

***Environmental Assessment
Storm Damage Repairs –
Colonial Creek Campground, North***

July 2005

NORTH CASCADES

National Park Service Complex • Washington

Comments on this Environment Assessment must be postmarked (surface mail) or sent (e-mail or fax) no later than August 30, 2005. You may submit comments by any one of several methods:

Using PEPC: We encourage you to comment on-line at the NPS Planning, Environment, and Public Comment (PEPC) website (<http://parkplanning.nps.gov/noca>). At the website select "Colonial Creek Campground Storm Damage Repairs." You will find the full text of the document, an on-line comment form, and instructions for submitting on-line comments under the *Documents and Links* tab. Please use the on-line comment form to submit your ideas, questions, or comments.

By mail or hand delivery to: Superintendent
North Cascades National Park Service Complex
810 State Route 20
Sedro-Woolley, WA 98284

By fax to the Superintendent at: (360) 856-1934

Via the Internet to: NOCA_Superintendent@nps.gov

Please submit Internet comments as an ASCII file, avoiding the use of special characters and any form of encryption. Please also include "Attn: Cathi Jones" and your name and return address in your Internet message. If you do not receive a confirmation from the system that your Internet message has been received, contact Dan Allen directly at (360) 856-5700 x 367 or e-mail dan_allen@nps.gov with the subject: Environmental Assessment.

FREEDOM OF INFORMATION

Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the rulemaking record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the rulemaking record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. However, we will not consider anonymous comments. We will make all submissions from organizations, or businesses, and from individuals identifying themselves as representatives of officials of organizations or businesses, available for public inspection in their entirety.

Table of Contents

1	PURPOSE AND NEED FOR ACTION	1
1.1	BACKGROUND	1
1.2	SCOPING ISSUES	2
1.3	ISSUES CONSIDERED BUT DISMISSED	2
1.4	RELEVANT LAWS AND POLICIES	3
2	ALTERNATIVES.....	5
2.1	ALTERNATIVES DESCRIPTIONS	5
2.1.1	<i>Alternative A: Abandon the Damaged Campsites (No Action)</i>	5
2.1.2	<i>Alternative B: Rebuild Loop Roads Closest to Pre-flood Location (Preferred Alternative)</i>	6
2.1.3	<i>Alternative C: Rebuild Shortened Loop Roads Farther from Pre-flood Location</i>	7
2.2	MITIGATION	9
2.3	SUMMARY TABLE.....	10
2.4	ALTERNATIVES CONSIDERED BUT NOT FURTHER ADDRESSED.....	11
2.5	ENVIRONMENTALLY PREFERRED ALTERNATIVE	11
3	AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES	12
	METHODOLOGY	13
3.1	GEOMORPHOLOGY	13
3.2	WATER QUALITY.....	14
3.3	VEGETATION	14
3.4	FISH AND WILDLIFE.....	17
3.5	VISITOR USE	25
3.6	CONCLUSIONS.....	26
4	CONSULTATION AND COORDINATION	27
4.1	PERSONS, ORGANIZATIONS, AND AGENCIES CONSULTED	27
4.2	LIST OF PREPARERS	27
4.3	LIST OF RECIPIENTS	27
	REFERENCES.....	29
	APPENDIX A-1	30
	APPENDIX A-2	31
	APPENDIX B	32

List of Tables

Table 1: Comparison of Alternatives (Campsites and Roads).....	10
Table 2: Vegetation Surveys of Proposed Routes	15
Table 3: Special Status Species with Suitable Habitat and/or with Documented Presence in the Lower Thunder Creek Valley or Diablo Basin.....	18
Table 4: 2003 Visitor Use Statistics, Colonial Campground	25

List of Figures

Figure 1: Colonial Creek Flowing Over Campground Road	1
Figure 2: Colonial Creek Alluvial Fan with Past and Current Channels	3
Figure 3: Existing Conditions (Alternative A)	6
Figure 4: Proposed Actions under Alternative B	7
Figure 5: Proposed Actions under Alternative C.....	9
Figure 6: Number of Trees to be Cut by Size Class, Alternative B.....	16
Figure 7: Number of Trees to be Cut by Size Class, Alternative C.....	16

1 Purpose and Need for Action

In October 2003 severe floods damaged roads, campgrounds, trails, and bridges throughout the North Cascades National Park Service Complex (hereafter, the Complex). Colonial Creek Campground, located along the North Cascades Highway (State Route 20) within Ross Lake National Recreation Area, was heavily impacted when the creek filled its channel with debris and began to flow through the north unit of the campground. At least 15 campsites and portions of the campground loop road were damaged or destroyed. The creek now flows directly through the campground (see Figure 1), amidst a tangled mess of exposed utility lines and flood debris. The purpose of the actions proposed in this EA is to allow continued use of the north side of the campground while reducing the risk of flood damage in the future. Action is needed in order to reopen the north loop of the campground for visitor use.

Figure 1: Colonial Creek Flowing Over Campground Road



1.1 Background

In the early 1960s the US Forest Service built most of the north side of the campground on the alluvial fan of Colonial Creek. To prevent flooding of the campground, the creek was confined to a single channel and an earthen levee was constructed between the creek and campground. On at least four different occasions since its construction, the creek has breached the levee and flooded portions of the campground. Each time, the creek has been placed back into its former channel and the levee has been repaired. In October 2003, the creek again breached the levee

and flooded the campground, although the damage was far more severe than previous occasions.

1.2 Scoping Issues

Public scoping took place from November 17 to December 10, 2004. Interested individuals, organizations, and agencies received a public scoping letter that described the various preliminary management alternatives under consideration for repairing the campground. A brief description of the advantages and disadvantages of each management alternative, along with photos and an overview map of the project area was also provided. The objectives of the public scoping process were to:

- Invite participation from the public and other interested parties including local, state, and federal agencies
- Develop a reasonable range of management alternatives for consideration
- Identify environmental issues and concerns for detailed environmental impact analysis
- Eliminate irrelevant issues or concerns so the impact analysis remains focused and concise

Two comment letters were received during the comment period. Both letters were in support of Alternative C as the appropriate means for providing long term protection of the campground. Neither letter identified additional environmental issues or concerns.

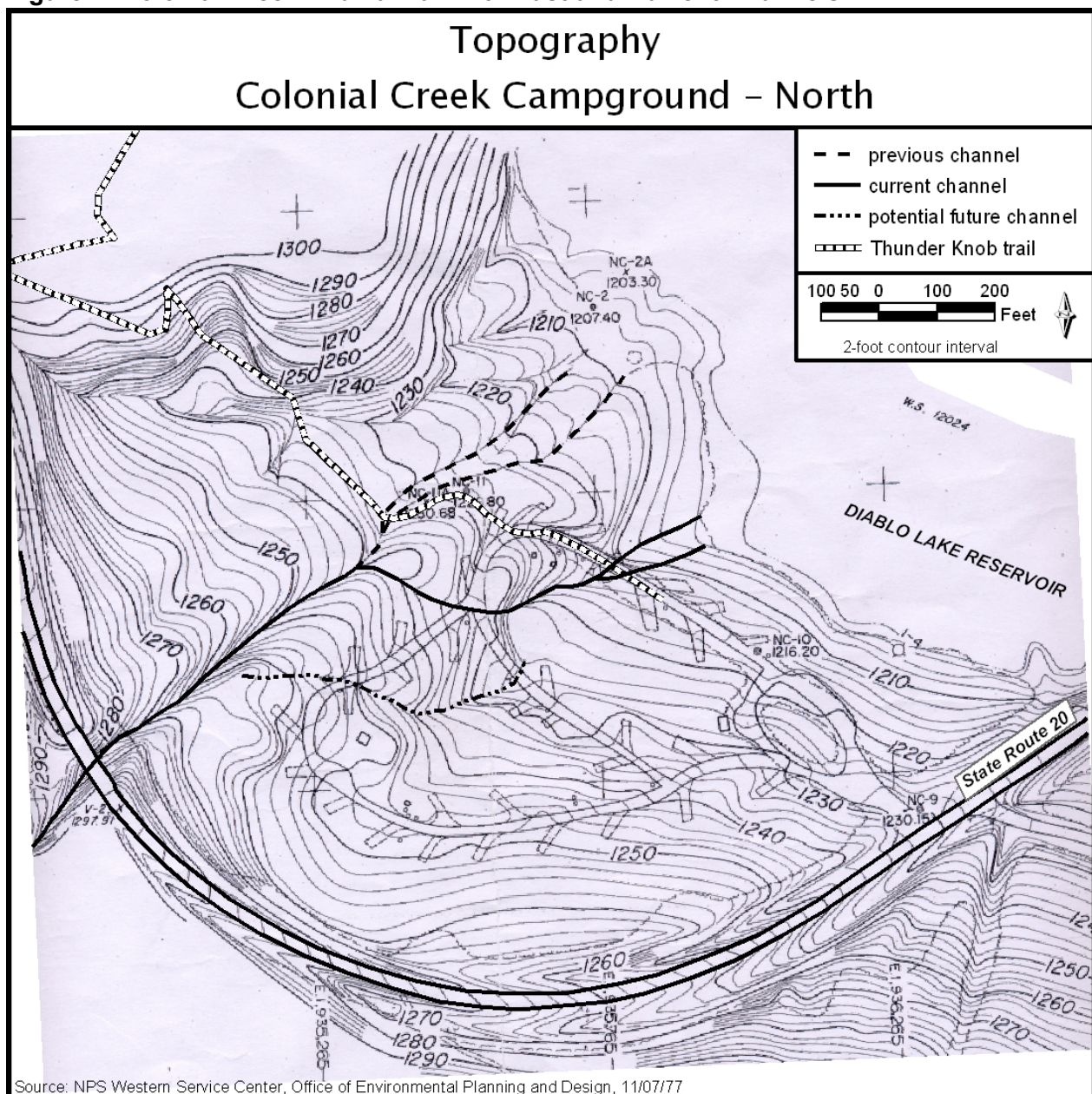
Internal scoping with NPS staff was used to define issues, alternatives, and potential impacts. The following is a list of issues that have been identified through the scoping process:

- The campground is built on an active alluvial fan that is generally unstable; more storms and/or floods could cause further damage as the stream changes course, particularly in one area where an old channel exists (see Figure 2)
- The stream banks are relatively unstable and could require bank stabilization to minimize flood risk
- Road building and bank stabilization will further manipulate alluvial fan development
- Manipulation of the stream bank and activities occurring below the high water mark could harm potential bull trout habitat (a federally listed species)
- A loss of camping sites could impact visitors during the peak season when the south campground fills to capacity on weekends
- The campground contains several invasive weeds that could spread during ground-disturbing activities, including herb Robert, St. Johnswort, and oxeye daisy

1.3 Issues Considered but Dismissed

- Cultural resources. The campground has been surveyed and no cultural resources were found.

Figure 2: Colonial Creek Alluvial Fan with Past and Current Channels



1.4 Relevant Laws and Policies

Various laws, regulations and policies limit the nature and scope of management actions that are acceptable in Ross Lake National Recreation Area. Relevant portions are described in this section.

Enabling Legislation. Ross Lake National Recreation Area was established, “In order to provide for the public outdoor recreation use and enjoyment of portions of the Skagit River and Ross, Diablo, and Gorge lakes, together with the surrounding lands, and for the conservation of the scenic, scientific, historic, and other values contributing to public enjoyment of such lands and waters...”

Endangered Species Act. The Endangered Species Act requires that all federal agencies take necessary actions to ensure that critical habitat for endangered or threatened species is not adversely modified or destroyed.

NPS Management Policies. NPS Management Policies (2001) set the framework and provide direction for all management decisions. Applicable policies are listed below:

4.4.2.3 Management of Threatened or Endangered Plants and Animals: “The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both pro-actively conserve listed species and prevent detrimental effects on these species.

The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible. In addition, the Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance.”

4.6.6 Watershed and Stream Processes: “The Service will manage streams to protect stream processes that create habitat features such as floodplains, riparian systems, woody debris accumulations, terraces, gravel bars, riffles, and pools. Stream processes include flooding, stream migration, and associated erosion and deposition.

The Service will achieve the protection of watershed and stream features primarily by avoiding impacts to watershed and riparian vegetation, and by allowing natural fluvial processes to proceed unimpeded. When conflicts between infrastructure and stream processes are unavoidable, NPS managers will first consider relocating or redesigning facilities, rather than manipulating streams. Where stream manipulation is unavoidable, managers will use techniques that are visually non-obtrusive and that protect natural processes to the greatest extent practicable.”

4.4.2.1 NPS Actions that Remove Plants and Animals: “Whenever the Service removes plants or animals... [it] will seek to ensure that such removals will not cause unacceptable impacts to native resources, natural processes, or other park resources.”

9.1.1.6 Siting Facilities to Avoid Natural Hazards: “The Service will strive to site facilities where they will not be damaged or destroyed by natural physical processes...Park development that is damaged or destroyed by a destructive, hazardous, or catastrophic natural event will be thoroughly evaluated for relocation or replacement by new construction at a different location. If a decision is made to relocate or replace a severely damaged or destroyed facility, it will be placed, if practicable, in an area that is believed to be free from natural hazards. In areas where dynamic natural processes cannot be avoided, developed facilities should be sustainably designed. When it has been determined that facilities must be located in such areas, their design and siting will be based on: a) a thorough understanding of the nature of the physical processes; and b) avoiding or mitigating the risks to human life and property and the effect of the facility on natural and physical processes and the ecosystem.”

9.1.3.2 Re-vegetation and Landscaping: “Wherever practicable, soils and plants affected by construction will be salvaged for use in site restoration...If additional soil and plants are needed to restore disturbed sites, they may be obtained from other sites in the park if it is determined

that the use of an in-park source will not significantly affect cultural or natural resources or ecological processes. In any case, imported soils must be compatible with existing soils, free of undesired seeds and organisms, and fulfill the horticultural requirements of plants used for restoration.”

9.2.1.1 Park Roads: “Park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience. Park roads are generally not intended to provide fast and convenient transportation; rather, they are intended to enhance the quality of a visit, while providing for safe and efficient travel, with minimal 106 or no impacts on natural and cultural resources.”

9.3.2.1 Campgrounds: “When campgrounds are determined to be necessary, their design will accommodate the differences between recreation-vehicle camping and tent camping, and will consider cultural landscapes, terrain, soils, vegetation, wildlife, climate, special needs to users, visual and auditory privacy, and other relevant factors.”

2 Alternatives

This chapter describes the alternatives developed to fulfill the purpose and need as described in Chapter 1. Included in the alternatives is the *No Action* alternative, as required by the National Environmental Policy Act (NEPA). The *No Action* alternative is used as a baseline from which to measure the impacts of the other *Action* alternatives.

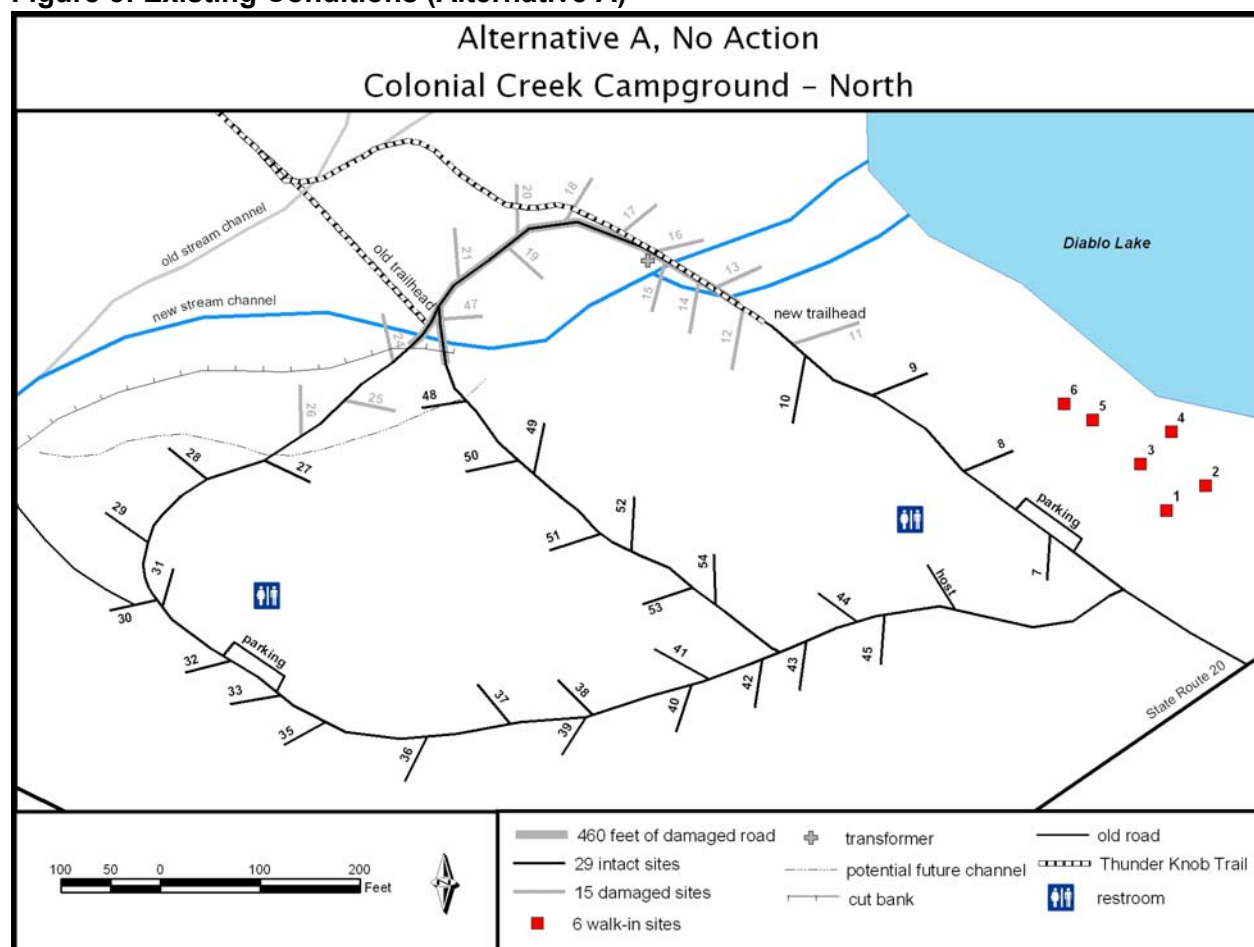
2.1 Alternatives Descriptions

2.1.1 Alternative A: Abandon the Damaged Campsites (No Action)

Under this alternative, the former loop roads would be foreshortened into dead-end roads with turnarounds for use by smaller vehicles. Campsites that have become inaccessible via the loop roads would be cleared of all improvements and abandoned. Damaged utility lines and asphalt would be cleaned up to protect public safety and environmental health, but none of the damaged campsites would be repaired. The Thunder Knob trailhead has already been relocated to a more accessible location (see Figure 3).

This would be the least costly means of addressing the damage; however, Colonial Creek Campground is the most popular campground in Ross Lake NRA. Twelve campsites would be abandoned. Three additional damaged campsites that are currently accessible would be closed to future use (see Figure 3). Large vehicles and RVs could not safely negotiate the dead-end road network, so use of the remaining campground (29 drive-in and six walk-in sites) would be limited to smaller vehicles capable of turning around on the dead-end roads.

Figure 3: Existing Conditions (Alternative A)



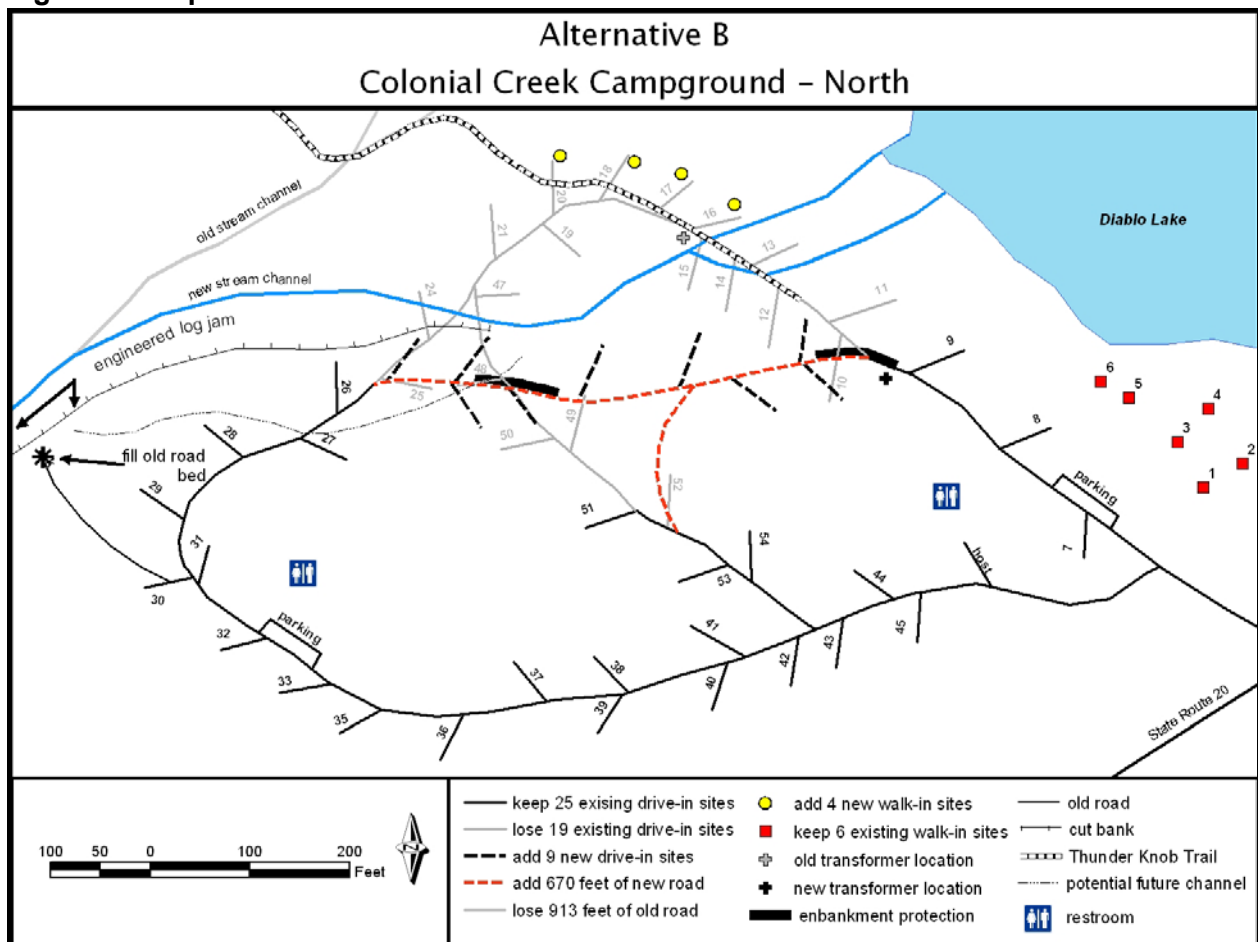
2.1.2 Alternative B: Rebuild Loop Roads Closest to Pre-flood Location (Preferred Alternative)

Under Alternative B, the loop roads would be rebuilt adjacent to portions of the new creek channel on higher ground (see Figure 4 and Appendix A1). Two segments of the road shoulder (where the old road intersects the new route) would be protected with boulders, woody debris, and live vegetative material to prevent creek migration into the remaining portion of the campground. Twenty cubic yards of material will be cut and 409 cubic yards will be filled in various places to grade the road. Nine new campsites would be built along the new section of road. Four damaged sites (now isolated by the creek and no longer accessible by vehicle) would become footbridge-accessible walk-in sites. The transformer located near Site 15 would be relocated to a spot across from Site 9. A new electrical line and water line will be installed along the length of new road. Damaged utilities and asphalt would be removed, and debris would be cleaned up. Abandoned campsites and road segments would be re-graded to a natural contour and re-vegetated with native plants. An engineered log jam would be constructed along 100 feet of the cut bank of Colonial Creek near site 29 to stabilize the bank. An old road cut starting at the creek and dropping into site 30 will be filled at its head near the channel (see Figure 4). The Thunder Knob trailhead will continue to be in its new location along the first loop road.

This alternative is the agency-preferred course of action. It would maximize use of the remaining undamaged campsites and restroom facilities, and minimize loss of drive-in RV camping

capacity. Replacement of the damaged sites with four walk-in sites would provide relatively secluded camping opportunities. Approximately 670 feet of a new one-way, loop road would need to be constructed to reestablish vehicle access. Three large diameter (> 24 inches in diameter) trees would need to be cut and removed to build the new road. There would be a net loss of six campsites. There would be some seasonal risk (from October – February and April – June) of future flood damage because the road loops would be built between an ancient creek channel and the current active creek channel. Should the creek leave its current channel, it could move to the ancient channel and wash out sections of the new road. However, the engineered log jam and blocking of the old road cut required under this alternative are intended to reduce this risk.

Figure 4: Proposed Actions under Alternative B



2.1.3 Alternative C: Rebuild Shortened Loop Roads Farther from Pre-flood Location

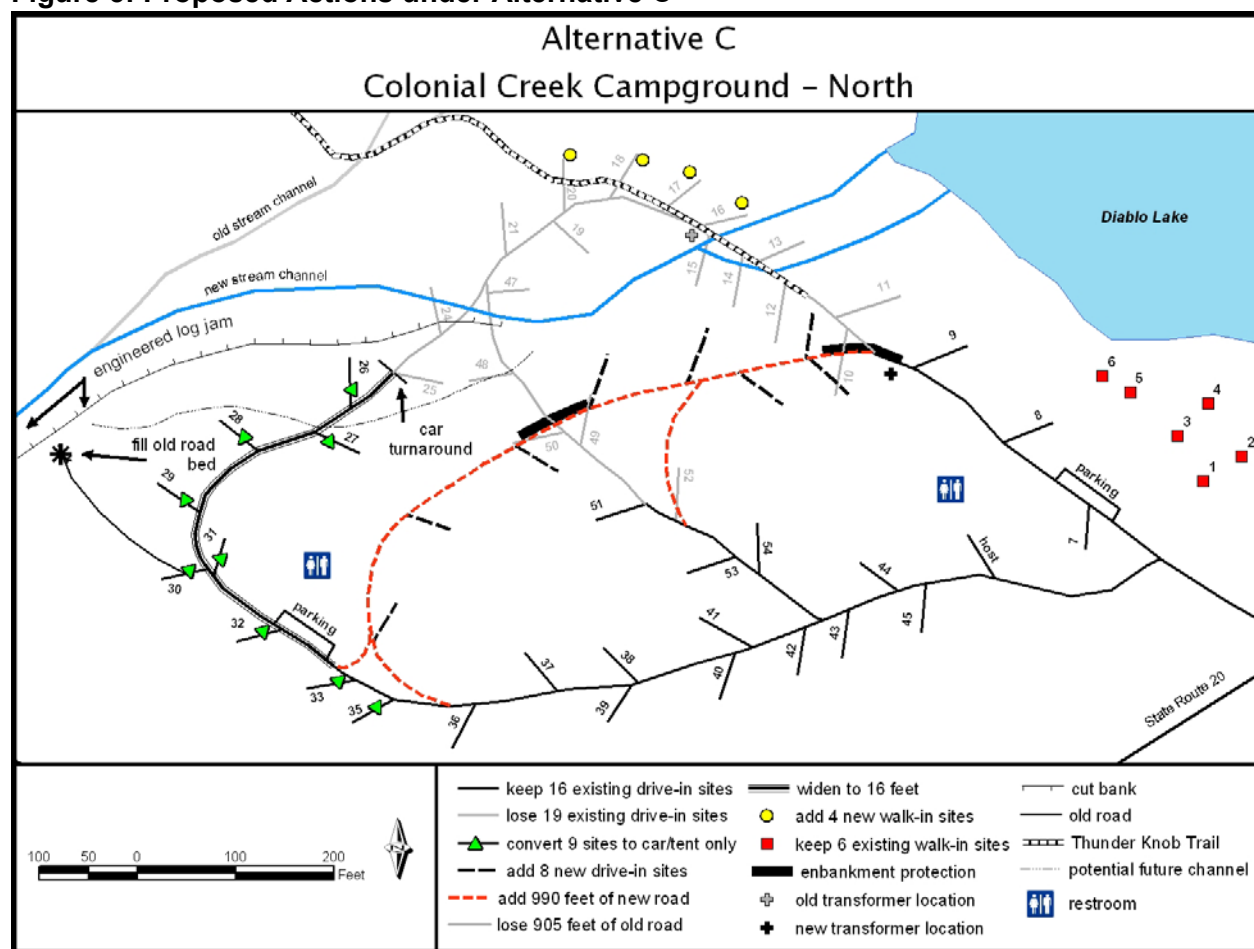
The main difference between this alternative and Alternative B is the loop roads would be shortened to avoid an ancient creek channel that could flood in the future if the creek shifted its alignment at the “head” of its alluvial fan. There would still be enbankment protection along the two segments of road shoulder (where the old road intersects the new route) to prevent creek migration into the remaining portion of the campground. Forty cubic yards of material will be cut and 240 cubic yards will be filled in various places to grade the road. The same number of damaged sites (four) across the creek would become walk-in sites. Additionally, eight new campsites would be built along the road, and the westernmost loop would become car-accessible only (i.e., no RV or trailers), converting nine sites along the loop to tent sites. The

westernmost loop would become a dead-end road. It would be widened to accommodate two-way traffic (to 16 feet wide), and a hammerhead turnaround would be constructed at the end of the road (see Figure 5 and Appendix A2).

As in Alternative B, new electrical and water lines would be installed along the new route, and damaged lines and asphalt would be removed from the old road. Abandoned campsites and road segments would be re-graded to a natural contour and re-vegetated with native plants. The transformer would be relocated to a spot across from Site 9. The same engineered log jam would be constructed along the cut bank of Colonial Creek near site 29 to stabilize the bank, and the same old road cut starting at the creek and dropping into site 30 will be filled at its head near the channel. The westernmost loop would be widened, and may require additional tree removal. The Thunder Knob trailhead will continue to be in its new location along the first loop road.

This alternative is a more precautionary approach for minimizing the risk of flood damage, short of the "No Action" Alternative. The number of drive-in sites would be the same as Alternative B (34), but nine of the drive-in sites would be restricted to cars only. The number of walk-in sites would be the same as Alternative B (six existing plus four new sites). There would be a net loss of seven campsites. Eight large diameter (> 24 inches in diameter) trees would need to be cut and removed to build the new road, including one very large diameter tree (59.8 inches DBH) that could be removed, or at minimum, impacted by root cutting, to accommodate the road alignment. The risk of future flood damage would be less than that of Alternative B.

Figure 5: Proposed Actions under Alternative C



2.2 Mitigation

To minimize resource impacts, the mitigation measures listed below would be followed for all action alternatives, and are analyzed as part of the action alternatives. These actions were developed to lessen the potential for adverse effects of the proposed action.

Noise

- Construction activities will be limited to between 7:30 am and 5:00 pm during weekdays to minimize impacts to campers.

Water

- Silt fences will be used to contain debris that is loosened during log jam and road construction.

Fish and Wildlife

- Prior to stream crossing, equipment tracks should be cleaned.
- Prior to stream crossing, staff will walk ahead of heavy equipment to kick rocks and flush amphibians out of the vicinity.
- Check for char redds prior to crossing the channel.
- Timber mats will be laid across the stream and used as equipment pads to distribute weight during stream crossing.

- Use the same stream crossing route every time to minimize disturbance, and keep number of crossings to a minimum.
- Avoid within-stream activities during char spawning and incubation (mid-August through June).
- Avoid cutting trees larger than 24 inches DBH (Diameter at Breast Height) and protect trees with signs of use by pileated woodpeckers.

Vegetation

- Cutting of large diameter trees will be avoided to the extent possible, including the cutting of their root systems.
- Imported fill will come from a known clean source to minimize invasive weeds, and disturbed areas will be monitored as part of regular exotic plant inventories.
- Duff that is removed from the new roadbed will be used as a seed source for areas that need to be revegetated, and revegetation will occur with local native plants.

2.3 Summary Table

Table 1: Comparison of Alternatives (Campsites and Roads)

Campsites	Prior to Storm Damage	Alternatives		
		A – No Action	B – Maximize Drive-in Sites	C – Minimize Flood Risk
Abandoned drive-in sites		15	19	19
Existing walk-in sites		6	6	6
Gained walk-in sites		0	4	4
Total walk-in	6	6	10	10
Existing drive-in sites (RV-accessible)		29	25	16
Converted drive-in sites (car accessible)		0	0	9
Gained drive-in sites		0	9	8
Total drive-in	44	29	34	33
Total sites	50	35	44	43
<i>Net loss of campsites</i>		15	6	7
Roads				
Lost length (linear ft)		460	913	905
Existing length (linear ft)		2,535	2,082	2,066
Added length (linear ft)		0	670	990
Total length (linear ft)	2,995	2,535	2,752	3,056
New road surface (sq ft)		0	11,120	25,000
Disturbed area beyond road surface (sq ft)		0	13,081	8,000
Imported fill required (cubic yds)		0	389	200

2.4 Alternatives Considered but not Further Addressed

Two alternatives were initially considered but later rejected. The first alternative, to put the creek back into its former channel, was rejected because it does not fulfill the purpose of reducing the risk of future flood damage. It is also contrary to several NPS Management Policies as discussed in Section 1.4. The second alternative, to rebuild the loop roads using an S-curve, was rejected because of its similarity to Alternative B.

Put the creek back into its former channel and repair the campground

Under this Alternative, the former creek channel would be excavated and the creek would be put back in its former channel. Several thousand cubic yards of alluvial material (rock and gravel) would be excavated to reestablish the former channel, and the levee that protected the campground would be rebuilt using heavy equipment. The flood debris would be cleaned up, and the loop roads, campsites and utilities (plumbing and electrical lines) would be repaired.

Since the construction of the campground, there is a greater understanding of the hazards of building campgrounds and other facilities on unstable alluvial fans. It would be unreasonable to put the creek back into its former location for several reasons. First, the former creek channel is now filled with several thousand cubic yards of rocks and debris. This material would have to be excavated at considerable expense to reestablish the former channel. The creek would likely change course again on its alluvial fan and flood the campground, undoing costly repairs. Finally, the braided network of new channels formed by the creek provide good spawning habitat for native trout and char. This new spawning habitat would be lost if the creek was returned to its former location and the new channels were filled in. In light of these reasons, this alternative has been considered but is rejected.

Rebuild Loop Roads Farther from Pre-flood Location Using an S-Curve

Under this alternative, the loop roads would be rebuilt following a similar alignment to Alternative B, except the route would be farther from the current creek channel before it connects to the existing loop road. Thirty cubic yards of material would be cut and 368 cubic yards will be filled in various places to grade the road. Embankment protection would be installed along two segments of the road shoulder (where the old road intersects the new route) to prevent creek migration into the remaining portion of the campground. Four damaged sites across the creek would become walk-in sites. As in alternatives B and C, new electrical and water lines would be installed along the new route, and damaged lines and asphalt would be removed from the old road. Abandoned campsites and road segments would be re-graded to a natural contour and re-vegetated with native plants. The transformer would be relocated to a spot across from Site 9. An engineered log jam would be constructed along the cut bank of Colonial Creek near sites 24 – 29 to stabilize the bank, and the old road cut starting at the creek and dropping into site 30 will be filled at its head near the channel. Eight new campsites would be built along the new section of road.

Although this alternative would locate the road farther from the new creek channel where it crosses the middle loop road, embankment protection would still be required along a large section of the cut bank. Nine large diameter (> 24 inches in diameter) trees and other vegetation would need to be cut and removed to build the new road. For these reasons, this alternative has been considered but is rejected.

2.5 Environmentally Preferred Alternative

The environmentally preferred alternative is the alternative that causes the least damage to the biological and physical environment, and that best protects, preserves, and enhances historic,

cultural, and natural resources. The NPS is required to identify the environmentally preferred alternative that will promote the national environmental policy expressed in NEPA (Sec. 101 (b)).

Alternative A, No Action, is the environmentally preferred alternative. The biological and physical environment is best protected through the minimal actions that would be taken to clean up the campground. No engineered log jams or embankment protection would be installed; therefore, the alluvial fan would be allowed to develop more naturally without additional barriers to its movement. There would be no new road alignments, no trees would be cut, and there would be no additional ground disturbance. Wildlife habitat would be better preserved by restricting development close to Colonial Creek. Conversely, both alternatives B and C call for the removal of a large number of trees (184 and 212, respectively), some of which are high-value, large-diameter old growth trees that provide valuable habitat and serve as important remnants of a once-intact, old growth forest (though now it is heavily disturbed). Bank alteration through the construction of an engineered log jam will change the course that Colonial Creek naturally would have taken, thus altering alluvial fan development.

3 Affected Environment and Environmental Consequences

In this chapter, the resources that could experience environmental impacts from implementation of any of the alternatives are described. Following each resource description is an analysis of the environmental consequences that could occur under each alternative. Each resource has been analyzed for the direct, indirect, and cumulative impacts that might occur as a result of implementing one of the alternatives. Direct impacts are caused immediately by an action and they occur in the same place as the action. Indirect impacts are caused by the action but they occur later in time or farther away in distance from the action. Cumulative impacts have additive effects on a particular resource; they include impacts of actions in the past, present, and the reasonably foreseeable future. NEPA also requires an analysis of the type (beneficial vs. adverse), duration (short-term vs. long-term), and intensity (degree of severity) of impacts to affected resources.

The NPS is required by law to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. Adverse impacts that constitute impairment are prohibited. Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Methodology

In this chapter, the impacts of each alternative on each resource are identified, and the context, duration, and intensity of impacts are defined. The duration and intensity of impacts were determined using field investigations and the best professional judgments of NPS staff. Impacts are quantified in numbers when possible, and are described qualitatively based on intensity and duration. The qualitative levels of impact include:

- 1) *Negligible*: the impact is at the lowest level of detection and of very short duration;
- 2) *Minor*: the impact is slightly detectable and of short duration;
- 3) *Moderate*: the impact is readily apparent and of some duration;
- 4) *Major*: the impact is either severely adverse or exceptionally beneficial and/or of long or permanent duration;
- 5) *Impairment*: the impact harms the integrity of park resources or values (not allowed according to NPS Management Policies)

3.1 Geomorphology

Affected Environment

The north unit of Colonial Creek Campground was built on the alluvial fan of Colonial Creek. The substrate is mainly composed of alluvium that was deposited as the creek moved across its fan over time. Construction of an earthen levee several decades ago along Colonial Creek (in the north unit of the campground) effectively prevented the creek from naturally migrating to a lower channel that is located within the campground, until the 2003 floods when the creek filled its channel, broke through the levee, and moved to lower ground (Note: although the levee has been breeched over the last few decades, the creek was placed back into its former channel each time). Today the creek channel sits several feet lower than its previous channel elevation. Another old channel is located just south of the outer loop road (near sites 25, 26, 27, and 48). Erosion on the stream bank below the Highway 20 Bridge could eventually threaten the last section of the upper campground loop road. Should Colonial Creek abandon its channel again, it could move southward into the older channel (see Figure 2).

Environmental Consequences

Alternative A – Abandon the Damaged Campsites (No Action)

Natural channel migration and alluvial fan development would be the least impacted under this alternative. There would be no engineered structures used to stabilize banks or roadways. No cutting or filling would take place for road building. Impacts would be negligible to minor.

Alternative B – Rebuild Loop Roads Closest to Pre-flood Location

Natural channel migration and alluvial fan development would be the most impacted under this alternative because the route is located closest to the current channel as well as between the current channel and a potential future channel, where the creek could migrate during a high water event. The engineered structures used to protect the campground, including embankment protection made of boulders and vegetation and a log jam, will direct streamflow away from where it might have naturally gone. This alternative would have moderate impacts.

Alternative C – Rebuild Shortened Loop Roads Farther from Pre-flood Location

Of the two action alternatives, this alternative would least impact natural channel migration and alluvial fan development because it is located the farthest from the current channel and on the other side of the potential future channel; however, this alternative would have a greater impact than the no action alternative, A. Impacts from the engineered structures would be similar to Alternative B, except that the embankment protection along the middle loop road would be

located farther from the creek than in Alternative B. This alternative would still have moderate impacts.

3.2 Water Quality

Affected Environment

Colonial Creek is a permanent, glacier-fed stream that is a tributary to the Diablo Reservoir on the Skagit River. Colonial Glacier, which feeds the creek, helps to regulate streamflow and stabilize annual runoff. Streamflows are generally highest in spring when snowmelt peaks and in late fall due to rain on snow events. The October 2003 flood occurred during a rain on snow event. Runoff from these types of events is the primary cause of erosion and deposition and consequent changes in channel morphology.

During the 2003 flood, a large amount of bedload (cobble- and boulder-sized rock) was deposited in the middle portion of the channel between the reservoir and the Highway 20 Bridge, filling the channel and shifting the flow into the campground. Additional bedload material was deposited as far as the floodwaters reached, and it remains there today along with asphalt, electric cables, and waterlines buried in the flood debris. The new creek channel begins just upstream from the original Thunder Knob Trailhead, flows down a section of the upper loop road, and separates into two channels before it cuts into the lower loop road and then enters Diablo Reservoir. At present the southerly channel is dry, but heavy runoff will cause parts of the creek to re-enter the channel.

Environmental Consequences

Impacts Common to All Alternatives

The process of removing the damaged utilities and asphalt could have short-term minor impacts to water quality because large equipment will have to cross the channel to retrieve the materials, potentially impacting water quality in the creek. There is virtually no silt or clay in the alluvial fan deposit, however, and it is likely long-term benefits of removing asphalt outweigh short-term risks from siltation by the equipment.

Alternative A – Abandon the Damaged Campsites (No Action)

There would be no additional impacts to water quality under this alternative.

Alternative B – Rebuild Loop Roads Closest to Pre-flood Location

Construction of the engineered log jam along the cut bank of Colonial Creek could cause a small amount of siltation for the duration of the project, resulting in minor, short-term impacts to water quality.

Alternative C – Rebuild Shortened Loop Roads Farther from Pre-flood Location

The impacts of Alternative C on water quality would be similar to those identified in Alternative B, except that only the log jam will be built under this alternative, resulting in minor, short-term impacts to water quality.

3.3 Vegetation

Affected Environment

The north campground is situated within a low elevation, mixed conifer old growth forest. Old growth is defined in the Pacific Northwest as consisting of trees that are 200 years old or older. Large-diameter old growth western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*), and western redcedar (*Thuja plicata*) are common in the overstory, along with red alder (*Alnus rubra*), and western (or Pacific) yew (*Taxus brevifolia*). There are also several very large-

diameter old growth Douglas fir (*Pseudotsuga menziesii*) that occur in the campground, though at a much lower frequency than the hemlock and grand fir. Dominant understory species include Oregon grape (*Mahonia nervosa*), salal (*Gaultheria shallon*), and blueberry (*Vaccinium* spp.), along with a dense carpet of mosses.

A vegetation survey was conducted of the proposed routes at the campground (see Appendix B for a species list). Results indicate an abundance of western hemlock and grand fir (see Table 2 below). The total number of trees that would be removed under Alternative B is 184, with an average Diameter at Breast Height (DBH) of 10.3 inches. The size of trees that would be cut ranges from 2.0 inches DBH to 30.7 inches DBH for Alternative B. Figure 5 is a graph that displays the size classes of trees that would be cut under Alternative B. The largest number of trees (71) that would be cut falls into the 6- to 11.9-inch size class. The total number of trees that would be removed under Alternative C is 212, with an average DBH of 10.2 inches. The size of trees that would be cut ranges from 2.0 inches DBH to 59.8 inches DBH under Alternative C. Figure 6 is a graph that displays the size classes of trees that would be cut under Alternative C. The largest number of trees (92) that would be cut falls into the 6- to 11.9-inch size class.

No state or federally listed plant species were found in the survey area (no federally listed species are known to occur within the Complex). Large diameter old growth conifers and western yews, however, are listed as Park Species of Special Management Concern. Species with this designation are of concern to park management because of their limited distribution.

Table 2: Vegetation Surveys of Proposed Routes

	Western hemlock	Grand fir	Western redcedar	Red alder	Douglas fir	Total
	<i>Tsuga heterophylla</i>	<i>Abies grandis</i>	<i>Thuja plicata</i>	<i>Alnus rubra</i>	<i>Pseudotsuga menziesii</i>	(All species)
<i>Alternative B</i>						
Number of trees	108	43	20	7	6	184
Average DBH (in)	9.7	8.9	14.0	10.8	19.2	10.3
Largest DBH (in)	23.2	25.6	30.7	13.8	22.0	30.7
Smallest DBH (in)	2.0	2.0	4.3	7.5	12.2	2.0
<i>Alternative C</i>						
Number of trees	125	58	19	7	3	212
Average DBH (in)	9.5	8.4	16.0	7.3	43.2	10.2
Largest DBH (in)	23.2	25.6	28.3	9.8	59.8	59.8
Smallest DBH (in)	2.0	2.0	4.3	4.3	24.8	2.0

Figure 6: Number of Trees to be Cut by Size Class, Alternative B

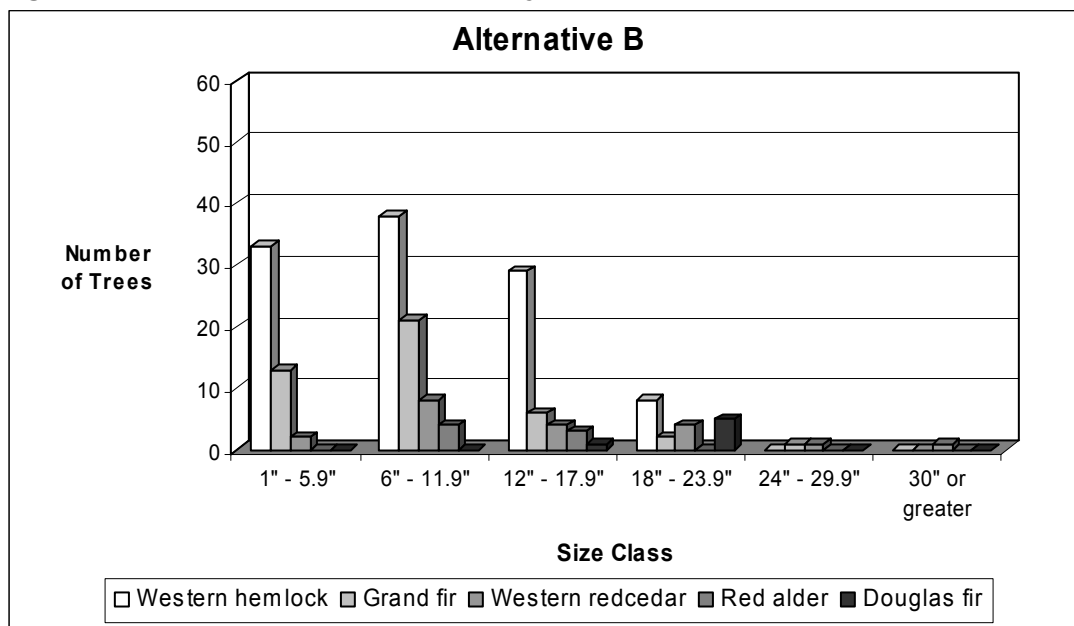
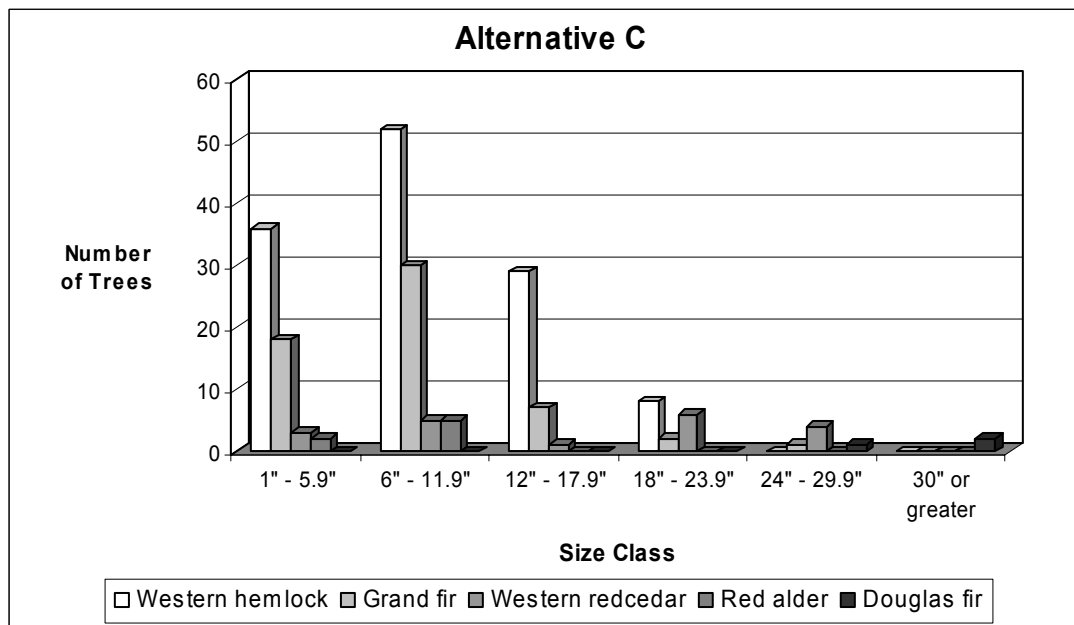


Figure 7: Number of Trees to be Cut by Size Class, Alternative C



A hazard tree removal program was initiated in the campground in the mid-1990s to survey for weak and diseased trees or branches that could pose a threat to visitors. Identified trees are removed or topped in order to prevent them from falling into campsites, structures, or the roadway. Following the 2003 floods, numerous large-diameter hemlock, grand fir, and Douglas fir trees fell as floodwaters weakened their root systems. Large numbers of bark beetles were attracted to the downed trees, where they laid eggs and last spring the larvae hatched to feed on the downed trees. Anticipating a potentially large beetle infestation in 2005, managers applied an anti-aggregating pheromone to disperse the beetles. The pheromone was applied to

prevent the beetles from attacking live old growth trees (the preferred host) within the campground, which could eventually result in the creation of additional hazard trees. Some of the downed trees that were not in the stream channel were removed in the spring of 2005 and used for other park projects.

Non-native plant species, some of which are invasive, were introduced near the north unit of the campground when fill material infested with weed seeds was used to build the Thunder Knob Trail. The potential for weeds to spread from the trail into the campground exists and is monitored by park staff. It is also possible that the fill material, used to build any of the road reroutes under alternatives B or C, could be infested with non-native seeds that could spread throughout the campground.

Environmental Consequences

Alternative A – Abandon the Damaged Campsites (No Action)

Sensitive plants, hazard trees, and other native vegetation will not be affected if Alternative A is implemented. Invasive plants, however, might become established in newly disturbed habitat created by the flood event. With proper monitoring and control of weeds at the site, impacts would be negligible.

Alternative B – Rebuild Loop Roads Closest to Pre-flood Location

Several Park Species of Special Management Concern will be impacted by Alternative B, including several large diameter trees. The removal of three trees larger than 24 inches in diameter along the road alignment, along with removal 184 trees of varying sizes (including the three large diameter trees) constitutes a moderate impact. Large diameter trees are of special concern to park management because they often provide important roosting or nesting sites, they can be food sources for certain wildlife species, they may play important roles in stabilizing soil or providing shade, and they are often important genetic resources for local tree populations. An increase in the number of hazard trees could occur if they are weakened by root cutting during construction of the road or compaction from traffic. The potential for non-native plant species to invade the area is high since there will be a large area of disturbance and several hundred cubic yards of fill will be imported from another location.

Alternative C – Rebuild Shortened Loop Roads Farther from Pre-flood Location

The impacts of Alternative C on vegetation would be greater than those identified in Alternative B because the number of large trees removed would be more (8), and the overall number of trees removed would be more (212 trees). There is a possibility that a tree measuring almost 60 inches DBH, one of the largest trees in the campground, would be cut along this route. If the tree isn't cut, the road alignment would be adjacent to the tree and would likely impact its root system. This tree could eventually become a hazard tree and require cutting. Because of the high value of the tree and the high number of large-diameter trees that would be cut under this alternative, impacts to vegetation would be moderate to major. The same risks outlined in Alternative B would be present for the creation of hazard trees and for the potential for non-native plant species to invade the area.

3.4 Fish and Wildlife

Affected Environment

Fish. Colonial Creek, in addition to Thunder Creek, is one of a few viable fish-bearing streams in the Diablo Basin. Several species are known to use the creek for spawning and rearing. The Washington Department of Fish and Wildlife surveyed the creek prior to the floods in the fall of 2003. Surveys revealed numerous juvenile rainbow trout and native char (bull trout or Dolly Varden). Upstream of the Highway 20 Bridge the gradient steepens and a series of falls

preclude fish access. Since the 2003 floods, the habitat quality of lower Colonial Creek is in a less mature stage, providing more spawning and rearing area. It is likely that pool quality will increase over time as the channel down cuts and becomes more established. The large amount of woody debris contributed to the stream from the floods will help to control stream velocities, stabilize stream banks, foster recruitment of floodplain vegetation, make waterfalls and pools, and create and protect fish spawning areas.

Wildlife. Although the north unit of the campground is situated in the lower Thunder Creek Valley, which provides outstanding habitat for many species of wildlife, the concentrated human use of the area likely causes many wildlife species to avoid it. The north unit is located on a small parcel of land that is bounded on the north and east by Diablo Reservoir/Thunder Arm and on the south and west by Highway 20. Some of the larger mammals found in the lower valley, including black tail deer, bobcat, cougar, and black bear, are likely not found within or near the campground because of the disturbance associated with the campgrounds, highway, and water body. There are several species, however, that are common at the campground in the summer and that use it as habitat. Mammals include mice, Douglas squirrels, and several bat species. Birds include pileated woodpeckers, jays, warblers, flycatchers, tanagers, and swallows. No formal surveys have been conducted for amphibians in or near Colonial Creek; however, several species are likely found in the vicinity, including the tailed frog, western toad, red-legged frog, the chorus frog, ensatina (fully terrestrial species), and the rough skinned newt. Amphibian species less likely to occur but still possible include the Pacific giant salamander, Western red backed salamander, Columbia spotted frog, and the Cascades frog.

Special Status Species. Several state and federally listed fish and wildlife species have been documented within, or have the potential to inhabit, the lower Thunder watershed (See Table 3). Species descriptions and potential impacts are discussed in the next section, Environmental Consequences.

Table 3: Special Status Species with Suitable Habitat and/or with Documented Presence in the Lower Thunder Creek Valley or Diablo Basin

Common Name	Latin Name	Status*		Documented**
		Federal	State	
Mammals				
Canada lynx	<i>Lynx canadensis</i>	T	T	N
Gray wolf	<i>Canus lupis</i>	E	E	N
Grizzly bear	<i>Ursus arctos</i>	T	E	Y
Keen's myotis	<i>Myotis keenii</i>		C	N
Pacific fisher	<i>Martes pennanti pacifica</i>	C	E	N
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>		C	N
Birds				
American white pelican	<i>Pelecanus erythrorhynchos</i>		E	Y
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T	Y
Common loon	<i>Gavia immer</i>		S	Y
Marbled Murrelet	<i>Brachyramphus marmoratus marmoratus</i>	T	T	Y
Merlin	<i>Falco columbarius</i>		C	Y
Northern goshawk	<i>Accipiter gentiles</i>		C	Y
Northern spotted owl	<i>Strix occidentalis caurina</i>	T	E	Y
Peregrine falcon	<i>Falco peregrinus</i>		S	Y
Pileated woodpecker	<i>Dryocopus pileatus</i>		C	Y

Common Name	Latin Name	Status*		Documented**
		Federal	State	
Vaux's swift	<i>Chaetura vauxi</i>		C	Y
Western grebe	<i>Aechmophorus occidentalis</i>		C	Y
Amphibians				
Columbia spotted frog	<i>Rana luteiventris</i>	C	C	N
Western toad	<i>Bufo boreas</i>		C	N
Fish				
Bull trout	<i>Salvelinus confluentus</i>	T	C	Y? (char)

* E = Endangered; T = Threatened; C = Candidate Species; S = Sensitive

** Y = species have been documented in the lower Thunder Creek Valley/Diablo Basin; N = species have not been documented

Environmental Consequences

Impacts Common to All Alternatives

The long-term positive impacts of the flood events at Colonial Creek include an improvement in habitat quality for fish, amphibians, and other aquatic organisms; and a decrease in the area of human disturbance (the size of the campground will shrink regardless of the alternative chosen).

The removal of asphalt and utility and water lines will be conducted with heavy equipment that will have to cross Colonial Creek. Some of the exposed asphalt will also be dug out of the active stream channel. These activities within the stream can crush or injure aquatic organisms, causing minor to moderate impacts depending on the number of organisms that are injured or killed. Although no amphibian surveys have been conducted at Colonial Creek, tailed frog tadpoles were found in abundance during a benthic macroinvertebrate survey in the 1990s. Tailed frogs are strictly stream dwellers (do not inhabit ponds or lakes) and during summer months adult frogs can be found under rocks in streams. Tadpoles are usually numerous and are also found under rocks in streams. Females produce 50 to 60 eggs that are laid in June and early July. The string of eggs is attached to large rocks for about six weeks until the embryos hatch. Rainbow trout and native char are also known to exist in the creek. Rainbows typically spawn from April to June and char in mid-August to mid-November. Since heavy equipment will be crossing the creek to remove utility lines, and asphalt will be removed from the channel under all alternatives, the proposed actions would have minor to moderate impacts on tailed frogs, rainbow trout, and char (see the section on bull trout below for impacts specific to bull trout). Both tadpoles and adult tailed frogs, and trout and char redds could be crushed since they are commonly found under rocks or gravels in stream channels.

The bark beetle pheromone discussed in Section 3.3 should be effective at dispersing bark beetles from the area, and will not have direct effects on other species.

Special Status Species. The following thresholds were used to determine the magnitude of effects on federally listed species that would result from implementation of any of the alternatives.

No effect. The proposed action would not affect a listed species or designated critical habitat.

May affect / not likely to adversely affect. Effects on special status species are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or are completely beneficial.

May affect / likely to adversely affect. When an adverse impact to a listed species may occur as a direct or indirect result of proposed actions and the effect is not discountable or beneficial.

Is likely to jeopardize proposed species / adversely modify proposed critical habitat (impairment). The appropriate conclusion when the NPS or the US Fish and Wildlife Service identifies situations in which the proposal would jeopardize continued existence of a proposed species or adversely modify critical habitat to a species within or outside the Complex.

NPS Management Policies require units to consider the potential impacts of proposed actions on state or locally listed species in addition to federally listed species. Impact thresholds for non-federal species are identical to those outlined at the beginning of this chapter in the Methodology section.

Special Status Mammals. There will be no noticeable change in habitat quality for listed species with large home ranges (e.g., lynx, wolf, grizzly bear, and fisher) under any of the alternatives.

Canada Lynx (Federally Threatened-FT, State Threatened-ST). In the Cascades, lynx habitat includes mixed conifer forests above 4,000 feet. Although the Complex has suitable habitat for lynx and snowshoe hare (its primary prey) in subalpine forests and alpine areas along its eastern border, it is highly fragmented. There have been six lynx observations reported within the Complex. There is no lynx habitat within or nearby the project area, and there have been no lynx sightings within or nearby the project area. Therefore, there will be no effect on lynx as a result of any of the alternatives.

Gray Wolf (Federally Endangered-FE, State Endangered-SE). Wolves are wide-ranging carnivores that use forested and open habitats with sufficient year-round prey, suitable and somewhat secluded areas for raising pups, and sufficient space with minimal exposure to humans. Although the Complex contains ample habitat for gray wolves and abundant prey, they were eliminated from Washington by the early 20th century due to hunting and other human activities. Wolves appear to be re-colonizing Washington from Canada. Although the lower Thunder Creek Valley contains wolf habitat, the proximity of the highway and the campground makes their presence unlikely. Therefore, the proposed actions may affect, but are unlikely to adversely affect, gray wolves under any of the alternatives.

Grizzly Bear (FT, SE). Grizzlies use a variety of habitat classes during different seasons. Denning, which usually takes place from mid-fall to early spring, typically occurs above 6,000 feet, or at or above treeline. Bears emerge between March and May and begin moving down to lower elevations to feed on grasses and forbs, as well as concentrated protein sources (such as winter-killed ungulates), ants, grubs, and rodents. From late spring through early summer, bears move up in elevation, following the “greening up” of vegetation. In mid-summer, berry-producing plants begin fruiting; berries are a critical component of the grizzly’s diet, providing carbohydrates needed for winter denning. Bears will often return to the low elevation spring ranges in the late fall to feed on lush vegetation again.

Currently it is believed that fewer than 20 grizzlies reside in the 10,000-square mile North Cascades Ecosystem. The Thunder Creek Valley, including Colonial Creek Campground, provides high-quality spring and fall habitat for grizzly bears. The last confirmed sighting in the Thunder Creek Valley was about one mile from Colonial Campground in 1987. This observation notwithstanding, the proximity of the highway, the south campground and related visitor activities, make it unlikely grizzly bears would be near the project area.

Therefore, the proposed actions may affect, but are unlikely to adversely affect, grizzly bears under any of the alternatives.

Pacific Fisher (Federal Candidate-FC, SE). Fishers prefer dense forests with extensive, continuous canopies and complex forest floor structure, and they are often associated with wetland forests and riparian areas. The Complex contains suitable habitat for fishers, including the Thunder Creek Valley. Nine observation reports of fishers within the Complex have been completed since 1997, several of which provide good enough details to conclude that at least a few fishers still reside in the Complex. Since no fishers have been documented in the Thunder Creek Valley, the proposed actions may affect, but are unlikely to adversely affect, fishers under any of the alternatives.

Keen's Myotis (State Candidate-SC). The Keen's myotis roosts in tree cavities and rock crevices in coastal forests of northwest Washington, British Columbia, and southeast Alaska. This myotis forages high along forest edges and over ponds, streams, and open meadows. A park-wide baseline inventory of bats conducted from 1998 to 2001 did not document this species in the Complex; however, western long-eared myotis was documented at a number of sites. Taxonomically these two species are very similar and it is possible some captures were misidentified and were actually Keen's myotis. It is likely that the campground and other activities would preclude the species from roosting in the project area. Therefore, the proposed actions would have a minor impact on Keen's myotis under any of the alternatives.

Townsend's Big-eared Bat (SC). Townsend's big-eared bats hibernate in caves and use caves, lava tubes, and abandoned buildings for breeding and roosting sites. Nursery colonies are extremely sensitive to human activity, and sites are readily abandoned if disturbed. This species has been found once within the Complex in an abandoned cabin within Ross Lake National Recreation Area. Although big-eared bat habitat exists in the Thunder Creek Valley, the proximity of the campgrounds and associated activities likely preclude the species from roosting near the project area. Therefore, the proposed actions would have a minor impact on Townsend's big-eared bats under any of the alternatives.

Special Status Birds.

American White Pelican (SE). American white pelicans are very rare spring and fall migrants to reservoirs in the Complex; only five observations have been reported. Only one breeding colony remains in Washington, which is along the Columbia River. Suitable nesting habitat that is free from human disturbance is rapidly declining, thus there are few opportunities for breeding populations of American white pelicans to become reestablished. Since the reservoirs are rarely visited, the proposed actions would have a negligible impact on American white pelicans under any of the alternatives.

Bald Eagle (FT, ST). Bald eagles are highly mobile raptors that respond to seasonally fluctuating food supplies by migrating to areas with large dependable concentrations of these resources. In the Pacific Northwest, annual concentrations of spawning salmon and waterfowl populations provide ample food resources for wintering eagles. One of the largest wintering bald eagle concentrations occurs along the Skagit River, both within and adjacent to the Complex. Wintering bald eagles are also observed in small numbers along reservoirs in the Complex, but are not known to nest on the west side of the Complex. Therefore, the proposed activities (all of which will take place in the summer) may affect, but are unlikely to adversely affect, bald eagles under any of the alternatives.

Common Loon (State Sensitive-SS). Common loons require water bodies with ample prey populations. They are uncommon on the reservoirs throughout the Complex from April to October, but they have been documented nesting on Thunder Arm. Since the loons are using areas far from the project area, the proposed actions would have a negligible impact on common loons under any of the alternatives.

Marbled Murrelet (FT, ST). The marbled murrelet is a small seabird that feeds on fish in near-shore marine waters. Murrelets nest in forested areas up to 50 miles from their marine foraging areas. They primarily use old-growth forests but will also use mature forests that mimic old-growth characteristics. Murrelets have been sighted at Diablo and Ross lake reservoirs. They could be using the reservoirs for foraging or as flyway paths. Given the limited distribution of murrelets in the vicinity of the project area, the proposed actions may affect, but are unlikely to adversely affect, marbled murrelets under any of the alternatives.

Merlin (SC). Merlins are small, fast falcons that prey mostly on small birds, but also rodents, bats, and large insects. During breeding season they seek rugged terrain that provides both nesting trees and open areas for hunting. They typically use other birds' abandoned nests. They are found in more diverse habitats during other times of the year. The Thunder Creek Valley contains suitable habitat for merlins, and they have been documented in the valley. The status of nesting merlins in the state of Washington is unknown. The proposed actions would have minor impacts on merlins under any of the alternatives.

Northern Goshawk (SC). Goshawks are uncommon residents of the North Cascades that nest in dense, mature coniferous forests. Nests are typically built in the largest trees of the nest stand, and can be in either coniferous or deciduous trees. The Thunder Creek Valley contains suitable habitat for goshawks, and they have been documented in the valley. Therefore, the proposed actions would have a minor impact on northern goshawks under any of the alternatives.

Northern Spotted Owl (FT, SE). The northern spotted owl is strongly associated with structurally complex mature or old-growth forests. They nest in cavities or platforms in trees and have home ranges that are typically 3,000 to 5,000 acres per pair. In addition to habitat degradation and loss, barred owls also threaten this species with extinction. They have invaded much of the range of the northern spotted owl and have displaced and hybridized with them. Although there is excellent spotted owl habitat in the Thunder Creek Valley, there have been no confirmed sightings, and six unconfirmed sightings. The last sighting was in 1988. Nesting barred owls have been documented in the valley, so it is possible that spotted owls were there and became displaced by barred owls. It is also possible that spotted owls are indeed in the valley but they aren't responding to calls-a typical response when they are cohabitating in the same area with barred owls. No owl species have been documented in the immediate vicinity of the north campground; therefore, the proposed actions may affect, but are unlikely to adversely affect, northern spotted owls under any of the alternatives.

Peregrine Falcon (SS). Nesting habitat for peregrine falcons includes the presence of prominent cliffs. Suitable nest sites require ledges that are inaccessible to mammalian predators and provide protection from inclement weather. Usually a lake, river, marsh, or saltwater is in close proximity to the site. Although a peregrine was documented at Diablo Lake, nearby nest sites, if they exist, would be located along the valley walls. Activities associated with any of the proposed actions would take place at quite a distance from any potential peregrine nest. Therefore, the proposed actions would have negligible impacts on peregrine falcons under any of the alternatives.

Pileated Woodpecker (SC). Pileated woodpeckers are year-round residents of the Complex that require large trees. Key habitat includes the presence of large snags for nesting. They roost in cavities of both live and dead trees. Preferred nest and roost stands are characterized by greater than 60 percent canopy closure and dominated by trees greater than 80 years old. Pileateds are common in the Colonial Campground; several sightings have occurred during the course of field investigations for this project. The removal of large diameter trees would be especially harmful to pileateds. The proposed actions would have moderate impacts on pileated woodpeckers under any of the alternatives.

Vaux's Swift (SC). Vaux's swift is a common summer visitor to the Complex that prefers to breed in coniferous and mixed coniferous/deciduous forests. It is more common in old-growth forests than in younger stands. Swifts nest and roost in hollow trees. They are aerial foragers that spend much of their time in flight just above the forest canopy or over water hawking ants, bugs, flies, moths, spiders, and aphids. Both the Thunder Creek Valley and Diablo Basin provide suitable habitat for Vaux's swift, and it has been documented in the area. The proposed actions would have minor impacts Vaux's swifts under any of the alternatives.

Western Grebe (SC). Western grebes are locally common breeders on large freshwater ponds, lakes, and reservoirs in arid areas. In winter, they move to coastal saltwater lagoons or stay on large freshwater bodies that remain ice free. In the Complex they are uncommon winter visitors and rare spring and fall migrants to the reservoirs. Western grebes are transient visitors on Thunder Arm. Therefore the proposed actions would have negligible impacts on western grebes under any of the alternatives.

Special Status Amphibians.

Columbia Spotted Frog (FC, SC). The Columbia spotted frog is usually found near perennial water bodies such as springs, ponds, lakes, or stream backwaters. It is most often associated with non-woody wetland plant communities (sedges, rushes and grasses). Breeding occurs in February or March. Females will lay their eggs partially submerged and adjacent to other egg masses. Oviposition occurs between March and June and metamorphosis occurs three to four months after eggs are laid. Columbia spotted frogs are not known to exist in the vicinity of the project area, although no formal surveys have been conducted. Since Colonial Creek contains marginal spotted frog habitat, the proposed actions may affect but are unlikely to adversely affect, Columbia spotted frogs under any of the alternatives.

Western Toad (SC). Western toads are found from sea level to over 7,000 feet. Oviposition sites and aquatic habitat include lakes, springs, ponds, wetlands, stock ponds and slow-moving segments of streams. Terrestrial habitats include forests, grasslands, and along streams. Western toads are most common near marshes and small lakes, but they may wander great distances through dry forests or shrubby thickets. In contrast to the jumping habits of frogs, toads move overland by climbing or crawling. Breeding occurs in mid-to late spring. Females deposit up to 12,000 eggs in strings that can extend 30 feet. Tadpoles often form large schools that swim along the margins of ponds or lakes in search of food. Western toads are nocturnal outside of the breeding season. No western toads have been documented within or nearby the project area, although suitable habitat exists throughout the lower Thunder Creek Valley. Activities associated with any of the alternatives would have negligible impacts on western toads.

Special Status Fish.

Bull Trout (FT, SC). Bull trout, members of the family Salmonidae, are char that have relatively specific habitat requirements compared to other salmonids. They primarily inhabit colder streams; water temperature above 59 degrees is believed to limit bull trout distribution, thereby partially explaining their patchy distribution within a given watershed. Bull trout spawn from mid-August to mid-November during periods of decreasing water temperatures. Eggs hatch the following spring (March to June) and fry can remain in the stream for one to five years before venturing downstream to lakes or larger rivers. Bull trout and Dolly Varden (another char species) are easily confused with one another because they are similar in appearance-so similar that often genetic analysis is required for positive identification. During a 2003 survey of Colonial Creek the Washington Department of Fish and Wildlife found numerous native char; however, it is unknown whether these were bull trout, Dolly Varden, or both. In 2000, a US Fish and Wildlife Service (USFWS) survey in nearby Thunder Creek and Diablo Reservoir detected native char, which were later confirmed as exclusively Dolly Varden. The USFWS noted that bull trout could still occur in the area but Dolly Varden is the primary native char inhabiting lower Thunder Creek and Diablo Reservoir (Manager 2003). Impacts to char can be minimized by avoiding within-stream activities during spawning and incubation (mid-August through June). If mitigation measures are followed, the proposed actions may affect, but are unlikely to adversely affect, bull trout under any of the alternatives.

Alternative A – Abandon the Damaged Campsites (No Action)

Under Alternative A the local wildlife within and in close proximity to the campground would benefit from the limited use of the north campground (minor beneficial impact). Noise associated with generator use by RVs would not occur, and there would be less traffic. There would be no noticeable benefit to animals with large home ranges (negligible impacts).

Alternative B – Rebuild Loop Roads Closest to Pre-flood Location

Under Alternative B some species that use the stream could be impacted due to the close location of the new road to the creek. On busy weekends some of the more mobile species (deer, black bears, and birds) might be less inclined to use the stream. Construction of the engineered log jam could disturb local fish and amphibians within or near the stream. The removal of three large trees (greater than 24 inches in diameter) could impact species that depend on large trees, especially the pileated woodpeckers seen frequently in the campground. This alternative would have minor impacts on most wildlife species, except for pileated woodpeckers, which would experience moderate impacts from the removal of large diameter trees.

Alternative C – Rebuild Shortened Loop Roads Farther from Pre-flood Location

Under Alternative C species that use the stream would be less impacted than in Alternative B because a segment of the road is considerably farther from the creek channel, and the northwest loop section will be limited to car campers, and thus would limit noise from generator use. Log jam construction could impact local fish and amphibians within or near the stream. This alternative would have negligible to minor impacts on fish and most wildlife species, except for pileated woodpeckers, which would experience moderate impacts from the removal of eight large diameter trees.

3.5 Visitor Use

Affected Environment

Colonial Campground is one of four car campgrounds along State Route 20 in Ross Lake National Recreation Area. Prior to the flood damage of 2003, there were 50 campsites on the north side of the campground, six of which were walk-in sites and the remaining 44 were drive-in sites. The campground on the south side contains 100 sites, 21 of which are walk-in and the remaining 79 are drive-in. Colonial is the most popular of the four car campgrounds; the south unit is usually the first to fill up during peak visitation in August. Both campgrounds are generally open mid- to late May through early to mid-September. In 2003, the last year that the north campground was completely open, it never filled to capacity and it was never more than 94 percent full. The majority (68 percent) of overnight campers at Colonial used tents; however, a smaller percentage (58 percent) of campers that stayed on the north side used tents. Table 4 below shows visitor use statistics for 2003 at Colonial Campground. Since visitor use data prior to 2003 is unavailable, it is assumed that the numbers in the table are representative of an average camping year at Colonial Campground.

Table 4: 2003 Visitor Use Statistics, Colonial Campground

	<i>North Unit (50 sites)</i>	<i>South Unit (100 sites)</i>	<i>Entire Campground (150 sites)</i>
Tents	58%	73%	68%
RVs	42%	27%	32%
Season capacity:			
100% full	0 days	2 days	0 days
>= 95% full	0 days	5 days	6 days
>= 75% full	21 days	19 days	20 days
<= 25% full	22 days	27 days	28 days
Average for the season	46% full	44% full	44% full

Environmental Consequences

Alternative A – Abandon the Damaged Campsites (No Action)

Under this alternative, fifteen out of 50 sites would be closed due to damage or inaccessibility in the north campground, leaving 35 available sites. In 2003 the north campground had more than 35 occupied sites (>= 75% full) on 21 days out of the season. In similar visitation years, therefore, several campers would be displaced from the north campground into the south campground or other sites along Highway 20, due to the loss of the 15 campsites. Additionally, the north campground would be closed to RV traffic. Although on most occasions RV campers would be able to find sites at the south campground, it sometimes fills to capacity; in 2003 it was filled to capacity on two different occasions. Since 42 percent of the campers in the north campground are RV campers, several could be displaced to the other campgrounds along Highway 20 on certain weekends when the south campground fills to capacity. The displacement of campers could result in minor impacts to those who might have to stay at another campground. Conversely, tent campers might benefit from the RV closure. An area designated only for tent camping would appeal to many campers who are seeking a more primitive camping experience. Since the majority of campers (68 percent) in Colonial campground are tent campers, implementation of this alternative would have minor impacts on most campground visitors.

Alternative B – Rebuild Loop Roads Closest to Pre-flood Location

Under Alternative B, there would be a net loss of six campsites after several new sites would be built along the new road and some damaged sites recovered and rebuilt. This alternative offers the maximum number of available drive-in sites (34), as well as 10 walk-in sites. In 2003 the north campground had more than 44 occupied sites on 10 days out of the season. In similar visitation years, therefore, several campers would be displaced from the north campground into the south campground or other sites along Highway 20, due to the loss of the six campsites. This alternative would displace the fewest number of campers (on 10 days) compared to Alternative A (21 days) and Alternative C (11 days). Therefore, this alternative would have negligible impacts on visitor use.

Alternative C – Rebuild Shortened Loop Roads Farther from Pre-flood Location

Under Alternative C there would be a net loss of seven campsites. This alternative includes the conversion of nine RV-accessible sites to car-accessible sites (see Table 1), for a total of 33 drive-in (9 car-accessible and 24 RV-accessible), and 10 walk-in sites. In 2003 the highest number of RVs staying in the north campground in one night was 22, which is two less than the maximum number of available RV sites that would exist under this alternative. There were more than 43 occupied sites on 11 days out of the season. The limiting of the two-way road segment and turnaround to car traffic could inconvenience some RV campers and potentially cause a safety hazard for those who take the route without paying attention to restricting signage. This alternative would therefore have minor impacts on RV users and negligible impacts on tent campers who are seeking a more primitive camping experience.

3.6 Conclusions

Impacts Common to All Alternatives

Under all alternatives, the process of removing the damaged utilities and asphalt could have impacts on water quality, fish, and wildlife. There would be short-term minor impacts to water quality during creek crossing and retrieval of the damaged utilities and asphalt. However, it is likely that the long-term benefits of removing asphalt outweigh the short-term risks from siltation by the equipment. If mitigation measures are followed, char (potentially bull trout) may be affected, but are unlikely to be adversely affected by removal of the utilities and asphalt. Mitigation measures include the avoidance of within-stream activities during spawning and incubation (mid-August through June). Activities in the stream channel could also impact tailed frogs and other amphibians that could reside in Colonial Creek. Since tailed frogs are strictly stream dwellers that cling to the underside of rocks, they would likely be impacted by stream crossings and asphalt removal in the stream bed, resulting in minor to moderate impacts. Beneficial impacts under all alternatives include a decrease in the area of human disturbance (the size of the campground will shrink regardless of the alternative chosen).

Alternative A – Abandon the Damaged Campsites (No Action/Environmentally Preferred)

Under this alternative, resource impacts range from negligible to minor. Geomorphology would be least impacted under this alternative, with negligible to minor impacts on alluvial fan development. Water quality would experience short-term, minor impacts due to stream crossings and asphalt/utilities removal from the streambed. There would be negligible impacts on vegetation since none will be removed. Fish and wildlife would experience negligible to minor beneficial impacts due to the partial campground closure and reduction in human activity in the vicinity of Colonial Creek. There would be an improvement in habitat quality for fish, amphibians, and other aquatic organisms (in the long-term). The actions under this alternative may affect, but are unlikely to adversely affect, any federally listed species. Visitor use would experience minor impacts due to a net loss of 15 campsites and restrictions on RV access. Impairment of resources or values would not occur under this alternative.

Alternative B – Rebuild Loop Roads Closest to Pre-flood Location

Under Alternative B, resource impacts range from negligible to moderate. Geomorphology would be most impacted under this alternative since part of the road alignment is located adjacent to the creek, and a log jam will be installed to stabilize the cut bank. Alluvial fan development would be limited, constituting a moderate impact. There would be minor, short term impacts to water quality during the construction of the engineered log jam. The removal of 184 trees, including three of large-diameter, would result in moderate impacts to vegetation due to the loss of important habitat and a reduction in structural complexity of the area. Local unlisted wildlife would experience moderate impacts with the loss of habitat and disturbance associated with this alternative, including pileated woodpeckers, which would experience moderate impacts from the removal of large diameter trees. Federally listed species may be affected, but are unlikely to be adversely affected, under this alternative. Visitor use would experience negligible impacts due to a net loss of six campsites. Impairment of resources or values would not occur under this alternative.

Alternative C – Rebuild Shortened Loop Roads Farther from Pre-flood Location

Under Alternative C, resource impacts range from negligible to major. Although the road relocation would occur farther from the current creek channel under this alternative, the creation of a log jam to stabilize the cut bank will influence future alluvial fan development, resulting in moderate impacts to geomorphology. There would be minor, short-term impacts on water quality during the construction of the engineered log jam. The removal of 212 trees, eight of which are large diameter (< 24 inches in diameter), including the potential removal of one very large-diameter Douglas fir would result in moderate to major impacts to vegetation. Local wildlife would experience negligible to minor impacts with the loss of habitat and additional disturbance associated with this alternative, except for pileated woodpeckers, which would experience moderate impacts from the removal of large diameter trees. The actions under this alternative may affect, but are unlikely to adversely affect, federally listed species. Visitor use would experience negligible to minor impacts due to a net loss of seven campsites and restrictions on RV access. Impairment of resources or values would not occur under this alternative.

4 Consultation and Coordination

4.1 Persons, Organizations, and Agencies Consulted

Brendon Brokes, Area Habitat Biologist, Washington Department of Fish and Wildlife

Mark Downen, Inland Fisheries Biologist, Washington Department of Fish and Wildlife

4.2 List of Preparers

This EA was prepared by Cathi Jones, Resource Management Specialist. Contributors include Dennis Stanchfield, Maintenance Mechanic Supervisor; Jon Riedel, Geologist; Mignonne Bivin, Plant Ecologist; Roy Zipp, Resource Management Specialist; Jack Oelfke, Chief of Resource Management; and Tom Belcher, Chief of Facilities and Maintenance.

4.3 List of Recipients

Agencies

Washington Department of Fish and Wildlife, Region 4 Office

US Fish and Wildlife Service, Western Washington Office

Mount Baker-Snoqualmie National Forest

Chambers of Commerce

Concrete Chamber of Commerce
North Cascades Chamber of Commerce
Sedro-Woolley Chamber of Commerce

Mayors

Mayor Jack Billman, Concrete
Mayor Sharon Dillon, Sedro-Woolley
Mayor Bud Norris, Mount Vernon
Mayor Roger Tjeerdsma, Burlington

Media

Skagit Valley Herald

Organizations

Cascade Chapter of the Sierra Club
The Mountaineers
National Parks and Conservation Association
North Cascades Conservation Council
North Cascades Institute
Northwest Ecosystem Alliance
NOLS, Pacific Northwest
Outward Bound West
YMCA Camp Orkila

Public Libraries

Bellingham Public Library
Burlington Public Library
Mount Vernon City Library
Sedro-Woolley Public Library
Upper Skagit Library

Other

Seattle City Light

References

- Beamer, E. M., and R. A. Henderson. 1998. Juvenile Salmonid Use of Natural and Hydro Modified Stream Bank Habitat in the Mainstem Skagit River, Northwest Washington. Report prepared for US Army Corps of Engineers, Seattle District. Fisheries and Environmental Services for the Swinomish Tribal Community, Upper Skagit and Sauk-Suiattle Indian Tribes. 51 pp.
- Behnke, Robert J. 2002. Trout and Salmon of North America. New York: The Free Press; 359 pp.
- Bloom, Arthur L. 1991. Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, 2nd Ed. Englewood Cliffs, New Jersey: Prentice Hall; 532 pp.
- Leonard, William P., Herbert A. Brown, Lawrence L. C. Jones, Kelly R. McAllister, and Robert M. Storm. 1993. Amphibians of Washington and Oregon. Seattle: Seattle Audubon Society; 168 pp.
- Manager, Western Washington Fish and Wildlife Office. August 13, 2003. Letter to Superintendent regarding re-initiation of consultation on proposed fishing project at the Colonial Creek Campground.
- Singh, Pratap and Vijay P. Singh. 2001. Snow and Glacier Hydrology. The Netherlands: Kluwer Academic Publishers; 742 pp.

6/21/05 15:52 DENWU P11 C:\DOCUMENTS AND SETTINGS\DENWU\MY DOCUMENTS\PROJECTS\MOCK\CAUT\0501_104631_1\ATTN\TERRACE 104631_1.DWG 6/21/05 15:52 DENWU P11 C:\DOCUMENTS AND SETTINGS\DENWU\MY DOCUMENTS\PROJECTS\MOCK\CAUT\0501_104631_1.DWG 6/21/05 15:52 DENWU P11 C:\DOCUMENTS AND SETTINGS\DENWU\MY DOCUMENTS\PROJECTS\MOCK\CAUT\0501_104631_1.DWG



5/21/16 1:50 DESMAY P10 C:\DOCUMENTS AND SETTINGS\DESMAY\MY DOCUMENTS\PROJECT\MODS\GUY\MODS\10631_1\BME.DWG C:\DOCUMENTS AND SETTINGS\DESMAY\MY DOCUMENTS\PROJECT\MODS\GUY\MODS\10631_1\BME.DWG C:\DOCUMENTS AND SETTINGS\DESMAY\MY DOCUMENTS\PROJECT\MODS\GUY\MODS\10631_1\BME.DWG C:\DOCUMENTS AND SETTINGS\DESMAY\MY DOCUMENTS\PROJECT\MODS\GUY\MODS\10631_1\BME.DWG



Appendix B – 2005 Plant Species List, Colonial North Proposed Routes

Scientific Name	Common Name
Trees	
<i>Abies grandis</i>	Grand fir
<i>Alnus rubra</i>	Red alder
<i>Psuedotsuga menziesii</i>	Douglas fir
<i>Taxus brevifolia</i>	Western yew
<i>Thuja plicata</i>	Western redcedar
<i>Tsuga heterophylla</i>	Western hemlock
Shrubs	
<i>Gaultheria shallon</i>	Salal
<i>Menziesia ferruginea</i>	False azalea
<i>Oplopanax horridus</i>	Devil's club
<i>Pachistima myrsinites</i>	Oregon boxwood
<i>Ribes sp.</i>	Gooseberry
<i>Rosa gymnocarpa</i>	Baldhip rose
<i>Rubus parviflorus</i>	Thimbleberry
<i>Rubus ursinus</i>	Trailing blackberry
<i>Vaccinium parvifolium</i>	Red huckleberry
Herbs	
<i>Chimaphila umbellata</i>	Prince's-pine
<i>Claytonia sibirica</i>	Siberian miner's-lettuce
<i>Clintonia uniflora</i>	Queen's cup
<i>Colomia heterophylla</i>	Colomia
<i>Corallorhiza striata</i>	Striped coralroot
<i>Cornus canadensis</i>	Dwarf dogwood
<i>Fragaria chilensis</i>	Coastal strawberry
<i>Galium aparine</i>	Cleavers
<i>Geum macrophyllum</i>	Large-leaved avens
<i>Hieracium albiflorum</i>	White-flowered hawkweed
<i>Linnaea borealis</i>	Twinflower
<i>Mycelis muralis</i>	Wall lettuce
<i>Osmorhiza chilensis</i>	Mountain sweet-cicely
<i>Ranunculus acris</i>	Meadow buttercup
<i>Rumex conglomeratus</i>	Bitter dock
<i>Tiarella trifoliata</i>	Meadow foam
<i>Trillium ovatum</i>	Western trillium
<i>Viola sempervirens</i>	Trailing yellow violet
Grasses	
<i>Poa annua</i>	Annual bluegrass
<i>Dactylis glomerata</i>	Orchard grass
Ferns	
<i>Dryopteris expansa</i>	Spiny wood fern
<i>Polystichum munitum</i>	Sword fern