuration will over time move slowly downstream. Over an unknown period, the river meander would migrate downstream and affect the new bridge.

Factors such as weather conditions, flow events, and debris movement and accumulation within the channel can play a major part in the configuration of channel morphology and the pressures exerted on riverbanks and road structures.

Water Quality/303 (d) Listing

The water quality associated with this project is within acceptable limits, and there are no 303(d) listed streams within the project area. The 303(d) list identifies waters not meeting State Water Quality standards.

Limited sampling in the mid and lower South Fork Sauk River indicates no violations of water quality standards. There is a record of one spike in temperature between 50 and 60° Fahrenheit, based on one summer temperature reading taken in 1992, which rated between "fair to good" (WSCC 2003). The temperature standard for the Sauk and White Chuck Rivers is 60.8°F (16°C). A thermograph in the White Chuck River record a daily maximum water temperature of 59.09° F(15.05°C) during the summer of 2003.

The Gold Hill Fire in 2003 added an undetermined amount of suspended sedimentation to tributaries to the Sauk River. However, field observations indicated the amount of sediment movement as minor (District Hydrologist, R. Hausinger 2003). Salvage logging of a small portion of the Gold Mountain Fire area was finished in 2005; the salvage of 16 acres equates to 0.1 percent of the 171100060401 watershed. No major surface scour of the soil or obvious delivery of suspended sediment or bedload (pers. comm. P. Reed) to streams was observed in field review following the salvage. Sediment movement was observed retained on site behind the large pieces of down wood positioned across the slope to catch and store loose soil. There was an upgrade of four culverts in Road 24 below the fire to better match potential flows.

Geomorphology/Soils/Hydrology Environmental Consequences

Alternative A No Action

The No Action Alternative would leave the landscape in current post-flood conditions. Existing hydrologic processes would remain the same, but with no repair or maintenance of portions of Roads 22, 2210, and 2211, and there would continue to be potential for additional plugged culverts and loss of road fill. The potential for additional sediment deliveries to the Sauk River fish habitat areas would remain a moderate to high risk. The section of Road 22, between the Road 2210 and the Road 24 junctions (MP 4.0-7.0) would continue to be at risk of failure due to undersized culverts to handle storm flows. Review of Road 22 identified the flood-damaged areas at Sites #3, through #7 as high risk of continued failure due to undersized culverts, perched fillslope materials, and a history of chronic failure during storm events. Based on 2004 field surveys, there is an estimated 10,000 cubic yards of road fill material that would remain in place along this segment of untreated road with a potential for sediment delivery to the Sauk River.

Culvert failures at stream crossings along Road 22 are likely to be triggered by storm events, such as rain-on-snow events, that produce high run-off with debris torrents. Rain-on-snow events can quickly saturate the shallow soils causing mobility that can involve vegetation and/or rock as the failure gains mass and speed. Various scenarios of flushing events range from 74 to 2,500 cubic yards of road fill material being set in motion, and having a high probability of reaching fish bearing locations along the Sauk River.

Sediment delivery to the Sauk River in the project area is facilitated by the close proximity of Road 22 to the river and the steep gradient of tributary streams along Road 22, especially between MP 4.0 and MP 7.0. A number of factors including location, timing, and volume of sediment delivery may influence whether sediment loads that reach the Sauk River would be considered detrimental to fish habitat, fish and/or other species use of aquatic areas.

If implemented, the No Action Alternative would mean that there would be a high probability of losing the emergency road maintenance access to Road 2210, via Road 22 and having sites between MP 4 and MP 7 contribute additional sediment to the Sauk River.

With No Action, the Road 2210 system would continue to have road drainage problems, because of flood damage due to ditchline failure and run-off diverting high flows onto the road surface. This situation would send water and sediment into nearby perennial streams.

Sediment from Road 2211 and stream crossings would likely reach Hyachuck Creek due to the steep 26 percent gradients, making this stream a sediment transport system. Road 22-110 would remain in its present minimal maintenance condition, allowing the road to grow in with brush and alder trees. A major culvert on a fish-bearing stream would not be removed at this time, and future access would be difficult.

Road 22, southeast of Site #2, would remain closed. The culverts would not receive maintenance, or treatment, and may result in road drainage problems if plugged, even though these culverts are on relatively flat ground. In addition, Road 22-013 (approximately 1.3 miles) would remain inaccessible and untreated. Some increase of stream sediment is expected due to lack of access for road maintenance. There is a potential for plugged culverts diverting flows onto road fill and flushing out streams. The section (approximately 0.8 miles) of road between Site #2 and White Chuck Bridge would remain closed and untreated. The inaccessible portion of Road 22, east of Site #2, has three culverts (one 36” diameter and two 18”diameter) located on relatively flat ground, which could fail because of lack of road maintenance.

Limited access for road maintenance on Gold Mountain would result in road drainage concerns, such as ditchline and culvert blockage. Blockages in the road drainage would cause redirected surface flows and potential road fill loss, accelerating sediment delivery to stream systems.

The White Chuck Bridge would remain in its current configuration, leading to possible flow blockage and redirection of river flow. The portion of the bridge within the river (steel framed cement bridge decking) and the remaining supports in the channel would continue to interact significantly with the river during high-water flows. The present debris is hardened material that would continue to deflect and redirect flows. The bridge material would likely act as a nick-point (a point along a river, or stream bank that would catch and accumulate debris traveling down the channel) for large woody debris to lodge. Lodged material could increase the probability of diverted flows causing additional pressure on the south bank material. This may result in an increased erosion of loose riverbank material and further lateral channel migration toward the Mountain Loop Highway.

The No Action Alternative would not result in any additional soil compaction. The impacts of limited access, and no road maintenance would likely result in some increased overland flows, but volumes and durations of sediment movement would not likely to be higher than background sediment budget of the Sauk and White Chuck River. In the future, flood damaged Sites #4 through #9 would likely have stream crossing failures during high flows and debris torrents.

Alternative B

The repairs described in Alternative B would allow direct access to the Road 22 system facilitating road maintenance and other administrative and recreational activities. Repairs of the flood-damaged road include road sections that have exposed bedrock and shallow landslides along the stream banks, road cuts, and steep slopes with numerous seeps and surface drainages. If implemented, Alternative B would re-establish access, improve drainage on the Road 22 system, and move a portion of Road 22 away from the Sauk River.

Implementing Alternative B repairs would lessen the risk of additional plugged culverts and loss of road fill. Improved road drainage systems would benefit long-term environmental conditions. Based on 2004 field surveys, there is an estimated 10,000 cubic yards of road fill material at stream crossings on Road 22 between the junctions with Road 24 and Road 2210. The proposed repair would dip the road at the stream crossings (within their inner gorges), reducing the road fill at the various washout sites by 30 to 50 percent. This represents a reduction of about 3,000 to 5,000 cubic yards of fill material.

Dipping and hardening the crossings with rock would help prevent future washouts from plugged culverts. In the event of a plugged culvert, the dip would direct the flow across the road, rather than down the road or ditchline where it could cause a fill failure or major slope failure below the road. Dipping and hardening would allow debris to move down natural channels.

Repairs and roadwork associated with Alternative B would cause no long-term (more than two years) impacts to water quality. Some short-term (one to two years) sediment delivery of suspended solids (an estimated four cubic yards[17]) would reach the Sauk River. This sediment would come from the freshly disturbed areas being subject to flushing of loose soils over two years. The rapid reestablishment of vegetation in these areas, the control of storm water and the use of Best Management Practices listed in the mitigations on page 35 would prevent most of the material from entering the rivers. Short-term sedimentation from Sites #3 to #9 has the potential for delivery into the Sauk River below the White Chuck confluence. The short-term sediment associated with Sites #1and #2 (bridge and approaches) would be within the lower reach of the White Chuck River. Water quality would be visually monitored for sedimentation during the instream work activities. Improved road drainage and a longer bridge span across the White Chuck River channel would reduce long-term sediment delivery.

The reconstruction of the existing road (old road/railroad grade) that would be used to connect Roads 22-013 and 24-023 would minimize new ground disturbance. Drainage improvements (culverts and dipping and hardening) would improve stream flow distribution and prevent drainage diversions. Additionally, the Road 22 reroute would remove about 1.7 miles of Road 22 and move the connecting route about one-fourth to one-half mile further away from the Sauk River. By moving Road 22 away from the Sauk River, sediment from suspended solids will have a longer distance to travel in order to reach the river, and the road would be removed from the Sauk river floodplain. The river would have more freedom to move across the floodplain.

Soil disturbance from this reroute reconstruction would be highly unlikely to have detrimental impacts on the river systems. Disturbance would be minimal and short-lived. Generally, ground disturbance would only last one to two years, with sediment likely to be captured on hillslopes and benches before reaching the rivers. The first year following ground disturbance has the greatest risk of soil movement with sediment movement expected in the first flush of fall rains while vegetation is reestablishing on disturbed sites.

[17] One cubic yard is equal to about two pick up truck loads.

The proposed new White Chuck Bridge location is approximately 200 feet downstream of the old bridge. Moving the bridge site, downstream would:

- Increase the longevity of the bridge by moving the south bridge approach away from the rapidly eroding high bank just upstream of the bridge, and the away from the peak amplitude of the meander;
- Free span the active river to approximately the 100-year flow level, lessening the constriction of the channel under high flow regimes, which translates into less constriction of flow and acceleration; and
- Incorporates stronger approaches and abutments designed to survive a 500-year flood event. Compared to the construction of the original bridge in 1947, designs and construction have changed measurably.

The White Chuck Bridge reconstruction would have the bridge abutments located approximately in the limits of the 100-year floodplain elevation on natural ground rather than fill. Armoring of the abutments may include replacement of rock protection that would extend along the active channel and within the 100-year floodplain. Armoring placement would not reduce the current 100-year flood capacity of the river.

Note: The 100-year floodplain was established by using the U.S. geological survey regional regression equations as published in Magnitude and Frequency of Floods in Washington, (U.S. Geological Survey, 1997, Water-Resources Investigations Report 97-4277).

Alternative C

White Chuck Bridge replacement and reroute around Site #2, and repairs to Sites #7-#9 would be the same as Alternative B up to the intersection with Road 24. The effects of the repairs to this portion of the road would be the same as Alternative B.

From Road 24 the Alternative C route would continue above Sites #3 through #6, utilizing existing spur roads, and some newly constructed road. Road 22 between Site #3 and Site #6 would be decommissioned, effectively eliminate future erosion concerns for that road segment. Much of Road 22 was established on steep, but stable slopes with soils that are in need of proper drainage during road construction (U.S. Soils Conservation Service 1983).

Decommissioning Road 22 between Site #3 and #6, and rerouting the road above these sites, would cause short-term (one to two years) erosion from ground disturbance. Long-term erosion and road drainage problems would be reduced. The route would require about 0.6 miles of newly constructed road, with about 2.3 acres of vegetation removal to join spur roads (2210-014 and 2220-060) (see Figure 12 Alternative C reroute). Roads 2210-014 and 2220-060 would require about 0.6 miles of reconstruction. Sites #7-9 on Road 2210 and 2211 would be repaired in place. Overall, this route would reduce the road system by a total of 1.6 miles.

Sediment and erosion would be minimized to an estimated 10 cubic yards by installing proper drainage and using erosion control Best Management Practices during construction. No detrimental effects would be expected by constructing the Alternative C reroute.

Soils/Hydrology Cumulative Effects

Assumptions

- Cumulative Effects associated with Alternatives B and C would be similar;

- Sediment effects from site erosion are generally short term – one to two years;
- Long-term sediment has two major sources: a) site erosion and future road washouts during floods and, b) sediment residing in the system from previous storms;
- Sediment travel distances (per year) vary by sediment size and are based on Bunte and MacDonald (1998); and
- Suspended sediment is the predominant size of sediment that would be created by the work activity; with relative proportions of 60 percent suspended sediment and 40 percent bedload.

Cumulative Effects Analysis

There are no expected cumulative effects on channel processes and aquatic habitat from sediment. A number of projects in the Sauk River were evaluated for potential cumulative sedimentation effects in combination with the proposed Gold Mountain Road Repairs and White Chuck Bridge replacement (Table 12). Two projects, the Forgotten Thin Timber Sale, and road maintenance were identified as having potential sedimentation cumulative effects that could overlap in both time and space with the Gold Mountain road repairs. Three others, the miscellaneous ERFO culvert replacements, the Mountain Loop Highway ERFO repairs, and the White Chuck ERFO road repairs would likely overlap in time and to some extent space (suspended sediment), but the effects of those projects are not projected to be measurable in the Sauk River at the lower end of the Gold Mountain Road Repair project. The White Chuck ERFO road repair would introduce sediment during culvert replacement on an unnamed tributary, and only when movements of an excavator on gravel bars during large wood placement. Best Management Practices (mitigation measures) would minimize erosion and sedimentation.

All of the other projects are too far away, have no lingering effects, or do not or would not occur during the time Gold Mountain Repairs are being made.

The sediment effects from the Gold Mountain Road Repairs would be minor. This is due to the use of Best Management Practices (mitigation measures) that would minimize the sediment production on the following work: replacing of some stream crossing culverts, upgrading several road drainage culverts, and reconstructing or relocating portions of the road. This could result in transport of sediment downstream of ground-disturbing work. With the first fall rains after the repair work, there would be a flush of sediment (all sizes) from the work sites (up to four cubic yards for Alternative B and ten cubic yards for Alternative C). The sediment would enter the stream network, distributed along approximately six miles of river where it would be indistinguishable from background sediment levels. The effects from ground-disturbance would be short-term (first season) as sites revegetate.

Suspended Sediment: Suspended sediment particularly lacustrine clays and fine sediment in lahars deposits would travel down the tributaries to the Sauk River. The suspended sediment has the potential to reach a maximum distance of 12 miles downstream (Bunte and MacDonald 1998). The quantities are very small (2.0 to 2.5 cubic yards with Alternative B, and 6 cubic yards with Alternative C) when compared to the suspended sediment discharging from the Upper Sauk and White Chuck Rivers. Erosion by glaciers on Glacier Peak and from unstable stream banks and landslides along the river maintain a high sediment load in the White Chuck River[18]. There

[18] Simplified calculations suggest that over 24 million tons (18 million cubic yards) of sediment are produced annually in the upper Sauk and White Chuck Rivers combined (Ketcheson and Hausinger 2005, draft EA for Forgotten Thin Plus timber sale).

would be no detectable change in the sediment loading of the river. Any suspended sediment from the Forgotten Thin Timber Sale, the Mountain Loop ERFO repair, and the White Chuck road ERFO repair would be mixed with the other suspended sediments from upstream and would not be detectable from background sediment. No cumulative effects would result from the projects mentioned above, in conjunction with the Gold Mountain Road Repairs.

Glacial meltwater keeps the White Chuck River cloudy during the summer when the bridgework would be scheduled. Any sediment generated at the White Chuck Bridge site would occur when the turbidity of the river is already high. There would be no general detectable change in turbidity since bridge removal would be done when the river is diverted, and new construction would be outside of the normal wetted channel width. Diversion of the river would create a plume of suspended sediment that would only last as long as it takes to construct the diversion (minutes). This would add noticeably to the turbidity downstream for a couple hours. Dilution would occur immediately upon joining the Sauk River. Clear flowing tributaries such as Clear Creek that flow into the Sauk River would further dilute the suspended sediments.

No measurable sedimentation from the Gold Hill Fire Salvage is expected to reach the Sauk River so while there is overlap of location with the Gold Mountain Road repairs, this area is not expected to contribute to cumulative effects of additional sediment into the Sauk River.

The short duration of the increased turbidity would not likely be coincident with other work in the watershed that might increase turbidity; therefore, there is no overlap in time and no cumulative effect in the short term. The fine sediment would settle out in quiet water areas along the Sauk River and become re-suspended during the next high runoff, it would be masked by the high turbidity in the river at that time.

The effects of suspended sediment within the ecosystem are primarily a concern for aquatic organisms (see Fisheries Cumulative Effects).

Bedload Sediment (Sand and Gravel): Sand and gravel are the predominant bedload constituents (heavier materials) that would result from project activities. Using the assumption that 40 percent of the project-related sediment is bedload and that 90 percent of the bedload is sand and gravel, approximately 1.5 cubic yards of sand and gravel may enter the stream network the first runoff season. Within the small tributaries where most of the road repair related sediment would be delivered, travel distance the first year would be approximately 0.5 km (0.3 miles) (after Bunte and MacDonald 1998). For Sites #2 through #7, little sediment would enter the Sauk River, overall, less than a half a cubic yard. This would be indistinguishable in the river and not sufficient to cause any change in channel dynamics; therefore, there would be no cumulative effect

Removal of the White Chuck Bridge would not generate any new sediment but redistribute the gravels in the river. Reconstruction of the new bridge would be outside of the normal channel and the sediment generated by this activity is included in that described above.

Bedload sediment (Cobble): Minimal amounts of cobble-sized material may enter the channel network as the result of the Gold Mountain repair work (quantity is estimated to be less than 0.2 cubic yards). Under most flow conditions in the tributaries the cobble material would move only short distances (300-400 feet) and have no effect on the tributaries or the Sauk River.

Two other proposed ERFO projects, the Mountain Loop Highway road repairs in the South Fork Sauk River watershed, and the White Chuck River road repairs in the White Chuck River watershed, include road relocations varying from minor (20 feet) to major (completely rerouted road, high on a hill). All proposed road designs are intended to reduce the interactions between the rivers and roads.

These two upstream projects would also include work adjacent to the rivers that could generate minor amounts of sediment during construction and up to one year afterward. The Mountain Loop Highway repair sites are approximately seven miles upstream (upper Sauk River), and therefore there would be no mixing of bedload sediment with the Gold Hill project.

Peak Flows (Hydrologic Maturity): Since the proposed Gold Mountain Road Repair project would alter less than five acres (0.04 percent of subwatershed # 171100060401) of forest canopy there would be no significant canopy alteration. There would be no change in hydrologic maturity; and therefore, no cumulative effects on peak flows from changes in canopy cover. Therefore, this project would have no cumulative effects with other forest canopy altering projects (timber sales) planned or ongoing within the Gold Mountain and Sauk River area.

There have been a number of second growth timber sales in the Sauk River drainage including Skull Thin Timber Sale (three-quarters finished in 2005), and Funnybone (on-going work in 2005). Past timber sales include Too Thin, Rib Thin, and Wishbone Thin (1994-1999). These sales have retention of over 70 percent of the forest canopy and understory vegetation. This canopy retention assists in providing for hydrologic maturity important to processing snow accumulation, melt, and peak flows. Temporary roads are closed, and mainline road drainage were upgraded to better maintain natural hillslope drainages within historic patterns.

Natural seeding from the surrounding live timber, and replanted trees in the Gold Hill Fire burned area, will aid in stabilizing the slope, and begin the process of moving the overstory towards hydrologic maturity eventually improving precipitation interception, distribution, and infiltration rates.

Road 24 winter vehicle use, combined with the proposed road repair cumulatively would not likely increase sediment delivery to distinguishable levels. Spatial and temporal overlap to the project area is dependent on weather and road conditions.

Water Quality/303 (d) listing

There are no water quality effects other than the turbidity and sediment discussed above, and therefore, no other water quality cumulative effects

Long-term water quality in the Sauk River would improve due to the combined effects of road mile reductions and drainage improvements integrated into the following projects: The proposed Gold Mountain Road Repairs, Forgotten Thin Timber Sale, Gold Mountain Road Stormproofing, Road 4096 Decommissioning, and the Sauk Roads Erosion Control project (2005-2007). These projects would result in a cumulative reduction of road mileage and in improved road drainage, thereby reducing risk of catastrophic failure and chronic erosion. The risk of failure and sediment delivery during a large flood event would be reduced. Cumulatively, the projects would result in a reduction of road related sediment into the Sauk River between the White Chuck and Suiattle River.

Table 12: Cumulative Effects Determination for Projects in the Sauk and White Chuck Rivers.

Project or Activity Description	Potential Effect	Overlap in		Measurable in Both Time and Space?	Comment
		Time	Space		
Gold Hill Fire Supression.	Increased suspended sediment Increased bedload	No No	Yes No	No	There are no measurable/significant effect to sediment.
Gold Hill Fire Rehabilitation. Larger culverts, cross-drains, mulching, and seeding of roads.	Increased suspended sediment Increased bedload	No No	Yes No	No	Long-term improvement–sediment reduction. Treatments are complete and no sediment effects are present.
Gold Hill Fire Salvage Timber Sale Removal of 16 acres dead/dying trees; 100 acres reforestation, including some riparian reserve.	Increased suspended sediment Increased bedload	No No	Yes No	No	Salvage sale of 16 acres is complete (2005) and there are no measurable sediment effects present.
Sauk Road Erosion Control Project 1. Treatment of Roads 2210-011, 2210-014, 2210 and 2211, includes removing culverts, restoring natural drainage patterns, and removing fill from unstable areas.	Increased suspended sediment Increased bedload	Yes No	Yes Yes	No	Sediment generation is not expected to be detectable. Completed 1.9 of treatment on Road 2210-011 & 2210-014 in 2003. Local improvements to hydrology. May have reduced effects from 2003 storm event. Long-term improvement/sediment reduction treatments are not complete due to lack of access from 2003 floods.
Gold Mountain Road Stormproofing. Past and Future Projects.	Increased suspended sediment Increased bedload	No No	Yes No	No	Long-term improvement – sediment reduction. Timing of the storm proofing is uncertain, but it will not likely overlap in time. The effects are small and short in duration (weeks).
Wishbone Timber Sale. **A** 404 acre thin, approx. 180 acres in Riparian Reserves(upper Dan Ck, lower Conn and Decline Creeks); 2.5 road reconst; 1.9 temp road.	Increased suspended sediment Increased bedload	No No	Yes No	No	Timber sale is complete and there are no lingering sediment effects.
Too Thin and Rib Thin Timber Sales. 360 acre and 480 acre thinnings. 30% acres in Riparian Reserveswith 70% canopy retention (upper Dan Creek,Sauk by White Chuck).	Increased suspended sediment Increased bedload	No No	Yes No	No	Timber sale is complete and there are no lingering sediment effects.
Forgotten Thin Timber Sale. 107-533 acres to be thinned (planning phase) upto 25 acres in riparian reserve.	Increased suspended sediment Increased bedload	Yes Yes	Yes No	Yes	Suspended sediment mixed with sediment from the Mtn. ERFO proposed project and background would not be detectable below confluence of the Sauk and White Chuck Rivers.
Funnybone Thin Timber Sale. 431 acre thin, 25% acres in Riparian Reserveswith 70% canopy retention (upper Dan Creek; Sauk R.).	Increased suspended sediment Increased bedload	No No	No No	No	There are no measurable/significant effect to sediment.
Skull Thin Timber. Sale. 64 acres thinning sale (15 acres in riparian reserve, 70% canopy retention (upper Dan; Sauk).	Increased suspended sediment Increased bedload	No No	Yes No	No	Part of sale is complete with erosion controls in place, remaining activity would occur after the White Chuck Bridge replacement .

Lyle Thin Timber Sale. 200 acre thinning sale.	Increased suspended sediment Increased bedload	No No	Yes No	No	Timber sale completed (2001). There are no lingering sediment effects.
Timber Stand Improvement. 19990-20001. Pre-commercial thinning 419 acres on Gold Mtn. draining to Dan Creek, Sauk.	Increased suspended sediment Increased bedload	No No	No No	No	Timber stand improvement complete, There are no lingering sediment effects expected.
Misc. ERFO culvert replacements. Two sites draining to Dan creek; one site draining to Sauk River; one site drainin to Decline Creek	Increased suspended sediment Increased bedload	Yes No	Yes Yes	No	Only one culvert replacement site drains into the Sauk, sediment generation is expected to be undetectable.
Past ERFO Treatments on Road 22 System Multiple fixes from past floods in 1974, 80, 90, 96, and 99. Included replacing fill and riprap, cleaning and replacing culverts, and removing slide debris along Road 22 and spurs.	Increased suspended sediment Increased bedload	No No	Yes Yes	No	Work is complete and there are no lingering effects.
Road Maintenance. 12 miles of Road 24 system graded annually; additional 13 miles on rotation basis possible.**.**	Increased suspended sediment Increased bedload	Yes Yes	Yes Yes	Yes	Effects depend on timing of maintenance and storms
White Chuck ERFO Project. Repairs to four sites washed out/damaged during 2003 flood event. MP 1.9, 2.4, 3.5, and 5.7. May include instream work at MP 1.9.	Increased suspended sediment Increased bedload	Yes Yes	Yes No	No	Suspended sediment mixed with background glacial melt; effects not detectable. Timing may not overlap with actual Gold Hill construction.
Mountain Loop ERFO Project. Repairs at 4 sites washed out or damaged in 2003 flood.	Increased suspended sediment Increased bedload	Yes No	No No	No	A minor amount of suspended sediment mixed with background amounts would then mix with White Chuck River and would not be detectable.
Suiattle ERFO Project. Road repair to 3 sites washed out during 2003 flood event. MP 14.4, Downey Creek, and Sulpher Creek crossings.	Increased suspended sediment Increased bedload	No No	No No	No	Suspended sediment would not mix with Suiattle sediments.
Sauk River Road Construction (Snohomish County Road). Repair/relocate road at washout from 2003 flood event at MP 0.5,. Site is not on NSF lands, but is just down stream of Gold Mtn. Road Repair project..	Increased suspended sediment Increased bedload	No No	Yes No	No	Expected to occur after the Gold Mtn. Road Repairs are completed. No overlap in space. There would be no lingering effects from Gold Mountain Road Repairs
Instream Treatments. Multiple instream projects in 1980s and 1990s to construct rearing ponds and add instream wood.	Increased suspended sediment Increased bedload	No No	Yes Yes	No	No lingering effects, because of the gap in time.
Fish Passage Tiny Kisutch pond and Hyachuck tributary.	Increased suspended sediment Increased bedload	No No	Yes No	No	No lingering effects, because of the gap in time.

Riparian Reserves Affected Environment

The Gold Mountain Repair Project is located along approximately five miles of the Sauk River downstream from the confluence of the White Chuck and Sauk River. Road 22 parallels the Sauk River on the northeast side of the river, where floodwaters impacted the White Chuck Bridge and damaged Road 22 at Sites #1 and #2. High tributary flows or blocked culverts on Road 22 stream crossings resulted in damage at Sites #3- #6. Damaged sites #7- #9 on Roads 2210 and 2211 were also related to plugged culverts and water flow misdirected on fill or road surfaces.

Watershed analyses for *Sauk River and Sauk Forks Watershed Analysis* (USDA FS 1996a) and *White Chuck Watershed Analysis* (USDA FS 2004a), along with the Forest Road Analysis of 2003 identified the influence of Road 22, 2210 and 2211 on the Aquatic Conservation Strategy objectives and risk to aquatic and other resources in the riparian area. The ID team used these analyses to design alternatives that included reconstructing roads and associated drainage features that pose substantial risk (USDA/USDI ROD 1994, RF-3, p. C-32) and prioritized reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected (USDA/USDI ROD 1994, RF-3, p. C-32).

The following table indicates the amount of Riparian Reserves that would be affected through road repairs under the proposed action (Alternative B):

Table 13: Riparian reserves Acres Affected – Alternative B

Road Number	Mile Post	Site #	Acreage Affected
22	10.2 and 10.1	White Chuck Bridge & Site #1	1.3 acres –ground disturbance
22	9.4	Site #2 Decommission	**0.6 mile- road-1 acre +**
22-013 24-023		Site #2 reroute	0.7 acres – 4 stream crossing, new culverts
22	5.7 to 4.3	Sites #3-6	0.10 acres- 4 stream crossing improved
2210 and 2211	0.0-0.4 and 1.4	Sites #7-9	0.10 acres- 3 stream crossing improved
22-110	0.0 – 0.5	Decommission/culvert removal	**0.5 mile of road-0.85 ac +**

With these repairs, conifer and hardwood trees would be felled with trees being 8” in diameter. Four trees of approximate 20” in diameter would be felled at the White Chuck Bridge and up to six trees at Sites #3 to #6.

Riparian Reserves Environmental Consequences

Under Alternative A, no repair activities would occur and there would be no effects to Riparian Reserves from project activities. There is the potential that Riparian Reserves could be affected during future flood events: portions of the damaged bridge and remaining fill materials from Road 22 at Site #1 and Site #2 could potentially be eroded further back into the hill. If this were to occur, the riparian areas adjacent to the river and down stream from the repair sites could be washed away, too. Standards and guidelines for Riparian Reserves would not be met since there would be no upgrade of the culverts, bridges, and other stream crossings to accommodate at least the 100-year flood, including associated bedload and debris. Crossings would not be upgraded or maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure (USDA/USDI ROD 1994, RF-4, p. C-33). There would be no treatment of the flood damaged sites and no minimizing disruption of natural hydrologic flow paths, including diversion of stream-flow and interception of surface and subsurface flow or restricting sidecasting

as necessary to prevent introduction of sediment to streams (USDA/USDI ROD 1994, RF-2, p. C-32).

Riparian Reserves

Since the Sauk is a fish-bearing stream, the Riparian Reserves extends approximately 360 feet along either side of the river (two site-potential tree heights) (ROD 1994, page C-30). Given that the repair sites are within a five-mile stretch of river, this equals a riparian reserve length of 26,400 feet or approximately 220 acres (not including wet areas or side channels that could extent the Riparian Reserves boundary). Under the proposed action (Alternative B), there would be 2.2 acres of roadwork within Riparian Reserves and an additional 1.85 acres of riparian area affected by road decommissioning. The total area impacted is 4.1 acres of Riparian Reserves, with 1.0 percent of the Riparian Reserves affected with road reconstruction and 0.8 percent in road decommissioning, for a total of 1.8 percent of the total Riparian Reserves on the Road 22 side of the Sauk River. Since the area that would be affected is small, any effects from vegetation removal as a result of Alternative B would not be measurable as Riparian Reserves change.

The proposed 1.1 miles of road decommissioning in the Riparian Reserves would provide enhanced fish passage and use of the area by foraging bald eagles during winter. For Alternative C, it is estimated that the Riparian Reserves would be similarly affected with the decommissioning of Sites #3-#6. Alternative C would have additional impacts estimated at one-half to one acre to the riparian reserve. Thus, as with Alternative B, the effects from Alternative C on the Riparian Reserves would be immeasurable.

Effects Common in both Alternative B and C:

Both Alternatives B and C would have repairs at damaged sites designed to meet Riparian Reserves standards and guidelines[19]. In both action alternatives, the relocated White Chuck Bridge piers would be located out of the active channel, with the abutments placed at approximately the limit of the 100-year flood plain elevation to better meet standards and guidelines for upgrading culverts, bridges, and other stream crossings to accommodate at least the 100-year flood, including associated bedload and debris. In both Alternative B and C, all stream crossings would be upgraded or maintained to prevent streams from diverting out of the channel and down the road in the event of crossing failure (USDA/USDI ROD 1994, RF-4, p. C-33). Both alternatives would provide treatment of the flood damaged sites to minimize disruption of natural hydrologic flow paths, including diversion of stream-flow and interception of surface and subsurface flow, or restricting sidecasting as necessary to prevent introduction of sediment to streams (USDA/USDI ROD 1994, RF-2, p. C-32).

Both Alternatives B and C would result in a net decrease in permanent roads in Riparian Reserves of the Sauk River and of tributaries draining the south side of Gold Mountain. Alternative C has a greater net decrease in road density, and would benefit the Sauk River from the landscape perspective because more of the road system would be routed farther upslope and away from the valley bottom. Alternative B would treat the concerns but leave more of Road 22 along the lower slope, closer to the Sauk River.

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19 Federal Highways Administration has been an integral partner in the assessment and design of the repair. Federal, state, and county agencies cooperation has been elicited in review of the environmental assessment, in field trips, and consultations in order to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives (USDA/USDI ROD 1994, RF-1, p. C-32).

Relocation of the bridge would create a new disturbance until trees and other vegetation re-establish on the abandoned segment. Decommissioning roads in Riparian Reserves would not result in immediate restoration, but would be expected as trees and ground cover grow back. In the long-term (after 2 to 5 years), the road-related influences on the landscape and to the Riparian Reserves would lessen.

All work at the White Chuck Bridge site would be within Riparian Reserve for both the bridge removal and the replacement bridge construction. Approximately 0.22 miles in Riparian Reserve would be affected by the bridge relocation. The Riparian Reserve would continue to be affected at the old bridge site for about 0.18 miles until trees and other vegetation grow back to restore riparian function.

- Decommissioning in Riparian Reserves around Site #2 and for the length of Road 22-110 would total 1.1 miles (0.6 miles and 0.5 miles, respectively).
- Relocation around Site #2 would involve reconstruction and repairs of 0.4 miles in Riparian Reserve along Road 24-023 and Road 22-013. Relocation around the Site #2, will cut into the rock wall to the north and result in not putting riprap back along or in the active channel for approximately 50-100 feet.
- Repairs to Sites #7 through #9 would involve an estimated 0.06 miles in Riparian Reserve.

Differences between Action Alternatives for roadwork within Riparian Reserves would be:

- Alternative B includes repairs along Road 22 between MP 4 and MP 7 for an estimated 0.3 miles in Riparian Reserves.
- Alternative C includes decommissioning along Road 22 between MP 4 and MP 7 for about 0.3 miles in Riparian Reserves. Relocating around Sites #3-6 would involve approximately 0.15 miles of new construction in Riparian Reserve, and 0.23 miles of reconstruction and repairs on Roads 22-014 and 2420-060 in Riparian Reserves.

Riparian Reserves Cumulative Effects

Several projects have been completed or are proposed in the same vicinity as the Gold Mountain road repairs (see Appendix C). These projects are:

- Timber thinning sales (Wishbone, Rib, Too, Skull, Funnybone, Lyle, Gold Mountain Salvage, Forgotten)
- Road decommissioning (Rd 2080, 2083, 2084, 2086, 2087,)
- Flood Repair (White Chuck and Lower Sauk River ERFO)
- Annual Road maintenance (Mountain Loop Road, Rd 22 and 24 road systems)
- Road Storm proofing (Sauk Roads Erosion Control)
- Noxious Weed Management (Mountain Loop and timber thinning sale treatments)

For a cumulative effects analysis, all of the timber sales identified no treatment zones within the Riparian Reserves, where no removal of vegetation or ground disturbing activities take place, resulting in no adverse affect to the Riparian Reserves for the South Fork Sauk. All of the thinning sales have included treatments to maintain and restore species composition and structural diversity of plant communities in Riparian Reserves. The retention of the no treatment zones and canopy cover of the riparian areas of sales within the “area of potential effect” for the Gold

Mountain project results in no measurable amounts of effects from these projects to combine cumulatively.

For the road decommissioning, the only road that is within the Sauk River's Riparian Reserves is Forest Road 2080 and possibly the beginning of road 2081 (on the south side of the river). These projects could be within the "area of potential effect" of Gold Mountain. However the best management practices, seasonal mitigations, and other measures will reduce potential sediment delivery. With decommissioning, vegetation removal is anticipated to be short-term (one growing season) with vegetation expected to grow and fill-in areas where plants and trees are removed, thus improving the riparian reserve. Since the effects of the Gold Mountain repairs are small to non-existent, and the road decommissioning effects are also small, any combined effects are too small to measure. Over time, riparian conditions would improve as the vegetation grows in and around Roads 2080 and 2081.

The flood repair on the White Chuck and Sauk River Road (County project) are located within the Riparian Reserves. All projects are expected to utilize the best management practices, seasonal mitigations, and other measures to reduce potential sediment delivery, and are expected to have minimal, or non-measurable cumulative effects.

When considering road maintenance and noxious weed eradication, none of these projects would remove riparian vegetation. In fact, eradicating noxious weeds would be beneficial to Riparian Reserves because this would allow native species to re-inhabit the area. Since there would be no vegetation removal, there would be no cumulative effects in regards to the Mountain Loop project.

Fisheries Affected Environment

Most repair sites are located within the Sauk Tier 1 Key Watershed. The Sauk watershed contributes to the conservation of anadromous salmonids and bull trout particularly by providing refugia for at-risk fish species. This segment of the Sauk is also part of the Skagit Wild and Scenic River (WSR) corridor. Fisheries are one of the outstandingly remarkable values for which the Sauk was designated as Scenic. The segment of the White Chuck River located outside of the Glacier Peak Wilderness is recommended as a WSR with a Recreation designation. (The fisheries specialists report contains additional details, and is located in the analysis file).

Fish Species of Interest

Fish of interest utilizing the Sauk and tributary streams downstream of the project area are listed in Table 14, and include Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), bull trout (*Salvelinus confluentus*), coastal cutthroat (*O. clarki clarki*), and Salish sucker (*Catostomus sp*.). Other fish of interest utilizing these areas include chum (*O. keta*), pink *(O. gorbuscha*), a small population of riverine sockeye (*O. nerka*), and steelhead and rainbow (*O. gairdneri*).

Table 14: Fish Species of Interest for the Gold Mountain Road Repair Project

Species (Stock)	Status	Utilization Associated with Project Analysis Area
Chinook (upper Sauk Spring)	NMFS – Listed Threatened (3/99)[20] SaSI – Depressed (2003)	Sauk and White Chuck mainstems
Chinook (lower Sauk Summer)	NMFS – Listed Threatened (3/99) SaSI – Depressed (2003)	Sauk mainstem from mouth to Darrington Bridge RM 21.2; Dan Creek to approximately RM 1.2
Coho (Skagit)	NMFS – Candidate (7/95) USFS – Sensitive SaSI – Healthy (2003)	Sauk and White Chuck mainstems; Dan Creek to approximately RM 1.2; Tributaries: 1087 to approximately RM 1.0, 1088 to approximately RM 0.6, 1089 to approximately RM 0.3, 1095 to approximately RM 0.2, 1110 (Hyachuck Creek) below Rd. 24, unnumbered trib locally known as Tiny Kisutch (TK) Creek below Rd. 24
Pink (Skagit)	NMFS – Not Warranted (10/95) SASSI – Healthy	Sauk mainstem; Dan Creek to approximately RM 1.2; could be strays in White Chuck mainstem
Chum (Sauk Fall)	NMFS – Not Warranted (3/98) SASSI – Healthy	Sauk mainstem; Dan Creek to approximately RM 0.3; Tributary 1087 to approximately RM 0.1
Steelhead (Sauk Winter)	NMFS – Not Warranted (8/96) SaSI – Depressed (2003)	Sauk and White Chuck mainstems; Dan Creek to approximately RM 1.2; some residents in tributaries.
Sockeye (riverine; not Baker R. stock)	NMFS – Not Warranted (Baker River stock in Skagit; 3/99) USFS – Sensitive	Sauk and White Chuck mainstems
Coastal sea-run cutthroat	NMFS – Not Warranted (4/99) USFS – Sensitive SaSI – Unknown (2000)	Sauk and White Chuck mainstems; anadromous to Dan Creek to approximately RM 1.2; resident to Dan headwaters
Bull trout	USFWS – Listed Threatened (11/99) SaSI – Healthy (1998)	Sauk and White Chuck mainstems; Dan Creek to approximately RM 1.2
Salish sucker	USFS – Sensitive	Unknown; verified in a pond of Tributary 1110 draining to the Sauk.

Abbreviations: NMFS—National Marine Fisheries Service; USFWS—United States Fish and Wildlife Service; USFS—United States Forest Service (USDA FS 2004c); SASSI—Washington State Salmon & Steelhead Stock Inventory (WDF et al. 1993; WDFW and WWTT 1994); SaSI—Washington State Salmonid Stock Inventory (WDFW 1998, WDFW 2000 and 2003 draft)

Federally Listed Species

Chinook

Three Chinook stocks occur in the Sauk River Basin and two are associated with this project. Lower Sauk summer Chinook spawn from the Darrington Bridge (RM 21.2) downstream to the confluence of the Sauk and Skagit Rivers. Upper Sauk spring Chinook spawn in the White Chuck (mostly from RM 9.9-12 and in some tributaries) and in the Sauk primarily upstream of the White Chuck River confluence (RM 31.9) due to lack of available spawning habitat in the 10.7-mile reach above Darrington, which separates the lower Sauk stock from the upper Sauk stock. The third stock of spring Chinook occurs in the Suiattle.

The highest redd density for lower Sauk summer Chinook is the mainstem Sauk from the Suiattle River confluence (RM 13) to Darrington (RM 21). The lower Sauk summer stock and upper Sauk spring stock are classified as depressed (WDFW and Western Washington Treaty Indian Tribes WWTIT 2003) based on factors determined by WDFW stock assessment biologists.

[20] All listings are documented in the Federal Register; citations are included in the Reference section.

Hayman (2004) notes in a draft of the upper Sauk spring Chinook constraints section from the Skagit Chinook Restoration Plan that sedimentation is a primary factor depressing egg-to-fry survival of this stock, but that glacial sediments and high temperatures may be limiting other freshwater life history stages that influence overall survival. Other factors along the lower Sauk River within the past 20 years include an influx of home-building and development along the river, which could contribute to drainage disturbances (e.g. field drainage, septic, etc).

The natural limiting factor for Chinook in the lower 13.2 miles of the Sauk River is thought to be glacial sedimentation primarily from the Suiattle River, but also from the White Chuck River. Washington State Department of Fish and Wildlife biologists have noted a decrease in Chinook redd density in the mainstem Sauk River below the Suiattle River (RM 0-13) over the last 20 years. It is suspected that an increased rate of melting of Chocolate Glacier in the Suiattle River combined with additional sediment loads accelerated by management practices and flood damage may have changed the physical characteristics in the lower river, thus reducing available spawning habitat (USDA FS 1996).

Bull Trout

The USDI Fish and Wildlife Service (2004) defines the lower Skagit bull trout core area as including all of the Skagit basin downstream of Seattle City Light's Diablo Dam (and therefore includes the Sauk River). The recovery team considers the bull trout in the lower Skagit core area, which includes 19 local populations, to have the greatest abundance of bull trout within the entire Puget Sound Management Unit (USDI Fish and Wildlife Service 2004). There are twelve local subpopulations in the Sauk watershed identified in the Draft Bull Trout Recovery Plan: two in the Sauk proper (upper South Fork Sauk River, Forks of the Sauk River), two in the White Chuck and eight in the Suiattle (USDI Fish and Wildlife Service 2004). Most spawning occurs upstream of the project proposed project area, but juveniles will disperse downstream throughout the watershed to rear and will forage in the low gradient tributaries of the Sauk downslope of the project and in the White Chuck.

Bull trout are particularly sensitive to habitat conditions and require cold-water temperatures for spawning and incubation. Limiting factors for Sauk River bull trout include poaching, habitat alterations due to management activities, natural and management-related sedimentation of spawning and rearing areas, hybridization, and water quality degradation.

While the resident component of the upper South Fork Sauk local population is believed to be abundant and stable, the resident component of the Forks of the Sauk population is unknown. The migratory component for both these local populations appears abundant and increasing (USDI Fish and Wildlife Service 2004).

The resident component of the lower White Chuck River local subpopulation is believed to be abundant and likely stable (with near historical numbers) and the migratory component appears abundant and increasing based on available spawning info in other parts of the basin (USDI Fish and Wildlife Service 2004).

Sensitive Fish

The MBS has habitat for four fish species included on the Region 6 Regional Forester's Sensitive Animal Species List (USDA FS 2004c). These fish are the Salish sucker, Puget Sound/Strait of Georgia coho salmon, Baker River (Skagit) sockeye salmon, and Puget Sound coastal cutthroat trout.

Salish suckers have been found in lowland streams, ponds and lakes, including those in the Sauk watershed Suckers from Hyachuck Pond (about Sauk RM 25; lies downslope of Road 22) and

from the Suiattle (from Marsh Pond and Suiattle Slough), were identified as Salish suckers by WDFW. They may also be in other ponds in the Hyachuck pond complex downslope of Road 22.

Coho spawn in Dan Creek up to an anadromous barrier, and in several small, unnamed tributaries of the Sauk that drain the proposed project area (including those locally known as Hyachuck and Tiny Kisutch Creeks). Limited rearing occurs in many of these small streams, since flow is intermittent in the summer. Ponds in Tiny Kisutch and Hyachuck Creeks allow coho to overwinter if fish make it to the ponds prior to when the water goes subsurface. Coho are also in the Sauk and White Chuck mainstems.

Riverine sockeye are found in the Sauk watershed in the Sauk and White Chuck mainstems, and are not managed as part of the Baker River stock.

The anadromous and resident forms of coastal cutthroat are found in the mainstem Sauk and White Chuck and can seasonally use Tiny Kisutch and Hyachuck Creeks. The resident form has been found in Dan Creek to the headwaters.

Other Fish Species of Interest

Steelhead spawn in the Sauk and White Chuck mainstems and large tributaries The mainstem Sauk River between RM 32 and RM 40 has a high density of steelhead redds (15 redds/miles). Steelhead spawn in reaches upstream of the White Chuck Bridge Steelhead juveniles may rear up to three years in freshwater before smolting. The Sauk mainstem and both forks were stocked in the past with steelhead and rainbow trout. Steelhead smolts are still stocked annually. Rainbow and steelhead that are present are considered wild (sustained by natural spawning and rearing in the natural habitat regardless of parentage). The Sauk winter stock is considered to be "depressed" (WDFW and WWTT 2003).

Pink salmon in the Sauk are part of the Skagit stock. This stock is considered "healthy". An odd-year stock (spawns in odd calendar years), the stock was affected by the October 2003 floods, and numbers of returning spawners in 2005 are expected to be noticeably fewer. Pink in the White Chuck are considered strays and not a contributing part of the Skagit stock (USDA FS 2004c).

Chum prefer to spawn in protected areas along the mainstem Sauk (e.g., side channels) downstream of the North Fork and South Fork Sauk confluence. Chum rear in the estuary. Part of the Sauk fall chum stock, chum associated with the analysis are considered to be "healthy." Chum salmon do not appear to use habitats in the White Chuck River.

Watershed-Scale Flood Effects

The October 2003 flooding events affected fish habitat at the watershed scale by scouring the river channel and streambanks, and by recruiting trees that accumulated into jams and caused shifts in the river channel. The effects both improved and degraded some baseline conditions mentioned below, but are drivers of natural habitat forming processes in all watersheds. Existing spawning and rearing habitats have been degraded due to the substantial quantities of bedload and sediment deposited by the high flows. As these materials are transported downstream, and as trees anchor and form jams and new pools, spawning and rearing habitat conditions will be improved and new habitat will be created. Doyle (2005) qualitatively described effects to baseline conditions from these recent flooding events.

The October 2003 flooding events also affected fish that had already spawned or had started spawning. Chinook and pink salmon were particularly affected. Chinook had already spawned, and although they lay their eggs deeper in the gravels than pink, the channel scouring and bedload movement likely destroyed most of the redds. Numbers of returning spawners will likely be

noticeably reduced for Chinook in the 2007-2009 brood years, and possibly succeeding odd brood years for pink.

Sauk River Watershed-Scale Conditions

In 1998, the Forest Service contracted with David Evans and Associates, Inc. (DEA 1999) to conduct a baseline conditions assessment of fish habitat indicators for bull trout and for two Sauk Chinook stocks using indicators and condition levels in the USFWS Matrix of Diagnostics/Pathways and Indicators (*in* USDI FWS 1998) as a guide along with various other existing documents. DEA used the Sauk River and Sauk River Forks Watershed Analysis (USDA FS 1996e), the 1992 Washington State Salmon and Steelhead Inventory (WDFW 1993), the 1998 Washington Salmonid Stock Inventory, Bull Trout and Dolly Varden Appendix (WDFW 1998), and A Catalog of Washington Streams and Salmonid Utilization (Williams et al., 1975) in the assessment. The objective of the assessment was to integrate the biological and habitat conditions and the potential effect of land management activities on a proposed or listed species at a watershed scale. The Suiattle and White Chuck subwatersheds were not included in the DEA (1999) assessment.

Three categories of function were described in USDI FWS 1998. *Functioning appropriately* infers that the indicators maintain strong populations and promote recovery of a listed species or its critical habitat. *Functioning at risk* infers the indicators provide for species persistence but may need active or passive restoration efforts. *Functioning at unacceptable risk* suggests the listed species is maintained at low levels and active restoration is needed for recovery.

With the recruitment of large wood after the 2003 flooding events, this indicator has improved, and is improving pool quantity and quality particularly in the lower-gradient reaches where wood functions to create pool habitat. At the watershed scale, these indicators will improve toward an *at-risk* function over the next several years.

Baseline Habitat for Lower Sauk Summer Chinook

Of the 19 habitat indicators assessed for this stock, five indicators were considered functioning appropriately. Eleven indicators were functioning at risk: temperature, sediment substrate embeddedness, off-channel habitat refugia, width-to-depth ratio, streambank condition, change in peak and base flows, increase in drainage network, road density and location, and disturbance regime. Three indicators were functioning at unacceptable risk for summer Chinook, including large woody debris, pool frequency and quality, and large pools. These indicators have been improving since the 2003 floods.

Baseline Habitat for Upper Sauk Spring Chinook

Of the 19 habitat indicators assessed for Chinook in 1999, nine indicators were considered as functioning appropriately. Eight indicators were functioning at risk: temperature, substrate embeddedness, large pools, streambank condition, change in peak and base flows, increase in drainage network, road density and location, and disturbance regime. Two indicators were functioning at unacceptable risk for upper Sauk spring Chinook: large woody debris and pool frequency and quality. These indicators have been improving since the 2003 floods.

Baseline Habitat for Sauk Bull Trout

Of the 19 habitat indicators assessed for bull trout in 1999, 12 indicators were considered functioning appropriately. Six indicators were considered functioning at risk: temperature, substrate embeddedness, large pools, streambank condition, change in peak and base flows, and

disturbance regime. Only one indicator, "pool frequency and quality" was considered by DEA to be *functioning at unacceptable risk*; is currently improving since the 2003 floods.

White Chuck River Watershed-Scale Conditions

Doyle (USDA FS 2000) preliminarily assessed the White Chuck River watershed to determine baseline conditions of fish and fish habitat indicators for upper Sauk spring Chinook and bull trout. Of the 19 habitat condition indicators, 18 habitat indicators, plus the overall integrated indicator, were rated as *f*unctioning appropriately, and one indicator, "Road Density and Location" was identified as functioning at risk. This assessment has not changed, but will incrementally improve as roads in the watershed are treated for drainage concerns and closed, decommissioned, or relocated.

Project-Level Conditions

The road damage sites on Gold Mountain drain to the south into several small, unnamed streams. Two streams are recognized in Williams et al. (1975) as Tributaries 04-1110 and 04-1111. One repair site crosses the White Chuck River. The access route to the repair sites (besides the site at the White Chuck River) follows Road 24 and drains to the north to a reach of the Sauk known as Sauk Prairie. The route crosses upper Dan Creek, channels draining to Dan Creek, and small, unnamed streams recognized as Tributaries 04-1087, 04-1088, and 04-1089. The south side of Gold Mountain drains to the Sauk and to unnamed tributaries, locally known as Hyachuck and Tiny Kisutch Creeks. About one mile of the access road drains to Black Oak Creek in the lower White Chuck watershed. The damaged bridge on Road 22 at MP 10.2 crosses the White Chuck River about 0.05 River Miles (RM) upstream from its confluence with the Sauk River. Ground-disturbing activities would occur on the south side of Gold Mountain and in the White Chuck River.

The collapsed White Chuck Bridge is currently in the White Chuck River. It is acting to restrict the channel and has disrupted natural routing of wood and bedload. Prior to its failure, the bridge restricted the channel and disrupted natural routing of wood due to piers constructed within the river. This reach of the White Chuck provides fish migration and rearing habitat, with spawning for various salmonids occurring in the mainstem or tributaries upstream. Riparian function and floodplain connectivity is limited in this lowest stretch of the river due to the presence of Road 24 on both sides of the White Chuck and along the river's north bank. An old road prism on the south bank is in the floodplain.

In the Sauk between RM 24 and 31.9 (basically downstream of the White Chuck and downslope of project activities on Gold Mountain), fish habitat is limited by lack of wood, quality and quantity of pools, and sediments in the gravels. The Gold Mountain area has many roads, and Road 22 parallels the Sauk in its valley bottom. With increased wood recruitment to the Sauk here since the 2003 floods, and as pools form around this wood and as gravels sort, spawning and rearing habitat conditions will improve. The tributaries to the Sauk River, draining from Gold Mountain, experienced some scouring, and wood recruited to these tributaries. This wood is expected to help attenuate effects of future high flows. Where roads washed out, fine and coarse sediments were added to the channels, with deposition of the coarser materials prior to reaching the Sauk River.

Disturbed vegetation includes forest stands less than 25 years of age (on average based on species and site conditions). Vegetation disturbance can affect fish habitat if the disturbance is sufficient to alter the timing and quantity of flows that might affect (primarily) spawning. Models are used to estimate disturbance levels, and are limited in that they provide only a general basis for further

analysis. Disturbance levels for four subwatershed areas that include the project analysis area range from 3-18 percent (see analysis file).

Special Habitat Designations—Critical Habitat

Chinook: On September 2, 2005, the National Marine Fisheries Service (NMFS) issued a final rule designating critical habitat for 12 Evolutionarily Significant Units (ESUs), including the Puget Sound Chinook salmon ESU (70 FR 52630). This rule became effective January 2, 2006. The Gold Mountain Repair project lies within the Sauk Sub-basin portion of this ESU. It includes the following water body segments: the Sauk River from its confluence with the Skagit River upstream to the confluence with the White Chuck River, Dan Creek from the mouth upstream to a natural barrier at approximately RM 2.9, and the White Chuck River from its confluence with the Sauk River, upstream to approximately RM 12. All the above areas provide spawning, rearing, or migration habitat and were rated by NMFS as having high conservation value to the ESU. These segments support the independent populations of the lower Sauk River (summer) Chinook and the upper Sauk River (spring) Chinook.

Bull trout: The USFWS issued a final rule September 26, 2005 (70 FR 56212), designating critical habitat for Coastal-Puget Sound bull trout. While stream segments in the Sauk River and White Chuck River drainages were initially proposed for listing, National Forest lands covered under the Northwest Forest Plan (including all lands within the Mt. Baker-Snoqualmie National Forest) were excluded from final listing designation. Critical habitat is designated in the Sauk River downstream from the National Forest boundary at about RM 24.5. Tiny Kisutch Creek confluences with the Sauk just upstream from the National Forest boundary, and Road 2200-110 is located approximately upslope from Sauk RM 24.6 to 25.1.

Special Habitat Designations—Essential Fish Habitat

Note: See Chapter 1 for a description of the Sustainable Fisheries Act of 1996 amendment to the Magnuson-Stevens Fishery Conservation and Management Act in relation to federal activities.

Relative to this project, essential fish habitat (EFH)[21] for Chinook coho, and pink are present in the Sauk River mainstem and side channels and in Dan Creek up to the anadromous extent. Additional coho EFH may be found in Tributaries 1087, 1088, and 1089, and in a few unnamed Sauk tributaries downslope of Road 22 (two are locally known as Hyachuck and Tiny Kisutch Creeks). The White Chuck River mainstem associated with the proposed project area provides essential fish habitat for Chinook and coho. Coho are suspected to use Black Oak Creek from the mouth up to about RM 0.6.

Watershed and Fish Habitat Restoration

Formal watershed restoration on the Mt. Baker-Snoqualmie National Forest began in fiscal year 1995 as part of an Aquatic Conservation Strategy described in USDA FS 1994. The goals and objectives of watershed restoration are integral to recovery of fish habitat, riparian habitat, and water quality. Restoration activities are designed to protect and restore upslope, riparian, and channel components of watersheds, including physical, chemical, and biological characteristics. Treatments are applied to accelerate natural recovery. Table 15 displays many of the restoration treatments that have been implemented in the Sauk River system since the mid-1980s. The list is not exhaustive but shows a variety of treatments and locations.

[21] Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (Magnuson-Stevens Fisheries Conservation and Management Act, 1996).

Table 15: Watershed Restoration History in the Sauk River System

Location	Date	Description
Sauk River floodplain (Constant Channel, Hyachuck Pond, Skinney Sauk Pond, Tiny Kisutch Pond, Hyatrib Pond); Two Pink in White Chuck	1985 - 1990	Side-channel or off-channel rearing-pond creation to restore historic spawning and rearing habitat
Sauk River Tribs (Clear, Dutch, Murphy, R&T, Early Coho, Lost Ck, Constant), Black Oak in White Chuck	1985 -1995	Inchannel structure placements for habitat formation
Rd 2079, 2080, 2083, 2084, 2086, 2087	1990 - 2000	Road Decommissioning, about 12 miles
Dan Creek	1996	Riparian treatment for future recruitment
Murphy Creek	1997	Block vehicle access to stream
Dutch Cr, Hyatrib Pond, Tiny Kisutch Pond	1999 - 2002	Restore road crossing fish passage barriers
Rd 20 (Mtn Loop Highway)	2000 - 2005	Japanese knotweed prevention and control along 20 road miles
Rd 24, 2210, 2210-011, 2210-014, 2211	2002 - 2005	Road stormproofing (replacing with bigger culverts, fill removal, etc)

Opportunities still exist for additional restoration treatments in the Sauk River system. Restoration activities would benefit salmonid fish and their habitats by reducing human-influenced sedimentation above an already high natural loading, and by increasing or enhancing off-channel habitat quantity or quality.

Fisheries Environmental Consequences

Fisheries biological assessments (BA) and consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) were initiated in April 2005 for the White Chuck Bridge removal and replacement (documentation is located in the analysis file and discussed in the Fisheries Environmental Consequences). Biological opinions (BOs) for this repair site were received in September 2005 from the USFWS and in November 2005 from NMFS. For other repair activities covered by this Ea, consultation was tiered to and completed by January, 2006, under existing programmatic coverage or under the interagency streamlined consultation guidelines (USDA-FS, USDC-NMFS, USDI-BLM, USDI-FWS, 1999.).

Alternative A No Action

Fish Species of Interest

There would be no direct effects to fish species of interest at the watershed or subwatershed project-level scales by implementing this Alternative.

Leaving the existing damaged bridge in-place may encourage people to use this as a dispersed site to wade, etc. These recreationists could displace fish (adults waiting to spawn, juveniles rearing) in the large pool formed by the wood lodged against the south pier.

Effects to Federally Listed Fish: With the No Action Alternative, existing trends in Chinook and bull trout populations would not change, and there would be no direct effects to federally-listed fish. Indirect effects could occur to redds or rearing juveniles due to road-related sedimentation mentioned above, but may not be measurable or traceable to lack of project action.

Impacts to Sensitive Fish: With the No Action Alternative, existing trends in Salish sucker, coho, sockeye, and coastal cutthroat populations would not change, and there would be no direct effects to regionally sensitive fish. Indirect effects associated with additional sediments could occur to redds or rearing juveniles but may not be measurable or traceable to lack of project action. This no-action alternative could indirectly impact individual coho, sockeye, and coastal cutthroat in the Sauk and White Chuck but would not likely cause them to trend toward federal listing. If the culvert at Tiny Kisutch Creek, under Road 22-110, were left in place, it would maintain the site as a partial fish passage barrier. This alternative could indirectly impact Salish suckers if not repairing the sites upslope results in future failures that deliver to Hyachuck Creek and to Hyachuck Pond. Past road failures have led to sedimentation that partially filled the pond, though monitoring of the sucker population has not occurred.

Impacts to Other Fish Species of Interest: With the No Action Alternative, existing trends in chum and steelhead populations would not change, and there would be no direct effects to these other fish species of particular interest. Indirect effects associated with additional sediments could occur to redds or rearing juveniles but may not be measurable or traceable to lack of project action.

Impacts to Fish Habitat: While indirect effects at the watershed scale would not be significant, they could still occur in association with not treating road failure sites and by leaving the damaged bridge in-place. By not treating the road failures, these sites would continue to fail and add road-related sediments to the Sauk River. Effects of sediment delivery from these untreated sites are difficult to determine. The hydrologic cumulative effects analysis in this EA, found no estimated cumulative effects on channel processes and aquatic habitat. There are numerous other sources of lacustrine clay and Glacier Peak Lahars exposed in unstable riverbanks between the

project sites along the Sauk River and along the White Chuck River. The small amount of suspended sediments from the untreated project sites would likely be diminished and undistinguishable from sediment that is picked up along the way from river flow through parent materials.

Leaving the damaged bridge in place would lead to continued erosion of the south approach, which would contribute more localized road-related sediments. The bridge piers are in the bankfull channel, interrupting the natural routing of woody material. Wood stacked against the south pier has created a pool that is likely used by fish for both holding and rearing. Additional build-up of woody material against the pier would lead to further erosion of the banks and additional sedimentation of the pier, possibly leading to localized scouring of habitats in the White Chuck downstream of the site. While the existing bridge (piers and abutments) would continue to influence channel migration at the site, the Sauk mainstem at MP 9.4 would freely migrate into the banks by Road 22.

Another indirect effect associated with the No Action Alternative would be that the existing 2,000-gallon cement vault toilet at the White Chuck Boat Launch would not be maintained. Left without maintenance, this toilet might eventually fail and lead to additional contaminants into the Sauk. While lack of access to this boat launch might lead to formalization of another launch elsewhere, none is being planned, and the temporary launch across the river would not be further developed. Less vehicle traffic also means a lower potential for water-quality effects due to inputs of oil and other chemical contaminants from vehicles (though benefits may not be quantifiable).

Other indirect effects to fish habitat associated with change in recreational access would not be significant.

Alternatives B and C

Fish Species of Interest

Effects from either action alternative are similar to each other due to similar types of activities. Both action Alternatives would remove the damaged White Chuck Bridge and replace it with a new bridge just downstream. Both would include road reconstruction and decommissioning, and would repair some of the damaged sites in-place.

Concussive Effects: Removing the piers of the damaged White Chuck Bridge would require the use of equipment such as a hydraulic breaker. The new bridge abutments may involve drilled or driven piles. Sound pressure vibrations in or adjacent to water have been documented to cause injury and death to rearing and adult fish from rupture of the swimbladder and other organs, and to eggs and pre-emergent fry both directly and from collapse of redds. This lowest reach of the White Chuck is not identified as spawning habitat for any of the fish species of interest (see p. 76). While eggs and pre-emergent fry are not expected here, rearing juveniles and migrating adults could be in the area. Larger fish are less susceptible to concussive effects. Vibrations from the breaker and pile-driver would occur intermittently during the 2-4 weeks estimated for removal of the existing bridge piers and construction of new abutments, affecting up to 700 feet out from the site.

Explosives would be used to construct the new approach to the bridge through bedrock on the north side of the White Chuck River. The interface between air and water acts as an effective reflector and very little sound energy generated in the air passes into the water (USDI FWS 2003). Concussive effects to fish would be from the impulse waves through the rock and water (USDI FWS 2005). Sound pressure through rock and water will not be continuous, and is not expected to displace fish or disrupt behavior. Effects from use of explosives would occur only

during blasting operations, and are expected to affect fish in the stream 1,500-2,000 feet upstream and downstream of the site.

Effects to Federally Listed Fish: The effect determination for federally listed fish for both action alternatives is *May Affect, Likely to* Adversely Affect for both Chinook and bull trout due to activities associated with construction of the new White Chuck Bridge and removal of the existing bridge.

Activities associated with either action alternative would maintain overall trends in subpopulation characteristics for federally listed fish (USFWS 1998) at the scale of the Sauk River sub-basin. Project activities would not measurably influence the indicators (subpopulation size, growth and survival, life history diversity and isolation, and persistence and genetic integrity) at this scale.

At the subwatershed project-level scale, direct effects to federally listed fish could occur from concussive activities. Studies documenting effects from vibrations in this type of habitat are lacking, and the regulatory agencies would work with the Forest Service to perform hydroacoustic monitoring associated with using a hydraulic breaker, pile-driver, and explosives at this site (see mitigation measures). Indirect effects to fish rearing at this site, such as behavioral changes, would be indirectly monitored by monitoring sound pressure levels and adjusting activities; blasting is not expected to affect behavior. No crushing of juveniles in the substrate would be expected from removing the damaged bridge because the river will be diverted away from the piers and any visibly stranded fish rescued. The USFWS and NMFS have determined the extent of the effects to bull trout and Chinook.

While project activities associated with the White Chuck Bridge have potential to negatively affect growth and survival of these fish, they are not expected to result in a decline in the populations of bull trout or either Chinook stock at these specific locations, and any fish visibly stranded during the project would be rescued. Benefits to fish habitat mentioned above, such as reducing potential sedimentation and improved routing of wood, would benefit fish survival or health, but would not significantly increase the size of the subpopulations.

Impacts to Sensitive Fish: The impact determinations for coho, sockeye, and coastal cutthroat are *May Impact Individuals but Not Likely to Trend toward Listing*. The impact determination for Salish sucker is *No Impact* due to lack of habitat and species presence in direct relation to project activities.

At the watershed scale, impacts to sensitive fish would not be noticeable or measurable.

At the subwatershed project-level scale, direct effects to sensitive fish could occur due to vibrations associated with removal of the damaged White Chuck Bridge and construction of the new north approach. Project activities are likely to impact individual rearing coho, cutthroat, or sockeye, but are not likely to cause them to trend toward federal listing. Benefits to fish habitat mentioned above, such as reducing potential sedimentation and improved routing of wood, would benefit fish survival or health, but would not significantly increase these subpopulations.

The White Chuck River Bridge site is not Salish sucker habitat. Salish suckers are located downslope of Road 22 in Hyachuck Pond and would not be affected by the other activities in either action alternative.

The culvert under Road 22-110 at Tiny Kisutch Creek is a partial fish passage barrier. Coho fry and rearing cutthroat would benefit by removing this barrier. Loss of the pool formed by the outflow from this culvert would prevent fry from becoming stranded as the stream goes subsurface in the summer.

Impacts to Other Fish Species of Interest: At the watershed scale, impacts to other fish would not be noticeable or measurable.

At the subwatershed project-level scale, concussive activities associated with both action alternatives could result in direct effects to steelhead in the White Chuck. Steelhead have not been documented as spawning in this lowest reach of the White Chuck, but rearing juveniles could be present. Pink and chum do not rear in freshwater and would not be in the area when vibrations from project activities could affect them. Adults are expected to move from the area, and larger fish are less susceptible to concussive effects. Benefits to fish habitat mentioned above, such as reducing potential sedimentation and improved routing of wood, would benefit fish survival or health, but would not significantly increase these subpopulations.

Watershed-Scale Effects to Fish Habitat

At the scale of the Sauk River sub-basin and Sauk and White Chuck subwatersheds, activities associated with both action alternatives are expected to maintain all watershed conditions at their existing levels of function, but would improve wood routing and pool habitats in the lower White Chuck and the reach of the Sauk from the White Chuck confluence downstream to Darrington.

Subwatershed Project-Level Effects to Fish Habitat

Activities associated with either action alternative are qualitative in relation to each other, though both would result in improved spawning and rearing habitats in the reach of the Sauk downstream from the White Chuck confluence. Not all benefits may be quantifiable. Short-term negative effects might occur during project activities or within the first couple years afterwards. Conservation measures will minimize potential negative effects, and have been effective with past Forest projects.

Pool habitat would be improved after the project is completed, particularly in the reach of the Sauk downstream of the White Chuck confluence. The White Chuck in the project area is dominated by riffle habitat with some lateral pocket pools. While these pocket pools are not expected to be affected, improved routing of woody material under the new bridge would allow opportunities for pool-creation downstream in the White Chuck and in the Sauk River. Incorporating woody material into the riprap, where possible, would improve the margin habitats.

Removing the culvert at Tiny Kisutch Creek would probably eliminate a road-created (but relatively large) pool and removing the damaged White Chuck Bridge would likely eliminate the large pool formed by wood caught against the south pier. Tiny Kisutch Creek flows intermittently in the summer, and the pool below this culvert can strand fry (current pool quality is not good), so no mitigation to create a replacement pool is recommended. Both action alternatives would restore a natural channel to Tiny Kisutch Creek and overall improve habitat in the White Chuck and Sauk Rivers.

Sedimentation to spawning and rearing habitats: associated with removing culverts adjacent to fish-bearing waters and using equipment in the White Chuck River are likely to occur during project activities. Such sedimentation is not expected to be measurable to occupied habitats during spawning due to timing restrictions and minimization of effects by conservation measures and adherence to regulatory terms and conditions (see mitigation measures). Sediment added to the Sauk would not cause the total loading to fall outside the range of variability, and sediments from instream activities in the White Chuck would be transported and diluted. In the long-term, project activities would reduce road-related sedimentation, though improvements in spawning and rearing habitats downstream might not be traceable to this project.

During the first year after the project, while groundcover becomes established and banks and slopes begin to stabilize, additional sedimentation is likely to occur. Conservation measures will help limit sedimentation.

Water quality: could be temporarily degraded, as equipment in the river might introduce chemical contaminants during operations, but little to no effect is expected because conservation measures such as doing equipment maintenance away from streams and having spill plans and oil-absorbing pads/booms have been effective at preventing contamination on other Forest projects.

***Streambanks*:** would be disturbed while work is performed to replace culverts and remove the damaged White Chuck Bridge. Groundcover would become established in the first year after project completion, and trees will help further stabilize the banks in the next few years after the project. Pulling back the abutment fills to an angle of repose at the damaged bridge would help to restore bank conditions as the site stabilizes. Removing the culvert at Tiny Kisutch Creek and reshaping its banks would restore bank stability at this site also.

Fish passage: would improve after removing the partial barrier at Tiny Kisutch Creek.

Large woody debris and routing: in the White Chuck and Sauk Rivers would improve after removing the damaged White Chuck Bridge and replacing it with one that is higher and spans the bankfull channel.

Floodplain connectivity: for the 100-year flood event would improve, as project activities would remove bridge piers from within the bankfull channel, and the new bridge piers would be outside the 100-year floodplain. Natural migration of the Sauk River channel would be allowed at Site #2. Abutment fill would be in the 500-year floodplain, though the natural topography would help keep flows in the 100-year floodplain.

Special Habitat Designations

Effects to Critical Habitat: The NMFS has determined that activities to remove and replace the White Chuck Bridge would *Not Likely Destroy or Adversely Modify* chinook critical habitat (USDC NMFS 2005), and concurred that other activities *May Affect, Not Likely to Adversely Affect* designated chinook critical habitat (concurrence on January 19, 2006).

The USFWS excluded NFS lands from final listing designation for bull trout critical habitat, but had concurred that all activities besides the removal and construction of the White Chuck Bridge would be *Not Likely to Adversely Affect* proposed critical habitat. The USFWS also determined that activities to remove and replace the White Chuck Bridge would *Not Likely Destroy or Adversely Modify* Puget Sound bull trout critical habitat (dated October 5, 2005).

Effects to Essential Fish Habitat: Activities associated with both action alternatives are rated as *Likely to Adversely Affect* essential fish habitats for Chinook, coho, and pink salmon in the short-term due to activities within the wetted channel to remove the damaged bridge and construct the new bridge. Riprap and fill within and along the margins of the 100-year floodplain would have long-term effects in the marginal-quality pool habitat along the river's edge. Improved routing of woody material under the new bridge (combined with incorporation of wood into the riprap where possible) would help create higher quality in-channel pools; these activities would offset negative effects and may result in a net benefit to EFH in the long-term. Removing the Tiny Kisutch Creek culvert on Road 22-110 would improve coho EFH in both the short and long terms.

Key Watersheds

With either of the action alternatives there would be no net increase in permanent roads in the Sauk River Sub-basin and a net decommissioning of 1.10 miles of road.

Fisheries Cumulative Effects

The effects of implementing one of the action alternatives could overlap with lingering effects from past projects, from incremental effects of concurrent projects, or from effects of projects being planned for the near future. Table 16 displays activities that are being considered in this cumulative effects assessment for fisheries and aquatic habitats. There are no cumulative effects to fish or their habitats expected from implementing either action alternative.

The cumulative effects section for hydrology and soils provides a detailed assessment of the potential influences from these projects. The predominant effect from management activities with which this project could cumulatively overlap is sedimentation. Suspended sediments and bedload (coarse sediments such as sand and gravels) are of particular concern for fisheries due to negative effects on spawning and rearing habitats. These materials can smother redds and fill pool habitats, reducing fish survival and growth.

Effects from the proposed Gold Mountain Road 22 Repairs that overlap in time and space, and have **potential** for cumulative effects with other projects are: Gold Mountain Road Treatments, the proposed Forgotten Thin Timber Sale, remaining work on Funnybone and Skull Thins, remaining miscellaneous ERFO culvert replacements, road maintenance, White Chuck Road 23 ERFO flood repairs, Mountain Loop Highway ERFO repairs, and the Snohomish County Sauk River Road reconstruction projects.

The cumulative effect of the proposed repairs with the effects from the above projects will not be measurable or significant, and the mitigation measures would minimize effects. Suspended sediments may overlap, and they will not be overlapping until they reach the Sauk or Dan Creek, and will have become diluted and masked by background sediments. Hydrologic effects from road maintenance, the miscellaneous ERFO culvert replacements, and Gold Mountain Road Treatments will not be measurable. All other effects from the remaining projects (including hydrologic changes from timber sales, riparian or instream conditions from the other ERFO projects, concussive effects from Mountain Loop ERFO Repairs) will not persist into the potential area of influence of the Gold Mountain Road Repairs project.

There would be no cumulative effects to fish or their habitats by implementing either action alternative. Refer to the Soils/Hydrology Cumulative Effects section for additional discussion and rationale.

Table 16: Projects and Activities Being Considered for Aquatics Cumulative Effects.

Project or Activity and Extent/Description	Potential Influence	Overlap		Comments Resulting Cumulative Effect of Proposed Action with Project or Activity Listed?
		Time	Space	
Gold Hill Fire Suppression Blasting; hand line; road reconstruction; dipping; retardant drop.	Suspended sediment delivery to fish-bearing waters, chemical contamination, potential fish-dipping	No	No	Emergency action in 2003; dipping effects minimized (one large pool ; sufficient instream flows); retardant dropped away from fish-bearing streams. No potential cumulative effect due to lack of overlap in both time and space (effects were in different location and are not still lingering).
Gold Hill Fire Rehabilitation Larger culverts, cross-drains, seeding, mulching of roads	Hydrologic routing, suspended sediment delivery to fish-bearing waters	No	No	Done 2003; effects of suppression minimized by this action, and sedimentation reduced in long-term. No potential cumulative effect due to lack of overlap in both time and space (effects were in different location and are not still lingering).
Gold Hill Fire Timber Salvage Removal of 16 acres dead/dying trees; 100 acres reforestation, includes some riparian reserve.	Suspended sediment delivery to fish-bearing waters	No	Yes	Salvage and reforestation completed in 2005. No measurable sediment effects. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).
Sauk Roads Erosion Control Project 1. Treat Roads 2210-011, 2210-014, 2210 and 2211, including removing culverts, restoring natural drainage patterns, and removing fill from unstable areas.	Hydrologic routing, suspended sediment delivery to fish-bearing waters	Yes	Yes	Completed 1.9 miles on 2210-011 and 2210-014 in 2003; local improvements to hydrology, may have reduced effects from 2003 storm events. Remaining roads not completed due to 2003 floods. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant effects to hydrology or fish/habitat conditions, and therefore not cumulative.**
Gold Mtn. Road Stormproofing One mile culvert replacement; surfacing	Hydrologic routing, suspended sediment delivery to fish-bearing waters	No	No	Done in 1999 after storm damage; likely helped reduce effects from 2003 storm events and provides long-term sediment reduction. No potential cumulative effect due to lack of overlap in both time and space (effects were in different location and are not still lingering).
Wishbone Thin Timber Sale 404 acres thin, approximately 180 acres in Riparian Reserves(upper Dan Ck., lower Conn and Decline Cks); 2.5mi road reconst.; 1.9mi temp road.	Hydrologic routing, suspended sediment delivery to fish-bearing waters, riparian conditions and instream wood	No	Yes	Harvested 1997-2000. Treatment along Dan and Conn to improve future recruitment; no instream removal; roadwork likely reduced effects from 2003 storm events. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).
Too Thin & Rib Thin Timber Sales 360 acres and 480 acre thins, 30% acres of treatment in Riparian Reserveswith 70% canopy retention (upper Dan, Sauk by White Chuck)	Hydrologic routing, suspended sediment delivery to fish-bearing waters, riparian conditions and instream wood	No	Yes	Harvested 1997-2002; no-thin buffer 30-100' back from topographic slope break into streams; no instream wood removal; hydrology maintained with canopy retention and buffers. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).

Forgotten Thin Timber Sale 107-533 acres being planned for thin, with up to 25 acres in riparian reserve.	Hydrologic routing, suspended sediment delivery to fish-bearing waters, riparian conditions and instream wood	Yes	Yes	107-533 acres planned for 2006-2009. Suspended sediments may linger but effect not detectable below confluence of Sauk and White Chuck Rivers. Any increased bedload would settle upstream of Gold Mtn. project. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant effects expected to hydrology or fish/habitat conditions, and therefore not cumulative.**
Funnybone Thin Timber Sale 431 acres thin, 25% acres in Riparian Reserveswith 70% canopy retention (upper Dan; Sauk)	Hydrologic routing, suspended sediment delivery to fish-bearing waters, riparian cond. and instream wood	Yes	Yes	Harvesting 2004-2009. 416 acres (15 acres harvested in 2001). No instream wood removal; hydrology maintained with canopy retention and buffers. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant effects expected to hydrology or fish/habitat conditions, and therefore not cumulative.**
Skull Thin Timber Sale 64 acres thin (15 acres in Riparian Reservesw/70% canopy retention)	Hydrologic routing, suspended sediment delivery to fish-bearing waters, riparian cond. and instream wood	Yes	Yes	54 acres harvested 2005; helicopter remaining 10 acres linked to Funnybone, may not finish until 2009. Erosion controls in place. No instream wood removal; hydrology maintained with canopy retention and buffers. Potential cumulative effect due to overlap in both time and space, **but no lingering effects, and remaining work will not have measurable/ significant effect to hydrology or fish/habitat conditions, so therefore not cumulative.**
Lyle Thin Timber Sale 200 acres thin	Hydrologic routing, suspended sediment delivery to fish-bearing waters; riparian cond. and instream wood	No	Yes	Completed 2001. No lingering sediment effects. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).
Timber Stand Improvement 419 acres precommercial thinning and release on Gold Mtn. draining to Dan, Sauk	Hydrologic recovery of veg. cover, riparian cond. and instream wood	No	No	1999-2001; improve future wood recruitment quality. No potential cumulative effect due to lack of overlap in both time and space (effects were in different location and are not still lingering).
Misc. ERFO culvert replacements Two sites draining to Dan Creek; one site draining to Sauk River, one site draining to Decline Creek	Hydrologic routing, suspended sediment delivery to fish-bearing waters	Yes	Yes	Planned for 2006; conservation measures would minimize sedimentation (short-term if at all) and improve local hydrology. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant effects to hydrology or fish/habitat conditions, and therefore not cumulative.**
Past ERFO treatments on Road 22 system Multiple fixes from past floods in 1974, ’80, ’90, ’96, ’99, including replacing fill and riprap, cleaning and replacing culverts, and removing slide debris along Road 22 and spurs	Hydrologic routing, suspended sediment delivery to fish-bearing waters	No	Yes	Sedimentation from past washouts; local drainage improved where culverts cleaned and upgraded. No lingering sediment effects of the work. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).
Road Maintenance 12 miles Road 24 graded annually; with approximately 13 miles on rotation.	Hydrologic routing, suspended sediment delivery to fish-bearing waters	Yes	Yes	Planned for 2006+; conservation measures would minimize sedimentation (short-term) and improve local hydrology. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant effect to hydrology or of sediments to habitats, and therefore not cumulative**.

White Chuck Road 23 ERFO Flood Repairs Repairs at four sites washed out/damaged during 2003 flood event. MP 1.9, 2.4, 3.5, and 5.7. May include instream work at MP 1.9.	Suspended sediment delivery to fish-bearing waters, instream habitat (wood, pools), channel morphology	Yes	Yes	Planned for 2006-2007. Suspended sediments would not be detectable when mixed with background glacial flour. Bedload would have settled prior to reaching White Chuck Bridge. Conservation measures would minimize effects. Incidental take of bull trout and Chinook granted by regulatory agencies. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant effect from sediments or to habitat, and therefore not cumulative.**
Mtn. Highway ERFO Road Repairs Repairs at four sites washed out/damaged during the 2003 flood event on Road 20 at MP 33.1, 33.6, 34.8, and 35.6.	Suspended sedment delivery to fish-bearing waters, inwater concussive effects, channel morphology	Yes	Yes	Planned for 2006-2007, there could be overlap in time, and suspended sediments may extend downstream past the confluence of the Sauk and White Chuck. Once reaching this confluence, the background glacial sediments and additional flows will dilute the effects to insignificance. Conservation measures would further minimize effects. Concussive effects would stop upstream of Gold Mtn. Project. Potential cumulative effect due to overlap in both time and space, **but no lingering effects from concussive activities or work within the channel, and no measurable/significant effects from sediments, so therefore not cumulative.**
Suiattle Road 26 ERFO Repairs Three sites washed out during 2003 flood event. MP 14.4, Downey Creek, and Sulpher Creek crossings.	Suspended sedment delivery to fish-bearing waters	Yes	No	Planned for 2006-2007; conservation measures would minimize effects. Suspended sediments from these projects would not mix. No potential cumulative effect due to lack of overlap in both time and space (different location).
Sauk River Road Reconstruction (Snohomish County road). Repair/relocate road at washout from 2003 flood event at MP 0.5. Site is off-National Forest, just downstream of Gold Mtn. Road Repair projects.	Suspended sedment delivery to fish-bearing waters	Yes	Yes	Planned for approximately 2006-2007. Best management practices would minimize sedimentation. Potential cumulative effect due to overlap in both time and space, **but no measurable/significant sediment effect, and therefore not cumulative.**
Winter Recreational Use	Suspended sediment delivery to fish-bearing waters	No	Yes	Seasonal use. Suspended sediments may travel down road tracks during snowy conditions (sediments directed down ruts). No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).
Instream Treatments Multiple instream projects in 1980s and 1990s to construct rearing ponds and add instream wood.	Instream spawning/rearing, overwinter rearing habitat, suspended sediments	No	Yes	Increased diversity; increased quantity and quality for rearing and spawning. Limited monitoring. Suspended sediments and bedload have transported away or settled. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).
Fish Passage Tiny Kisutch Pond outlet; Hyachuck tributary culvert removal	Increased access for spawning/rearing	No	Yes	Improved local hydrology and increased overwintering habitat for coho, reducing effects from 2003 storm events. No potential cumulative effect due to lack of overlap in both time and space (no lingering effects).

Skagit Wild and Scenic River Affected Environment

Public Law 95-265 (November 10, 1978) amended the 1968 Wild and Scenic Rivers Act by adding the Skagit River to the Wild and Scenic River System. The amended Act identified the Outstandingly Remarkable Values of the Skagit River System as fisheries, wildlife, and scenic quality. The Act described three river classifications; wild, scenic and recreation and the Sauk River was classified as scenic and the definition is:

> *"Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely undeveloped, but accessible in places by roads."*

Section 15(b) of the Act defines free flowing as "existing or flowing in natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway".

The Forest Plan as amended designates the Wild and Scenic River corridor as Management Area 6 – Skagit Wild and Scenic River. The Skagit Wild and Scenic River System includes 158 miles of designated river and includes the Sauk River and parts of North Fork and South Fork Sauk, the Cascade and Suiattle Rivers as well as the main stem Skagit downstream of North Cascades National Park (near Bacon Creek). The Sauk River segment runs from the mouth upstream to the Sauk River Forks and from the forks upstream on the North Fork Sauk to the Glacier Peak Wilderness and on the South Fork Sauk to its junctions with Elliot Creek (P.L. 90-542, as amended Section 3a(18)).

Scenic Quality

Forest management activities are visible from the Sauk River particularly on Gold Mountain where timber management programs have been in place since the 1920s. The scenic viewpoint is from the river, the Mountain Loop Highway and Road 22 are both occasionally viewed from the river. The scenic values of the river are outstanding. Mountain peaks, snow chutes, glaciers, and rugged forested slopes are visible in the background. Foreground views include tributary streams and side channels, large Douglas-fir trees and stands of cottonwood and alder. Rustic campsites, a hiking trail, and a developed campground at Clear Creek are viewed from the river. Scenic classification provides that all management activities be accomplished "without a substantial adverse effect" on the natural appearance of the river and its immediate environment. Forest Plan direction dictates that the projects be designed to substantially retain scenic quality.

River Recreation

The Skagit River Management Plan divides the Sauk River into four segments for recreation use; the upper, the middle and two lower segments with the segment break for the lower described by the confluence of the Sauk and Suiattle Rivers. The management segments are used for analyzing aquatic based river activities, primarily boating. The Plan further segregates use by commercial and private users by season. The Gold Mountain Road Repair project area is completely within the middle Sauk River segment. The Gold Mountain road repair project has one damaged site that is within this middle segment at M.P. 9.4 (Site #2) of Road 22 Other flood-damaged sites are located on Road 22 and spur road systems at the boundary or outside of the scenic corridor. The damaged White Chuck Bridge site(M.P. 10.2) and approach to the bridge Site #1, (M.P. 10.1) are on the White Chuck River, which is a recommended Recreational River in the Forest Plan.

Commercial use is by Special Use Authorizations. Four commercial whitewater outfitters are permitted and all four may provide guided whitewater rafting on the middle Sauk River. The loss of access on the east end of White Chuck Bridge because of storms in October 2003 has resulted in the identification of a temporary alternative launch site. There are some safety concerns related to the temporary launch. Boaters are exposed to highway traffic while unloading their boats and gear. Warning signs have been posted, yet the lack of an easily accessible road shoulder forces some boaters using long vehicles with trailers to park within the travel lane. A section of guardrail has been removed allowing smaller vehicles to park outside the fog line.

Note: Replacement options related to the White Chuck Boat Launch are outside the scope of the analysis. However, preliminary reviews of options for providing temporary access to the Sauk River for the boating public revealed few reasonable alternatives with a cost of $100,000-$200,000 for construction, and $60,000 to $80,000 for environmental analysis. Options reviewed did not include any new construction or ground clearing. In fact, the temporary access mentioned above is an old access point used by boaters prior to the construction of the bridge across the Sauk River on the Mountain Loop Highway.

Two take-outs for middle Sauk raft trips are used: Snohomish County's Backman Park and the Sauk Prairie Bridge on property owned by Hampton Lumber Company.

The following table details maximum use limits for the Sauk River (USDA FS 1983 Skagit River Management Plan, Volume II, page 48).

Table 17: Maximum Use Limits

Segment	Commercial Use	Unregulated Non Commercial Use	Total
Upper: Bedal – White Chuck	1,840	2,760	4,600
Middle: White Chuck - Backman	3,000	1,600	4,600
Lower: Backman - Suiattle	2,700	4,100	6,800
Lower: Suiattle - Skagit	2,400	4,400	6,800

Recent use numbers, based on outfitters' reports and register box counts, suggest that use on the middle Sauk is less than 2,000 boaters per year. Use reports for 2004 suggest far fewer trips than recent averages due primarily to the loss of access at the east end of the White Chuck Bridge. As boaters become accustomed to using the temporary facility, and if flow regimes remain within long-term averages, boater use of the temporary access site should increase from 2004.

Use of the upper Sauk by rafters is limited to early season boating when spring snowmelt fills the river (Bennett, 1997). While the timing varies, there is usually not enough flow to support rafts by late June/early July. No commercial outfitters currently hold authorizations to launch guided raft trips from Bedal Campground, the put-in for the upper Sauk. Register box counts suggest fewer than 200 boat trips are made on this segment annually.

The lower Sauk is used by a variety of boaters including overnight guided and private rafters, drift boat anglers, kayaks, and canoes. No use numbers are available, as no register boxes have been installed at any of the launches typically used by these boaters.

Skagit Wild and Scenic River Environmental Consequences

While potential impacts to the Wild and Scenic River corridor were identified as an issue (see Chapter 1, page 24:

- The proposed repair associated with both Action Alternatives would not impact the free flowing characteristics of the Wild & Scenic River.

The following discussion discloses the consequences of each alternative.

Alternative A No Action

Some or all of these road failure sites would continue to deliver sediment to the Sauk River. In the case of the culvert ditch and roadwork identified around the Road 2210 junction with Road 22, these have the potential, if left untreated, to lead to further road failures, additional culvert blockages, and sediment delivery to the river. Quantities of sediment delivery from these untreated road damage sites would be immeasurable when compared to that delivered during the October 2003 storm.

The No Action Alternative would leave the failed White Chuck Bridge in place. The bridge supports could become further undercut during high flows, increasing the instability of what is left of the structure, which is becoming an attractive nuisance. The White Chuck Boat Launch would remain inaccessible. The launch facility, built in 1995, has served between 2,000 and 4,000 boaters per year as well as other recreational drivers, dispersed campers and hikers.

With no action, further investigation of a new boat launch site would be needed. If a site were found, the cost would likely range between $100, 000 to $200, 000 for construction depending on site, grading and clearing for road construction, and parking lot development. Much of the cost would be attributed to rock haul for the access road and end hauling excavated material off site. In addition, a new site would also require environmental analysis, at the cost of $60,000 to $80,000 depending on issues, surveys, appeals, etc.

Alternative B Skagit WSR Effects

Alternative B calls for the relocation of Road 22 around Site #2 by connecting existing Road 22-013 with Road 24-023 utilizing an old road/railroad. The connecting roads are not visible from the river, so scenic quality would be unaffected. This alternative would result in removing a segment of road corridor from the floodplain of the river and allow the river to continue to meander within its channel migration zone. This would enhance the characteristics for which the Sauk River was designated under the Wild and Scenic Rivers Act, especially free-flow, fisheries and scenery. Access to the existing White Chuck Boat Launch would be reestablished.

The White Chuck Bridge and Site #1 are located adjacent to the White Chuck River. Therefore, there would be no direct or adverse effect on the Sauk River, a federally designated Wild and Scenic River.

Road work on Roads 2210 and 2211 and at MP 4.0 on Road 22 will not involve repairs within or adjacent to the Sauk River. This, combined with the realignment of the road, away from the river, resulted in the determination that a Section 7(a) Determination is not needed (Wild and Scenic Rivers, as per FSM 2354.7 and WO amendment 2300-2004-2).

Alternative C Skagit WSR Effects

Repair and replacement Alternatives identified in Alternative C are the same as in Alternative B for the White Chuck Bridge Site #1 and Site #2. The boat launch access would be reestablished. No further evaluation would be needed.

While the repair and replacement or relocation of Roads 2210 and 2211 and for the area around MP 4.0 of Road 22 varies from Alternative B, these sites are not within, adjacent to or visible from the Sauk River.

The difference is that the road segment of Road 22 between Road 24 (Seven-Mile) and Road 2210 (Four-Mile) would be decommissioned This entire road segment would be upslope from the

river. It would neither be within nor adjacent to the river. The road corridor would be screened from view of the river by native forest. There would be no effect on the Sauk River's designated characteristics.

As with Alternative B, the White Chuck Bridge and Site #1 are on the White Chuck River. Therefore, there would be no direct or adverse affect on the Sauk River, a federally designated Wild and Scenic River.

Roadwork on Roads 2210 and 2211 and at around MP 4.0 on Road 22 do not involve repairs within or adjacent to the Sauk River. Nor are these sites visible from the river. Therefore, alternative repair methods, including relocation would not be evaluated for their effect on the Wild and Scenic River corridor.

Alternative B and C Skagit WSR Cumulative Effects

As has been discussed, there would be no direct or indirect effects from activities in either Alternative B or C to the Wild and Scenic River, thus there would be no effects from this project that could be added cumulatively to effects from other projects.

White Chuck River Recommended WSR Environmental Consequences

The White Chuck River was recommended as a Recreation River in the Forest Plan (Management Area 5a). The goal would be to protect from degradation the outstandingly remarkable values and the wild, scenic, and recreation characteristics of recommended rivers and their environments pending a decision on inclusion into the National Wild and Scenic River System. The outstandingly remarkable values for the White Chuck River are scenic, recreation, fisheries, and wildlife (Forest Plan FEIS Appendix E-5).

The Forest Plan as amended stipulates '(these) rivers shall be managed to protect those characteristics that contribute to the eligibility of these rivers' (Chapter 4, p.4-95 USDA FS 1990). The Forest Plan, as amended identified the Outstandingly Remarkable Values to be Scenic, Recreation, Fisheries, and Wildlife (Appendix E, p.E-93 USDA FS 1990). Replacing the failed bridge with a new bridge would likely improve the free-flow character of the White Chuck River.

The old bridge had four piers in the water and the new bridge would have none. Repairs at Site #1 include moving the road alignment inland into a bedrock wall and away from the river. Again, this likely improves the free flow character of the river by removing the constraint of the hardened road surface and allowing the river to migrate towards the bedrock wall. Replacing the White Chuck Bridge would reestablish the access of the existing White Chuck Boat Launch. This would end the need for the continued use of the temporary launch

The desired future condition for recommended recreation rivers is evidence of a full range of management activities including the existence of low dams, diversions, residential development, and forestry uses. In addition, the river is readily accessible by roads or railroad and bridge crossings.

Alternative A No Action

Under No Action, the White Chuck Bridge would not be replaced and the existing bridge would be left in the river as well as the existing approaches The existing bridge may affect the flow of the river. Refer to the Recreation, Fisheries, and Wildlife sections for affects on those values.

White Chuck Recommended WSR Effects

A new White Chuck Bridge would be constructed approximately 200 feet downstream from the previous location and the old bridge and approach fills would be removed. The new bridge would span the river and would not affect the free flow. The remaining fill from the north abutment would remain in place to help protect the new bridge from the natural channel migration. Existing asphalt would be removed, and the remaining abandoned portion of the road would be revegetated with natural species. Refer to the Recreation, Fisheries, and Wildlife sections for affects on those values.

Alternative B and C White Chuck Recommended WSR Cumulative Effects

As has been discussed, there would be no effect to the White Chuck River Recommended Wild and Scenic River since both Alternative B and C would remove the collapsed bridge and the new bridge would span the river. Since there is no adverse direct or indirect effects from the White Chuck Bridge relocation and the other Gold Mountain Road 22 repairs, there would be no effects from this project that could be added cumulatively to effects from other projects.

Scenic Viewshed Middleground Affected Environment

The slope on Gold Mountain above the Wild and Scenic River Corridor is allocated to Management Area 2B, Scenic Viewshed Middleground. The goal of Scenic Viewshed is to provide a visually appealing landscape as viewed from major travel corridors and use areas (Mountain Scenic Byway and Sauk River). Scenic viewsheds accommodate a variety of activities, which to the casual observer are either not evident or are visually subordinate to the natural landscape. Activities borrow from or repeat form, line, color, and texture elements that are frequently found in the natural landscape. Middleground is the visible terrain beyond the foreground where individual trees are visible, but do not stand out distinctly from the stand. The Visual Quality Objective is Partial Retention in the middleground of primary road corridors. Standard and Guidelines for Road Construction and Reconstruction (Forest Plan page 4-175) are that cut and fill slopes should be revegetated within one year of construction and rock pits and stockpile sites should be located outside seen areas whenever possible and rehabilitated if in seen areas.

The two major travel corridors in the project area would be the Mountain Loop Scenic Byway and the Sauk River (part of the Skagit Wild and Scenic River System). The terrain and dense vegetation growing along the Sauk River bank would screen most views of the middleground slopes of Gold Mountain. The middleground slope of Gold Mountain is visible from only a few locations along the Mountain Loop Scenic Byway. Four sites where people could stop and look at Gold Mountain were found and photos were taken and analyzed. Forest stands could be seen, but no roads were evident. Actual road damage sites were not visible from these views.

Scenic Viewshed Environmental Consequences

Alternative A No Action

Visually, there would be no change from the current, existing condition described above for middleground. The visual quality objective condition would remain unchanged.

Alternatives B and C Scenic Viewshed Effects

Visually, there would be no change from the current existing condition described above for middleground. Refer to the Wild and Scenic River section for description of scenic quality in the river corridor.

Scenic Viewshed Cumulative Effect

As has been discussed, there would be no effect to the middleground viewshed of the surrounding lands when viewed from the Sauk River, Mountain Loop Highway, or the Gold Mountain Road 22, thus there would be no effects from this project that could be added cumulatively to effects from other projects.

The road decommissioning associated with Alternative B and C would eventually result in the revegetation of the remaining road prism at Site #2, which would obscure the view of Road 22 from the river. The road construction associated with Alternative C would not detract from the overall appearance of the Road 22 corridor.

There would be no adverse cumulative effects since there are no other direct or indirect effects from the project on visual quality in the middleground.

Wildlife Affected Environment

Based on review of available records of species observations, and because of a lack of suitable habitat the following species are not expected to occur within or adjacent to the project area: gray wolf, lynx, larch mountain salamander, Van Dyke's salamander, peregrine falcon, great gray owl, common loon, marten, California wolverine, and mountain goat.

The proposed project sites are within or adjacent to suitable habitat for the following species: grizzly bear, Northern spotted owl, marbled murrelet, bald eagle, primary excavators, neotropical migrants, Townsend's big-eared bat, other bats, elk, and black-tailed deer. Approximately 0.5 mile of Road 22 and Site #5 are within Designated Critical Habitat for the Northern spotted owl and 0.5 mile of Road 22-110 is within Designated Critical Habitat for the Marbled Murrelet. Only those species and habitats listed here will be discussed further in this document.

A separate biological assessment was prepared for listed species for consultation with the US Fish and Wildlife Service (USFWS). A wildlife report was prepared and is in the project analysis file with more site-specific details of species and habitat within or adjacent to the project area, environmental consequences are described by each repair site, as well as the detailing of the wildlife effects and cumulative effects analysis that follows below.

Federal Threatened and Endangered Species Designated Critical Habitats[22]

Grizzly Bear (Ursus arctos) Status-Threatened: Grizzly bear are not expected to be present within the proposed project area due to current low numbers of grizzly bear in the North Cascades and the availability of other habitat without high road densities and high year round human use. However, the North Cascades Grizzly Bear Management Committee, which consists of the Park Superintendent of the North Cascades National Park and the Forest Supervisors of the Wenatchee, Okanogan, and Mt. Baker-Snoqualmie National Forests, agreed to an interim standard of "no net loss of existing core habitat until superseded by a Forest/Park Plan amendment or revision. The proposed projects will be discussed in relation to Bear Management Unit (BMU) core habitat and early and late seasonal habitat.

[22] Species list obtained from USFWS (2004)

The project area lies almost exclusively within BMU #11 (Prairie). There are no validated sightings (Class 1 or 2 sightings) within this BMU. The low percent of core habitat (43.4% early core and 39.3% late core) within this BMU also suggests that this BMU does not provide optimal habitat for grizzly bear use. (See Grizzly Bear "No Net Loss" Policy.)[23]

All of the damaged sites are within BMU #11, except for the southern approach and bridge abutment for the White Chuck Bridge. The bridge and abutment lies within BMU #8 (Boulder BMU). However, since this part of the project area would not change core habitat, no additional analysis was conducted for this BMU #8.

Geographic Information System (GIS) analysis shows that BMU #11 is approximately 90,013 acres in size, with 65,070 acres on National Forest. Based on conditions as of 1997, the BMU had approximately 43.4 percent in early core habitat and 39.3 percent in late core habitat (on National Forest lands only). On Federal lands, 20.5 percent of early season foraging habitat within BMU #11 is within core habitat while 32.8 percent of late season foraging habitat is within core habitat. (This BMU was originally drawn as a small BMU since it was located in proximity to the Darrington community and was thought to be an area that might be managed for other than grizzly bear recovery- P. Reed, personnel communication 2005).

The acres of core habitat and foraging habitat 'gained' from the placement of Road 2141 into Level 1 storage as part of the Sauk Road Projects is being applied as mitigation for any core or foraging habitat 'lost' as part of the Gold Mountain flood projects.

Northern Spotted Owl (Strix occidentalis caurina;)Status-Threatened and a Management Indicator Species (Management Indicator Species):[24] Suitable nesting /roosting foraging and dispersal habitat does exist adjacent to repair sites on Road 22 from Site #4 to site #7. Potential suitable nesting habitat is present within the proposed upper relocation route for Road 22. There is an historic activity center adjacent to and north of the proposed project site. There is a second historic activity center for a resident single owl, which is over a linear mile to the north of the proposed project area. However, barred owls have been detected within these areas since the early 1990s.

Northern Spotted Owl Designated Critical Habitat (DCH): Approximately 0.5 mile of Road 22 and repair site #5 (MP 5.0) are within Designated Critical Habitat (WA-26), and DCH borders on Site #4 (MP 5.6).

Marbled Murrelet (Brachyramphus marmoratus marmoratus) Status-Threatened: Suitable nesting habitat is present adjacent to most of the repair sites on Road 22 from Site #4 to Site #7. Potential suitable nesting habitat is present within the proposed upper relocation route for Road 22. Use of the area by murrelets is unknown, since surveys in the area have been limited. Presence (fly over) was detected on the south side of the Sauk River in the early 1990s within a linear mile of Road 22 repair sites.

Marbled Murrelet Designated Critical Habitat: Approximately 0.5 mile of Road 22-110 is within Designated Critical Habitat (WA-09-b).

Bald Eagle (Haliaeetus leucocephalus); Status-Threatened and MIS: Key foraging areas for bald eagles are present along the Sauk River and are used throughout the winter (generally

[23] The baseline for the "no net loss of core habitat policy" is open road, motorized and high use non-motorized trails occurring in Bear Management Units (BMUs) as of July 31, 1997. Any reductions in core habitat due to new or reopened roads, motorized or high use trails, would need to be offset by increases to core habitats (see project folder for policy and analysis details).

[24] Management Indicator Species as defined under National Forest Management Act

October through the end of March). Anadromous fish are not expected to be present in creeks along Road 22 due to high gradients. There are no known nests on the Darrington District.

The closest known staging and roost area is over two miles to the southeast of the proposed project area near Beaver Lake. There are two additional roost areas, 1) two miles northwest of the proposed project area, and adjacent to Road 24 and 2) two miles (one mile from Beaver Lake) to the southeast by Lyle Creek.

Sensitive Species[25] and Other Special Status Wildlife Species

Three additional wildlife species of Townsend's big-eared bat, elk, and black-tailed deer, and three grouped species of primary excavators, neotropical migratory birds, and other bats are listed as species of concern or otherwise have a designated special status, and are expected to occur or may occur in the project area.

The following are existing conditions for Sensitive Species and Other Special Status Wildlife Species evaluated and found Likely to be Present near the Proposed Gold Mountain flood repair sites:

Primary excavators: **Status-Management Indicator Species**. Suitable nesting /foraging habitat is within or adjacent to the proposed project sites. Project Sites #4 and #3 (MP 5.6 and 5.7) are within the Seven Mile (6-02) management area for the pileated woodpecker.

Neotropical migrants: **Status-Species of Concern.** Suitable nesting /foraging habitat is present within or adjacent to the proposed project sites.

Townsend's big-eared bat (Plecotus townsendii): **Status-R6 Sensitive Species**. Suitable roosting habitat is not present within the project areas, but is likely within the older stands adjacent to the proposed project areas. The proposed project areas likely provide suitable foraging habitat.

Other Bat Species: **Status-Protection Buffer Species.** Suitable roosting habitat is likely to be present within the older forest of the proposed upper Road 22 re-route location, but not within the other relocation sites (Site #2). Forested stands adjacent to the proposed project areas are also expected to provide suitable roosting /foraging habitat.

Elk (Cervus elaphus) and Black Tailed Deer (Odocoileus hemionus: **Status-Management Indicator Species.** Suitable winter range is present at the lower end of Dan Creek over two miles to the north of the project area. Occasional elk have been transient in the area, but to date, no herds of elk have established seasonal ranges that consistently occupy the area. However, the black tailed deer do use lower elevations that are relatively snow free, which includes the south side of Gold Mountain and the project area. Suitable fawning/calving areas are present away from roads. During a site review of the reroute around Site #2, sign of deer use (e.g. pellets and bedding sites) was observed.

Biodiversity

Other Wildlife Species: The stands within/adjacent to the project area include younger stands from past harvest activities and mature and old-growth stands with a variety of structural and species diversity. Stands of younger and older forest, including hardwoods and riparian areas adjacent to streams near the project areas, ensures a higher diversity of species habitat for a variety of species. The project area is considered a high human use area year round with trails, boat launch and roaded access for dispersed recreation, timber management, and administrative uses.

[25]Species list obtained from R6 Sensitive Species List (2004)

Wildlife Environmental Consequences

The Wildlife biological assessment (BA) and consultation with the U.S. Fish and Wildlife Service (USFWS) was completed in April 2005 (documentation is located in the analysis file and effects determinations are discussed in the Wildlife Environmental Effects section). Consultation was tiered to and completed under the existing programmatic coverage.

Since the 30-day comment period: All sites comply with the Survey and Manage Standards and Guidelines under the 2001 ROD, as amended prior to March 21, 2004*. The Gold Mountain Road Repair project is within the range of *Cryptomastix devia* (Puget Oregonian), but the proposed repair sites do not contain suitable habitat. Nor does the proposed activity result in an adverse effect on species habitat. No survey work is required at sites limited to the existing road prism, previously disturbed sites, and other areas not considered suitable habitat. Therefore, no surveys were necessary for this project.

The project area is not within the suspected range of the Larch Mountain and Van Dyke's salamanders, therefore, no surveys were needed, and there would be no potential impact on known sites of Larch Mountain and Van Dyke's salamanders from implementation of any of the alternatives.

*Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan Version 3.0 (USDA, USDI 2003)

Alternative A No Action

Flood damaged roads would not be accessible for maintenance so damaged roads would be expected to eventually grow in with a variety of vegetation, including hardwoods and conifers. Currently the forest stand on either side of the road includes canopy closure over much of Road 22. Traffic on the damaged road system would be primarily by foot vs. motorized vehicles, resulting in less noise disturbance but there would still be the visual disturbance to wildlife from persons hiking or biking on the damaged road systems. The damaged bridge would eventually fall into the river.

Threatened and Endangered Wildlife Effects

Alternative A, the No Action Alternative, would eventually result in an increase in bear core habitat and an increase in early and late season foraging habitat within core habitat.

The table below shows the incremental net increases of early and late (season) core habitat and early and late (season) foraging within the core habitat.

Table 18: Changes within BMU #11 Core Habitat/Season Foraging Habitat

Alternative	Change in Early Core (%)	Change in Late Core (%)	Change in Early Season Foraging w/in Core (%)	Change in Late Season Foraging w/in Core (%)
A	↑ 1.8	↑ 1.8	↑ 2.7	↑ 2.3
B	↑ 0.3	↑ 0.3	↑ 0.03	↑ 0.07
C	↑ 0.1	↑ 0.1	↓ 0.3	↓ 0.09

Alternative A would result in reduction of potential noise disturbance from vehicles within suitable spotted owl and murrelet nesting habitat and eagle foraging areas. Traffic would be on foot rather than motorized vehicles, resulting in visual disturbance from persons walking, hiking or biking on the damaged road systems. Use is expected to be less than 20 parties per week, so the area would be considered low use, and contribute toward core habitat for the grizzly bear

Restricted vehicle activity would result in less potential disturbance to bald eagles foraging in the riparian areas along the Sauk River

General Wildlife Habitat, Sensitive Species and Special Status Wildlife Species

Existing habitat would be retained in the short term, and in the long-term there would be tree growth into the damaged roadbed, providing additional forest cover for species such as primary excavators, neotropical birds, or bats. The bridge would continue to provide potential structure for roosting bats until it falls into the river. No vehicle access on the damaged portion of Road 22 would minimize the threat of woodcutting of snags in the Seven-Mile pileated woodpecker management area (06-2) for the pileated woodpecker.

Deer and elk would have additional cover in the long-term, but less forage as canopy closes in the road. There would be less noise disturbance of ungulates with a decrease in vehicle and human use with the potential for increased deer use of flood-damaged road systems for bedding foraging and travel routes.

Under the No Action Alternative, some slumping and continued erosion of unstable banks is expected to occur. These habitat impacts to other wildlife species, wetland and riparian habitat and snags and coarse woody debris are expected to be minimal. While there would be some impacts to riparian habitat in the short term (up to an acre of habitat loss), habitat changes would be of limited scale and scope.

The No Action Alternative, if implemented, would result in less human or vehicle interaction with wildlife. Less human use of the damaged road system could result in more wildlife use of the road system and surrounding stands.

Alternative B Wildlife Direct and Indirect Effects

The proposed work on the collapsed bridge and nine additional flood-damaged sites of Alternative B would have a variety of potential influences on wildlife and habitat. Effect determinations range from *No Effect* to *Likely To Adversely Affect* due noise disturbance. Effects to wildlife from this Alternative were reviewed in regards to species occurrence and habitat, grouping repair activities as follows: 1) Remove and replace bridge approximately 200 feet down river; 2) Relocate around Site #2 (decommission 0.60 mile of Road 22 at Site #2); 3) Repairs to Sites #3-9 on existing Road 22, 2210 and 2211; and 4). Decommission 0.5 miles of Road 22-110

Removing the old bridge and construction of the new bridge entails no work in old forest habitat and limited vegetation removal at the new bridge site in the 100-year floodplain. Blasting is expected to be needed for the new bridge abutment on the north side of the river. The former bridge site would then be allowed to revegetate, although erosion control measure would be taken initially, including seeding and mulching. Relocation of Road 22 at MP 9.4 (Site #2) moves the road away from the Sauk River and upslope into primarily second-growth forest stands.

Repairs to the existing road (Sites #3-#9) are within or adjacent to older forest stands and would entail minimal removal of trees at the repair sites (only four trees < 21 inches dbh, trees are outside of critical habitat and without nesting structure for either owls or murrelets). The decommissioning of the road approaches to Site #2 (second growth forests) and Road 22-110 (older forests) would provide areas of minimal human disturbance and additional areas for forest stand development.

Threatened and Endangered Species

Grizzly Bear: This Alternative would have *no effect* would on grizzly bear since this species is not expected to be currently use the project area. There would also be *no effect* to grizzly bear

core habitat from the bridge relocation repairs of the existing road, or decommissioning the 0.3 miles on the west side of the MP 9.4 washout. Reduction in core habitat resulting from the relocation of Road 22 around Site #2 (MP 9.4) would be mitigated by road decommissioning associated with Alternative B. There would be an overall *beneficial affect* on core habitat and the amount of early and late season foraging habitat within core habitat (see Table 19 - Alternative B). The number of acres 'gained' of both early and late season foraging habitat within core habitat is based on current habitat conditions and would be a short-term occurrence. The forage acres that are included in this habitat analysis primarily include old clear-cuts and not natural openings. In another ten to twenty years, these acres would no longer provide foraging habitat for bears as stands age and canopy closure occurs.

Spotted Owl and Marbled Murrelet and their Critical Habitat: The Sustainable Ecosystems Institute (SEI) report (Courtney et al. 2004) identified three continuing threats to the spotted owl and murrelet: loss of nesting habitat (associated with timber harvest), catastrophic fire, and barred owls. Repairing and maintaining this road is not expected to contribute to catastrophic wildfire or an increase in barred owl, although barred owl is known to be present in the project area. It is expected that continued timber harvest (e.g. thinning) would continue in this watershed. All work on other project sites under Alternative B would result in no adverse affects from noise disturbance or habitat modification/alteration for the northern spotted owl due to no work in suitable habitat or timing restrictions for instream work and fish.

All project work under Alternative B would have no adverse affects due to habitat modification for the marbled murrelet . Project activities are outside of suitable habitat or expected to be within ambient noise levels of this area (river, road, and recreational use). Work at road sites, except for the bridge and bridge approaches, are within 75 yards of suitable habitat. The project work window to avoid impacts to fish habitat will result in work above ambient noise levels in the late murrelet breeding season. While the duration of work at any of the road sites is of short duration (one day or less), the effect determination for noise disturbance in un-surveyed suitable murrelet habitat is rated as a *may affect, likely to adversely affect adverse* to the marbled murrelet (see Table 20).

Timing restrictions, project site distance to suitable habitat, high visitor use of the bridge area, and vegetation buffer between the site and suitable habitat were factors considered in the affects determination for both the spotted owl and murrelet. Since the noise disturbance affect determination is along a previous moderate to high- use road system, work activity would be within a forest habitat subject to frequent motorized activity. Due to conflicts between wildlife timing restrictions with instream work restrictions for fisheries, project activities were consulted on for potentially adverse affects from noise disturbance for 133 acres of suitable nesting habitat for the marbled murrelet during the July 16 to August 6 period.

Table 19: Suitable Habitat Within 75 Yards of Project Sites with Potential for Noise Disturbance.

Site	Acres
Site #2	8
Sites #7, #8, #9	33
Sites #4, #5, #6, #3	74 acres
Road 22-110 (decommission)	18 acres

Repair work in these areas would be scheduled when possible to be outside of the critical breeding period for marbled murrelet (after August 6) and spotted owl (after July 16). Road 22-110 decommissioning under this Alternative would incrementally benefit designated critical habitat for the marbled murrelet in the long term with eventual stand development on 0.5 mile of decommissioned road.

Bald Eagle: No adverse affects from the repair sites of Alternative B would occur for the bald eagle This effects determination is based on timing restrictions on repair work that would avoid activities during the winter eagle use period; or, that there is sufficient distance between the project area and suitable foraging habitat to buffer any noise effects. Decommissioning Road 22-110 would lessen foot and vehicle traffic into an area where bald eagles have been observed perching and feeding (pers. comm. P. Reed, 2004).This may result in a long-term beneficial affect for wintering eagles that forage in the area.

Sensitive Species and Special Status Wildlife Species

Townsend's Big-eared Bats: Big-eared bats forage in both forested and non-forested environments and are found in arid and moist regions. As a result, they demonstrate little affinity for specific vegetation types, but appear to be primarily influenced by the availability of roosts. Roosts for this species are associated with caves, mines, and buildings. Both of the action alternatives for the Gold Mountain project would modify up to two to three acres of foraging habitat. Surveys of the White Chuck Bridge have detected no use of the bridge by Townsend's Big-eared bat, so the removal of the damaged bridge would have no impact on current roost sites. The construction of the new bridge could provide structure for roosting bats, but it is unknown at this time if the bats would utilize the future structure. The repair sites of Road 22 will result in a change in foraging habitat on 2-3 acres with less canopy closure in the road prism. The sizes of the repair sites or affected areas are comparable to gaps that commonly occur within old growth forests that provide foraging habitat for bat species.

Primary Excavators/Woodpeckers): The construction of the White Chuck Bridge and repair of Road 22 would result in shifts of 3-4 acres of national forest lands to be retained in road management. The sizes of the repair sites or affected areas are comparable to gaps that commonly occur within old growth forests that provide for a diversity of forest tree species and foraging habitat for woodpecker species. This alternative is not expected to reduce the number of available territories for primary excavators.

Black-tailed Deer and Elk: Deer and elk are not likely to be influenced by the bridge repair due to the proximity of this site to the high vehicle and public use on the Mountain Repairs. The relocations at other sites would be within the road prism or shift road use from near the river to upslope. Ungulate use would be minimally impacted due to little change in forage or thermal cover from Alternative B repairs. Return of vehicle access to flood damaged roads would likely shift elk and deer use away from the roads, but roadways would continue to provide elk and deer travel ways and green-up along roads would attract seasonal use as forage. While project activities may result in disturbance to these two species, given the mobility, the range sizes, and the presence of suitable habitat outside the vicinity of the project area, no adverse impacts are expected for either species

General Wildlife Habitat

Biodiversity: Existing habitat would be retained within the project area, with specific repair sites having approximately 1.3 acres of habitat change at the proposed bridge relocation. Species such as neotropical birds or bats would have habitat impacted with the shift in bridge location, but the scale and scope of the impacts from the other repair work would be mostly in the road prism and are limited in scope and impact on the surrounding vegetation. The bridge would continue to provide potential structure for roosting bats until it is removed, and a new structure is constructed that may or may not be attractive as a bat roost. The trees to be removed for the new approaches to the relocated bridge do not provide suitable roosting habitat for bats. There is one snag that is a size that could provide suitable roosting habitat for a small (<10) group of bats, but the

surrounding area has snags of comparable size and decay so the loss of one snag would not change habitat quality or result in a trend toward listing.

Return of vehicle traffic throughout the area would likely influence wildlife use of roadways and the immediate surrounding areas. Active motorized use of the roadways is suspected to result in less wildlife use in the immediate areas adjacent to Road 22 2210, and 2211. The decommissioning of Road 22-110 and 0.6 miles at Site #2 would result in long-term additions to forest habitat.

Under Alternative B habitat impacts to other wildlife species, wetland and riparian habitat snags and coarse woody debris are expected to be minimal and be located within or adjacent to established road prisms. No significant detrimental impacts to biodiversity are expected due to limited scale and scope of the project. Overall, in Alternative B, the decommissioning of roads within riparian areas are expected to provide additional connectivity of habitat for low mobility riparian species. Impacts to habitat are expected to be in the short term, with the impacts mostly within second growth stands that are well represented in the project landscape.

Timing restrictions for federally listed species are generally beneficial to other wildlife species by limiting noise disturbance from project activities during critical breeding periods.

Alternative B Wildlife Cumulative Effects

Due to lack of direct or indirect effects, there would be no cumulative effects for Canada lynx, larch mountain salamander, Van Dyke's salamander, gray owl, peregrine falcon, common loon, mountain goat, wolverine, gray wolf, or pine marten.

Grizzly Bear: Under this Alternative, there would be no effect for the grizzly bear since this species is not expected to currently use the project area. Other projects in the area have no potential for net change in core habitat with the exception of the Sauk Roads treatments that could provide for additional core habitat with up to four miles of road into storage or decommissioned

Spotted Owl and Marbled Murrelet: All projects included in this effects assessment had timing restrictions where necessary to prevent noise disturbance to listed species. None of the other projects reviewed for cumulative effects, (see Table 20) are within designated critical habitat for the spotted owl Therefore, no adverse effects would result for the spotted owl. Road 2141, placed in Level 1 storage as part of the Sauk Road Projects, and the decommissioning of Road 2200-110 under this Alternative would cumulatively benefit designated critical habitat for the marbled murrelet with eventual forest stand growth on closed roads.

When considering other projects' potential impacts, the major shift in habitat within the Mid Sauk River drainage (Sauk River above Clear Creek to Swift Creek) has been from past timber harvest. Timber harvest occurred in approximately 40.0 percent of the forested land in the Mid Sauk grouping of watersheds since 1900 (USDA 1995). This past timber harvest and its associated road construction have reduced nesting habitat for the northern spotted owl and marbled murrelet over the last 100 years. Current timber management within the mid Sauk Drainage is within second growth stands, with no change in suitable nesting/foraging habitat. Dispersal habitat is retained. The Gold Mountain Road Repair would not measurably add to any residual effects of past timber management.

Alternative B would modify up to 1.3 acre of vegetation at the White Chuck Bridge site that currently does not provide habitat for either species, and up to 1.5 acres of road prisms (Site #3–Site #9). Although the road repair sites host vegetation types that could develop into old growth forest (in the long-term), the area to be disturbed is too small to be meaningful to these species. The average spotted owl home range in the project area is approximately 4,270 acres. Therefore,

the area impacted is at 0.042 percent of the average home range. The sizes of the affected areas are smaller or comparable to gaps that commonly occur within old growth forests that provide nesting habitat for both species. Since no suitable spotted owl and marbled murrelet habitat would be affected, none of the alternatives would add cumulatively to past reductions in habitat area that led to the listing of the two species.

Spotted Owl, Marbled Murrelet Critical Habitat: With Alternative B and since 1990, at least 10 miles of road have been decommissioned in the Mid Sauk River drainage portion within critical habitat units for the spotted owl and murrelet (Spotted Owl Designated Critical Habitat WD-17 and Late Successional Reserves (LSRs) 115, 116). With an average width of 14 feet, the decommissioning of these roads has increased the area that can potentially provide future nesting habitat by approximately 15 acres. The trend since designation of critical habitat has been an increase in forest acres toward future nesting habitat. Habitat quality within designated areas (within potentially suitable habitat zones) has been increasing as previously harvested stands mature. For LSRs and critical habitat units, the cumulative effects of all activities have resulted in a net increase in habitat quality for future nesting habitat. The proposed decommission of Road 22-110 of Alternative B continues the trend of improving habitat quality in designated critical habitat (murrelet), which will also provide for spotted owls. There is 0.5 mile of Road 22 within spotted owl critical habitat, and the rest of the repairs of Road 22 are outside of critical habitat for either murrelets or spotted owl, so the cumulative impacts of projects would be a trend of improved condition of the critical habitat units.

Bald Eagle: No adverse affects from the other projects occurred or would occur for the bald eagle because of timing restrictions or because of sufficient distance between the project area and suitable foraging habitat to buffer any noise effects. No adverse affects would occur to the bald eagle from project activities under this Alternative for the same reasons, therefore no cumulative effects are expected. Decommissioning Road 22-110 would have seasonal restrictions for the culvert removal so the work would be accomplished outside of the use time that bald eagles might be in the area. The road decommission would result in less foot and vehicle traffic into an area where bald eagles have been observed perching and feeding (pers. comm. P. Reed, 2004).

Special status Species

Townsend big-eared Bat: Timber harvest on over 129,000 acres in the Mid Sauk drainages of the National Forest System lands since1900 has modified foraging habitat for this species but has not affected the availability of roost sites. Therefore, cumulative changes to foraging habitat would not affect the distribution or populations of this species, which is suspected to be controlled by the availability of maternal roost sites, which are not known to have been affected by previous actions, or by any of the alternatives.

Primary excavators/Woodpeckers: Timber harvest on over 129,000 acres in the Mid Sauk drainages of the National Forest System lands since1900 has modified foraging habitat for woodpeckers and species that use snags and down wood. Populations of these species have likely decreased where harvest activities have occurred. The habitat value of lands harvested more than 30 years ago is increasing for woodpeckers but probably would not reach maximum potential until larger diameter trees develop. Alternative B is not expected to add to the cumulative effects of past timber harvest for primary excavators, and due to the limit scale and scope of the other projects, the number of available territories for primary excavators, is not expected to change .

Black-tailed deer and Elk: Due to the limited scale and scope of Alternatives B repair sites with reconstruction of a current road system, there are no expected major impacts to ungulates. Other flood repair projects are also expected to be minimal and not result in a shift in the forage and

cover available for deer or elk. There are no cumulative effects from the Gold Mountain project due to the limited scope and scale of these projects resulting in small shifts of forage or cover that do not translate into a difference in carrying capacity for deer or elk.

Biodiversity/ Neotropical Migrants Landbirds: No measurable impacts to biodiversity are expected because of Alternative B implementation. Overall, decommissioning roads and sections of roads within riparian areas are expected to benefit biodiversity. These activities, in addition to those of the other projects, will benefit biodiversity in the long term by increasing stand heterogeneity and coarse woody debris recruitment. Although there would be some short-term impacts (one growing season for disturbed ground) within the road prisms and approximately 1.3 acres of second-growth area at the bridge, no adverse cumulative impacts are expected due to the small scale and short-term nature of potential impacts. Size of repair sites is comparable to gaps found in forest stands from a root rot pockets, wind throw, and mortality from insect or disease. The limited scope and scale of the repair projects across the watershed would not be measurable in habitat shifts or habitat affects for neotropical migrant landbirds.

Alternative C Wildlife Direct and Indirect Effects

Alternative C also proposes to re-establish vehicle access to Gold Mountain with construction of a new White Chuck Bridge, and repair of a portion of the flood-damaged roads. Alternative C effects are similar to Alternative B with the exception the upper reroute and decommissioning of Road 22 between Sites #3-6. No additional affects from the Actions Common to Alternative B will be discussed below[26]. Alternative C shifts vehicle access out of contiguous late-successional forested habitat on the toeslope of Gold Mountain to the upper portion of the southwestern slope of Gold Mountain, and the effects are discussed below.

Federal Threatened and Endangered Species and Designated Critical Habitats

Grizzly Bear: The rerouted portion of Alternative C (associated with Road 2210-014 and 2420-060 would result in a change of core habitat and foraging habitat (Alternative C). This table shows the expected increase of early and late (season) core habitat and the expected change of early and late (season) foraging within core habitat. However, the number of acres changed in both early and late season foraging habitat is based on current habitat conditions, and would be a short-term occurrence. The acres that have been identified as changed in forage habitat analysis primarily include old clear-cuts and not natural openings. In another ten to twenty years, these acres will no longer provide foraging habitat for bears as stands age and canopy closure occurs.

Spotted Owl and Marbled Murrelet: Alternative C re-route between Roads 24-060 and 2210-014 parallels the northernmost edge of a stand of late-successional habitat; and does enter the edge of this stand toward the west end for approximately 0.25 miles. This stand is suitable nesting habitat for both the spotted owl and marbled murrelet. The Alternative C route would re-open Roads 2420-060 and 2210-014 (into second growth stands), and would require 3,400 feet of new road construction to connect them (approximately half of the construction would be in old forest and half in second growth). The new construction includes the removal of a number (estimate 10 to 20) of large (30 – 60” DBH, one western red cedar of 75” DBH) conifers and a number (estimate 10-20) of smaller (< 30” DBH) conifers, including Western hemlock, Douglas-fir, and western redcedar. While the larger diameter trees (30-60 inches dbh) provide suitable nesting structure for both the spotted owl and murrelet, this reroute would be entirely outside of designated critical habitat for the spotted owl and marbled murrelet.

[26] Alternative C actions that are common to Alternative B include: relocate the White Chuck Bridge, relocate Road 22 around MP 9.4 with decommissioning of 0.6 mile of approach road, repair of road sites on 2210 and 2211 (sites #7 to 9) and decommission Road 22-110.

Decommissioning three miles of Road 22 and relocating an access route upslope on the southwestern side of Gold Mountain would be a trade-off of vehicle noise in suitable habitat with potential noise disturbance shifted from a site with 80 percent suitable habitat to upslope with 50 percent suitable habitat. Road 22 has over-reaching canopy and provides minimal disruption in contiguous habitat for arboreal species such as the spotted owl or marbled murrelet, the decommissioning of this section of Road 22 would retain stand continuity with eventual reforestation of the 0.5 miles of road within designated critical spotted owl habitat.

Alternative C is not likely contribute to other threats to spotted owl such as catastrophic wildfire or increased competition from the barred owl that is known to be present in this area. This proposed new access route could facilitate timber harvest (e.g. thinning) especially in younger stands, which are present on the southwestern side of Gold Mountain. A number of studies, only a few of which are cited here (Carey 2003; Carey and Wilson 2001; Muir et al. 2002 IN: Courtney et al. 2004 [SEI Report]) show that variable density thinning in younger stands has considerable potential for accelerating development of spotted owl habitat and dense prey populations.

Work on this re-route could start as early as July 15, so there could be a total of 13 acres of suitable nesting habitat for the murrelet adversely affected by above ambient noise levels.

Bald Eagle: Road 22 is a sufficient distance (varies from 370 to 950 feet) from the river with a thick vegetation buffer to mitigate any noise disturbance to wintering eagles that would be present. The proposed re-route would be over 0.50 miles from the river with no known eagle night roost activity. As a result, no adverse affects to the bald eagle are expected from proposed repair or relocation activities, and work can proceed for the road decommissioning and the re-route from July 15 to March 1, with no *adverse affect* to the bald eagle. Decommissioning Road 22-110 would be accomplished outside of the use time that bald eagles might be in the area. The road decommission would result in less foot and vehicle traffic into an area where bald eagles have been observed perching and feeding (pers. comm. P. Reed, 2004). This may result in a long-term beneficial affect for wintering eagles that forage in the area.

Sensitive Species and Other Special Status Wildlife Species

Deer and Elk: There is suitable hiding and thermal cover and some foraging habitat for deer in the area adjacent to Road 22 Removing culverts and fill during the decommissioning of this road would not be expected to significantly impact these two species during implementation. The proposed re-route provides suitable foraging, hiding, and thermal cover for deer and elk. Foraging habitat is present along the proposed re-route in natural openings, including several wetland/riparian areas. During a field review of this proposed re-route, extensive ungulate use was observed (e.g. pellets and bedding sites). Deer are known to use the general area of Gold Mountain; while elk have been transient in the area, but to date, no herds of elk have established seasonal ranges that consistently occupy the area. While project activities may result in disturbance to ungulates, given the mobility, the large range sizes, and the presence of suitable habitat outside the vicinity of the project area, no adverse impacts are expected for either species

Townsend's big-eared bat and other bats, Primary Excavators, and Neotropical Migrants Landbirds; Suitable nesting /roosting habitat for primary excavators, neotropical birds, and bats would not be affected during the decommissioning of Road 22 in Alternative C. Only a few shrubs or small saplings may need to be removed within the existing road prism in order to remove the culverts and fill. Some noise may disturb species within habitat immediately adjacent to the road being decommissioned but due to the relatively short duration of the work at any one site (1-4 hours at a site) the noise is not expected to result in adverse impacts.

Suitable nesting /roosting /foraging habitat are present for all three species groups within and adjacent to the proposed reroute. The start time of July 15 would likely prevent significant direct impacts to primary excavators and neotropical migrants, although some mortality to unfledged juveniles could occur. Project activities may also result in short term avoidance of the immediate area by these species. The possible mortality would not be expected to lead to a trend in federal listing. Since most young would likely have fledged by this time, these species are mobile, and there are foraging areas available away from the project areas, the effects of this project activity are expected to be minimal.

A number of large trees within the project area that could be removed (estimated to be <6) as part of project activities could provide suitable roosting habitat for bats. Suitable roosting habitat for the Townsend's big-eared bat is not present within the project area. Noise disturbance to mature forest with potential bat roost is possible in sites adjacent to the project... Potential mortality of bats using roost trees that would be removed as part of project activities is possible, but not likely due to the mobility of the species... Groups of bats using trees can range from one individual to several hundred with a typical group size being small (< 15). The timing restrictions for listed species and instream work are expected to minimize impacts from noise and from losses of young during removal of potentially suitable roost trees. Most female bats can move their pups to a new roost site if noise is above their tolerance limits (Nagorsen and Brigham 1993). Due to conservation measures in place, no significant impacts to bats are expected therefore, a trend in federal listing is not a concern.

Biodiversity: Decommissioning Road 22 would impact very little additional riparian habitat within the existing road prism. In the long-term riparian habitat in stream crossings of this road would be re-established. There are a number of stream crossings and associated riparian areas along the length of Roads Road 2210-014 and 2420-060 and the new road that would be impacted. No snags would be removed and coarse woody debris would be left on site. There would be a number of snags (< 6 snags) and several larger diameter conifers (estimate of 14-18 trees 10 to 20 inches dbh) that would have to be removed during the reconstruction/construction of the proposed re-route. Some coarse woody debris would also be altered or removed because of the re-route, which would include some large diameter conifer logs. Construction activities for the re-route would start to occur July 15 due to instream work restrictions for fisheries. This work may extend up to March 1. These timing restrictions would delay project activities outside of spring and early summer when young are most vulnerable. As a result, no significant impacts to other wildlife species are expected.

Alternative C Wildlife Cumulative Effects

The cumulative effects for Alternative C for all species except grizzly bear, spotted owl, and marbled murrelet would be the same as Alternative B. Minor differences in cumulative effects from the reroute/decommissioning of sections of Road 22 are noted below.

Grizzly Bear: Implementation of Alternative C would have a short-term change of early and late season foraging habitat within core habitat, but no net loss of core habitat. This determination was based on current habitat conditions, which include old clearcuts. Natural openings are not present in the areas of consideration. Therefore, in the long term, a change of foraging habitat would not occur as tree stands grow and canopy closure occurs. Other projects in the area have no potential for net change in core habitat, with the exception of the Sauk Roads treatments that could provide for additional core habitat with up to four miles of road into storage or decommissioned. Under Alternative C, there would be no effect for the grizzly bear since this species is not expected currently use the area at this time.

Spotted Owl and Marbled Murrelet: Due to conflicts with fisheries timing restrictions for instream work, the Gold Mountain Road Repair project activities could result in potentially indirect adverse affects from noise disturbance for up to 146 acres (total under Alternative C) of suitable nesting habitat for the marbled murrelet. An estimated 1.5 acres of suitable nesting habitat would be removed with the new road construction in Alternative C. None of the habitat is within designated critical habitat for either marbled murrelet or spotted owl. The other projects included in this cumulative effects assessment (see Table 20), would not result in adverse affects to either the spotted owl or marbled murrelet. Therefore, there would be no additional cumulative affects to these two species then what has been reported in the flood repair projects.

Under this Alternative, there would be an overall benefit to critical habitat for spotted owls since the section of Road 22 within designated critical habitat for the owl would be decommissioned. Road 2141, placed in Level 1 storage as part of the Sauk Road Projects, and the decommissioning of Road 22-110 under this Alternative would cumulatively benefit marbled murrelet designated critical habitat.

However, no cumulative effects from other projects are expected due to the projects' distance from suitable nesting habitat and timing restrictions for other project activities to prevent adverse affects from occurring. Dispersal habitat would be retained with all projects.

Table 20: Other Projects Assessed as Part of Wildlife Cumulative Effects.

Project/Activity	Extent/Description	Potential Impact	Status/Comment
Gold Mountain Communication Tower	New lighted communication tower at the end of Road 2420-014	Possible direct impacts (e.g. mortality) to migratory birds.	Project started in 2005, and in progress. Effects limited to tower site.
Skull-Funnybone Commercial Thin (second-growth)	Commercial thin of 480 acre of 50 to 70 year old stands, 8 acres, riparian reserve w/ 70% canopy retention.	Canopy/ snag reduction. Adjust riparian habitat, adjust stand structure	Sale awarded, but not finished. Implementation started in 2004. No adverse cumulative effects to listed species or other special status species.
Wishbone Thin Timber Sale (second-growth)	404 acres thin, approximately 180 acres in Riparian reserves(upper Dan Creek, lower Conn/Decline Creeks); 2.5 miles road reconstruction; 1.9 miiles temporary road.	Canopy/ snag reduction. Adjust riparian habitat, adjust stand structure	1996-1998. Treatment along Dan/Conn Creeks to improve riparian area. Project for timber stand development, likely to improve foraging habitat for owl. Mitigation measures were adhered to, and there are no adverse cumulative effects to listed species or other special status species.
Too/Rib ThinTimber Sales (second growth)	360/480-acre thins, 10 acres in Riparian reservesw/70% canopy retention (upper Dan, Sauk by White Chuck)	Canopy/ snag reduction. Adjust riparian habitat, adjust stand structure	1998-2000. Timber stand development project, likely to improve foraging habitat for owl. Mitigation measures were adhered to, no adverse cumulative effects to listed species or special status species.
Timber Stand Improvement	419 acre precommercial thinning/release on Gold Mountain.	Stocking adjustment of stand	Project completed in1999-2001. Activities improved future wood recruitment quality and stand structure.
Forgotten Thin Timber Sale (second growth and mature)	400 acre proposed thin of second-growth in the Brown Creek to Falls Cr. drainage	Canopy/ snag reduction. Adjust riparian habitat, adjust stand structure	Proposed. Timber stand development project, likely to improve foraging habitat for ungulates, maintain owl dispersal habitat. Mitigation measures for no adverse cumulative effects to listed species/other special status species
Sauk Roads Erosion Control Projects I and II	25 miles of road maintenance or roads in storage	Increase core habitat	2003/2005. Approximately 6 miles of storage completed in 2003, 3 miles in 2005, 10 miles of upgrade.
Roads Mileage - Decommissioned	A total of 10 miles of road decommission in Falls Cr., Helena Cr., Goodman Cr. and Prairie Mountain area.	Increase core habitat, and increase in forest cover in critical habitat areas.	No negative cumulative effects. Increased future forest cover from decommissioning of roads. Roads for designated habitat for spotted owls and marbled murrelets. Decommissioning increased bear core habitat.
Road Maintenance	12 miles of Road 24 and Road 22 systems.	Noise disturbance in suitable nesting habitat	No additional cumulative effects. Part of moderate to high use roads.
Other ERFO repairs	Mtn.Loop Highway, White Chuck, and Suiattle Roads	Noise disturbance in suitable nesting habitat	No additional cumulative effects. Part of moderate to high use roads.
Lyle Thin (second-growth)	200 acre thin of second-growth timber.	Canopy/ snag reduction. Adjust riparian habitat, adjust stand structure	No adverse cumulative effects to listed species or special status species.
Past timber harvest (1922-2000)	12, 900 acres of past timber harvest in the Mid Sauk River (from Clear Creek to Swift Creek)	Decrease in suitable nesting habitat for spotted owl and marbled murrelet, loss of foraging and nesting habitat for woodpeckers, and bats	No additonal cumulative effects – maturing of forest stands provides dispersal habitat and foraging.
Gold Fire Timber Salvage.	16 acres dead/dying trees; 100 acres of reforestation	Potential for impacts to snag reduction.	Completed in 2005. No adverse effects, retention of over 100 acres of burned area with snags.

Botany Affected Environment

In the project area, the stands are a mix of age classes, ranging from stands 15 years of age to 500 years of age. In those actual sites where road repair work in place would occur or where habitat-disturbing activities are possible, the oldest stands are approximately 300 years old, and most stands are 70 years old and younger.

Survey and Manage: As noted in Chapter I, "Relationship to the Forest Plan," on January 9, 2006, a U.S. District Court decision reinstated the 2001 ROD that amended the standards and guidelines for survey and manage species (including protection buffer species and other mitigation measures). This includes any amendments or modifications to the 2001 ROD that were in effect as of March 21, 2004. The latest modification was the December 2003 Table 1-1 species list update from the Interagency Annual Species Review.

In order to be in compliance with the 2001 ROD, as amended or modified, pre-disturbance surveys for Category A and C species need to be completed in all areas where habitat disturbance is proposed. \ On the Mt. Baker-Snoqualmie National Forest, internal Botany Program procedures direct botanists, to the extent possible, to document all species (vascular plants, bryophytes, lichens and fungi) during pre-disturbance surveys, regardless of what is on the agency lists at the time of the survey. For this reason, pre-disturbance surveys have been completed to protocol consistent with the 2001 ROD. In order to be in compliance with the 2001 ROD, it is also necessary to manage known sites of Survey and Manage species in categories A, B, C, D, and E. There are no known Category A through E sites to manage in this proposal. See discussion on *Usnea longissima,* below.

Botanical surveys of the proposed road re-routes and proposed road decommissioning occurred on June 17, June 22, and June 23, 2004. Road re-routes include the Road 22-013 connection to Road 24-023, and the Road 2420-060 connection to Road 2210-014. The proposed road decommissioning included examination of Road 22-110. These were Level 5 (intuitive controlled) surveys using the April 2004 Regional Forester's Sensitive species list[27].

A botanical survey of the proposed site for the White Chuck Bridge relocation and the area in between the old bridge site and the proposed site was completed on March 9, 2005. This survey cannot be considered a Level 5 survey (the standard for botanical surveys) because of the time of year it occurred. Outside of the bloom season, some of the vascular plant species cannot be identified. It is an appropriate time of year, however, to survey for bryophyte and lichen species. This survey also used the April 2004 Sensitive species list. The other sites damaged by floods were not surveyed because proposed work would be restricted to the road prism, where suitable Survey and Manage and Sensitive species habitat is not expected. These areas received a general field review, however.

During the 2005 survey, the Survey and Manage lichen *Usnea longissima* was found in the project area near the proposed bridge site. This is a Sensitive species, as well as a Category F Survey and Manage species. Management of known sites is not required. This species is rather common on the north end of the Forest as well. As a Sensitive species, the Forest Supervisor decided to treat *Usnea longissima* like any other common plant when found north of Stevens Pass. (A copy of the July 29, 2004 letter is contained with the Botanist's report in the analysis file for the Gold Mountain Road Repairs project). No other Sensitive, or Survey and Manage, plant species were found.

[27] The Regional Forester's Sensitive Species list was the only one in effect at the time.

The Bureau of Land Management's Survey and Manage Geographical Biotic Observations database (dated January 2006) shows a site of the lichen *Nephroma bellum* located approximately 800 feet away from the nearest project location, the proposed connection of Roads 22-013 and 24-023. This is a Category E species, where management of all known sites is required. No specific management direction exists for this species, but it is discussed briefly along with other species in its group in Appendix J2 from the 1994 Northwest Forest Plan ROD. In Appendix J2, the mitigation measures are to maintain old growth fragments, and maintain colonized trees in wind-firm clumps in sufficient area to maintain suitable microclimate amelioration. Sufficient area is defined as at least four acres. In this case, at nearly 800 feet away from the nearest project site, a circle drawn around the *N. bellum* would equal approximately 46 acres.

The BLM database shows one site of the Survey and Manage fungus *Cudonia monticola* at the same location as the *N. bellum* described above. This is a Category B species, where management of all known sites is required. No specific Management Recommendations exist for this species either, but it is discussed briefly in Appendix J2. In that document, mitigation is described as: conduct general regional surveys, determine if management is necessary to protect known populations, and within harvest areas in Matrix aggregate leave trees to provide adequate interior microclimate and duff layer. No definition of "adequate" is given. However, 46 acres seems likely to be sufficient to provide an adequate interior microclimate.

There is also a known site of the fungus *Sparassis crispa*, located approximately 0.3 mile north of the proposed connection between Roads 24-023 and 22-013. This is a Category D species, where management of high priority sites is required. No specific Management Recommendations exist for this species either, but it is discussed briefly in the 1994 Appendix J2. Mitigation measures focus on retention of clumps of green trees. This site is far enough away from the proposed project site that no effect is anticipated.

The noxious weed herb Robert (*Geranium robertianum)* was found extensively along Road 22 northwest of the junction with Road 24 and sporadically east of Road 24. A small amount was also found on Road 22-110 spur. The noxious weed orange hawkweed (*Hieraceum aurantiacum*) was found sporadically along Road 22 northwest of Road 2210 and a small amount in Road 22-110. Other noxious weed known from the area include invasive knotweed (*Polygonum X bohemicum*, probably) recorded at Road 24 near Road 24-023 and at the end of spur 22-013. Orange hawkweed is known from along the Mountain Loop Highway and Road 24 near the Sauk Prairie Road. A small patch of tansy ragwort (*Senecio jacobaea*) has also been found in the past along Road 24 near the Sauk Prairie Road, where it was pulled each time it was seen. The two sites of invasive knotweed in the project area will be treated, as per the June 2005 decision on Forest-wide treatment of invasive plants (and New Invaders Strategy). Both are small clumps.

Botany Environmental Consequences

Alternatives A-C Botany Effects

Under all of the Alternatives there would be *No Effect* to Sensitive or Survey and Manage species because none are present (see note previously about *Usnea longissima*). The survey of the bridge sites occurred outside the normal survey window for the vascular species. However, this stand is not suitable habitat for the vascular Sensitive or Survey and Manage species and none are suspected there.

The current management recommendations or guidance for the fungi *Sparassis crisp*a and *Cudonia monticola* have been reviewed. Given the distance of the known sites to the proposed

road repairs, there would be no impact on known sites from implementation of any of the alternatives. The current management direction or guidance for the lichen *Nephroma bellum* was reviewed, and given the distance from this site to the proposed road repairs, there would be no impact on it from implementation of any of the alternatives.

There would be a slightly higher likelihood of spread of invasive plants under the action alternatives due to soil disturbance, but the mitigation measures should minimize this. Regardless of which alternative is selected for implementation, the weeds would be scheduled for control, as per the 2005 decision on noxious weed control on the Mt. Baker-Snoqualmie**.**

Botany Cumulative Effects

There would be no cumulative effects to Sensitive species because none is present (see previous note about *Usnea longissima*). There would be no cumulative effects to the Survey and Manage species because none were found in the project areas (see again note about *Usnea longissima*), and known sites are too far away to be impacts.

There are several other projects in the Gold Mountain area that, collectively, could have cumulative effects on noxious weeds' spread. On going or proposed on the west side of Gold Mountain area are the Gold Hill Fire salvage (completed in 2005), the communications site on the north end of Gold Mountain (on going), and the Sauk Roads Erosion Control. Cumulatively, these could lead to a higher likelihood of noxious weed spread on the road systems on the southwest side of Gold Mountain, but weed control mitigation measures have been applied to each project.

In addition, there is on-going weed control work along the Mountain Loop Highway by Snohomish County Noxious Weed Control, which is reducing the orange hawkweed population. The cumulative effect would be expected to be minor.

Heritage Resources Affected Environment

The Sauk River/Sauk Forks Watershed Analysis (USDA Forest Service 1996) provides an overview of the past uses and known heritage resources near the project analysis area. Information specific to the area was gathered by using record searches and a heritage resource field survey to identify historic properties that may be affected by the proposal, and to provide a contextual framework within which documented heritage resources can be evaluated. In addition, information was provided through government-to-government consultation with the local tribes, and through consultation with the State Historic Preservation Office (SHPO). Information gathered because of these efforts is summarized below and in an analysis file to provide a background for the evaluation of impacts on historic properties (see Environmental Consequences section).

For this project, the Forest Service has fulfilled its general trust responsibilities through the proper management of natural resources as determined in the Forest Plan as amended, and through continued consultation with Indian tribal governments.

The proposed action has been determined to meet the definition of an "undertaking" pursuant to Section 301(7) of the National Historic Preservation Act (NHPA). The Forest's responsibility to address the effects of a proposed undertaking on historic properties is fulfilled through a Programmatic Agreement developed in consultation with the Advisory Council on Historic Preservation (ACHP) and the Washington State Historic Preservation Office (SHPO) pursuant to Section 800.13 of the 1986 Regulations (36 CFR 800) implementing Section 106 of the NHPA.

Records search determined there was a high potential for heritage resources associated with the Sauk River Lumber Company National Register Historic District (i.e. railroad grades and their associated features). Review of the Inventory of Native American Religious Use, Sites, Practices, Localities (Blukis Onat and Hollenbeck, 1981) identified one area potentially of concern to local tribal groups. Tribal groups provided no response during initial scoping that this or any other heritage resources within the area of potential effect (APE) were resources of concern to American Indians**.**

The APE for the proposed project was determined pursuant to Programmatic Agreement Regarding Cultural Resources Management on National Forests in the State of Washington (PA) and 36 CFR Part 800.2 (c). Surveyed locations and intensity were determined in accordance with the Forest's Cultural Resource Inventory Strategy (Hearne and Hollenbeck, 1996). A cultural survey of the project area was completed in the summer of 2004. Surveys identified and documented five segments of historic logging railroad grade associated with the Sauk River Lumber Company. Following Secretary of Interior Standards and Guidelines for Evaluation, and 36 CFR Part 63, the Forest has reached the following determinations of effect. As of May 2005, the Forest in consultation with the State Historic Preservation Officer (SHPO) received concurred with the findings of "No Adverse Effect" based on the proposed mitigations measures for the project (see Mitigation Measures section of this document in Chapter 2).

Heritage Resources Environmental Consequences

Alternatives A-C

In addition to potential effects to recorded (known) resources, the project could have effects to heritage resources that remain unknown because of difficulties locating resources in areas of steep topography or where the forest undergrowth or duff is thick and may obscure resources, or because tribal representatives may be reluctant to identify traditional cultural properties.

Alternative A

Constructed historic landscape features (e.g. railroad grades, through-cuts) would become more obscure and may slump or fail due to natural processes. Objects and features made of organic materials would continue to decompose (e.g. wooden culvert). Non-organic artifacts (e.g. metal cable) would not be disturbed, and would deteriorate over time. The decreased access to the area and reduced use of roads, which were previously railroad grades, would have minor beneficial impact by decreasing potential for looting and impacts from road maintenance.

Alternatives B and C

Road reconstruction and reengineering related to re-routing Road 22 traffic on to roads 22-0013 and 24-0023 potentially impacts two segments of historic railroad contributing to the Sauk River Lumber Company National Register Historic District. In order to reduce and document any unforeseen potential effects to these contributing segments a mitigation/protection plan was developed in accordance with PA and consultation with other Forest resource specialists and SHPO, see Mitigation Measures section of this document. These mitigation measures reduce the effect of both Alternative B and C to No Adverse Effect to historic properties.

Heritage Resources Cumulative Effects

Past actions and natural events that preceded the creation of the National Historic Preservation Act of 1966 and other historic preservation laws that impacted an unknown number of heritage resources that might today qualify for the National Register of Historic Properties. Several miles of railroad grade have been converted to roads and no longer retain integrity of surface or width

characteristics of pre-1950s logging railroads. Actions in the most recent past have resulted in effects to a relatively small number of known historic properties in the Sauk River Watershed.

Since 1986, at least two Sauk River Lumber Company sites have been impacted as a direct result of timber harvest activities or in one case, site vandalism, which may have been an indirect effect of timber harvest activities. With the implementation of Alternatives B and C, there would be no cumulative effects to known individual cultural resources in and around the project area. Mitigation measures would be implemented with both action alternatives to protect the integrity of known cultural resources. With Alternative B and C, the proposed project would not contribute cumulatively to adverse effects to the integrity of this historic district.

Treaty Resources/Reserved Indian Rights Affected Environment

Treaties, statutes, and executive orders obligate federal agencies to fulfill certain trust responsibilities. The extent to which treaty resources (related to hunting, gathering, and fishing on NFS lands) are present or to which federally recognized tribes depend on the project area for treaty resources is not fully known. Lacking specific information from some tribes regarding treaty resources in the project area, this discussion focuses on a narrow range of resources recognized as having high values to Indian people for subsistence, cultural, and ceremonial uses (e.g. western red cedar, deer, elk, and salmon).

Treaty Resources Environmental Consequences

The rights of tribal members to access NFS lands and exercise Treaty rights are unchanged. There may be indirect and cumulative effects to tribal hunting, gathering and fishing practices related to changes in management, access, and effects to fish, wildlife and plant resources. These effects may be positive (e.g. increased forage for large game) or negative (e.g. because of habitat impacts from temporary roads). Refer to the various resource sections for discussions of environmental consequences. For this project, the Forest Service fulfills its general trust responsibilities through the proper management of natural resources as determined in the Forest Plan as amended, and through continued consultation with Indian tribal governments.

Local Economy/Tourism Affected Environment

According to the U.S. Census 2000 for the local area (Census Tract 537), the four primary industry types in the local area are: 1) manufacturing; 2) education, health, and social services; 3) construction; and 4) agriculture, forestry, fishing, hunting, and mining. The median household income in 2000 was $35,052 and approximately 8.3 percent of households live below the poverty level.

Local Economy: The Darrington community includes the Hampton Lumber Company, Oso Lumber and Truss Company, the Darrington School District and the USDA Forest Service as major employers. The community has attempted to diversify the local economy to increase tourism and recreation with support for state and national archery tournaments, the Blue Grass Festival, a local rodeo, and supported festivals in Darrington and neighboring communities (Wildflower Festival, Skagit Bald Eagle Festival, Festival of the River, etc.). Recreational visitors are attracted to the area for a variety of outdoor pursuits and recreational driving, with access to recreational sites an important part of the desired recreational experience for both local residents and visitors. Recreational users spend money on food, transportation, lodging, fuel, supplies and other services for travel to and from their recreation sites. Some of the money would be spent along the way and possibly near the destination site. These expenditures contribute to personal

income and to the creation and maintenance of jobs in the affected economic sectors (e.g. lodging, gas, groceries, restaurants, auto repair, etc.).

In the Gold Mountain area, recreation use is likely a combinations of both local and recreation users from the greater Puget Sound area. The Sauk River and the White Chuck Boat Launch has been a popular destination for both private and commercial river rafters, and kayakers. The Gold Mountain area also has the lowland White Chuck Bench trail, and the area is used for camping, hiking, climbing, kayaking, rafting (both private and commercial), fishing and hunting, mushroom, berry, fern, and cone collection, bird watching, bike riding, Christmas tree cutting, and recreational driving. While much of the use is day use, recreationists typically spend money in the Darrington area for incidentals like snacks, drinks, food and supplies, restaurant meal on the way through, gas fill ups or guide services. While only a portion of the recreation trip expenditures may actually be spent in the Darrington area, numbers of users through the area can add up.

Local Economy/Tourism Environmental Consequences

The No Action alternative (A) would continue to displace recreational users on Gold Mountain. River recreationists would continue to use other rivers or access the river in other locations. Other users (camping, hiking, climbing, kayaking, rafting (both private and commercial), fishing and hunting, mushroom, berry, fern, and cone collection, bird watching, bike riding, Christmas tree cutting, and recreational driving.) would also be limited by lack of access and may shift use and expenditures on recreation to other areas. As reported earlier (see EA page 58), the flood impacts would also influence the timber industry with increased haul costs computed for some timber sales off Gold Mountain due to the longer routes with less of the route on county road. There would be no socioeconomic benefits to the local businesses or local community from the No Action alternative.

Both of the Action Alternatives (B and C) would restore access to the White Chuck Boat Launch and dispersed recreation sites of Gold Mountain. The return of recreational users to the area is likely to result in a concurrent return in visitor spending on food, transportation, lodging, fuel, supplies and other services for travel to and from their recreation sites. These expenditures would contribute to personal income and to the creation and maintenance of jobs in the affected economic sectors (e.g. lodging, gas, groceries, restaurants, auto repair, etc.). Haul costs for timber sales would be reduced with short haul routes and use of the Mountain. The hauling cost would be about 50 percent less than hauling over Gold Mountain on Road 24 (see EA page 58). While the effect may not be measurable in the local economy separate from general fluctuations brought on by a variety of other factors (national and regional economy, weather, events in Darrington, etc.), the expectation is a positive trend in expenditures within the community.

In summary, the economic impact on the Darrington area because of the alternative chosen is likely to be small, but would be a positive impact due to the shorter haul routes for timber sales and return of visitor expenditure in the local economy. None of the Alternatives would necessarily create new jobs for people, but the action Alternatives would create contracts for existing companies to bid on while the No Action Alternative would not.

Local Economy/Tourism Cumulative Effects

Cumulatively, the repairs to the Gold Mountain roads Mountain Loop Highway, Suiattle Road, 26, the Boundary Bridge, and the White Chuck Road 23, would result in re-establishment of access to recreational sites. Areas that would be accessible once more are the White Chuck

drainage, the Suiattle drainage, the White Chuck Boat Launch, Glacier Peak Wilderness, and dispersed recreation sites for a wide variety of users[28].

Driving for pleasure is considered a major recreational pursuit on the National Forests, and the cumulative effects of the Gold Mountain project with other projects in the Sauk watershed is to re-establish the access to the White Chuck Boat Launch, restore access for dispersed recreational use on Gold Mountain (17 miles) and access on both the Mountain Loop (44 miles), and the White Chuck Road (10.6 miles). Restored vehicle access provides a recreational activity for a segment of the population not able to actively hike or climb, and who rely on recreational driving for enjoyment of their national forests. It is anticipated that use of trails, rivers, and campgrounds, such as Bedal on the Mountain Loop Highway, and other dispersed sites, would return to similar use numbers or higher than the use prior to the 2003 flooding, based on visitor numbers at the Darrington Ranger Station (see Table 21). Based on numbers of users at the Bedal Campground on the Mountain, during the summer of 2004 (post-flood), there was a 56 percent reduction of people using that fee campground.

If none of the 2003 flood damage were repaired (no action alternatives on the Gold Mountain Road system, Mountain Highway, Suiattle Road 26, the Boundary Bridge, and White Chuck Road 23), the cumulative recreational effect on the Darrington District would be the continued displacement of all types of recreation users to other parts of the MBS, and potentially off-forest. As shown in Table 21, there has been a drop of approximately 4,000 visitors/year at the Darrington Ranger Station or 1/3 of the pre-flood visitation.

Since the Gold Mountain road system, Mountain Highway, Suiattle Road 26, the Boundary Bridge, and White Chuck Road 23 would remain washed out, there would be a continuing impact on Darrington businesses from the reduced number of tourists and recreations[29]. The following table displays the number of visitors at the Darrington Ranger District Office over the past seven years.

Table 21: Visitors* to Darrington Ranger District Office

Year	Visitors
2005	7,361
2004	7,011
2003	10 851
2002	11,021
2001	9,824
2000	8,941

- Walk-in the door counts do not include phone calls, mail or e-mail responses to other visitors that may use the area.
- There were significantly fewer visitors at the Ranger District office in 2004 and 2005, after the October 2003 flood washed out many roads and trails.

Local businesses report impacts in sales due to decreased visitors and a letter from the Mayor of Darrington (August 2005) indicates that the drop in tourism has affected the businesses in town (letter on file at the Darrington Ranger District). While it is unknown to what degree the loss of road access has had on local businesses, the indications are a negative effect on the local economy.

The economic impact on the Darrington area from the other projects may each be small. Cumulatively the repairs may result in a positive economic effect due to the shorter haul routes for timber sales on Gold Mountain and the return of visitor expenditure in the local economy.

[28] Including commercial and private rafters and kayaks from the White Chuck boat launch and mushroom and cone collections, berry picking, camping, hunting, and fishing in the Gold Mountain, Suiattle, and Mountain Loop areas.
[29] A letter from the Mayor of Darrington (August 2005) indicates that the drop in tourism has affected the businesses in town. (letter on file at the Darrington Ranger District).

Wilderness, Inventoried Roadless Areas, Unroaded Lands

The proposed Gold Mountain road repair and White Chuck Bridge replacement are **not** located within congressionally designated wilderness or within Inventoried Roadless Areas.

The closest wilderness, Glacier Peak Wilderness, is located several miles east of the project area. Boulder River Wilderness is located four to six miles west of the project area, within the Stillaguamish River Basin. There would be no direct, indirect, or cumulative impact on wilderness if any of the alternatives were implemented, including no action.

The nearest Inventoried Roadless Area (IRA) is White Chuck Mountain, Area 6051 (USDA Forest Service 1990, pg C-176). Its boundary lies over one mile east of the proposed reroute around Site #2 in Alternatives B and C. There would be no direct, indirect, or cumulative impact on this IRA or its roadless characteristics if any of the alternatives were implemented, including no action.

The project area is currently roaded (see Figure 4). If either Alternatives B or C were implemented, the area would continue to be roaded; effects on other resource values would be as disclosed in this chapter. If the No Action alternative were implemented, the project area would remain roaded—with some short damaged sections—for many years. No road decommissioning would be done, nor road surface/drainage structures removed. It is unlikely that any acreage would attain the characteristics of unroaded lands in the short-term (one to five years) or in the estimated long-term (10 to 25 years), nor would the area likely be considered for inventory for potential wilderness (as per FSH1909 Interim Directive No. 1909.12-2005-8).

Environmental Justice

In the past decade, the concept of Environmental Justice has emerged as an important component of Federal regulatory programs, initiated by Executive Order No. 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations”.

This Executive Order directed each Federal agency to “make achieving environmental justice by avoiding disproportionately high or adverse human health or environmental effects on minority and low income populations” a part of its mission. This Order emphasized that federally recognized Native tribes or bands are to be included in all efforts to achieve environmental justice (Section 6.606).

The demographics of the affected area were examined to determine the presence of minority, low income, or tribal populations in the area of potential effect. The following table indicates the race and ethnic profile of Snohomish County compared to the entire state of Washington as of the year 2000. This data was obtained from the website at:
http://quickfacts.census.gov/qfd/states/53/53061.html.

There is limited commercial uses of this area for other forest products (boughs and cones). Tribal members do use the project area for gathering and other uses.

Table 22: Race and Ethnicity Profile

Total Populations of the State and County as of the year 2000	Snohomish County Population 606,024	Washington State Population 5,894,121
Race or Ethnic Population Group	**Approximate Percentage**	**Approximate Percentage**
American Indian and Alaskan Native	1.4% (8,480 Persons)	1.6% (94,300 Persons)
Black or African American	1.7% (10,300 Persons)	3.2% (188,600 Persons)
Asian	5.8% (35,100 Persons)	5.5% (324,150 Persons)
Hispanic or Latino	4.7% (28,480 Persons)	7.5% (442,100 Persons)
White	85.6% (518,750 Persons)	81.8% (4,821,400 Persons)
Other	0.8% (4,950 Persons)	0.4% (23,580 Persons)

Alternative A

No road repairs would limit access to recreationists and use of the area by tribal members.

Alternatives B and C Environmental Justice Effects

The repairs found in Alternatives B and C would restore access to previous use areas and would have no disproportionately high or adverse effects to low-income or minority populations.

Other Resources

Air Quality Effects

The Glacier Peak Wilderness (east of the project area) is a Class I area for air quality protection. Visibility is a value that is protected primarily within the boundaries of the Class I area. Glacier Peak Wilderness visibility is officially monitored at a site shared with the National Park Service and located at Ross Lake. Another site is located at Snoqualmie Pass for Alpine Lakes Wilderness. This site has some applicability to conditions such as visibility at Glacier Peak, and probably falls somewhere in between what is measured at the two sites. Average natural visibility in the western United States is estimated to be about 110 to 115 miles. The visual range measured at Ross Lake is very close to this, showing that the visibility is generally excellent. Visibility at Snoqualmie Pass is more impaired.

Alternatives A-C

No burning is planned with this project so there would not be any impacts on visibility from smoke. Use of vehicles and equipment would return to previous levels.

Prime Forestland, Prime Farmland, Rangeland, etc.

Prime forestland, as defined by Natural Resources Conservation Service[30] may be found on the MBS. However, it is estimated that none of the alternatives, including no action, would have any measurable impact on such land.

There is no prime farmland or rangeland within the project area. Noise, climate, minerals, energy, fire insects, disease, etc. were considered, but are not described here because they are associated with limited or no impacts.

Wetlands and Floodplains Effects

Wetlands: The project has a wetland/pond complex near Road 22-110. Both Alternative B and C propose decommissioning of Road 22-110 The action alternatives would provide an additional

[30] Land capable of growing wood at the rate of 85 cubic feet per acre per year at culmination of mean annual increment.

buffer of non-roaded area surrounding the wetland. In all alternatives, there is no loss of wetlands or encroachment on wetland areas.

Floodplains: The project includes damaged sites within the floodplain. The White Chuck Bridge (M.P. 10.2) has piers within the river, a portion of the bridge deck fell in the floodplain, and the Road 22 approach to the bridge on the north side of the river (M.P. 10.1) has a damaged site on the edge of the floodplain.

The No Action Alternative would leave the bridge within the river and floodplain, with potential to influence river dynamics in the White Chuck Bridge area of constricting flow and re-directing flows. Both of the Action Alternatives proposed to remove the damage bridge from the river, and to locate the bridge supports at approximately the limit of the 100-year floodplain elevation, on natural ground rather than fill, to better accommodate free-flow of the White Chuck River. In both action alternatives there are no irretrievable impacts to the floodplain.

Irreversible and Irretrievable Commitment of Resources

An irretrievable commitment of resources occurs when opportunities are foregone for the period of time that the resource cannot be used. Road 22, 24, and associated spur roads are a reversible commitment because it is possible to obliterate the entire road site and return the area to its previous condition. However, the roads in the project area are not scheduled for obliteration and thus represent an irretrievable commitment of resources for as long as the roads are a valued asset to the surrounding communities. The removal and utilization of rock resources for road reconstruction would be an example of a common use on the MBS (Final Environmental Impact Statement for the Forest Plan IV-203).

Potential Conflicts With Plans and Policies of Other Jurisdictions

Several private individuals, groups, and governmental agencies including tribal representatives have been contacted in regards to this project. Further, several articles have been published in various forms of the media (Refer to page 22 and 123 Table 1). There are no known conflicts between the alternatives discussed in this document and the plans and policies of these other jurisdictions.

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