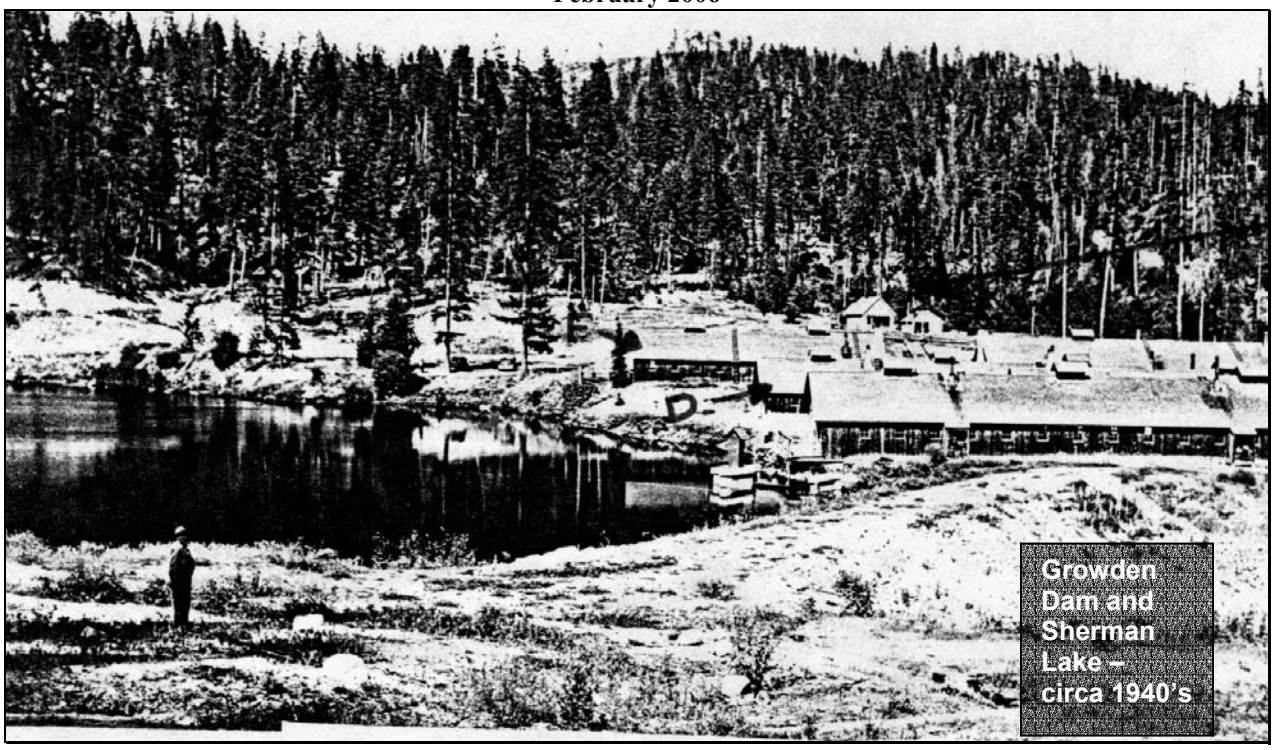
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28
Final Environmental Impact Statement

COLVILLE NATIONAL FOREST
Ferry County, Washington

February 2006



Responsible Agency: USDA Forest Service, Colville National Forest

For further information, contact:	Responsible Official:
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ABSTRACT

The Colville National Forest proposes to decommission the Growden Dam and restore approximately 1.1 miles of trout habitat in the Sherman Creek Watershed. The project area is located west of Kettle Falls, Washington, includes all National Forest System lands administered by the Three Rivers Ranger Districts in Township 36, Range 36, Sections 25-36. The Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 Final Environmental Impact Statement (FEIS) documents the environmental analysis of the proposed action, no action, and two alternatives. The alternatives are compared in the context of a variety of physical, biological, and social concerns, including the five purpose and needs of Safety, Temperature, Bedload Transport, Fish Passage, and cost, and the two alternative driving issues of heritage resources and wetlands. Four alternatives were studied in detail: **Alternative A (No Action)** would not implement any action. The **Proposed Action (Alternative B)** would remove a portion of the dam, restore 1.1 miles of fish habitat downstream of Growden Dam, provide logs for the project from 38 timbered acres, and restore Lane Creek Pit. **Alternative C (Run of the River)** would construct a channel on the dam to allow for flows over the dam. The stream restoration would also occur, but Lane Creek Pit would not be restored. **Alternative D (Emergency Spillway)** would create an emergency spillway on top of the dam to allow for high flows to overtop the dam without causing it to breach. There would also be an amendment to the Forest Plan changing the project area's Visual Quality Objective from "Retention" to "Restoration" under the action alternatives.

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Summary

Chapter 1 - Purpose of and Need for Action

The Colville National Forest proposes to decommission the Growden Dam and restore approximately 1.1 miles of trout habitat in the Sherman Creek Watershed.

Project Overview
Since the early 1970's, the Colville National Forest and the Washington State Dam Safety Section has recognized the potential for Growden Dam to overtop and wash away, causing major downstream damage to private and public lands (USDA Forest Service, Dam Maintenance Inspection – Growden Dam, 1977). This was made more evident during the floods of 1998. The outlet structure of the dam clogged with branches and the water was 6 inches from going over the dam. A Colville National Forest road crew responded and removed the debris. Since the dam is made of dirt and gravel, water overtopping the dam can erode the dam which would cause it to wash away.

In 1995, the Forest Service and the Bureau of Land Management issued the Inland Native Fish Strategy (INFISH). The strategy amended the Forest Plan. This strategy listed several variables for riparian management objectives. Among the objectives are temperature and indirectly fish passage. In 1996, the Colville National Forest prepared the North Sherman and Fritz Timber Sales Environmental Impact Statement (October 1996). In this document the aquatics report recognized a need to reduce stream temperatures, since the stream was listed on the Washington State Department of Ecology 303d list[1]. Further testing showed that the increased temperatures originated from the wetland behind Growden Dam and the lower portion of the South Fork of Sherman Creek. Genetics testing over the last 8 years have shown isolated populations of native species. Providing fish passage at the dam would connect these populations.

In response to the safety and INFISH issues and concerns, the Forest convened a workshop in 2002 to study the dam and provide ideas for mitigating the safety and INFISH concerns. The NEPA (National Environmental Policy Act) process for this project started with that workshop. Through interdisciplinary team and public input alternatives were developed. The main issues that drove the development of the alternatives are the loss of historical significance of Growden and the loss of the wetlands behind the dam.

The project area is located west of Kettle Falls, Washington, and includes all National Forest System lands administered by the Three Rivers Ranger District in Township 36 North, Range 36 East, Sections 25-36. The project area is 7680 acres in size; however less than 74 acres will be directly impacted at the dam site and the habitat restoration reach. Approximately 1.1 miles of stream and 38 acres of stand treatment will occur at the habitat restoration reach. Approximately 8 acres will be affected at Growden Dam. There will be 8 acres of pit expansion. 10 acres of Lane Creek Pit will be rehabilitated. There are approximately 10 acres exclusive of the pit development that will be affected by travel, staging, and construction activities. Named streams within the project area include: Sherman Creek, Trout Creek, Canyon Creek, Nueske Creek, South Fork of Sherman Creek, Lane Creek, Hart Creek and Milk Creek, which drain eastward into the Columbia River.

Management Direction
The guiding management direction for the project area is provided by the 1988 *Land and Resource Management Plan, Colville National Forest*, as amended (hereafter referred to as the **Forest Plan**). The project area is in Management Area 3A. **Management Area 3A** emphasis is Recreation: Its goal is to provide roaded and unroaded recreation opportunities in a natural appearing setting.

The Forest Plan includes amendments that are also management direction for this project. They are the Regional Forester's Forest Plan Amendment #2, entitled *Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales* (June 5, 1995) and the Inland Native Fish Strategy (July 28, 1995). In 1995, the Forest Plan was amended by the Inland Native Fish Strategy (INFISH). INFISH delineated riparian habitat conservation areas (RHCAs). Regional Forester's Forest Plans Amendment #2 and the INFISH Direction are collectively referred to as "Screening Direction".

The Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 FEIS is tiered to the *Managing Competing and Unwanted Vegetation FEIS* (1988). This document set forth a Pacific Northwest regional policy that allows use of all methods to manage competing and unwanted vegetation, with emphasis on preventing vegetation management problems. The selected alternative (Alternative H) is currently being

implemented on the Colville National Forest by selection and implementation of Alternative C from the *Environmental Assessment for Integrated Noxious Weed Treatment, Colville National Forest*, (1998). Additionally, the *Colville National Forest Noxious Weed Prevention Guidelines*, became Colville National Forest policy in November 1999, and are incorporated by reference in this FEIS.

The **USDA Forest Service Roads Policy** became effective January 12, 2001. The roads policy gives the line officer the discretion on whether or not to do a road analysis before the final decision. In this project one existing road access across the dam is proposed to be eliminated. There will also be 1 mile of access road that will be obliterated. The only road affected is 2000-214. The management level will not be changed. The scale of the project is small and does not warrant a roads analysis. Therefore a roads analysis is not needed.

The **USDA Forest Service Natural Resource Agenda** is a policy statement (not explicit management direction) by the Chief of the Forest Service outlining management philosophy and priorities for administration of National Forest System lands by the USDA Forest Service. The Natural Resource Agenda helps set priorities and guide management decisions within the framework of existing laws, regulations, and the Forest Plan.

Implementation of this project will require permits from the Department of Ecology, Washington Department of Fish and Wildlife, and the Corp of Engineers. The State Historic Preservation office has already issued a concurrence with the project and associated mitigation.

Purpose and Need for the Proposed Action

The dam is in danger of breaching. The picture (figure I-1) of the downstream impacts of the Horseshoe Lake Dam breach is similar to the downstream impacts that a breach in Growden dam would cause. To prevent a breach the structure at the dam site needs to pass a 500-year flood event.

Figure 1 – Downstream of Horseshoe Lake dam breech.

The Forest Plan has goals of high quality aquatic habitat, water, and riparian resources. The INFISH Forest Plan Amendment has goals of maintaining or restoring stream channel integrity, channel processes, and sediment regime, and diversity and productivity of native and desired non-native plant communities. INFISH standard and guideline LH-1 requires surface water developments such as dams to maintain or restore riparian resources, favorable channel conditions, and fish passage, reproduction and growth. The dam currently affects water temperature, bedload transport, and fish passage on Sherman Creek.

To meet the purpose of fish reproduction and growth as stated in INFISH and the temperature needs of the Clean Water Act, the maximum stream temperature as it leaves the Growden site needs to be less than 16 degrees C (7 day average daily maximum water temperature).

To meet the purpose of the Forest Plan to maintain or restore stream channel integrity, channel processes, sediment regime, and favorable channel conditions, the Growden dam site needs to allow bedload movement through the reach. The reach between Log Flume and the Bangs Mountain Road needs the structure to store this bedload.

The drop structure is a barrier to fish movement. Redband trout and Westslope Cutthroat trout populations are present in the watershed. The Forest Service has listed these species as sensitive. One of the main redband trout populations occurs in Lane Creek, a tributary that enters just below the dam. This population does not have access to the prime habitat found above the dam. To meet the purpose of the Forest Plan as amended by INFISH the structure at the dam site needs to provide fish passage.

The alternatives will be evaluated on how much they cost. The proposed action is projected to cost $1,000,000. Some people are concerned that this expenditure is not a good use of limited funds. Alternatives need to be economically feasible. The line officer has determined an economically reasonable alternative to be not more than 10% over the proposed action cost or $1,100,000.

Proposed Actions
The project is a proposal to remove the Growden Dam and restore approximately 1.1 miles of fish habitat downstream of the dam. These proposed actions include:

Partially remove the Growden Dam structure.

Restore the channel and valley bottom behind the dam to pre-dam elevations and adding 1 – 3 backwater ponds in the new valley bottom behind the dam.

Remove sediment deposits from behind the dam and creating a terrace with part of the sediment and taking the rest to the Lane Creek pit.

Restore Lane Creek pit with sediment from behind the dam.

Improve fish habitat and sediment storage on approximately 1.1 miles of stream below the dam.

Thin riparian vegetation to get the material needed for the stream restoration at Log Flume.

Develop rock sources to use for material in stream restoration at the dam site.

Provide interpretation of the Growden Dam removal as mitigation for dam removal.

Amend the Forest Plan for the Visual Quality Objective from Retention to Restoration for the Project Area.

Figure 2 - Below is a conceptual before and after picture at Growden Dam.

Public Involvement
The initial effort of the public involvement process came about prior to the proposed action being developed. The Forest Service held a dam decommissioning workshop open to the public in October 2002. Approximately 15 people attended from private, federal and state agencies. Alternatives for mitigating the safety hazards of the dam were developed in the workshop.

The interdisciplinary team was convened in the spring of 2004 to begin the process of developing a proposed action that could be brought before the public as part of the formal scoping process. The task was completed in the spring of 2004.

The Notice of Intent (NOI) was published in the Federal Register on March 1, 2004. The NOI asked for public comment from April 7, 2004 to May 7, 2004, on the Forest Service proposed action for the Growden Dam and Sherman Creek Restoration Project. A notice of the scoping period was placed in the newspaper of record, the Colville Statesman Examiner on April 7, 2004. Scoping letters were sent to individuals and organizations on the master mailing list of publics interested in watershed management activities on the Three Rivers Ranger District. Additional letters were sent out to landowners within the Sherman Creek watershed who owned property within ½ mile of National Forest System land in the Project Area. A second NOI was placed in the Federal

Register in April 2005 changing the name from the Growden Dam and Sherman Creek Restoration Project to the Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 Final Environmental Impact Statement (FEIS). This was to allow for the change of the Visual Quality objective from Retention to Restoration.

The Confederated Tribes of the Colville Reservation, Kalispel Tribe, and the Spokane tribe of Indians were contacted about the project. A meeting was held with the Confederated Tribes of the Colville Reservation to consult with them on this project.

The scoping effort resulted in 4 letters, faxes, interviews, and electronic messages from interested members of the public, and 6 from organizations concerned with resource management in the project area. Most of the comment sheets and letters addressed multiple issues. Many comments voiced were the same. Not all comments made issues, however. Responses generally fell into two positions: those who favored dam decommissioning and those who opposed dam decommissioning based on historical significance. There was also concern about logging operations, sedimentation, the need for fish passage, negative effects to fisheries, and other archeological sites.

Issues

Using the comments from the public, other agencies, and internal scoping, the interdisciplinary team developed a list of issues to address. Concerns over the loss of a heritage site and the wetland behind the dam became the alternative driving issues. There were 7 significant issues: keeping noxious weeds from spreading, and minimizing effects to recreation (3 separate issues), and minimizing effects to water quality (3 separate issues). The public raised additional concerns. The Interdisciplinary Team addressed these concerns and found them not to be Alternative Driving Issues or Significant Issues. Effects will be disclosed in this EIS. However, effects of implementation of the proposed action will have effects that may be considerations in making the decision. These effects were assessed and are disclosed in Chapter 3 of this EIS and in the project analysis file.

Responsible Agency and the Decision to be Made

The Colville National Forest Supervisor is the deciding official for this environmental impact statement. The decision options are:

- Whether or not to implement the dam removal and if so how much of the dam will be removed.
- Whether or not to implement the stream structures downstream of the dam.

Chapter 2 - Alternatives

Alternative Description

To provide a reasonable range of effects in the context of the alternative driving issues, the team considered the features of the proposed action that sparked public comment. This included the amount of dam modified. Varying the amount of dam modified between alternatives extends the range of effects the alternatives have on the issues. The Interdisciplinary team changed the proposed action from a full removal to two-thirds removal of the dam width to address the heritage mitigation. Alternative C, the run of the river alternative, reduces the height of the dam but maintains a large portion of the dam. Alternative D, the emergency spillway, does not alter the hydrology behind the dam.

In all, this FEIS considers four alternatives.
Alternative A: The No Action Alternative
Alternative B: Proposed Action Alternative – Partial Removal
Alternative C: The Run of the River Alternative
Alternative D: The Emergency Spillway Alternative

Alternative A – No Action

The No Action Alternative is defined as not implementing actions proposed under this environmental analysis. Nothing would be done to the dam, stream restoration would not occur, vegetation management in the riparian areas would not occur. Noxious weed management would continue as prescribed under the current policy. The Forest Service road crew will still check on the dam during floods.

Alternative B – The Proposed Action
Partial Removal of Growden Dam

This alternative would partially remove the Growden Dam and would reconstruct a stable stream system from the upper end of the existing floodplain impounded above the existing dam, down through the current dam location. The proposed reconstructed stream system would be restored to an elevation above the original floodplain prior to the construction of the Growden Dam. Segments of the existing dam on the North and South side of Sherman Creek would be conserved in an undisturbed state as culturally significant features to be interpreted as part of the adjacent Growden Dam Recreation Site.

The area to be impacted would extend from approximately 300 feet below the downstream toe of the dam, upstream to a point approximately 1100 feet upstream from the top of the dam. The width of disturbed area for this alternative would generally be the width of the existing Sherman Creek flood plain plus 50’ to each side. Small ponds will be placed in the floodplain. They will be designed to support trout.

Rock sources needed for implementing this alternative would be the Bridge Creek Pit, in the South Fork Sherman Creek Drainage, the Lane Creek Riprap pit, in the Sherman Creek drainage, and the Lane Creek Pit, in the Lane Creek Drainage. Lane Creek Pit would also be used as a source for cobbles and gravels for reconstructing the proposed Sherman Creek channel, once the Growden Dam is removed, and as a waste area for excess material removed from the dam, and the flood plain behind the dam.

The existing drop inlet structure just upstream from the dam would be retained. The drop inlet would be preserved in its current outward configuration but would be uncovered from its existing condition as the excavation of the flood plain proceeds. Under this alternative, the drop inlet would not be needed for proper operation of the stream system. The drop inlet would be plugged with concrete and sand to limit access into its interior as a safety measure.

Restoration of Stream Habitat
Approximately twenty-five sites have been selected for improvement between the east end of the Log Flume Interpretive Site upstream to the Bangs Mountain Bridge on Forest Road #136. This is to mitigate both the loss of the wetland behind the dam and to increase the amount of sediment and bedload storage in Sherman Creek. The goal of these structures is to provide for sediment storage, reduce stream temperatures, provide high quality fisheries habitat, and allow for the stream to interact with its floodplain. The structures to be used include log jams, bar buddies, and rock structures.

Riparian Vegetation Treatment
The material source for logs will be the timber stand adjacent to the Log Flume interpretive site, Highway 20, and Bangs Mountain Road. Trees would be removed on these 38 acres for use in the stream structures. Trees used for this project will be less than 20 inches diameter at breast height (dbh). Most of the trees will be between 6 and 12 inches dbh. Live trees will be taken to thin a stand. Most of these will be lodgepole pine. A large portion of the trees that will be used are dead and dying from a beetle infestation. The trees would be felled and moved by an excavator and forwarder. Some trees will be cut and others will be pushed over by an excavator so that the tree with roots attached may be used in the stream structures. The forwarder would place the logs at the work sites. Designated routes to the stream channel are over existing skid trails or roads from past work.

Temporary Road Access
Approximately ½ mile of existing access roads would be used temporarily for the Log Flume Project Site. Two roads depart from the Log Flume trailhead. One was used as a salvage logging road and the other to put in the bank stabilization at the log flume interpretive site in 1999. A third road off of Bangs Mountain road was used to place a footbridge in the upper portion of the reach. All temporary roads would be decompacted and seeded with native grasses and shrubs when the structures are finished.

Alternative C – The Run of the River Alternative
This alternative would address wetland retention issues by changing the site to a Run-of-the-River condition. The wetland behind the dam would remain intact. This alternative would excavate out a portion of the top of the dam approximately 8 feet deep, down to the elevation of the existing streambed at the existing drop inlet. The floodplain downstream from the dam would be raised and a new stream channel constructed from the existing drop inlet structure, through the dam and down to the existing stream channel at a point around the mouth of Lane Creek. Segments of the existing dam on the North and South side of Sherman Creek would be conserved in an undisturbed state as culturally significant features to be interpreted as part of the adjacent Growden Dam Recreation Site. The existing drop inlet would be left in place and would be plugged with concrete and sand to limit access into its interior as a safety measure.

Figure 3 - Run of the River conceptual picture

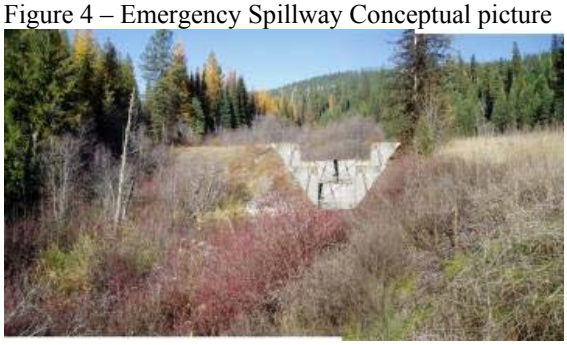
No stream bed or sediment removal would be done above the dam except to tie the proposed stream channel into the existing stream channel at the drop inlet structure. The proposed stream channel would be constructed to widths and depths similar to the stream reaches just downstream of the dam.

The material sources, riparian vegetation treatments, temporary road locations, and stream restoration described in Alternative B would also be used in this alternative.

Alternative D – The Emergency Spillway Alternative
Alternative D addresses the Heritage Resource and Wetland retention issues. This alternative would maintain the dam as is and create a 15-foot-wide and 6-foot-deep concrete emergency spillway on top of the dam. The spillway would channel water into a 30-foot-long by 15-

foot-wide chute on the face of the dam which would direct the water into the pool below the dam. This spillway is designed to pass a 500 year flood flow, so it meets the DSS regulations safety issue. This alternative would not affect the wetland or wetland water table. The drop inlet would remain as the main outlet for the dam. It would still require maintenance. Riparian vegetation treatments, temporary road locations, and stream restoration described in Alternative B would not be used in this alternative.

Figure 4 – Emergency Spillway Conceptual picture



Three Alternatives were not considered in detail and the rationale is given in chapter 2. They are:

Alternative E – Installation of a Culvert through the Dam
Alternative F – Yearly maintenance and stream cleanout
Alternative G – Emergency Spillway with 6 acre lake

Features Common to All Action Alternatives
The Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 FEIS will only address the prevention of weed spread and/or the compounding of weed problems that could result from proposed activities except where needed to prevent spread of weeds to the project site. The project will not address treatment of existing weed problems or the spread of weeds that would occur independently of the proposed actions. Treatment of existing weeds is addressed by the Colville National Forest Environmental Assessment for Integrated Noxious Weed Treatment (1998).

The proposal to amend the Forest Plan to change the visual quality objective of retention to restoration due to the construction at the Dam site is in all the action alternatives.

Mitigation Measures and Monitoring Plan
Best Management Practices are the primary mitigation measures used to reduce or eliminate potential effects to soil, water, and fisheries resources. BMPs are incorporated by reference, and the text of applicable BMPs is included in the Project Analysis File. Additional or supplemental project-specific mitigation measures are listed in Chapter 2.

The monitoring plan includes revegetation effectiveness, stream structure effectiveness, temperature reduction, dam outlet condition, fish passage effectiveness, snag retention, and sedimentation monitoring.

Chapter 3 - Affected Environment and Environmental Consequences

Direct, indirect, and cumulative effects are discussed for each resource in this FEIS. While direct and indirect effects tend to focus on the effects of implementing proposed activities (or in the case of the No Action alternative, the effects of not implementing the proposed actions), cumulative effects discussions focus on the incremental effects of the proposed activities when added to other past, present, and foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (listed in Chapter 3). This summary focuses on the environmental consequences as they relate to the Purpose and Need and Issues.

Chapter 4 - Contacts
Listed in this chapter are the members of the interdisciplinary team and other individuals and agencies that participated in the development of this EIS.

Chapter 5 – Chapter 5 contains a list of persons, organizations, and agencies to who copies of the FEIS are sent.

Table 1 - Alternative Comparison Table of the Purpose and Need and the Alternative Driving Issues

	Ability to safely pass a 500-year flood event	Reduction in stream temperature expected	Amount of the vertical height of the dam removed	Increase in area available for bedload storage	Fish passage provided	Cost of the project not more than 10% of total removal cost ($1,000,000)	Adverse Call / If yes does mitigation satisfy the State Historic Preservation Office (SHPO)	Change in wetland habitat behind the dam
A – No	No	No	0%	No	No	Annual	No	None

Action						Maintenance		
B – Dam Removal	Yes	Yes	100%	Yes	Yes	$1,042,000	Yes / Yes	5-6 acres
C – Run of the River	Yes	No	40%	Yes	Yes	$681,000	Yes / Yes	1-2 acres
D – Emergency Spillway	Yes	No	0%	No	No	$287,000	No	None

Table 2 – Alternative Comparison Table of the Significant Issues

	Noxious Weeds - Acres of soil disturbance within the project area	Recreation-Amount of disturbance to Log Flume	Recreation-Amount of disturbance to the Growden Interpretive Site	Recreation-Sherman Byway Plan Consistency	Recreation-Visual effects consistent with Forest Plan	Water Quality - Amount of stream channel disturbed.	Water Quality - Amount of dam removed is indicative of the amount of disturbance
A – No Action	0	0	0	Yes	Yes	0	0
B – Dam Removal	74	Site closed for 1 Summer	Site closed for 1 summer	Yes	No – Amendment to the Forest Plan needed	1.3 miles	60%
C – Run of the River	66	Site closed for 1 Summer	Site closed for 1 summer	Yes	No – Amendment to the Forest Plan needed	1.1 miles	10%
D – Emergency Spillway	10	0	Site closed for 1 summer	Yes	Yes	0	2%

For Further Information or to receive a copy of this Final Environmental Impact Statement contact:

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Table of Contents

Tables and Figures

I) Purpose of and Need For Action

Document Structure

The Forest Service has prepared this Final Environmental Impact Statement (FEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This FEIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five chapters.

This is the first of five chapters included in this project level FEIS.

- Chapter one describes the purpose of and the need for the Growden Dam, Sherman Creek Restoration Project and Forest Plan Amendment #28.
- Chapter two describes the alternatives to the proposed action.
- Chapter three, entitled Affected Environment and Environmental Consequences, presents the existing environment and the effects on the environment expected by the alternatives.
- Chapter four lists the preparers and contacts of the FEIS.
- Chapter five lists people, agencies and organizations to which copies of this FEIS are sent.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at the Three Rivers District office, 255 W. 11th, Kettle Falls, WA 99141.

Chapter Structure

This chapter describes where the project area is and gives some background on the project, including guiding management direction. It then identifies the purpose and need for this action, summarizes the proposed action, and describes the public involvement process utilized. The chapter concludes by listing and describing key issues used to develop alternatives, and other pertinent issues.

1.1 Introduction

Since the early 1970's, the Colville National Forest and the Washington State Dam Safety Section has recognized the potential for Growden Dam to overtop and wash away, causing major downstream damage to private and public lands (USDA Forest Service, Dam Maintenance Inspection – Growden Dam, 1977). This was made more evident during the floods of 1998. The outlet structure of the dam clogged with branches and the water was 6 inches from going over the dam. A Colville National Forest road crew responded and removed the debris. Since the dam is made of dirt and gravel, water overtopping the dam can erode the dam which could cause it to wash away.

In 1995, the Forest Service and the Bureau of Land Management issued the Inland Native Fish Strategy (INFISH). The strategy amended the Forest Plan. This strategy listed several variables for riparian management objectives. Among the objectives is temperature and indirectly fish passage. In 1996, the Colville National Forest prepared the North Sherman and Fritz Timber Sales Environmental Impact Statement (October 1996). In this document the aquatics report recognized a need to reduce stream temperatures, since the stream was listed on the Washington State Department of Ecology 303d list[2]. Further testing showed that the increased temperatures originated from the wetland behind Growden Dam and the lower

[2] 303(d) List – Section 303(d) of the federal Clean Water Act (CWA) requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses of water, such as for drinking, recreation, aquatic habitat, and industrial use, are impaired by pollutants. These water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards, and are not expected to improve within the next two years.

The federal Environmental Protection Agency (EPA) allowed states to skip the year 2000 303(d) list due to the ongoing development of new federal rules affecting the listing process and the TMDL (Total Maximum Daily Load) program. The CWA has been amended and now requires state 303(d) lists to be revised every four years instead of two. The next list was due in October 2002/2004. As of February 2006, the list was still in draft form. The State of Washington Department of Ecology (DOE) is also proposing revisions to the current state surface water quality standards and to the policy that guides 303(d) assessment. Even though changes are being proposed, DOE assumes that the current water quality standards will still be applicable when the new list is revised. Consequently, existing data will be evaluated against current water quality standards.

portion of the South Fork of Sherman Creek. Genetics testing over the last 8 years have shown isolated populations of native species. Providing fish passage at the dam would connect these populations.

In response to the safety and INFISH issues and concerns, the Forest convened a workshop in 2002 to study the dam and provide ideas for mitigating the safety and INFISH concerns. The NEPA (National Environmental Policy Act) process for this project started with that workshop. Through interdisciplinary team and public input alternatives were developed. The main issues that drove the development of the alternatives are the loss of historical significance of Growden and the loss of the wetlands behind the dam.

1.2 Changes made between DEIS and FEIS

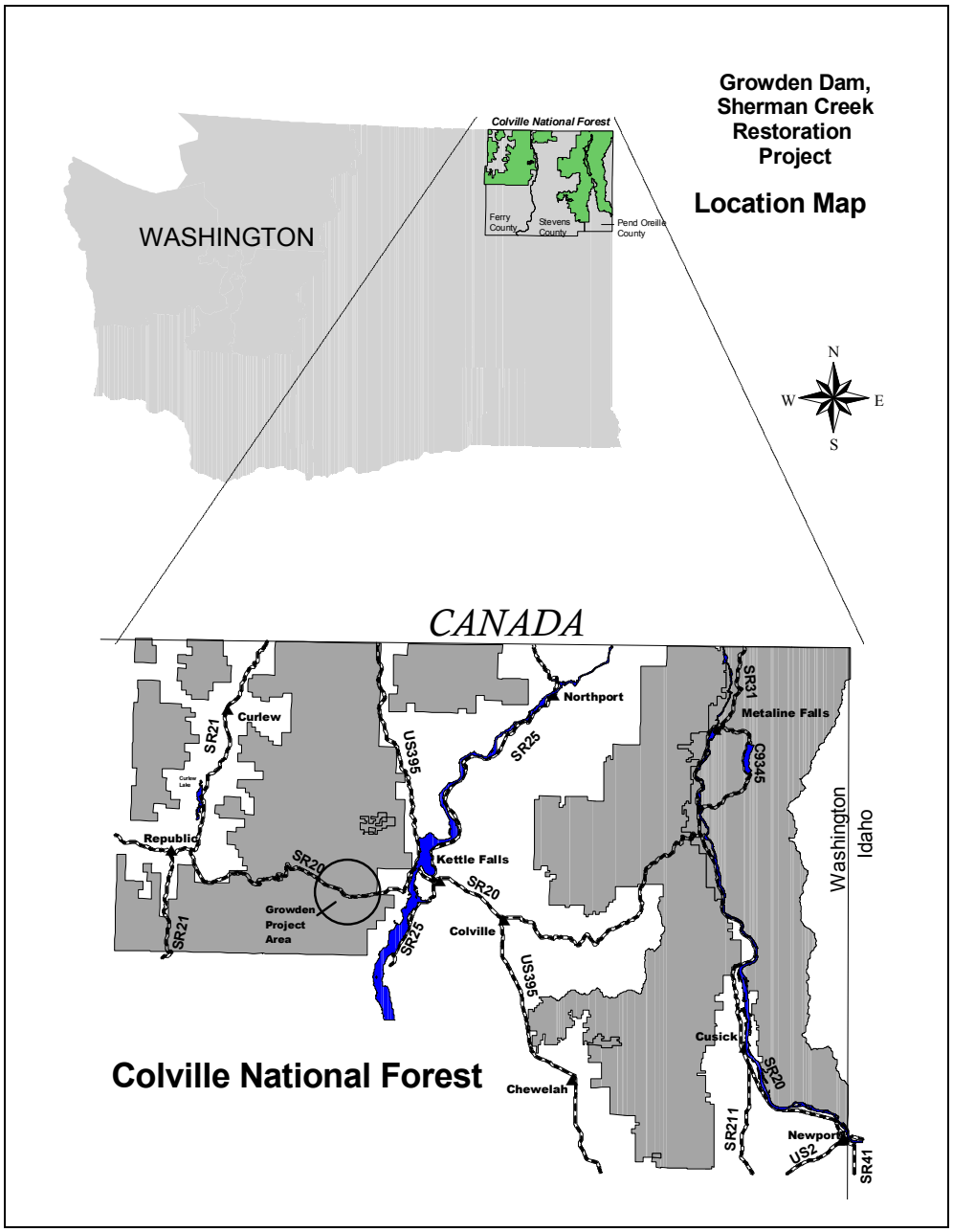
In response to comments, additions were made to the FEIS. Comments on wetlands from the Environmental Protection Agency (EPA) prompted us to include more information on this issue. Additional information was requested on the Lane Creek pit.

1.2 The Planning Area

1.2.1 General Location and Size

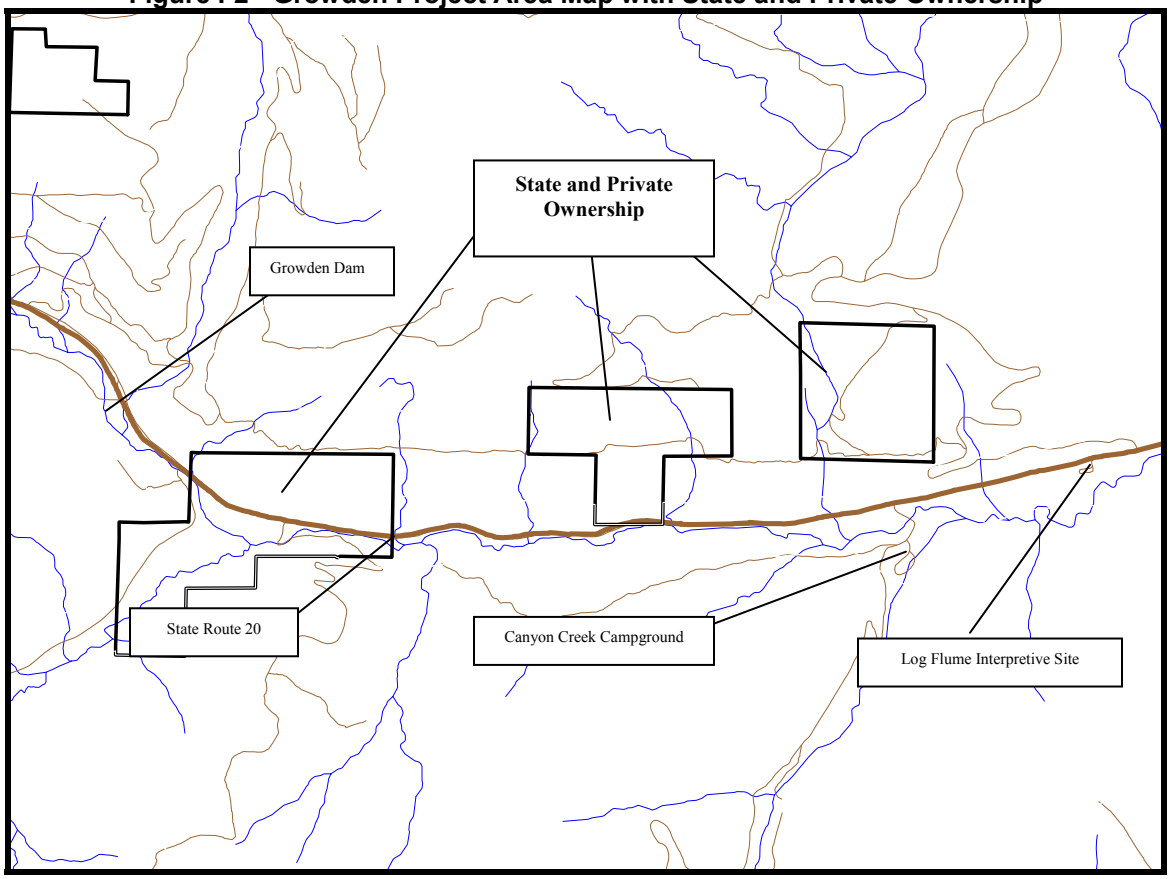
The project area is located west of Kettle Falls, Washington, and includes all National Forest System lands administered by the Three Rivers Ranger District in Township 36 North, Range 36 East, Sections 25-36. The project area is 7680 acres in size; however less than 74 acres will be directly impacted at the dam site and the habitat restoration reach. Approximately 1.1 stream miles and 38 acres of stand treatment will occur at the habitat restoration reach. Approximately 8 acres will be affected at Growden Dam. There will be 8 acres of pit expansion. 10 acres of Lane Creek Pit will be rehabilitated. There are approximately 10 acres that will be affected by travel, staging, and construction activities.

Table I-1 - Vicinity Map



Projects are proposed only on National Forest System Lands administered by the Three Rivers Ranger District within the project area boundary (see Figure 1 Vicinity Map). Environmental impacts, and the analysis and discussion of those impacts consider lands of other ownership. Such analysis and discussion is required under the National Environmental Policy Act implementing regulations in Forest Service Environmental Policies and Procedures Handbook 1909.15, section 15.1: "Cumulative effects which occur must be considered and analyzed without regard to land ownership boundaries."

Figure I-2 - Growden Project Area Map with State and Private Ownership



1.3 Background Documentation

1.3.1 History/Background of the Project

Native peoples hunted and gathered in the area. Compared with many other areas of the Pacific Northwest, the numbers of native peoples living in Ferry and Stevens County were relatively small. The project area may have been occupied by several native groups, including Lakes, Colville, Kalispel, Kootenai, and Chewelah.

European immigrants directly affected Sherman Creek in a number of different ways by since the late 19th century. The wagon freight road that supplied Republic during the gold rush was heavily used for several years. The "Transportation History of Sherman Creek Area" states that "At the peak of the boom in 1898 360 freight teams were in service." The area was opened to homesteaders in 1900, and in 1923 Jim Haynes occupied the area at the mouth of South Fork Sherman Creek. During the same period of time, the White Pine Lumber Co. completed construction of the flume that transported logs from the Canyon-Trout Creek vicinity to the mill at the mouth of Sherman Creek.

Use of the flume involved two log ponds, one located just below the mouth of Trout Creek, and one at the current Flume Interpretation Site (camp #5 as it was known). These were earth dams, and the latter one had a maximum height of about 12' according to notes taken by Former Forest Service Employee Ed Javorka in 1970 when he visited the sites with Fred Fine, who had worked for the White Pine Sash Co. The notes also state "the flume from camp #5 could operate about 15-20 minutes before the water in the pond dropped too low. It would take from 45 minutes to 1 1/2 hours to refill the pond..." Thus, the reach of stream below the dam at camp #5 was probably kept essentially dry for substantial periods of time. Presumably this would have been true of the reach below the lower dam also.

In 1927, Hedlund's Lumber Co completed a railroad up Sherman Creek to Growden, with a 1/2 mile long spur up South Fork Sherman, to harvest a Lane Creek-Graves Mt area timber sale. The Dollar Mountain fire burned the timber and the flume in

the summer of 1929, ending both White Pine and Hedlund's operations. According to Ed Javorka's notes, the fire "was forced to the ground when it hit Sherman Creek near Camp #5. The bottom was logged out and there was only ground fuels and slash to burn". Most of the logging done in these early operations was apparently the large ponderosa pine on the south-facing grassy slopes, but this note indicates the riparian area was also cut, perhaps clear-cut. This was probably true of much of the valley length downstream of Canyon Creek to the lower canyon.

Evaluation of current stream and habitat conditions on main Sherman Creek shall be done in full consideration of the historical context of recent massive and extensive channel alterations. Between 1952 and 1954, the main Sherman road was reconstructed to the current alignment of the Sherman Highway. In many locations, the roadway was relocated directly on top of the stream channel, which was rerouted to one side or the other. Many segments of the original channel were cut off, and those areas are evident now as wetlands, some occupied by beaver. The channel straightening and relocation caused extensive erosion. Streambank erosion was accelerated to the point that the Forest Service undertook a stabilization project in 1961. The project included removal of most of the woody debris from the stream between the Albion crossing and Growden dam with a bulldozer. Mid-stream boulders were moved to the banks for stabilization, gabions were placed, and banks were shaped and planted with willow cuttings and grass. No stabilization work was done on the relocated segments of lower Sherman Creek below Growden, since that area is largely off National Forest System lands. Unstable cutslopes and undercut terrace edges that are now streambanks are still an eye-catching element of the drive up the Sherman Highway, although it is likely these slopes are more stable now than they were in the early 1960's.

Growden Dam was constructed in 1937 to be a recreational pond. The dam is earth-filled, 25 feet high, 150 feet long, with a 16 foot wide roadway across the top. The pond was twenty feet deep at the dam and approximately six acres with a storage capacity of 37 acre-feet. After the construction of the Sherman Highway, about the period of 1952-1953, the lake silted in. This was a direct result of siltation from the new highway. The lake site is covered with a thicket of alder and brush and Sherman Creek meanders through (USDA Forest Service, Dam Maintenance Inspection – Growden Dam, 1977).

The Department of Ecology's Dam Safety Section surveyed the dam in 1991. Their analysis revealed that under extreme flood conditions, the dam does not meet current Dam Safety Section Standards. Should a dam failure occur, two permanent residences and several vacation cabins would be inundated. The dam almost washed out in the flood of 1998.

Over the past five years, the Colville National Forest (CNF) and the Ferry Conservation District (FCD) have been addressing major issues in the Sherman Creek watershed. In 1996, CNF completed and signed the Sherman Environmental Impact Statement. Part of this document was a comprehensive action plan for the watershed to deal with stream restoration needs.

To help assess conditions in Sherman Creek, and to address deficiencies in the stream's functioning condition, FCD applied for and received CCWF grant funding for the Sherman Creek Implementation Project (SCIP). The Department awarded FCD the grant in March 1998. At this point, the way was paved for a comprehensive, coordinated watershed management program.

Due to a flood event in May 1998, the CNF and FCD completed projects that have improved conditions in the watershed. Two washed-out roads were rebuilt, with their drainage problems fixed. Another road was obliterated and reclaimed. A gravel pit on a tributary stream was reclaimed and restored in 2000. Both the CNF and FCD conducted extensive planting projects to help streambanks and riparian areas heal. In the fall of 2000 the Forest Service completed the Log Flume Restoration project on the lower reach of Sherman Creek.

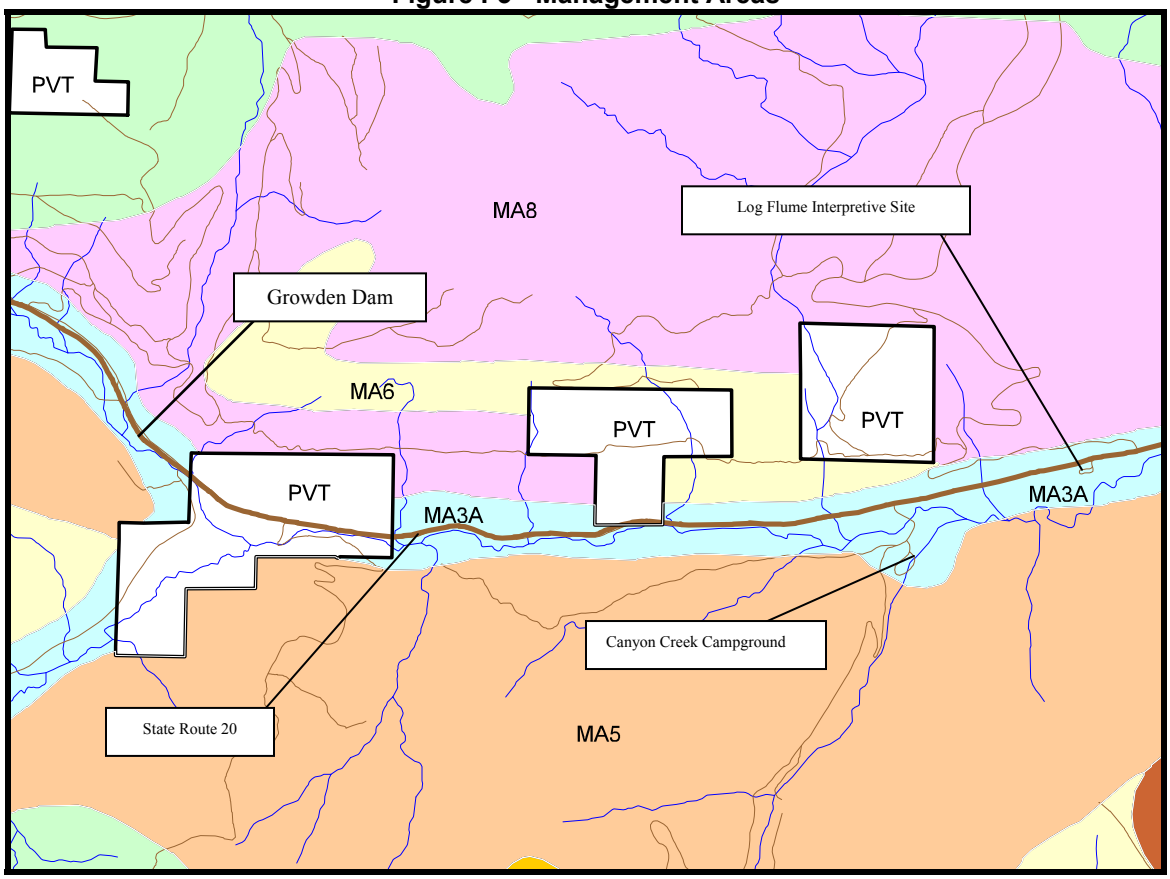
Besides the implementation projects, FCD conducted in-depth studies of water temperature, canopy cover, and streambank vegetation under the Sherman Creek implementation plan. This data provides an accurate picture of the creek's condition, and the steps needed to improve conditions. The Sherman Creek data is being used as part of a broader study to set Total Maximum Daily Load (TMDL) for temperatures. As part of this a Detailed Implementation Plan for reducing temperatures will be produced. It is anticipated that removal of the dam would be a major part of the plan. The Forest Service completed a Growden Dam Spillway Evaluation Engineering Report in 1998. The recommendations from that report were used to develop alternatives.

1.3.2 Management Direction

The guiding management direction for the project area is provided by the 1988 *Land and Resource Management Plan, Colville National Forest*, as amended (hereafter referred to as the **Forest Plan**). The project area is in Management Area 3A

Management Area 3A emphasis is Recreation: Its goal is to provide roaded and unroaded recreation opportunities in a natural appearing setting.

Figure I-3 - Management Areas



The Forest Plan includes amendments that are also management direction for this project. They are:

Regional Forester's Forest Plan Amendment #2, entitled *Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales* (June 5, 1995). This amendment revised the interim ecosystem standard and the interim wildlife standard for timber sales from Regional Forester's Forest Plans Amendment #1 (May 20, 1994).

Inland Native Fish Strategy (July 28, 1995). In 1995, the Forest Plan was amended by the Inland Native Fish Strategy (INFISH). INFISH delineated riparian habitat conservation areas (RHCAs). These areas are to be managed for riparian dependent resources. These areas include traditional riparian corridors, wetlands, intermittent streams, and other areas that maintain the integrity of aquatic ecosystems. INFISH provides the main management direction including fish passage and managing for riparian dependent resources.

Regional Forester's Forest Plans Amendment #2 and the INFISH Direction are collectively referred to as "Screening Direction." The screening direction was implemented to preserve future planning options concerning wildlife habitat associated with Late and Old structural stages, fish habitat, and old forest abundance until the Eastside EIS is completed.

The Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 FEIS is tiered to the *Managing Competing and Unwanted Vegetation FEIS* (1988). This document set forth a Pacific Northwest regional policy that allows use of all methods to manage competing and unwanted vegetation, with emphasis on preventing vegetation management problems. The selected alternative (Alternative H) is currently being implemented on the Colville National Forest by selection and implementation of Alternative C from the *Environmental Assessment for*

Integrated Noxious Weed Treatment, Colville National Forest, (1998). Additionally, the *Colville National Forest Noxious Weed Prevention Guidelines*, became Colville National Forest policy in November 1999, and are incorporated by reference in this FEIS.

The **USDA Forest Service Roads Policy** became effective January 12, 2001. The roads policy gives the line officer the discretion on whether or not to do a road analysis before the final decision. In this project one existing road access across the dam is proposed to be eliminated. There will also be 1 mile of access road that will be obliterated. The only road affected is 2000-214. The management level will not be changed. The scale of the project is small and does not warrant a roads analysis. Therefore a roads analysis is not needed.

The **USDA Forest Service Natural Resource Agenda** is a policy statement (not explicit management direction) by the Chief of the Forest Service outlining management philosophy and priorities for administration of National Forest System lands by the USDA Forest Service. The Natural Resource Agenda helps set priorities and guide management decisions within the framework of existing laws, regulations, and the Forest Plan.

Implementation of this project will require permits from the Department of Ecology, Washington Department of Fish and Wildlife, and the Corp of Engineers. The State Historic Preservation office has already issued a concurrence with the project and associated mitigation.

1.4 Purpose and Need

The project is proposed to meet specific purposes and needs. The purpose is a statement of goals and objectives that Forest Service intends to fulfill by taking action. The need is a discussion of existing conditions that need to be changed, problems that need to be remedied, decisions that need to be made, and policies or mandates that need to be implemented. Alternatives must meet these identified purposes and needs in order to be considered in detail in this environmental analysis. Alternatives that fail to meet the purposes and needs will not be considered in the scope of this environmental analysis.

List of Purpose and Need

1.4.1 To meet the purpose of the DSS Standards, the structure at the dam site needs to pass a 500-year flood event.

1.4.2 To meet the purpose of fish reproduction and growth as stated in INFISH and the temperature needs of the Clean Water Act, the maximum stream temperature as it leaves the Growden site needs to be less than 16 degrees C on average in the summer time.

1.4.3 To meet the purpose of the Forest Plan to maintain or restore stream channel integrity, channel processes, sediment regime, and favorable channel conditions, the Growden dam site needs to allow bedload movement through the reach and the reach between Log Flume and the Bangs Mountain Road needs the structure to store this bedload.

1.4.4 To meet the purpose of the Forest Plan as amended by INFISH the structure at the dam site needs to provide fish passage.

1.4.5 To meet the purpose of this project at the best cost to the government, alternatives need to be economically reasonable.

Figure I-4 - Growden Dam in 1937. The dam is in the bottom right corner of the picture and the buildings are part of the Civilian Conservation Corp camp.

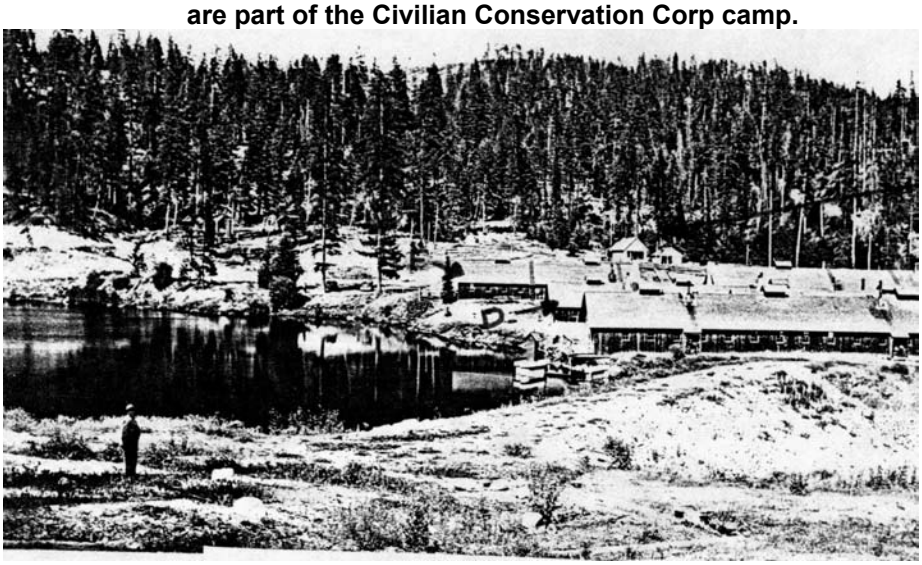
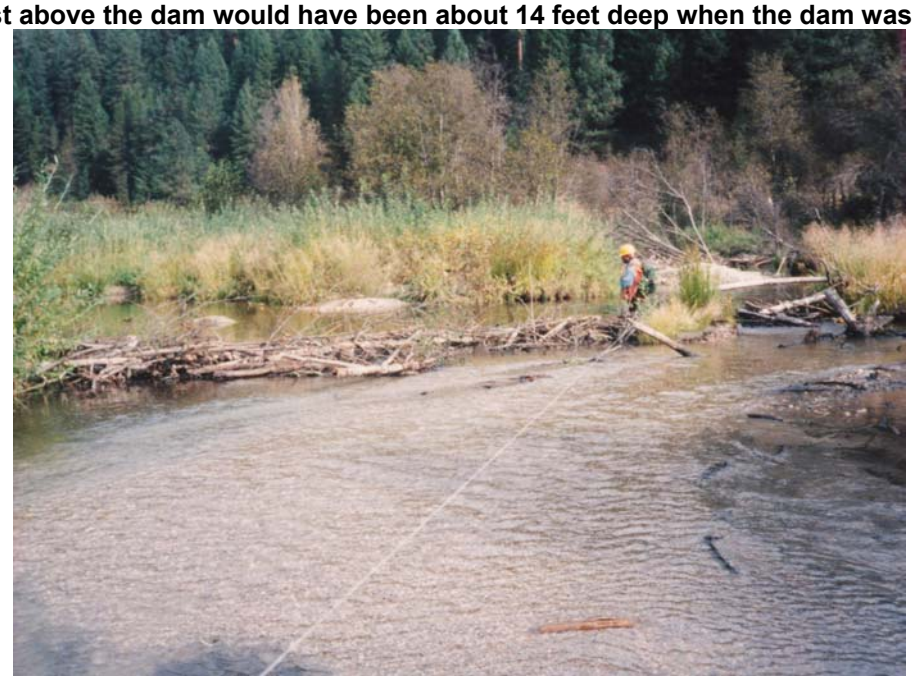


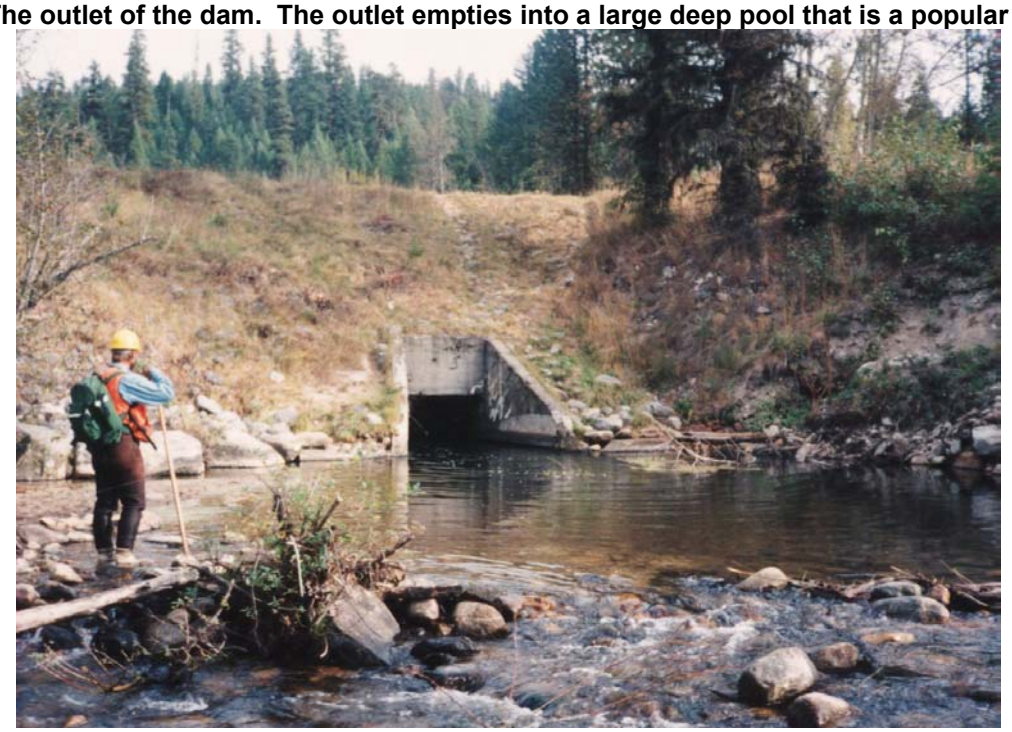
Figure I-5 - Taken in October, 1998, the surveyor is standing approximately 30 feet above the dam. This area just above the dam would have been about 14 feet deep when the dam was constructed.



- The outlet structure is a drop structure, an L shaped concrete tunnel which drops sixteen feet and then flows under the dam into a large pool. During flood flow events, the debris catcher becomes clogged with branches, causing the water to almost overtop the dam. If water overtops the dam, then the energy of the water would erode the dam. Potential for these events puts the dam at a high risk to fail and would cause severe downstream damage if it washed out (Sherman Lake Dam Inspection Letter, November 15, 1991, Washington State Department of Ecology.)

Figure I-6 - The inlet structure. This was taken in 1998 during a high flow event. The Forest Service brought in equipment to remove the debris from a metal safety grate on the structure.

Figure I-7 - The outlet of the dam. The outlet empties into a large deep pool that is a popular fishing spot.



The Horseshoe Lake Dam near Chewelah broke in 1974 in a manner similar to what is expected from Growden: it washed out and caused severe downstream damage (Figure I-8). The stream below the dam is recovering slowly. This picture was taken 25 years after the event and the vegetation has not recovered. The channel cut as much as sixty feet in places, and massive deposition occurred in low gradient valley sections. If Growden dam fails, the results would be similar.

Figure I-8 - Downstream of Horseshoe Lake Dam

1.4.1 To meet the purpose of the DSS Standards, the structure at the dam site needs to pass a 500-year flood event.

In 1977, the Washington Department of Ecology Dam Safety Section, (DSS) and the Forest Service inspected the dam and determined it to be at risk of failure because the outlet is too small to pass a 500-year flood event. The DSS inspected the dam again in 1991 and classified the dam as a Significant Hazard Class 2. Their analysis revealed that under extreme flood conditions, the dam does not meet current Dam Safety Section Standards. Should a dam failure occur, two permanent residences and several vacation cabins would be negatively affected. The dam almost washed out in the flood of 1998 (Figure I-8). If a failure occurs, massive damage would occur to the channel and highway. Approximately eight miles of stream would be affected. There are also three downstream bridges that could be negatively impacted during a flood event. A Washington State Department of Fish and Wildlife hatchery is located at the mouth of Sherman Creek; a dam breach could cause significant damage to the hatchery.

To meet the **purpose** of the DSS standards the structure at the dam site **needs** to pass a 500-year flood event. This would prevent the damage and safety risk to downstream resources. The Colville National Forest uses the Washington State Department of Ecology's Dam Safety Section (DSS) standards to determine the safety of its dams. The DSS is authorized to provide for the comprehensive regulation and supervision of dams in order to reasonably secure safety to life and property through the WAC 173 – 175. Federal Dams are exempt from DSS regulations; however the Colville National Forest uses the standards as a gage for the safety of the dams on the National Forest. Region 6 has developed partnerships with the DSS and is currently developing an MOU with the DSS. Since the DSS and the Forest Service have documented the risk of a dam failure, it is the Forest Service's responsibility to reduce the risk.

Indicator

- ❑ Ability to safely pass a 500-year flood event.

1.4.2 To meet the purpose of fish reproduction and growth as stated in INFISH and the temperature needs of the Clean Water Act, the maximum stream temperature as it leaves the Growden site needs to be less than 16 degrees C on average in the summer time.

The Forest Plan has goals of high quality aquatic habitat, water, and riparian resources (Forest Plan Record of Decision Page 4, and Forest Plan page 4-2). The INFISH Forest Plan Amendment has goals of maintaining or restoring stream channel integrity, channel processes, and sediment regime, and diversity and productivity of native and desired non-native plant communities (Inland Native Fish Strategy Attachment A, pages A-1, A-2). INFISH standard and guideline LH-1 requires surface water developments such as dams to maintain or restore riparian resources, favorable channel conditions, and fish

passage, reproduction and growth. The dam currently affects water temperature, bedload transport, and fish passage on Sherman Creek.

Currently as the stream flows through the wetland the maximum water temperatures exceed state standards. Sherman Creek is on the 2000 Washington State 303d list for water temperature. The Department of Ecology is in charge of implementing the Clean Water Act. In 1999, the Department of Ecology funded a temperature study on Sherman Creek. Two areas showed up as the main contributors to high temperatures. These are Growden Dam and the lower reach of the South Fork of Sherman. Above the influence of the dam, the maximum water temperature was 15.5 degrees C in 1999. At the outlet of the dam the maximum water temperature was 18 degrees C during the same time. South Fork of Sherman Creek adds another 2 degrees C to this, which brought the maximum water temperature to 20 degrees C. These high temperatures affect the reproduction and growth of trout living in Sherman Creek. To meet the **purpose** of fish reproduction and growth as stated in INFISH and the temperature needs of the Clean Water Act, the maximum stream temperature as it leaves the Growden site **needs** to be less than 16 degrees C (7 day average daily maximum water temperature).

Indicator

- ❑ Reduction in stream temperature expected.

1.4.3 To meet the purpose of the Forest Plan to maintain or restore stream channel integrity, channel processes, sediment regime, and favorable channel conditions, the Growden dam site needs to allow bedload movement through the reach and the reach between Log Flume and the Bangs Mountain Road needs the structure to store this bedload.

The dam also blocks bedload (gravel and rock) transport. This has caused portions of the downstream channel to downcut. During high water, the flows are contained in the channel and water is not able to spill out onto the floodplain which releases the energy and slows the water down. The faster stronger flows flush logs and gravels out of these sections. Bank erosion is increasing in these areas because of the lack of wood and overbank flows. Eroding banks are between 5 to 60 feet high. Even though there is sediment coming in from the banks, gravels for spawning are limited. The gravels are being either trapped by the dam or flushed through because of lack of structure to store the gravels.

In 1998, Sherman Creek was surveyed for habitat parameters. Number of pieces of large wood and pools were below INFISH riparian management objectives. This was caused by activities associated with the Log Flume, and the dam blocking bed load transport. The downstream channel has downcut and no longer spills over into the floodplain during high flow events. The stream is no longer able to store wood and sediment in these areas. This is negatively affecting stream channel integrity, channel processes, sediment regime, and favorable channel conditions. The riparian area adjacent to the Log Flume area has approximately 300 dead and dying trees.

Approximately twenty-five sites are selected for improvement between the east end of the Log Flume Interpretive Site upstream to the Bangs Mountain Bridge. This area was selected because it is the deposition reach. This mitigates both the loss of the wetland and increases the amount of sediment and bedload storage in Sherman Creek. The goal of these structures is to provide for sediment storage, reduce stream temperatures, provide high quality fisheries habitat, and allow for the stream to interact with its floodplain.

To meet the **purpose** of the Forest Plan to maintain or restore stream channel integrity, channel processes, sediment regime, and favorable channel conditions, the Growden dam site **needs** to allow bedload movement through the reach. The downstream reaches **need** to be able to store additional bedload.

Indicators

- ❑ Amount of the dam vertical height of the dam removed.
- ❑ Increase in area available for bedload storage.

1.4.4 To meet the purpose of the Forest Plan as amended by INFISH the structure at the dam site needs to provide fish passage.

The drop structure is a barrier to fish movement. Redband trout and Westslope Cutthroat trout populations are present in the watershed. The Forest Service has listed these species as sensitive. One of the main redband trout populations occurs in Lane Creek, a tributary that enters just below the dam. This population does not have access to the prime habitat found above the dam. The nearest blockage below the dam is approximately 8.5 miles downstream. There is 36 miles of fish habitat between the downstream falls on Sherman Creek and its tributaries. The blockage above the dam is approximately 3 miles

above the dam. Accounting for fish bearing tributaries, there is approximately 5.75 miles of fish habitat above the dam. Connecting the two areas improves the total accessible area to almost 42 miles. To meet the **purpose** of the Forest Plan as amended by INFISH the structure at the dam site **needs** to provide fish passage.

Indicator
- ❑ Whether or not fish passage is provided.

1.4.5 To meet the purpose of this project, alternatives need to be economically feasible.
The alternatives will be evaluated on how much they cost. The proposed action is projected to cost $1,000,000. Some people are concerned that this expenditure is not a good use of limited funds. Alternatives need to be economically feasible. The line officer has determined an economically reasonable alternative to be not more than 10% over the proposed action cost or $1,100,000.

Indicator
- ❑ The cost of the alternative in relation to the proposed action

1.5 Proposed Actions

The project is a proposal to remove the Growden Dam and restore approximately 1.1 miles of fish habitat downstream of the dam. These proposed actions include:

- **Partially remove the Growden Dam structure.**
- **Restoring the channel and valley bottom behind the dam to pre-dam elevations and adding 1 – 3 backwater ponds in the new valley bottom behind the dam.**
- **Remove sediment deposits from behind the dam and creating a terrace with part of the sediment and taking the rest to the Lane Creek pit.**
- **Restore of Lane Creek pit with sediment from behind the dam.**
- **Improve fish habitat and sediment storage on approximately 1.1 miles of stream below the dam.**
- **Thin riparian vegetation to get the material needed for the stream restoration at Log Flume.**
- **Develop rock sources to use for material in stream restoration at the dam site.**
- **Provide interpretation of the Growden Dam removal as mitigation for dam removal.**
- **Amend the Forest Plan for the Visual Quality Objective from Retention to Restoration for the Project Area.**

1.6 Public Involvement

The initial effort of the public involvement process came about prior to the proposed action being developed. The Forest Service held a dam decommissioning workshop open to the public in October 2002. Approximately 15 people attended from private, federal and state agencies. Alternatives for mitigating the safety hazards of the dam were developed in the workshop.

The interdisciplinary team was convened in the spring of 2004 to begin the process of developing a proposed action that could be brought before the public as part of the formal scoping process. The task was completed in the spring of 2004. The Notice of Intent (NOI) was published in the Federal Register on March 1, 2004. The NOI asked for public comment from April 7, 2004 to May 7, 2004, on the Forest Service proposed action for the Growden Dam and Sherman Creek Restoration Project. A notice of the scoping period was placed in the newspaper of record, the Colville Statesman Examiner on April 7, 2004. Scoping letters were sent to individuals and organizations on the master mailing list of publics interested in watershed management activities on the Three Rivers Ranger District. Additional letters were sent out to landowners within the Sherman Creek watershed who owned property within ½ mile of National Forest System land in the Project Area. A second NOI was placed in the Federal Register in April 2005 changing the name from the Growden Dam and Sherman Creek Restoration Project to the Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28. This was to allow for the change of the Visual Quality objective from Retention to restoration.

The Confederated Tribes of the Colville Reservation, Kalispel Tribe, and the Spokane tribe of Indians were contacted about the project. A meeting was held with the Confederated Tribes of the Colville Reservation to consult with them on this project.

This effort resulted in 4 letters, faxes, interviews, and electronic messages from interested members of the public, and 6 from organizations concerned with resource management in the project area. Most of the comment sheets and letters addressed multiple issues. Many comments voiced were the same. Not all comments made issues, however. Responses generally fell into two positions: those who favored dam decommissioning and those who opposed dam decommissioning based on historical significance. There was also concern about logging operations, sedimentation, the need for fish passage, effects to fisheries, and other archeological sites.

Using the comments from the public, other agencies, and internal scoping, the interdisciplinary team developed a list of issues to address.

1.7 Issues

Environmental analysis is an issue driven process. Issues are gathered and analyzed by the interdisciplinary team; and alternative driving issues (those that are used to develop alternatives) are approved by the responsible official. Issues may be based on review of similar actions, knowledge of the area involved, discussions with interested and affected persons, community leaders, organizations, State and local governments, and/or consultations with experts and other agencies familiar with such actions and their direct, indirect, and cumulative effects (Forest Service Environmental Policy and Procedures Handbook 1909.15, section 11.51).

For the project, the issues were derived from:
1) Review of similar projects off the National Forest
2) Knowledge of the area involved (contributed collectively by the interdisciplinary team);
3) Comments gathered during the scoping period
4) Issues and concerns brought to the table by representatives of the Department of Ecology, Colville Tribes, Ferry County government, and the Ferry Conservation District
5) A workshop focused on Growden Dam.

The issues related to the project were divided into three categories:
1) **Alternative Driving Issues**, which were used in alternative development
2) **Significant Issues**, which are very important, but were not used in alternative development, primarily because there was not an irresolvable conflict with the proposed action. They are used in alternative evaluation.
3) **Other Concerns and Comments**.

1.7.1 Alternative Driving Issues

1.7.1.1 Heritage Concerns

Growden Dam is 60 years old, so it was evaluated as eligible to the National Register. The dam site and habitat restoration reach has been impacted throughout recent history; consequently there is concern over surface and sub-surface cultural remains. The proposed action would remove a significant portion of the dam, causing an adverse effect on a historic structure.

Indicators

- Adverse or Not Adverse Call
  a. If the alternative receives an adverse effect call, then the mitigation must satisfy the State Historic Preservation Office (SHPO).

1.7.1.2 Loss of Wetland habitat behind the dam

The wetlands behind the dam are used by wildlife such as beaver and waterfowl. Wetlands are specialized habitats that provide a source of biodiversity because they often support unusual species of flora and fauna. They also serve as a critical component in a watershed's hydrologic budget by moderating both high and low flows due to their "sponge" effect (their

ability to absorb and store water). When wetlands are also located in association with streams, they may exert a strong control on surface water quality. Because of their high moisture content, wetland soils are very sensitive to soil displacement and rutting as well as changes in the groundwater regime that may be induced by removal of the adjacent vegetation. **The proposed action would change the Growden reach from slow water stream with many slack water areas to a faster pool riffle stream**.

Indicators

- ❑ Change in wetland habitat behind the dam.
    - o If the alternative reduces the wetland size, then the mitigation must satisfy the State Department of Ecology and Corp of Engineers.

1.7.2 Significant Issues

1.7.2.1 Noxious Weeds

Long-term, traditional use of quality forest and rangelands is being adversely impacted due to the encroachment of unpalatable, undesirable and competitive plant species. There are two key concerns associated with the Noxious Weed Issue: 1) amount of area disturbed down to mineral soil and 2) the ability to treat existing infestations and/or prevent seed production in the area. The proposed action involves excavation behind the dam and for the instream structures down in the Log Flume reach. The exposed soil would provide a seed bed for noxious weeds within the area. In accordance with the Managing Competing and Unwanted Vegetation Final Environmental Impact Statement and Accompanying Record of Decision (as supplemented by the mediated agreement: Northwest Coalition for Alternatives to Pesticides, et. al. v. Clayton Yeutter, 1989) all site-specific analyses must consider and analyze the strategy of prevention.

Indicators

- ❑ Acres of soil disturbance to the project area.

1.7.2.2 Recreation

The project area is located next to the Sherman Pass Scenic Byway. Sherman Pass Scenic Byway stretches 35 miles across Northeast Washington on the Colville National Forest, connecting the communities of Republic to the west and Kettle Falls on the east. Along this section of State Route 20, the Byway passes through the Kettle Range, which is an extension of the Selkirk range, ultimately leading to the Canadian Rockies. Sherman Pass, at an elevation of 5575 feet, is the highest pass in the State of Washington that is kept open year round. It is named for General William T. Sherman, who passed through the area in 1883. Recreation sites along the byway within the Growden project area include 1 developed campground, 2 miles of paved hiking trails, and 2 developed trailhead/day use areas. Recreationists use the byway and project area for berry picking, hunting, dispersed camping, fishing, driving for pleasure, and a variety of other recreational activities. During project activities at the Log Flume and Growden Dam sites, the recreational sites within the Growden Project Area will be closed to the public for the summer.

In addition to the short-term impacts to recreational use of the Log Flume and Growden Dam sites, there is a public concern that the proposed action may change the recreational experience at the Growden Dam site. The pool below the dam is a high value fishing spot for the county residents. The project would eliminate this pool, which has the potential to reduce recreational use at the Growden Dam site. This site is part of the Sherman Byway. It is a popular stop for users of the byway. Most of the users stop here for a stretch break or to use the restroom. Some users make their way down to view the dam. The Sherman Byway Plan has developed an interpretive plan for the site to draw more users into the site and change the site from merely a rest stop to part of an overall interpretation for the byway. Consistency with the Sherman Byway plan would not decrease users of the site.

Indicators

- ❑ Amount of disturbance to recreation sites.
- ❑ Sherman Byway Plan Consistency as it relates to change in use of the site.
- ❑ Visual effects as viewed from the Sherman Byway

1.7.2.3 Water Quality

The proposed action has the potential to release sediment into the lower reaches, causing effects to water quality, fisheries, and stream channels.

Indicators

- ❑ Amount of stream channel disturbed.
- ❑ Amount of dam removed is indicative of the amount of disturbance.

1.7.3 Other Concerns or Comments

The public raised additional concerns. The Interdisciplinary Team addressed these concerns and found them not to be Alternative Driving Issues or Significant Issues. Effects will be disclosed in this FEIS. However, effects of implementation of the proposed action will have effects that may be considerations in making the decision. These effects were assessed and are disclosed in Chapter 3 of this FEIS and in the project analysis file.

Effects on:

- Economic condition of the local community, including Ferry County
- Fire and fuels
- Fisheries habitat components (Riparian Management Objectives: RMOs) and fish populations, including Threatened and Sensitive species
- Forest trees
- Infrastructure - The road over the dam, 2000-214, accesses some timber land. Changes to the dam will block access to the road. However the dam has already been prohibited for log haul. Slope configuration will allow for new access to the area from the South Fork Sherman Creek Road No.2020.
- Plants listed as sensitive
- Soils - Logging equipment may compact the soil during the riparian thinning in the Sherman Creek Restoration Area.
- Flow regime, and channel morphology
- Wildlife, including all Management Indicator species (MIS) and Threatened and Endangered and Sensitive (TES) species
- There is a concern that removal of the dam may preclude future projects that would dredge the wetland behind the dam and turn it into a pond.

1.7.4 Responsible Agency and the Decision to be made

The scope of the decision to be made from this environmental impact statement is limited to the activities presently proposed within the project area. The Colville National Forest Supervisor is the deciding official for this FEIS.

The decision options are:

- ❑ Whether or not to implement the dam removal and if so how much of the dam will be removed.
- ❑ Whether or not to implement the stream restoration downstream of the dam.

II) Alternatives

Chapter Structure

The National Environmental Policy Act of 1969 (NEPA) directs all agencies of the Federal Government to study, develop, and describe appropriate alternatives to those proposed actions involving unresolved conflict. Public comment on the proposed action helps define unresolved conflict.

This chapter describes the alternatives, including the proposed action. Alternatives to the proposed action were developed to respond to the issues that came out of the many comments solicited from the public, governments, and others. The primary objective of the alternatives is to present the public and the decision maker with a reasonable range of effects on these issues. Also, the range of alternatives should not prematurely foreclose options that might protect, restore, and enhance the environment. Alternatives must also meet the purpose and need of the proposed action. Along with these responsibilities, the interdisciplinary team used the issues to focus the range of alternatives.

2.1 Alternative Description

NEPA gives the interdisciplinary team the responsibility of providing the decision maker with alternatives to the proposed action when unresolved conflict exists. The Act notes that all reasonable alternatives[3] should be considered. As noted in Chapter One, public comment generated two Key Issues involving unresolved conflict: Heritage and Wetland concerns.

To provide a reasonable range of effects in the context of these two issues, the team considered the features of the proposed action that sparked public comment. This included the amount of dam modified. Varying the amount of dam modified between alternatives extends the range of effects the alternatives have on the issues. The Interdisciplinary team changed the proposed action from a full removal to two-thirds removal of the dam width to address the heritage mitigation. Alternative C, the run of the river alternative, reduces the height of the dam but maintains a large portion of the dam. Alternative D, the emergency spillway, does not alter the hydrology behind the dam. The three resulting action alternatives and the No-Action Alternative are described in detail in this chapter.

In all, this FEIS considers four alternatives.
Alternative A: The No Action Alternative
Alternative B: Proposed Action Alternative – Partial Removal
Alternative C: the Run of the River Alternative
Alternative D: The Emergency Spillway Alternative

These are described below. All three action alternatives employ measures to mitigate unwanted effects. These are described after the alternative descriptions.

2.1.1 Alternative A – No Action

The No Action Alternative is defined as not implementing actions proposed under this environmental analysis. Nothing would be done to the dam, stream restoration would not occur, vegetation management in the riparian areas would not occur. Noxious weed management would continue as prescribed under the current policy. The Forest Service road crew will still check on the dam during floods.

The picture (Figure II-1) is used as the base picture under the conceptual pictures in the other alternatives.

[3] As established in case law interpreting the National Environmental Policy Act, the phrase "all reasonable alternatives" has not been interpreted to require that an infinite or unreasonable number of alternatives be analyzed, but does require a range of reasonable alternatives be analyzed whether or not they are within Forest Service jurisdiction to implement.

Figure II-1 - Existing Growden Dam Structure

2.1.2 Alternative B – The Proposed Action

The project is a proposal to partially remove the Growden Dam and restore approximately 1.1 miles of fish habitat downstream of the dam on National Forest ownership. These proposed actions include:

- **Partially remove the Growden Dam structure.**
- **Restoring the channel and valley bottom behind the dam to pre-dam elevations and adding 1 – 3 backwater ponds in the new valley bottom behind the dam.**
- **Remove sediment deposits from behind the dam and creating a terrace with part of the sediment and taking the rest to the Lane Creek pit.**
- **Restore of Lane Creek pit with sediment from behind the dam.**
- **Improve fish habitat and sediment storage on approximately 1.1 miles of stream below the dam.**
- **Thin riparian vegetation to get the material needed for the stream restoration at Log Flume.**
- **Develop rock sources to use for material in stream restoration at the dam site.**
- **Provide interpretation of the Growden Dam removal as mitigation for dam removal.**
- **Amend the Forest Plan for the Visual Quality Objective from Retention to Restoration for the Project Area.**

The proposed action was designed by the Interdisciplinary Team to meet the purpose and need, within the constraints of the Forest Plan.

Partial Removal of Growden Dam

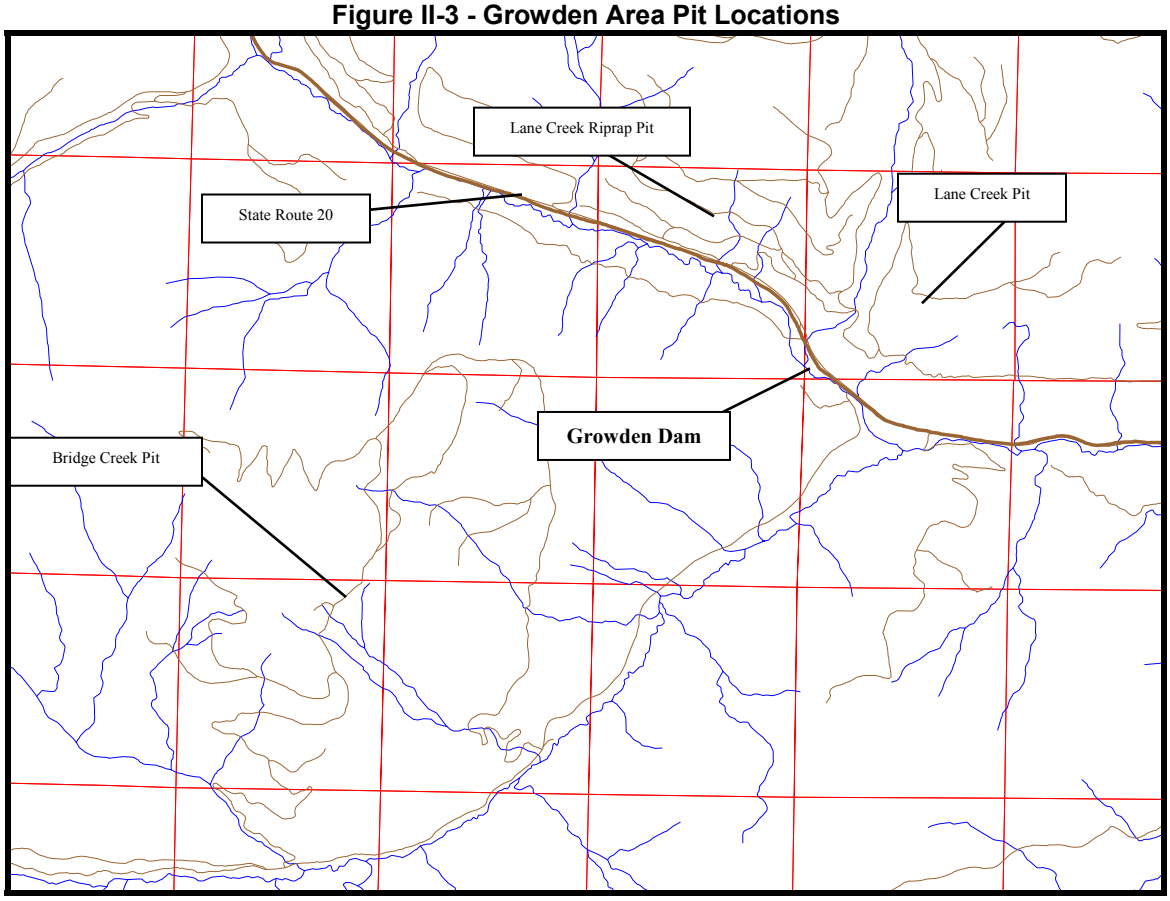
This alternative would partially remove the Growden Dam and would reconstruct a stable stream system from the upper end of the existing floodplain impounded above the existing dam, down through the current dam location. The proposed reconstructed stream system would be restored to an elevation above the original floodplain prior to the construction of the Growden Dam. Segments of the existing dam on the North and South side of Sherman Creek would be conserved in an undisturbed state as culturally significant features to be interpreted as part of the adjacent Growden Dam Recreation Site.

The area to be impacted would extend from approximately 300 feet below the downstream toe of the dam, upstream to a point approximately 1100 feet upstream from the top of the dam. The width of disturbed area for this alternative would generally be the width of the existing Sherman Creek flood plain plus 50' to each side. Small ponds will be placed in the floodplain. They will be designed to support trout.

Figure II-2 - Proposed action conceptual picture

Rock sources needed for implementing this alternative would be the Bridge Creek Pit, in the South Fork Sherman Creek Drainage, the Lane Creek Riprap pit, in the Sherman Creek drainage, and the Lane Creek Pit, in the Lane Creek Drainage. The Bridge Creek Pit is a glacial till and hard rock pit located in Section 1, T35N, R35E along Forest Roads 2020120 and 2020135. The Bridge Creek Pit would supply finer streambed cobbles and gravels for reconstructing the proposed stream channel in Sherman Creek, once the Growden Dam is removed. The Bridge Creek Pit could also supply the large riprap material needed to hold finer cobbles and gravels in the proposed Sherman Creek stream channel reconstruction. The Lane Creek Riprap Pit is a solid granite quarry located adjacent to Forest Road 2000222, in Section 29, T36N, R35E. Material from the Lane Riprap Pit would be the source for the large riprap material needed to hold finer cobbles and gravels in the proposed Sherman Creek stream channel, once Growden Dam is removed. The Lane Creek Pit is a glacial till pit located in Section 28, T36N, R36E, adjacent to Forest Road 2000244. This pit would also be used as a source for cobbles and gravels for reconstructing the proposed Sherman Creek channel, once the Growden Dam is removed, and as a waste area for excess material removed from the dam, and the flood plain behind the dam.

Figure II-3 - Growden Area Pit Locations



Additional area will be cleared and grubbed to access adequate stream channel material in each of these material sources. The Bridge Creek Pit would be expanded by approximately 3 acres, to the north and west. The Lane Riprap Pit would be expanded by approximately 5 acres along Forest Road 2000222, to the west. The Lane Pit would be expanded by approximately 2 acres to the south. The existing disturbed area at the north west corner of the pit will be utilized for stockpiling waste material from excavations at the Growden Dam and the floodplain behind the dam. These pits will be used during reconstruction of interpretation sites along the byway.

This alternative will first dewater the flood plain surface behind the Growden Dam by diverting the overland flow into culverts at a point approximately 900 feet upstream from the dam. This water would be piped through the upper part of the dam, and back into Sherman Creek, downstream from the project construction limits. After the surface water is contained upstream of the project construction limits, the subsurface water in the floodplain would be drained by digging a series of sumps from which water draining from the surrounding soil can be pumped to a settling basin, and then drained over the dam.

Once the existing Sherman Creek floodplain behind the dam is drained of excess subsurface water, the floodplain would be lowered and the excavated material will be set aside to drain further. This excavated material would then be hauled to the waste area in the Lane Pit, or placed on the sides of the existing floodplain to form terraces along the proposed Sherman Creek Stream channel upstream of the dam. The terrace walls would be armored with rock and native vegetation to prevent erosion of the terrace. The proposed flood plain would be constructed to an 80 foot width, which will accommodate constructing a stream channel with meander widths and lengths similar to the pre-dam channel in this length of Sherman Creek. The rock and logs would be placed where the stream bends come close to the terrace. The rest of the terrace would be revegetated with shrubs. The conserved topsoil and vegetation would be placed over the floodplain and terrace. Native grasses would be seeded on all exposed soils.

Once the existing floodplain is excavated down approximately to the pre-dam elevation, a new stream channel would be excavated within the 80 foot width of the proposed floodplain. The proposed stream channel would be constructed to widths

and depths similar to the stream reaches just above the existing flood plain, and just down stream of the dam. Similar reference reaches would be measured to establish stream morphology values for stream bed width, depth, meander length, pool depth and length, etc. for use in construction of the proposed stream channel. Depending on the stream grade to be constructed, stream widths would vary between 16 and 30 feet, and stream depths between 1.5 and 3 feet deep. Revegetation behind the dam would include using topsoil and vegetation conserved during excavation of the existing wetland. Small 1 acre ponds will be placed within the area above the dam to provide for recreational use.

As the excavation of the existing floodplain proceeds, the existing drop inlet structure just upstream from the dam would be retained. The drop inlet would be preserved in its current outward configuration but would be uncovered from its existing condition as the excavation of the flood plain proceeds. Under this alternative, the drop inlet would not be needed for proper operation of the stream system. The drop inlet would be plugged with concrete and sand to limit access into its interior as a safety measure.

Lane Creek Pit Restoration

The Lane Creek Pit is a glacial till pit located in Section 28, T36N, R36E, adjacent to Forest Road 2000244. This pit would also be used as a source for cobbles and gravels for reconstructing the proposed Sherman Creek channel, once the Growden Dam is removed, and as a waste area for excess material removed from the dam, and the flood plain behind the dam.

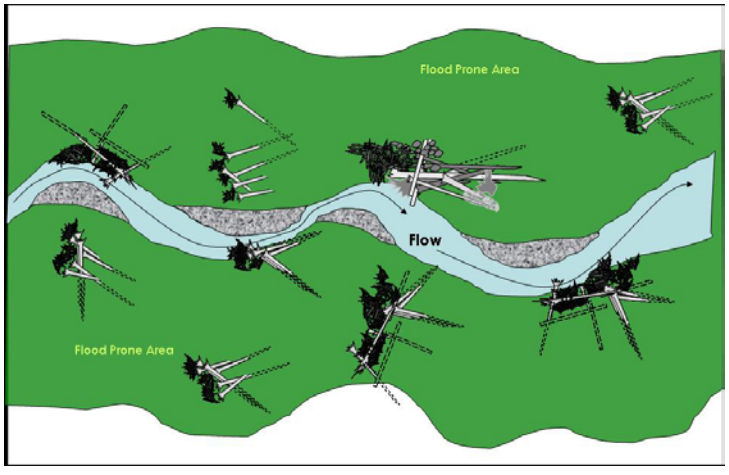
The Lane Pit would be expanded by approximately 2 acres to the south. The existing disturbed area at the north west corner of the pit will be utilized for stockpiling waste material from excavations at the Growden Dam and the floodplain behind the dam.

This excavated material would then be hauled to the waste area in the Lane Pit, or placed on the sides of the existing floodplain to form terraces along the proposed Sherman Creek Stream channel upstream of the dam. The material would be shaped into a natural looking configuration in the pit, with undulations and water holding pockets. This waste material from Growden Dam would be placed in a portion of the pit that is scheduled for reclamation since it is depleted of material used for road gravel production. This area would then be covered to a depth of 3", with topsoil stockpiled on the side of the existing pit. Soil micro-nutrients and organic fertilizer would be applied along with seed to revegetate this reclaimed area. The reclaimed area would be revegetated with grasses, native forbs and shrub species. Some pockets of trees would also be planted to provide hiding cover in the long term. The goal would be to revegetate this area with plants that are conducive to big game production.

Restoration of Stream Habitat

Approximately twenty-five sites have been selected for improvement between the east end of the Log Flume Interpretive Site upstream to the Bangs Mountain Bridge on Forest Road #136. This is to mitigate both the loss of the wetland behind the dam and to increase the amount of sediment and bedload storage in Sherman Creek. The goal of these structures is to provide for sediment storage, reduce stream temperatures, provide high quality fisheries habitat, and allow for the stream to interact with its floodplain. The structures to be used include log jams, bar buddies, and rock structures.

Figure II-4 - Example of conceptual plan view layout for structure and debris placement.

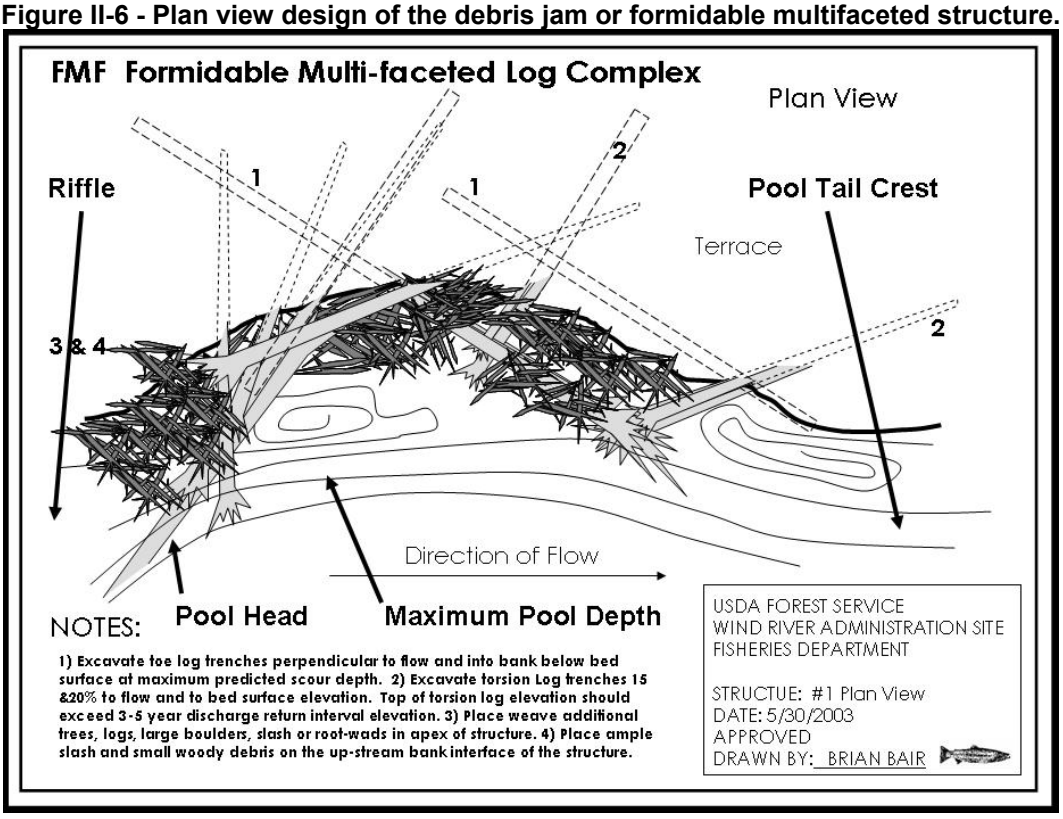


Log Jams

The log jams would be placed at bends in the river and provide pool habitat. The deeper pools would reduce the amount of surface area for the sun to heat. It also provides refuge for trout during the hot summer months and cold winter months when the creek freezes over. The jam also would provide sediment storage across and upstream of the structure.

Figure II-5 - Log Jam within the Log Flume Reach. Structures are designed to mimic this jam.

Figure II-6 - Plan view design of the debris jam or formidable multifaceted structure.



Bar Buddies

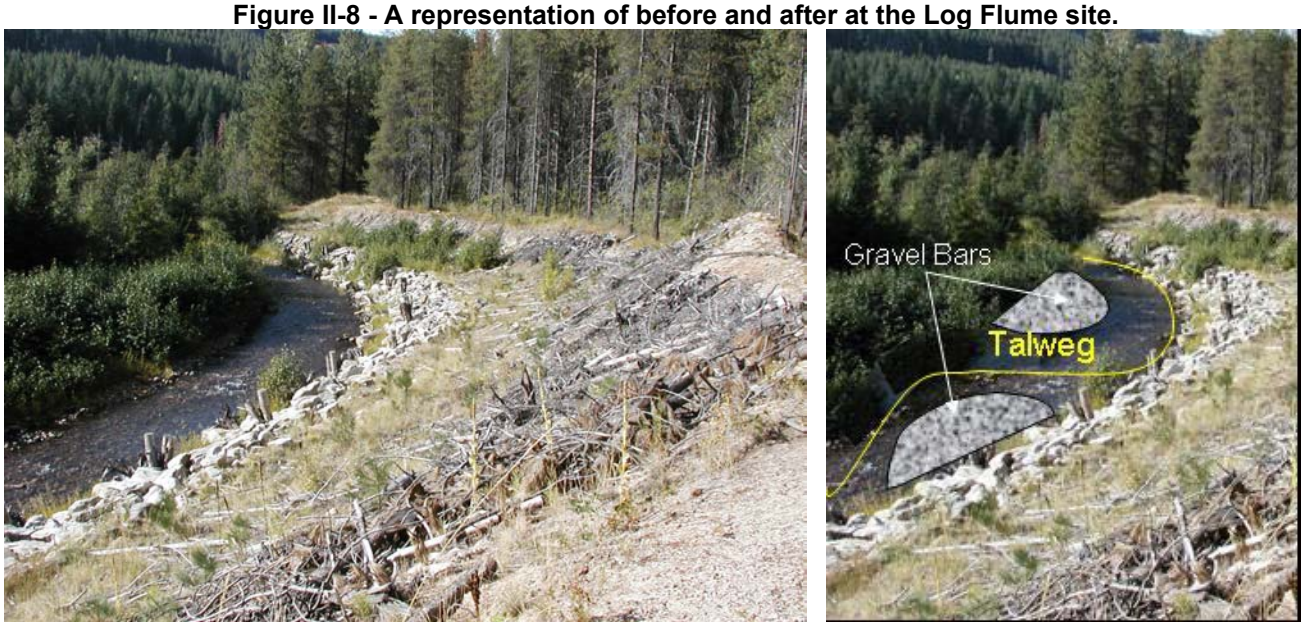
The bar buddies would be placed on existing rock bars to provide an area for sediment to settle out during high flows. This would also provide a place for vegetation, which would in turn shade the creek.

Figure II-7 - Bar Buddies within the Log Flume Reach. These structures were placed in 1999. The structures proposed would look similar to these.

Rock Structures

The rock structures would create pools and narrow the channel, reducing solar heating on the water surface. The structures would create deposition areas above them. In figure 2.6, it shows how the stream would look before and after the structures.

Figure II-8 - A representation of before and after at the Log Flume site.



Riparian Vegetation Treatment

The material source for logs will be the timber stand bounded by Log Flume interpretive site, Highway 20, and Bangs Mountain Road. Trees would be removed on these 38 acres for use in the stream structures. Trees used for this project will be less than 20 inches diameter at breast height (dbh). Most of the trees will be between 6 and 12 inches dbh. Live trees will be taken to thin a stand. Most of these will be lodgepole pine. A large portion of the trees that will be used are dead and dying from a beetle infestation. The trees would be felled and moved by an excavator and forwarder. Some trees will be cut and others will be pushed over by an excavator so that their roots may be used in the stream structures. The forwarder would place the logs at the work sites. Designated routes to the stream channel are over existing skid trails or roads from past work. The creek will be used to by the forwarder to move the logs up and down the channel. All machines working in the stream channel will be checked each time they enter the stream channel for oil leaks. No machine will be allowed in the channel with oil leaks.

A 0.7 acre landing from a previous timber operation would be used for staging. This landing area would be decompacted and seeded after the thinning is finished.

Figure II-9 - This is the stand of trees in which the dead trees would be used for the structures.

As seen in the figure 9, there are numerous dead or dying trees in the stand adjacent to the restoration area. When these trees fall and litter the forest floor, they pose a high fire risk. By using the trees in the structures, the fire risk would be reduced. The stand would be managed for large tree recruitment. This is to benefit the Riparian Habitat Conservation Area.

Temporary Road Access

Approximately ½ mile of existing access roads would be used temporarily for the Log Flume Project Site. Two roads depart from the Log Flume trailhead. One was used as a salvage logging road and the other to put in the bank stabilization at the log flume interpretive site in 1999. A third road off of Bangs Mountain road was used to place a footbridge in the upper portion of the reach. All temporary roads would be decompacted and seeded with native grasses and shrubs when the structures are finished.

2.1.3 Alternative C – The Run of the River Alternative

This alternative would address wetland retention issues by changing the site to a Run-of-the-River condition. The wetland behind the dam would remain intact. This alternative would excavate out a portion of the top of the dam approximately 8 feet deep, down to the elevation of the existing streambed at the existing drop inlet. The floodplain downstream from the dam would be raised and a new stream channel constructed from the existing drop inlet structure, through the dam and down to the existing stream channel at a point around the mouth of Lane Creek. Segments of the existing dam on the North and South side of Sherman Creek would be conserved in an undisturbed state as culturally significant features to be interpreted as part of the adjacent Growden Dam Recreation Site. The existing drop inlet would be left in place and would be plugged with concrete and sand to limit access into its interior as a safety measure.

Figure II-10 - Run of the River conceptual picture

No stream bed or sediment removal would be done above the dam except to tie the proposed stream channel into the existing stream channel at the existing drop inlet structure. The proposed stream channel would be constructed to widths and depths similar to the stream reaches just down stream of the dam. Similar reference reaches would be measured to establish stream morphology values for stream bed width, depth, meander length, pool depth and length, etc. for use in construction of the proposed stream channel. The proposed stream channel would be constructed to a 16 to 20 foot width and a depth of 1.5 to 3 feet. The floodplain would be constructed through the dam at approximately a 40’ width, and would grade down to the existing Sherman Creek stream channel at the mouth of Lane Creek on a slope of approximately 3 to 5 percent. The dam would be sloped back from the sides of the proposed flood plain at a slope of 2 feet horizontal to 1 foot vertical (2:1).

The stream channel downstream from the dam would be dewatered during construction of the proposed floodplain in that area. The construction area would be dewatered by piping from the existing stream channel just upstream of the existing drop inlet, through the dam and downstream to a point just past the confluence with Lane Creek. The pipe would be installed along the south side of Sherman Creek. Once the proposed Sherman Creek stream channel is reconstructed from the existing drop inlet down to the mouth of Lane Creek, the dewatering pipe would be removed except for sections of pipe that are buried more than 5 feet below the proposed ground surface.

The material sources described in Alternative B would also be used in this alternative. Material from the Lane Creek Pit would be used to raise the elevation of the floodplain below the dam. The Lane Riprap Pit would be the source for the large riprap material needed to hold finer cobbles and gravels in the proposed Sherman Creek stream channel, and the Lane Creek

Pit and Bridge Creek Pit would also be used as a source for cobbles and gravels for reconstructing the proposed Sherman Creek channel.

The wetland behind the dam would remain intact; however the water table will be lower. The current stream channel would be maintained behind the dam. Stream restoration would occur below the dam since it will be needed to mitigate wetland loss and meet the sediment transport objective. Lane Creek Pit would not be restored. Access to the 2000-214 road would be blocked.

2.1.4 Alternative D – The Emergency Spillway Alternative

Alternative D addresses the Heritage Resource and Wetland retention issues. This alternative would maintain the dam as is and create a 15-foot-wide and 6-foot-deep concrete emergency spillway on top of the dam. The spillway would channel water into a 30-foot-long by 15-foot-wide chute on the face of the dam which would direct the water into the pool below the dam. This spillway is designed to pass a 500 year flood flow, so it meets the DSS regulations safety issue. This alternative would not affect the wetland or wetland water table. The drop inlet would remain as the main outlet for the dam. It would still require maintenance.

Stream Reconstruction – Under this alternative the stream would not be reconstructed behind the dam, since the current stream channel would be maintained.

Stream Restoration – The stream below the dam would not receive treatment since it would not be needed to mitigate the loss of the wetland.

Riparian Thinning – The riparian thinning was part of the stream restoration project and will not be implemented under this alternative.

Fish Passage - There will be no fish passage structure built.

Figure II-11 - Emergency Spillway conceptual picture

2.1.5 Alternatives Not Considered in Detail

Alternative E – Installation of a Culvert through the Dam

This alternative would excavate out the dam down to the original stream level. The drop inlet structure would be left in place and a large bottomless arch culvert (approximately 30 feet wide) would be constructed through the dam. The culvert would then be backfilled with excavated material conserved from the excavation, back up to the original level and cross section of the existing dam. A 26 foot wide, Rosgen Type A channel would be constructed through the culvert at approximately a 3 to

5 percent grade. A reference reach of similar slope would be established below the dam, and the steam morphology values would be measured for this reach from which the proposed channel through the culvert would be constructed.

The floodplain upstream from the existing dam would be excavated as described in Alternative B. An 80 wide floodplain would be constructed in the existing wetland upstream of the dam, and a channel would be constructed within this floodplain as described in Alternative B. Excess material from the excavation of the proposed floodplain and stream channel upstream of the dam would be utilized below the dam to raise the floodplain, or hauled to the Lane Creek Pit and disposed of as in Alternative B. Material sources for material to line the proposed stream channel through the culvert and upstream would come from the same material sources as described in Alternative B. The disposition of the existing drop inlet structure would be the same as in Alternative B.

The restoration of Sherman Creek above and below the dam would be the same as the proposed action.

This alternative costs $243,000 more than the proposed action. It also maintains a structure that will need continual maintenance.

This alternative was proposed to mitigate the heritage impact of the dam removal. Part of the heritage issue is that the public will no longer be able to see the structure in place. With this alternative the general shape of the dam would remain. This alternative was dropped and the other alternatives incorporated heritage mitigations. However it was evaluated and determined that it would still have an adverse effect on the dam, so it does not address the heritage issue.

This alternative was dropped because it failed to meet the purpose and need of cost and the alternative driving issue of Heritage Resources.

Alternative F – Yearly maintenance and stream cleanout
This alternative was proposed by the public during scoping. It involves removing wood from upstream reaches to prevent damage to Growden Dam. This alternative does not address the 500-year flood flow as stated in the purpose and need. It also does not meet INFISH which does not allow for removal of large wood from a stream and would continue to block fish passage.

Alternative G – Emergency Spillway with 6 acre lake
This alternative was proposed by the public during scoping. This alternative was proposed by the Forest Service in 1993. The cost of this alternative was $1,886,400 in 1993. Maintenance dredging was estimated to be needed every 10 years at a cost of $100,000 each time.

In a survey done at the Growden site in 1991, there were 27 respondents. The survey was to get public comments with regard to a proposal at Growden Dam. The following table lists the reasons they stopped.

Table II-12 - Reasons for stopping at Growden

Fishing / Hunting	Rest Stop	Camping	Historical Visit to CCC camp	Other
5	12	3	5	2

They were also asked "What do you consider to be the most important element of the project." They were given the choices in the following table.

Table II-13 - Important Elements at Growden from 1991 survey

CCC Camp History	Picnicking	Nature Trail	Cross-Country Skiing	Rest stop facilities	Camping	Lake Enlargement
14	6	3	2	8	6	3

Most of the respondents favored interpretation of the CCC camp history and rest stop facilities. The Forest Service implemented those parts of the project. The lake enlargement proposal was dropped due to cost.

Temperatures will not be decreased with this alternative. "Temperatures increase in release water either when the reservoir is shallow or when the withdrawal structure is close to the surface of the lake. In shallow reservoirs, seasonal warming heats the slow-moving waters to temperatures that are higher than those experienced in free-flowing streams...withdrawal structures that are situated near the surface of a reservoir behind a dam also may supply warm water to downstream areas, because the

warmest water is usually found near the lake surface." (Dam Removal, Science and Decisionmaking; H. John Heinz III Center for Science, Economics and the Environment; 2002; The Heinz Center)

Warm water is less dense than cold water, and therefore rises to the surface of lakes and reservoirs. The impoundment behind Growden dam would be classified as a shallow reservoir and the existing drop inlet structure is designed to remove water from the top of the reservoir rather than from the bottom. If the existing drop inlet structure is retained to function as designed, the warmer water at the surface will be removed and used to supply downstream reaches below the dam. This will not reduce downstream water temperatures and may actually increase them over the current condition.

This proposal was dropped from further considerations in this analysis, since it did not meet the purpose and need. The cost is well over the 10% allowed by the decision maker. It will not allow bedload movement through the dam site. It will not reduce stream temperatures. It does not provide fish passage. The 1991 public comments and the current public comments did not show a large support for retaining the dam or dredging behind the dam.

Alternative H – Complete Removal of the Dam
Complete removal of the dam was Alternative B. This alternative was modified to meet heritage needs.

2.1.6 Features Common to All Action Alternatives

Management of Noxious Weeds[4]

The Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 FEIS will only address the prevention of weed spread and/or the compounding of weed problems that could result from proposed activities except where needed to prevent spread of weeds to the project site. The project will not address treatment of existing weed problems or the spread of weeds that would occur independently of the proposed actions. Treatment of existing weeds is addressed by the Colville National Forest Environmental Assessment for Integrated Noxious Weed Treatment (1998).

Noxious weeds are present along most roads in this area and in some locations are spreading from the roads to the adjoining forest or grassland. Weeds in the immediate area with potential to seed into disturbed sites would be treated using chemical, biological, and manual methods, in accordance with the Colville National Forest Environmental Assessment for Integrated Noxious Weed Treatment or whichever noxious weed treatment direction is in effect at time weed treatment takes place. Treatment of noxious weed infestations will occur prior to closure and/or decommissioning of temporary access roads. Follow-up monitoring and re-treatment of areas behind road closures will be conducted, at a minimum, once a year for the first two years after the treatment or until such time as it can be verified that the weed infestation has been effectively eliminated.

Mitigation Measures and Monitoring Plan

Best Management Practices (BMPs)
Best Management Practices are the primary mitigation measures used to reduce or eliminate potential effects to soil, water, and fisheries resources. BMPs are incorporated by reference, and the text of applicable BMPs is included in the Project Analysis File (copy is available from Three Rivers Ranger District on request). Additional or supplemental project-specific mitigation measures are given below, and are designed to work in concert with BMPs.

[4] The Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28 FEIS will only address the prevention of weed spread and/or the compounding of weed problems that could result from

Table II-14 - Mitigation Measures

Specialty	Effect	Mitigation	Alternatives
Botany – 1	Direct Impact to plants	If any sensitive species is found in the project area while project activities are occurring, a botanist will be consulted as to measures required to protect the species and its essential habitat.	B, C, D
Fish – 1	Impacts to trout from dewatering	Isolate Work Area – Before diverting the stream channel, block nets will be set up at both up and downstream locations and will be left in a secured position to exclude fish from entering the project area. The nets will be secured to the stream channel bed and banks. The net will be removed after stream work is complete and the water diversion is removed. The nets will be monitored on a daily basis to ensure they are secured to the banks and free of organic accumulation.	B, C
Fish - 2	Impacts to trout from dewatering	Fish Removal - Before diverting the water out of the wetland and after the block nets are in place, begin removing fish from the work area. As the area is dewatered, fish will be collected by hand or dip nets. All fish will be placed in Sherman Creek outside of the work area.	B, C
Fish -3	Impact to spawning habitat	Timing of Activities - State of Washington Guidelines for timing of instream work correlates with the spawning and incubation period for trout. Work is allowed within the stream channel from June 1 – August 30. Instream work outside of this time period must have prior approval of the fisheries biologist. In addition project activities will cease during wet periods that have the potential to generate and deliver sediment to Sherman Creek.	B, C, D
Fish – 4	Water Quality	Follow State and Water Quality Guidelines – All project actions will follow all provisions of the Clean Water Act and provisions of related permits.	B, C, D
Fish - 5	Discharge of Pollutants	Spill Prevention Control and Containment Plan (SPCCP) – The contractor will be required to have a written SPCCP, which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc). The SPCCP shall contain a description of the hazardous materials that will be used, including inventory, storage, handling, and monitoring.	B, C, D
Fish – 6	Minimize Heavy Equipment Fuel/Oil leakage	The contractor shall have a written spill prevention and containment plan for the project and shall have all necessary personnel, supplies and equipment available to ensure	B, C, D

Specialty	Effect	Mitigation	Alternatives
		that the plan is promptly and effectively implemented.	
Fish – 7	Minimize Heavy Equipment Fuel/Oil leakage	All equipment used for instream or dam decommissioning work shall be cleaned and leaks repaired prior to arriving at the project. Remove external oil and grease, along with dirt and mud. Inspect all equipment before unloading at site. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands.	B, C, D
Fish – 8	Minimize Heavy Equipment Fuel/Oil leakage	Equipment used for in-stream or riparian work shall be fueled and serviced in an established staging area (at least 150' away from Sherman Creek or other water bodies). When not in use, vehicles will be stored in the staging area.	B, C, D
Fish – 9	Minimize Heavy Equipment Fuel/Oil leakage	Two oil absorbing floating booms appropriate for the size of the stream shall be available on-site during all phases of construction whenever surface water is present. Place booms in a location that facilitates an immediate response to potential petroleum leakage.	B, C, D
Fish – 10	Minimize Sedimentation through Dewatering	Divert flow with pumps or structures such as cofferdams constructed with non- erosive devices, such as sandbags, bladder bags, or other means that divert water.	B, C, D
Fish – 11	Minimize Sedimentation through Dewatering	The temporary bypass system may consist of non-erosive techniques, such as a pipe or a plastic-lined channel, both of which must be sized large enough to accommodate the predicted peak flow rate during construction. In cases of channel rerouting, water can be diverted to one side of the existing channel.	B, C, D
Fish - 12	Minimize Sedimentation through Dewatering	Dissipate flow at the outfall of the bypass system to diffuse erosive energy of the flow. Place the outflow in an area that minimizes or prevents damage to riparian vegetation. If the diversion inlet is not screened to allow for downstream passage of fish, place diversion outlet in a location that facilitates safe reentry of fish into the stream channel.	B, C, D
Fish – 13	Minimize Sedimentation through Dewatering	When necessary, pump water from the de-watered work area to a temporary storage and treatment site or into upland areas and filter through vegetation prior to reentering the stream channel.	B, C, D
Fish – 14	Minimize Sedimentation through Dewatering	Any water intake structure (pump) will have a fish screen installed, operational, and maintained.	B, C, D
Fish – 15	Flow Reintroduction	Slowly re-water the construction site to prevent loss of surface water downstream as	B, C

Specialty	Effect	Mitigation	Alternatives
		the construction site streambed absorbs water and to prevent a sudden increase in stream turbidity. Look downstream during re-watering to prevent stranding of aquatic organisms below the construction site.	
Fish – 16	Sedimentation of fish habitat	Site Rehabilitation - A revegetation plan will be prepared by the Forest Service. All disturbed areas shall be rehabilitated and stabilized by seeding and planting with native vegetation. Revegetation would be monitored and maintained for at least three years to ensure a minimum of 80% survival throughout revegetated areas. If survival falls below 80%, additional vegetation would be planted until the threshold for survival is met. All bank stabilization shall be completed and all construction materials, debris, fills, etc shall be removed before the bypass is removed.	B, C, D
Fish – 17	Damage to sites	Upon project completion, remove project related waste. Initiate rehabilitation of all disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials, seeding, and/or planting with native seed mixes or plants. If native stock is not available, use soil- stabilizing vegetation (seed or plants) that does not lead to propagation of exotic species.	B, C, D
Fish - 18	Fish Habitat	Stream channel cross-section and gradient that reflects more natural conditions found up and downstream will be constructed. Large wood and/or boulders will be placed in the reconstructed stream channel and floodplain.	B, C, D
Fish - 19	Sedimentation of fish habitat from erosion	Access roads, stream channel within the dewatered work area, staging, and stockpile areas will be de-compacted.	B, C, D
Fish - 20	Fish habitat	In-stream or floodplain restoration material such as large wood and boulders will mimic as much as possible those found in the project vicinity. Such materials may be salvaged from the project site or hauled in from offsite.	B, C
Fish - 21	Sedimentation of fish habitat from erosion	Site restoration activities such as mulching will occur within five days of the last construction phase.	B, C, D
Heritage - 1	Adverse Effect to Growden Dam	Appropriate interpretative signing will be placed at the Growden Dam site. The Colville National Forest Recreation Program Manager will work with the Forest Archaeologist to develop the appropriate interpretive signing for Growden Dam at the Growden CCC Camp Recreation Area. The interpretive signing will be designed to reflect the historic nature and values of the CCC dam.	B, C, D

Specialty	Effect	Mitigation	Alternatives
Heritage – 2	Adverse Effect to Growden Dam	A qualified historian/archaeologist shall be retained to complete a Historical American Engineering Record (HAER) for Growden Dam for submittal to the SHPO. The Forest will provide copies of all documents pertaining to the construction and maintenance of Growden Dam to the historian/archaeologist retained to complete the HAER.	B, C
Heritage - 3	Potential effects to archeological resources	Stream Restoration Activities – All stream restoration activities need to be completed by moving up and down the creek. If cultural resources are discovered in the course of implementing the project all work must stop and the Colville National Forest Heritage Program needs to be contacted immediately.	B, C
Heritage - 4	Potential effects to archeological resources	Falling of Trees and Trees with Root Pulls – When falling trees near historic properties, the trees need to be felled away from the property. An archaeologist or a cultural resource technician needs to be present when trees with root balls are extracted.	B, C
Heritage - 5	Potential effects to archeological resources	Equipment ingress/egress – Heavy machinery must use previously developed pathways to the creek. Any new ingress/egress points must be approved by the Heritage Program. The equipment must have appropriate tires/treads that reduce erosional impacts on the soil.	B, C
Recreation - 1	VQO - Retention	Mimicking natural density changes around created openings, and retaining the natural variances within the stand rather than "evening out" the spacing of trees, would help to reduce the obvious character changes occurring in the overall landscape.	B, C
Recreation - 2	VQO - Retention	Maintain or replant hardwoods for diversity of pattern and color.	B, C
Recreation - 3	VQO - Retention	Preserve the existing vegetation along temporary roads as much as possible for screening.	B, C
Recreation - 4	VQO - Retention	Revegetate disturbed areas (tree removal, temporary roads, and trail relocation) based on the silvicultural prescription that will move the site towards a sustainable vegetative pattern.	B, C
Recreation - 5	VQO - Retention	Revise the stream restoration work done in 1999 by removing the evenly spaced structures to help restore a natural appearing landscape along Sherman Creek.	B, C

Specialty	Effect	Mitigation	Alternatives
Recreation - 6	VQO	Remove or dispose of the slash generated so that it is not evident within the visible foreground.	B, C
Recreation - 7	VQO	Place tags, flagging, paint markings and stakes so that they are not visible from travel routes.	B, C, D
Recreation - 8	VQO	Stump height would be specified as a maximum of eight inches with and cut faces of stumps faced away from the road. Stumps seen from the trail or road would be recut to be flat and flush with ground level in order to reduce the evidence of tree removal activity.	B, C
Recreation - 9	VQO	Slash would be lopped and scattered	B, C
Recreation - 10	Growden Heritage Site	Create a short accessible loop trail in the area between Sherman Creek and the parking area. This trail will have interpretive information nodes integrated with picnic table pads along the trail. Information that could be provided: CCC construction of the dam, historic photos of CCC buildings to help visually reconstruct the camp.	B, C, D
Recreation - 11	Growden Heritage Site	Create an Interpretive trail that addresses the dam. It will cross the existing dam site and follow Sherman Creek west, approximately one quarter mile in length. Install necessary interpretive signage.	B, C, D
Recreation - 12	Growden Heritage Site	Approximately 10 trees will be taken from the western side of the site in order to increase visibility for approaching east bound traffic.	B, C, D
Recreation - 13	Log Flume Trail Damage	Put in an interpretive sign that covers the following subject matter: "Today we live in an era with machines that can accomplish tasks that 100 years ago could not have been imagined. It is just as hard today to imagine what it must have been like to cut and remove full grown trees without contemporary technology. The intent of interpretation at the Log Flume Heritage Site is to present the culture of forestry in its formative years of the early twentieth century and the processes that were employed to harvest the vast stands of timber that existed at the beginning of the century."	B, C
Recreation - 14	Log Flume Trail Damage	Reroute beginning of Log Flume Interpretive Trail and revegetate.	B, C

Specialty	Effect	Mitigation	Alternatives
Recreation -15	Log Flume Trail Damage	Remove 120 foot length of trail at west end of parking area that begins trail to Sherman Creek Discovery Trail. Trail should begin as part of new kiosk plaza with the Log Flume Interpretive Trail.	B, C
Recreation - 16	Stream Accessibility conflicts with INFISH	In order to mitigate the number of access points to the river along sandbars to comply with INFISH regulations, Designate one access point to the creek. A sand bar just above the trail crossing of the creek already receives use, and an attempt has been made to make it accessible. Consider improving access to this site.	B, C
Soil - 1	Compaction	Require yarding equipment to use existing skid trails and landings (use designated 130' skid trail spacing for conventional tractor yarding and designated 40' trail spacing for CTL equipment); restrict mechanical equipment to slopes <35%; restrict mechanical equipment to the dry season under a one-pass scenario, or winter felling/yarding over >20" of snow and/or 3-4" of frozen ground; rip and revegetate major skid trails, temp roads, and landings at the completion of the project. Woody debris resulting from the felling/yarding operations (limbs and branches) should be left on-site without any post-harvest treatment to maintain long-term site productivity.	B, C
Soil - 2	Soil Productivity	Retain topsoil from the wetland reach above the dam for later reapplication during the stream restoration phase of the project.	B
Soil - 3	Surface Erosion	Reconstructed roads will include installation of appropriate drainage structures, deep ripping, and seeding with native species.	B, C, D
Soils / Water - 1	Sedimentation	Conducting operations during dry, low-flow periods; use of silt fences and/or erosion mats on disturbed soils; construction of settling ponds/catchment basins below the dam; and timely seeding and planting to reestablish vegetation disturbed during the construction of the spillway.	B, C, D
Soil and Water - 2	Erosion	Implement the downstream restoration project between Canyon Creek and Log Flume before starting any soil disturbing activities at or above the dam. This will allow the stream restoration structures in this reach to temporarily capture and store sediments from the dam as they move through the lower reaches of the watershed. This will spread out the "sediment pulse" over a longer period of time and reduce downstream effects at the fish	B, C

Specialty	Effect	Mitigation	Alternatives
		hatchery.	
Water -1	Channel Morphology	Protect existing functioning stream structures from mechanical damage in the service contract. Require construction equipment to maintain the integrity of existing, functional beaver dams and structures by using alternative routes around these sites.	B, C
Water - 2	Channel Morphology	Protect existing vegetation during channel restoration—especially in the Log Flume area which is still recovering from recent events. Monitor changes in channel morphology at representative downstream restoration sites using appropriate techniques (channel cross-sections, bank pins, etc.) to determine changes and trends. Take appropriate action as necessary if unacceptable impacts occur--including removal of the structure(s).	B, C
Water - 3	Channel Morphology, Stream Flow Regime	Mitigation measures include regular monitoring and maintenance of the trashrack and spillway during spring and storm high flow events.	C, D
Water - 4	Discharge of Pollutants	Mitigate through proper cleaning, maintenance, and inspection of equipment. The FS ER/COR (or other authorized representative) will be on-site during equipment operations. Equipment operations will be limited to low flow periods. Diversion channels will be used where practical to allow operations to occur "in the dry". No servicing or refueling will occur within the riparian zone or contributing areas.	B, C,
Water - 5	Erosion	Mitigate through proper design, construction, and placement of in-stream structures by qualified resource specialists with experience in stream restoration.	B, C
Water - 6	Erosion, Channel Morphology	Mitigation measures should include using large and/or rot resistant tree species to construct the structures. Use lengths that span the width of the channel to reduce the risk of downstream migration during high flows. Monitor structures during high flow events and implement contingency measures as needed.	B, C
Water - 7	Erosion, Turbidity	Mitigation measures at the dam site will include excavating and moving some sediment to the Lane Creek Pit and recontouring the remainder to decrease slopes and move it away from the stream. Establish settling ponds and temporary diversion channels as feasible. Revegetate disturbed soils using appropriate native, riparian species. Protect existing vegetation to the extent practicable—especially in the log flume area which is still recovering from recent	B

Specialty	Effect	Mitigation	Alternatives
		events. Restrict the season of operation to low flow periods. It will be important to drawdown the water table to allow accumulated sediments behind the dam to drain and stabilize. Silt fencing (or other containment devices) will be needed along the stream to prevent exposed soils from re-entering the stream. Monitor stream turbidities during operations according to Washington State DOE sampling protocol. Coordinate with appropriate state and federal agencies to obtain the necessary permits prior to implementation. Mitigation measures on the restoration reach will include restricting operations to low flow periods and revegetation of disturbed slopes and soils.	
Water - 8	Stream Flow Regime, Wetlands	Mitigation measures will require regular cleaning and maintenance of the overflow on the dam and channel inlet to remove beaver structures and debris. Trapping and relocation efforts are often costly and ineffective.	C, D
Water - 9	Stream turbidity	Monitor stream turbidities using standard Washington state sampling protocol. Monitor riparian planting for 3-5 years following project completion and replant as necessary.	B, C, D
Water - 10	Wetland Loss	Coordinate with appropriate state and federal agencies to obtain the necessary permits prior to project implementation.	B, C
Water - 11	Turbidity, Channel Morphology	Mitigation measures at the dam site will include: installation of hard bank protection (rock and large wood) and revegetation with appropriate native riparian species to protect the new channel structure and the adjacent highway. Protect existing vegetation to the extent practicable. Stockpile topsoil and reuse to increase revegetation success.	B
Water - 12	Water Temperature	Long-term mitigations include introduction of native riparian species to shade the stream and reduce water temperatures. It will take many years of natural riparian stand succession due to a slightly increased stream gradient before it may become effective	B, C
Water - 13	Water Temperature	Plant appropriate native, riparian species. Plant as soon as possible based on weather and soil moisture conditions.	B, C, D
Water - 14	Water Temperature, Channel Morphology	Monitor planting growth and survival for 5 years after project completion and replant as necessary.	B, C, D
Weeds - 1	Disturbed Areas being infested with weeds	Evaluate disturbed sites and develop site-specific prescriptions for revegetation.	B, C, D
Weeds - 2	Disturbed Areas	Reduce or eliminate the time lag between the	B, C, D

Specialty	Effect	Mitigation	Alternatives
	being infested with weeds	ground disturbing activity and revegetation efforts. Revegetate immediately following ground-disturbing activities.	
Weeds - 3	Disturbed Areas being infested with weeds	Select native species that will occupy the site and compete successfully against noxious weeds. Follow the Colville National Forest Seeding and Planting Guide.	B, C, D
Weeds - 4	Native Plant Population Effects	Completing a revegetation plan for the site using the Colville National Forest Seeding and Planting Guide.	B, C, D
Weeds - 5	Transportation of weed seed	Remove mud dirt and plant parts from all off road equipment.	B, C, D
Weeds - 6	Transportation of weed seed	Use only weed-free mulch on surface soil stabilization and erosion control projects. Minimize the use of straw unless the source is known to be weed free.	B, C, D
Weeds - 7	Weed Spread	Before construction equipment moves into a project area, treat seed bearing noxious weed plants along existing access roads leading to the project area.	B, C, D
Weeds - 8	Weed Spread	Treat pre-existing and proposed landings, skid trails that are weed infested before the proposed activity.	B, C, D
Wildlife - 1	Loss of Snags	Preserve or Create at least 4 large snags and 4 green trees per acre in the areas used to obtain trees for the stream structures.	B, C

Table II-15 - Monitoring Plan

Item	Task	Frequency	Responsible Personnel
Revegetation Effectiveness	Monitor planting growth and survival. Photo point monitoring and walk through survey.	Every year for 5 years after project completion.	Forest Revegetation Team
Stream Structures Effectiveness	Photo monitoring on each site	Every 3 years and after bankfull events	Zone Fisheries Biologist, Zone Hydrologist, and Project Engineer
Temperature Reduction	Place a thermograph downstream and upstream of the dam site and the restoration reach	Every year for 5 years after project completion.	Zone Fisheries Biologist or Zone Hydrologist
Dam outlet condition	Monitor the stability of the outlet area of the Growden Reach	Every year for 5 years after project completion and after bankfull events	Zone Fisheries Biologist, Zone Hydrologist, and Project Engineer
Fish Passage Effectiveness	Monitor the fish passage through the Growden Reach outlet area	The first year after construction and then every 3 years	Zone Fisheries Biologist
Snags	Monitor the Log Flume Restoration Reach to assure appropriate snags are left.	After project completion	District Wildlife Biologist
Sedimentation	Monitor changes in bedload at the dam site and the restoration reach using a wolman pebble count	Every June for 5 years after project completion.	Zone Fisheries Biologist or Zone Hydrologist

Table II-16 - Alternative Comparison Table of the Purpose and Need and the Alternative Driving Issues

	Ability to safely pass a 500-year flood event.	Reduction in stream temperature expected.	Amount of the vertical height of the dam removed.	Increase in area available for bedload storage	Whether or not fish passage is provided.	Cost of the Alternative not more than 10%	Adverse or Not Adverse Call / If yes does mitigation satisfy the State Historic Preservation Office (SHPO	Change in wetland habitat behind the dam
A – No Action	No	No	0%	No	No	Annual Maintenance	No	No
B – Dam Removal	Yes	Yes	100%	Yes	Yes	$1,000,000	Yes / Yes	5-6 acres
C – Run of the River	Yes	No	40%	Yes	Yes	$534,000	Yes / Yes	1-2 acres
D – Emergency Spillway	Yes	No	0%	No	No	$232,000	No	No

Table II-17 - Alternative Comparison Table of the Significant Issues

	Noxious Weeds - Acres of soil disturbance to the project area	Recreation-Amount of disturbance to Log Flume	Recreation-Amount of disturbance to Growden	Recreation-Sherman Byway Plan Consistency	Recreation-Visual effects as viewed from the Sherman Byway	Water Quality - Amount of stream channel disturbed.	Water Quality - Amount of dam removed is indicative of the amount of disturbance
A – No Action	0	0	0	N/A	N/A	0	0
B – Dam Removal	74	Site closed for 1 Summer	Site closed for 1 summer	Yes	Amend Forest Plan	1.3 miles	60%
C – Run of the River	66	Site closed for 1 Summer	Site closed for 1 summer	Yes	Amend Forest Plan	1.1 miles	10%
D – Emergency Spillway	10	0	Site closed for 1 summer	Yes	Consistent with Forest Plan	0	2%

III) Affected Environment and Environmental Consequences

3.0 Chapter Structure

This chapter summarizes the physical, socio-economic, and biological environments of the project area. The chapter also describes the environmental effects that would occur if the No Action alternative were selected, or if any of the action alternatives were implemented. These discussions are organized by resource, and are the basis for the alternative comparison presented at the end of Chapter II.

Direct, indirect, and cumulative effects are discussed for each resource. While direct and indirect effects tend to focus on the effects of implementing proposed activities (or in the case of the No Action alternative, the effects of not implementing the proposed actions), cumulative effects discussions focus on the incremental effects of the proposed activities when added to other past, present, and foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

3.0.1 Past, Present, and Foreseeable Future Actions

Specific actions that were considered in cumulative effects included, but were not limited to:

1. The Graves Mountain Allotment in the Sherman Creek Watershed is vacant and there are no plans to activate it in the future.
2. Washington State Department of Transportation DOT conducts annual road maintenance activities adjacent to the project area along SR #20. These include application of winter traction sand and deicing chemicals, winter snowplowing, spraying herbicides for noxious weeds, pavement sweeping, culvert and ditch maintenance, brushing, asphalt repair, etc. The DOT developed a new sand and gravel stockpile site on private land approximately 1 mile downstream of Growden Dam. The cut and fill slopes are still actively eroding sediment. No new road construction or reconstruction is planned by the state during the implementation period of this proposal.
3. The Forest Service also maintains roads within the project area. These are normally gravel or native surfaced roads that may or may not include a ditch. Typical activities include spot spraying herbicides for noxious weeds, culvert and ditch maintenance, blading the travelway, and brushing of roadside vegetation. Forest Service roads are not normally maintained for winter travel except in support of active timber sale operations. These winter services are normally performed by the timber sale purchaser under the authority of the timber sale contract. No new road construction or timber sales are planned by the Forest Service during the implementation of this proposal.
4. Growden Dam is maintained by the Colville National Forest engineering staff. This includes removal of vegetation on the face of the dam, annual inspection of the structure, and cleaning of the trash rack behind the dam during spring flows.
5. The picnic areas, campgrounds, and interpretive hiking trails are the responsibility of the Three Rivers Ranger District recreation staff. This includes security patrols, restroom/site cleaning and maintenance, brushing of trails and user areas, etc. The Forest Service maintains a rest stop/interpretive area at Growden with toilets and a couple of picnic tables. A developed Forest Service campground (12 sites) is located at the mouth of Canyon Creek. This campground is connected with the Log Flume Interpretive Site via a paved, barrier-free foot trail along the stream. Another rest area/picnic area is located at the Log Flume site with toilets, picnic tables, interpretive signs, and a trail along the stream. FR #2000.136 is used by forest visitors as the Bangs Mountain Auto Tour. State Route #20 was designated as a National Forest Scenic Byway in 1990 and has been a State Scenic Byway since 1967.
6. Washington State Department of Ecology (DOE) is currently in the process of implementing new water quality standards. These changes include new standards for water temperature based on the beneficial uses of key aquatic species within the watershed and will be computed on a 7-day average of the daily maximum temperature. The draft 2002/2004 303(d) list of impaired waters that is currently in review will be based on the old Class AA water quality standards. The new state water quality standards will be applied to the 2006 303(d) list. DOE is currently working with the Forest Service to develop a Total Maximum Daily Load (TMDL) for stream temperatures. A TMDL has been completed for the Okanogan-Wenatchee National Forests and DOE expects to release a draft of the technical report and the Summary Implementation Strategy in April 2005. The final TMDL approval by EPA is expected by the end of 2005.

7. The Sherman Pass Byway 2004 Corridor Plan proposes to improve the trail system at both the Log Flume and Growden interpretive sites as well at the trail along Sherman Creek connecting the Canyon Creek Campground and Log Flume Heritage site.
8. There are approximately 7 summer homes/cabins located on private land one mile east and downstream from Growden Dam. Several of these homes are located on a low terrace adjacent to Sherman Creek where the potential for flood damage is high.
9. The Washington State Department of Fish and Wildlife operates a fish hatchery at the bottom of Sherman Creek. This facility utilizes water directly from Sherman Creek in the operation of the rearing ponds.
10. The Forest Service will continue to conduct prescribed burns adjacent to the project area for the purpose of reducing fuels and improving wildlife habitat.
11. High flows will continue to be a part of the Sherman Creek streamflow regime.

3.1 Physical Environments

3.1.1 Fire and Fuels

Affected Environment

The trees that will be used for the downstream sedimentation storage structures will be removed from an area between Log Flume Interpretive Site and Canyon Creek campground. The area is approximately 38 acres in size. The dominant tree species in the stand is lodgepole pine. The stand has been attacked by Mountain Pine Beetle and has caused significant mortality to the trees. Currently, surface fuels created by the beetle killed timber are low to moderate. However, as time passes and the standing dead trees fall surface fuels will accumulate enough to raise the risk of damaging wildfire. The trees being removed for the structures will be dying and dead. The whole tree will be used in the sediment structure, there will be few tops left on the ground. Slash will be minimal.

Environmental Effects

No Action and Alternative D – The Emergency Spillway Alternative

There is a small effect to fire management. At the Log Flume site, dead and dying material from insect damage will not be removed from the site. Over time stand deterioration will cause an increase in the amount of standing dead, increase fuel loading, and increase the risk of damaging wildfire. This is of concern as this stand is next to Forest Service improvements and SR #20 which increases the risk of ignition.

Alternative B – Proposed Action Full Removal with Down Stream Restoration and Alternative C – The Run of the River

The dam will be altered with sediment structures being placed in the stream for fish habitat. These alternatives remove some of the standing dead material. This will have a positive effect for Fire Management.

3.1.2 Geology / Soils

Affected Environment

Wetland behind the Dam

The steep mountain slopes along the Kettle Crest are underlain by Tertiary granitic rocks and older gneisses and schists of the Kettle Dome. Parts of this high elevation landscape have been influenced by alpine glaciation. Except for some of the highest peaks on the Kettle Crest, the entire watershed is believed to have been covered by the continental ice sheet. Glacial meltwaters deposited deep valley fills of outwash in the bowls below the steep slopes of the Crest. The middle part of the watershed contains valley side slopes that have been glacially scoured and are now mantled with glacial till. Rock outcrops are frequent and virtually all of the valleys are filled with sandy outwash materials.

This sandy outwash material filled the lake behind the dam with sediment shortly after completion of the Sherman Pass Highway (State route #20). There is a high probability that highway-generated sediment, and the constriction and straightening of the channel during highway construction were largely responsible for the deposition behind the dam and the subsequent formation of the current wetlands in the impoundment reservoir.

The sediment, deposited after the dam was constructed, varied in type and size of materials with normal and high runoff events. The coarse material dropped out first in the upper portion of the lake, and most of the expected sediment in the lower and middle sections of the reservoir area would generally be relatively fine-grained material.

In the reservoir area, a subsurface investigation encountered stratified deposits of fluvial materials and with varied soil classifications. The materials in the layers that have accumulated since the dam has been in place appear to be primarily silts and sands, or mixtures of both. These include well-graded sand and poorly graded sand; these soil types generally have very good drainage characteristics. Other soils were sandy silts and silts; these soil types generally have fair to poor drainage characteristics. All of these soil types do not stick together when in a dry state. The accumulated sediment layers should drain relatively freely and quickly if the water table was lowered, so there should not be much concern with slope failures related to draining them.

However, these soils have characteristics that will not provide much resistance to either lateral or vertical erosion unless they are covered with vegetation or otherwise protected. These soils erode easily during rain storms, snowmelt, or stream action.

Dam and surrounding construction Site

"Soil quality standards and guidelines do not apply to intensively developed sites such as mines, developed recreation sites, administrative sites, or rock quarries." (R-6 Supplement 2500-98-1, 2520, p.5) The area around Growden Dam is understood to meet this criterion and these standards will not be applied to proposed activities in that area; however the effects will be disclosed by alternative. The Forest Service maintains a rest stop/interpretive area at Growden with toilets and a couple of picnic tables.

The dam is located at the downstream end (or "pinch point") on a reach of Sherman Creek that has a moderately wide valley bottom, consisting of glacial (fluvial) outwash deposits. There is a relatively flat area above and east and southeast of the dam (where the valley bottom narrows abruptly), which appears to be a glacial outwash terrace or similar feature.

As a result of the apparent natural constriction in the valley at the dam location, it is likely that there was a meadow area with fluvial deposits of varied gradations (from normal and high runoff events) within this stream reach before the dam was constructed.

The materials sampled from within the dam structure do not appear to be native to the immediate area, and were probably imported from somewhere off-site. The materials were examined by viewing them with a 14 power hand lens. The materials are not rock flour, but are most likely a very fine glacial silt/sand mixture. It seems unlikely that there are natural deposits with only the size range of materials found in the dam core materials. However, it is likely that these materials were screened from a deposit of glacial materials (derived from granitic rock types), and that all but the very finest components were screened out prior to it being used as an embankment material. These materials seem to extend from the surface down to a depth of at least 31.5 feet. The depth at which the samples became saturated (from about 24 feet downward) appears to be the same elevation as the pool below the outlet.

Downstream Restoration
In the lower watershed below the junction of Upper Sherman and the South Fork, the jointed metamorphic rocks are thought to have been intensely scoured by glacial outbreak flooding. This created the rocky, lineated landscape. Extremely narrow forested valleys with frequent wetlands in this landscape are tightly confined between rock walls. Because of the prevalence of deep percolation over surface flows, the surface water regime would not be expected to respond dramatically to changes in forest cover, except in some local areas. Because of this, sediment transport is also less efficient than in other parts of the watershed. Natural erosion processes were probably dominated by streambank erosion and lower slope mass wasting due to undercutting. (Sherman Creek Area Aquatic Ecosystem Report, 1996)

Soils Description
The project area soils are all located on glacial outwash. Soils along Sherman Creek in the stream restoration portion of the project area are mapped as Shaskit-Tonata complex. These soils are located on bottom land adjacent to Sherman Creek and are poorly drained with a high water table formed in alluvium. The vegetation is mainly western redcedar, black cottonwood, alder, red-osier dogwood, horsetail, and snowberry. Permeability is slow and available water capacity is high. Roots penetrate to the seasonal water table at a depth of 2 to 4 feet.

Soils along the low terraces adjacent to the creek in the Log Flume area are mapped as Nanamkin gravelly sandy loam. The Nanamkin series consists of somewhat excessively drained, nearly level to strongly sloping soils formed in sandy glacial outwash. The vegetation is mainly lodgepole pine, ponderosa pine, western larch, and Douglas-fir with an understory of snowberry, kinnikinnick, Oregon grape, rose, and willow. Permeability is rapid and available water capacity is very low. Roots penetrate to a depth of 40 – 60 inches. Runoff is slow or medium, and the erosion hazard is slight or moderate.

Compaction and Logging
Several site visits during the summer and fall of 2004 were used to verify and evaluate the existing conditions of soils for this project. Two soil pits were dug in the Nanamkin series between SR #20 and Sherman Creek west of the Log Flume interpretive site. This sample area was chosen because it contains the highest tree mortality of beetle-killed pine available for use in the construction of stream structures during the stream restoration phase of this project. The test pits revealed a sandy loam similar to the mapping description for the Nanamkin series; however, the gravel component described was either absent or very low. This conclusion was subsequently confirmed during penetrometer surveys of the area when little to no rock was encountered.

The timber stand on the north side of the creek has been harvested several times. It was logged after the turn of the 20th century in conjunction with the construction of the narrow gauge railroad and log flume that was located here. The Dollar Mountain fire burned through the stand in 1929 leaving charred stumps and snags as well as charcoal in the upper soil horizons. The most recent harvest entry occurred in the 1990's during the Portal Timber Sale. The stand was harvested during the winter over snow, with a Cut-to-Length machine using skid trails that were located parallel to the highway corridor for visual considerations.

Five random soil transects totaling ~3100' were established in this stand to determine the existing detrimental condition of the soil. The compaction results of this monitoring are shown in the following table.

Table III-1 - Log Flume Soil Compaction Monitoring Results

Transect	Low	Moderate	High	Other	Total
1	39	10	7	1	57
2	22	1	2	1	26
3	55	4	3	0	62
4	24	2	0	1	27
5	14	0	1	0	15
Totals	154	17	13	3	187
% Compaction	82.3%	9.1%	7.0%	1.6%	100%

All the high and moderate compaction readings were located on existing landings, skid trails, old roads, and the old railroad grade. The compaction readings outside of these areas were all in the low category. High readings are expected to significantly reduce permeability and may increase surface runoff and erosion. Highly compacted soils will also probably reduce growth rates of existing vegetation and decrease the germination/survival rates of newly established seedlings. Moderate compaction will reduce permeability and increase runoff, but only during extreme conditions such as large storm events. Areas of moderate compaction are not expected to appreciably reduce vegetative germination, growth, and survival rates. Areas of low compaction are not expected to differ significantly in their effects from natural, undisturbed areas. Only the high compaction readings are assumed to be detrimental in terms of meeting forest plan standards. Rocks and roots encountered by the penetrometer during the survey were placed into the "Other" category if 3 samples at the same point failed to reach the required depth.

No areas of above ground detrimental soil disturbance were noted on any transect. All landings and skid trails have a full vegetative cover of grasses, forbs, and herbs. The slope gradient in this stand is so flat that no surface erosion would be expected even with high levels of compaction and above ground disturbance. The erosion hazard is considered to be very low. No evidence of soil mass wasting was observed during the surveys of this area.

An informal walk-thru survey was also conducted in the timber stands along the south side of Sherman Creek. Numerous random penetrometer readings were taken. Units previously logged along FR #2000.137 (road now closed) have higher levels of compaction and rock than the transect unit on the north side of the creek; however the trees in these stands are not large

enough to qualify for use as stream structures, nor do they contain much beetle mortality. Unharvested timber stands on the south side of the creek contain trees large enough to qualify for stream structure use, but show little evidence of beetle mortality and therefore are unlikely to be harvested for stream structures. They have low levels of soil compaction and no evidence of above ground soil disturbance. Except for the logging units along FR #2000.137, these stands probably have had no management activity since before the Dollar Mountain fire.

Bark beetles will continue to affect timber stands along Sherman Creek. As beetle populations vary, their effects will also vary. Dead and dying crowns in the overstory will provide less shade and may slightly increase soil temperatures.

Environmental Effects

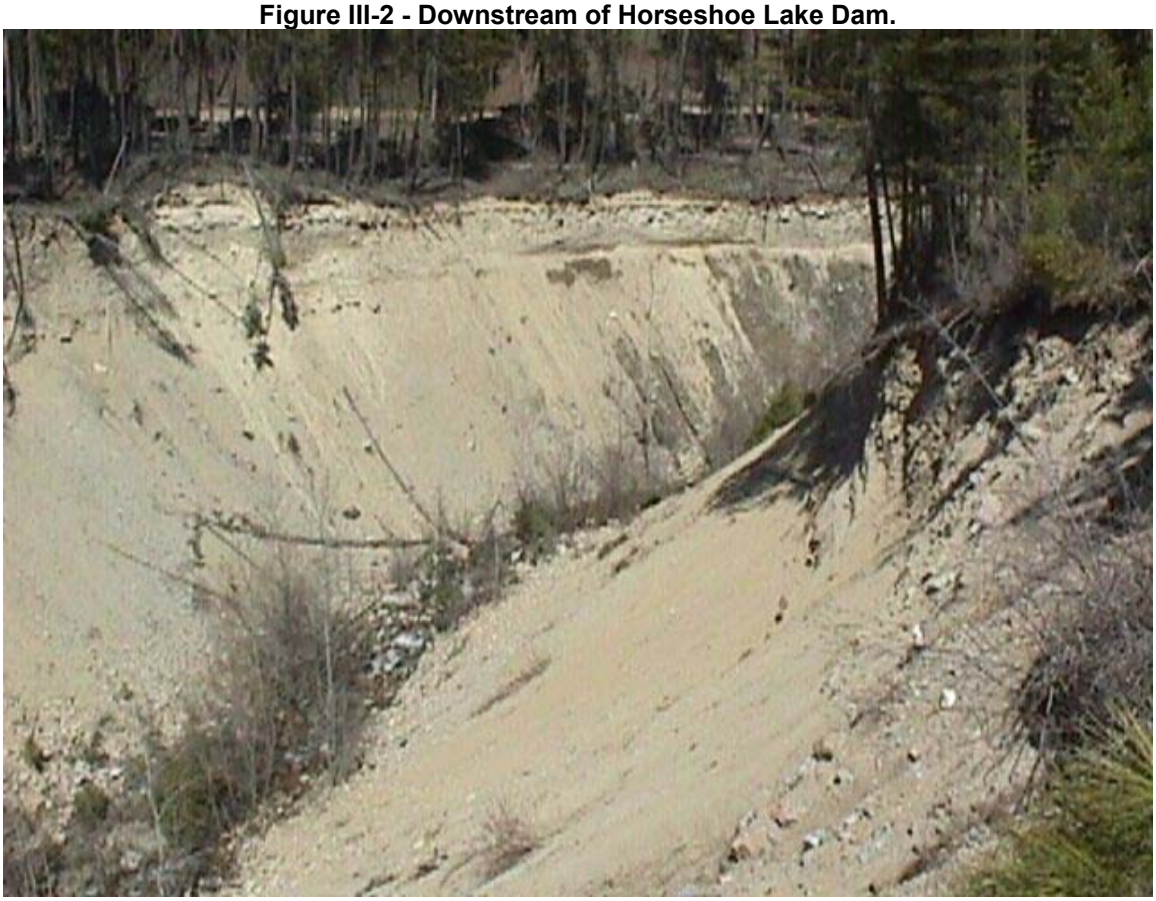
Direct and Indirect Effects

Alternative A

Wetland behind the Dam

These soils have characteristics that will not provide much resistance to either lateral or vertical erosion unless they are covered with vegetation or otherwise protected. If the dam washed out, a new channel would develop through rapid vertical and lateral erosion. This is expected to occur until it re-established the pre-dam stream gradient and approximate channel length through the reservoir area. The picture (figure III-1) shows a downstream reach of Sherwood Creek below Horseshoe Lake after it failed. It failed in a manner similar to what is expected from Growden. The Sherwood Creek event occurred in 1974 in conjunction with a Chinook wind event and rapid snowmelt. Rising lake levels breached the outlet, downcut, and drained the lake causing severe downstream damage. These downstream reaches of Sherwood Creek are recovering slowly. This picture was taken 25 years after the event and the vegetation and stream still has not recovered. The channel cut as much as sixty feet in places, and massive deposition occurred in low gradient valley sections. If Growden dam fails, the results would be similar. The sandy soils as seen in the picture are similar to those in the Sherman Creek Watershed

Figure III-2 - Downstream of Horseshoe Lake Dam.



Dam and surrounding construction Site

The dam site and the surrounding site will remain the same. The dam will remain at risk of failure.

Downstream Restoration
In the absence of a dam failure, Alternative A will not result in any direct or indirect effects to soil resources. Vegetative succession and soil recovery will continue to occur on sites previously disturbed by logging and fire. Surface erosion and dry ravel will continue to contribute sediment to Sherman Creek from exposed streambanks, especially between Canyon Creek and Log Flume. SR #20 will also continue to be a major contributor of sediment to Sherman Creek. Soil recovery from historic logging and other activities will occur very slowly over many years before soils are completely recovered to their pre-disturbance state. No surface erosion or mass wasting is anticipated to occur on terraces adjacent to the steam due to deep permeable soils, gentle slope gradients, and the high percent of effective ground cover on these sites.

Bark beetles will continue to affect timber stands along Sherman Creek. As beetle populations vary, their effects will also vary. Dead and dying crowns in the overstory will provide less shade and may slightly increase soil temperatures. Increased sunlight usually increases the density and composition of understory vegetation which will provide shade to offset some of the losses from insect mortality in the overstory. Any increase in soil temperatures is expected to be undetectable at the project level and with the natural range of variation. Any such increases will also likely be of short duration (5 – 10 years) until understory vegetation responds to increased solar radiation.

Soils will continue to meet forest plan standards for compaction and soil temperature under this alternative.

The downstream of effects of a dam failure would depend upon the timing and magnitude of the event, as well as the subsequent sequence of events as the dam failed. Would it be an almost instantaneous failure over a short period of time, or would it occur slowly over hours or days? The impact of released water and sediment stored behind the dam would depend on this timing and how the dam failed. Near downstream banks and vegetation would be scoured and the channel downcut by the release of upstream material. Fine sediments stored just behind the structure would be the first to be released. As the stream continued to breech the structure, it would also be downcutting into the sediments behind the dam and working its way upstream. This headcutting would continue upstream until the stream had reached its original pre-1937 grade and elevation. Downcutting through the impounded sediments behind the dam may create nearly vertical banks in some areas, while others will slump and erode into the creek due to the high water content of the sediments. After the stream reaches "grade", it will begin to work laterally against the banks causing additional sedimentation. A dam failure is most likely to occur during spring snow melt or rain-on-snow events.

Failure of the dam will result in extensive downstream scouring and bank erosion. Depending on the magnitude of the flows and the timing of the failure, summer homes, bridges, forest roads, and the state highway could be threatened. Riparian vegetation would be uprooted and washed downstream. This will decrease bank stability, and increase surface erosion and bedload movement. The direct impacts will occur closest to the dam and dissipate further downstream.

Many wetlands are located along the floodplain next to Sherman Creek, or on low terraces a few feet above the bankfull stage. In case of dam failure these areas will receive bedload material from higher in the watershed and from behind the dam. These low gradient areas will slow water velocities and cause aggradation of large and medium sized bedload material (cobbles and gravels) on the rising leg of the runoff hydrograph. As stream levels drop on the falling leg of the hydrograph, flows will diminish and begin to return to the pre-event stream channel. As this happens smaller sand and silt-sized particles will also begin to be deposited on floodplains and depositional bars. Wetlands on the north side of SR #20 are protected by the highway and are not likely to be affected. The majority of the project area wetlands are located on the south side of the highway. These areas will likely be covered with a new layer of depositional material.

Most of the sediments affected by a catastrophic failure of the dam will work their way down through the stream system and eventually be deposited in Lake Roosevelt. Depending on the cause of the failure, these sediments may reach Lake Roosevelt in a matter of hours, or may be periodically flushed and stored in the system for a number of years as it makes it way down to the lake in a series of pulses. An event that flushes sediment and bedload material through the system in a short time period will form a large delta at the mouth of Sherman Creek near the fish hatchery where the stream enters the slack water. The hatchery may have to modify their operations to mitigate the effects of such a dam failure.

Alternative B
Implementation of Alternative B will result in direct and indirect effects to soils resources.
Soil resources are expected to continue to meet forest plan standards under this alternative.

Wetland behind the Dam
Surface erosion will occur on soils exposed during the removal of the dam and the associated upstream and downstream restoration. Minor slumping and ravel is expected to occur along the upstream reach above the dam as wetland soils drain.

No large scale or deep-seated mass wasting is expected to occur at these sites as a result of the proposed activities.

Soils in the upstream restoration reaches (above the dam) will also be compacted, displaced and eroded by heavy equipment used during the stream restoration process. Most of these effects will be short-term and can be mitigated. The effects of displacement will recover over a period of a few years as native vegetation becomes reestablished on the site and the upper soil horizons recover. Stockpiled topsoil will be reapplied to disturbed areas in the restoration reach above the dam. Use of this topsoil is expected to retain some of the site productivity that would otherwise be lost, and increase the rate of soil and vegetative recovery over a shorter period of time.

Dam and surrounding construction Site
Soils will be compacted and displaced from heavy equipment used during the implementation of this project. Most of these impacts will occur at the dam. Since this is an administrative site, Forest Plan soil standards will not be applied at this location.

Downstream Restoration
Minor slumping, erosion, and ravel are also expected to occur along streambanks during the placement of the log structures in the restoration reach between Canyon Creek and Log Flume.

No large scale or deep-seated mass wasting is expected to occur at these sites.

Soils will be compacted and displaced from heavy equipment used during the implementation of this project. Most of these impacts will occur at the dam and in the upstream restoration reach. Soils may also be detrimentally impacted by equipment used to harvest, yard, and place logs during the construction of the downstream restoration structures. Some soil displacement will occur in small, localized areas where root wads are extracted. These displacement levels are generally estimated to be <100 ft^2/extraction site (based on the size and tree species). Loss of soil productivity can occur if less than 80% of an activity area is left in an acceptable soil quality condition through compaction, displacement, etc. (Forest Plan, 1988) Most of these effects will be short-term and can be mitigated. The effects of displacement will recover over a period of a few years as native vegetation becomes reestablished on the site and the upper soil horizons recover. Proposed activities at these sites can be mitigated to retain an effective ground cover, prevent erosion, and maintain site productivity. Previous management activities have resulted in a combined detrimental soil disturbance of ~7%. Proposed ground-based activities may increase detrimental impacts by up to 10% for a possible 17% total detrimentally disturbed condition. Mitigation measures will probably reduce these new impacts by half to insure the proposed action continues to meet soil standards.

Increased surface erosion and runoff from logging and road reconstruction is not expected to occur from activities associated with the stream restoration between Canyon Creek and Log Flume under this alternative. The affected area is relatively small and the slope gradients are flat to gently rolling.

Trees harvested for stream restoration structures will already be dead or dying from bark beetle attacks. Since these trees have already lost their needles (or are in the process of losing them) shade levels and soil temperatures are not expected to differ substantially from the No Action Alternative. Bark beetles will continue to affect timber stands along Sherman Creek. As beetle populations vary, their effects will also vary. Dead and dying crowns in the overstory will provide less shade and may slightly increase soil temperatures. Increased sunlight usually increases the density and composition of understory vegetation which will provide shade to offset some of the losses from insect mortality in the overstory. Any increase in soil temperatures is expected to be undetectable at the project level using current sampling techniques and within the natural range of variation. Any such temperature increases will likely be of short duration (5 – 10 years) until understory vegetation responds to increased solar radiation. No appreciable direct changes to plant communities or site productivity are anticipated to occur from implementation of this alternative due to the limited scope and area affected.

Alternative C
The range of effects to soils for this alternative will be similar to Alternative B, although somewhat less in intensity since no upstream restoration will be implemented. Soil resources are expected to continue to meet forest plan standards under this alternative.

Wetland behind the Dam
No stream restoration will occur in the wetlands above the dam; however the water table will be lowered slightly under this proposal. This will result in a small decrease in wetland area behind the dam. Some riparian vegetation will eventually be replaced by drier upland species around the perimeter as soils dry out.

Dam and surrounding construction Site
This alternative will result in an increased amount of soil disturbance at the dam site over Alternative D due to the construction of a fish passage channel on the north side of Sherman Creek and with the adjustment of the downstream channel gradient below the dam.

Downstream Restoration
Stream restoration will occur in the Canyon Creek/Log Flume area to offset the small loss of wetland habitat behind the dam due to the lowering of the spillway elevation. The effects of Alternative C for the downstream restoration are the same as Alternative B.

Alternative D
Soil resources will continue to meet forest plan standards under this alternative.

Wetland behind the Dam
Stream restoration will not occur in the wetlands above the dam. The effects of Alternative D for the wetland are the same as Alternative A.

Dam and surrounding construction Site
This alternative will result in the least soil disturbance of any of the action alternatives. Soil disturbing activities will be limited to the face of the dam where the emergency spillway will be constructed. Soils affected by this alternative have already been compacted and displaced during the construction of the dam. Some surface erosion will occur during and shortly after the spillway is constructed.

Downstream Restoration
Stream restoration will not occur in the downstream reach between Canyon Creek and Log Flume. The effects of Alternative D for the downstream restoration are the same as Alternative A.

Summary of Direct and Indirect Effects
Direct and indirect impacts to soils will include erosion, compaction, and displacement. Many of these impacts at the site of Growden dam will occur on soils that have already been impacted from previous activities. Soil resources are expected to continue to meet forest plan standards under all action alternatives. However, there are differences between the alternatives with respect to the amount of soils that will be detrimentally disturbed.

Table III-3 - Alternative Rating of Detrimental Soil Disturbance

Alternative		Detrimental Soil Disturbance Rating	Upstream Restoration	Downstream Restoration
A		0	No	No
B		3	Yes	Yes
C		2	No	Yes
D		1	No	No

The higher numbers on the numerical rating indicate that more soil disturbance will occur than those rated with a lower number. Alternative A will have the least effects with only concurrent actions affecting soil resources unless the dam breaches. Then it will have the most effects.

Cumulative Effects

Alternative A

Erosion and sediments contributed by the highway as well as private and forest roads will continue under this alternative and all action alternatives. Streambank erosion will continue above natural baseline levels due to the steep, unstable nature of the banks, especially between Canyon Creek and Log Flume. Road and bank sediments will travel downstream outside the project area especially during spring runoff and storm events. These will be temporarily deposited in low gradient stream reaches and behind wood instream structures. Eventually they will move through the system into Lake Roosevelt and be deposited on the bottom of the reservoir.

No cumulative off-site effects from compaction, displacement, puddling, or burning will occur above current levels. Soil resources will continue to meet forest plan standards under this alternative.

Alternatives B and C

The soils at the dam site have already been detrimentally affected by construction of the dam, activities at the CCC camp, and the current continuing use of the area as a recreation/interpretive site. These effects are mainly limited to compaction and displacement. Most of the additional compaction, displacement, and erosion associated with this alternative will occur on top of soils that have already been impacted by previous activities at this site. The detrimental soil conditions described above will be created by this alternative; however, the area in the vicinity of the dam is understood to be exempt from forest plan standards and guidelines for soil resources. (R-6 Supplement 2500-98-1, 2520, p.5) The area around the dam will remain in a detrimentally disturbed condition for a very long period of time before full soil recovery and site productivity occur.

Soils in the upstream and downstream restoration reaches will also be compacted, displaced and eroded by heavy equipment used during the stream restoration process. Most of these effects will be short-term and can be mitigated. The effects of displacement will recover over a period of a few years as native vegetation becomes reestablished on the site and the upper soil horizons recover. In Alternative B, stockpiled topsoil will be reapplied to disturbed areas in the restoration reach above the dam. Use of this topsoil is expected to retain some of the site productivity that would otherwise be lost, and increase the rate of soil and vegetative recovery over a shorter period of time.

Surface erosion will occur on disturbed soils at the dam as well as the restoration reaches. Eroded sediments will travel downstream outside the project area especially during spring runoff and storm events. These will be temporarily deposited in low gradient stream reaches and behind wood instream structures. Eventually they will move through the system into Lake Roosevelt and be deposited on the bottom of the reservoir. These project related sediments will be in addition to those currently delivered by roads, trails, overland flow, and streambank erosion.

The effects of compaction will take much longer to recover (many years) and may be cumulative in those areas where trees are harvested for construction of stream structures. Compaction may be cumulative and exceed forest/regional standards if the next entry by heavy equipment occurs before soils have recovered from the effects of this entry. The proposed harvest entries, when added to current compaction levels, are unlikely to exceed soil guidelines if standard contract mitigation measures are applied. This conclusion is based on soil surveys conducted at sites identified for harvest for this alternative, and on soils monitoring conducted at numerous other harvest units around the forest that used similar ground-based yarding equipment.

Soil resources are expected to continue to meet forest plan standards under these alternatives.

Alternative D

The cumulative effects of this alternative will be confined to the area around the dam since no upstream or downstream restoration will occur. The soils at the dam site have already been detrimentally affected by construction of the dam, activities at the CCC camp, and the current continuing use of the area as a recreation/interpretive site. These effects are mainly limited to compaction and displacement. Most of the additional compaction, displacement, and erosion associated with this alternative will occur on top of soils that have already been impacted by previous activities at this site. The detrimental soil conditions described above will be created by this alternative; however, the area in the vicinity of the dam is understood to be exempt from forest plan standards and guidelines for soil resources. (R-6 Supplement 2500-98-1, 2520, p.5) The area around the dam will remain in a detrimentally disturbed condition for a very long period of time before full soil recovery and site productivity occur.

Summary of Cumulative Effects

Implementation of all action alternatives will result in varying degrees of compaction, displacement, and erosion. The area of detrimental soil disturbance in this project is not large enough to create cumulative impacts to soil and water resources at the watershed scale. Impacts to soils (especially compaction) will be cumulative over time. This may increase the possibility that the area where trees have been harvested for stream structures may exceed forest plan soil standards at the time of the next harvest entry. Many of these effects can be mitigated. No off-site changes to plant communities due to increased soil temperatures or long-term site productivity from bio-mass removal are anticipated to occur from implementation of this alternative.

Soil resources are expected to continue to meet forest plan standards under all alternatives.

Conclusions

Soil impacts from this project will be direct, indirect, and cumulative. These impacts will include compaction, displacement, and erosion. While each action alternative will result in varying degrees of soil effects, soil resources are expected to continue to meet forest plan standards under all alternatives. Based on previous monitoring, some of these effects are anticipated to be short term and will be mitigated through the application of standard Best Management Practices (BMP's) that have proven effective on similar projects.

3.1.3 Hydrology

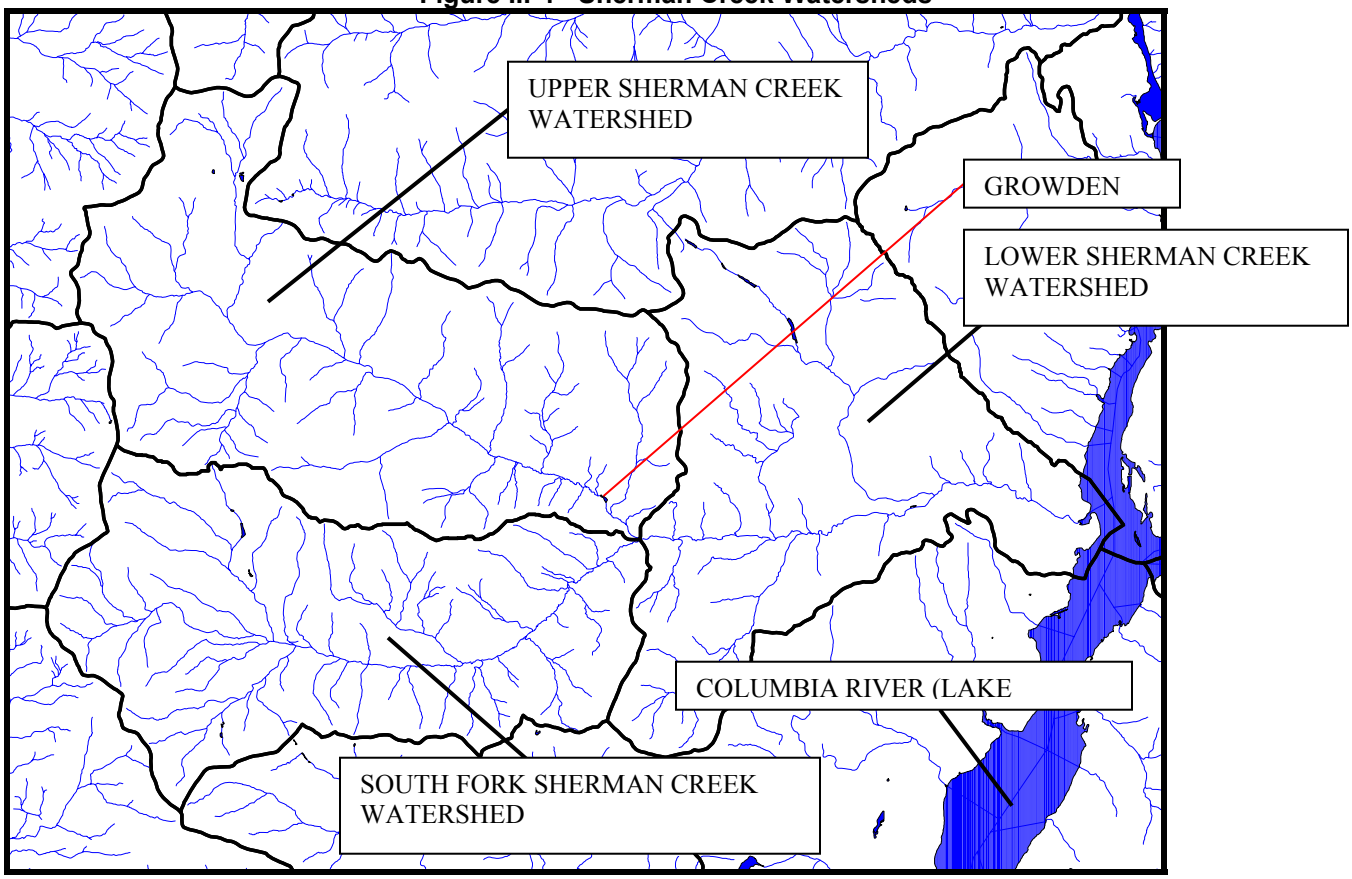
Affected Environment

Sherman Creek is a mostly forested watershed located in northeastern Ferry County, Washington. Sherman Creek enters the Columbia River west of the town of Kettle Falls, Washington. This portion of the Columbia River is located in the backwaters behind Grand Coulee Dam known as Lake Roosevelt. Sherman Creek is a fifth-order[5], east flowing, Class II stream and is identified by hydrologic unit code [HUC] #1702000103.

Elevations in the watershed range from 1310 feet, where Sherman Creek joins the Columbia River, to over 7000' feet on the Kettle Crest. Washington State Highway #20 provides the main access route into the analysis area. The Sherman Creek watershed occupies an area of 70,760 acres (110.6 mi2) and is composed of three subwatersheds: Upper Sherman (26,530 acres), South Sherman (21,944 acres), and Lower Sherman (22286 acres). See Figure 2.

[5] Stream order is a measure of the position of a stream in the hierarchy of tributaries. First-order streams are those that have no tributaries. Second-order steams are those that have as tributaries only first-order channels. However, each second-order stream is considered to extend headward to the tip of the longest tributary is drains. A third-order stream receives as tributaries only first- and second-order channels, and is considered to extend headward to the end of the longest tributary, etc. (Leopold et. al., 1964)

Figure III-4 - Sherman Creek Watersheds



Existing Condition

Water Temperature

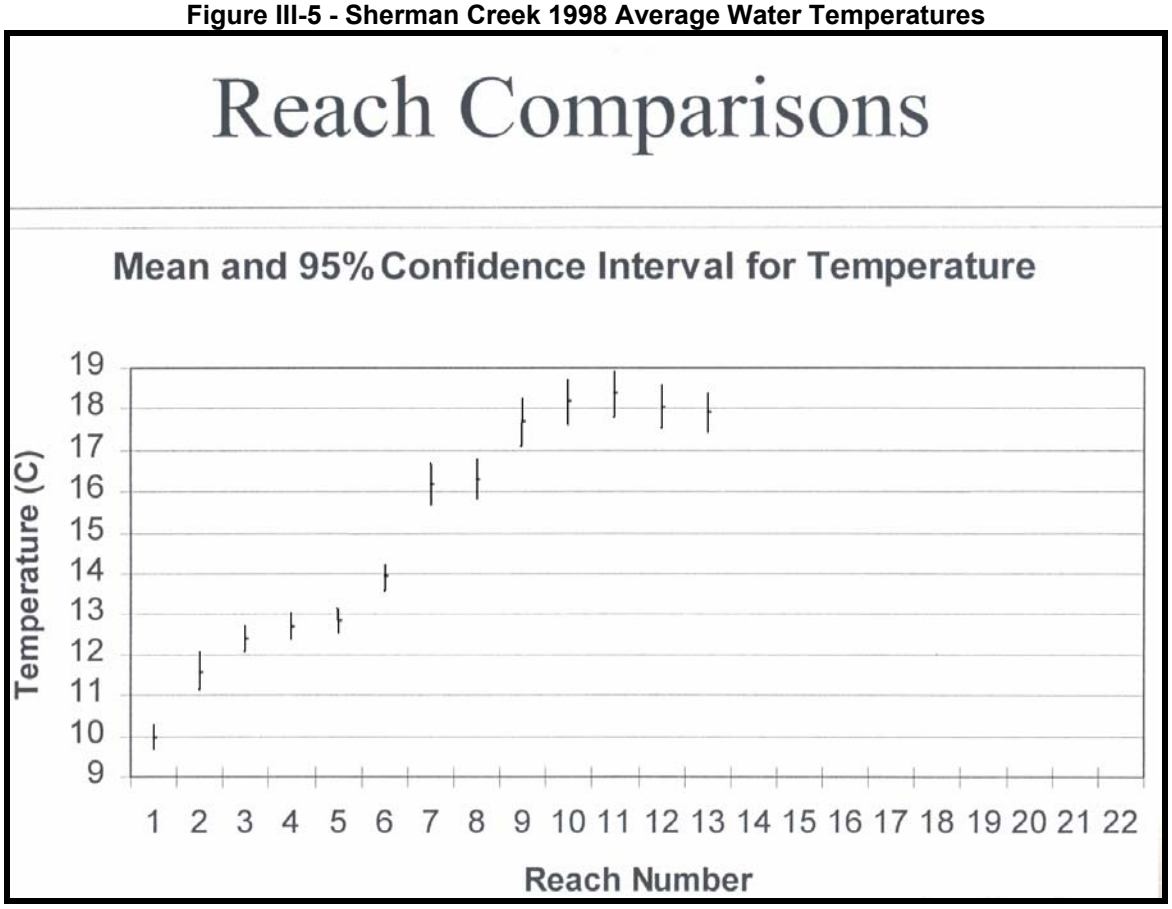
A number of factors are influencing the water temperatures of Sherman Creek. These are:

- Elevation
- Origin of the Water
- Solar Radiation
- Ambient Air Temperature
- Channel Morphology
- Stream Discharge

Shading effects of the forest canopy become significant during the summer months when solar radiation levels are increased due to higher sun angles, longer days, and clear skies. Stream discharges are also lowest during this same time period.

The mainstem of Sherman Creek is currently on the Washington State 1998 303(d) list of impaired surface waters for temperature. These elevated water temperatures may be the result of residual effects from the riparian logging and flume operation during the early 20th century, the Dollar Mountain Fire in 1929, and the construction of SR #20 in the 1950's. Thermograph comparisons between Log Flume Interpretive Site and the fish hatchery in 1992 and 1993 indicate that there was virtually no temperature recovery between these to sites in spite of the deep, topographically shaded canyon immediately upstream from the hatchery.

Figure III-5 - Sherman Creek 1998 Average Water Temperatures



(Source Ferry County Conservation District, 1998)

Ferry County Conservation District placed a series of thermographs in Sherman Creek between 1998 and 1999. The data derived from this project indicated that elevated stream temperatures continue to be a problem in Sherman Creek. The lower reaches[6] (8-13) of the mainstem below Growden Dam as well as the lower South Fork are contributing most of the elevated readings. Lower elevation tributaries such as Canyon Creek and Trout Creek are also elevated above 16 ^{o} C during the latter part of the summer months. Reach 7 on the chart above refers to the reach through the wetland just above the dam. Average water temperatures between Reach 6 (the next reach upstream from the dam) and Reach 7 at the dam increase over 2^{o} Celsius (3.6^{o} F). These temperatures remain elevated through the remaining downstream Reaches 8 through 13 (at the fish hatchery). The thermograph in Reach 7 also showed larger diurnal temperature fluctuations than reaches higher in the watershed. Water temperatures contributed by the South Fork (Reach 9) below the dam are similar to those experienced in the mainstem through the Growden Reach. The lower portions of the South Fork have very little shade. This has produced elevated water temperatures in the South Fork.

The work by Ferry County also included measurement of ambient air temperature and canopy cover. They found the strongest correlation between high water temperatures and canopy cover. Their model predicted that "when canopy cover drops below 64% for a section of stream, water temperature [will] exceed 16 degrees Celsius (60.8 degrees Fahrenheit)". Stream Reach 10 between Log Flume and Canyon Creek has the lowest canopy cover of only 5.11% whereas most of the stream reaches above Growden Dam have canopy covers of 50% or higher. The canopy cover along Reach 23 of the South Fork is next lowest at 15.76%.

[6] The stream reach numbers used by the Ferry County Conservation District project do not correspond to the reach numbers used by the Forest Service during the Harkin-Reeves stream surveys. The Conservation District started numbering at the top of the watershed, while the Forest Service started numbering at the mouth of Sherman Creek near the hatchery.

Sediment
Sherman Creek is not currently on the 303(d) list for turbidity; however, fine sediment deposition at the fish hatchery is reported to be an annual problem during peak runoff in the Spring (Mitch Combs, 1995). This time period is the rising limb of the snowmelt hydrograph for Lower Sherman. Channel sediments deposited during low flows become mobilized during this time and are flushed downstream. Some of these sediments are derived from streambank erosion, while others are contributed from traction sand applied by DOT during the winter driving season. Coarse sediment from upper main Sherman is currently cutoff from the lower stream reaches[7] by Growden Dam. (Sherman Creek Area Aquatic Ecosystem Report, 1996)

Stream Flow Regime

The hydrology of the Northern Glaciated Mountains Ecological Reporting Unit (ERU), in which Sherman Creek is located, is best characterized as snow-pack dominated. More than half the annual runoff is estimated to be snowmelt influenced, about a third by snow and rain, and about 10% by groundwater. Peak discharge generally occurs from April through June. Periodic rain-on-snow events, however, can cause elevated streamflow during winter months. Generally, base flow in the summer is maintained by groundwater and is relatively unaffected by precipitation, although precipitation in the form of infrequent showers or occasional storms may cause minor streamflow increases. Mid-winter rain-on-snow events are rare, but can cause runoff damage from peak flows. Late spring, rain-on-snow events and/or Chinook wind events are more common, but they are usually confined to the higher elevations and resulting peak flows are localized and usually not excessive. (ICBEMP, 1997)

There is no evidence that the streamflow regime has been significantly altered by modifications in vegetative cover through either natural events or management. High flows on upper main Sherman Creek are able to move much of the streambed materials. Boulders can be heard rolling down the channel during string runoff. This is thought to be due to lack of in-channel debris and to channel straightening rather than to altered peak flows. (Sherman Creek Area Aquatic Ecosystem Report, 1996)

Runoff from the lower elevations begins around April, whereas the higher elevations retain snowpack until late May or early June. Evidently the sediment causing the hatchery problems is derived primarily from Lower Sherman Creek based on personal communications with Mitch Combs the hatchery manager. These problems include fine sedimentation and turbidity and usually occur in April and early May. (Sherman Creek Area Aquatic Ecosystem Report, 1996)

The latest year of higher than average flows on Sherman Creek occurred in May of 1998. During that event the trashrack at the drop inlet of Growden Dam became plugged with debris and the rising waters in the impoundment almost overtopped the dam before Forest Service employees were able to clear the debris and restore flows. This event moved large amounts of bedload material through the system and caused increased bank erosion throughout the downstream reaches of the mainstem and on the South Fork. The highway and several Forest Service roads were closed until road crews could implement repairs. Several bridges on Sherman Creek were also damaged or destroyed and had to be replaced.

Channel Morphology
The hyporheic zone is the area both beneath and adjacent to streams and rivers where surface and ground water mix. Hyporheic flow occurs when river water moves into the spaces between rock and gravel particles below and along the edge of the river. The size of this zone varies depending on the geology and morphology of the channel. The amount of time that water remains in this zone also varies depending on the length of the flow path and the hydraulic conductivity. Hyporheic zones serve as transition areas between surface water and groundwater systems and provide increased temporary storage space and residence time for water. As a result, nutrients and other materials remain in the system longer before they move downstream. There was no attempt to measure or model the effects to the hyporheic zone during the analysis for this project.

Upper Main Sherman
From the confluence of South Fork Sherman Creek to Growden Dam, Upper Main Sherman is relatively stable. This can be attributed to its Rosgen B3 channel type. “B3 stream types are moderately entrenched systems with channel gradients of 2-4%. The channel bed morphology is dominated by cobble materials and characterized by a series of rapids with irregular spaced scour pools. Channel materials are composed primarily of cobble with a few boulders, lesser amounts of gravel and sand. The large cobble materials often have originated from lag deposits that are the result of both alpine and continental

[7] A **reach** is a length of stream with similar hydrologic, geomorphic and ecological conditions throughout its extent.

glaciation. The bed and bank materials of the B3 stream types are stable and contribute only small quantities of sediment during runoff events. Large woody debris is an important component for fisheries habitat when available." (Applied River Morphology, 1996)

Stream structural diversity and the energy dissipating capacity of the stream have been diminished by the effects of stream cleaning, wildfire, and the construction of SR #20. These impacts are most obvious in the stream reaches nearest the highway. It is common to see a high cobble bar building downstream of these highway-adjacent reaches where high velocity flows encounter the resistance of a bend. This is an indication of an abrupt change in the transport capacity of these reaches. A portion of the winter traction sand applied to SR #20 reaches the creek and becomes entrained in the bedload and moves through the system during higher flows. (Sherman Creek Area Aquatic Ecosystem Report, 1996)

On reaches furthest from the influence of the highway, the natural dynamics of the channel can still be observed. Large stable debris jams are trapping large volumes of sand, gravel and cobble. This creates overflow and flooding of adjacent terrace surfaces. These in-channel structures eventually break or are outflanked. (Sherman Creek Area Aquatic Ecosystem Report, 1996)

Lower Main Sherman

The lower mainstem of Sherman Creek varies between a Rosgen B3 to a C3/4 channel type from the South Fork junction downstream to the forest boundary. The B3 channel type is described in the paragraph above. "The dominant bed material in C3/4 channel types is often originates as a lag deposit from both Pleistocene and Holocene deposition and from extreme, rare floods. C3/4 channels have gentle gradients (< 2%), display high width/depth ratios, and are slightly more sinuous and have a higher meander width ratio than C1 and C2 stream types. C3 streambanks are generally composed of unconsolidated, heterogeneous, non-cohesive, alluvial materials that are finer than the gravel/cobble-dominated bed material. Consequently, the channel is susceptible to accelerated bank erosion. Rates of lateral adjustment are influenced by the presence and condition of riparian vegetation. C3 sediment supply is low, unless streambanks are in a high erodibility condition. C4 sediment supply is moderate to high, unless stream banks are in a very low erodibility condition. A C4 channel type is characterized by the presence of point bars and other depositional features and is very susceptible to shifts in both lateral and vertical stability caused by direct channel disturbance and changes in the flow and sediment regimes of the contributing watershed." (Applied River Morphology, 1996)

Figure III-6 - Lower Main Sherman Creek below Canyon Creek

The picture above shows the highly erodible banks along a C3 channel section of lower main Sherman. This stream type has a high sensitivity to disturbances from increased flows or sediment supply. Vegetation is a controlling influence because it determines both the width/depth ratio and channel stability.

Human influences are having dominant effects on the channel morphology of this area. Riparian logging and highway construction/maintenance are the primary factors influencing these lower reaches. Reaches further away from the influence of the highway are in a more natural condition. Most of the stream; however lacks the large woody debris and boulders that are important as structural and stabilizing elements. Beaver have returned to Sherman Creek and are creating pockets of diverse habitat. Debris jams are also starting to accumulate and create a few deep pools which provide refuge for fish during low flows as water temperatures increase. These reaches are on a slow upward trend to recovery; however bankfull width/depth ratios are high (21-22) and LWD is low (0-2). (Sherman Creek Area Aquatic Ecosystem Report, 1996)

Growden Dam

In addition to the other factors already mentioned, the construction of the dam has influenced the channel morphology of the downstream reaches on Sherman Creek. "Perhaps the best example of the effect of hydrologic changes on channel behavior is provided by the evidence of degradation below dams…hydrologically speaking dams tend to even out the duration curve, lowering the peak stages and increasing the base flow. In addition clear water is released below dams in place of the sediment-laden flow that existed prior to construction. The combination of clear water and changing flow regimen leads to erosion of the channel and lowering or degradation of the bed of the channel below the dam." (Leopold, et al, 1964) This would have been the situation at Growden during the 17 years between 1937 (when Growden Dam was constructed) and 1954 (when SR #20 was built). The impoundment behind the dam served as a depositional zone for sediment and bedload material, and prevented the larger material from moving through the lower reaches of the watershed during this time. Between 1937 and 1954 there were 9 years of significantly higher than average annual runoff events on the Colville River. In fact, every year between 1948 and 1953 experienced higher than average annual flows. The Colville River watershed is located directly across Lake Roosevelt (east) of the Sherman Creek watershed and has been gauged from 1923 to the present. Sherman Creek discharges are assumed to have been above average during the same time period due to the close proximity of the two watersheds. These peak flows on the Colville River occurred during the months of March, April, and May, indicating that they were associated with spring snowmelt. It was during this time that the area was beginning to recover from the drought of the great depression and experience higher than average precipitation.

Construction of SR #20 in the early 1950's resulted in the delivery of large amounts of highly erodible cut and fillslope material to Sherman Creek. These exceeded the storage capacity behind Growden Dam in a short period of time. Since the 1950's, and because of the sediments currently in storage behind the dam and the aggraded stream level, the dam has become essentially a run-of-the-river structure during normal and peak flows (up to about a 100-year flood). While stream flow regimes in the lower reaches have remained very similar to pre-dam flows (due to the small storage capacity behind the dam), the channel and sediment conditions are obviously quite different now than before the dam was built. Currently the dam continues to affect sediment and large woody debris transport through the system for all but the smallest particle sizes by creating a depositional zone in the low gradient reach behind the dam.

Figure III-7 - Growden Dam Sediment Impoundment

Figure III-5 (above) shows the upper end of the drop inlet (left, foreground) and the channel with the created alder wetland in the depositional zone behind the dam. State Route #20 is in the background at the bottom of the conifer tree-line. A beaver dam is visible in the channel in right, center of the picture.

Figure III-8 - Base of Growden Dam

Figure III-8 was taken below Growden Dam looking upstream at the outlet in the base of the dam.

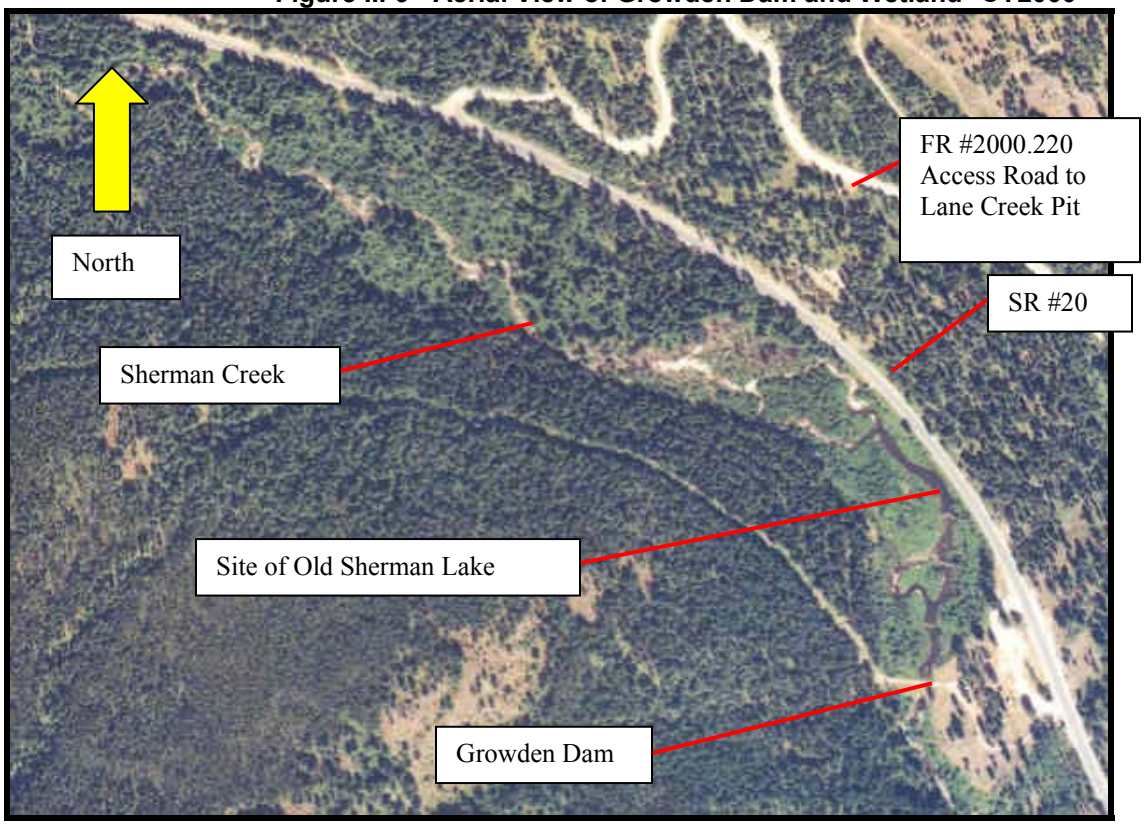
Wetlands

There are approximately 127 acres of wetlands associated with this project. They extend from the backwater, depositional wetland behind Growden Dam (24 acres) to just below the Inchelium Bridge on Ferry County Highway #3. Below this bridge, Sherman Creek enters a deep canyon that extends to the mouth on Lake Roosevelt. There are no wetlands associated with the creek in this canyon reach. There are four types of wetlands in the project. All are classified in the National Wetlands Inventory as "Palustrine". Palustrine wetlands are dominated by trees, shrubs, and persistent emergents (i.e. cattails and other species that normally remain standing until the beginning of the next growing season). Over 80% of the project wetlands are seasonally flooded with a scrub-shrub overstory of hardwood vegetation. The largest continuous wetland (53 acres) in the project is in this category and extends along Sherman Creek from below Log Flume to above Canyon Creek. Most of the other wetlands are temporarily or seasonally flooded, forested, wetlands (15%). Only about 1% of the wetlands are seasonally flooded and dominated entirely by emergent vegetation. Some of the wetlands, such as the one created behind Growden Dam and the oxbows on the north side of SR #20 have been created by management activities. Other wetlands are natural and have been created or enhanced by beavers.

The created wetland behind the dam is contributing to the elevated stream temperatures that are occurring in the Lower Sherman reaches. The vegetation in these wetlands is not tall enough to provide the riparian shade needed to reduce direct solar radiation and stream heating. The shallow depths, low gradient flows, and dark organic sediments characterize these wetland channels and contribute to the temperature problems.

Most of the wetlands in the project are in the Mountain Alder Series (Alnus incana). "Mountain alder occupies a wide variety of sites in eastern Washington, including wetlands, as well as traditional well-drained streambanks and terraces. It is uncommon in upland habitats. The dense networks of alder roots are very effective in stabilizing streambanks to withstand severe flooding. The importance of mountain alder communities for streambank protection, cover, and thermal protection cannot be emphasized enough. The dense multiple stems of mountain alder and other shrubs aid in filtering out sediments during high flows thereby contributing to overall streambank building, channel maintenance, and stream stabilization. Streams lined with [alder] stands develop relatively deep and narrow channels that provide cover, spawning sites, food, and cool temperatures critical to trout and other salmonids. The mountain alder also provides a critical substrate for insects with subsequent impacts as fish and aquatic insect food. The nutrients derived from fallen decomposing alder leaves are important to the stream ecosystem." (Kovalchik, 2001)

Figure III-9 - Aerial View of Growden Dam and Wetland--CY2000



Environmental Effects

Alternative A

Alternative A, the no action alternative, will maintain the existing condition at the dam site and throughout the downstream reaches. Water quality standards will continue to be exceeded for temperature. Larger sediments and woody debris will continue to be intercepted in the low gradient reach behind the dam. The created wetland behind the dam will continue to function in its existing state. Streamflows during large storm events or spring runoff may bring in debris and block the drop inlet. This would result in failure of the dam. Such a failure would release most of the impounded sediments that accumulated behind the structure since its construction. This may occur slowly or catastrophically depending on the timing and magnitude of the flow event.

Cumulative Effects

Stream temperatures will continue to exceed state standards downstream from the Growden site to Lake Roosevelt. Sediment transport will continue to be interrupted by the dam between the upper and lower reaches of Sherman Creek. Downstream aquatic habitat and channel conditions will continue to be degraded due to a lack of large woody in-channel structure to dissipate flows. Sediment will continue to cause operational problems during spring flows at the state fish hatchery. In case of a catastrophic dam failure, downstream private property, aquatic habitat, existing infrastructure, and the state fish hatchery will be flooded with adverse impacts.

Alternative D (the emergency spillway)

Alternative D will have the same effects as alternative A with the exception of the construction of an emergency spillway on the dam. During construction of the spillway, stream turbidities may exceed state standards for short periods of time during the implementation phase. Any exceedances are expected to recover quickly both in time and downstream distance. The main change is the cumulative effect of providing an emergency spillway. The probability of dam failure is reduced. Effects related to dam failure listed in alternative A would not occur.

Alternative B
The Proposed Action Alternative will reconstruct the channel behind the dam to a more natural configuration and restore natural levels of sediment transport. Water temperatures through the dam reach will begin to recover (decrease), however it will take many years of riparian vegetative recovery before it meets state water quality criteria. Water temperatures may never meet water quality standards until issues in the South Fork are adequately addressed. Restoration in the South Fork is slated to begin in 2008. There will be an estimated direct loss of 5-6 acres of wetland function behind the dam. Some of this wetland function (1-2 acres best scenario) is expected to be offset by the stream restoration project below the dam. Stream turbidities will probably exceed state standards for short periods of time during the implementation phase, even with mitigation measures in-place. These exceedances are expected to recover quickly both in time and downstream distance. No direct changes to flow regimes are anticipated under this alternative.

This alternative that eliminates the sediment reservoir above the dam and reestablish the natural channel through this stream reach will allow the river to meander and create new gravel bars and side channels. This should increase hyporheic flows and has the potential to moderate stream temperatures through subsurface-surface water exchange. This alternative that results in downstream restoration of the lower reaches of Sherman Creek will allow the stream to flow more freely over adjacent areas that historically were subject to periodic flooding. As the stream regains some of its floodplain width and complexity, this natural function will also have a moderating effect on water temperature by increasing hyporheic flows. The current location of SR#20 will be unaffected by this project, but it will continue to cumulatively impact the hyporheic zone because it has straightened the channel and hardened the banks. This will continue to increase the energy of the stream during floods and create accelerated erosion at other downstream locations. This has simplified the stream and diminished the complexity and abundance of aquatic habitats and has reduced the ability of the stream to interact with the groundwater (hyporheic flow).

Wetlands
There would be a reduction in wetland acres behind the dam. The proposed action would change the Growden reach from slow water stream with many slack water areas to a faster pool riffle stream. Executive Order No. 11990, Protection of Wetlands required the Forest Service to meet the President's goal of no net loss of wetland functions and values. The Colville National Forest added approximately 1.1 miles of stream restoration to the proposed action to mitigate the loss of the wetlands. We also added a small pond system in the reach behind the dam. The State Department of Ecology was consulted on this issue. They reviewed the proposal and gave the following statement:

"We have discussed this issue at our Wetlands Technical Advisory Group meetings, specifically the planned removal of the dam on the White Salmon River. Our collective wisdom is that as dams are such an unnatural perturbation to the watershed, that their removal is usually a good thing. We can accept the loss of the artificially maintained wetlands if the tradeoff results in restoration of landscape processes, e.g. sediment transport, temperature stabilization, fish migration, etc. As part of the mitigation, riparian restoration is central to the above elements, and also to simply stabilizing the reborn river banks. Because this is "Out-of-Kind" mitigation (trading off Palustrine wetland for riverine riparian, or actually natural process restoration), we do not have a crediting formula to crunch a number that is felt acceptable in making that trade off. My personal feeling, after seeing the dam and driving the length of Sherman Creek numerous times, is that restoring 1.1 miles of riparian and the processes mentioned is an acceptable trade for the loss of 8 acres of dam-induced wetland." (Chris Merker, Wetland Biologist)

The Corp of Engineers gave the following statement:
"A quick question to our mitigation specialist elicited the following.
As soon as you fill the wetland, you must get a permit and mitigate. The Corps can choose to accept out of kind and off site mitigation, it just must be with justification. Also, keep in mind that riffle/pool complexes are considered special aquatic sites, and fit in with wetlands. So creating riffle/pool complexes is the same as creating wetlands. So move ahead.

Anne Robinson
U.S. Army Corps of Engineers"

Thus, our analysis concluded that with the additional riparian treatments, we have met the intent of the Executive Order No. 11990, Protection of Wetlands.

Cumulative Effects

Water temperatures will begin to recover; however it will probably take many years before the stream reach below the dam meets state water temperature standards. Water temperatures below the confluence with the South Fork will probably continue to exceed state standards all the way to the mouth of Sherman Creek due to elevated temperatures contributed by the South Fork. Removal of the dam will restore sediment mobility between the upper and lower reaches of Sherman Creek, but the sediment regime will continue to be influenced by factors outside the scope of this project (i.e. Highway 20) and will remain above natural background levels. No downstream cumulative changes to flow regimes are anticipated under this alternative. The net wetland loss resulting from this alternative is anticipated to be 3-4% of the wetland total for the project area, and about 1% of the entire Sherman Creek watershed. This loss is not anticipated to be large enough to affect flows or wetland function at the watershed level.

Alternative C (run-of-the-river)
The difference between alternative C and B is the amount of dam removed and restoration above the dam. The effects related to the downstream restoration listed in alternative B are the same for this alternative.

Because the dam will remain intact, this alternative will have the same effect as alternative D for the water temperature, sediment transport, woody debris transport, flow regimes, and turbidity. There will be an estimated direct loss of 1-2 acres of wetland function behind the dam due to a reduction in the upstream water table resulting from the installation of the weir and fish channel. This wetland loss is expected to be offset by the stream restoration project below the dam as discussed above.

Cumulative Effects
Water temperatures on the lower reaches of Sherman Creek will continue to exceed state temperature standards due to the influences of the low gradient stream reach behind the dam and input from the South Fork of Sherman Creek. There may be a slight increase in the particle size of sediment transported to the lower reaches due to the slightly lower dam height and subsequent change in stream gradient; however most bedload and large woody debris will continue to be intercepted at the top of the reach above the dam. Sediments will be eroded from soils exposed during excavation. No downstream cumulative changes to flow regimes are anticipated to occur as a result of this alternative. Downstream wetlands will remain in their existing condition under normal flow regimes.

Conclusions

For alternatives A, C, and D, sediment transport between the upper and lower watershed will continue to be disrupted. The lower stream reaches will continue to be deficit in large woody debris. Bank erosion will continue at current levels and aquatic habitat will continue to be impaired due to lack of habitat diversity.

The proposed action (Alternative B) best addresses the issues of degraded water quality. Water temperatures will decrease; however the stream will probably not meet state water quality standards due to the elevated water temperatures coming from the South Fork of Sherman Creek. Natural levels of sediment transport will be reestablished through the system. Introduction of large woody debris and other downstream improvements will begin to restore natural stream function and improve aquatic habitat.

3.2 Socio-economic

3.2.1 Economics and Engineering

Alternative A – "No Action"

Alternative A does not meet the standards and guidelines in the Forest Plan or Forest Service Manual direction since the existing spillway system on the Growden Dam is not capable of handling the probable maximum flood. This is the design standard for spillways contained in the Forest Service Manual 7500 on Water Storage and Transmission. The standards and guidelines in the Forest Plan say that facilities should be planned, developed, maintained and operated for safe use. Alternative A does nothing to change the substandard spillway configuration to one that meets the current safety standard of being able to pass the probable maximum flood without the dam being over topped.

Original contour maps of the site show the dam having a maximum storage capacity of approximately 59 acre-feet at a water surface elevation equivalent to the elevation at the top of the dam. This dam is inventoried as being a high hazard dam with an administrative classification of C (Class C dams are 25 to 40 feet high from the stream channel bottom at the toe of the

dam, to the top of the dam, impounding 50 to 1000 acre-feet of water). Current survey information shows a maximum storage capacity of 16 acre feet and a surveyed dam height of 22 feet. The administrative classification should be changed to a class D dam (less than 25 feet high, and impounding less than 50 acre feet of water). The current Forest Service Manual 7500 (Section 7524.31) shows a minimum spillway size for a high hazard dam being able to accommodate an Inflow Design Flood (IDF) equivalent to the Probable Maximum Flood (PMF), for high hazard dams. Using the State of Washington Department of Ecology, Dam Safety Sections guidelines, the design goals (which would be equivalent to the PMF) for the structural elements of this dam (such as an emergency spillway) could be to withstand between a 3,000 year flood (815 cfs) and a 10,000 year flood. The exact design goals depend on a rating process that weighs the consequences of a failure of the dam to down stream potential property damage and loss of life.

In the recent 1998 flood event, the current drop inlet was not able to handle the runoff from this 100 year storm with associated debris, without emergency maintenance. However once this debris was removed from the drop inlet, the structure was capable of handling this flood flow. The calculated capacity of the existing drop inlet is 817 cfs. This is approximately equivalent to a 3,000 year flood (based on flood prediction calculations from the Magnitude and Frequency of Floods in the United States).

This alternative would leave the Growden Dam in place, as is, continuing the yearly operation and maintenance inspections and work. In addition, safety inspections for structural deficiencies and changes in hazard classification are done every 5 years. The dam would continue to operate without an emergency spillway capable of handling the inflow design flood.

Alternative B – Proposed Action

This alternative would partially remove the Growden Dam and would reconstruct a stable stream system from the upper end of the existing floodplain impounded above the existing dam, down through the current dam location. The proposed reconstructed stream system would be restored to an elevation above the original floodplain prior to the construction of the Growden Dam. Segments of the existing dam on the North and South side of Sherman Creek would be conserved in an undisturbed state as culturally significant features to be interpreted as part of the adjacent Growden Dam Recreation Site.

The area to be impacted would extend from approximately 300 feet below the downstream toe of the dam, upstream to a point approximately 1100 feet upstream from the top of the dam. The width of disturbed area for this alternative would generally be the width of the existing Sherman Creek flood plain plus 50’ to each side.

Rock sources needed for implementing this alternative would be the Bridge Creek Pit, in the South Fork Sherman Creek Drainage, the Lane Creek Riprap pit, in the Sherman Creek drainage, and the Lane Creek Pit, in the Lane Creek Drainage. The Bridge Creek Pit is a glacial till and hard rock pit located in Section 1, T35N, R35E along Forest Roads 2020120 and 2020135. The Bridge Creek Pit would supply finer streambed cobbles and gravels for reconstructing the proposed stream channel in Sherman Creek, once the Growden Dam is removed. The Bridge Creek Pit could also supply the large riprap material needed to hold finer cobbles and gravels in the proposed Sherman Creek stream channel reconstruction. The Lane Creek Riprap Pit is a solid granite quarry located adjacent to Forest Road 2000222, in Section 29, T36N, R36E. Material from the Lane Riprap Pit would be the source for the large riprap material needed to hold finer cobbles and gravels in the proposed Sherman Creek stream channel, once Growden Dam is removed. The Lane Creek Pit is a glacial till pit located in Section 28, T36N, R36E, adjacent to Forest Road 2000244. This pit would also be used as a source for cobbles and gravels for reconstructing the proposed Sherman Creek channel, once the Growden Dam is removed, and as a waste area for excess material removed from the dam, and the flood plain behind the dam.

Additional area will be cleared and grubbed to access adequate stream channel material in each of these material sources. The Bridge Creek Pit would be expanded by approximately 3 acres, to the north and west. The Lane Riprap Pit would be expanded by approximately 5 acres along Forest Road 2000222, to the west. The Lane Pit would be expanded by approximately 2 acres to the south. The existing disturbed area at the North West corner of the pit will be utilized for stockpiling waste material from excavations at the Growden Dam and the floodplain behind the dam.

This alternative will first dewater the flood plain surface behind the Growden Dam by diverting the overland flow into culverts at a point approximately 900 feet upstream from the dam. This water would be piped through the upper part of the dam, and back into Sherman Creek, downstream from the project construction limits. After the surface water is contained upstream of the project construction limits, the subsurface water in the floodplain would be drained by digging a series of

sumps from which water draining from the surrounding soil can be pumped to a settling basin, and then drained over the dam.

Once the existing Sherman Creek floodplain behind the dam is drained of excess subsurface water, the floodplain would be lowered and the excavated material will be set aside to drain further. This excavated material would then be hauled to the waste area in the Lane Pit, or placed on the sides of the existing floodplain to form terraces along the proposed Sherman Creek Stream channel upstream of the dam. The proposed flood plain would be constructed to an 80 foot width, which will accommodate constructing a stream channel with meander widths and lengths similar to the pre-dam channel in this length of Sherman Creek.

Once the existing floodplain is excavated down approximately to the pre-dam elevation, a new stream channel would be excavated within the 80 foot width of the proposed floodplain. The proposed stream channel would be constructed to widths and depths similar to the stream reaches just above the existing flood plain, and just down stream of the dam. Similar reference reaches would be measured to establish stream morphology values for stream bed width, depth, meander length, pool depth and length, etc. for use in construction of the proposed stream channel. Depending on the stream grade to be constructed, stream widths would vary between 16 and 30 feet, and stream depths between 1.5 and 3 feet deep. Alternative B would handle the 3000 year flood at approx a 2' depth and 10 ft/sec velocity. Up to three backwater ponds will be built in the new valley bottom behind the dam to provide rearing habitat for trout and fishing opportunities.

As the excavation of the existing floodplain proceeds, the existing drop inlet structure just upstream from the dam would be retained. The drop inlet would be preserved in its current outward configuration but would be uncovered from its existing condition as the excavation of the flood plain proceeds. Under this alternative, the drop inlet would not be needed for proper operation of the stream system. The drop inlet would be filled with concrete and sand to limit access into its interior as a safety measure.

Of all the alternatives, this alternative has the least risk of damage from failure. It provides a wider opening to safely accommodate more flow with debris than Alternative C.

Alternative C – Run of the River, Over the Top of the Dam

This alternative would excavate out a portion of the top of the dam approximately 8 feet deep, down to the elevation of the existing streambed at the existing drop inlet. The floodplain downstream from the dam would be raised and a new stream channel constructed from the existing drop inlet structure, through the dam and down to the existing stream channel at a point around the mouth of Lane Creek. Segments of the existing dam on the North and South side of Sherman Creek would be conserved in an undisturbed state as culturally significant features to be interpreted as part of the adjacent Growden Dam Recreation Site. The existing drop inlet would be left in place and would be filled with concrete and sand to limit access into its interior as a safety measure.

No stream bed or sediment removal would be done above the dam except to tie the proposed stream channel into the existing stream channel at the existing drop inlet structure. The proposed stream channel would be constructed to widths and depths similar to the stream reaches just down stream of the dam. Similar reference reaches would be measured to establish stream morphology values for stream bed width, depth, meander length, pool depth and length, etc. for use in construction of the proposed stream channel. The proposed stream channel would be constructed to a 16 to 20 foot width and a depth of 1.5 to 3 feet. The floodplain would be constructed through the dam at approximately a 40’ width, and would grade down to the existing Sherman Creek stream channel at the mouth of Lane Creek on a slope of approximately 3 to 5 percent. The dam would be sloped back from the sides of the proposed flood plain at a slope of 2 feet horizontal to 1 foot vertical (2:1). Alternative C would handle the 3000 year flood at approx a 2' depth and 10 ft/sec velocity.

The stream channel downstream from the dam would be dewatered during construction of the proposed floodplain in that area. The construction area would be dewatered by piping from the existing stream channel just upstream of the existing drop inlet, through the dam and downstream to a point just past the confluence with Lane Creek. The pipe would be installed along the south side of Sherman Creek. Once the proposed Sherman Creek stream channel is reconstructed from the existing drop inlet down to the mouth of Lane Creek, the dewatering pipe would be removed except for sections of pipe that are buried more than 5 feet below the proposed ground surface.

The material sources described in Alternative B would also be used in this alternative. Material from the Lane Creek Pit would be used to raise the elevation of the floodplain below the dam. The Lane Riprap Pit would be the source for the large riprap material needed to hold finer cobbles and gravels in the proposed Sherman Creek stream channel, and the Lane Creek Pit and Bridge Creek Pit would also be used as a source for cobbles and gravels for reconstructing the proposed Sherman Creek channel.

There is still a risk of damage from failure of the dam. The dam will remain mostly intact. Overtime the dam will decay, the outlet may become clogged with debris, and a dam breach may occur.

Alternative D – Construct an Emergency Spillway

For a size class C or D high hazard dam, the minimum Inflow Design Flood (IDF) is the Probable Maximum Flood (PMF) and for a class C or D moderate hazard dam, the IDF would be 0.5 of the PMF, according to the current 7500 Forest Service Manual. Due to the possible "loss of life" issues associated with the houses built three quarters of an air mile downstream of the dam, on the terrace just above the floodplain, this dam would probably rate out as a "high hazard" dam, according to the 7500 Forest Service Manual. Consequently, the IDF would be equal to the PMF for this dam. In 1991, this dam was rated given the downstream development conditions at that time, as having a "significant" hazard potential with a downstream hazard classification of "2", according to the State Department of Ecology's (DOE) rating system. In the State's decision framework on design standards, this would translate into the PMF being somewhere between a 3,000 year flood and a 10,000 year flood. This alternative was designed to for a PMF of 3,000.

The 10,000 year flood flow for Sherman Creek at this location is 900 cubic feet per second (cfs) as calculated from the Magnitude and Frequency of Floods in the United States. Assuming that the current drop inlet spillway is left in place and in functioning condition, the emergency spillway would conceivably handle a component of this flow. How much of a component would be directly dependent on the amount of debris blocking the drop inlet in a flood situation. For this analysis, it is assumed that the emergency spillway would be of sufficient size to handle approximately 100 cfs. This is 800 (cfs) less flow than the 10,000 year flood flow. The rest of the 800 cfs would go through the drop inlet during the 10,000 year flood.

This alternative would construct an emergency spillway in the top of the dam, approximately 5 feet deep and 15 feet wide as a high flow channel. The invert of the spillway at the top of the dam would be constructed at the existing floodplain elevation. High flows that overtop the existing stream channel upstream of the dam and are in excess of the capacity of the existing drop inlet, would be allowed to flow through the emergency spillway. The spillway would extend down the face of the dam to a stilling basin. Energy dissipation structures would be built downstream from the toe of the dam for approximately 300 feet to dissipate water energy when high stream flows divert through the emergency spillway. This alternative would not disturb any of the existing wetland currently formed behind the existing dam. The existing drop inlet would be conserved in its current state and use.

The spillway would meet current design standard of passing the probable maximum flood without over topping the dam, so that the dam would meet the standards and guidelines in the Forest Plan and the requirements in the Forest Service Manual 7500. This alternative provides less of an opening through the dam than Alternatives B or C. While this alternative does provide sufficient failure protection against over topping to meet current dam safety standards, this alternative has a greater chance of damaging downstream resources and developments in the unlikely event that the dam is overtopped in an extreme flood event. This is due to the amount of material left in, and behind the dam, which is available to be washed down stream in the extreme flood event.

Table III-10 - Cost of Proposals

Alternative	Dam Removal	Downstream Construction	Mitigation
B – Proposed Action	$942,000	$60,000	$40,000
C – Run of the River	$581,000	$60,000	$40,000
D – Emergency Spillway	$267,000	N/A	$20,000

The costs associated with alternative B include removal of the dam, restoration of the channel behind the dam and at Log Flume. There are also costs associated with the mitigation. The Growden Site will have interpretation, trails, and

improvements made to bring it in line with the Sherman Byway plan. Alternative C has the same costs as B with the exception of restoration above the dam. This also includes less haul of material offsite and fewer changes to the dam itself. Alternative D does less at the dam site than alternatives B and C. There is also no downstream restoration. However there will be some interpretation at the Growden site.

3.2.2 Heritage

Affected Environment

There are five identified historic properties within the proposed planning area. Four of the historic properties are located within or near identified planning units, and have the potential to be affected.

Past management practices have identified two of these properties as eligible to the National Register of Historic Places. Historic properties that are unevaluated are managed as if eligible, and mitigations for these properties will follow management prescriptions as specified.

There was a public concern over native American burial grounds. No burial grounds have been found within the project area. Heritage resource personnel will be present during excavation activities. Work will halt if archeological artifacts are unearthed and work will be changed appropriately.

Log Flume
In the 1920's, the timber industry entered the area with White Pine Lumber Company and Hedlund Lumber being the most prominent lumber companies. The White Pine Lumber Company constructed a temporary sawmill in order to build a dry and wet log flume. Once the flumes were completed, the sawmill was removed and the logs were floated down Sherman Creek to their mill that was situated at the confluence of the Columbia River. Hedlund Lumber built a railroad through Sherman Creek to assist in the transportation of their materials. The railroad was used for approximately two years. Later the railroad was removed and its components salvaged for the World War II efforts. A combination of events, the Fires of 1929 and the Great Depression, bankrupted both companies driving them out of the area. In the 1930's, the CCC built a number of buildings, structures, trails, and telephone line; as well as assisted in firefighting activities.

Growden Dam
Growden Dam was constructed in 1937 by a Civilian Conservation Corp (CCC) company from Little Rock, Arkansas. (Holstine, 1987) The dam was intended to be part of a larger development that included recreational residences and day use. The CCC had a camp next to the dam from 1933 to 1940.

Management Class Recommendations

A National Register of Historic Places (NHRP) determination of eligibility is prescribed by Regulation as the method for designing management recommendations for historic properties located on National Forest System lands. Evaluations of eligibility are performed for each property within the project boundary, when practical. Following this, management prescriptions are provided for project analysis. The following list of management prescriptions was developed for historic properties on National Forest System lands. These prescriptions are based on National Register eligibility determinations for historic properties.

Eligibility Ratings
Management Class 1 - Evaluated as Not Eligible. No further need to actively manage.

Management Class 2 - Not Evaluated. Property must be protected and preserved as if eligible. Protect historic property through avoidance.

Management Class 3 - Evaluated as Eligible to the National Register. Project will have No Effect on property. Property must be protected and preserved as defined by Regulation. Protect historic property through avoidance.

Management Class 4 - Evaluated as Eligible. Project will have no Adverse Effect on property. Property must be protected and preserved as defined by Regulation. Protect historic property through avoidance.

Environmental Effects

Alternative A, No Action
There would be no change from the current condition. Heritage sites would continue to gradually deteriorate over time, subject primarily to natural forces.

Alternative B, Removal of Growden Dam and Alternative C, Run of the River

Growden Dam Site
Alternatives B and C will have an adverse effect on the Growden Dam, 06211200033 Management Class 4. The State Historic Preservation Office (SHPO) will allow this adverse effect with mitigation to document and interpret the Growden Dam Site. The structural changes proposed under Alternative B will significantly alter the character of the dam. The eligibility requirements for National Register of Historic Places (NRHP) are based on the construction of the property. Alternatives B and C will negatively impact the integrity of design, setting, materials, workmanship, feeling, and association; thus making the dam ineligible to the NRHP.

Management Class 4 sites must be protected and preserved. Additional documentation and evaluation would be required prior to mitigation and project implementation. A plan for mitigating the adverse effects to the site has been developed by the Heritage staff in coordination with the State Historic Preservation Office. A Historic Architectural Engineering Record (HEAR) and the construction of an interpretive site will mitigate the adverse affect. The HEAR analysis would be completed by a qualified professional. The interpretative site would include any remaining remnants of the dam. Additionally an MOA has been reached with the SHPO; this document outlines the agreed upon mitigations and provides guidance in completing the mitigations for this project.

Log Flume Site
At the Log Flume site, three heritage sites have the potential to be impacted by stream restoration activities. These are 06210200016 - Management Class 1, 06210200025 - Management Class 2, and 06211200087 - Management Class 2.

Project activities have the potential to damage or destroy these three sites directly or indirectly by heavy machinery, falling trees, ground disturbance, deconstruction activities, etc., or indirectly as a result of increased access to each site.

The Management Class 1 site has been evaluated as not eligible to the NRHP. There is no further need to actively manage these sites.

Management Class 2 sites must be protected and preserved as if they were eligible to the NRHP. These sites will be avoided. The State Historic Preservation Office (SHPO) concurs with this action.

Alternative D, Construct an Emergency Spillway
Growden Dam
Growden Dam, 06211200033 Management Class 3, has the potential to be impacted under alternative D.

Alternative D will have no adverse effect on the historic property. The structural modifications will not significantly alter the property as to make it ineligible to the NRHP. Because only a small portion of the dam will be modified, the dam will retain the integrity of location, design, setting, materials, workmanship, feeling, and association. The modification will leave the majority of the materials and workmanship intact and will allow for future interpretation of the site.

3.2.3 Recreation and Scenery

Affected Environment

On the east side of the Kettle Crest, visitors experience flowing stands of coniferous forests. These forests form a carpet covering valleys and extending over ridge lines. Interspersed throughout are riparian hardwoods, experienced generally in close proximity to Washington State Highway 20 as it follows along side Sherman Creek. Highway 20 is a major travel route from the Washington coast to eastern side of the state.
Sherman Pass Scenic Byway

The Sherman Pass National Forest Scenic Byway was dedicated as a National Forest Scenic Byway on July 20, 1990 and runs from the town of Republic eastward to the junction of Highway 20 and Highway 395 just west of the town of Kettle Falls. Washington State has recognized this portion of Highway 20 as a State Scenic Byway since 1967.

Several of the Goals originally established for the Sherman Pass Scenic Byway are applicable to this planning effort.

- "To demonstrate how past and present management activities have contributed to the unique character of Sherman Pass."
- "To maintain/enhance the natural character of Sherman Pass."
- "To provide a high quality fishery in Sherman Creek."
- "To capture history through innovative interpretation to provoke the visitor and instill a sense of having experienced the cultural past."
- "To pay attention to aesthetic detail and to demonstrate the identity of each site and its unique character."

The Planning Area is viewed in foreground as visitors travel the Byway and enjoy the recreational opportunities.

Driving has become an increasingly popular form of recreation. Sherman Pass Scenic Byway is part of a larger network of scenic byways and recreational driving routes in northeast Washington. The close proximity to Canada has made pleasure driving of the many possible loops that lead into Canada and back popular activities as well. Canadians living just north of the U.S. border also use these loop routes. Sherman Pass forms a key link along these loop routes connecting Northeastern Washington with Southeastern British Columbia. The Byway is considered to be an important part of a regional economic strategy.

The Byway accommodates three main user groups:

1. Area residents traveling east and west across the region regularly.
2. Recreational travelers who may be first time visitors to the region.
3. Currently bicyclists are frequent users of the corridor, both those that are touring regionally and those attempting transcontinental trips.

Recreational Use and Facilities Within the Planning Area

Currently, the Byway includes developed sites that offer visitors opportunities for interpretation, day use picnicking, hiking and camping. Some of these sites have been selected for further improvement within the 2004 Corridor Plan.

Sites along Sherman Creek within the Corridor Plan include Sherman Overlook (overlook of the drainage), Growden Heritage Site, Sherman Creek Trail (also known as the Canyon Creek Trail) and Log Flume Heritage Site. Of these the latter three will be affected by the project.

Growden Heritage Site:

The site is located approximately 12 miles east of Sherman Pass at milepost 331, on the south side of the Byway. This site stands as a remnant of the New Deal Era of the 1930s during which time government programs sought to deal with the country's economic crisis. The existing developed interpretive site tells about the Civilian Conservation Corps (CCC) and their activities at Camp Growden on the Colville National Forest from the mid 1930s to early 1940s.

This main use of this site is a highway rest area. The facilities consist of a large gravel parking area with vaulted toilet facilities. A fountain located near the parking, and dam to the west are all that remain from the CCC era. A replica gateway arch stating "Little American" on it is located over the path that leads down to the picnic area and dam just beyond it. An arching stone veneer wall holds porcelain enamel interpretive panels. A steel sculpture of a man laying the last stone in the wall and steel work boots on a boulder that reads "Step into these Shoes", evoke images of the CCC era.

Sherman Creek Trail

The existing Canyon Creek Trail (#93) leading from the Canyon Creek Campground area to the Log Flume Heritage Site to the east is currently paved as an accessible trail providing visitors an opportunity to enjoy a 1 mile walk along Sherman Creek. This trail provides one of the few opportunities to experience Sherman Creek along the corridor and a riparian habitat type.

Log Flume Heritage Site
Log Flume Heritage Site is located at approximately milepost 335, three quarters of a mile to the east of the turn off for Canyon Creek Campground, on the south side of the road, and one half mile to the west of the Colville National Forest Service boundary.

This existing developed interpretive site tells the story of logging operations that took place here at the beginning of the twentieth century. An existing informational kiosk invites people to walk a short interpretive trail that provides further detail about the past logging operation and points out visible evidence in the landscape remaining from the activity of removing and transporting logs from the forest.

A paved parking area stretches east west to accommodate pull thru parking for trailers. Trees left as medians between these pull thru parking spaces works well to disguise the parking area's scale and blend it with its surroundings. From the south east corner departs the loop interpretive trail, where an informational kiosk and rest rooms are also found. A small picnic area is found to the west of the kiosk. At the west end of the parking area departs the existing Canyon Creek Trail #93 to Canyon Creek Campground.

Sense of Place Analysis
Sense of place is the meaning or attachment that people have for this landscape. Many residents living in the surrounding areas are descendants of the first settlers of the area, some from the CCC (Civilian Conservation Corp), and are likely to have strong values regarding the land. Recreation visitors develop an attachment to places based on past experiences (ICBEMP Vol. I). Families may visit the same area for a number of years and often many generations seek the same type of recreation experiences and activities. Trends in recreation uses indicate a growing interest in driving for pleasure, hiking, and visiting interpretive facilities. An appreciation for the value of natural scenery will continue among residents and visitors.

Scenery Analysis
The Colville National Forest manages visual resources according to Visual Quality Objectives developed through the Visual Management System (USDA Forest Service 1974), and further specified in the Colville Land and Resource Management Plan (1988), which allocates management areas that guide resource management activities on National Forest System Lands. The Visual Management System has recently been updated by Landscape Aesthetics, A Handbook for Scenery Management (USDA Forest Service 1995), otherwise known as the Scenery Management System (SMS). The Colville National Forest utilizes the concepts within the SMS process during area analysis, and will further implement the process upon Forest Plan revision.

Visual Quality Objectives were used in the Forest Plan to describe a desired level of scenic quality, and diversity of natural features, based on physical and sociological characteristics of a specific Management Area. The objective for each Management Area refers to the degree of acceptable alteration of its characteristic landscape. The five categories of Visual Quality Objectives are Preservation, Retention, Partial Retention, Modification, and Maximum Modification.

The Visual Quality Objectives relating to proposed activities within the Planning Area are defined as follows:

- Retention – Human activities are not evident to the casual Forest visitor. Activities may only repeat the forms, lines, color, and textures, which are frequently found in the characteristic landscape.

Viewing Distance also determines the sensitivity of the landscape and is described as; Immediate Foreground (0 to 500 feet from observer), Foreground (500 feet to ½ mile from observer), Middleground (1/2 mile to 4 miles from observer), and Background (from 4 miles to horizon from observer). The viewing distances applicable to this Planning Area are Immediate Foreground and Foreground.

Scenic Attractiveness is an indicator of the variety found within a landscape. All landscapes have value and those with the highest variety and diversity have the greatest potential for high scenic value. The planning area can be described as having a Class B (Common) variety class throughout.

Concern Levels are a measure of the degree of public importance placed on landscapes viewed from travelways and use areas. The critical viewing locations affecting this analysis, and documented through Forest Planning, are as follows:

- Washington State Highway 20 Corridor: This travel route is designated as a Level One Primary Travelway due to the high public interest in scenery, and the regional importance as a state highway. Visitors traveling the route view the planning area as they travel both directions. The National Forest Lands of primary concern are those acres seen at a foreground and middleground distance from the Highway.

- Growden Heritage Interpretive Site: This site is designated as a Level One Primary Use Area due to the high public interest in the history of the area, and the regional importance as a feature of the Sherman Pass National Forest Scenic Byway. The National Forest Lands of primary concern are those acres seen at an immediate foreground distance at the site. Activities seen at a foreground distance from this route are also discussed in this analysis

- Sherman Creek Trail (#93): This trail route is designated as a Level One Primary Travelway due to the high public interest in scenery, and the regional importance as a feature of the Sherman Pass National Forest Scenic Byway. Visitors walking the route have an opportunity to move along a paved accessible route that follows along Sherman Creek for approximately one mile. The National Forest Lands of primary concern are those acres seen at an immediate foreground distance from the trail. Activities seen at a foreground distance from this route are also discussed in this analysis.

- Log Flume Heritage Site and Interpretive Trail (#77): This trail route is designated as a Level One Primary Travelway due to the high public interest in the history of the area, and the regional importance as a feature of the Sherman Pass National Forest Scenic Byway. Visitors walking the route have an opportunity to move along a paved accessible route that includes interpretive features related to the historical site. The National Forest Lands of primary concern are those acres seen at an immediate foreground distance from the trail. Activities seen at a foreground distance from this route are also discussed in this analysis.

Public comment is monitored and reviewed to determine if changes have occurred over time to the values placed on these landscapes since Forest Plan approval. For the Planning Area, the public scoping did yield comments specific to the scenic values of the Planning Area and those values have not changed.

The following statements describe the visual situations relating to the specific Management Areas within the Planning Area:

- Immediate foreground areas (approximately 500 feet) around significant dispersed recreation sites will be managed to meet the Retention visual quality objective (Forest Plan Standards and Guidelines, Visual Resource Management, Item Number 2).
- Management Area 3A (Recreation Emphasis) represents 100 % of the project area with a visual quality objective of Retention or Partial Retention, and can be seen from the State Highway 20 corridor and the above mentioned recreation facilities in immediate foreground and foreground viewing distance.

Effects of Past Actions

Existing Visual condition mapping was updated in 1994. The designated Retention and Partial Retention areas generally meet the Natural Appearing designation.

Scenic Integrity is defined in the 1995 scenery management handbook as “the degree of direct human-caused deviation in the landscape, such as road construction, timber harvesting, or activity debris”. It is evaluated by measuring “degree of alteration in line, form, color, and texture from the natural or natural-appearing landscape character or from the established landscape character accepted over time by the general public”.

Generally, on National Forest System Lands with no visible alterations, the scenic integrity is Very High, especially where the average viewing duration from highways is fairly short due to driving speeds (45-55 mph).

Within the Planning Area, however, the stream stabilization structures that were placed in 1999 as a result of the flooding that occurred along Sherman Creek in 1998, were placed in such an evenly spaced pattern, that they detract from the landscape character of the area and do not meet the Visual Quality Objective for the site.

Environmental Effects

Recreation
Will the alternatives affect the use at each site?
How long will each site be closed?

Growden Heritage Site:
This project will not change the main use of this site as a highway rest stop. Under alternatives B, C, and D, this site will be improved to include the interpretation of the byway. This site will attract more people to stop to experience the overall interpretation theme. The safety of this site for visitors will be improved under alternative B and C. Currently the drop inlet can be accessed. The trash rack was put on to stop people from getting into the drop inlet, however the bars are wide enough apart for a small child to fall through. The drop inlet will be effectively sealed under alternatives B and C. Alternative A and D maintain this safety hazard.

Under alternatives B, C, and D the site will be closed for two summers during construction.

Sherman Creek Trail and Log Flume Heritage Site
This project will not change the main use of this site. Some of the interpretative features of the site have been in disrepair. These features will be updated and improved to include the interpretation of the byway. The riparian features of these sites will be enhanced for visitors. Fishing will be improved for visitors. This site will attract more people to stop to experience the overall interpretation theme.

Under alternatives B and C, the site will be closed for two summers during construction. However the work will be done before the Growden construction begins.

Cumulative Effects
This project moves the Sherman Pass Scenic Byway Plan implementation along. It will improve 3 of the 5 sites on the East side of the byway. This will attract more visitors to stop and enjoy all of the sites along the byway.

Site closures would impact recreation in the Planning Area for most of one use season, but this is necessary due to safety concerns. Closure of these sites will place pressure on other sites along the byway.

Scenery
Will the project meet VQO of Retention as viewed from Sherman Pass Scenic Byway and existing recreation sites?

No Action Alternative
In general, no immediate change would occur in the quality of the scenic resource. The quality of the Planning Area as a scenic backdrop to the Sherman Pass Scenic Byway may not be sustainable. While no proposed activities would occur in this alternative, and consequently no immediate change in landscape appearance, in the long-term due to the high risk of flood damage, and high intensity wildfire, this appearance may not be sustainable.

Action Alternatives (B, C, and D)
Growden Dam Site
This project amends the VQO for the project area to Restoration until the time that vegetation recovery. Under Alternative B, the area behind the dam will be under construction and not appear natural. There will be 8 acres of unvegetated landscape next to highway 20 in the first year of construction. Within one season grass will be over most of the site and trees and shrubs will have been planted. Within five years, trees and shrubs will be established and the area will appear more natural.

The area around the dam under all three alternatives will be a construction zone visible from Highway 20. A change in the VQO to Restoration will be in effect under vegetation is reestablished.

The following activities will meet the Retention VQO (as seen from the critical viewing locations discussed in the existing condition section) in all action alternatives: restoration of the stream channel and single tree selection. These activities are intended to restore a natural appearance and function to the stream channel and improve the sustainability of

the vegetation viewed by travelers of the Byway and users of recreation facilities within the planning area, thus allowing them to meet the VQO.

Pit Development
There are three proposed pit developments for the planning area. The Lane Creek riprap source is the only one that would increase the visibility of the existing pit by creating a larger area of light colored rock that is in contrast to the surrounding landscape. Due to slope and aspect, there are no opportunities to screen the expansion from the Byway and the Growden Heritage Interpretive site.

Temporary Road Activities
For this Planning Area, the negative visual effects of temporary road use, including the un-natural linear feature or exposed soils that contrast in color with the natural landscape character can be mitigated by restoring the area to natural grades and slopes. The temporary road construction, as proposed, does not have the frequency of views or the topographic concerns that would negatively affect the natural appearance of the characteristic landscape.

Tree Removal Activities:
Management activities related to tree removal vary in their intensity. The various types of logging systems create differing effects in the landscape. Ground based logging systems (proposed in this project), because of the flexibility of the operation, can produce openings of varying size and shape. The primary concern is soil disturbance and the potential for introducing line and color contrast into the area viewed from travel routes and user areas. As the ground gets steeper, or in some cases where the line of sight is from a higher vantage point, the potential for introducing visible contrast in color or line increases.

The proposed tree removal activities would remove enough of the forest canopy to create obvious openings and expose ground surface to viewers traveling the Byway and Sherman Creek Trail. Minimizing ground disturbance and slash accumulation will be critical to meeting the VQO.

Equipment crossing over the trail and placement of structures will negatively affect approximately 300 feet of trail at the Log Flume Heritage Site and Sherman Creek Trail. Mitigation measures will assure damage is kept at a minimum and the trail will be returned to its current state.

Activity Debris:
The effectiveness of the technique used to reduce the visual impact of activity debris is a primary concern. For landscapes viewed mostly from vehicles, the size of the disturbed area visible in foreground, and how contiguous the treatment areas appear, is important to maintaining scenic integrity. The project as proposed would leave minimal debris in the visually sensitive areas.

Loss of aquatic habitat in the pool at the base of the dam will be mitigated by improved habitat in the downstream restoration reaches.

Cumulative Effects
The proposed activities within the Planning Area, at a broad scale, would serve to perpetuate the desirable attributes of the existing landscape character. The expansion of Lane Creek riprap source, however, would introduce deviations in line and color that will not remain subordinate to the natural appearing landscape. This would irretrievably change that portion of the existing landscape and allow it to negatively impact the landscape character.

From a scenery standpoint, activities that treat vegetation to increase sustainability and restore natural processes, without the introduction of long-term negative visual elements, will meet the objectives of the Forest Plan. With mitigation, the necessary temporary roads, facility impacts, and tree removal debris would not take away from the valued landscape character of the National Forest Lands.

3.3 Biological Environment

3.3.1 Fisheries

Affected Environment

Fish Populations

There are 2 natural barriers and 2 man-made barriers in the Sherman Creek Watershed and 1 man-made barrier on the Columbia. There is a man-made barrier at the hatchery and just above is a waterfall barrier. Growden Dam is the next barrier. There are 2 waterfalls above Growden dam. The natural barriers and glaciation have played a role in historic trout distribution and the man made barriers have played a role in current trout distribution. The native trout species that may have occurred in this watershed include bull trout, Westslope cutthroat trout, and Redband trout. Eastern brook trout are the only non-native trout that have occurred in the watershed. Today only a remnant Westslope cutthroat population, isolated redband populations, a hybrid redband population, and an eastern brook trout population occur in the Sherman Creek Watershed.

At one time the natural falls may have been passable to trout as evidenced by redband trout populations above the falls. Colonization may have occurred during the glacial periods. Bull trout, redband trout, and Westslope cutthroat trout may have had access to Sherman Creek. These fish would have migrated in from the Columbia River and were in the Columbia at the end of the last glacial retreat. Early records of salmonid stocking in the Sherman Creek watershed begin in 1933 with the stocking of brook trout, rainbow trout, and cutthroat trout.

Bull Trout

Documentation exists that bull trout occupied the Columbia River into the late 20th century. Information from tribal members of the Colville Confederated Tribes, talked about "two types of Bull trout, one larger, associated with the Columbia River and another smaller type associated with headwater streams and streams with barriers to the Columbia." (Hunner and Jones, 1997). Records indicate that bull trout were being caught by gill nets in 1962 and 1963. Coulee Dam stopped upstream migration in 1939. This changed fluvial habitat into the present reservoir. The Coulee dam did not provide for upstream fish passage. This action isolated the existing population of bull trout into smaller populations. Grand Coulee also modified the habitat by increasing water temperatures and eliminating the original complexity of habitat which included turbulence, riffles, pools, riparian habitat, and off channel habitats.

Presently, individual bull trout have been found in Lake Roosevelt.
1990 one Bull trout was found at the mouth of Boulder Creek.
1992, two juvenile bull trout were found in Onion Creek in the first quarter mile of Onion Creek.
1995, two bull trout were found at the mouth of Sherman Creek and one at the mouth of Hawk Creek.

The location of the fish captured, indicate that these fish are not resident but most likely adfluvial[8] in life history. On Sherman Creek, there is a blockage to fish passage approximately 1.5 miles upstream of the confluence with the Columbia in the form of an approximately 18 foot high natural falls on state land. In the summer of 2001, the fisheries inventory crew conducted population surveys during the day and night in Sherman and South Fork Sherman Creeks for bull trout. No bull trout were found.

From the reports of the Colville Confederated tribal members, it is thought that two distinct populations (adfluvial and resident) of bull trout inhabited Sherman Creek. Even though one individual has been found at the mouth of Sherman Creek, they are thought to have been extirpated from the watershed from habitat loss and competition from brook trout. While future surveys and trapping may locate other bull trout, numbers are not expected to increase more than slightly. Presently no known reproduction of bull trout is occurring within lower Lake Roosevelt or its tributaries, including Sherman Creek. Lake Roosevelt and the Sherman Creek Watershed are not listed as critical habitat for Bull Trout.

Westslope Cutthroat Trout

An isolated Westslope cutthroat trout population has been found upstream of Growden Dam in the North Fork of Sherman Creek. This population may have either naturalized before barriers were formed, or have survived from initial stocking. There are 2 natural barriers between Growden Dam and this population. This population would not be affected by any activities at the dam.

[8] Reside in a larger body of water, but return to a stream to spawn.

Redband Trout / Rainbow Trout
Redband trout are an inland Rainbow Trout. There are three known pure strains of Redband trout in upper Sherman Creek, Canyon Creek, and Lane Creek. These populations are cut off from the mainstem of Sherman Creek. The Lane Creek population is cut off by a barrier (falls). Lane Creek empties into Sherman Creek near the base of Growden Dam. Canyon Creek goes subsurface as it enters its fan during low flow periods. These streams support rainbow trout up to 6 inches and are what we would expect from these streams. They do not have water deep enough and a large enough food source to support larger fish even if the habitat was in good condition. Below the barrier on Lane Creek, rainbow trout may be coming up from Sherman Creek and spawning. There is a population in the mainstem of Sherman Creek; however it is hard to determine the size of the population because there are numerous rainbow trout hybrids.

Coastal rainbow trout have been stocked in this watershed from 1931 – 1956. These stocked fish hybridized with the redband trout population. The rainbow trout fishery in Lower Sherman Creek is sustaining itself. The habitat limits trout to about 8 – 10 inches in size. Spawning is successful. These reaches have gravel/cobble deposits on which the rainbow trout make redds in late April. The fry emerge in July and are able to find refuge in these reaches. The rainbow trout range in age from 1 to 3 years. This matches the habitat quality. There are few deep pools and the riffles are very shallow. This stream should be able to support large trout but as discussed, the habitat has been so altered by human activity that this stream is now lacking in habitat diversity.

Brook Trout
Brook trout originally came from the East coast of the United States and were stocked widely in streams across the West. Earliest stockings may have been at the turn of the century; however the earliest recorded stocking is 1933 after the creation of the Washington State Department of Fish and Wildlife.

The Sherman Creek brook trout population depends on both the tributaries and the mainstem Sherman Creek for different stages of the life cycle. The adults migrate into the tributaries to spawn and return to the mainstem to take advantage of larger water and food supply. They spawn in the fall with the young hatching in the spring. The 1994 population surveys in the main Sherman Creek, and tributaries of Sherman Creek including Milk Creek, McGahee Creek, and Hart Creek show this. In main Sherman Creek very few brook trout fry were found as compared with large numbers of adult trout (3-8 inches). In Milk Creek, McGahee Creek, and Hart Creek, the reverse was true. In the mainstem, lack of coarse gravel storage and seasonal sedimentation from road sanding contribute to the poor spawning success of the brook trout. In the tributaries, the channel substrate is made up of smaller materials which are ideal for spawning habitat. However the streams lack the habitat and the food base to support adult trout.

Habitat Factors
Large Woody Debris
Log Flume Reach
Background
During the logging of the watershed and flume building the stream was cleared of large wood. Since the early 1900s, the section of creek between Log Flume and Canyon Creek has not had very much wood in it.

On May 27th, 1998 a heavy rainfall event was followed by high runoff which appeared to reach the estimated 100 year event level. This flood event had both positive and negative effects on the stream channel. It left a few large debris jams and gravel bars in the habitat restoration reach. It also undermined banks and valley walls and caused them to erode into the stream. The debris jams were created at bends and were usually related to a large key piece of wood. In one instance this was the footbridge which landed on the bank and jutted out to the creek. In another case a large cottonwood tree tipped over and trapped other debris in its roots and branches. The 1.1 miles of stream habitat was surveyed in 1994 and again in 1998 after the flood using a Hankin and Reeves survey protocol. The table below shows that changes to the number of pieces of wood after the flood.

Table III-11 - Wood Sizes in the Log Flume Reach

Wood Size	1994	1998
20 feet x 12 dbh	51	25.5
35 feet x 12 dbh	8	12
35 feet x 20 dbh	0	5
INFISH Pieces per mile	7	15

Current levels of wood are still less than the INFISH RMO of 20 pieces per mile. This reach has areas that move wood through them instead of storing the wood.

Reach 2
The in between reach is the reach between the Log Flume reach and the base of Growden Dam. The private land was not surveyed. Most of this reach is confined by Highway 20. There were 19 pieces of large woody debris per mile. The highway and past logging of the reach have contributed to the lack of wood in this reach.

Growden Dam
There are 9 pieces of large woody debris per mile above the dam. The area above the dam has highway 20 on the North side, road 2000-143 on the south side, and Growden Dam to the east. These activities in the riparian area restrict the growth of large trees. The wetland has a stand of alder, but alder doesn't reach the size needed to meet the large woody debris criteria.

Pools
Log Flume Reach
Before the 1998 flood, the habitat in this reach had simplified. In the absence of a large flood and woody debris, pools disappeared. As the table shows below, there were 15 more habitat units after the flood. 7 of these were pools. The other 8 were part of the old riffles. Pool acreage almost doubled and average riffle length was cut almost in half. A comparison showed that the pools found in the 1994 survey still existed after the flood, however they were usually shallower. Beavers have created 2 pools in this reach. The beavers have been tying into existing debris jams. Current pools per mile numbers are still less than the INFISH RMO of 56 pools per mile.

Table III-12 - A comparison of pre-flood and post-flood pool data for the Log Flume Reach

STREAM NAME	1994	1998
Habitat Units	25	40
Pool Area	0.25 acres	0.45 acres
Pools	8	15
Pools Per Mile	7	13
Pool Depth	2.3	1.8
Pool Length Average	57	55
Riffle Length Average	524	275

Reach 2
There were 20 pools per mile in this reach. The residual pool depth[9] averaged 1.5 feet deep. There were 4 pools in this 3 mile reach that had a residual pool depth greater than 3. These would be the higher quality pools. Pools per mile is still less than the INFISH RMO of 56 pools per mile. Channel downcutting and the lack of wood are the causes of the lack of pools.

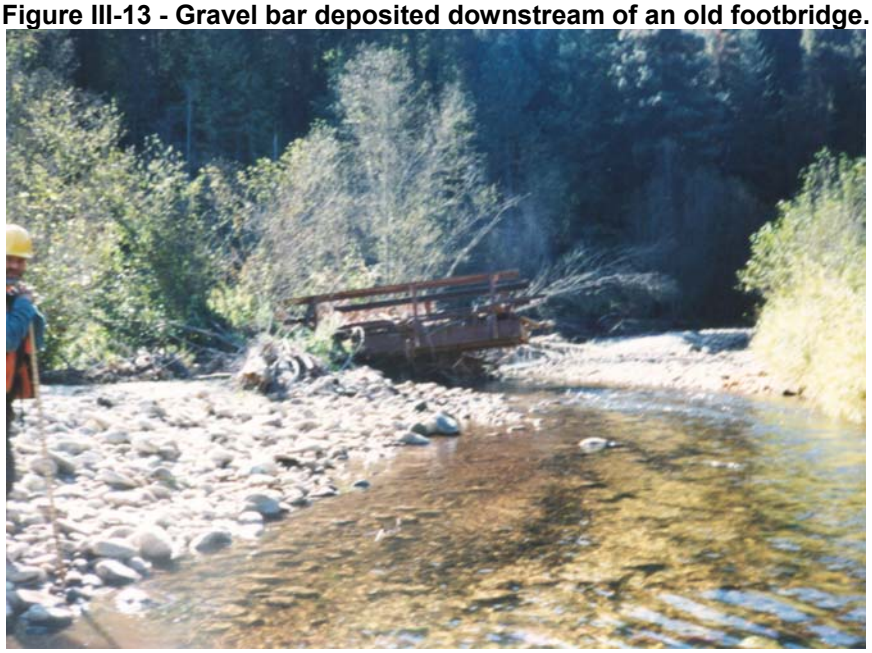
Growden Dam
There are 8 pools behind Growden Dam to the end of the wetland. This translates to 12 pools per mile. This is less than the INFISH RMO of 56 pools per mile. Lack of wood and high sedimentation is the cause of the low number of pools. 2 of the

[9] Residual Pool Depth is the depth of the water if the stream were not flowing. This is used to compare data at different flows.

8 pools are deeper than 3 feet. Beavers have created and maintained numerous dams. These dams breach each spring and the beaver rebuild the dams. Pools behind these dams are used by trout.

Bankfull Width to Depth Ratio (BFWD)
Log Flume Reach
Bank erosion is a severe problem in this reach. Bankfull width to depth ratio has been substituted for the wetted width to depth ratio, since it is more accurate and easier to repeat the measurements. The bankfull width depth ratio is the width of the channel divided by the depth of the channel. As a channel gets wider or shallower, this number increases. The flood deposited numerous sandbars on the sides of the main channel. These sandbars reduce the width of the channel and the channel also deepens. The 1998 flood had a positive effect on BFWD. The BFWD ratio went from 29 to 13. The current BFWD meets the INFISH RMO of 13. The picture shows a gravel bars that was deposited and narrowed the wetted width of the channel.

Figure III-13 - Gravel bar deposited downstream of an old footbridge.



Reach 2
The stream is wide and shallow. Bankfull width to depth (BFWD) ratios average 15. An example is that if this stream averaged 15 feet wide, the average depth would be one foot. The bankfull width to depth indicator is used to judge the health of the stream. As erosion cuts away at the bank and makes the stream wider, the BFWD ratio increases. The dam blocks gravel and other bed materials (bedload) from moving beyond the dam. This is in effect starving the reach of bedload causing downcutting and erosion. When the stream moves gravels and cobbles through the reach, it is not replaced with the same amount. South Fork Sherman Creek is a significant source and reduces the effect of the dam. The highway affects the migration of the channel in this reach. Numerous wetlands have been cutoff from the main channel either from the road or downcutting. The stream has lost areas where energy would have been released during a flood; resulting in the energy being transferred to the banks causing bank erosion.

Growden Dam
The bedload trapping effect of the dam has led to aggradation of the stream channel. The stream has widened to accommodate the high amount of bedload.

Environmental Effects

No Action

Fisheries

Bull Trout and Westslope Cutthroat Trout

Maintaining the dam will not affect either Bull Trout or Westslope Cutthroat Trout populations, since neither exists in the project area. Habitat for these species will not be improved at the dam site and below.

Redband Trout, Rainbow Trout Hybrids, Brook Trout

The current condition of the trout populations will remain. The isolated redband populations will not be affected.

If a dam breach occurs, the habitat would be severely altered and the populations would be negatively impacted. Sediment and debris from the dam will move swiftly downstream. Trout eggs will get smothered with silt, or the redds[10] will scour out and the eggs will be destroyed. Individual trout may get washed ashore, hit with debris, or suffocate from the sediment laden waters. The populations will be reduced. Refounding[11] will occur from the tributaries especially the South Fork of Sherman Creek.

Habitat Factors

Large Woody Debris

The number of pieces of large wood in the stream will increase over time. The beetle killed trees in the Log Flume reach will start to drop into the stream. In some areas the wood would still be washed through since the stream is not able to get out into it's floodplain to reduce its power. Reach 2 will also slowly accumulate large woody debris from the south side of the stream. The Growden reach will accumulate large woody debris slowly as it washes down from upstream reaches.

A dam breach may strip the riparian areas of vegetation. As described in the Horseshoe lake dam breach, the riparian area did not recover. There are still sandy soils with not very much growing on them.

Pools

As wood and beaver populations increase at Log Flume, the pool quality and quantity will improve.

If a dam breach were to occur, the stream would be stripped of most of its habitat.

BFWD

As wood and beaver populations increase in these reaches, the habitat diversity will improve. Stream width would narrow and the stream will get deeper. However the dam will still store bedload behind it. The stream will start to erode existing gravel bars and banks. The stream will tend to widen as it had done before the 1998 flood. Bankfull Width to Depth would slowly return to pre-1998 levels.

If a dam breach were to occur, the stream would downcut and banks would erode increasing the BFWD ratio. .

Cumulative Effects

The no action will maintain the current condition of the dam and the effects of blocking bedload transport. These include - downstream bank erosion and loss of spawning habitat.

Proposed Action

This project restores 1.1 miles of stream habitat at the Log Flume Site. It also allows fish passage at the Growden Dam site. The reach above Growden will also be improved.

Bull Trout and Westslope Cutthroat Trout

Since these trout species are not within the effects reaches of the project and the project is not within critical habitat for Bull Trout there is "No Effect" to these species. However the habitat would be improved for restocking efforts.

[10] Redd – a place in the gravel where trout lay eggs.
[11] Refounding – a species reoccupies and establishes itself in an area

Redband Trout, Rainbow Trout Hybrids, and Brook Trout
The Redband Trout, Rainbow trout hybrids, and brook trout populations will be beneficially affected by the proposed action. A change in size distribution would be expected in all three reaches. Since gravels will make it through the Growden dam reach and there will be storage sites for this material, spawning habitat will increase in the Log Flume reach and Reach 2. Spawning habitat will be created above in the new stream above the dam. This will increase the amount of young of the year in these reaches.

There will be more hiding and overwintering habitat with the additional pools created in the Log Flume and Growden Reach. This will increase the carrying capacity for larger trout. It is expected that the average adult size fish will go from 8-10 inches in length to greater than 12 inches in length.

Fish passage through the Growden dam reach will open up the upper 3 miles of fish habitat to the lower 8 miles of Sherman Creek and the associated tributaries. These populations have been separated since the dam was built.

Habitat Factors
Large Woody Debris
Approximately 300 pieces of wood will be added to the Log Flume reach during the restoration. This will bring the large woody debris number up to 286 pieces per mile. The project would not add any wood to reach 2. Approximately 150 pieces of wood will be added to stabilize the new stream behind the Growden Dam. This will bring the total to 223 pieces of large woody debris per mile. Not all of the added structure will meet the INFISH standard of >12" diameter and >35' long.

Pools
At the Log Flume reach, the number of pools will not increase, however the quality of the pools will increase. Twenty-five sites have been selected to enhance existing pools. The residual pool depth will increase from 1.8 feet to greater than 4.0 feet. The pool area may increase.

In reach 2, some pool changes may occur from increased bedload. There may be some pool filling. This will cause a reduction in aquatic habitat.

At the Growden Dam site, the large pool below the dam may be affected in during construction activities. A new pool will be constructed after the dam is removed.

BFWD and Bedload
The dam blocks bedload (gravel and rock) transport. This has caused portions of the downstream channel to downcut. During high water, the flows are contained in the channel and water is not able to spill out onto the floodplain which releases the energy and slows the water down. The faster, stronger, flows flush logs and gravels out of these sections. Bank erosion is increasing in these areas because of the lack of wood, highway constriction, and lack of overbank flows. Eroding banks are between 5 to 60 feet high. This has affected BFWD ratios. Even though there is sediment coming in from the banks, gravels for spawning habitat are limited. The gravels are being either trapped by the dam or flushed through because of lack of structure to store the gravels.

The downstream channel has downcut and is too low to allow flood water to spread across the floodplain. The stream is no longer able to store wood and sediment in these areas. This is negatively affecting stream channel integrity, channel processes, sediment regime, and favorable channel conditions. By restoring bedload movement through the Growden Dam reach and providing structure in the Log Flume reach, the BFWD ratios would improve. The channel is expected to become more stable.

Cumulative Effects
The cumulative effects of the proposed action involve the effects to Lake Roosevelt and the effects from other activities. This project will improve sediment storage in the system. Sediment coming off of the highway and other roads in the watershed will be stored in the new sediment storage sites. This will improve the fisheries that had been impacted from highway sand entering the stream system. Sediment will likely make it to Lake Roosevelt, however it will not likely impact any fisheries since the sediment storage sites should actually decrease total sediment moving through.

The proposed action restores natural processes that will reduce bank erosion, improve spawning habitat, and improve fish habitat throughout the downstream reaches.

Removing Growden Dam will improve access to the entire watershed for the trout populations. However access to Lake Roosevelt will still be blocked by an existing natural falls and a man-made dam.

Alternative C

Alternative C will have the same effects as Alternative B except for the effects related to dam removal. There would still be a large effect to bedload transport, and it would continue to be a problem affecting both BFWD and Pools per mile. There would be no improvement to the reach above the dam. This would maintain the existing condition of the fisheries above the dam.

Cumulative Effects

The cumulative effects of alternative C do not differ than those of alternative B.

Alternative D

Alternative D will have the same effects as Alternative A except for the effects related to dam breaching. The emergency spillway will provide relief to the dam in the event of a flood and the dam is less likely to breach. Therefore this alternative will continue to impact INFISH RMOs, since bedload transport would continue to be a problem affecting both BFWD and Pools per mile.

Cumulative Effects

The cumulative effects of alternative D do not differ than those of alternative A.

Summary

As seen in the table below, alternative B is preferred. It is the alternative that best addresses the fish passage and bedload issues. Alternative C provides fish passage and some bedload transport; however the lack of total bedload transport will still affect downstream fisheries. It also does not address fish habitat needs above the dam. Alternative D does not address fish passage and bedload transport and therefore is not preferred. However it is better that alternative A, since an emergency spillway prevents a dam breach.

Table III-14 - Fisheries Summary Table

Alternative	Fisheries Rating12	Large Woody Debris	Pools Per Mile	Bankfull Width to Depth Ratio	Bedload	Fish Population
Alternative A -No Action	0 – Dam breach may occur.	No Effect unless the dam breaches	Prevents or Retards attainment of INFISH RMO	Prevents or Retards attainment of INFISH RMO	Continues to cause a detrimental effect	No Change to current trend
Alternative B - Proposed Action	3 – Preferred	Increases and moves toward attainment of INFISH RMO	Increases and moves toward attainment of INFISH RMO	Decreases and moves toward attainment of INFISH RMO	Improves Bedload Movement through the System	Beneficial Impact
Alternative C- Run of The River	2 – Does not fully address bedload movement	Increases and moves toward attainment	Increases and moves toward attainment	Decreases and moves toward attainment	Improves Bedload Movement through the system less than B	Beneficial Impact
Alternative D - Emergency Spillway	1 – Does not address bedload movement or fish passage.	Prevents or Retards attainment	Prevents or Retards attainment	Prevents or Retards attainment	Continues to cause a detrimental effect	No Change to current trend

[12] This rating is a value rating of the effects to fisheries. 0 is the least beneficial to fisheries and 3 is the highest benefit to fish species.

3.3.2 Noxious Weeds

Affected Environment

Inventoried noxious weeds of the area include; spotted and diffuse knapweeds, St. Johnswort, and Canada Thistle.

The whole area was heavily disturbed due to the construction of the dam and the old CCC Camp. Any top soil that was present on the site was incorporated into the existing Dam. As a result of the top soil lacking on the site it has been a constant source of noxious weed population in particular spotted knapweeds. These weeds have been repeatedly treated over the years but because of poor soil conditions it is difficult to fully occupy the site with desirable vegetation, thus always leaving an open spot for knapweeds to get started.

Environmental Effects

This whole project is about soil disturbance, soil movement and soil placement. Conservation of any organic layer (top soil) is an essential part to successful revegetation of disturbed areas. For this project it applies in particular to the area along Hwy. 20 and to the trucking of any waste material to the old Lane Creek Pit site.

At the Lane Creek Pit disposal site, if the top soil organic material can be separated and deposited last so it is on the surface this will greatly aid the rehabilitation work of an otherwise pretty sterile site.

The reed canary grass that is currently present in the riparian zone along the creek will persist and reoccupy this zone when the project is completed. Planting of other species such as brush will be done immediately following the ground disturbing activity in order to get a head start on the reed canary grass and some follow up release activity may be required in order to get the desired species established.

Alternative B
Seventy-four acres will be directly impacted at the dam site and the habitat restoration reach. Approximately 1.1 stream miles and 38 acres of stand treatment will occur at the habitat restoration reach. Approximately 8 acres will be affected at Growden Dam. There will be 8 acres of pit expansion. 10 acres of Lane Creek Pit will be rehabilitated. There are approximately 10 acres that will be affected by travel, staging, and construction activities. Currently all of these acres have noxious weeds on them. Because the weeds exist in the area soil disturbance may benefit those populations. The spread of these populations will be restricted by following the mitigations and the revegetation plan. Establishment of noxious weeds is expected to be minimal where desirable vegetation becomes established on disturbed sites. Through active weed treatment including revegetation activities, there should be a reduction in amount of acres with noxious weeds present.

Alternative C
The effect of alternative C will be the same as Alternative B except for the wetland behind the dam and the Lane Creek Pit rehabilitation. Without these areas, alternative C will have approximately 48 acres impacted.

Alternative D
There is expected to be a reduction in noxious weeds under this alternative. The site would be treated before and after construction of the emergency spillway.

All action alternatives will see a reduction of noxious weeds.

3.3.3 Sensitive Plants

Affected Environment

There are no federally threatened or endangered plant species documented or suspected from the project area. Forty-five sensitive plant species on the Regional Forester's Sensitive Species Plant List (USDA FS 1999) are documented or suspected to occur on the Colville National Forest. The pre-field review showed that no sensitive plant species are documented in the project area. Twenty-six sensitive species documented or suspected from the Colville National Forest have potential habitat in the project area (Appendix). These species were included in the field reconnaissance.

An intuitive controlled sensitive plant survey was conducted September 9, 2002 in areas that may: 1) have potential sensitive plant habitat, and 2) have proposed activities that may impact potential sensitive plant populations. No additional sensitive plant locations were found during this survey. A sensitive plant survey was also conducted in the Log Flume and Sherman Creek flood repair project area on September 3, 1998 (USDA FS 1998). A complete plant survey was conducted during the appropriate blooming periods for the two species with potential habitat in the project area.

Environmental Effects

Under the No Action Alternative (Alternative A) and Alternative D noxious weeds would continue to proliferate in the project area. The project area has a long history of site disturbance. The wetland at Growden has been invaded by reed canary-grass (Phlaris arundinacea). The land adjacent the wetland was disturbed and compacted by the Civilian Conservation Corps Camp and later recreational camping. It is now infested with spotted knapweed (Centaurea biebersteinii).

Under Alternatives B and C, dead and dying trees would be removed in the Log Flume area. No sensitive plants are known to occur in this area (USDA FS 1998). No long-term adverse affects of the timber harvest on sensitive plant species are expected.

The risk analysis for all alternatives concluded that the project may proceed as planned. The consequence of adverse effect was low. The likelihood of adverse affects was low. This analysis leads to a risk rating of 1. A rating of 5 is the most risk. For the no action alternative and the three action alternatives, risk assessment, effects and findings described above assume that the mitigation measures specified in the environmental assessment are fully implemented. All alternatives may have an impact on individuals, but are not likely to cause a trend to federal listing or loss of viability.

Cumulative Effects

There should be no negative cumulative effects from this project, since there are no known sensitive plants in areas of proposed activities.

Summary

Adherence to Forest Plan standards and guidelines will prevent adverse effects to sensitive plants under all alternatives. There are no irreversible or irretrievable effects associated with any of the action alternatives.

3.3.4 Silviculture

Affected Environment

The Sherman Creek watershed is similar to many watersheds in the area from the standpoint of vegetation. Upwards of 60 percent of what is now the west side of Three Rivers Ranger District burned between 1910 and 1930 with high intensity, stand-replacing fires. The primary disturbance processes affecting plant communities in the watershed have historically been fire, grazing and browsing by ungulates, weather, insect/rodent outbreaks and disease epidemics, windthrow, flooding and erosion. In this landscape, narrow forested valleys with frequent wetlands occur between rock walls. A number of both natural and human-caused factors have influenced Sherman Creek since the early 20th century. Bark beetles are a key disturbance agent in the watershed and are interrelated with the fire ecology of the area.

Upland Plant Associations[13]

The potential natural vegetation map shows the majority of the project area along the riparian in the western hemlock/western redcedar zone transiting to the Douglas-fir zone in the uplands. In some sections of the Sherman Creek the Douglas-fir zone extends to the stream channel.

There are seven biophysical environments within the analysis area: dry Douglas-fir/grand fir shrub, cool mesic western redcedar/western hemlock forb-shrub, very moist Engelmann spruce/subalpine fir bottoms, cold dry subalpine fir shrub, cold mesic subalpine fir forb-shrub, cool mesic Douglas-fir/grand fir forb-shrub, and very moist western redcedar/western hemlock bottoms.

[13] Williams, C.K., Lillybridge, T.R., and B.G. Smith. 1995. Forested Plant Associations of the Colville National Forest. USDA Forest Service, Pacific Northwest Research Station, PNW-GTR-360.

Riparian Plant Associations

Riparian areas and the associated vegetation, while being among the first to be altered by humans, also have the ability to recover quicker because of the abundance of water and deeper soil. Historically, these areas were sites with well developed tree and shrub layers with large trees present. Most of the larger stream courses were shade covered, with only small breaks in the canopy when a large tree had fallen. When this occurred, brush would colonize the site for a time, until conifers eventually regenerated. The cycle would begin again as conifers overtopped the brush and grew tall with large crowns. Streams on warmer sites were less overtopped with conifers, because the surrounding stands were generally less dense due to the drying effects and species differences associated with southerly aspects. Alder and willow were probably the major shrub species in lower elevations in the Douglas-fir biophysical environment. Intense fires burned through some stream channels in 1920's, destroying the immediate potential for woody debris recruitment. Timber practices of the 1960's to 1980's called for harvesting close to streams, as well as stream channel cleanout. In some cases, there is no trace of the stands that once existed. Beavers are an active part of the watershed ecosystem and have created several new pools in the project area.

Riparian data plots (Kovalchik, 2001) in the project area indicate a variety of riparian plant associations. The riparian vegetation that grows in post–dam removal environments interacts strongly with other factors that are generally given more direct consideration in dam removal efforts. Selected plant species for restoration need to consider the both the existing plant associations and projected changes from the activities. The revegetation plan will be done by the Forest Revegetation Team.

The National Wetlands Inventory map showed approximately 127 acres of wetlands associated with this project. They extend from the depositional wetland behind Growden Dam (24 acres) to just below the Inchelium Bridge on Ferry County Highway #3. The wetlands are dominated by trees, shrubs, and persistent emergents (i.e. cattails and other species that normally remain standing until the beginning of the next growing season). Over 80% of the wetlands in the project area are seasonally flooded with a scrub-shrub overstory of hardwood vegetation. Along the private section the stream is forested. The largest continuous wetland (53 acres) in the project is in this category and extends along Sherman Creek from above Canyon Creek to below Log Flume. Most of the other wetlands are temporarily or seasonally flooded, forested, wetlands. Field reconnaissance in the spring of 2004 showed beaver activity along 3 sites of the project area.
Most of the existing wetlands in the project are in the Alder Series (*Alnus*). Alder communities are important for streambank protection, cover, and thermal protection. Alder provides a critical substrate for insects with subsequent impacts as fish and aquatic insect food. The nutrients derived from fallen decomposing alder leaves are important to the stream ecosystem (Kovalchik, 2001).

Site Specific Forest Vegetation

The major activity area lies along the mainstem of Sherman Creek which contains nearly level terraces and floodplains in broad valley bottoms, and at the Lane Creek Pit. Slopes are generally less than 10 percent. This includes stands 2280177, 2280178, and 6599 along the mainstem of Sherman Creek (Log Flume), stand 2280080 and 2280218 at Growden Dam and 2280074 at the Lane Creek Rock Pit (GIS D2Veg Layer, 2000). Seral vegetation on the warmer, drier Lane Creek Rock Pit tends to be dominated by Douglas-fir and/or ponderosa pine, while cooler, more moderate mesic sites along Sherman Creek are dominated by lodgepole pine and/or western larch, ponderosa pine. Western redcedar and hardwood trees are found in many riparian areas, although the upper stream reaches were burned so hot that the natural climax vegetation has not fully recovered to date. Inclusions of Engelmann spruce and subapline fir occur along the cooler fringes of this group along valley bottoms or in cold air depressions. Grand fir and spruce trees are found near Growden Dam.

Impoundment Site – Alder Wetland

During construction of Growden Dam and Highway 20, vegetation along many segments of the original stream channel was removed or altered by the highway construction and are now wetlands. As the pond filled with sediment, both native and non-native vegetation became established creating the alder wetland we see today in Figure 11. Reed canary-grass (*Phlaris arundinacea*) has also become well established in the wetland. A beaver dam is visible in the stream channel Beavers have constructed several small dams within the project area. The beavers need for vegetation and trees for food and habitat would be an important consideration in developing the re-vegetation plan for the project.

Figure III-15 - Alder wetland created in deposition zone behind Growden Dam.

Figure III-16 - Vegetation in Restoration Reach

Figure III-16 shows existing vegetation along Sherman Creek. A lone lodgepole pine can be seen in the foreground dominated by grass and shrubs. Vegetation is a controlling influence because it determines both the width/depth ratio and channel stability.

Lane Creek Rock Pit
Douglas-firs, western larch, and ponderosa pine are found in the stands surrounding the pit. Understory vegetation including ninebark, serviceberry, spirea, Oregon grape, oceanspray, snowberry, pinegrass, strawberry, and heartleaf arnica are among the most common. Sediment from the impoundment will be used to restore the pit. The site will be re-vegetated. The re-vegetation plan will be done by the Forest Re-Vegetation Team.

Trees for Sediment Structures – Alternatives B and C
Twenty-five structures would be placed in the stream to mitigate both loss of wetland habitat behind the dam and to increase the amount of sediment storage in Sherman Creek. Trees are sparse along Sherman Creek, so an alternate source was selected to find the 200 to 300 trees needed. Trees, mostly dead or dying, would be felled and moved to the drop sites by forwarder. The area selected is a flat terrace in the Douglas-fir/ninebark-twinflower association between Sherman Creek and State Highway#20. Old road templates and skid trails from past activities would be re-used for access. In 1984, under the Sherpa Timber Sale Unit 1, 8 acres were commercially thinned and salvaged in Log Flume Interpretive developed recreation site. In 1997, Portal Timber Sale Unit 3 commercially thinned 32 acres near Log Flume Interpretive Site. Within this area, ponderosa pine, lodgepole pine and Douglas-fir trees are dead and dying due to a combination of stress from drought, bark beetle attacks, and off-site stock planted. A combination recent dead (yellow to brown needles) and live trees would be removed with an average diameter of roughly 9-inches diameter breast height. Some larger diameters may be taken. The entire tree in length of 30 to 35 feet is planned to be used. Twenty-five to fifty of the trees would be pushed over with an excavator or harvester to keep the rootwad attached. Some of the trees with rootwads attached may be delivered to the site. A forwarder would be used to move the trees from the stand to the drop sites.

Environmental Effects

Alternative A--The No Action Alternative
The No Action Alternative will not implement any new management actions. Growden Dam will continue to be maintained by the Colville National Forest engineering staff. This will include removal of vegetation on the face of the dam, annual inspection of the structure, and cleaning of the trash rack behind the dam during spring flows. Monitoring of vegetation will continue at the Log Flume site, and corrective action would be taken if necessary to assure adequate stocking of suitable plant species. Dead and dying trees would be cleaned up near developed sites as needed. The ecosystem process set in motion would continue. Natural regeneration would continue to be established from local seed sources. Successional processes will continue based on disturbances.

Natural regeneration that has become established since the 1998 flood will continue to develop along Sherman Creek. Recruitment of large wood debris would continue. The established trees and shrubs would provide shade and habitat. Beavers would continue to utilize tree and vegetation for habitat and food. The established vegetation surrounding the wetland would not be disturbed. Ecological processes would continue from the last disturbance.

There could be a slight effect to forest trees if the dam breaks and erodes stands along the banks. The wetland vegetation could also be affected as the established vegetation would be disturbed and successional processes reset. There would be no effect upon the silviculture of the watershed or the district.

Alternative B--The Proposed Action –Removal of the Dam

Twenty-five sites would be enhanced in the stream to mitigate both the loss of wetland habitat behind the dam and to increase the amount of sediment storage in Sherman Creek. Trees, mostly dead or dying, along the site would be felled for use as stream structures. The trees in lengths of 30 to 35 feet would be moved from the treatment area to the stream structure site by forwarder. An acre landing from a previous timber harvest would be used to stage the logs. The landing would be decompacted and seeded with native grasses, shrubs and trees when the project is completed. Approximately ½ mile of access roads would be required. Old road templates from past activities would be re-opened for this purpose. These areas would be decompacted and seeded with native grasses and shrubs when the project is completed.

Most of the trees removed would be dead or dying and the number of trees removed is a small percentage of the stand, the effects to the forest stand would be minimal. Since the whole tree would be used and groundwood levels are below what is generally required for long term site productivity maintenance would be decreased slightly. The immediate potential for recruitment of woody debris would be decreased slightly. The removal of dead trees would also reduce shade levels and

decrease down material for microsites where tree regeneration would become established. The effects to the timber resource would be minimal due to the small number live merchantable trees removed.

The removal of the dam site would result in loss of much of the existing vegetation. The successional processes would be re-set. Natural vegetation would slowly become re-established. Terrace benches would be artificially revegetated with shrubs and exposed soils seeded with native grasses. Stockpiled topsoil and vegetation would be brought back to revegetate the floodplain and terrace. The area affected would be so small there would be no cumulative effect on silviculture in the watershed.

Alternative C -- Construction of a Run-of-the-River Structure
The effects would be the same as Alternative B at the Log Flume site. At the wetland, loss of the wetland species would not occur. There may be some mortality from a reduced water table. There would be a minimal effect on silviculture in the watershed.

Alternative D -- Construction of an Emergency Spillway
There would be no effect to silviculture of the watershed.

Summary
The proposed activity is consistent with the standard, goals, and objectives of the Colville Forest Plan (USDA, 1988), as amended.

No extraordinary circumstances relative to forested vegetation were identified for this project.

There are no forest vegetation concerns in the project area that would prevent implementation of the proposed actions. This project is not expected to have any significant direct, indirect, or cumulative impacts on the forest vegetation resource.

3.3.5 Wildlife

3.3.5.1 Threatened, Endangered, and Sensitive Species

Affected Environment
The Endangered Species Act (ESA) requires that the Forest Service address the potential effects of proposed management activities on threatened and endangered species. Each Region of the Forest Service also maintains a list of sensitive species whose population viability is of concern because of either significant current or predicted downward trends in population numbers or density or because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The Regional Forester lists the following species as sensitive for the Colville National Forest; however, they are not expected to occur within the project area because: a) suitable habitat is not present in the analysis area, or b) the analysis area lies outside the known range of these species (except as possible migrants passing through the area). None of the alternatives will impact these species. There will be no direct, indirect, or cumulative effects associated with any of the alternatives.

Northern leopard frog	Common loon
Clark's grebe	Ash-throated flycatcher
Eared grebe	Green-tailed towhee
Ferruginous hawk	Western gray squirrel
Sharp-tailed grouse	American white pelican
Yellow-billed cuckoo	Greater sandhill crane

Environmental Effects
Table III-17 summarizes effects on federally and regionally listed species. For more detailed information, see the Biological Evaluation in the project analysis file.

Table III-17 - Threatened, Endangered, and Sensitive Species

Name & Status	Existing Conditions and Habitat Elements	Effects of Alternatives	Cumulative Effects	Risk Assessment
Bald eagle (Haliaeetus leucocephalus) Threatened	No nests in planning area. No winter roost sites because of distance to winter food sources.	No effect to species or habitat in any alternative.	No cumulative effects to species or its habitat.	No effect for all alternatives.
Bull trout (Salvelinus confluentus) Threatened	See section 3.3.1 and the fisheries specialist's report in the project analysis file.			
Gray wolf (Canis lupus) Threatened	Area does not contain winter range for ungulates. Area does not contain seclusion habitat or denning habitat	Noxious weed treatment will reduce loss of forage and will mitigate the temporary loss of summer range. Roads will be obliterated then seeded, so the new roads will not increase contact with humans.	No cumulative effects to species or its habitat.	No Effect for all alternatives.
Grizzly bear (Ursus arctos) Threatened	Project area is in Management Situation 5, not managed as grizzly bear habitat. Travel corridors, seclusion habitat, hiding cover and forage (big game) are not present because a large highway is adjacent to the planning area.	Travel corridors, hiding cover, core areas will not be affected by any alternative. Effects to seclusion habitat will not change.	No cumulative effects to species or its habitat	No Effect for all alternatives.
Canada lynx (Lynx canadensis) Threatened	Area not in Lynx Analysis Unit: the project area lies at elevations lower than lynx generally occupy and does not provide lynx habitat.	No effect to species or habitat in any alternative.	No cumulative effects to species or its habitat.	No effect for all alternatives
Woodland caribou (Rangifer tarandus) Endangered	Project not near recovery zone: -Woodland caribou are separated from the planning area by a mountain range and the Pend Oreille River. No caribou exist in project area.	No effect to species or habitat in any alternative.	No cumulative effects to species or its habitat.	No effect for all alternatives.

Name & Status	Existing Conditions and Habitat Elements	Effects of Alternatives	Cumulative Effects	Risk Assessment
California wolverine (Gulo gulo luteus) Region 6 Sensitive	Habitat exists; wolverine have been documented on the Colville National Forest. The area does not contain natal denning habitat.	All alternatives will have no or little effect to successional stages that wolverine use and no effect to stages on which wolverine depend. No alternative will affect travel corridors, prey populations, or seclusion habitat.	No cumulative effects to species or its habitat.	No impact for all alternatives.
Fisher (Martes pennanti) Region 6 Sensitive	Sightings have not been recorded in Ferry County and fisher are nearly absent from Washington State. None of the area affected by any alternative contains late structure or mature forest; the 38 acres proposed for thinning contain small- and medium-sized trees.	No alternatives will affect fisher or fisher habitat.	No cumulative effects to species or its habitat.	No impact for all alternatives.
Great gray owl (Strix nebulosa) Region 6 Sensitive	All of the planning area lies below 3,200 feet (maximum elevation is 2,600 feet), which we considered the lower level of elevation for great gray owls, thus the planning area does not provide habitat for great gray owls.	None of the alternatives will affect existing or potential habitat because the project area does not contain great gray owl habitat.	No cumulative effects to species or its habitat.	No impact for all alternatives.
Peregrine falcon (Falco peregrinus) Region 6 Sensitive	No nesting cliffs suitable for peregrine falcons occur in the watershed. No historical records list peregrine falcon as having nested on or near the Colville National Forest. Most of the NFS land in the watershed consists of forested stands and provides low quality habitat for foraging peregrine falcons.	No alternative would affect peregrine falcon habitat because no nesting habitat occurs and the area contains very poor habitat.	No cumulative effects to species or its habitat.	
Redband trout (Oncorhynchus mykiss) & cutthroat trout (Oncorhynchus clarki lewisi) Region 6 Sensitive	See the Fisheries section and also the fisheries specialist's report in the project analysis file.			

Name & Status	Existing Conditions and Habitat Elements	Effects of Alternatives	Cumulative Effects	Risk Assessment
Pacific western big-eared bat (Corynorhinus townsendii) Region 6 Sensitive	A bat survey conducted in 1988 (Perkins 1990) documented one Townsend's big-eared bat location, and subsequently 2 others have been found. None of the sites is near the planning area, though the area might contain roosting or reproductive habitat. No mines or caves occur in the area.	The proposed action and Alternative C propose thinning 38 acres, which will open the stand and make it more suitable for foraging bats. This amount is minimal and will not increase the bat population.	No cumulative effects to species or its habitat.	

3.3.5.2 Management Indicator Species (MIS)

Affected Environment and Potential Effects

Management Indicator Species (MIS) are chosen to represent habitat needs of all vertebrate species, to monitor selected habitats that could become limiting to some species through forest management activities, and to provide sufficient populations of selected species to meet demands for wildlife-related recreation.

Of the 14 Management Indicator Species (MIS) listed in the Colville National Forest Land and Resource Management Plan (Forest Plan), 13 might be found within the project area. The project area contains does not contain potential grizzly bear habitat; further description can be found in the Biological Evaluation for this project. The planning area is about 60 miles from the woodland caribou recovery area and caribou do not inhabit the planning area. We did not find any great blue heron rookeries or nest sites during field reconnaissance, thus excluded effects to great blue heron from analysis of great blue heron/large raptors.

The Colville National Forest (CNF) based the habitat capability objectives listed in the Forest Plan (page 4-13) on 1980 populations. Because the Forest Service (FS) manages habitat and the State of Washington manages wildlife populations, the FS objective is to provide habitat capable of supporting the desired population of each management indicator species.

The project area lies partially within the watershed of Sherman Creek, which flows into the Columbia River. We conducted effects analysis based on the planning area and cumulative effects based on, usually, the watershed.

Environmental Effects

Table III-18 lists management indicator species (MIS) and summarizes habitat requirements for that species, the potential effects and cumulative effects of the project alternatives on each species. For more detailed information, see the biologist's report in the project analysis file.

Table III-18 - Cumulative Effects on MIS

Name & Status	Current Conditions and Habitat Elements	Effects of Alternatives	Cumulative Effects
Big Game - Deer and elk (Odocoileus virginianus and Cervus elaphus)	The area does not contain winter range. The entire project area can be considered summer range.	No alternative will affect winter range. The Proposed Action and Alternative A will affect 38 acres of summer cover by removing dead or dying trees. These trees do not contribute to quality summer cover and the reduction will not affect big game. The reduction will open up the stand, increase light to the forest floor, and improve forage quality. The increase in quantity will be minimal and will not affect big game populations.	No alternative will cumulatively affect winter range. Several timber harvest and prescribed fire projects have occurred in the watershed within the past decade, particularly sales developed from the Sherman Creek Ecosystem Management Projects EIS. All have positively influenced forage by reducing the amount of cover and increasing the amount of forage. The proposed project will not contribute further to cumulative negative or positive effects to deer summer range.
Barred owl (Strix varia)	Area does not contain large trees or old growth habitat because of an intense fire in 1929 and subsequent salvage logging, and the area is not Forest Plan Management Area 1 (MA1).	Harvest will occur only in the Proposed Action and in Alternative C and will affect 38 acres of mostly lodgepole pine, and all trees are less than 16” dbh. The trees that will be harvested do not provide barred owl habitat. None of the other actions associated with any alternative will affect barred owls.	Because this project does not affect barred owls, implementation will not add to the cumulative effects of management on barred owls.

Name & Status	Current Conditions and Habitat Elements	Effects of Alternatives	Cumulative Effects
Beaver (Castor canadensis)	Sherman Creek contains beavers, and the wetland affected by the dam is frequently occupied by beavers. Nearly every autumn, beavers construct small dams across the stream, which the spring runoff destroys. Beaver have not built lodges in the area affected by the dam, but they have constructed lodges on Sherman Creek both above and below the dam in ponded water little-affected by spring runoff.	The Proposed Action will eliminate beaver habitat in the area influenced by the dam because it will return the river to its original contour, which is too steep for a beaver dam. Alternative C will reduce beaver habitat in the area influenced by the dam by lowering the water level. Both these alternatives will slightly improve habitat downstream because disturbance created during the installation of the stream structures will create conditions conducive to cottonwood germination, prime food for beaver. The No-Action Alternative and Alternative C will not affect existing beaver habitat. None of the alternatives will affect existing lodges. The negative effects of removing the dam and lowering the water table probably only affect transitory individual beaver and would not affect existing, established beaver colonies. The positive effects of regenerating cottonwood would be limited in extent.	The proposed project will not contribute further to cumulative negative or positive effects to beaver habitat.
Blue grouse (Dendragapus obscurus)	The planning area lies at too low an elevation to be considered blue grouse habitat.	This project will not affect blue grouse.	Because this project does not affect blue grouse, implementation will not add to the cumulative effects of management on blue grouse.
Franklin's grouse (Falcipennis canadensis)	Large stands of young lodgepole pine do not exist in project area.	The 38 acres proposed for treatment in the Proposed Action and Alternative C will not improve conditions for Franklin's grouse because the prescription calls for thinning, and few lodgepole pines will germinate. The change in vegetation that will occur in either of these alternatives will have nearly no effect to Franklin's grouse habitat. The No-Action Alternative and Alternative D will not affect Franklin's grouse habitat.	None of the alternatives would contribute to cumulative effects caused by other projects.

Name & Status	Current Conditions and Habitat Elements	Effects of Alternatives	Cumulative Effects
Large raptors (Accipiter species) and great blue heron (Ardea herodias)	In the project area, several stands contain trees suitable for nesting raptors. No raptors nest in these stands. Raptors do hunt in the area.	The No-Action alternative and Alternative C will not affect large raptor habitat because no harvest is planned and no forested stands will be disturbed. The Proposed Action and Alternative C will not affect raptors because the 38-acre stand proposed for harvest does not currently provide nesting habitat.	There are no cumulative effects to raptors for any alternative.
Northern three-toed (Picoides tridactylus) and pileated woodpeckers (Dryocopus pileatus); other primary cavity nesters	No high-quality Northern three-toed woodpecker habitat exists because no fires have burned through the area since 1929. These birds are also found at low population levels in large-tree and lodgepole pine cover found in the watershed. A few stands of medium-sized lodgepole pine grow along the stream. No pileated woodpecker MR[14]s are located in the planning area. Old growth does not exist in the planning area. No MA1 areas exist in the planning area. Pileated woodpeckers have been documented from the site, in the stands of larger trees primarily on the north side of Sherman Highway.	In the 38-acre harvest unit in the Proposed Action or Alternative C, at least 4 large snags and 4 green trees will remain per acre. If the number of remaining snags is not sufficient, the loss due to harvest will be mitigated by creating snags. The No-Action alternative and Alternative D will not remove snags. Harvest will not affect pileated woodpecker MRs, MA10 or MA11 areas because none of these exist in the planning area. No alternatives propose to harvest old growth or in MA1 areas because none exists.	The proposed project will add little to the cumulative negative effects of reduced snag levels because we will create snags in the 38-acre unit proposed for harvest in the Proposed Action or Alternative C if the number of snags falls below standards in the Forest Plan.
Pine marten (Martes americana)	Marten do not inhabit the planning area: the entire area lies below 3,200 feet elevation.	None of the alternatives would affect marten.	No alternatives will contribute to cumulative effects on this species' habitat.
Trout	See the Fisheries section of this EIS and the Fisheries biologist's report in the project analysis file.		

[14] MR – Management Requirement – 20 percent snags in each 40 acre area.

3.3.5.3 Neotropical Migratory Landbirds

Affected Environment

Impacts were examined at the level of individual, population, and community. None of the species that occupy the area have experienced the dramatic population declines of some Neotropical migratory landbirds. The loss of the wetland will result in a shift of the bird community that associates with wetland areas towards one that associates with open riparian areas. Considerable overlap in species exists, and no species that currently occupies the wetland is expected to disappear from the site.

The Project Area mostly contains riparian habitat consisting of alder and willow shrubs and a drier upland consisting of scattered stands of lodgepole pine, ponderosa pine, and Douglas-fir. We conducted a banding project at the Growden Dam for 5 years during the late 1990s, and the bird communities found within the analysis area are typical of those present throughout much of the Colville National Forest and this portion of northeast Washington (Vial and Loggers 2000). None of the species have experienced dramatic population declines.

Environmental Effects

No Action Alternative

The No Action alternative will not affect birds at any level.

Action Alternatives

Alternative D might affect some individual nesting birds but the effects are measurable only at the level of the individual and are insignificant. The Proposed Action (Alternative B) and Alternative C are the only alternatives that will affect the wetland and will be the only ones discussed further; impacts from either of these alternatives are minor. In both alternatives, 2 segments of existing, closed road will be reopened, then ripped, seeded and closed again. About 38 acres of dry, mainly lodgepole pine will be thinned of dead and dying trees. Some live trees will be taken. These trees will be used to construct fish habitat in Sherman Creek, adjacent to the stand. In Alternative B (the Proposed Action), the area behind the dam will be restored to its original contour, much of the sediment pushed into a terrace, and some sediment removed to the Lane Creek Pit for its restoration. Bare areas will be seeded with native vegetation. In Alternative C, the water level will lower but the area behind the dam will not be disturbed. Violet green and tree swallows, both very common species that hunt open areas extensively, will be the most-affected Neotropical migrant birds. Other species of Neotropical migrant birds sighted or heard during bird banding were also common in other areas of the stream (as were swallows, but less much common than at the wetland).

Effects at the level of individuals

The thinning of 38 acres in both the Proposed Action (Alternative B) and Alternative C will reduce habitat quality for some birds that require denser habitat and improve it for those that live in more open habitats. The dramatic change in the wetland in Alternative B (the Proposed Action) will affect those individuals that occupy the wetland.

Effects at the level of populations

The local populations of violet green and tree swallows might be negatively affected by the loss of the wetland in the Alternative B (Proposed Action). Loss is expected to be compensatory rather than additive and will not affect the overall numbers of swallows in the watershed. No other activities associated with any alternatives will affect populations of any Neotropical migratory birds.

Effects at the level of communities

Because the wetland is small, it does not provide sufficient habitat to support a community of birds that depend on wetlands, similar to what one would find in a larger wetland complex. The loss of the wetland will result in a shift of the bird community that associates with wetland areas towards one that associates with open riparian areas. Considerable overlap in species exists, and no species that currently occupies the wetland is expected to disappear from the site. No other activities associated any alternatives will affect communities of any Neotropical migratory birds.

Cumulative Effects

This is the only project to affect a wetland in the Sherman watershed. The changes that will occur as a result of any action alternative is to shift the bird community from birds associated with wetland areas to one more associated with open riparian

areas. Because most of these species are the same but differ in density, the cumulative effects will be at the community level. All species that currently occupy the site are expected to remain, though the densities probably will shift.

3.4 Other Required Analysis

3.4.1 Air Quality and Clean Air Act

None of the alternatives would affect air quality. No burning is planned that might add dust or particulate matter into the environment. All alternatives comply with the Clean Air Act.

3.4.2 American Indian Rights

No effects on the American Indian Religious Freedom Act are expected from the three action alternatives.

No effects are anticipated on American Indian social, economic, or subsistence rights from any of the alternatives.

3.4.3 Conflicts with Objectives of Other Land Management plans, policies, and Controls

Alternatives B and C comply with the Forest Plan as amended by INFISH. Alternatives A and D do not comply with the Forest Plan as amended by INFISH, since these alternatives do not have fish passage over Growden Dam.

3.4.4 Consumers, Civil Rights, Minority Groups, and Women

The alternatives are likely to have a small effect on consumers, civil rights, minority groups, and women. The project has been designed to maintain the access for persons with disabilities at the Log Flume interpretive trail. There will be a temporary closure to the Log Flume trail while project activities take place. This will affect users, but the effect is not disproportionate.

3.4.5 Economic and Social Effects

The action alternatives will not decrease the amount of users at the dam site. Most users use the Growden interpretative site as a rest stop. This project should increase the number of users in the project area. By restoring the fisheries and improving the interpretation, these sites will be more user-friendly and attractive.

3.4.6 Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources is an action that disturbs a nonrenewable or renewable resource to the point that renewal can occur only over a long period of time or at great expense (USDA FS 1988b, pp. IV-142 – IV-144).

The changes to Growden Dam in Alternatives B and C cause an irreversible and irretrievable loss of the wetland behind the dam. This is mitigated through downstream restoration.

The implementation alternatives A and D would not cause any irreversible or irretrievable commitment of resources.

3.4.7 Prime Farmlands, Rangelands, and Forestlands

There will be no change in the existing forestlands. There are no rangelands and prime farmlands on Forest Service administered lands.

3.4.8 Short-Term Use and Long-Term Productivity

Short-term uses are typically uses that determine the present quality of life for the public. They might be activities such as livestock grazing, recreation, removal of timber, road construction, and mineral exploration.

Long-term productivity is the capability of the land to provide resources, such as forage, timber, and high quality water. Long-term productivity determines the quality of life for future generations. Maintaining soil productivity and water quality are assumed to assure maintenance of long-term productivity. The standards and guidelines in the Forest Plan, Chapter 4,

were developed to protect the long-term productivity of the Colville National Forest. For information about short-term use and long-term productivity, see the Forest Plan FEIS (USDA FS 1998b, p. IV-145).

Alternative A
There will be no effect to either short-term use or long-term productivity.

Alternative B and C
There will be a short term effect to the recreation users at Log Flume Interpretive Site and the Growden Dam site. Long-term productivity will increase at these sites due to restoration work.

Alternative D
There will be a short term effect to recreation users at the Growden Dam site during installation of the emergency spillway.

3.4.9 Unavoidable Effects

Heritage

There will be an adverse affect to Growden Dam under alternatives B and C. These effects will be mitigated.

Recreation

Under alternative B, C, and D, the Lane Creek riprap source would increase the visibility of the existing pit by creating a larger area of light colored rock that is in contrast to the surrounding landscape. Due to slope and aspect, there are no opportunities to screen the expansion from the Byway and the Growden Heritage Interpretive site. To account for this, this project amends the Forest Plan visual quality objective from Retention to Restoration.

Noxious Weeds

Soil disturbance will occur and provide sites for noxious weed populations. Weed treatment will occur and there will be no new weed populations.

Wetlands

The wetland behind the dam will be altered under alternatives B and C.

To meet the Executive Order No. 11990, Protection of Wetlands, more wetlands delineation is needed to determine effects to the wetlands. There may need to be more mitigation added.

Response: The Forest Service used the National Wetlands Inventory for maps of wetlands in the area. Further wetlands delineation will be done using the 1987 Federal Wetland Delineation Manual during final design.

The Forest Service consulted with the Department of Ecology on Mitigations for impacting the wetlands. This is their response is detailed under Issue 2 – Wetlands. In summary, further mitigation is not necessary, since the wetland behind the dam is artificial.

3.4.10 Unroaded and Roadless Areas

The project is next to a major highway. There are no unroaded or roadless areas affected by this project. Road construction will be on previously used templates and these roads will be obliterated at the end of the project.

3.4.11 Wetlands and Floodplains

The proposed action would change the Growden reach from slow water stream with many slack water areas to a faster pool riffle stream. Executive Order No. 11990, Protection of Wetlands required the Forest Service to meet the President's goal of no net loss of wetland functions and values. Addressing this; the Colville National Forest added approximately 1.1 miles of stream restoration to the proposed action. We also added a small pond system in the reach behind the dam. The State Department of Ecology was consulted on this issue. They reviewed the proposal and gave the following statement:

“We have discussed this issue at our Wetlands Technical Advisory Group meetings, specifically the planned removal of the dam on the White Salmon River. Our collective wisdom is that as dams are such an unnatural perturbation to the watershed, that their removal is usually a good thing. We can accept the loss of the artificially maintained wetlands if the tradeoff results in restoration of landscape processes, e.g. sediment transport, temperature stabilization, fish migration, etc. As part of the mitigation, riparian restoration is central to the above elements, and also to simply stabilizing the reborn river banks. Because this is "Out-of-Kind" mitigation (trading off Palustrine wetland for riverine riparian, or actually natural process restoration), we do not have a crediting formula to crunch a number that is felt acceptable in making that trade off. My personal feeling, after seeing the dam and driving the length of Sherman Creek numerous times, is that restoring 1.1 miles of riparian and the processes mentioned is an acceptable trade for the loss of 8 acres of dam-induced wetland.” (Chris Merker, Wetland Biologist)

Because this is an artificially maintained wetland it does not support some of the more unique aspects of wetlands.

Thus, our analysis concluded that with the additional riparian treatments, we have met the intent of the Executive Order No. 11990, Protection of Wetlands.

For more effects on wetlands and floodplains, see the Water section of Chapter 3.

3.4.12 Wilderness, Wild and Scenic Rivers, and Research Natural Areas

The project does not contain any designated wilderness, wild and scenic rivers, or research natural areas.

IV) Contacts

4.1 Agencies and Persons Involved

Listed below are the members of the interdisciplinary team and other individuals and agencies that participated in the development of this EIS. Specialists' reports are available from the project analysis file.

4.1.1 Interdisciplinary Team Members

Table IV-1 - Interdisciplinary Team Members

Name	Resource Specialty	Professional Discipline	Degree	Expertise	Years Experience	Location
Alicia Beat	Heritage	Archeologist	University of Northern Colorado (1998) BA, University of Oklahoma (2003) MA	Archaeology and Physical Anthropology	5 years; FS Tenure: 1 yr 4 mos	CNF SO
Bruce Bailey	Engineering	Civil Engineering Technician	BS Civil Engineering, U. Cal. at Davis, 1976,	Heavy Construction	28	CNF SO
Chris Loggers	Wildlife	Wildlife Biologist	B.S. & M.S. Wildlife Biology	Wildlife habitats and populations	USDA FS, USDI FWS, Minnesota DNR, & Moroccan DWF, 22 years	Three Rivers Ranger District
Dennis Gordon	NEPA coordinator	West Zone Environmental Coordinator	BS in Soil Science from Montana State U in 1976	Soil science and Nepa	30 Years	Three Rivers Ranger District
Jann Bodie	Recreation and Scenery	Assistant Recreation Staff/Forest Landscape Architect	B.S. Landscape Architecture 1975 from Oregon State University	Landscape Architecture	22	CNF SO
Jim Parker	NEPA reviewer	Forest Environmental Coordinator	BS in Forestry, Northern Arizona University, 1975	Forestry, Silviculture, and Environmental Analysis	29	
Joe Coates	Hydrology and Soils	Hydrologist	B.S. Forest Management and 1 ½ years Watershed Mgt. post graduate	Hydrology, Soils, Forest Management	28	Three Rivers Ranger District

Name	Resource Specialty	Professional Discipline	Degree	Expertise	Years Experience	Location
			study;			
John Ridlington	Noxious Weeds	Rangeland Program Manager	B.S. Forestry and Range Mgt. Washington State University	Master Weed Advisor	36	CNF SO
Karen Honeycutt	Fisheries, Interdisciplinary Team Leader, writer-editor	Fish Biologist	B.S. Wildlife and Forestry with emphasis in Fisheries from Virginia Tech	Stream Restoration, Fisheries	16	CNF SO
Kathy Ahlenslager	Sensitive Plants	Forest Botanist	M.A. Botany	Rare plants	20	CNF SO
Mark Lysne	Geotechnical engineering	Geotechnical Engineer	B.S. in General Science from the University of Oregon in June 1971	Geology and Geotechnical Engineering	31	Malheur National Forest
Michelle Satterfield	Forest Vegetation and Silviculture	Silviculturist	B.S. Forest Science	R6 Certified Silviculturist	24	Three Rivers Ranger District
Mike Almas	Fire and Fuels	Assistant Fire Management Officer - Fuels	B.S. Forestry Resource Mgt;	Fuels	19	Three Rivers Ranger District
Stephen F. Kramer	Heritage Resources	Forest Archaeologist	B.S. & M.A.I.S. Anthropology	Historic and Pre-historic archaeology and History	11	CNF SO

4.1.2 Agencies and Persons Consulted

The following agencies and governments were consulted during the development of the FEIS:

1. Confederated Tribes of the Colville Reservation
2. Kalispel Tribe of Indians
3. Spokane Tribe of Indians
4. Ferry County Commissioners
5. Ferry Conservation District
6. Washington Department of Ecology – Habitat Section
7. Washington Department of Ecology - Dam Safety Section
8. Washington Department of Fish and Wildlife
9. Washington State Department of Transportation

10. USDA Forest Service – Restoration Assistance Team – Brian Baer, Paul Boehne, Johan B. Hogervorst, Bill Shelmerdine
11. USDA Forest Service – Colville National Forest Employees – Lou Janke, Tom Shuhda, and Stacy Webster-Wharton

4.1.3 Members of the Public

The following contributed comments or suggestions during the development of this EIS.

Kelly Carr	Landowner
C.B. Skipworth	Concerned Citizen
Mark McDougal	Tribal Member
David Heflick	Kettle Range Conservation Group
Brian Henderson	Concerned Citizen
Sharon Shumate	Ferry County Natural Resource Board
James Schumacher	Concerned Citizen

V) List of Persons, Organizations, and Agencies to Whom Copies of the FEIS are Sent

The following agencies, organizations, businesses, and individuals were sent the full ROD and FEIS or a letter notifying them of the availability of the Rod and FEIS on the website or at the Three Rivers Ranger District and Supervisor's Offices. All participants have been given the opportunity to receive the ROD and FEIS.

Table V-1 - List of Persons, Organizations, and Agencies to Whom Copies of the FEIS are Sent

Individuals	Location	Hard Copy	CD	Web
C.B. Skipworth	Auburn, WA			X
Kelly Carr	Colville, WA			X
Mark McDougal	Nespelem, WA			X
Brian Henderson	Kettle Falls, WA			X
James Schumacher	Curlew, WA			X
Organizations	**Location**	**Hard Copy**	**CD**	**Web**
Northwest Ecosystem Alliance	Kettle Falls, WA			X
Dept of Ecology, Water Resources Dept, Washington Dam Safety Office	Olympia, WA			X
Eastern Region, Washington State Dept of Transportation	Spokane, WA			X
Ferry County Commissioners	Republic, WA	X		X
Ferry County Natural Resources Board	Republic, WA			X
Sherman Creek Fish Hatchery, WDFW	Kettle Falls, Wa			X
Environmental Trust Department, Colville Confederated Tribes	Nespelem, WA			X
Kalispel Tribe of Indians	Usk, WA			X
Spokane Tribe	Wellpinit, WA			X
Agency	**Location**	**Hard Copy**	**CD**	**Web**
Deputy Director, USDA APHIS PPD/EAD	Riverdale, MD			X
Director, Office of Environmental Policy and Compliance	Washington, DC	X		X
Director, Office of NEPA Policy and Compliance, US Dept of Energy	Washington, DC			X
Director, Planning and Review, Advisory Council on Historic Preservation	Washington, DC			X
Division Administrator, Federal Highways Administration	Olympia, WA			X
EIS Review Coordinator, EPA, R 10	Seattle, WA	X		X
Habitat Conservationist Division, Northwest Region, National Marine Fisheries Service	Portland, OR			X
Head, Acquisitions & Serials Branch, USDA, National Agriculture Library	Beltsville, MD	X	X	X
National Environmental Coordinator, Natural Resources Conservation Service, USDA	Washington, DC			X
Northwest Power Planning Council	Portland, OR			X
US Army Engr, Northwestern Division	Portland, OR			
USCG Environmental Impact Branch, Marine Environmental and Protection Division	Washington, DC			X

Appendix A – Sensitive Plants

Table A-1 - USDA Forest Service, Region 6 Sensitive Plant Species listed for the Colville National Forest (April 24, 2001)

Plant Taxa	Documented (D) or Suspected (S) in Project Area	Habitat
Antennaria corymbosa		Bogs, 5000 ft.
Antennaria parvifolia	(S)	Dry, open places, on sandy or gravelly riverbanks, openings of ponderosa pine forests 1900-2600 ft.
Astragalus microcystis		Open woods near shorelines, riverbanks, floodplains, 1900-2100 ft.
Botrychium ascendens	(S)	Dry meadows, 3000-3400 ft.
Botrychium crenulatum	(D)	Western redcedar-western hemlock forests, streambanks, floodplains, 2030-4600 ft.
Botrychium hesperium	(S)	Dry to moist meadows, 3200-3300 ft.
Botrychium lineare	(S)	Western redcedar-western hemlock forests, streambanks, floodplains, 2000-4000 ft.
Botrychium paradoxum	(D)	Dry meadows, perennial and intermittent streams, 2500-3600 ft.
Botrychium pedunculosum	(S)	Dry to moist meadows, perennial streams, 2500-3300 ft.
Carex capillaris		Streambanks, wet meadows, moderate to high elevations.
Carex comosa		Marshes, lake margins, drainage ditches, wet meadows, 30-2000 ft.
Carex dioica var. gynocrates		Bogs, marshes, moderate to high elevations.
Carex flava	(D)	Fens, bogs, wet meadows and ponds, 2420-4300 ft.
Carex foenea	(S)	Marshes, 2585 ft.
Carex hystericina	(S)	Wet meadows, ponds, marshes, seeps, 550-1500 ft.
Carex rostrata	(S)	Bogs and fens, 4600-5000 ft.
Carex saxatilis var. major	(S)	Wet meadows and margins of lakes and streams.
Chrysosplenium tetrandrum		Perennial and intermittent streams, seeps in rock outcrops, moderate elevations.
Cicuta bulbifera	(S)	Marshes, bogs, wet meadows, edge of ponds, shores of beaver ponds, shallow standing water, 2200-3720 ft.
Cryptogramma stelleri		Cliffs, 3000-35000 ft.
Cypripedium parviflorum		Perennial streams on limestone rock under mixed conifer forest, 2300-2700 ft.
Dryas drummondii		Cliffs, 2000 ft.
Dryopteris cristata	(S)	Fens, wet meadows and wooded swamps, 2150-4100 ft.
Eriophorum viridicarinatum	(S)	Fens and marshes, 2900-4650 ft.
Gaultheria hispidula	(S)	Moist areas in coniferous woods, 2960-3360 ft.
Geum rivale	(S)	Wet meadows, fens, bogs, perennial streams and shrub wetlands, 2900-3700 ft
Hypericum majus		Mudflats, 1500 ft.
Lobelia kalmii		Bogs.
Lycopodiella inundata	(S)	Bogs, 1800 ft.
Lycopodium dendroideum	(S)	Coniferous forests, 3000-3650 ft.

USDA Forest Service, Region 6 Sensitive Species
listed for the Colville National Forest - plants (continued)
(April 24, 2001)

Plant Taxa	Documented (D) or Suspected (S) in Project Area	Habitat
Muhlenbergia glomerata		Bogs, fens, streambanks, wet meadows, marshes, lake and pond margins, 2950-3380 ft.
Ophioglossum pusillum	(S)	Moist meadows, 2800-3200 ft.
Physaria didymocarpa var. didymocarpa		Talus, 2000 ft.
Planthera obtusata		Moist meadows and perennial streams in coniferous forests, 4100-4400 ft.
Salix candida	(S)	Fens, 2400-3000 ft.
Salix maccalliana	(S)	Fens, 2400-3000 ft.
Salix pseudomonticola	(S)	Fens, 2900 ft.
Sanicula marilandica	(S)	Bogs, fens, streambanks, floodplains, benches, 1800-3050 ft.
Sisyrinchium septentrionale	(S)	Dry to moist meadows, perennial streams, 2200-3850 ft.
Spartina pectinata		Sandy, silt loam soil adjacent to areas seasonally flooded and adjacent to areas seasonally flooded and moist in late summer along large rivers, 2000 ft.
Talinum sediforme		Rock outcrops, 2700-4800 ft.
Teucrium canadense ssp. viscidum		Wet margins of lakes and ponds, streambanks, 1500-2300 ft.
Thalictrum dasycarpum		Dry meadows, mixed conifer forests, riverbanks, floodplains, 2000 ft.
Vaccinium myrtilloides	(S)	Western redcedar-western hemlock forests, 2000-3000 ft.
Viola renifolia	(S)	Moist lowland forests.

Appendix B - Response to Comments

EPA (United States Environmental Protection Agency) Comments

Comment: EPA recommends that the final EIS discuss the likely sources of the materials contained within the dam. The final EIS should describe what type of mining or milling operations were the source of the material and the results of any testing that was performed to identify the material.
Response: This was added to the FEIS on page III-41.

Comment: EPA recommends that the final EIS include an evaluation of the complete removal of the dam or contain the rationale for not considering this management action as an alternative
Response: Complete removal of the dam was considered as the original proposed action but was modified to meet heritage needs (page II-27 of the FEIS).

Comment: We suggest that the final EIS discuss any impacts (to hyporheic zone functions) that would potentially occur with implementation of the alternatives.
Response: This was added to the FEIS on page III-56.

Comment: We recommend that the final EIS include a section that describes the restoration that would occur at the Lane Creek Pit
Response: This was added to the FEIS on page II-20.

Comment: To meet federal requirements for wetland protection, we recommend including additional wetland mitigation as part of Alternative B and C to fully mitigate the loss of wetland functions and values. We recommend that the final EIS contain additional detail regarding the function and values that that will be replaced by the stream restoration activities, and if necessary, consideration of additional mitigation for the loss of the wetland functions.

EPA recommends that the final EIS contain a separate section on wetlands. The final EIS should clearly identify the wetlands that meet the Clean Water Act definition as waters of the U.S. This would require that all wetlands within the impact area of the project be delineated using the 1987 Federal Wetland Delineation Manual. Once this delineation is complete each alternative should evaluate the potential direct and indirect impacts it would have on these aquatic resources. This is required to meet the President's goal of no net loss of wetland functions and values, and the overall federal goal, of which the U.S. Forest Service is a partner, of a net gain of wetlands nationally of 100,000 wetland areas per year. The use of NWI mapping is not adequate in identifying these wetlands.

The DEIS has not clearly stated how it will reach the requirements and goals required under Executive Order No. 11990, Protection of Wetlands. This should be addressed in the final EIS and we have included a copy of Executive Order No. 11990 with our comments.

Response: This was added to the FEIS on page III-56.

Comment: This section should discuss the past management activities and their effect on sediment yield to the stream and what the cumulative effects would be to sediment yield with the implementation of this project. It should also attempt to quantify short term (sediment) impacts and discuss how they would be offset by long term benefits of dam removal and stream restoration.
Response: Due to the nature of this project, sediment is discussed in various areas. The history section on FEIS page I-5 details how the dam filled with sediment. FEIS page I-11 details how the channel has reacted to the sediment in the system by the blockage of the dam and the erosional processes. FEIS Pages III-39-40 lists past actions. FEIS Page III-51 lists current sediment contributions. The Hydrology Section addresses cumulative effects of sediment on pages III-55-57 of the FEIS. The fisheries section, FEIS pages III-72-74, addresses the effects of the cumulative impact from sediment and the projected effects on fisheries.

Comment: We recommend that the final EIS provide an estimation of the length of time that the soil disturbance would continue and the effects that it would have on aquatic habitat in Sherman Creek.

Response: The effect soil disturbance would have on aquatic habitat is provided on pages III-72-74 of the FEIS. Soil disturbance will only occur during construction. Construction of the stream habitat at log flume would occur in one summer. The dam work would be done the following summer. All areas will be seeded right after implementation (fish mitigation measure 17). All areas will have sediment controls in place to limit sediment movement (fish mitigation measures 16, 17, 21 and Water 7, 13). Sediment is expected to be fully contained when the bypass is removed (mitigation measure 16). There is expected to be a beneficial effect on aquatic habitat (FEIS page III-73-74).

Comment: Harvest entries are unlikely to exceed soil guideline if standard contract mitigation measures are applied. This section should indicate the likelihood of those measures being applied to this project. … This section states that "mitigation measures will probably reduce these new impacts by half to insure the proposed action continues to meet soil standards". EPA recommends that the final EIS describe the basis for the estimated amount of reduced impacts. We recommend inclusion of an analysis that will support this assumption.
Response: Soil compaction is the detrimental soil condition that lasts the longest and is therefore the most likely to cumulatively affect soil productivity. "The persistence of recognizable and detrimental compaction has been documented to last up to 40 years in the Region" (Guidelines for Soil Resource Protection and Restoration for Timber Harvest and Post-harvest Activities, Don Boyer, 1979, USDA Forest Service, Pacific Northwest Region). Monitoring of old harvest units on this forest has indicated that soil compaction may last longer than 40 years depending on site and climatic conditions.

Comment: This section states that many of the effects to soil disturbance can be mitigated. We recommend that the final EIS indicate the likelihood that mitigation would occur with this project
Response: An estimate of the effectiveness of mitigation measures is contained in the Best Management Practices (BMP's) for the Growden Project. The mitigation measures described are standard contract provisions in most timber sale contracts on this forest and have proven effective during implementation.

Comment: EPA's primary concern is with the method used to assess the wetlands behind the dam and whether the project is in compliance with Executive Order No.11990, Protection of Wetlands. Wetlands within the project need to be delineated using the 1987 Federal Wetland Delineation Manual.
Response: The Forest Service used the National Wetlands Inventory for maps of wetlands in the area. Further wetlands delineation will be done using the 1987 Federal Wetland Delineation Manual during final design.

Comment: We also recommend the evaluation of additional wetland mitigation to offset the potential wetland loss associated with Alternatives B and C.
Response: Given our discussions with the Washington Department of Ecology and the Army Corps of Engineers (added to the FEIS on page III-56), we believe the proposed wetland mitigation is adequate. We will be glad to discuss this issue further, especially if the EPA has site-specific recommendations.

Comment: EPA recommends the inclusion of additional maps in the final EIS that more clearly depict the wetland area above the dam.
Response: These will be created during final design.

Comment: The final EIS should discuss the contribution of the wetland to groundwater recharge and include an evaluation of the effect of potential wetland loss on existing groundwater levels.
Response: Streamflow regime and the impacts to the wetlands are contained on pages III-56-57 in the FEIS.

Comment: We support the Forest Service's efforts to improve water quality, habitat and fish passage conditions on Sherman Creek. Based on the information presented in the draft EIS, the dam removal alternatives (Alternative B and C) would best meet the primary project purpose of passing a 500 year flood event, reducing in stream temperatures and providing fish passage in Sherman Creek. Dam removal would provide the best opportunities for upstream and downstream passage of Redband and Cutthroat trout and other aquatic species. Except for complete dam removal, EPA agrees with the conclusion in the draft EIS that Alternative B would best address the issues of degraded water quality. It would also be more effective at providing additional long term habitat benefits by allowing sediment and large woody debris to be transported to downstream reaches of Sherman Creek.
Response: Comments are noted and will be taken into consideration.

James Schumacher Comments

Comment: I want to go on record opposing any alternative whose actions would include the breaching or partial breaching of Growden Dam
Response: Comments are noted and will be taken into consideration.

Comment: If forced to choose between the four alternatives covered in depth, I would have to choose Alternative D. In actuality, I would rather see Alternative G implemented.
Response: Comments are noted and will be taken into consideration.

Comment: I propose to have this alternative implemented in several phases which would eventually include the reconstruction of several of the original buildings one of which will house a museum.
Response: Restoration of the CCC camp is out of the scope of this project. This project does not preclude the restoration of the CCC camp. The original grounds of the CCC camp will not be changed.

Comment: I would hate to see such an historical treasure destroyed by the breaching of Growden Dam.
Response: I agree, but safety and aquatic resource needs are also very important. The historical aspects of the site will be retained by preserving part of the dam, and with signs that recall and explain the history of the site.

Comment: With natural fish migration barriers both upstream and downstream of the dam in the form of waterfalls, fish passage is already restricted.
Response: This was addressed in the FEIS on page I-11.

Comment: I disagree with the statement that deepening the lake will not reduce stream temperatures.
Response: This was addressed in the FEIS on page II-26-27.

Department of Ecology – Dam Safety Section Comments

Comment: Because of the downstream hazard, the DSS would likely require a design storm much greater than a 500 year flood." Based upon Dam Safety's evaluation that the project Downstream Hazard Classification was found to be Significant, Hazard Class 2, it is likely that the design flood event could be approaching a 3000 year event.
Response:
Page III-57-58 of the FEIS discusses the flood event design criteria used in the analysis. A 3000 year flood event was used to design the alternatives.

Comment: Since Dam Safety was not involved in any of the engineering work sizing spillways or embankment modifications, we cannot determine how this changes either the project cost estimates or feasibility.
Response:
The Forest Service will confer with the Department of Ecology – Dam Safety Section on final design.

Comment: If Dam Safety were prescribing abandonment of the drop inlet structure, we would require plugging the inlet structure AND the conduit through the dam.
Response:
Filling the drop inlet is part of Alternative B. The costs associated with filling the drop inlet were figured into the overall cost. (FEIS pages III-58 - 60)

Ferry County Board of Commissioners Comments

Comment: The Ferry County Commissioner support Alternative G-Emergency Spillway with 6 acre lake. Alternative G meets the needs of Ferry County's emphasis on recreation enhancement. The impact of Alternative G protects the historical integrity of the site while addressing the immediate threat of high water breaching of the dam's structure.
Response: Comments are noted and will be taken into consideration. Alternative G considered but was dropped from detailed study because of high cost and its failure to meet most of the project purposes and needs (Alternative G would not allow bedload movement through the dam site, would not reduce stream temperatures, and would not restore fish passage).

Comment: The issue of fish passage for genetic purposes can be achieved through alternatives other than dam removal. A system of capture of downstream fish and release upstream and upstream capture and release down stream would achieve the same results.
Response: Fish passage is not the only need. The project also needs to address safety (as required by the Washington State Department of Ecology Dam Safety Section), stream temperature reduction (as required by the Clean Water Act), restoration of aquatic function (per the Colville National Forest Land and Resource Management Plan, as amended by the Inland Native Fish Strategy); and costs must be kept within reason.

Comment: The historic value of the Growden Dam site is a major part of the Sherman Scenic By-way. The restoration of the lake would not only add to the authenticity of the site, Alternative G would maintain a portion of wetlands associated with the water table created by the dam's height. Whereas wetlands and lakes have been identified by the State of Washington's Department of Ecology as critical to the future of this state, we should take every opportunity to maintain and restore those we have.
Response: Comments are noted and will be taken into consideration. Alternative G was dropped from consideration for reasons listed on page II-26 of this FEIS. Page III-56 of this FEIS lists the State of Washington's Department of Ecology's view on this wetland. In summary, they would rather see the natural processes restored than for the dam to remain intact.

Comment: The Alternative # D meets the need of the Board of County Commissioner's goal of historic preservation and achieves the need of structure safety in a major flood event. This alternative would allow for future partnerships in the improvement of the Growden Dam site.
Response: Comments are noted and will be taken into consideration.

Comment: The Ferry County Commissioners would support Alternative # D as their second choice on the Growden Dam project as it impacts the site's potential for future development less than Alternatives # B and C. The Board of County Commissioners understands the need to address fish genetics and the water temperature issues. The commissioners believe there may be opportunity to address these issues as time and funds become available.
Response: Comments are noted and will be taken into consideration.

Comment: Alternative # C, The Run of the River Alternative does not meet the need of the County's future recreational direction. This alternative alters the dam and the spillway and will distract from the visual effect of the dam. It will severely affect any future for lake restoration.
Response: Comments are noted and will be taken into consideration.

Comment: Alternative # B is the least acceptable alternative for the county.
Response: Comments are noted and will be taken into consideration.

Comment: The Ferry County Board of Commissioners requests the reconsideration and selection of Alternative G. That decision along with the formation of a local coalition to develop a plan to restore and enhance the historical Growden CC camp site would meet the requirements of the Forest Service. It would allow the County, State of Washington, Forest Service and the recreation community to work for the good of the Sherman Creek Scenic By-way. The result would preserve a historic site, add to the county's economics and provide for a safer dam and improved fish habitat.
Response: Alternative G was dropped from consideration for reasons listed on page II-26 of this FEIS. The selected alternative complies with the Sherman Scenic By-way plan. The selected alternative was developed by a local coalition including Washington State Fish and Wildlife, Washington State Department of Ecology, Ferry Conservation District, and the Forest Service. A lake was not among the most important reasons why local recreationists stopped at the site. (page II-26 of this FEIS).

Appendix C – Agency Letters

EPA (United States Environmental Protection Agency) Letter

JUL-01-2005 FRI 03:16 PM FAX NO. P, 02

UNITED STATES ENVIRONMENTALPROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

July 1, 2005

Reply To Atn of: ETPA-088

Rick Brazell, Forest Supervisor
Colville National Forest
765 South Main Street
Colville, WA 99114

Dear Mr. Brazell:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for the **Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28, Colville National Forest,** in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions and the document's adequacy in meeting NEPA requirements.

The draft EIS analyzes a No Action alternative (Alternative A), and three action alternatives. The Proposed Action (Alternative B) would remove a portion of the dam and restore
1.1 miles of fish habitat downstream of the dam. Alternative C would construct a channel on the dam to allow for flows over the dam and include the same stream restoration as Alterative B. Alternative D would create an emergency spillway on top of the dam to allow for high flows to overtop the dam without causing it to breach.

We support the Forest Service's efforts to improve water quality, habitat and fish passage conditions on Sherman Creek. Based on the information presented in the draft EIS, the dam removal alternatives (Alternative B and C) would best meet the project purpose of passing a 500-year flood event, reducing in-stream temperatures and providing fish passage in Sherman Creek. Dam removal would provide the best opportunities for upstream and downstream passage of Redband and Cutthroat trout and other aquatic species. Except for complete dam removal, EPA agrees with the conclusion in the draft EIS that Alternative B would best address the issues of degraded water quality. It would also be more effective at providing additional long-term habitat benefits by allowing sediment and large woody debris to be transported to downstream reaches of Sherman Creek.

EPA has assigned the draft EIS an overall rating of EC-2 (Environmental Objections Insufficient Information). EPA's primary concern is with the method used to assess the wetlands behind the dam and whether the project is in compliance with Executive Order No.11990, Protection of Wetlands. Wetlands within the project need to be delineated using the 1987 Federal Wetland Delineation Manual. We also recommend the evaluation of additional wetland mitigation to offset the potential wetland loss associated with Alternatives 13 and C.
EPA appreciates the opportunity to comment on the Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28, Colville National Forest draft EIS. If you have questions regarding EPA's comments, please contact Denise Clark at (206) 553-8414 or myself at (206) 553-1601.
Sincerely,
Christina B. Reichgott, Manager
NEPA Review Unit

EPA Comments on Growden Dam, Sherman Creek
Restoration Project and Forest Plan Amendment #28
Draft EIS
Chapter 1.2 The Planning Area
EPA recommends the inclusion of additional maps in the final EIS that more clearly depict the wetland area above the dam. We suggest that Figures 1-2 and 1-3 consist of a scale that includes Sherman Creek and the dam site on the map. Would it be possible to have color maps posted on the U.S. Forest Service website for this project?
Chapter II. Alternatives:
It is not clear from the draft EIS how the range of alternatives were determined. Specifically, the document does not discuss removal of the entire dam as an alternative for evaluation. EPA recommends that the final EIS include an evaluation of the complete removal of the dam or contain the rationale for not considering this management action as an alternative. Complete removal of the dam would likely be most effective at passing bedload and large woody debris to downstream areas along Sherman Creek.
Section 2.1.2 Alternative B.: The proposed action for this alternative includes restoration of Lane Creek pit with sediment from behind the dam. We recommend that the final EIS include a section that describes the restoration that would occur at the Lane Creek Pit.
Chapter 111. Affected Environment and Environmental Consequences
EPA recommends that the final EIS contain a separate section on wetlands. EPA recommends that the final EIS contain a more detailed analysis of the functions and values of the wetlands that would be lost with implementation of Alternative B or C. The section on wetlands should also contain the following:
• The final EIS should clearly identify the wetlands that meet the Clean Water Act definition as waters of the U.S. This would require that all wetlands within the impact area of the project be delineated using the 1987 Federal Wetland Delineation Manual. Once this delineation is complete each alternative should evaluate the potential direct and indirect impacts it would have on these aquatic resources. This is required to meet the President's goal of no net loss of wetland functions and values, and the overall federal goal, of which the U.S. Forest Service is a partner, of a net gain of wetlands nationally of 100,000 wetland areas per year. The use of NWI mapping is not adequate in identifying these wetlands.
• The DEIS has not clearly stated how it will reach the requirements and goals required under Executive Order No. 11990, Protection of Wetlands. This should be addressed in the final EIS and we have included a copy of Executive Order No. 11990 with our comments.

Page Itt-39. **Dam and surrounding construction site:** EPA recommends that the final EIS discuss the likely sources of the materials contained within the dam, since Alternative B and C would cause disturbance of these materials and would have the potential for release of rock flour Into the stream. The final EIS should describe what type of mining or milling operations were the source of the material and the results of any testing that was performed to identify the material.
Page 111-43. Downstream Restoration. This section states that "mitigation measures will probably reduce these new impacts by half to insure the proposed action continues to meet soil standards". EPA recommends that the final EIS describe the basis for the estimated amount of reduced impacts. We recommend inclusion of an analysis that will support this assumption.
Page 111(-45. Alternative B. and C, first paragraph) The last sentence states that soil disturbance will continue for a very long period of time. We recommend that the final EIS provide an estimation of the length of time that the soil disturbance would continue and the effects that it would have on aquatic habitat in Sherman Creek. In this section, it is said that harvest entries are unlikely to exceed soil guideline if standard contract mitigation measures are applied. This section should indicate the likelihood of those measures being applied to this project.
Page 111-45. Summary of Cumulative Effects. This section states that many of the effects to soil disturbance can be mitigated. We recommend that the final EIS indicate the likelihood that mitigation would occur with this project. This section should discuss the past management activities and their effect on sediment yield to the stream and what the cumulative effects would be to sediment yield with the implementation of this project. It should also attempt to quantify short term impacts and discuss how they would be offset by long term benefits of dam removal and stream restoration.
111-52. **Wetlands.** The final EIS should discuss the contribution of the wetland to groundwater recharge and include an evaluation of the effect of potential wetland loss on existing groundwater levels. The project has the potential to affect the hyporheic zone adjacent to the stream. They hyporheic zone's functions include, nutrient cycling, providing habitat for invertebrate species, temperature modulation, and contaminant removal. We suggest that the final EIS discuss any impacts that would potentially occur with implementation of the alternatives.
111-54. Alternative B. The EIS states that only 1-2 acres out of 5-6 acres of wetland function loss will be mitigated. To meet federal requirements for wetland protection, we recommend including additional wetland mitigation as part of Alternative B and C to fully mitigate the loss

of wetland functions and values

Environmental Effects, **Page 111-77.** The *draft EIS* states that the loss of wetland habitat would be offset by enhancing 25 riparian sites downstream of the dam in Sherman Creek. This appears to be out of kind mitigation that may not replace the loss wetland functions and values of 5-6 acres of wetlands lost by implementation of Alternative B or C. EPA supports the proposed enhancement of Sherman Creek to restore the natural process of the creek. We also note that wetlands play a critical role in filtering out sedimentation, controlling downstream flooding, and maintaining summer flows. The DEIS states that 127 acres of wetlands have been identified using NWI that are associated with the project. We recommend that the final EIS contain additional detail regarding the function and values that that will be replaced by the stream restoration activities, and if necessary, consideration of additional mitigation for the loss of the wetland functions.

Protection of Wetlands
EXECUTIVE ORDER No. 11990
May 24, l977, 42 F.R. 26961
By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or Indirect support of new construction in wetlands wherever there is a practicable alternative, it is hereby ordered as follows:
Section 1. (a} Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.
(b) This Order does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.
Sec. 2. (a) In furtherance of Section 101(b)(3) of the National Environmental Policy Act of 1969 (42 U.S.C. 4331(b)(3)) to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors.
(b) Each agency shall also provide opportunity for early public review of any plans or proposals for new construction in wetlands, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102 (2) (C) of the National Environmental Policy Act of l969, as amended.
Sec. 3. Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in wetlands, whether the proposed action is in accord with this Order.
See. 4. When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or (c) withhold such properties from disposal.
Sec. 5. In carrying out the activities described in Section I of this Order, each agency shall consider factors relevant to a proposal's effect on the survival and quality of the wetlands. Among these factors are:
(a) public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion;
(b) maintenance of natural systems, including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and
(c) other uses of wetlands in the public interest, including recreational, scientific, and cultural uses.
Sec. 6. As allowed by law, agencies shall issue or amend their existing procedures in order to comply with this Order. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized fulfill the requirements of this Order. Sec. 7. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall Include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section I which are located in or affecting wetlands.
(b) The term "new construction" shall include draining, dredging. channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order.
(c) The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.
Sec. 8. This Order does not apply to projects presently under construction, or to projects for which all of the funds have been appropriated through Fiscal Year 1977, or to projects and programs for which a draft or final environmental impact statement will be filed prior to October 1, 1977. The provisions of Section 2 of this Order shall be implemented by each agency not later than October 1, 1977.
Sec. 9. Nothing in this Order shall apply to assistance provided for emergency work, essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat, 148, 42 U.S.C. 5145 and 5146).
Sec. 10. To the extent the provisions of Sections 2 and 5 of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review. decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.
JIMMY CARTER, May 24, 1977.

United States Department of Interior Letter

1N REPLY REFER TO
ER05/441

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance.
500 NE., Multnomah Street, Suite 356
Portland, OR 97232

JUN 2 3 2005

June 21, 2005

Rick Brazell
Forest Supervisor
Colville National Forest
765 South Main Street
Colville, Washington 99114

Re: COMMENTS - Review of the Draft Environmental Impact Statement for the Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28, Colville National Forest, Ferry County, Washington

Dear Mr. Brazell:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28, Colville National Forest, Ferry County, Washington. The Department does not have any comments to offer.

We appreciate the opportunity to comment.

Sincerely,

Preston A. Sleeger
Regional Environmental Officer

Department of Ecology – Dam Safety Section Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
TTY 711 or 800-833-6388 (For the Speech or Hearing Impaired)-

June 9, 2005

Mr. Rick Brazell, Forest Supervisor Colville National Forest 765 South Main Street Colville, WA 99114

Subject: Growden Dam EIS File No.: FE58-0622

Recently, the Washington Dam Safety Office (Ecology Water Resources Program) received notice that the "Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28, Draft Environmental Impact Statement" was available at the Colville National Forest's webpage. Dam Safety staff printed out the EIS and examined the document for dam safety-related inaccuracies or items that should be commented on. The following items came out of that review:

1) One of the main "tests" for the alternatives was the project's ability to pass the 500 year flood event. The text presenting this criterion for evaluation labeled this project feature as a requirement of the Washington Dam Safety Office. This requirement or finding was given as a result of the Office's October 1991 inspection and subsequent report.

The files for the Sherman Lake (Growden) Dam were examined and nothing could be located where Dam Safety told the Colville National Forest that the Inflow Design Flood event for the project was a 500 flood event. The exact phrase used by Dam Safety (letter from Doug Johnson to Lou Janke, November 15, 1991) was:

"...our evaluation and analyses revealed that under extreme flood conditions, the dam does not meet DSS standards." In the attached memo, the requirement is described succinctly. "The DSS requires that, at a minimum, dams and spillways must be capable of passing a 500 year flood. Because of the downstream hazard, the DSS would likely require a design storm much neater than a 500 year flood." Based upon Dam Safety's evaluation that the project Downstream Hazard Classification was found to be **Significant, Hazard Class 2,** it is likely that the design flood event could be approaching a 3000 year event. Since Dam Safety was not involved in any of the engineering work sizing spillways or embankment modifications, we cannot determine how this changes either the project cost estimates or feasibility.

2) Alternatives B & C - Partial Removal and Run-of-the-River; if Dam Safety were prescribing abandonment of the drop inlet structure, we would require plugging the inlet structure AND the conduit through the dam. Plugging the drop inlet entrance would remove the hazard from people, animals, and debris entering the structure. However, the risk over time of pipe collapse, and a post-collapse seepage failure of the dam would always be present until the dam failed or was removed. Our estimates show that the volume of cementitious fill (assuming CDF or lean concrete) would be about 150 cubic yards, using a 6x6 cross section and 110 foot culvert length (this length was taken from one of the file drawings). This would result in adding $10-$25,000 to this alternative's cost.

If you wish to discuss any of the above comments, please call me at my number shown at my signature, or call Doug Johnson at (360) 407-6623. In addition, I can be emailed at dcum461gecy.wa.gov.

Sincerely,
David Cummings, P.E.
Structural Specialist, WA Dam Safety Office
Ecology Water Resources Program

Cc: Keith Stoffel, Water Resources, Ecology ERO (via email)

Ferry County Board of Commissioners Letter

JUL-01-2005 FRI 03:17 PH FAX N0. P. 03

FERRY COUNTY
BOARD OF COMMISSIONERS

290 EAST TESSIE AVENUE
REPUBLIC, WASHINGTON 99166
TELEPHONE (509) 775-5229 . FAX (509) 775-5230
JOY OSTERBERG, Clerk of the Board
joy@co.ferry.wa.us

BRAD L. MJLLER, Curlew-District # 1
RONALD L. BACON, Republic-District #2
MIKE L. BLANKENSHIP, Boyds-District #3

July 5, 2005

Rick Brazell, Forest Supervisor 765 South Main Street Colville. Wa. 99114

Mr. Rick Brazell, Forest Supervisor,

The Ferry County Board of County Commissioners (BOCC) would like to take this time to comment on the proposed Growden Dam, Sherman Creek Restoration Project, and Forest Plan Amendment #28. The Ferry County Commissioners support Alternative G-Emergency Spillway with 6 acre lake. This proposal was first recognized in 1993 by the Forest Service as an Alternative. Alternative G meets the needs of Ferry County's emphasis on recreation enhancement. The impact of Alternative G protects the historical integrity of the site while addressing the immediate threat of high water breaching of the dam's structure.

The water temperature from the wet lands associated with growden dam, have been identified as a factor in the Department of Ecology's 303D listing of Sherman Creek. The removal of the sediment within the 6 acres would remove the majority of the lower portion of the wetland area creating a deep water pool. Sediment removal, creating a 6 acre lake, in conjunction with the downstream restoration should help the water temperature of Sherman Creek

The issue of fish passage for genetic purposes can be achieved through alternatives other than dam removal. A system of capture of down stream fish and release upstream and upstream capture and release down stream would achieve the same results.

The historic value of the Growden Dam site is a major part of the Sherman Creek Scenic By-Way. The restoration of the lake would not only add to the authenticity of the site, Alternative G would maintain a portion of the wetlands associated with the water table created by the dam's height. Whereas wetlands and lakes have been identified by the State of Washington's Department of Ecology as critical to the future of this state, we should take every opportunity to maintain and restore those we have.
The Alternative # D meets the need of the BOCC's goal of historic preservation and achieves the need of structure safety in a major flood event. This alternative would allow for future partnerships in the improvement of the Growden Dam site.
The Ferry County Commissioners would support Alternative # D as their second choice on the Growden Dam project as it impacts the site's potential for future development less than Alternatives # B, and # C. The BOCC understands the need to address fish genetics and the water temperature issues. The commissioners believe there may be opportunity to address these issues as time and funds become available.

Alternative # C, The Run of the River Alternative does not meet the need of the County's future recreational direction. This alternative alters the dam and the spillway will distract from the visual effect of the dam. It will severely affect any future for lake restoration.
Alternate # B is the least acceptable alternative for the County. This alternative removes the bulk of the Dam.
The Ferry County Board of Commissioners requests the reconsideration and selection of Alternative G. That decision along with the formation of a local coalition to develop a plan to restore and enhance the historical Growden CC camp site would meet the requirements of the Forest Service. It would allow the County, State of Washington. Forest Service and the recreation community to work for the good of the Sherman Creek Scenic By-Way. The result would preserve a historic site, add to the county's economics and provide for a safer dam and improved fish habitat.

Thank you for consideration of these comments.

Sincerely,

BOARD OF FERRY COUNTY COMMISSIONERS
MIKE L. BLANKENSHIP, Chairman
RONALD L. BACON, Vice Chairman
BRAD L. MILLER, Member

References

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