



Environmental Assessment

Minimize Erosion on the Upper Company Creek Road

September 2007



Upper Company Creek Road during spring 2007 snowmelt (9,600 cfs). The road now floods when river flows exceed 8000 cfs.

Public Review

Comments on this Environmental Assessment must be postmarked (surface mail) or sent (e-mail or fax) *no later than October 26, 2007*.

If you wish to comment, you may submit your comments by any of the following methods:

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

By fax to: (360) 856-1934

Via the internet (Planning Environment and Public Comment website; PEPC):
<http://parkplanning.nps.gov/noca/>

Using PEPC: at the PEPC web site, you should select the specific project for which you wish to comment, in this case “Minimize Erosion on the Upper Company Creek Road”. You will find the full text document, an on-line comment form and instructions for submitting on-line comments under the Documents and Links tab. Please use the on-line comment form to submit your ideas, questions or comments.

Please submit Internet comments as an ASCII file avoiding the use of special characters and any form of encryption. Please also include your name and return address in your Internet message. If you do not receive a confirmation from the system that we have received your Internet message, contact Roy Zipp at (360) 854-7313 or roy_zipp@nps.gov

Freedom of Information

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

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Chapter I. Purpose of and Need for Action

Purpose of the Proposed Action

The Stehekin River now floods with much greater frequency and intensity than in years past. There have been three floods of magnitude equal or greater to a 100-year event in the last twelve years, and two of the three largest flood of record have occurred in the last four years. These floods have caused river conditions in the vicinity of the Upper Company Creek Road to change substantially. The riverbed has aggraded 3-4 feet, the shoreline has eroded substantially toward the road, and massive log jams have formed, causing patterns of flow to shift substantially, especially during floods. One house has washed away, and areas that have never flooded before (such as the end of the road and adjacent private properties) are now threatened at relatively moderate flow rates, such as those that often exceed 8000 cfs during spring snowmelt (Cover photo and Figure 1).

In response to the risk of further flood damage to the Upper Company Creek Road, the National Park Service proposes to install bank barbs, large woody debris and plant riparian vegetation to stabilize the bank. The purpose of this proposed action is to minimize scouring and erosion on the Upper Company Creek Road while protecting the natural resources, ecosystem functions and values and the aesthetic qualities of the Stehekin River and adjacent riparian zone.

Need for Action

This action is needed in order to (a) minimize the pending threat of flood damage to the Upper Company Creek Road; (b) maintain motor vehicle access to National Park Service lands for recreational and administrative purposes (e.g. fire management, search and rescue operations) and private lands; and (c) honor the NPS' longstanding commitment to maintain the Company Creek Road in accordance with the 1995 General Management Plan for Lake Chelan National Recreation Area.

Objectives

- Minimize the erosive force of the Stehekin River against 600 lineal feet of bank for at least several years;
- Employ proven erosion control techniques prior to the fall 2007 flood season that minimize harm to riverine processes and instream habitat by incorporating native vegetation and woody debris into their design;
- Minimize the financial costs of future repair and maintenance activities.

Decision to be made

In accordance with NPS regulations and policies regarding implementation of the National Environmental Policy Act (NEPA), the National Park Service will decide what actions, if any, to minimize impacts to the Company Creek Road from the erosive forces of the Stehekin River. The Superintendent, North Cascades National Park Service Complex, will be the recommending official. The Regional Director, NPS Pacific West Region, will be the deciding official.



Figure 1. Photograph of the Upper Company Creek Road taken from a helicopter following the October 2003 flood. The dark dashed line indicates the approximate location of the streambank before the flood. The white dashed line indicates the current location of the streambank. The house, shown bisected by the white dashed line, has since fallen into the river.

Background

In 1972, the National Park Service assumed maintenance responsibilities for the Company Creek Road when it acquired ownership of the Stehekin Valley Road through quit claim deed from Chelan County. While the Company Creek Road had never been maintained by Chelan County, and was not part of the county road system in the Stehekin Valley, the NPS began maintaining the Company Creek Road in response to concerns from Stehekin Valley landowners who felt the NPS would abandon the road. The NPS also assumed maintenance in order to carry out its duties in the administration of Lake Chelan National Recreation Area (NPS, 1972).

Administrative archives from this time period indicate that the NPS sought to acquire approximately 40 easements from willing property owners on the middle and upper sections of the Company Creek Road. The easements were necessary because the legal authority on the part of the NPS to expend federal dollars on maintenance of the private road was unclear. The NPS,

however, met resistance from landowners and did not obtain easements for road maintenance purposes (Rick Wagner, NPS Realty Specialist, pers. comm. June 6, 2007). The U.S. Congress in 1996 rectified this problem by providing the NPS the unambiguous authority to maintain the road as part of the Appropriations Bill for the Department of the Interior, H.R. 1977, Title I, Section 117 (refer to “Laws, Regulations and Policies Guiding this Decision”).

Since the early 1970’s, the National Park Service has consistently maintained the Company Creek Road as part of the Stehekin Valley road system (NPS, 1995). Maintenance activities have included periodic grading, routine snow removal, and increasingly frequent repairs triggered by recurring floods along the Stehekin River.

Over the years the NPS has taken various steps to minimize damage to the middle and upper segments of the Company Creek Road. A brief summary follows:

- Mile 1.9: In 1976 the NPS constructed a 290-foot long log crib in the riverbank to protect the road. In 1981 the NPS lengthened the cribbing to 400 feet, raised it 2 feet and constructed an earthen levee on top. A flood in 1982 substantially damaged the cribbing/levee and the adjacent road. The cribbing was repaired and expanded, but was damaged again in the 1995 flood. In 1997 the NPS repaired the levee and elevated the road downstream of the levee to direct floodwaters off the road into adjacent wetlands and side channels.
- Mile 2.2: In 1995 a major flood washed out 225 feet of the road above the cribbing. The NPS rerouted the road for 300 feet and installed 2 additional bank barbs to stabilize the cribbing. In 1997 the NPS constructed 4 rock barbs on the river bank adjacent to the road and planted riparian vegetation between the barbs to reduce the risk of flooding. The bank barbs were damaged in the floods of 2003 and 2006. They will be repaired in fall 2007.
- Vicinity of Road End: In 2003 the Stehekin River flooded down the road and substantially scoured the last ¼ mile of the roadbed (cover photo). The flood left deep pits in the road and transformed the surface into a cobble field. The NPS repaired the road surface and installed a rock hump on the road to discourage future scouring. In 2006 the river flooded again, causing similar road damage. The NPS performed emergency repairs to the existing rock hump to prevent flood waters from running down the road unimpeded. In spring 2007 the NPS with permission from several private landowners to install three subsurface “grade control structures” (see Glossary) across and perpendicular to the road. Ranging from 14-60m in length, the purpose of the grade control structures is to maintain sheet flow down the road and discourage channel formation along the roadbed during future floods.

The various erosion prevention measures have substantially contributed to protecting the road from flood damage, however, the Stehekin River is very dynamic. Changes in the channel with each passing flood have revealed new vulnerabilities in the road, such as the risk of erosion and further flood damage at the end of the road which have prompted to this proposed action.

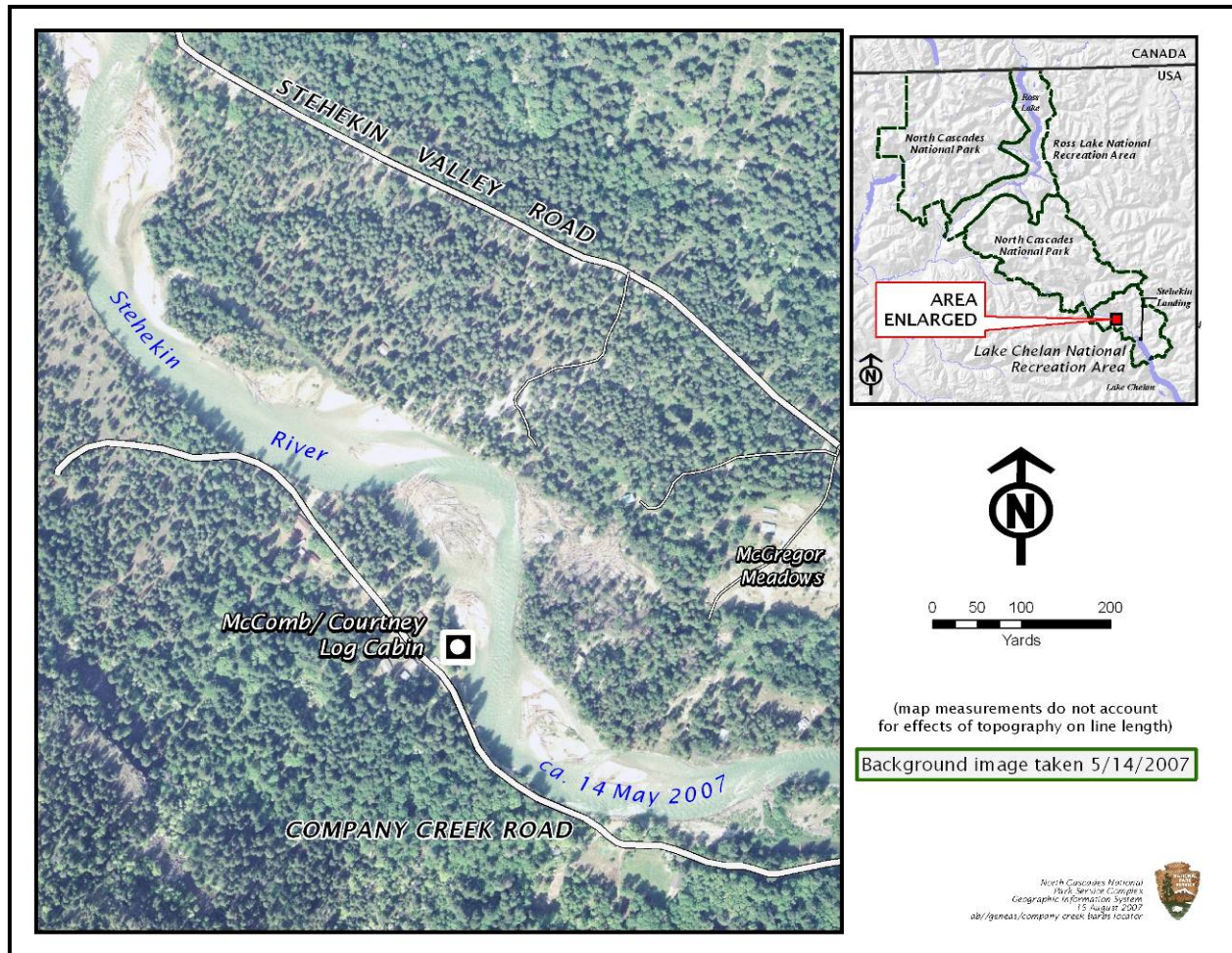


Figure 2. Project Area map depicting the location of the proposed bank barbs in relation to the Upper Company Creek Road, the Stehekin River and adjacent properties.

Issues and Concerns

The following section describes issues and concerns that will be considered in detail in this EA. The issues were derived from public and agency comments received during public scoping last winter, and from NPS staff. For more information on the public scoping process, please refer to Chapter V, Consultation and Coordination.

Issues to be Considered in Detail

Stehekin River and Floodplain

Over the years, the NPS and private landowners have enacted various erosion control measures to protect the Upper Company Creek Road in the vicinity of the Project Area. These efforts have partially constrained the Channel Migration Zone (see Glossary) of the Stehekin River floodplain in the Project Area to approximately 1/3rd of its historic width. Continued erosion control efforts to protect the Company Creek Road may further affect natural floodplain processes such as channel migration, recruitment of wood into the river and formation of off-channel wetland habitat.

Riparian Zone Vegetation

Installation of bank barbs may harm riparian vegetation within the immediate vicinity of the project area.

Fish and Wildlife Species and Habitat

The proposed action would manipulate riparian and instream habitat along approximately 600 feet of shoreline. This may cause disturbance to fish and wildlife, including several state and federally listed species.

Private Property along the Upper Company Creek Road

This proposal would help to maintain motorized access to private property along the Upper Company Creek Road, and reduce the impacts of erosion to those properties.

Private Property in McGregor Meadows

Further erosion control efforts to protect the Upper Company Creek Road may cumulatively increase the risk of river migration toward McGregor Meadows.

Recreational opportunities on the west side of the Stehekin River

The Upper Company Creek Road provides recreational access to the west side of the Stehekin River. This proposal would help to maintain recreational access to the area.

Derelict Structures

The NPS owns a 0.71 acre parcel of land (NPS parcel #07-111; Chelan County parcel #331716220700) near the end of the Company Creek Road and immediately adjacent to the Stehekin River. The parcel has an old cabin that has been heavily damaged by recent flooding and should be removed before it gets washed away in a future flood. The NPS is also finalizing acquisition of an adjacent parcel (NPS parcel #07-112; Chelan County parcel #331709330100) that was heavily damaged in the 2003 flood. The house on that parcel was washed away in the 2003 flood (Figure 1), but the remaining debris should be cleaned before it washes into the river.

Wild and Scenic Characteristics of the Stehekin River

The Stehekin River from High Bridge to its confluence with Lake Chelan is eligible for designation as “Recreational” under the Wild and Scenic River Act (Finlayson, 2002). The Alternatives included in this EA could adversely affect the free-flowing condition and outstandingly remarkable values that make the Stehekin River eligible for designation.

Issues and Concerns Considered but Dismissed

Hydrology

The frequency, duration, and magnitude of flooding are determined by regional climate patterns and watershed-scale processes that would remain unaffected by either management alternative.

Air Quality

The proposal would cause a temporary and inconsequential increase in emissions from construction equipment and fugitive dust. There would be no other air quality concerns or effects.

Flood Control

The Stehekin River adjacent to the Upper Company Creek Road has deposited massive amounts of gravel and raised the bed elevation 3-5 ft. A conservative estimate of gravel volume deposited in the 500 ft long reach of the river adjacent to the site is 10,000 cubic yards. The river has also deposited massive amounts of woody debris and completely blocked No Name Creek, a side channel to the Stehekin River (Figure 7). These dynamic conditions have encouraged the river to migrate laterally toward both McGregor Meadows and Company Creek Road. To control future flood damage, large-scale, intensive manipulation of the river channel and both banks would be needed. Such actions (a) would not meet the Purpose, Need and Objectives of this analysis; (b) would be cost prohibitive; (c) would not be feasible or sustainable given the dynamic nature of the Stehekin River; and (d) would adversely impact the values for which the river is currently eligible for Wild and Scenic River designation.

Cultural Resources

The entire bank of the Stehekin River within the Project Area has been surveyed for archeological resources but none have been found (Bob Mierendorf, NPS Archeologist, pers. comm.). The historic Courtney/McComb Cabin, listed on the National Register, is located immediately adjacent to the Company Creek Road at the southern end of the Project Area. The historic cabin is experiencing increased flood damage (e.g. water flowing through structure when road floods), but addressing the damage is beyond the purpose of this proposal. A separate analysis, in consultation with the Washington State Historic Preservation Office, will be initiated to determine appropriate management action.

Laws, Regulations and Policies and Administrative Procedures Guiding this Decision

Introduction

The following section highlights the most relevant regulatory, policy and administrative procedures guiding this decision. This summary is intended to inform the public as to the legal regulatory and policy constraints and considerations relevant to this decision.

National Park Service Organic Act of 1916

The key management-related provision of the Organic Act is as follows:

“[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified...by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” (16 USC 1)

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left

unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant (NPS, 2007)

Enabling Legislation, Lake Chelan National Recreation Area

The Enabling Legislation for Lake Chelan National Recreation Area states:

“In order to provide for the public outdoor recreation use and enjoyment of portions of the Stehekin River and Lake Chelan, together with surrounding lands, and for the conservation of the scenic, scientific, historic, and other values contributing to public enjoyment of such lands and waters...” (Sec. 202, Public Law 90-544, October 2, 1968).

Title IV, Administrative Provisions, provides:

“...the Secretary [of the Interior] shall administer the [Lake Chelan National Recreation Area] in a manner which in his judgment will best provide for (1) public outdoor recreation benefits; (2) conservation of scenic, scientific, historic and other values contributing to public enjoyment; and (3) such management use and disposal of renewable natural resources and the continuation of such existing uses and developments as will promote, or are compatible with, or do not significantly impair public recreation and conservation of the scenic, scientific, historic or other values contributing to public enjoyment. In administering the [Lake Chelan Recreation Area], the secretary may utilize such statutory authorities pertaining to the administration of the national park system, and such statutory authorities otherwise available to him for the conservation and management of natural resources as he deems appropriate for recreation and preservation purposes and for resource development compatible therewith.”

Clean Water Act, as Amended

Sections 404 and 401 of the Clean Water Act apply to erosion control measures along the Stehekin River because those actions would involve the discharge of fill material (large angular rock) into waters of the United States. In accordance with Section 404 of the Clean Water Act, this proposal would require a Corps of Engineers nationwide permit #13, Bank Stabilization (Debbie Knaub, pers. comm., July 11, 2007). The NPS would also need to obtain approval from the Washington State Department of Ecology in accordance with section 401 of the Clean Water Act because the proposed action would exceed 500’ of lineal threshold for bank protection. This approval, referred to as 401 Water Quality Certification, would become part of the conditions of the nationwide permit.

Endangered Species Act, as Amended

Section 7 of the Endangered Species Act precludes all federal agencies, including the National Park Service, from authorizing, funding, or carrying out any activity that may jeopardize the continued existence of a listed species. The NPS must consult with the U.S. Fish and Wildlife Service regarding any action that may affect a listed species. This Environmental Assessment includes a Biological Evaluation of potential impacts to rare and listed species.

Appropriations Bill for the Department of Interior, H.R. 1977, Title I, Section 117

Congress, in response to the identified need in the Lake Chelan GMP/EIS for legislation to authorize the NPS to maintain the Company Creek Road, provided the following authorization:

“Notwithstanding Public Law 90-544, as amended, the National Park Service is authorized to expend appropriated funds for maintenance and repair of the Company Creek Road in the Lake Chelan National Recreation Area: Provided that appropriated funds shall not be expended for the purpose of improving the property of private individuals unless specifically authorized by law.”

Wild and Scenic Rivers Act of 1968

The Stehekin River within the Project Area is eligible for inclusion as “Recreational” in accordance with the Act (Finlayson, 2002). The Stehekin River falls under the category of an “Agency Identified, 5(d)(1) Study River”. Guidance from the Interagency Wild and Scenic Rivers Coordinating Council (Diedrich, 2004), and Section 4.3.4 of NPS Management Policies 2006, preclude management actions that would adversely affect the “Free-flowing Condition” and “Outstandingly Remarkable Values” that qualify the river for inclusion in the National Wild and Scenic Rivers System.

Washington State Hydraulic Code

A Hydraulic Project Approval (HPA) from the Department of Fish and Wildlife under 75.20 RCW is required if a project will “use, divert, obstruct, or change the natural flow or bed of any fresh or salt water of the state.” An HPA would be needed to implement this proposal.

National Park Service Management Policies 2006, § 4.6.4 Floodplains

In managing floodplains on park lands, the National Park Service will (1) manage for the preservation of floodplain values; (2) minimize potentially hazardous conditions associated with flooding; and (3) comply with the NPS Organic Act and all other federal laws and executive orders related to the management of activities in flood-prone areas, including Executive Order 11988 (Floodplain Management), the National Environmental Policy Act, applicable provisions of the Clean Water Act, and the Rivers and Harbors Appropriation Act of 1899. Specifically, the Service will:

- Protect, preserve, and restore the natural resources and functions of floodplains;
- Avoid the long- and short-term environmental effects associated with the occupancy and modification of floodplains; and
- Avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks.

When it is not practicable to locate or relocate development or inappropriate human activities to a site outside and not affecting the floodplain, the Service will:

- Prepare and approve a statement of findings, in accordance with procedures described in Director’s Order 77-2 (Floodplain Management);
- Use nonstructural measures as much as practicable to reduce hazards to human life and property while minimizing the impact to the natural resources of floodplains;
- Ensure that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60).

General Management Plan (GMP), Lake Chelan National Recreation Area

The following sections of the 1995 GMP and associated Implementation Plans provide the following policy guidance relevant to this decision:

- The Park Service would not manipulate the Stehekin River to protect federal property except roads and bridges according to the following criteria. Existing public roads would be protected in erosion/river conflict zones only if (1) there are no feasible alternatives, (2) funds are available, (3) proposed actions would have lesser impacts than other alternatives, and (4) the proposed actions are permitted by the county, state, and other federal agencies. No new road construction would be proposed in active river/erosion conflict zones (p. 20).
- The Park Service would not manipulate the river to protect private property. No actions would be taken to prevent private owners from manipulating the river on their land to protect private property unless such actions would significantly harm recreation area resources or were in violation of local, state, or federal ordinances, regulations or laws (p.20).
- The National Park Service would manipulate woody debris in the Stehekin River or its tributaries only to protect public roads and bridges...Woody debris would not be removed from the river system in any case. The Park Service would not remove or manipulate woody debris on public land or water to protect private property (p. 23)
- The Company Creek Road would be maintained in its current alignment and condition. Three erosion control systems along the upper Company Creek road would be removed and replaced. The structures would be designed to keep the road from eroding during frequently recurring flood events (i.e., 10- to 25-year recurrence interval), and they would be made from rock, soil, and native vegetation (p.34).
- Sand, Rock, and Gravel Plan: Sand, rock, and gravel will be conserved and recycled whenever possible...To ensure conservation of sand, rock, and gravel, the National Park Service proposes to limit the use of in-park material to 1,400 cubic yards per year: 1,200 cubic yards for NPS use and 200 cubic yards per year for private use over a proposed 10-year excavation cycle...In the event of a large flood, the remaining 10-year stockpile could be used in one year...The superintendent will have the option to exceed the established limit in the event of an emergency such as a major flood (pp.3, 10, 11).
- Transportation Plan: Erosion control systems along the Upper Company Creek Road will be removed and replaced, designed to keep the road from eroding during frequently recurring flood events (i.e., 10- to 25-year recurrence interval), and will be made from rock, soil, and native vegetation...public roads will be protected in active river erosion zones only if (1) there are no feasible alternatives; (2) funds are available; (3) the actions will have less impacts than other alternatives; and (4) the actions are permitted by county, state, and other federal agencies (p.9).
- Stehekin Landing and Valley Development Concept Plan: The natural character of the lake and river edge on public lands (which includes areas within 200 feet of the lake and river shoreline) will be restored (p.1).

Chelan County Code, Flood Hazard Development, § 3.20.040

It is the purpose of this chapter to promote the general public health, safety, and welfare, and to minimize public and private losses due to flood conditions in specific areas, by providing standards designed to:

1. Protect human life and health;

2. Minimize expenditure of public moneys and reduce the need for uneconomical flood control projects;
3. Minimize the need for rescue and relief efforts associated with flooding and usually undertaken at the expense of the general public;
4. Minimize prolonged business interruptions;
5. Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone, and sewer lines; and streets and bridges located in flood hazard areas;
6. Help maintain a stable tax base by providing for the sound use and development of flood hazard areas so as to minimize future flood loss;
7. Ensure that potential buyers are aware that the property is located in a flood hazard area;
8. Ensure that those who occupy the flood hazard areas assume responsibility for their own actions; and
9. Satisfy the requirements established by the Federal Emergency Management Agency as failure to do so would jeopardize federal financial support to the county and its citizens. (Res. 99-91 (part), 7/6/99; Res. 89-56 § 106, 5/30/89).

Chelan County Emergency Resolution #2007-42

Chelan County on March 12, 2007 issued an Emergency Resolution (#2007-42) declaring “an imminent danger at several locations in the Stehekin River and upper Lake Chelan due to increased flooding risk.” The purpose of the Resolution was to “...request that the Washington State Department of Fish and Wildlife issue an expedited written permit to perform work to reduce the flooding risk in the Stehekin Community.” The Resolution identified several specific locations for flood protection measures, including the Upper Company Creek Road, based upon concerns voiced by landowners and recommendations provided by the Corps of Engineers, Emergency Management Division.

Chapter II. Management Alternatives

Alternative A. No Action—Continue Current Management

The NPS would continue to maintain the road in its current condition. Regular maintenance would primarily include periodic grading, ditch maintenance and gravel resurfacing. After floods the NPS would repair road surface damage as needed, and repair existing grade control structures as needed. Repairs would be performed by NPS employees or contractors.

This level of management action would normally be excluded from further environmental impact analysis (i.e. preparation of an Environmental Assessment) according to the following categorical exclusion:

C. Actions related to development: (9) Repair, resurfacing, striping, installation of traffic control devices, and repair/replacement of guardrails, culverts, signs, and other minor existing features on existing roads when no potential for environmental impact exists.

There is a high probability that over time, damage from flooding would require more intensive management efforts to repair to the road than those actions covered by the aforementioned Categorical Exclusion. The NPS would continue to maintain the road until flood damages prevented routine repairs. Time permitting, further environmental analyses would then be conducted to identify appropriate management actions. Otherwise, emergency actions would be implemented to repair the road, followed by after-the-fact permitting and environmental documentation.

In the event of an emergency, the NPS would take immediate action to prevent or reduce risks to public health or safety and to prevent road failure. The most likely action to protect the road would be to armor the eroding bank with rip-rap because flood conditions would most likely preclude careful placement of rip-rap and other resource protection measures. Landowners with easement access to their property would also presumably take action in ways that could harm the resources and values of Lake Chelan NRA.

Alternative B. Minimize Erosion with Bank Barbs and Bioengineering

Background

Bank barbs, also known as “rock barbs”, are instream rock structures used to deflect streamflow away from an eroding bank, and to reduce erosion by decreasing the velocity of streamflow adjacent to the bank (West Consultants, 1997). Bank barbs, when used in combination with strategic placement of large woody debris and bioengineering, have proven to be an effective means to stop bank erosion adjacent to public roads and facilities. Bank barbs have also proven to be very resilient to flood damage, and several have withstood multiple 100-year flood events.

Bank barbs represent a fundamentally different approach to bank protection, and stand in contrast to heavy-handed bank armoring techniques like rip-rap (large angular rock) or armored revetment levees. Bank barbs dissipate flow energy, require much less rock than bank armoring, do not accelerate erosion downstream, and do not cause bank undermining. Bank barbs also create pools in the vicinity of the eroding bank, allow growth of riparian vegetation, enhance fish habitat, are aesthetically unobtrusive and are easily passed by rafts and other boats.

Construction Details

The NPS would construct four bank barbs (Figure 3), place large woody debris between the barbs, and densely plant native vegetation along approximately 500 linear feet of shoreline (Figure 4). Each bank barb would be constructed using about 100 cubic yards of rock spalls and fragments weighing up to 3,500 lbs (DOT, 1992). An additional 100 cubic yards of large angular rock would be placed between the barbs and amongst the woody debris to anchor the materials. The total volume of rock placed along the Stehekin River shoreline would not exceed 500 cubic yards. The rock would be obtained from sources outside the valley, because large angular rock is not available in the Company Creek pit.

The bank barbs would be constructed using an excavator with thumb attachment, working “in the dry” from the bank. Each bank barb would include a significant amount of rock landward of the shoreline to allow the barb to ‘key’ into the bank and prevent the river from eroding around the structure. The in-stream part of the barb would have a low profile that tapers into the channel and could be overtopped by flood flows. The bank barbs would be approximately 15-20 feet long, and would protrude no more than ¼ of the way across the low flow channel so as to avoid transferring hydraulic impacts to the left bank (McGregor Meadows side) of the river.

Approximately 100 cubic yards of rock and large logs (with root wads attached for stability) would be placed between the barbs, from the toe of the bank up to the ordinary high water mark. The logs would be anchored with duckbill-type steel anchors and rock, and partly buried in the bank. Holes or weak points would be fortified with additional rock. No large trees would be felled during construction, although some riparian vegetation would be inadvertently damaged by heavy equipment. Following installation, the slope of the bank would be graded to an angle of repose between 1.5:1 – 2:1, then planted with riparian vegetation.

Mitigation Measures

The NPS would implement the following mitigation measures to offset adverse environmental and aesthetic impacts, and to satisfy any mitigation conditions that may be required by the Army Corps of Engineers or the Washington Department of Fish and Wildlife (WDFW). Additional mitigation measures required by the Corps’ nationwide permit or the Hydraulic Project Authorization issued by WDFW would be incorporated into the work plan as required.

Timing of construction

Construction would begin in mid-October and last several weeks. This work window would take advantage of low flows and coincide with reduced visitor use of the Lower Stehekin Valley (peak visitor use is from July-September). Construction would be limited to the hours of 6:00 a.m. to 8 p.m., Monday to Friday; and 7:00 a.m. to 8 p.m. on weekends.

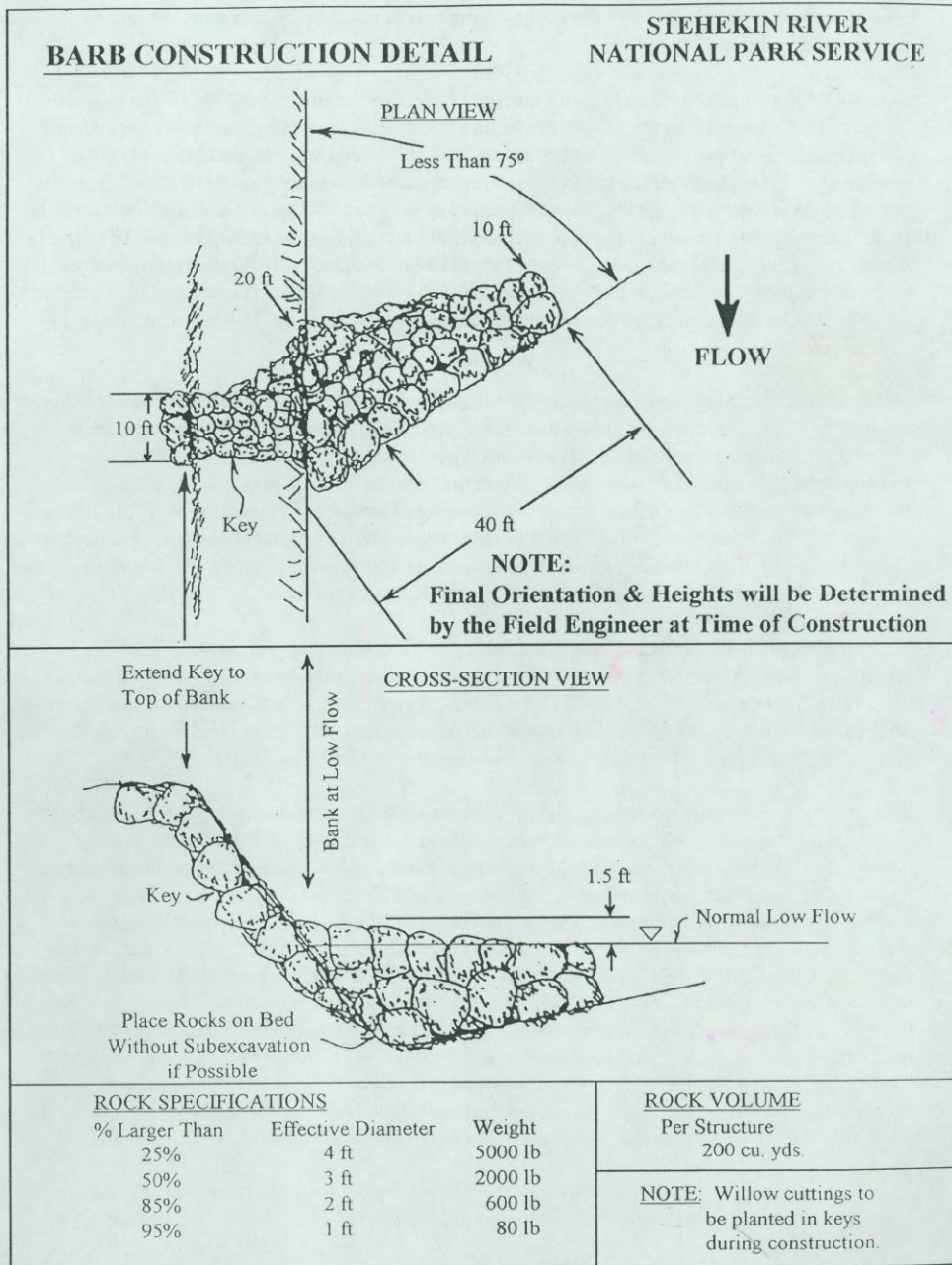


Figure 7. Rock barb design cross-section.

Figure 3. Bank barb construction details.

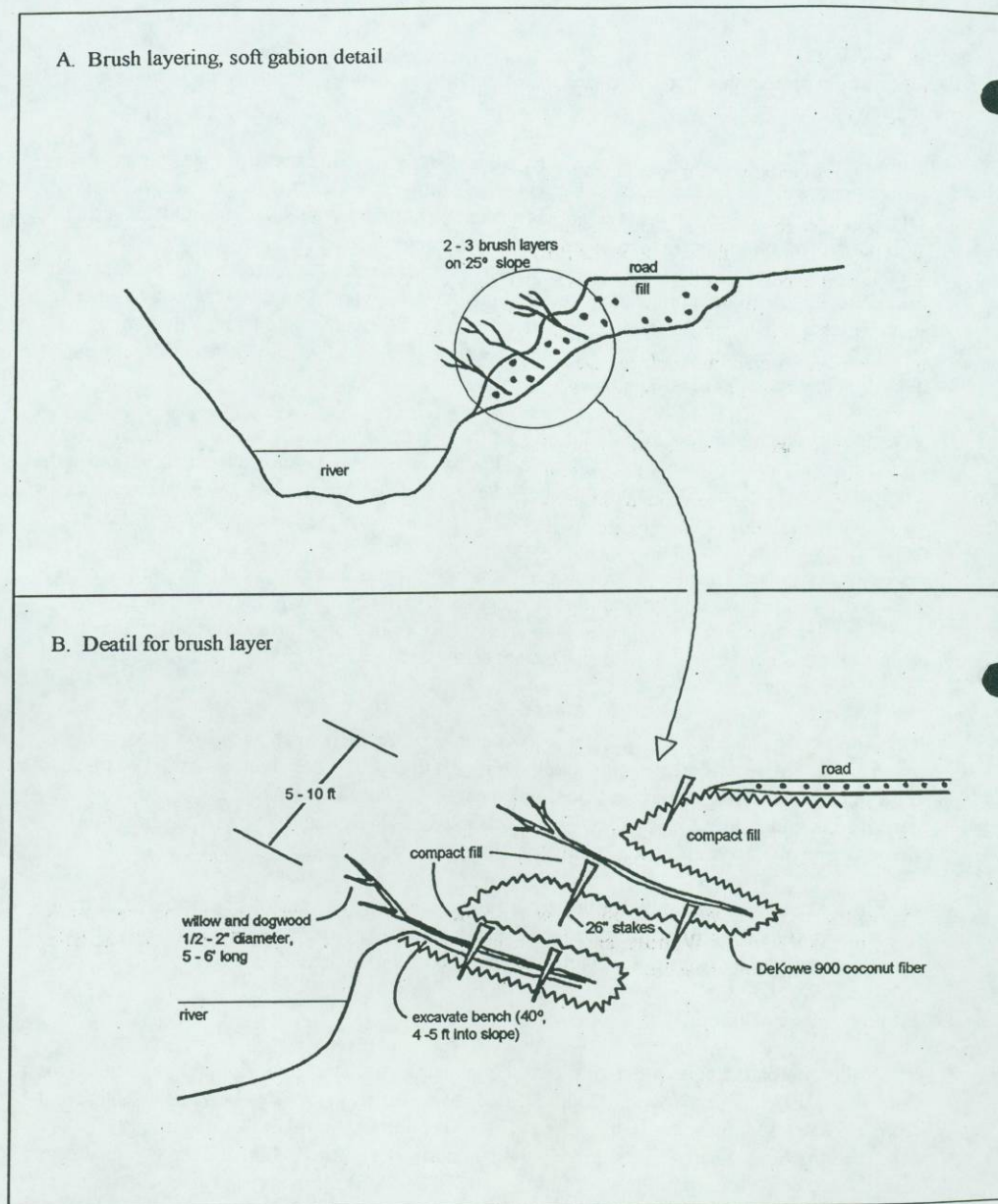


Figure 10 Bioengineering design cross-sections.

Figure 4. Bioengineering design details

(Mitigation measures cont.)

Heavy Equipment Constraints

A large excavator would be used to place rock into the water and to excavate the streambank. A spill containment kit would be kept on site. Pathways of ingress and egress would be marked using stakes and flagging to minimize damage to the shoreline.

Sediment Control

Mulch and/or geotextile fabric would be used to cover exposed soils until vegetation becomes established on the site.

Unanticipated Discoveries of Cultural Resources

Should construction unearth cultural materials, all ground-disturbing activities would cease pending further investigations by a qualified archeologist.

Revegetation

The upper 3-4 ft. of the stream bank would be rehabilitated with whips of native willows and red osier dogwoods (4-5 foot length; <1" diameter) for a total distance of about 500 linear feet. The whips would be collected from the local area to ensure genetic integrity. Most of the whips would be planted using a layering technique that employs biodegradable fabric (coconut-fiber) to protect soils until the roots become established (Figure 4). This technique, commonly referred to as "bioengineering", has been used successfully to protect more than ½ mile of eroding streambank elsewhere along the Stehekin River. Collection of cuttings and planting would take place during dormancy to minimize mortality. Planting would immediately follow.

Post-construction Monitoring

During the first three years following planting, NPS staff would periodically inspect the area to identify problems such as excessive plant mortality or damage to the barbs from flooding. Replanting and/or barb repairs would be conducted if needed.

Derelict Structure Removal

The NPS would remove the cabin and associated debris on NPS parcel #07-111 (Chelan County parcel # 331716220700). This 0.66 acre parcel, purchased by the NPS in 1973, has an old cabin that has been heavily damaged by recent flooding and needs to be removed before it gets washed away in the next flood. The NPS would also remove any remnants of the former residence and outbuildings on NPS parcel #07-112 (Chelan County parcel #331709330100). During the 2003 flood, the house and most of the outbuildings on this 0.66 acre parcel were washed away. The purpose of removing these structures would be to help restore the natural integrity of the riparian zone as partial mitigation for the impacts of the proposed erosion control measures. This action would also prevent loss of materials into the Stehekin River during future floods.

Alternatives Considered but Rejected

Armor 1000 lineal feet of riverbank

The Army Corps of Engineers, Emergency Management Branch visited Stehekin on January 30, 2007 to evaluate the risk of flood damage and provide flood protection recommendations to Chelan County. The visit was prompted by a request from Chelan county officials who were concerned about the risk of future flood damage in Stehekin (McCormick, 2007).

The Corps' site visit yielded the following recommendations for flood control and erosion prevention in the vicinity of the Project Area:

- Company Creek Road: removal of an additional logjam and approximately 1,000 lineal feet of bank protection is needed to lessen the effects of erosion and flooding damage
- McGregor Meadows: approximately 2,000 lineal feet of bank protection is needed to lessen the effects of erosion and flooding damage.

The NPS has considered but rejected the flood control recommendations of the Army Corps of Engineers, Emergency Management Branch for Company Creek road because the proposed measures (a) would not comply with several provisions of the General Management Plan; (b) would be extremely costly to implement given the volume of large angular rock that would be needed; and (c) would most likely not be permitted by the state and federal agencies with regulatory jurisdiction over the Stehekin River, including the separate Regulatory Branch of the Army Corps of Engineers.

The Corps of Engineers, Emergency Management Branch proposals for erosion control and flood protection measures for McGregor Meadows are beyond the purpose and scope of this EA. Instead, flood control and erosion control measures for McGregor Meadows will be considered in a forthcoming Stehekin River Corridor Implementation Plan/EIS.

Relocate the Upper Company Creek Road

This reroute would move the upper end of the road to the west, away from the river, and involve approximately 1.4-miles of new road construction (NPS, 1995). This reroute would also involve constructing driveways and spur roads to provide alternative motor vehicle access to private property. Variations of this proposal have been considered but rejected in previous environmental impact analyses, including the 1995 General Management Plan/EIS for Lake Chelan NRA, and the 1997 Environmental Assessment for Erosion Control on the Company Creek Road. This proposal was again considered but rejected primarily because it would require new road construction in undisturbed, mature forest and wetlands, and those impacts would exceed the impacts identified by the proposed alternative under consideration in this EA.

Environmentally Preferred Alternative

NPS policies regarding implementation of the National Environmental Policy Act require the identification of the Environmentally Preferred Alternative so the public has a clear

understanding of the relative merits of the various alternatives. The Environmentally Preferred Alternative is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historic, cultural and natural resources.

Alternative B would be the Environmentally Preferred Alternative because based on the assumptions provided for Alternative A, failure to enact preventive measures to minimize erosion would most likely result in partial or complete road failure due to channel avulsion. A road reroute, or substantial road reconstruction would then be needed to provide access to maintain access to private property. This would have greater adverse impacts to the biological and physical environment when compared with the preventive measures proposed in Alternative B.

Chapter III. Affected Environment

Project Area

The Company Creek Road is a 3.0 mile, dead-end gravel road located in the Lower Stehekin Valley in Lake Chelan NRA (Figure 2). The Project Area for this EA includes the northern end of the Company Creek Road (from approximately road mile 2.5 to road end) and the adjacent public and private lands. The Project Area also includes the adjacent reach (river mile 6-7) of the Stehekin River and its floodplain.

Biological and Physical Environment

Water Resources, Including the Stehekin River and Hydraulic Processes

The Stehekin River drains 73,000 acres of rugged Glacier Peak and Stephen Mather Wilderness areas. Local relief within the watershed is nearly 8,400 ft, with a low of 1,100 ft at Lake Chelan and a high of 9,511 ft on Bonanza peak at the headwaters of Company Creek. The Stehekin River's headwaters rise from glaciers located along the Pacific Crest of the Cascade Range. Approximately 103 small glaciers cover about 3% of the watershed, but provide as much as 20% of runoff during the dry summer months.

Hydrology

The location of the Stehekin River's headwaters along the wet Pacific Crest has a strong influence on its hydrology and flooding. Unlike most rivers on the east side of the Cascade Range, the upper Stehekin River, Flat Creek, and Agnes Creek valleys are prone to fall and early winter rain-on-snow floods because their headwaters are so far west. These floods are known for rising quickly and having relatively short durations of a few days.

The Stehekin River and its tributaries also flood during periods of rapid snow melt, typically in May and June. The largest spring floods occur when an above average snow pack persists late into the spring, and melts rapidly in sudden heat waves. Spring floods rise relatively slowly, but last for many days or even weeks. The fifth largest flood on record was a spring snow melt flood that occurred in 1948 with a peak discharge of 18,900 cfs (Figure 5).

Flows on the Stehekin River have been gauged almost continuously since 1911. The flood history on the river contains both fall rain-on-snow and spring snow melt floods. In 2003, the largest flood of record had a peak discharge of 25,900 cfs and was estimated to have been a 500 year event. The river flooded again in November 2006 and that flood was the 3rd largest flood of record. The most notable trend is that the three largest floods of record, all equal to or exceeding a 100-year flood event, have occurred roughly within the last 12 years (Figure 5).

Riverbed aggradation adjacent to the Upper Company Creek Road has increased the risk of flooding not only during severe floods but also from spring snowmelt (cover photo). The road presently floods when flows exceed 8000 cfs. In May 2006, the spring snowmelt peaked at 11,300 cfs, and in June 2007 the snowmelt peaked at 10,200 cfs.

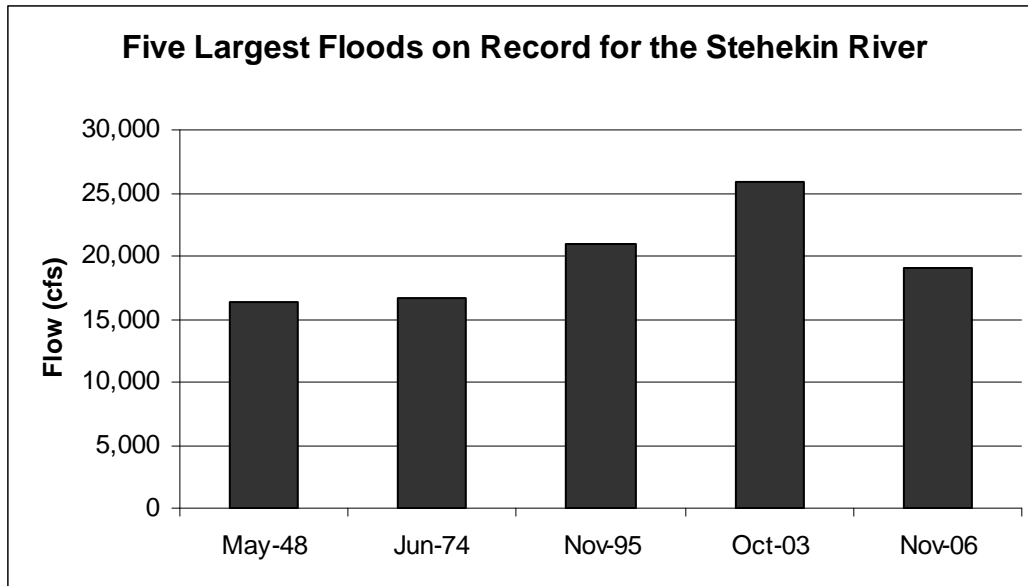


Figure 5. Five largest floods of record for the Stehekin River. The largest three floods have occurred within the last 12 years.

Lower Stehekin Valley Geology and Landforms

The lower Stehekin valley encompasses a wide floodplain containing an island-bar river channel pattern. The river has an island-bar channel pattern because of the coarse bed load it carries, its large-scale transport and storage of large wood, and the effective resistance provided by streambank vegetation.

Channel in last 50 years has been incremental, with most changes induced by flooding. The process begins with deposition of “wedges” of gravel and cobble-sized rock during floods. These wedges reduce channel capacity and accelerate bank erosion and over-bank flooding. Over-bank flooding exploits weaknesses in the floodplain, but generally follows and enlarges former river channels.

Areas standing above the floodplain, and limiting channel migration include a large lateral moraine on the north east side of the valley and the extensive alluvial fans of Company, Rainbow, and Boulder creeks (Figure 6). Over the past several hundred years, the Stehekin River has meandered across most of the valley floor between these landforms.

Due to changes in valley width and stream gradient, there are two main areas of stream bank instability in the lower Stehekin valley. One is where the river loses its energy upon entering Lake Chelan, and the other is at McGregor Meadows, where the valley width increases three-fold. In the McGregor Meadows reach, the increase in valley width is accompanied by a drop in valley gradient, which in turn results in loss of stream power and massive deposition of sand, gravel, and large wood.

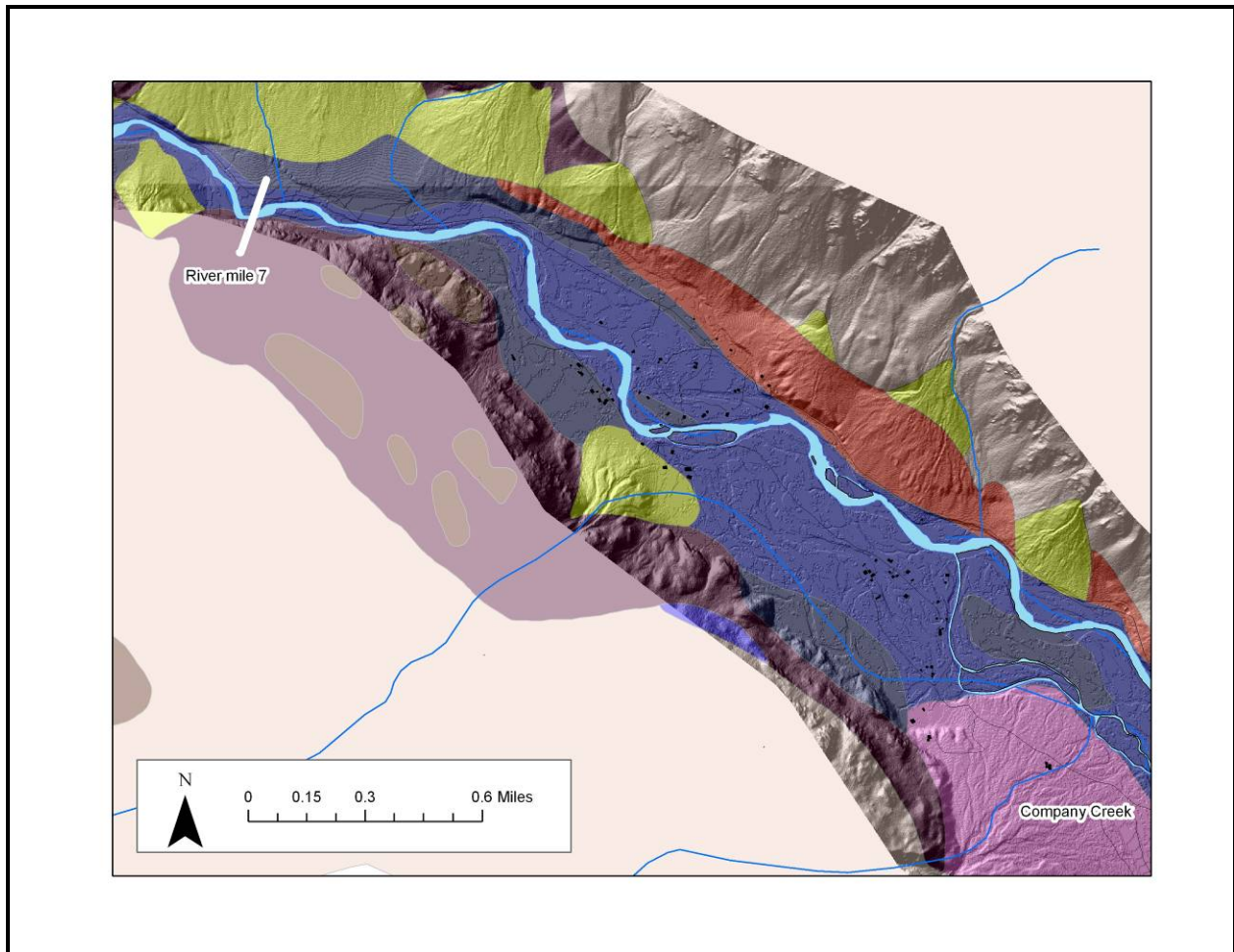


Figure 6. Landform map of the Project Area. Downstream of river mile 7, the width of the Stehekin River floodplain widens dramatically and the gradient decreases. This causes loss of stream energy and deposition of sand, gravel and wood in the Project Area.

A study in 2000 identified several large wood storage and transport zones in the lower Stehekin Valley. The area adjacent to McGregor Meadows is a log storage zone, and there are currently 13 logjams in the mile-long river reach adjacent to the upper Company Creek Road. In response to accumulation of gravel on the river bed, two particularly large logjams have formed in the past 15 years in the McGregor Meadows area (Figure 7). The log jams cover a combined area of almost five acres and contain several hundred large logs stacked as high as 10 ft. The logjams have grown progressively with passage of the 1995, 2003 and 2006 floods.

Reach Scale Channel Habitat

Stehekin River has created a diverse floodplain system of side channels, gravel bars, and terraces. Side channel habitat is extensive in certain reaches, with a total area in the lower valley of 17,126 m² (4.3 acres). In the reach adjacent to the Upper Company Creek Road there is currently one main side channel on the left bank known as No Name Creek (Figure 7, bottom right). No Name Creek was formerly the main channel of the Stehekin River, and evidence indicates the river is gradually reoccupying this route. However, a massive logjam is currently blocking the most direct route between the river and lower No Name Creek.

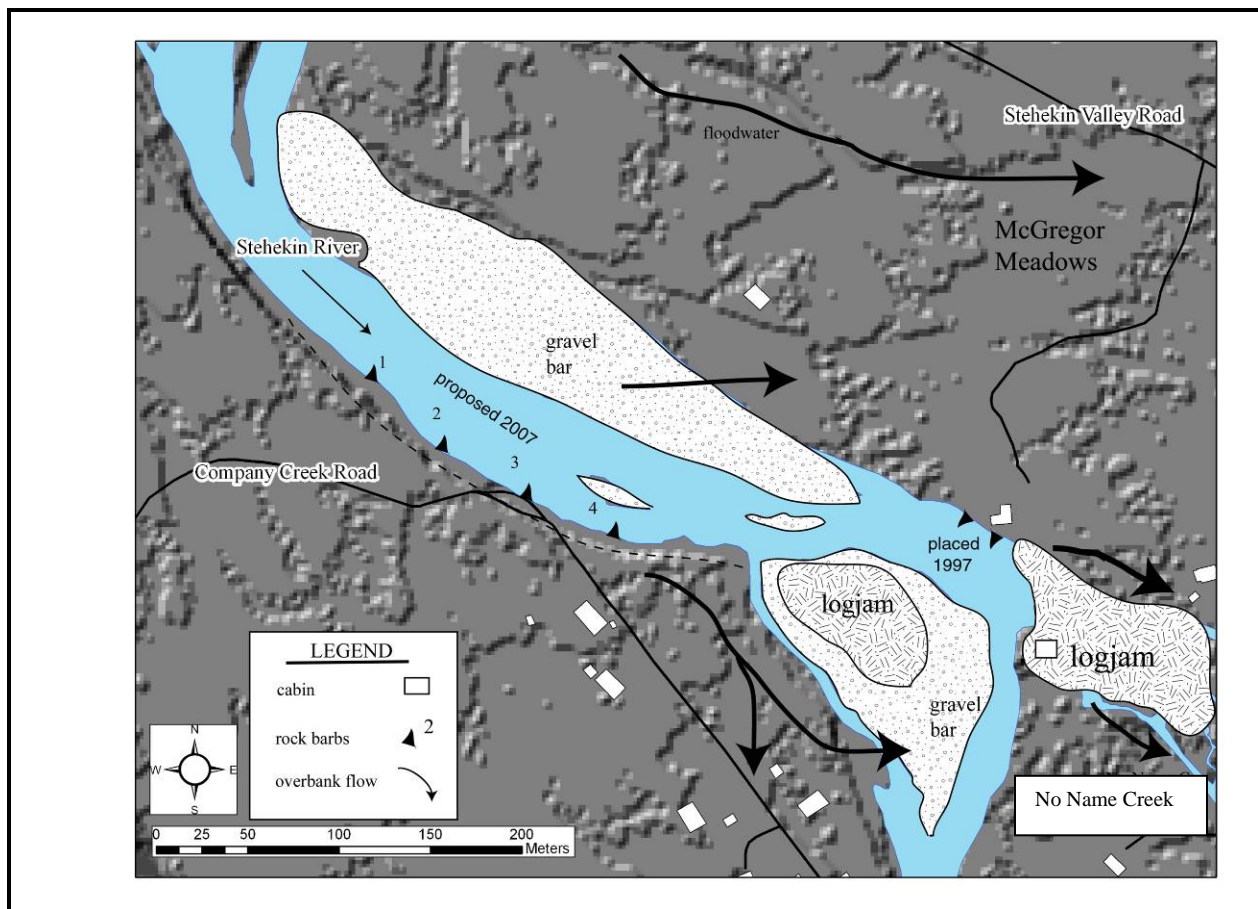


Figure 7. Proposed bank barb locations in relation to Stehekin River. Arrows depict direction of flood flows in relation to instream and riparian zone features.

Channel Instability within the Project Area

The Stehekin River has been migrating laterally toward the upper Company Creek Road for nearly 50 years (Figure 8). In 1962 the river bank was approximately 150 ft from the road. The large floods of 1995, 2003, and 2006 accelerated bank erosion and the river is now within 10 ft. of the road.

In the Project Area reach, river channel sinuosity has increased because floods have filled the main channel with gravel. The NPS has observed a 3-4 foot increase in the elevation of the bed of the Stehekin River adjacent to the eroding road section in the past 15 years. Following the 1995 flood, the NPS in consultation with a private consultant concluded that the loss of channel conveyance due to riverbed aggradation would ultimately result in a channel shift to the left bank, through McGregor Meadows (Riedel and Reichmuth, 1998).

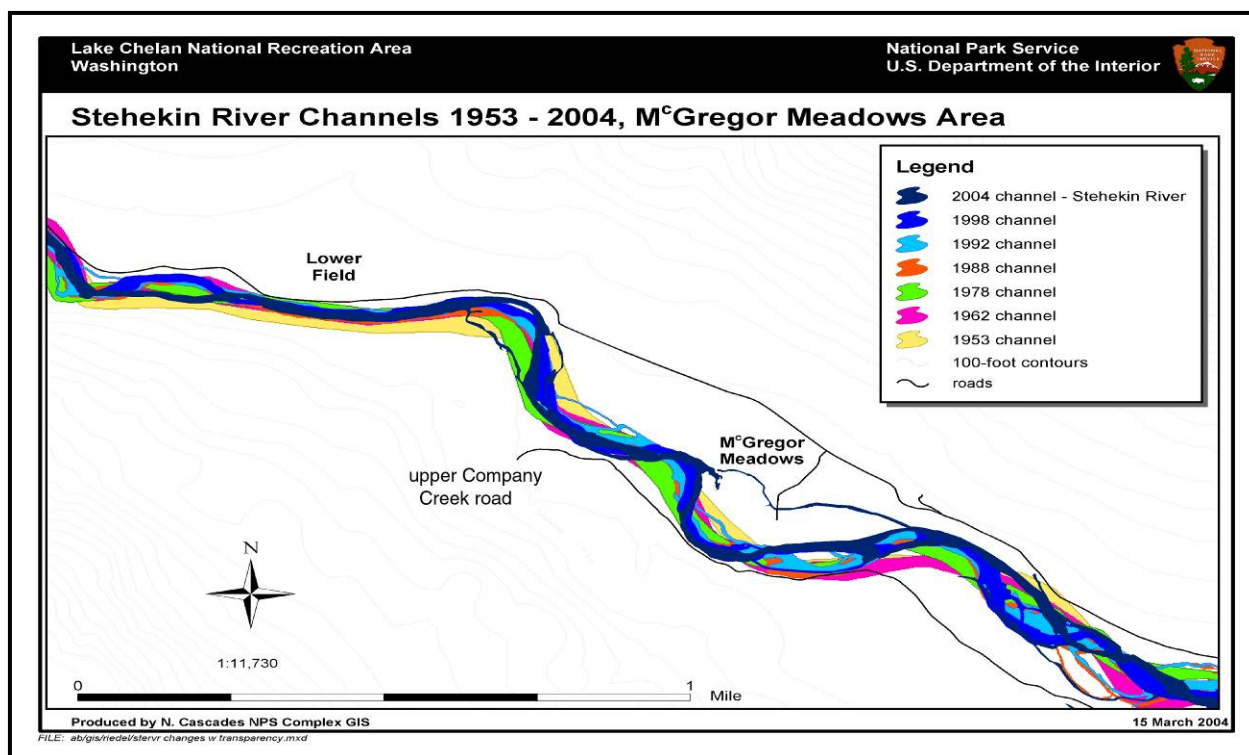


Figure 8. Changes in location of the Stehekin River from 1953 to 2004. The Stehekin River has been migrating toward the Company Creek Road for 50 years

Contrary to predictions, passage of the large floods in 2003 and 2006 did not result in a major channel avulsion through McGregor Meadows, but further filled the main river channel with gravel. Riverbed aggradation caused loss of channel conveyance capacity and forced floodwaters in November 2006 to spill over the right bank and flow directly down the Upper Company Creek Road to a depth of several feet. This event severely scoured the surface of the Upper Company Creek Road and flooded adjacent private properties (Figure 9). In response, the NPS in spring 2007 installed three grade control structures across the road to maintain sheet flow and reduce the risk of flood damage.

Riparian Vegetation

The shoreline in the immediate vicinity of the proposed bank barbs is a well-drained riverine terrace with soils and vegetation more commonly associated with upland environments. Dominant tree species include sparsely scattered ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*). Common understory species include Oregon grape (*Mohonia nervosa*) and kinnikinnick (*Arctostaphylos uva-ursi*). The vegetation also includes black cottonwood (*Populus trichocarpa*), big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*) and red-osier dogwood (*Cornus stolonifera*). No rare or sensitive plant species are believed to be present in the area.



Figure 9. November 2006 flood damage to Upper Company Creek Road, near road end.

Table 1. Erosion control structures on the Lower Stehekin River as of August 2007. These data are based upon shoreline inventory from Lake Chelan to High Bridge (97,152 feet of shoreline).

Bank Protection Technique	Number of Locations	Affected Streambank (ft)	% of Total Shoreline
Bank armoring with rip-rap	15 (1 site also has rock barbs)	2632	2.71
Cabled logs	14 (2 sites also have rip-rap)	1156	1.19
Rock barbs	6 (29 total barbs)	2000	2.06
Log cribbing/jam	4	640	0.66
Concrete bags	1	33	0.03
Cumulative length of shoreline <i>currently</i> affected by erosion control structures:		6461	6.65
Length of shoreline that would be affected by this bank barb proposal, if implemented:		600	0.62
Cumulative length of shoreline that would be affected by all erosion control structures, including this proposal:		7061	7.27

Fish and Wildlife, Including Rare/Listed Species

Fish

Historically, the native fish species in the river included westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and bull trout (*Salvelinus confluentus*). Today, however, the only pure (non-hybridized) strains of westslope cutthroat trout are located well upstream of the Stehekin/Bridge Creek confluence (Ostberg and Rodriguez, 2006). The last confirmed catch of bull trout was in 1957 (Brown, 1984). Once a tremendous attraction for anglers and tourists, bull trout may be extirpated because they have not been documented for 50 years despite numerous surveys (Reed Glesne, pers. comm.).

Non-native species of trout and char in the Project Area include cutthroat/rainbow hybrids, rainbow trout, brook trout, golden trout, and lake trout. Non-native salmon species, including kokanee (landlocked sockeye) and a few Chinook salmon, migrate from Lake Chelan into the Lower Stehekin River during spawning.

Wildlife

The Project Area is essentially surrounded by a very large, relatively pristine wilderness ecosystem that is home to a wide variety of common and rare wildlife, including 40 species of mammals, 96 species of birds, 2 species of lizards, 5 species of snakes, 5 species of amphibians, and at least one species of fish (Kuntz and Glesne, 1993). The diversity of species that may be affected by the actions contemplated in this EA, however, would be more limited than these numbers suggest because the immediate vicinity of the Project Area largely encompasses rural residential lands as opposed to pristine wilderness habitat. With a few exceptions, this same line of reasoning applies to the various Federally listed or Washington State listed Threatened (T), Endangered (E), Candidate (C) and other sensitive species for which there is suitable habitat in the Stehekin Valley (Table 2).

Table 2. Washington State and Federal endangered (E), threatened (T), candidate (C) and other sensitive species for which there is suitable habitat in the Stehekin Valley. Species unlikely to be present (or extirpated) in the Project Area are noted with an asterisk*. These species are not tolerant of human activity (e.g. residential development, motorized vehicle use) or they lack sufficient habitat.

Common Name	Scientific Name	Status	
		Federal	State
Gray Wolf*	<i>Canus lupus</i>	E	E
Grizzly Bear*	<i>Ursus arctos</i>	T	E
Canada Lynx*	<i>Lynx canadensis</i>	T	T
Pacific Fisher*	<i>Martes pennanti pacifica</i>	C	E
California Wolverine*	<i>Gulo gulo luteus</i>		C
Western Gray Squirrel	<i>Sciurus griseus griseus</i>		T
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>		C
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	T
Northern Spotted Owl	<i>Strix occidentalis caurina</i>	T	E
Northern Goshawk	<i>Accipiter gentilis</i>		C
Golden Eagle	<i>Aquila chrysaetos</i>		C

Common Name	Scientific Name	Status	
Merlin	<i>Falco columbarius</i>		C
Flammulated Owl*	<i>Otus flammeolus</i>		C
Vaux's Swift*	<i>Chaetura vauxi</i>		C
Lewis' Woodpecker*	<i>Melanerpes lewis</i>		C
Black-backed Woodpecker*	<i>Picoides albolarvatus</i>		C
Pileated Woodpecker	<i>Dryocopus pileatus</i>		C
Bull Trout*	<i>Salvelinus confluentus</i>	T	
Western Toad	<i>Bufo boreas</i>		C
Columbia Spotted Frog*		C	C

Recreation and Visitor Use

Residents and visitors use the Upper Company Creek Road to access the west side of the Stehekin River for fishing, hunting and hiking. The reach of river through the Project Area is also used by rafters during the summer season. By mid to late fall, few if any visitors raft the river. The NPS does not have data on public use of the area, but use is believed to be low relative to other areas in the lower Stehekin Valley because there are no maintained trails or public facilities.

Socioeconomics and Private Property

Eight parcels of private land totaling 10.64 acres lie within the Project Area (Table 3). The parcels contain two permanent and four seasonally occupied residences. The Company Creek Road provides the only motorized access to these parcels. All parcels are located on the west side of the river.

Table 3. Private land adjacent to the Upper Company Creek Road

Size (acres)	NPS Parcel Number	Chelan County Parcel #
4.82	07-100	331717110050
0.71	07-109	331716220200
0.70	07-110	331716220250
1.00	07-112	331709330100
0.61	07-149	331716220500
1.01	07-150	331716220450
0.90	07-153	331716220300
0.89	07-179	331716220350
10.64 acres		

Wild and Scenic Characteristics of the Stehekin River

The entire Stehekin River is eligible for designation as a component of the Wild and Scenic Rivers system (Finlayson, 2002). The reach of the river that flows through the Project Area is part of an approximately 11-mile segment of the river from its terminus at Lake Chelan to High

Bridge. This segment is eligible for designation as “Recreational” given its generally free-flowing characteristics (i.e. there is some evidence of human modifications, but no large scale bank armoring or dams) and various Outstandingly Remarkable Values (ORV’s) including wildlife and fish, prehistoric and historic cultural resources, geology, scenery and recreational opportunities.

Chapter IV. Environmental Consequences

Introduction

This chapter describes the direct, indirect and cumulative environmental impacts, or consequences, of the management alternatives under consideration in this EA. The scope of the analysis, and the impact topics selected for analysis, are based upon the ecosystem functions, natural and cultural resources and human values described in Chapter III, Affected Environment.

Definitions and Methods for Evaluating Impacts

This EA describes the nature, duration and intensity of impacts according to the following definitions and criteria:

Nature of Impact

Adverse Impact: Moves the system away from the desired condition .

Beneficial Impact: Moves the system toward the desired condition

Duration of Impact

Short-term: During construction or up to one year.

Long-term: Longer than one year.

Intensity of Impact

Negligible: Imperceptible, not measurable, or undetectable.

Minor: Slightly perceptible or measurable and limited in extent. Without further actions, impacts would reverse and the resource would return to the previous condition.

Moderate: Readily apparent and measurable but limited in extent. Without further actions, impacts would eventually reverse and the resource would return to the previous condition. Individuals of a species would be harmed or killed, with slightly measurable impacts to the population or surrounding community.

Major: Substantial and measurable, highly noticeable, and affecting a large area. Changes would not reverse without active management. Entire communities of species would be measurably affected.

This EA uses the following terminology to describe potential effects to federally listed species of wildlife:

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

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

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

Is likely to jeopardize a species and/or adversely modify critical habitat: the appropriate conclusion when the NPS or the U.S. Fish and Wildlife Service identifies situations in which the proposal would jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside the North Cascades Complex boundaries.

Cumulative Impacts

The analysis also includes a discussion of cumulative impacts for each proposal. Cumulative effects are the “additive” impacts from past, present or reasonably foreseeable management actions.

Impairment

The legislation that established the National Park Service in 1916, also known as the Organic Act, directed the service to manage its lands so as to leave them “*unimpaired for the enjoyment of future generations* (italics added).” NPS Policies 2006 define impairment as “...an impact that, in the professional judgment of a responsible NPS manager, would harm the integrity of park resources or values and violate Organic Act’s mandate that park resources and values remain unimpaired. Whether an impact constitutes impairment depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.” (NPS, 2007). NPS policies require an impairment analysis in environmental documentation, so an impairment discussion for all resource-related impact topics (excluding socioeconomic consequences) is included in this EA.

Impacts of Alternative A. Continue Current Management

Assumptions

The following assumptions guide the impact analysis for Alternative A:

- The Stehekin River would continue eroding toward its right (west) bank. As early as the next major flood it could erode up to the current road prism and possibly create a new channel by scouring out the roadbed.
- The NPS would continue to honor its commitment to maintain the Upper Company Creek Road according to the terms and conditions enumerated in the GMP (see Chapter I, “Laws, Regulations, Policies and Administrative Procedures”).
- If the GMP constraints prevented further NPS action to maintain the road, then private property owners would take action to protect the road on their property to maintain motorized access and to protect structures.

Water Resources

Stehekin River Hydraulic Processes

Bank erosion is a natural hydraulic process that is fundamental to a healthy riverine ecosystem. Most bank erosion occurs during flooding. Bank erosion recruits woody debris, creates spawning gravel, and provides inputs of nutrients into the aquatic environment. This No Action alternative would allow the process of bank erosion on approximately 500-lineal feet of the shoreline to continue unimpeded—at least until the next inevitable flood.

Bank barb construction during flooding would not be feasible or effective given the powerful hydraulic forces of the river. Instead, the only feasible emergency action would be to haphazardly dump rip-rap onto the river's edge to armor the bank and prevent road failure. Bank armoring with rip-rap would adversely affect the hydraulic processes of the Stehekin River by deflecting the erosive force of the river further downstream. This would trigger a cycle of further bank erosion downstream, and most likely require more bank protection measures over time (WDFW, 2003).

The magnitude of adverse impact to the hydraulic process of the Stehekin River would largely depend upon patterns of flood-induced channel formation elsewhere in the reach. For example, if the Stehekin River were to reoccupy No Name Creek in McGregor Meadows and take the pressure off of the Company Creek Road, then impacts would likely remain negligible because bank protection would be needed in the future. Conversely, impacts would probably be moderate to major if the river continued to move laterally toward the Upper Company Creek Road because emergency efforts would be needed to armor the bank and protect the road. If those efforts failed, then the river could partially or completely avulse into the upper 0.25-mile section of the Company Creek Road. This worst-case scenario would cut off motorized access to at least 8 parcels of private land and prompt an intensive road reconstruction effort with corresponding moderate to major, adverse impacts to the Stehekin River and its shoreline. The installation of three grade control structures in spring, 2007 was intended to prevent this worst-case scenario from occurring, but the risk still remains.

Stehekin River Floodplain

The Stehekin River floodplain on the west side of the river has widespread evidence of old, abandoned river channels and wetlands created and abandoned by past flooding. These channels and wetlands are not hydrologically connected by surface flow to the current river channel, but are fed by smaller streams from the valley wall. This No Action alternative would inadvertently sustain the natural connections between the river and its floodplain, and have no adverse effect to the floodplain unless or until emergency bank protection measures were needed to protect the road. As described in the previous section, emergency efforts such as bank armoring could have a substantial adverse impact on the floodplain in the vicinity of the Project Area by blocking or reducing hydrologic connectivity between the floodplain and the river.

If the road failed and reconstruction was not possible, then road relocation would be necessary to provide residents access to their property. According to the 1995 GMP, a 1.4 mile road would need to be constructed through relatively-pristine floodplain habitat. The road would require

several bridges over existing flood channels, and require clearing of at least one acre of vegetation (NPS, 1995).

Cumulative Impacts to Water Resources

The NPS and private landowners have cumulatively and adversely affected the natural hydraulic processes of the Stehekin River by installing approximately 800 lineal feet of bank protection measures within the vicinity of the Project Area, and 6461 lineal feet (6.65 % of the total shoreline) throughout the Stehekin Valley (Table 1). Additional bank armoring in response to flooding would have an adverse, cumulative impact on the natural hydraulic processes of the Stehekin River by constraining its channel migration zone within the Project Area. The magnitude of adverse cumulative impacts to the Stehekin River is difficult to predict, however, because (a) the future risk of flooding (magnitude, frequency and consequences) is uncertain; and (b) the degree to which the NPS may need to take emergency actions (e.g. bank armoring) in response to flooding is unknown.

Conclusions

- *Stehekin River Processes:* negligible to major, adverse, long-term impacts if the river continues to migrate toward the road. Impacts conjectural given dynamic nature of river, and uncertainty over future flood impacts and repair scenarios.
- *Stehekin River Floodplain:* negligible to major adverse impacts. Impacts conjectural given uncertainty over future flood impacts and repair scenarios.
- *Cumulative Impacts:* potentially adverse but magnitude uncertain given various road damage/repair scenarios that would result from future flooding in the valley.
- *Impairment:* Impacts would range from negligible to major and adverse, depending upon the magnitude of future flooding and the repairs that would be needed. Private landowners could also enact flood repair measures on their land independent of the NPS that could trigger concerns for impairment. The General Management Plan for Lake Chelan NRA, however, states the NPS would actively prevent private landowners from taking adverse actions that would significantly harm recreation area resources or were in violation of local, state, or federal ordinances, regulations or laws. Moreover, the NPS has the legal jurisdiction and authority to prevent significant adverse actions from taking place on private land (U.S. Dept. of Interior, 1985). The NPS would act within this legal and policy framework to prevent impairment of park resources.

Riparian Vegetation

Bank erosion is a natural process, so there would be no adverse impacts to riparian vegetation unless emergency action was needed to prevent road failure. Emergency action could harm riparian vegetation, for example, by injuring or killing trees and smaller vegetation with heavy equipment or rock. Road relocation would also cause damage to riparian and forest vegetation. The magnitude of potential adverse impacts would range from negligible to moderate and long-term, but is difficult to predict because there would be many different emergency response scenarios depending upon the magnitude of future floods.

Conclusions

- Negligible to moderate and long-term, but uncertain given potential emergency repair scenarios.

- *Impairment:* There would be no major adverse impacts to riparian vegetation, therefore there would be no impairment.

Fish and Wildlife, Including Rare/Listed Species

Bank erosion and lateral channel migration, both natural riverine processes, would continue to benefit fish and certain wildlife (e.g. harlequin ducks) by recruiting woody debris and creating future side-channel habitat for spawning and rearing of fish. These same processes would also continue to create quality fish cover habitat along the undercut streambank. These beneficial natural processes, however, would be adversely affected if the river eroded into the road prism during a flood.

River erosion into the road prism could cause the river channel to avulse partially or completely into the roadbed and necessitate emergency bank armoring measures. Road failure would release a plume of sediment into the river and cause short-term adverse impacts to fish and fish habitat, including spawning beds. Bank armoring to protect the road would harden the bank and locally degrade fish and wildlife habitat by preventing lateral channel migration and harming the natural process of shoreline habitat creation and renewal. Bank armoring would most likely require future bank protection measures downstream, further harming fish and wildlife habitat, and habitat forming processes, over the long-term. It is unlikely that wildlife or fish would be directly harmed or killed. Instead, fish and wildlife would be partially displaced and their habitat would be degraded over a 500- to 1000-foot section of the Stehekin River. This adverse impact would range from minor to moderate in intensity.

Impacts to Rare/Listed Species

This No Action alternative would have no effect on the following state and federally listed species because they either do not inhabit the Project Area or their presence is extremely unlikely and therefore discountable given their large home ranges and/or lack of sufficient habitat:

Gray Wolf, Grizzly Bear, Canada Lynx, Pacific Fisher, California Wolverine, Townsend's Big-eared Bat, Golden Eagle, Flammulated Owl, Vaux's Swift, Lewis' Woodpecker, Black-backed Woodpecker, Columbia Spotted Frog, Western Gray Squirrel.

This No Action alternative may affect, but is not likely to adversely affect the following species because they would readily avoid the Project Area in response to future repair or maintenance activities:

Pileated Woodpecker, Bald Eagle, Merlin, Northern Goshawk.

This No Action alternative may affect, but is not likely to adversely affect bull trout because they have not been documented in the Stehekin River for more than 50 years, and may be extirpated. There is no definitive consensus among biologists as to whether bull trout may be extirpated, so this not likely to adversely affect determination is based on an abundance of caution because their absence cannot be completely discounted.

The impact of this No Action Alternative on Northern Spotted owl would be highly uncertain and contingent upon the scale and timing of future maintenance and repair activities. Spotted owls have nested to the east of McGregor Meadows (about 0.3 mi. from the end of the road) in 2005 and 2006. Owls were documented in the same vicinity in 2007, but no nest was found in

spite of intensive surveys. These findings suggest that should flooding occur during spring nesting season, spotted owls could experience sufficient disturbance to cause adverse effects such as nest abandonment provided they were nesting nearby. Conversely, similar actions in the fall or winter would have no effect on owls because disturbance would take place outside of nesting season and owls would presumably avoid the area.

Conclusions

- *Fish and Wildlife (not listed under the ESA)*: Impacts would be minor to moderate and adverse.
- *Federally listed species*: Impacts would range from “no effect to “likely to adversely to adversely affect” depending upon spatial extent and seasonal timing of future repair scenarios. Northern spotted owl most sensitive listed species given relatively close proximity of owl activity.
- *Impairment*: There would be no impairment of fish and wildlife resources.

Recreation and Visitor Use

The Project Area has no recreational facilities that would be threatened by road damage other than the road itself. Emergency actions to repair road damage could indirectly affect recreation and visitor use elsewhere in the valley by creating aesthetically displeasing conditions in the form of dust and noise associated with emergency repair activities, including hauling rock and heavy equipment to and from the Ferry Landing and/or the Company Creek gravel pit. However, emergency circumstances would most likely occur during the late fall, or spring when flooding is most probable but visitation is generally low. Therefore, this indirect effect would be adverse, short-term and negligible to minor in intensity.

Socioeconomic Effects

NPS Operations

Given the risk of erosion-induced damage to the road, and the NPS responsibility to maintain the road, it is reasonable to conclude that failing to enact erosion control measures now would lead to much greater administrative costs in the future. Those costs would most likely exceed the \$160,000 estimated cost of Alternative B.

Private Property

It is assumed that the No Action alternative would eventually require the NPS to take emergency action to protect the road from flooding. Private properties along the road would be temporarily inaccessible by motor vehicle while the road was being repaired. This inconvenience would have a short-term, negligible to minor adverse impact on residents and property owners in the Project Area.

Under extreme flood circumstances, severe erosion could cause the Stehekin River to avulse and carve a new channel down the current roadbed. The installation of grade control structures in spring 2007 reduced this risk, but it still remains. It is likely that such an event would also cause considerable damage to several properties along the road. The combined effect of road loss and private property damage would make flood recovery particularly difficult for landowners. The

result would be longer-term, moderate to major impacts to some residents and landowners in the area.

As described in Chapter I, the current General Management Plan for Lake Chelan NRA provides the following criteria for determining whether or not the NPS would take action to protect public roads from flooding:

1. There are no feasible alternatives;
2. Funds are available;
3. The actions will have less impacts than other alternatives;
4. The actions are permitted by county, state, and other federal agencies

To date the NPS has successfully worked within these criteria to repair and maintain roads in the Lower Stehekin Valley, including the Upper Company Creek Road. But given the dramatic increase in flood frequency and intensity experienced in the past decade, reasonably foreseeable circumstances could arise (e.g. lack of funds or severe flood damage) in which these criteria could no longer be met and the NPS would be forced to abandon maintaining the Upper Company Creek Road. Under these circumstances, most if not all residents and landowners along the Upper Company Creek Road would presumably experience major adverse impacts from the combined effects of reduced property values and the substantial financial/logistical burden of maintaining the road.

Cumulative Impacts

The Channel Migration Zone (CMZ) of the Stehekin River floodplain in the Project Area has been reduced to approximately 1/3rd of its historic width due to the cumulative effects of bank protection measures intended to protect private property and the Company Creek Road from flood damage. Continued bank erosion could lead to emergency bank armoring actions and further constrain the river's ability to migrate westward during flood events. In the long run, further constraining the width of the channel migration zone could cumulatively increase the magnitude and intensity of flood damage to private property in McGregor Meadows.

The magnitude of impact to properties in McGregor Meadows is uncertain because the impacts would be contingent upon many factors including, but not limited to: (a) the individual actions of private landowners in the coming months and years in response to the risk of flooding; and (b) the severity and frequency of future floods. Some landowners, for example, have taken very active measures to minimize risk, including raising foundations and enacting other advance protection measures. Others have chosen to sell their property to the NPS, or to begin discussions of land exchanges. Should landowners continue to implement these proactive measures, adverse impacts would decline because the risk of flood damage would decrease.

Conclusions

- Minor, short-term to major, long-term impacts to private property resulting from loss of access and reduced property values. Impacts conjectural given dynamic nature of river, and uncertainty over future flood impacts and repair scenarios.
- Potential adverse cumulative impacts to McGregor Meadows, although magnitude of impacts conjectural given uncertainty as to how landowners will continue to respond to the flood risk.

- *Impairment:* Adverse socioeconomic impacts to private property would not cause impairment of NPS resources because there would be no corresponding biological or physical harm to NPS resources and values.

Wild and Scenic Characteristics of the Stehekin River

Free-flowing Characteristics

The Free-flowing characteristics of the Stehekin River would remain unaffected until a substantial flood required management action to repair the road. At that point it is assumed extensive rip-rapping of the bank would be needed to protect the road. Bank armoring would have a long-term, adverse impact on the free-flowing characteristics of the road by preventing channel migration and various instream hydraulic functions. Extensive bank armoring in the form of rip-rap could have major adverse impacts to the free-flowing characteristics of the Stehekin River within the Project Area, and potentially render the lower section of the river ineligible for designation as “Recreational”.

Fish and Wildlife

River erosion into the road prism could cause the river channel to avulse partially or completely into the roadbed and necessitate emergency bank armoring measures. Bank armoring would harm fish and wildlife habitat, and habitat forming processes, over the long-term. Fish and wildlife would be partially displaced and their habitat would be degraded over a 500- to 1000-foot section of the Stehekin River. These long-term adverse impacts would range from minor to moderate in intensity.

Historic and Prehistoric Cultural Resources

There would be no impact to these resources.

Geology

There would be no impacts to the geologic values that render the river eligible for designation as “Recreational”.

Scenic Resources

Construction noise would cause short-term, minor adverse impacts in the Project Area. Extensive rip-rapping of the shoreline would be a highly-visible aesthetic intrusion. Bank armoring would have a moderate, long-term impact on the aesthetic qualities of the right bank in the vicinity of the Project Area.

Recreation

Emergency actions to repair road damage could indirectly affect recreation and visitor use elsewhere in the valley by creating aesthetically displeasing conditions in the form of dust and noise associated with emergency repair activities, including hauling rock and heavy equipment to and from the Stehekin Landing and/or the Company Creek gravel pit. However, emergency circumstances would most likely occur during the late fall, or spring when flooding is most probable but visitation is generally low. Therefore, this indirect effect would be adverse, short-term and negligible to minor in intensity.

It is assumed that emergency action would eventually help to protect the road and maintain recreation access to the Project Area, and this would have a minor beneficial impact on land-based recreational opportunities in the vicinity of the Project Area. The proposed action would locally affect hydraulic process along 600 lineal feet of the Stehekin River. Those rafting or paddling the river through the Project Area would continue to experience a series of swift riffles and standing waves; opportunities for rafting or paddling the river would not be affected.

Conclusions

Extensive bank armoring in the form of rip-rap could have major adverse impacts to the free-flowing characteristics of the Stehekin River within the Project Area, and potentially render the lower section of the river ineligible for designation as “Recreational”. Bank armoring would cause long-term, minor to moderate adverse impacts to fish and wildlife habitat values. There would be no impacts to cultural or geologic values. Bank armoring would have short-term, adverse impacts to scenic values in the form of noise and dust during construction and long-term, adverse impacts to the aesthetic qualities of the right bank. There would be short-term, adverse impacts to land-based recreation during future road repairs, followed by long-term beneficial impacts in the form of continued access to the west side of the river.

Impacts of Alternative B. Prevent Erosion with Bank Barbs and Bioengineering

Assumptions

- The Stehekin River would continue eroding toward the right (west) bank and as early as the next major flood it could erode up to or beyond the current road prism.
- The NPS would implement the proposal as described herein. No further actions on the part of Chelan County or private landowners would be taken to prevent further bank erosion in the Project Area.

Water Resources

Stehekin River Hydraulic Processes

The proposed action would limit lateral migration of the Stehekin River into its right bank, and thus slow re-occupation of abandoned side-channels on the floodplain. The proposed action would eliminate about 1/3 of the width (approximately 700') of the Channel Migration Zone from reoccupation by the river for several years, if not longer. The duration would depend upon factors such as how rapidly the reach continues to aggrade or whether a future flood forces channel migration or avulsion toward the left bank and into McGregor Meadows. This adverse impact would most likely be minor and last for several years until riverbed aggradation rendered the barbs ineffective.

Stehekin River Floodplain Processes

The grade control structures (installed in spring 2007) downstream of the proposed bank barbs were designed to allow floodwater to flow in a sheet over the right bank, down the road, and across its floodplain. Their purpose was to prevent down-cutting and new channel formation within the immediate vicinity of the road prism. Like the grade control structures, the proposed bank barbs would not affect water surface elevations during floods because their design does not incorporate dikes or levees, but rather allows floodwater to readily occupy the floodplain. Therefore, this proposed action would have a negligible, long-term adverse affect on floodplain processes because flooding and associated processes would basically continue unimpeded.

Cumulative Impacts

Approximately 6,461 feet (6.65%) of total shoreline in the Lower Stehekin Valley from Lake Chelan to High Bridge are currently affected by various erosion control structures on NPS and private land combined (Table 1). This proposal would affect an additional 600 feet of shoreline, or 0.62% of the total shoreline from Lake Chelan to High Bridge. It would also increase the cumulative amount of shoreline affected by erosion control measures to 7,061 feet or 7.27% of the total shoreline. This would cause a minor adverse cumulative impact to Stehekin River processes over the long-term.

Conclusions

- *Stehekin River Processes*: minor, adverse long-term impacts, although duration uncertain given dynamic river conditions (aggrading reach).
- *Stehekin River Floodplain*: negligible, adverse, long term impacts.
- *Impairment*: adverse impacts to water resources would be minor; therefore there would be no impairment of park resources.

Riparian Vegetation

Installation of bank barbs would require heavy equipment to work along the edge of the bank. This equipment would trample some understory plant species, but would avoid larger trees and most shrubs. Some tree roots would be damaged by bank barb installation, and this could harm or kill some trees. These minor adverse effects would be offset by the proposed bioengineering and derelict structure removal. The net result would be long-term beneficial impacts to riparian vegetation along approximately 600 feet of shoreline.

Conclusions

- Impacts would be minor and adverse in the short-term, but beneficial in the long term.
- *Impairment*: there would be no impairment to riparian vegetation because impacts would be beneficial in the long-term.

Fish and Wildlife, Including Rare/Listed Species

The physical disturbance to the site during construction would temporarily displace fish and some wildlife within the project area. The timing of construction, however, would prevent harm to nesting birds in the immediate vicinity of the Project Area. Physical disturbance to the streambed would have a limited adverse effect on fish because the barbs would not be constructed on favorable spawning habitat, and the coarse substrate lacks fine sediment. Taken together, the direct adverse impacts of bank barb installation would be minor and short-term.

The shoreline currently consists of relatively sparse riparian vegetation, and the bank is unconsolidated alluvial material (gravel and cobble). Evidence of stumps and clearings suggests that these riparian conditions have resulted to some degree by past logging, road construction and residential development. Installation of large root-wads, logs and planting of riparian vegetation along the bank would indirectly enhance instream habitat by providing cover and habitat complexity. Moreover, the bank barbs would modify the existing riffle and glide habitat by creating a long eddy zone along the right bank. The size of the eddy zone would be approximately 3000 square meters, increasing the pool area by 10% in this reach. These indirect impacts would be moderately beneficial to fish over the long-term.

Impacts to Rare/Listed Species

Gray Wolf and **Grizzly Bear** have not been reported in the Stehekin Valley below High Bridge in the past 15 years although suitable habitat exists. There have been confirmed sightings of each species within 15 miles of the project site in the past 20 years. These sightings, however, were most likely animals migrating through the area. Although there is suitable habitat in the area, noise, disturbance, and human presence in the Stehekin Valley would make the project area less desirable than the surrounding wilderness landscape. *Determination*: This action may affect, but is not likely to adversely affect gray wolves or grizzly bears.

Canada lynx feed primarily on snowshoe hares and populations of the species overlap significantly. A vertebrate inventory conducted in 1990 and 1991 documented snowshoe hare presence in the Stehekin Valley. There have been at least 4 unconfirmed sightings of lynx in the lower valley (below High Bridge) between 1975 and 2001. However, the habitat affected by the project is not considered typical of that normally used by lynx. Lynx habitat is usually higher in elevation (above 4500) in lodgepole pine, subalpine fir, and or Engelmann spruce forests. Based on vegetation and elevation, the lower Stehekin Valley is not considered optimal lynx habitat (NPS, 1995). *Determination:* This action may affect, but is not likely to adversely affect lynx.

Pacific Fisher has not been documented in recent wildlife surveys of the Lower Stehekin Valley, although historically the highest number of recorded sightings in Washington has been in the North Cascades. Fishers are generally associated with dense old-growth coniferous and mixed coniferous-deciduous forests. Under natural forest conditions, the lower Stehekin Valley would be good fisher habitat, especially along the riparian corridors. But given the altered habitat and other human disturbance in the lower valley, the presence of fisher in the project area is unlikely. *Determination:* This action may affect, but is not likely to adversely affect Pacific fisher.

California Wolverine occurs in low densities, mostly in subalpine and alpine habitat zones. However, they can occur in silver fir and other lower elevation forests. In recent years, several wolverines have been captured and GPS-collared in North Cascades. Last winter, these wolverines traveled extensively throughout the south unit of North Cascades National Park, portions of Lake Chelan NRA and the adjacent Lake Chelan/Sawtooth Wilderness Area (Christophersen, pers. comm.). Given the altered habitat and other human disturbance in the lower valley, the presence of wolverine in the project area is unlikely. *Determination:* This action may affect, but is not likely to adversely affect California wolverine.

Western Gray Squirrel is associated with the grand fir/Douglas-fir habitat zone in the Stehekin Valley. They feed on fungi, and the seeds of pine, fir, bigleaf maple, and vine maple. Current population status in the Stehekin Valley is unknown, but recent surveys indicate the population is restricted to sites below Harlequin Bridge and exclusively on the east side of the Stehekin River (Hamer et al. 2005). These findings suggest that squirrels do not inhabit the Project Area, although suitable habitat does exist. *Determination:* This action may affect, but is not likely to adversely affect Western Gray Squirrels.

Townsend's Big-eared Bat hibernates in caves and use caves, lava tubes, and abandoned buildings for breeding and roosting sites. Nursery colonies are extremely sensitive to human activity, and sites are readily abandoned if disturbed. A park-wide baseline inventory of bats conducted in 1998-2001 did not document this species in the Stehekin River watershed (Kuntz and Glesne 1993). *Determination:* This action would have no effect on Townsend's Big-eared Bat.

Bald Eagle: Individual bald eagles are frequently seen at the head of Lake Chelan throughout the year. A bald eagle nest is located in the riparian zone at the delta of the Stehekin River. Four eaglets have fledged from this nest between 2000 and 2003. The eagle nest is over seven miles

from the proposed project area. *Determination:* this action may affect, but is not likely to adversely affect bald eagles.

Northern Spotted Owl: In spring 2007 the NPS surveyed the Stehekin River Valley for the presence of northern spotted owls. The nearest reported siting and nesting spot was greater than one mile from the Project Area. The sparse, open forests and exposed river bank are not suitable habitat for spotted owls (R. Christophersen pers com 2006). *Determination:* this action may affect, but is not likely to adversely affect Northern Spotted Owls.

Northern Goshawk (*Accipiter gentilis*) Kuntz and Glesne (1993) documented the occurrence of this species in upland mesic conifer and deciduous riparian forests within the Stehekin Valley. Goshawk nests were noted on the east side of Lake Chelan, and recently fledged goshawks were seen above High Bridge. *Determination:* this action may affect, but is not likely to adversely affect Northern Goshawk.

Golden Eagle (*Aquila chrysaetos*) No golden eagles have ever been documented to nest in the vicinity of the Project Area. The habitat in the vicinity of the Project Area is poorly suited for golden eagles. *Determination:* this action may affect, but is not likely to adversely affect Golden Eagles.

Merlin (*Falco columbarius columbarius*) Merlins have been documented on at least three occasions in the Stehekin Valley (June 1986, May 1993, September 1995). These records probably represent birds migrating through the valley. *Determination:* this action may affect, but is not likely to adversely affect Merlin.

Flammulated Owl (*Otus flammeolus*). Uncommon and local in eastern Washington, flammulated owls occur in mature forests consisting chiefly of ponderosa pine and Douglas-fir (Smith et al. 1997). Breeding habitat has been described as consisting of well-spaced Douglas-firs of varying ages, generally containing thick clumps of young trees with some ponderosa pine. Stand understory is very open and contains grasses and isolated shrubs. Suitable habitat has been mapped within the Stehekin River drainage (including Flat Creek and Bridge Creek as core habitat). Flammulated owls remain undocumented in the area (Kuntz and Glesne 1993). *Determination:* this action may affect, but is not likely to adversely affect Flammulated Owls

Vaux's Swift (*Chaetura vauxi*). Park studies (Kuntz and Glesne 1993, Wildlife Observation Database) have documented this species as regularly occurring in the Stehekin Valley from May through September. *Determination:* this action may affect, but is not likely to adversely affect Vaux's Swift.

Lewis' Woodpecker (*Melanerpes lewis*). Lewis' woodpecker is common in open forests and woody riparian corridors of eastern Washington in the ponderosa pine zone (Smith et al. 1997). While it has been documented nesting in both living and dead deciduous and coniferous trees, it shows a preference for ponderosa pine and black cottonwood. Smith et al. (1997) identified core habitat in Washington as including the Stehekin Valley. This woodpecker was observed in 1971 at the head of the Stehekin River. *Determination:* this action may affect, but is not likely to adversely affect Lewis' Woodpecker.

Black-backed Woodpecker (*Picoides arcticus*). Black-backed woodpeckers are uncommon residents in moderate to high elevation, open-canopy east-side coniferous forests and are locally uncommon in burns at lower elevations (Smith et al. 1997). Black-backed woodpeckers have been observed three times during the summer in the general vicinity of the Project Area. *Determination:* this action may affect, but is not likely to adversely affect Black-backed woodpeckers.

Pileated Woodpecker (*Dryocopus pileatus*) Pileated woodpeckers need habitat with large snags used for nesting and roosting. It is estimated that approximately 3 to 4 pairs are resident within the Stehekin Valley (Kuntz and Glesne 1993). *Determination:* this action may affect, but is not likely to adversely affect Pileated Woodpeckers.

Bull Trout (*Salvelinus confluentus*) historically, bull trout inhabited the Stehekin River and Lake Chelan. However, extensive surveys and monitoring have not shown bull trout to be present in the Stehekin River system for several decades. Bull trout may be extirpated from the Stehekin River and Lake Chelan, but the scientific community has yet to reach this consensus, and favorable habitat remains. *Determination:* this action may affect, but is not likely to adversely affect northern spotted owls.

Western Toad (*Bufo boreas*) Western toads are found from sea level to 7,400 feet. Breeding sites and aquatic habitat include lakes, springs, ponds, wetlands, stock ponds and slow-moving parts of streams. Terrestrial habitats are forests, grasslands and along streams, and they may wander great distances through dry forests or shrubby thickets. Outside of the breeding season, western toads are nocturnal, spending the day buried in the soil, concealed under woody debris, or in the burrows of other animals. The western toad has been documented in the Stehekin Valley and could be present in the Project Area (Kuntz and Glesne 1993). *Determination:* this action may affect, but is not likely to adversely affect Western Toads.

Columbia Spotted Frog (*Rana luteiventris*) Columbia spotted frog is nearly always found in or near a perennial water body (required for breeding) such as a spring, pond, lake or stream backwater. It is most often associated with nonwoody wetland plant communities (sedges, rushes and grasses). Breeding occurs in February or March at lower elevations of eastern and western Washington but does not occur until late May or early June at higher elevations. Kuntz and Glesne (1993) documented this species in the Stehekin Valley. *Determination:* this action may affect, but is not likely to adversely affect Columbia spotted frogs.

Conclusions

- Minor adverse, short-term, negligible to minor adverse impacts during construction. Indirect, moderately beneficial impacts (habitat enhancement) over the long-term. No effects to rare/listed species except may affect, not likely to adversely affect bull trout.
- *Impairment:* There would be no impairment of fish and wildlife resources because adverse impacts would negligible to minor and there would be no harm to federally listed species.

Recreation and Visitor Use

The Upper Company Creek Road has no recreational facilities, but it is used by anglers, hunters and hikers to access the western side of the river in the vicinity of the Project Area. Construction would take place this fall (October/November) when visitor use is low. It would mostly adversely affect recreation and visitor use by creating aesthetically displeasing conditions in the form of dust and noise along a 2-mile stretch of the Company Creek Road between the gravel pit and the road end. These adverse impacts would be minor, short term and limited to the immediate vicinity of the Project Area.

Conclusion

- Negligible to minor, short-term adverse impacts to recreational opportunities.
- *Impairment*: there would be no impairment of resources and values related to recreation and visitor use because impacts would be negligible to minor and short-term.

Socioeconomic Effects

Stehekin Economy

Some local residents would benefit economically because a portion of the work would be performed by a local contractor. Use of local contractors would have a short term, beneficial impact to the Stehekin economy.

Private Property along Upper Company Creek Road

Bank barb installation would require hauling approximately 500 cubic yards of rock from the Company Creek gravel pit to the end of the road. Hauling would take several days and create aesthetically displeasing conditions such as dust and noise. Use of heavy equipment at the end of the road would also create noise and dust, and adversely affect several residences immediately adjacent to the site. To mitigate these effects, construction would be limited to 6:00 a.m. to 8 p.m., Monday to Friday; and 7:00 a.m. to 8 p.m. on weekends. These minor adverse impacts would last several weeks.

This alternative would not help to prevent flooding of adjacent property, but it would minimize the risk of erosion-induced damage to several parcels of private property along the Upper Company Creek Road. It would also help to maintain motor vehicle access to private lands. During floods, the proposed action would also help to enable motorized access to private lands for evacuation and emergency flood mitigation measures (e.g. sandbagging). Taken together, the impacts to eight parcels of private land along the Upper Company Creek Road would be minor to moderate and beneficial. These beneficial effects would be of moderate duration (e.g. several years), because the aggrading reach would eventually limit the effectiveness of the barbs.

Private Property within McGregor Meadows

Private property in McGregor Meadows would not be directly affected by this action because the hydraulic effects of bank barbs would attenuate substantially within 50-100 feet of the bank and 100 feet downstream of their emplacement (West Consultants, 1997). The bank barbs could, however, have a cumulative adverse effect on private property in McGregor Meadows. Please refer to the following Cumulative Impacts section for this analysis.

Cumulative Socioeconomic Impacts

Cumulative impacts to private property in McGregor Meadows would be similar to Alternative A given the uncertain/dynamic river conditions, the cumulatively constrained channel migration zone along the west bank, and the flood mitigation/avoidance measures that could be enacted by landowners in the next few years given the manifest risk of flooding in McGregor Meadows.

The NPS has been maintaining the Company Creek Road since 1972. From 1972 to 2002, the NPS has expended approximately \$500,000 on erosion control measures for the Upper Company Creek Road. Repairs to all roads and facilities in the lower Stehekin Valley following the 2003 and 2006 floods have cost an additional \$1.1 million dollars (not including the costs of engineering studies, hydraulic modeling, personnel costs or administrative overhead). Since 2003 the NPS has spent approximately \$33,000 for repairs specifically to the Upper Company Creek Road. This proposed action would cost approximately \$160,000, not including additional costs associated with project administration, resource surveys and data gathering efforts (Paul Slinde, NPS Maintenance Mechanic Supervisor, pers. comm.).

Conclusions

- *Impacts to private property:* negligible to minor, short-term adverse impacts during construction. Minor to moderate, long-term beneficial impacts to 8 parcels of private land; duration uncertain given dynamic river conditions.
- *Cumulative effects:* adverse cumulative impacts to properties in McGregor Meadows uncertain given unknown magnitude of future floods and the potential actions landowners may take in the near future to minimize flood damage to their property.

Wild and Scenic Characteristics of the Stehekin River

Free-flowing Characteristics

The Free-flowing characteristic of the Stehekin River would experience minor, adverse impacts because the bank barbs would inhibit channel migration along approximately 600 lineal feet of shoreline for several years.

Fish and Wildlife

Wildlife would experience short-term, negligible to minor adverse impacts during construction. However, over the long-term impacts would indirect, and moderately beneficial because habitat would be enhanced. There would be no effects to rare/listed species except for bull trout. Impacts to bull trout would be indirect and not likely to adversely affect the threatened fish.

Historic and Prehistoric Cultural Resources

There would be no impact to these resources.

Geology

There would be no impacts to geology other than negligible to minor adverse impacts to hydraulic processes in the immediate vicinity of the project area.

Scenic Resources

Fugitive dust and construction noise would cause short-term, minor adverse impacts to aesthetic values in the Project Area. The bank barbs themselves would be unobtrusive and therefore would have no impact on scenic resources. Removal of the derelict structure would have a minor beneficial impact on the riparian scenery in the immediate vicinity of the Project Area.

Recreation

The proposed action would help to protect the road and maintain recreation access to the Project Area, and this would have a minor beneficial impact on land-based recreational opportunities in the vicinity of the Project Area. The proposed action would locally affect hydraulic process along 600 lineal feet of the Stehekin River. Those rafting or paddling the river along the reach would experience a long series of discontinuous eddies in place in place of a continuous riffle. Navigation of the river would not be adversely or beneficially affected.

Conclusions

The proposed actions would have negligible to minor adverse impacts the free-flowing characteristics of the Stehekin River within the immediate vicinity of the Project area. There would also be negligible to minor adverse impacts to fish and wildlife and geology, and short-term adverse impacts to scenic resources followed by long-term minor beneficial impacts. Impacts to recreational values would be minor and beneficial. There would be no impairment of the free-flowing characteristics or outstandingly remarkable values associated with the Stehekin River's eligibility as "Recreational".

Chapter V. Consultation and Coordination

Public Involvement

The NPS on February 16, 2007 initiated public scoping on several flood recovery proposals, including the proposed actions considered in this EA. This process involved mailing approximately 180 Flood Recovery Newsletters to a comprehensive list of individuals, Stehekin landowners, organizations and regulatory agency personnel. No public comments were received regarding this specific proposal. Feedback from NPS staff in Stehekin indicated that many Stehekin landowners did not realize the Newsletter was partly intended to initiate public comment on this proposal. In response, a second Newsletter, specific to Stehekin, was prominently posted on bulletin boards, in the Visitor Center and in the Post Office. Again, no comments were received concerning this proposal.

Chelan County on March 12, 2007 issued an Emergency Resolution declaring an imminent danger at several locations in the Stehekin River and upper Lake Chelan due to increased flooding risk (see Chapter I, Laws, Regulations, Policies and Administrative Procedures Guiding this Decision). In coordination with the NPS, Chelan County officials convened a public meeting in Stehekin on March 29, 2007 to discuss the resolution and to develop flood protection proposals. Approximately 30 people attended the meeting. Following the meeting, approximately 10 residents visited several flood-damaged sites along the Upper Company Creek Road, including the Project Area, to discuss options for mitigating flood damage.

The meeting and on-site discussions helped to further awareness of the risks and magnitude of flooding along the Upper Company Creek Road, and provided a constructive forum for NPS staff to engage directly with Stehekin residents and Chelan County officials regarding various measures the NPS was contemplating to minimize flood damages to the road. In turn, the discussion helped NPS staff better understand the flood control measures desired by Stehekin property owners. Specifically, while the residents supported NPS proposals to construct grade control structures near the end of the Company Creek Road, most wanted to see more extensive measures aimed at flood control as opposed to erosion prevention measures such as those proposed in this EA.

During this public scoping phase the NPS also met with the North Cascades Conservation Council (NCCC) at their request on March 23, 2007 to discuss potential NPS actions regarding flooding. NCCC representatives expressed concern that landowners on the Company Creek Road and McGregor Meadows would take actions that could adversely impact the Stehekin River and other resources and values in Lake Chelan NRA.

Agency Consultation

The NPS has consulted with the Army Corps of Engineers, U.S. Fish and Wildlife Service, Chelan County, and the Washington Department of Fish and Wildlife on the details of this proposal, especially the urgent need to implement erosion control measures prior to the fall 2007 flood season. These discussions prompted the regulatory agencies to receive permit applications for installation of the proposed bank barbs so that if the proposed action is selected, the agencies

will be able to grant permits in time to conduct work prior to the fall 2007 flood season. No specific comments from the agencies resulted in modifications to this proposal, presumably because the NPS has a long history of working with the agencies to enact erosion control measures with minimal adverse impacts to water resources, wetlands and fish/wildlife habitat.

List of Preparers and Contributors

Roy Zipp, Environmental Protection Specialist; and Jon Riedel, Geologist prepared this EA.

Contributors included the following NPS personnel: Vicki Gempko, Stehekin District Natural Resource Specialist; Paul Slinde, Maintenance Mechanic Supervisor; Anne Braaten, GIS Specialist; Reed Glesne, Aquatic Ecologist; Tom Belcher, Facility Manager; Rick Wagner, Realty Specialist (Seattle); and Wayne Hill, Realty Specialist (Seattle).

Distribution List

Backcountry Horsemen of WA	The Wenatchee World
Bellingham Herald	The Wilderness Society
Bellingham Public Library	WA Dept of Fish & Wildlife
Chelan Community Library	WA Trails Association
Chelan County Board of Commissioners	Washington Environmental Council
Chelan County Planning	Washington Wilderness Coalition
Chelan County PUD	Washington's National Park Fund
Colville Confederated Tribes	Western Land Exchange Project
Conservation Alliance	Wilderness Society
Conservation Northwest	Wilderness Watch
Earth Justice Legal Defense Fund	
East Wenatchee Community Library	
Friends of the Earth	
Jeffers, Danielson, Sonn & Aylward, P.S.	
Lake Chelan Mirror	
Methow Valley News	
North Cascades Conservation Council	
North Central Washington Audubon Society	
NPCA	
Office of the Governor	
Pacific Crest Trail Association	
Port of Chelan County	
Seattle Times	
Sierra Club - Cascades Chapter	
Skagit Valley Herald	
State Representative, 12th District	
State Senator, 12th District	
Stehekin Landowners	
The Herald	
The Mountaineers	

References

Literature Cited

Brown, Larry G. 1984. *Lake Chelan Fishery Investigations*. Unpublished report, Washington Department of Game.

Kuntz, R.C. II and R.S. Glesne. 1993. A terrestrial vertebrate inventory of the Stehekin Valley, Lake Chelan National Recreation Area. NPS Technical Report NPS/PNNOCA/NRTR-93/010, Sedro-Woolley, Washington.

Finlayson, Leslie. 2002. *Stehekin Wild and Scenic River Eligibility Report*. NPS Report. May, 2002. 48 pp.

Hamer, Thomas; Nathalie Denis and Jim Harmon, 2005. *Distribution and Habitat Characteristics of Western Gray Squirrel Nest Sites in the Stehekin River Valley, North Cascades National Park*. Hamer Environmental L.P., Mount Vernon, WA. 44pp.

McCormick, Michael. 2007. *Letter from Colonel, Corps of Engineers Emergency Management Branch to Board of Commissioners, Chelan County RE: Request for Assistance for Potential Flood Threat to Community of Stehekin*. 2pp.

National Park Service, 1972. *Letter from NPS Associate Director Raymond L. Freeman to Mr. Richard G. Jeffers of Hughes, Jeffers and Jeffers, Attorneys at Law (file code D30-M)*. 4pp.

National Park Service, 1993. *Data Summary Booklet: Support Studies for the General Management Plan and Environmental Impact Statement, Lake Chelan National Recreation Area*. U.S. Government Printing Office: 1993-838-508. 53 pp.

National Park Service, 1995. *Final General Management Plan/Environmental Impact Statement for Lake Chelan National Recreation Area, Volume 1 of 2*. NPS D-174A, June 1995. 493 pp.

National Park Service, 1997. *Environmental Assessment: Erosion Control on Company Creek Road, Stehekin Valley*. 41pp.

Nelson, Leonard M. *Effect of Bank Protection Measures, Stehekin River, Chelan County, Washington*. U.S. Department of the Interior Geological Survey: Water Resources Investigations Report 85-4316. 22pp.

Ostberg, Carl O. and Rusty J. Rodriguez, 2006. *Hybridization and Cytonuclear Associations among Native Westslope Cutthroat Trout, Introduced Rainbow Trout, and Their Hybrids within the Stehekin River Drainage, North Cascades National Park*. Transactions of the American Fisheries Society 135:924–942.

Riedel, Jon and Don Reichmuth, 1998. *Draft Briefing Statement: Proposed Long and Short Term Solutions to Erosion and Flooding Problems along the Stehekin River near McGregor Meadows*. Unpublished draft file report. 4pp.

U.S. Department of the Interior, 1985. Memorandum from Office of the Regional Solicitor to Superintendent, North Cascades National Park Complex. Subject: The Regulation of Lands, Waters and Activities within the Lake Chelan National Recreation Area. *Administratively Restricted* document, file code NPS.PN.0164, July 8, 1985.

Washington Department of Fish and Wildlife, 2003. Integrated Streambank Protection Guidelines. <http://wdfw.wa.gov/hab/ahg/ispgdoc.htm>

West Consultants, Inc. 1997. *Company Creek Road Erosion Control Project: Two Dimensional Circulation Model Analysis*. Prepared for the NPS via Century West Engineering Corporation, Portland, OR. 19pp.

Personal Communications

Wagner, Rick. Chief, NPS Columbia-Cascades Land Resources Program Center. Personal Communication with Roy Zipp, NPS, June 4, 2007.

Knaub, Deborah. Project Manager, U.S. Army Corps of Engineers regulatory Branch. Personal communication (e-mail) with Roy Zipp, NPS, July 11, 2007.

Glesne, Reed. Aquatic Ecologist, North Cascades NPS Complex. Personal communication with Roy Zipp, NPS, July 2007.

Glossary

Aggradation

Aggradation involves the raising of the streambed elevation, an increase in width/depth ratio, and a corresponding decrease in channel capacity. The cause of aggradation is often an increase in upstream sediment load and/or size of sediment exceeding the transport capacity of the channel. Aggradation can be a result of channel instability and a decrease in stream power and shear stress. Adverse consequences associated with aggradation include channel accelerated bank erosion or avulsion.

Accretion

The addition to land bordering water caused by the gradual deposition of sediment and debris over time.

Avulsion

Avulsion refers to a sudden loss or addition to land caused by the erosive or depositional action of water (aggradation) creating a new channel or filling in an existing channel.

Bank Barbs

Bank barbs are low-profile, angular rock structures that protrude into a river channel at an angle pointed upstream. They are used as an instream flow redirection technique designed to redirect the fastest, deepest part of the channel away from the eroding bank and to create eddies along the bank where velocity and erosion are reduced.

Bioengineering

Bioengineering uses live plant materials to provide erosion control, slope and stream bank stabilization, landscape restoration, and wildlife habitat. These techniques are used alone or in conjunction with conventional engineering techniques.

Channel Migration Zone

The channel migration zone (CMZ) is the geographic area susceptible to channel erosion and/or channel occupation. Because alluvial channels are rarely static through time, rivers and streams naturally migrate within their valleys. Channels respond with horizontal movement (lateral migration, avulsion, channel widening, channel narrowing) and vertical movement (incision and aggradation) depending on site-specific circumstances and watershed conditions. Human landscape disturbance can exaggerate or constrain channel migration by affecting local and watershed processes of flooding, erosion, and deposition. The CMZ can extend beyond areas of flood inundation and can advance into landscape features above the 100-year flood water surface elevation.

Grade Control Structures

Subsurface erosion control devices consisting of large angular rock ballast buried in a trench approximately 3 feet deep by 9 feet wide (varying lengths). The structures help to maintain sheet flow and dissipate erosive forces. They help to prevent head cut formation which could lead to channel avulsion.

Rip-rap

Hard, durable, angular rock that is free of organic material and resistant to weathering and erosion. Rip-rap is commonly used for bank armoring purposes.

Stream Reach

A classification term used in hydrology to refer to relatively similar section of stream or river based on factors such as stream gradient and valley width.