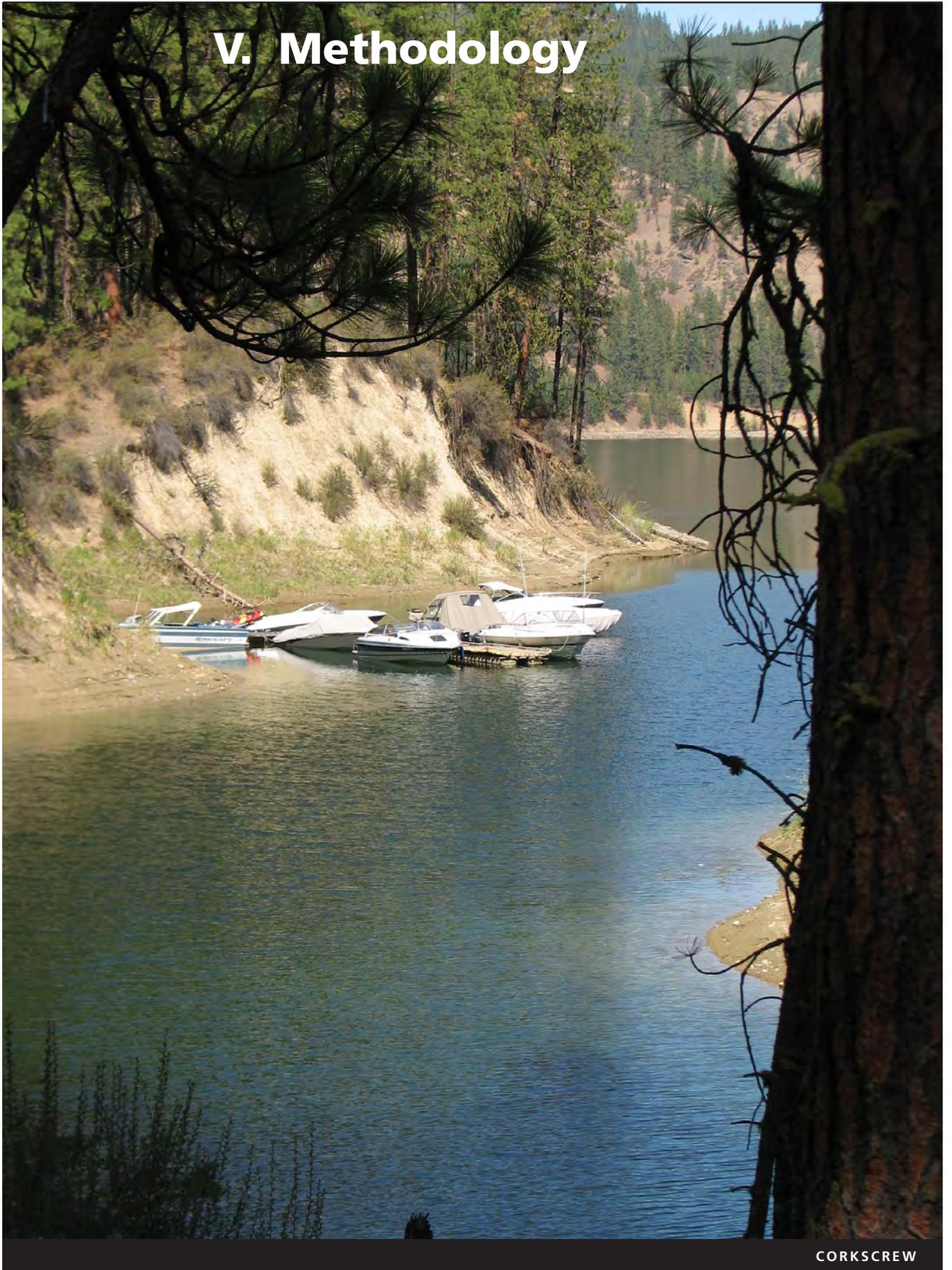


V. Methodology



How Chapter V Is Organized

A. Impact Topics

Specific impact topics were developed to address potential natural, cultural, recreational, social and park operations impacts that might result from the Alternatives as identified by the public, NPS, and other agencies, and to address federal laws, regulations and executive orders, and NPS *Management Policies* (NPS 2006). A brief rationale for the selection or non-selection of each impact topic is given in this section.

B. Methodology

This section contains the methods/criteria used to assess impacts for specific resource topics. Additional information is found in the Environmental Consequences section preceding impact analysis. The definitions of impacts adhere to those generally used under the NEPA to describe impacts as well as to those used under Section 106 of the National Historic Preservation Act (NHPA) and those used under Section 7 of the Endangered Species Act (ESA).

A. Impact Topics



Lot overlooking Marcus Island area with a view of the lake

Impact Topics Analyzed

Impacts of each alternative have been analyzed for the following topics: soils; water resources, including wetlands and water quality; vegetation; wildlife; special status species; prehistoric and historic archeological resources; historic structures; cultural landscapes; visitor experience; and park operations.

PHYSICAL RESOURCES

LAND USE: While the overriding land use would remain as park lands, some land use would change as a result of the implementation of the alternatives described herein. Additional facilities would be constructed where there are now none.

AIR QUALITY: Lake Roosevelt is a class II area under the Clean Air Act. The Clean Air Act states that park managers have an affirmative responsibility to protect park air quality related values (including visibility, plants, animals, soils, water quality, cultural resources and visitor health) from adverse air pollution impacts. The park area has been designated a class II area for purposes of controlling increases in air pollution under the Clean Air Act. Class II areas allow only moderate increases in certain air pollutants. Some actions within the alternatives would result in ground disturbance and the potential for negligible to minor localized impacts to air quality.

SOILS: NPS *Management Policies* (2006) require the NPS to understand and preserve and to prevent, to the extent possible the unnatural erosion, physical removal, or contamination of the soil. The alternatives involve ground-disturbing activities with the potential for erosion impacts to occur with excavation and the potential for soil erosion.

WATER RESOURCES: The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act (CWA) (1977) is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters, to enhance the quality of water resources, and to prevent, and control, and abate water pollution. *Management Policies* (NPS 2006) provide direction for the preservation, use, and quality of water in national parks.

The CWA is a national policy aimed at restoring, maintaining, and enhancing the chemical, physical, and biological integrity of the nation's waters and to prevent, control, and abate water pollution. Construction will result in earth disturbing activities, which increases the potential for erosion and sedimentation to occur.

Water Quality: Section 401 of the CWA as well as NPS policy requires analysis of impacts on water quality. Ongoing localized impacts to water quality are likely occurring from the inadequate disposal of human waste on the Lake Roosevelt shoreline. Actions in the alternatives address this issue.

BIOLOGICAL RESOURCES

VEGETATION: NEPA calls for examination of the impacts on the components of affected ecosystems. NPS *Management Policies* (2006) call for protecting the natural abundance and diversity of park native species and communities, including avoiding, minimizing or mitigating potential impacts from proposed projects. Actions within the alternatives would result in vegetation removal.

WILDLIFE: NEPA calls for examination of the impacts on the components of affected ecosystems. NPS policy is to protect the natural abundance and diversity of park native species and communities, including avoiding, minimizing or mitigating potential impacts from proposed projects. More than 300 native species of terrestrial and aquatic vertebrates have been recorded in the park, including 75 mammals, 200 birds, and 10 species of amphibians and 15 species of reptiles. Many wildlife species may reside in or near the area that would be affected by the Shoreline Management Plan.

SPECIAL STATUS SPECIES: The Endangered Species Act (ESA) requires an examination of impacts to all federally listed threatened or endangered species. *Management Policies* (NPS 2006) call for an analysis of impacts to state-listed threatened or endangered species and federal candidate species. Under the ESA, the NPS is mandated to promote the conservation of all federal threatened and endangered species and their critical habitats within the park boundary. NPS *Management Policies* include the additional stipulation to conserve and manage species proposed for listing. Ongoing informal consultation with the U.S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife has identified several important rare, threatened and endangered species that occur in LARO that could potentially be affected by proposed actions.

CULTURAL RESOURCES (HISTORIC PROPERTIES)

PREHISTORIC AND HISTORIC ARCHEOLOGICAL RESOURCES/HISTORIC STRUCTURES/

CULTURAL LANDSCAPES: Consideration of the impacts to historic properties is required under provisions of Section 106 of the NHPA (1966), as amended, and the 1995 Programmatic Agreement among the National Park Service, the National Conference of State Historic Preservation Officers, and the Advisory Council on Historic Preservation (ACHP). It is also required under NPS *Management Policies* (NPS 2006).

Conformance with the Archeological Resources Protection Act in protecting known or undiscovered archeological resources is necessary. NPS *Management Policies* (2006) call for ongoing inventory and analysis of the significance of archeological resources found within parks.

Federal land managing agencies are also required to consider the effects proposed actions have on properties listed in, or eligible for inclusion in, the National Register of Historic Places (i.e., Historic Properties), and allow the ACHP a reasonable opportunity to comment. Agencies are required to consult with federal, state, local, and tribal government/organizations, identify historic properties, assess adverse effects to historic properties, and negate, minimize, or mitigate adverse effects to historic properties while engaged in any federal or federally assisted undertaking (36 CFR Part 800).

RECREATIONAL/SOCIAL RESOURCES

VISITOR EXPERIENCE: Depending on the selected alternative, a variety of impacts to visitor use may occur. Based on NPS *Management Policies* (NPS 2006), impacts to visitors are considered with respect to park undertakings. Among the impacts considered in this section are visitor access and opportunities, safety, and scenic resources.

PARK OPERATIONS: Impacts to park operations and visitor services are often considered in Environmental Assessments to disclose the degree to which proposed actions would change park management strategies and methods and what additional costs (including staffing) are associated with the proposal.

SOCIOECONOMICS: Socioeconomic impact analysis is required, as appropriate, under NEPA and *Management Policies* (NPS 2006) pertaining to gateway communities. The local and regional economy and most business of the communities surrounding the park are based on tourism and resource use. Agriculture, manufacturing, professional services, and education also contribute to regional economies. There would likely be some measurable effects to regional or gateway community economies, or changes in visitor attendance or visitor spending patterns as a result of the implementation of the actions described herein.

Impact Topics Dismissed From Further Analysis

The topics listed below either would not be affected or would be affected only negligibly by the alternatives evaluated in this Environmental Assessment. Therefore, these topics have been dismissed from further analysis. Negligible effects are localized effects that would not be detectable over existing conditions.

WATER RESOURCES

WATER QUANTITY: The increased/decreased use of water to provide for public use may also have an impact on park resources, such as amphibians. A slight (negligible) increase in the use of water would occur with the Crescent Bay campground in Alternatives B and C.

WETLANDS: Executive Order 11990 requires that impacts to wetlands be addressed. No wetlands would be affected by the proposals in this Environmental Assessment. Due to the fluctuating nature of the reservoir, few perennial wetlands exist along the shoreline. Wetlands were mapped by the National Wetlands Inventory (USFWS 1987). Jurisdictional wetlands are found at Colville Flats (north portion of the lake) and Mill Creek (south side of Spokane River). Other potential wetlands are located west of Lincoln Mill, along the south shore bluff, in an area immediately below the Little Dalles on the west shore and in an area in the Kettle River corridor south of Barstow (NPS 2000: 60). No wetlands would be affected by the actions in the Alternatives in this Environmental Assessment.

FLOODPLAINS: Executive Order 11988 (Floodplain Management) requires an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. NPS *Management Policies*, DO-2 (Planning Guidelines), and DO-12 (Conservation Planning, Environmental Impact Analysis, and Decision Making) provide guidelines for proposals in floodplains. Executive Order 11988 requires that impacts to floodplains be addressed. Although all areas within the national recreation area that are below the 1,290 maximum pool elevation are within the floodplain of Lake Roosevelt, flooding is not a concern because it is controlled by Grand Coulee Dam and at other upriver dams and thus is predictable and occurs slowly. Park facilities within this area, such as docks and boat ramps, are designed to withstand fluctuating lake levels. Shoreline facilities comprise an exception to the Floodplain Management Guideline because they are recreational facilities that must occur near water. No overnight use is proposed in areas that would be subjected to an unpredictable rise in floodwaters.

FLASH FLOODS: The potential for flash flood in the tributaries and side canyons of the lake exists, but no evidence of flash flooding has occurred to date. Therefore, this impact topic has been dismissed from further analysis.

GEOLOGIC PROCESSES/GEOTHERMAL RESOURCES/GEOLOGICAL HAZARDS

There would be no increase or decrease in potential impacts associated with geology or geological hazards from the impacts of the proposed plan. Ongoing geological hazards associated with shoreline erosion would continue, but would not be influenced by the implementation of the alternatives.

AMERICAN INDIAN RELIGIOUS AND TRADITIONAL CULTURAL RESOURCES

Analysis of impacts to known resources is important under the NHPA and other laws, including the Native American Graves Repatriation Act (NAGPRA), American Indian Religious Freedom Act (AIRFA) and Executive Order 13007 (Indian Sacred Sites). The NPS defines American Indian traditional cultural (ethnographic) resources as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (DO-28, Cultural Resource Management Guideline, p. 181). Traditional cultural properties are ethnographic resources listed on or eligible for the National Register of Historic Places.

There are two federally recognized tribes associated with the park, including the:

- Confederated Tribes of the Colville Reservation, and the
- Spokane Tribe of the Spokane Reservation.

Based on ongoing consultation, there have been no ethnographic resources found or identified in the proposed project area to date (also see “Chapter Eight: Consultation and Coordination”). Thus, there would be no effect on any known ethnographic resources as a result of the implementation of the proposed project under any of the alternatives in this Environmental Assessment.

To comply with the American Indian Religious Freedom Act (AIRFA), federal agencies must consider the effects of their actions on American Indian traditional religious practices. Based on analysis of the area of potential effects, there are no known traditional or religious use areas within the proposed project area. In addition, there are no known Indian sacred sites that would require compliance with Executive Order 13007. Areas that have potentially significant cultural/tribal resources have been excluded from proposed actions in this Environmental Assessment.

MUSEUM COLLECTIONS

Management Policies (NPS 2006) and other cultural resources laws identify the need to evaluate effects on NPS collections if applicable. The collections at LARO would not be affected by the proposed project, except by the potential addition of material to the collections if any is found (see mitigation measures under “Archeological Resources” in the “Environmental Consequences” chapter). Requirements for the management of museum objects are defined in 36 CFR 79.

PRIME AND UNIQUE FARMLANDS

Although soil surveys have not been conducted in most of LARO, no unique agricultural soils are believed to exist in this area.

ENERGY CONSUMPTION

Implementation of the proposed actions would not cause measurable increases or decreases in the overall consumption of electricity, propane, wood, fuel oil, gas or diesel associated with visitation or for park operations and maintenance.

ENVIRONMENTAL JUSTICE

Executive Order 12898 requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. This Executive Order does not apply to the subject of this Environmental Assessment. The actions evaluated in this Environmental Assessment would not adversely affect socially or economically disadvantaged populations.

B. Methodology



Marina at Kettle Falls

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented. NEPA requires consideration of context, intensity and duration of impacts, indirect impacts, cumulative impacts, and measures to mitigate impacts. In addition to determining the environmental consequences of the alternatives, NPS *Management Policies* (NPS 2006) and Director's Order-12, Conservation Planning, Environmental Impact Analysis, and Decision-making require analysis of potential effects to determine if actions would impair park resources.

This section provides the reasoning associated with the analysis of the environmental impacts of project alternatives on affected park resources.

Environmental Impact Analysis

The analysis in the Environmental Consequences section compares the effects of the alternatives based on the following definitions of context, type of impact, duration of impact, and area of impact as well as cumulative impacts. Unless otherwise stated or demonstrated in the resource section in Environmental Consequences, analysis is based on a qualitative assessment of impacts.

CONTEXT

Setting within which impacts are analyzed – such as the project area or region, or for cultural resources – the area of potential effects.

TYPE OF IMPACT

A measure of whether the impact will improve or harm the resource and whether that harm occurs immediately or at some later point in time.

- **Beneficial:** Reduces or improves impact being discussed.
- **Adverse:** Increases or results in impact being discussed.
- **Direct:** Caused by and occurring at the same time and place as the action, including such impacts as animal and plant mortality, damage to cultural resources, etc.
- **Indirect:** Caused by the action, but occurring later in time at another place or to another resource, including changes in species composition, vegetation structure, range of wildlife, offsite erosion or changes in general economic conditions tied to park activities.

DURATION OF IMPACT

Duration is a measure of the time period over which the effects of an impact persist. The duration of impacts evaluated in this Environmental Assessment may be one of the following:

- **Short-term:** Often quickly reversible and associated with a specific event, one to five years
- **Long-term:** Reversible over a much longer period, or may occur continuously based on normal activity, or for more than five years.

AREA OF IMPACT

- **Localized:** Detectable only in the vicinity of the activity
- **Widespread:** Detectable on a landscape scale (beyond the affected site)

CUMULATIVE

The Council on Environmental Quality (CEQ) describes a cumulative impact as follows (Regulation 1508.7):

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

The cumulative projects addressed in this analysis include past and present actions, as well as any planning or development activity currently being implemented or planned for implementation in the reasonably foreseeable future. Cumulative actions are evaluated in conjunction with the impacts of an alternative to determine if they have any additive effects on a particular resource. Because most of the cumulative projects are in the early planning stages, the evaluation of cumulative impacts was based on a general description of the project. Among the projects considered in the cumulative impacts analysis include the following. descriptions of many of these are provided in “Chapter Two: Purpose and Need”:

- *General Management Plan* (NPS 2000)
- *Programmatic Environmental Impact Statement and a Draft Supplemental EIS: Lake Roosevelt Incremental Storage Releases Program* (2008)
- *Lake Roosevelt Shoreline Management Waterfront Facilities Draw down Impact Study* (KPF Consulting Engineers 2008) (See “Chapter II: Purpose and Need” for a description of this study.)
- *Livestock Management Plan and Environmental Assessment* (2005)

- *Fire Management Plan* (Update 2009)
- *Concessions Management Plan* (1991)
- *Invasive Plant Management Plan* (in prep.)

IMPACT MITIGATION

- Avoid conducting management activities in an area of the affected resource
- Minimize the type, duration or intensity of the impact to an affected resource
- Mitigate the impact by
 - Repairing localized damage to the affected resource immediately after an adverse impact
 - Rehabilitating an affected resource with a combination of additional management activities
 - Compensating a major long-term adverse direct impact through additional strategies designed to improve an affected resource to the degree practicable.

ALL IMPACTS EXCEPT SPECIAL STATUS SPECIES AND CULTURAL RESOURCES

Note: Special Status Species and Cultural Resources impact determinations are formally determined under the Endangered Species Act (Section 7) and the National Historic Preservation Act (Section 106), respectively.

- **NEGLIGIBLE:** Measurable or anticipated degree of change would not be detectable or would be only slightly detectable. Localized or at the lowest level of detection.
- **MINOR:** Measurable or anticipated degree of change would have a slight effect, causing a slightly noticeable change of approximately less than 20 percent compared to existing conditions, often localized.
- **MODERATE:** Measurable or anticipated degree of change is readily apparent and appreciable and would be noticed by most people, with a change likely to be between 21 and 50 percent compared to existing conditions. Can be localized or widespread.
- **MAJOR:** Measurable or anticipated degree of change would be substantial, causing a highly noticeable change of approximately greater than 50 percent compared to existing conditions. Often widespread.

Note: Cultural resources impacts are also initially characterized as noted above, however the conclusion follows the format below, and makes a formal determination of effect under Section 106 of the National Historic Preservation Act. In accordance with National Park Service *Management Policies* (2006), the analysis in this Environmental Assessment fulfills the responsibilities of the National Park Service under Section 106 of the National Historic Preservation Act.

SPECIAL STATUS SPECIES IMPACTS

- **No Effect:** The project (or action) is located outside suitable habitat and there would be no disturbance or other direct or indirect impacts on the species. The action will not affect the listed species or its designated critical habitat (USFWS 1998).
- **MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT:** The project (or action) occurs in suitable habitat or results in indirect impacts on the species, but the effect on the species is likely to be entirely beneficial, discountable, or insignificant. The action may pose effects on listed species or designated critical habitat but given circumstances or mitigation conditions, the effects may be discounted, insignificant, or completely beneficial. Insignificant effects would not result in take. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects or 2) expect discountable effects to occur (USFWS 1998).
- **MAY AFFECT, LIKELY TO ADVERSELY AFFECT:** The project (or action) would have an adverse effect on a listed species as a result of direct, indirect, interrelated, or interdependent actions. An adverse effect on a listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the effect is not: discountable, insignificant, or beneficial (USFWS 1998).

CULTURAL RESOURCES IMPACTS

- **No Effect:** There are no historic properties in the Area of Potential Effect (APE); or, there are historic properties in the APE, but the undertaking will have no impact on them.
- **No Adverse Effect:** There will be an effect on the historic property by the undertaking, but the effect does not meet the criteria in 36 CFR Part 800.5(a) (1) and will not alter characteristics that make it eligible for listing on the National Register. The undertaking is modified or conditions are imposed to avoid or minimize adverse effects. This category of effects is encumbered with effects that may be considered beneficial under NEPA, such as restoration, stabilization, rehabilitation, and preservation projects.
- **Adverse Effect:** The undertaking will alter, directly or indirectly, the characteristics of the property making it eligible for listing on the National Register. An adverse effect may be resolved by developing a memorandum or program agreement in consultation with the SHPO, ACHP, American Indian tribes, other consulting parties, and the public to avoid, minimize, or mitigate the adverse effects (36 CFR Part 800.6(a)).

- **SIGNIFICANT IMPACT:** An impact to a National Register historic property would be considered significant when an adverse effect cannot be resolved by agreement among SHPO, ACHP, American Indian tribes, other consulting and interested parties, and the public. The impact will diminish the integrity of location, design, setting, materials, workmanship, feeling or association characteristics that make the historic property eligible for inclusion in the National Register Historic Places. The resolution must be documented in a memorandum or programmatic agreement or the FONSI.

IMPAIRMENT

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies* (NPS 2006) and Director's Order-12, Conservation Planning, Environmental Impact Analysis, and Decision-making, require analysis of potential effects to determine if actions would impair park resources. The following sections from *Management Policies* define impairment and highlight the difference between an impact and impairment.

1.4.3 The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values

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. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. The laws do give the Service the management discretion, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. 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. This is how courts have consistently interpreted the Organic Act.

1.4.4 The Prohibition on Impairment of Park Resources and Values

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment.

1.4.5 What Constitutes Impairment of Park Resources and Values

The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated. An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park . . .

1.4.6 What Constitutes Park Resources and Values

The “park resources and values” that are subject to the no-impairment standard include:

the park’s scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;

appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;

the park’s role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and

any additional attributes encompassed by the specific values and purposes for which the park was established.

1.4.7 Decision-making Requirements to Identify and Avoid Impairments

Before approving a proposed action that could lead to an impairment of park resources and values, an NPS decision-maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values. If there would be an impairment, the action must not be approved.

In this Environmental Assessment determinations of impairment are provided in the conclusion section under each applicable resource topic for each alternative. Impairment determinations, however, are not made for health and safety, land use, visitor use, maintenance, operations, socioeconomic resources and other non-natural or cultural resources topics.

Mitigation Measures Incorporated into the Action Alternatives

The measures found in “Appendix 1” which are also listed under each resource section in Environmental Consequences have been developed to lessen the potential adverse effects of the action alternatives.

VI. Affected Environment



LUPINE AT STERLING POINT

Introduction



The interior area of eastern Washington is characterized by hot dry summers and cold winters. On the lake surface, small bays and coves freeze during the winter. The whole lake freezes approximately every 10 years, including in 1968, 1978, 1985, 1992, and 1997. Winter storms can be large, bringing significant snowfall.

The regulated hydrology of the lake caused by Grand Coulee Dam is important. The Bureau of Reclamation manages downstream flows from the dam to provide electric power, irrigation, water for salmon, water supply for cities and to control flooding. Although recreation needs are considered in the lake level regulation, the National Park Service does not participate in lake level decision-making. The lake level may vary up to 80 feet in elevation in a wet year: the lake is typically drawn down in the spring to provide future storage of spring runoff and snow melt.

A. Land Use



Town of Coulee Dam

Located in the northeastern corner of Washington State, Lake Roosevelt is surrounded by rural agricultural lands (primarily farming wheat, barley and lentils), numerous rural areas and several small towns. Small towns include Colville and Kettle Falls at the north end (with over 6,000 residents), and Coulee Dam, Grand Coulee and Electric City at the southwestern end (with more than 3,500 residents). Rural areas include Evans, Gifford, Cedonia, Hunters, Fruitland, and Enterprise. Nearby, but not adjacent to the recreation area are the small towns along U.S. Route 2, including Reardon, Davenport, Creston, and Almira. Spokane lies about 79 miles from Grand Coulee Dam and 85 miles from Kettle Falls and Seattle is about 230 miles southwest via Interstate 90 or U.S. Route 2. Five counties and two Indian reservations are adjacent to the recreation area. Clockwise starting at the northwest, the counties include Okanogan, Ferry, Stevens, Lincoln and Grant. The two Indian reservations are the Colville Indian Reservation in the central west, and the Spokane Indian Reservation on the central east (above the Spokane Arm of the lake). In addition to rural towns, the area supports agriculture (grain), timber production and mining.



Town of Hunters

The Confederated Tribes of the Colville Reservation and the Spokane Tribe of the Spokane Reservation are the largest surrounding landowners. In 1990, an agreement was reached that divided lake management among the NPS and the Colville and Spokane tribes. Shoreline areas within the reservations and all adjacent waters out to the centerline of the old Columbia River are managed by the tribes. The Five Party Agreement among the NPS, Bureau of Reclamation, the Confederated Tribes of the Colville Reservation, the Spokane Tribe of the Spokane Reservation, and the Bureau of Indian Affairs stated purpose is to allow the tribes to manage their recreation lands in similar ways to the NPS, charging camping and boating fees and protecting large portions of shoreline.



Colville side of Lake Roosevelt across from Lincoln Mill

Land use adjacent to the reservation's shoreline is less developed than that on recreation area lands. The Colville Tribes do not allow homes within one mile of the lake shore, while the Spokane Tribe has also placed a moratorium on lake shore development outside the Two Rivers area. This lack of visible development across the lake on the reservations adds to the scenic quality from the lake and recreation area.

NPS recreation area lands are mostly comprised of Lake Roosevelt, but include surrounding shoreline areas that range from a few feet up to 0.5 miles wide. The NPS manages 312 miles of the shoreline, 47,438 acres of water and 12,936 acres of land along the shore. Seven miles of shoreline along the Kettle Falls arm and 29 miles of shoreline along the Spokane arm also make up part of the recreation area. Other shoreline and water surface areas are managed as part of the Colville Indian Reservation (managing approximately 93 miles of shoreline) and the Spokane Indian Reservation (managing approximately 37 miles of shoreline).

Surrounding lands have been dedicated to large scale ranching and agriculture since the establishment of the park. Property owners were spread thinly over a large area. Over the last twenty years, however, population growth in the region has resulted in the subdivision of large properties for homesites for both year-round residents and vacation homeowners.



Farm on Colville Reservation with Lake Roosevelt in the background

B. Air Quality



The U.S. Environmental Protection Agency has set health-based standards for six air pollutants: ozone, oxides of nitrogen, fine particulate matter less than 10 micrometers in diameter (PM₁₀), carbon monoxide, lead, and sulfur dioxide. When ambient concentrations of these pollutants exceed the standards, health problems can result. The Lake Roosevelt area is within an attainment area for national and state air quality standards for the six health-based air quality standards—ozone, oxides of nitrogen, fine particulate matter less than ten microns (PM₁₀), carbon monoxide, lead and sulfur dioxide. Attainment is based on representative air quality monitoring from nearby stations, including at Kettle Falls. Air quality related values, scenic vistas and pollution sensitive resources have not been identified.

Recreation area air quality is affected by a few pollutant sources. Among the sources of air pollution in the area include paper and pulp mills and smelter plants (sulfur dioxide, nitrogen oxides, and particulates), as well as motor vehicles and equipment. Occasional periods of high particulate concentrations occur from windblown dust from agricultural operations, unpaved roads, and exposed lake bottom areas during draw down. Other temporary air pollution impacts occur from smoke from wildland or management fires in the recreation area as well as in surrounding areas. These short-term events affect visibility (from increased particulates).

The federal Prevention of Significant Deterioration (PSD) program is designed to allow growth in areas of good air quality, without allowing pollutant concentrations to exceed the ambient air quality standards. For this program, the recreation area is a class II area, where moderate industrial growth may be allowed in the vicinity of the designated recreation area lands. The Spokane Indian Reservation and the Confederated Tribes of the Colville Indian Reservation, however, are class I areas, requiring a higher level of protection. As a result, only minimal long-term additional deterioration of air quality may occur in their vicinity.

C. Geology and Geological Hazards



Spokane Arm

Lake Roosevelt is contained within the upper Columbia River gorge and spans three distinct physiographic provinces: the Okanogan Highlands, the Kootenay Arc, and the Columbia Plateau—which has been sculpted by the Ice Age floods. The geologic features of these three regions are radically different and the juxtaposition of these landforms is a major factor that contributes to the unique character of the area (NPS 2000a: 37). In many locations, the geology is completely different from one side of the lake to the other. The Okanogan Highlands on the northwest are characterized by granites (volcanic rocks that cooled slowly underground); the Columbia Basin by basalts from massive outpourings of lava (from fissures or cracks in the earth’s surface, not volcanoes) that forced the river to change course and form a loop around the northern and western sides of the plateau; and the Kootenay Arc by metamorphic rocks and former ocean bottom sediments deposited in a trench where the North American plate overrode the Pacific plate (NPS 2000a:7, 37).



Basalt cliffs near Dry Falls

The landscape of Lake Roosevelt is dominated by the immense valley and gorge created by the Columbia River. The layers and landscapes of the Lake Roosevelt area show the geologic forces that shaped this scenery: changes that happened through gradual uplift, erosion, and occasionally—in sudden cataclysmic events. Over millions of years, intermittent lava flows created the Columbia Basin and earthquakes uplifted these basalt layers and nearby mountains that form the landscape within which Lake Roosevelt is located. The gradual erosion of these rock layers changed over time as the Cascade Mountains rose, forming a rain shadow that reduced the amount of precipitation in the Columbia Basin and nearby Okanogan Highlands (www.nps.gov/laro 2-25-08). During the last Ice Age a series of massive floods—the largest scientifically documented floods in North America—scoured the coulees (long, dry, steep-walled, trench-like gorges carved by water), channel scablands (an irregular land surface of bedrock and thin soil scoured of deep soils by flood waters), and other land forms in the Columbia Basin across eastern Washington. The floods were formed from collapsed ice dams in

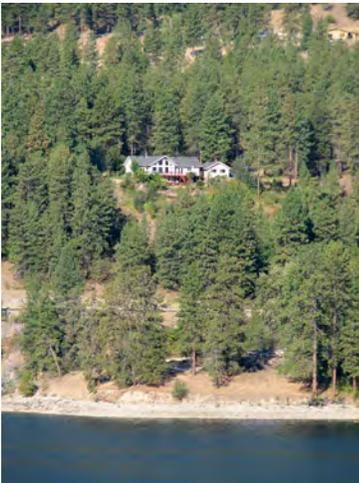


Kelly Hills east of Kettle River

the Clark Fork Valley in Montana and Idaho (NPS 2000a:7). Ancient glacial Lake Missoula contained more water than some of the Great Lakes do today and about 176 times as much water as Lake Roosevelt at full pool (NPS nd:11) and were up to 700 feet deeper.

Bank erosion and landslides are common geological hazards at Lake Roosevelt. Ninety percent of the shoreline is composed of thick ice-age deposits made up of silt and sand. According to the GMP, terrace deposits on parts of the north shore of the lower reach of the reservoir near the Sanpoil River, in the middle reach near Nine-Mile Creek, Cedonia and at the mouths of the Kettle and Colville rivers have failed at hundreds of sites over the last 54 years (USGS 1961 and Schuster 1979 in NPS 2000a:58). These landslides are believed to be caused by the rapid draw down of the lake and reservoir below 1,240 feet. Risk of landslides is greatest from draw-downs greater than 50 feet, moderate for 30-50 foot draw-downs and a minor concern for 30 foot-draw-downs. As a result, the BOR has begun to limit draw-downs to 1.5 feet/day.

Landslides have resulted in the loss of private and public property and large waves on Lake Roosevelt. Four types of landslides, including slump earth flow, slip-off slope, multiple alcove and mudflow are known from Lake Roosevelt. For example, a 1952 landslide at Reed Terrace on the Spokane Arm caused the shoreline to retreat nearly 2,000 feet in one day, claiming three roads and considerable agricultural land. This landslide also caused a 65 foot high wave to cross Lake Roosevelt (USGS 1961) (NPS 2000b:80). In January of 2009, a large landslide affected docks on public lands near Mill Canyon on the Spokane River Arm. This landslide also caused a wave over 20 feet high wave to cross the Spokane Arm and erode the shore. Landslides have also been caused by landowner actions above the reservoir related to historic land use.



New home in the north Lake Roosevelt area

Bank erosion occurs when areas near the shoreline are disturbed by uncontrolled runoff from new construction. Wave erosion and freeze thaw processes also can cause bank erosion. It is estimated that bank erosion claims at least five acres/year on Lake Roosevelt (NPS 1997c in NPS 2008b:80). Slower, more gradual rates of bank recession also threaten sensitive cultural resources, campgrounds, trails, and other facilities on lower terraces near full pool elevation. Wave erosion and freeze-thaw processes are probably the main cause of gradual shoreline erosion in northern reservoirs (U.S. Army 1985; NPS 1990c in NPS 2008b:80). Surficial processes such as rilling and gullying on shorelines without vegetation are also important. Vegetation is disturbed by construction of new homes. Rills can expand to gullies when landowners fail to control site runoff. Much of the problem originates from the land occupied by single-family homes and new development (NPS 1997c in NPS 2008b:80).

D. Soils



Soils in the upper Columbia watershed reflect the geology and climate of the area. Soils found in the mountainous areas are primarily entisols, while aridosols dominate the Columbia Plateau. Detailed soil surveys from the Natural Resources Conservation Service (NRCS) are available for Ferry (1979), Stevens (1980) and Lincoln (1981) counties. These surveys provide detail on soil types and distribution as well as information on land use, erosion hazards, and engineering properties. Additional soil and surficial geological information is available for the Colville National Forest, and for some private, state, county and tribal lands within the Lake Roosevelt watershed (Riedel 1997:21).

Lake Roosevelt's shorelines are comprised of bedrock (10 percent) and thick ice age deposits (90 percent) (Jones *et al.* 1961 in Riedel 1997:21). Bedrock shorelines, found mainly on the south shore of the lower reach and in the Spokane Arm, are generally more stable than those composed of silt and sand. Terrace deposits are particularly extensive on parts of the north shore of the lower reach of the reservoir near the Sanpoil River, and in the middle reach near Ninemile Creek, Cedonia, and the mouths of the Kettle and Colville Rivers. These terraces have failed at hundreds of sites over the last 54 years (Jones *et al.* 1961 and Schuster 1979 in Riedel 1997:21).

Slower, gradual rates of erosion also threaten campgrounds, trails and other facilities located on lower terraces near the full pool elevation. Wave erosion and freeze-thaw processes, as well as vegetation loss are common causes of this erosion.

Soils at Crescent Bay were greatly disturbed from the construction of Grand Coulee Dam as well as from other activities that have taken place at the site. Soils consist of native sand and gravel interspersed with a great deal of fill and construction debris, such as concrete, asphalt and wood.



Exposed hillsides at Crescent Bay

E. Water Resources



Lake Roosevelt

The Lake Roosevelt watershed encompasses about 44,969 square miles. Eighty-eight percent of this watershed is in Canada. The lake extends more than 154 miles along the Columbia River through the national recreation area and includes the lower reaches of many rivers and streams, with approximately 132 miles within the boundary of the recreation area. Most of the water (89 percent) in the lake comes from glacial ice, lakes and snow high in the Canadian Rockies that feed the Columbia River. The national recreation area has two major tributaries, 30 miles of the 111-mile-long Spokane River in the south and 15 miles of the 175-mile-long Kettle River in the north. Smaller tributaries include the Colville and Sanpoil Rivers. Besides the Columbia River, other water in Lake Roosevelt comes from the Spokane River (7 percent) and the Colville, Kettle and Sanpoil Rivers combined (4 percent) (NPS 2000a: 59).

Full pool elevation is 1,290 feet above sea level, and minimum pool elevation is 1,208 feet. Excess runoff is discharged over the spillway at Grand Coulee Dam. At full pool, the reservoir surface covers about 81,000 acres with more than 500 miles of shoreline. Water depths range from 400 feet upstream from the dam to 14 feet below the international border. Historically, the reservoir level is highest from late June through the winter months. In the late winter and early spring, the water level is usually lowered to hold spring runoff (NPS 2000b:81).

The lake provides more than 9.4 million acre-feet of storage at any one time to support various uses such as power generation, flood control, irrigation, domestic water supply, industry, recreation, and additional flows for anadromous fish passage in the lower Columbia River. Periodic fluctuations in water level occur to accommodate these demands, sometimes leaving a draft of up to 82 feet and exposing floodplains and/or steeply eroding banks (NPS 2000b:81).

Surface water resources include Lake Roosevelt, springs and seeps, intermittent and perennial streams, and two major rivers that flow into Lake Roosevelt, the Spokane and Kettle Rivers.

Springs

Relatively few springs occur near Lake Roosevelt. The largest spring is within the Fort Spokane Military Reserve Historic District and supports domestic visitor and agency use and large-scale administrative and maintenance project needs. Ongoing monitoring of the spring's flow rates is occurring related to water usage.

Wetlands

Wetlands have been mapped for the national recreation area by the National Wetlands Inventory Program (USFWS 1987 in NPS 2008b:82-83). The two largest wetlands are at the mouths of the Kettle and Colville Rivers. Due to the fluctuating nature of the reservoir, few perennial wetlands exist along the



Colville Flats day use area

shoreline. More common are intermittent wetland areas that flood seasonally. Two areas within the national recreation area have been evaluated and delineated as jurisdictional wetlands (meeting federal criteria). These include Colville Flats in the northern portion of the lake and the Mill Creek inlet on the south side of the Spokane River. Other non-evaluated wetlands include an area west of Lincoln Mill along the south shore bluff, an area immediately below the Little Dalles on the west shore, and an area in the Kettle River corridor south of Barstow.

Surface Water Quality

Lake Roosevelt waters are classified by the State Department of Ecology as AA (extraordinary), which means that they are afforded the maximum level of protection under state water quality regulations (WAC 173, Sec. 201A) (NPS 2000a: 59). The quality of these waters shall markedly and uniformly exceed the requirements for all or substantially all uses. Characteristic uses designated for Class AA waters include, but are not limited to:

- Water supply for domestic, industrial and agricultural uses;
- Stock watering;
- Fish and shellfish (including migration, rearing, spawning, and harvesting);
- Wildlife habitat; and
- Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).



Kettle River

Lake Roosevelt National Recreation Area waters are designated as outstanding resource waters. The antidegradation policy of Washington State says “that water quality shall be maintained and protected in waters designated as outstanding resource waters” (Washington State Dept. of Ecology 1997 in NPS 2000).

Various water quality criteria have been established for Class AA waters, one of which includes:

“Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste” (Washington State Dept. of Ecology 1997 in NPS 2000). (Note: The impairment in this water quality standard is different from “impairment” as defined by the NPS in the Organic Act).

Water quality at Lake Roosevelt is a complex and critical resource issue. Because of its economic importance (near mining, smelting and timber), the lake is a repository for a wide range of organic and inorganic pollutants. The Spokane River, which drains into the Columbia, is the water supply for most of eastern Washington and a large part of the Idaho panhandle. Other waters drain into the lake from nearby agricultural lands (NPS 2000a: 59).

There have been concerns about water quality in the lake for several years, primarily due to a significant influx of pollutants from mining in Canada (see below) and related to a uranium mine on the Spokane Indian Reservation. There has been no regular monitoring to address pollution from boats, campgrounds, and human waste.

In 1997, according to several studies the water quality in Lake Roosevelt was generally considered poor due to point and nonpoint sources of pollution (NPS, 1997). There are two primary point sources of Canadian industrial pollution that affect the lake—the Teck Cominco lead-zinc smelter in Trail, British Columbia and the Celgar Pulp Mill in Castlegar, British Columbia. In the early 1980s, concerns about water quality in Lake Roosevelt were first reported in a USFWS study that reported elevated concentrations of arsenic, cadmium, lead, and zinc in fish. Follow-up studies identified the primary source of the contamination to be a lead-zinc smelter owned by Teck Cominco, a Canadian company with U.S. subsidiaries, on the Columbia River in British Columbia just upstream from the international boundary. Beginning in the 1950s, the smelter discharged several hundred tons of furnace slag and effluent per day into the Columbia River. At the time of the GMP, the slag discharge had almost been eliminated and a new smelter had been built.

The GMP noted that this, along with other improvements, should reduce the amounts of metals being discharged to the Columbia River (NPS 2000b:82). The current effects of these improvements are being studied as part of the Remedial Investigation/Feasibility Study.

Long-term threats to water quality remain severe (Riedel 1997:63). Threats include land use, recreational use, ongoing discharges from factories, and the existence of millions of tons of heavy metals on the bottom of Lake Roosevelt, near the international border. According to Riedel (1997:63) coarse grained sediments at the northern end of the reservoir contain higher concentrations of zinc, lead and copper; while finer grained sediments downstream have higher concentrations of mercury and cadmium.



Beach at Kettle Falls

In 1994, the Washington Department of Health issued a health advisory to lake users, recommending that the consumption of fish be limited due to toxic substances, dioxins and furans in lake water. These were attributed to the Celgar Pulp Mill, which later completed a multiyear upgrade to its facilities to reduce the potential for this contamination. Monitoring has shown a reduction in pollutant levels (NPS 2000a:60).

In June 2006, EPA released beach sediment data from samples that were collected from 15 beaches at Lake Roosevelt. In the spring of 2005, nine developed beaches within the recreation area were sampled, three beaches on the Colville and Spokane Reservations were sampled, and three beaches north of the recreation area were sampled. All 15 samples taken within the recreation area and reservations tested within acceptable health based risk standards for short-term recreational users (e.g., 14 consecutive days on one beach in the summer). The three beaches north of the recreation area had slightly elevated levels of arsenic and one of those beaches had slightly elevated levels of lead. These three beaches will be further evaluated by EPA as their study of the Upper Columbia progresses. Fish tissue analysis initial results were released in the summer of 2007 (<http://www.nps.gov/laro-2-25-08>). After reviewing the study, the Department of Health updated their fish advisory stating “fish in Lake Roosevelt contain chemicals, including mercury, that may be hazardous to your health. Women who might become pregnant, are pregnant, nursing, and young children less than six years old may be especially at risk. These individuals should limit the amount of fish they consume from Lake Roosevelt.”



Boating on the Spokane Arm

Lake Roosevelt water quality is also affected by runoff from wastewater treatment plants, nearby agriculture, logging and mining, shoreline erosion, rural and suburban development along the shoreline, poor waste disposal from recreational use and from the release of exhaust and unspent fuels from boating.

Water quality monitoring has been conducted sporadically, using various methods and sample designs since the late 1940s and 1950s (Riedel 1997:64). Broad-scale baseline water quality measurements with standardized methods were first completed in the late 1970s (Stober et al. 1981 in Riedel 1997:64). In the early 1990s, many of these baseline parameters were remeasured using the same protocols in the Stober study (Serdar 1993 in Riedel 1997:64).

Ground Water Quality

According to the GMP, groundwater resources are threatened by industry near Kettle Falls. Five wastewater disposal sites were being monitored for potential groundwater contamination. Although high concentrations of pollutants were found in soils at these sites, there has not been any confirmed contamination of groundwater to date (NPS 1997b in NPS 2000b:82).

Water Quantity

The constant shift between lake and dry land due to fluctuating water levels affects the preservation of natural and cultural resources. The lake level varies depending on inflow from rain and snow pack and outflow from the dam. The elevation of the surface of Lake Roosevelt is measured from sea level. An elevation of 1290 feet is considered “full pool,” however fluctuating water levels have gone as low as 1208 feet. Low lake levels leave boat ramps high and dry, and also expose a great deal of previously inundated land.

F. Vegetation



Lake Roosevelt National Recreation Area is located in a semi-arid transition zone and bisects two ecoregions, the Columbia Basin ecoregion and the Okanogan Highlands ecoregion. These areas are characterized by differences in water availability, surface geology and climate. As a result, plant communities along the 150 mile-long reservoir gradually change from shrub-steppe plant communities (dominated by sagebrush and bunchgrass) to ponderosa pine and white oak woodlands. Drier areas in the south near the dam are characterized by shrub-steppe and have rainfall averaging 11 inches per year, while wetter areas near Colville average about 17 inches per year and are characterized by ponderosa pines and Douglas-fir (NPS 2000a:37). Rural areas are dominated by pasture and agricultural lands, while areas of native vegetation contain plant communities from either the Columbia Basin or Okanogan Highlands ecoregions.

Plant communities in the Columbia Basin ecoregion include:

- Shrub-steppe: Shrub-steppe habitat is the major vegetation type throughout the Columbia Plateau, appearing in large landscape patches. Livestock grazing is the primary land use in the shrub-steppe although much of this area has been converted to irrigation or dry land farming.
- Ponderosa Pine Forest and Woodlands: On wetter north facing slopes above the lake shore, pine forests mix with the scrub-shrub vegetation of the shrub-steppe.
- Grasslands: The plateau above Lake Roosevelt is composed of gentle slopes with deep silty loess soils in an expansive rolling dune-like landscape (converted to agriculture in Lincoln County). Grasslands near the shore occur in a patchwork with shrub-steppe landscape, often created by brush removal, chaining or spraying, or by fire.
- Riparian-Wetlands: A minor component of the Columbia Basin ecoregion, riparian and wetland habitat occupies areas of seeps and stream beds providing dense vegetative cover (Jones & Jones, Inc. 2008:11).



Ponderosa pine forest

Plant communities in the Okanogan Highlands ecoregion include:

- Ponderosa Pine and Woodlands: This woodland habitat typifies the lower tree-line, transitioning to mixed conifers, shrub-steppe, grasslands, or agriculture.
- Canyon Shrublands: This habitat is generally found in steep canyons surrounded by grasslands and below or in a mosaic with the Ponderosa pine and eastside oak woodland habitat. This habitat can develop near talus slopes, at the heads of dry drainages, and toe slopes in moist shrub-steppe and steppe zones.
- Grasslands: Eastside grassland habitats appear below and in a matrix with lower tree-line ponderosa pine and eastside oak forests and woodlands. It can also be part of the lower elevation forest matrix. Agricultural uses and introduced perennial on abandoned or planted fields are common throughout the current distribution of eastside grassland habitats (Jones & Jones, Inc. 2008:12).



Grasslands south of the recreation area

The lower lake valley between Grand Coulee Dam and Keller Ferry is dominated by disturbed shrub-steppe. At the time of the GMP, the intact shrub-steppe community at Lake Roosevelt had retained nearly 70 percent of its historic extent. Antelope bitterbrush-steppe is one of the dominant plant communities of the shrub-steppe, providing food and cover for animals such as mule deer and the Great Basin pocket mouse. Common species in this section include grasses such as bluebunch wheatgrass, needle-and-thread grass, and hard fescue; forbs such as arrowleaf balsamroot, northern buckwheat, brittle prickly pear, alumroot, and lupine; shrubs such as sagebrush, bitterbrush, rabbitbrush, snowberry, greasewood, and serviceberry; and trees such as black cottonwood, ponderosa pine, and Douglas-fir. Dogwood and river birch are also along the tributaries.

Areas along the middle and upper lake, between the Spokane River and Kettle Falls, transition from shrub-steppe to a mix of dense ponderosa pine forests, Douglas-fir, and grasslands. Alder, willow, hazelnut, and black cottonwood are common along the waterways, and some rocky mountain juniper may be found on rocky river bars. Common shrubs include chokecherry, serviceberry, wild rose, Douglas hawthorn, snowberry, and occasionally some smooth sumac and elderberry. Forbs include hairy goldaster, phlox, and nodding onion.

The upper valley, north of Kettle Falls to Onion Creek near the boundary, traverses a forest dominated by second-growth ponderosa pine, Douglas-fir, and western larch. Some grand fir, mountain maple, paper birch, and aspen can also be found. Among the pines, and in dry, rocky areas, a variety of shrubs occur, including mallow ninebarks, Oregon grape, elderberry, chokecherry, snow berry, deer brush, and buck brush. Dominant grassland species include wheatgrasses and spring sunflower.

Although the dramatic rise and fall of water prevents riparian vegetation from establishing along the shoreline, a host of native plants have colonized the riparian edges along the lake. The area around 1290' is dominated by Reed canarygrass. It occupies most of the area within a few feet in elevation of the annual high water line. There are extensive stands of this grass in large shallow bays (such as near Kettle Falls Campground) and shoreline marshes (such as down from Napoleon Bridge). Other less abundant species occupy this zone as well; tickseed, sedge, short-awn foxtail have been found. Other species would be expected to be found by a more thorough survey.



Riparian vegetation in Moonshine Canyon

The general absence of shoreline vegetation has decreased the ecological function of the shoreline habitat area. Where shoreline vegetation is present, roots stabilize underlying soils and entrap and filter sediments and pollutants along the shore and from stormwater runoff. Plants also contribute shading and moderate shoreline water temperatures and provide wildlife habitat (Jones & Jones, Inc. 2008:13).

Open-water habitat in the lake and its tributaries support numerous species of aquatic vascular plants. The most common of these include water starwort,

waterweed, common watermilfoil (American watermilfoil), common hornwort (coontail), pondweeds, and pygmy weed (NPS 2000b:83).



Aquatic vegetation at Camp Nabor-Lee

In the areas that are submerged for the majority of the summer, aquatic plants are dominant. These plants are generally less coarse than the grasses and sedges at the full pool level and therefore may be more heavily grazed by waterfowl. Various species of pondweed are abundant, with the non-native Eurasian watermilfoil common in some areas. Eurasian watermilfoil is a highly invasive weed that forms dense surface mats that interfere with boating and angling and degrade water quality (Sytsma and Miller 2008). During the spring draw down, various small annuals can be found among the pondweed on the exposed lakebed, such as popcorn flower. (See “Chapter II: Purpose and Need” for a summary of the aquatic vegetation study conducted in 2007).

Non-native Invasive Plants

Although Lake Roosevelt has three distinct plant communities, the last 100 years of human occupation has added to, and in some case replaced, portions of these plant communities. Invasive species are defined as a species that is non-native (or alien) to the ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Introduction, in some cases, is accidental. In other cases, invasive plants spread naturally along transportation thoroughfares such as roads, trails and through water.

A preliminary survey of 1,233 terrestrial park acres (10% of LARO) identified 181 acres containing 12 different invasive plant species. The most common invasive plants identified in the upland areas were: spotted knapweed, rush skeletonweed, Dalmatian toadflax and leafy spurge. Other invasive species include Canadian, star and Russian thistle, diffuse knapweed, cheatgrass, common mullein, houndstongue, goatweed and baby’s breath. Several non-native species also thrive in the shallow littoral zones and riparian margins of the lake. The most common aquatic invasive plant identified in the lake was Eurasian watermilfoil.

In addition to the noxious weed management program, the park conducts ongoing hazard tree evaluation and treatment according to the 1984 Hazard Tree Management Plan. In addition, there are site-specific vegetation management plans for restoring the historic grounds at the Fort Spokane Military Reserve Historic District, including rehabilitation of the vegetative cover found there in the late 19th century.

Fire

Historically, fire cleared eastern Washington forests of undergrowth, allowing Ponderosa pine seedlings to open and germinate, thus contributing to an ecosystem of mixed forest and grassland clearings. Fire is now regulated under the guidance of the recreation area’s Fire Management Plan. Forest management activities, including thinning and fuel load reduction are conducted, usually in areas with low-density residential or urban interface (Jones & Jones, Inc. 2008:13).



Pine showing effects of fire at Marcus Island

G. Wildlife



Overview: Lake Roosevelt and the Columbia Basin is an area of rich biodiversity and serves as an important travel corridor and migration route for many species of wildlife including birds, mammals, fish, and butterflies.

Wildlife species are abundant and varied in the Lake Roosevelt area. More than 75 species of mammals, 200 species of birds, 15 species of reptiles, and 10 species of amphibians may occur in the recreation area. Systematic inventories of vertebrates and invertebrates have not been completed. The observations and research of other federal, state, and tribal biologists have contributed most information about the occurrence, abundance, and distribution of species (NPS 2000b:84).

Given the linear nature of the national recreation area and its limited landward area, terrestrial habitat for wildlife is somewhat limited. Natural areas of ponderosa pine forests, sagebrush, grasslands with water resources, and tributary riparian areas offer the greatest value as wildlife habitat. The lack of range and associated resources is the primary limiting factor influencing wildlife abundance and distribution. The initial loss of range for animals in the area can be attributed to inundation of bottomland from filling the reservoir. Continuing threats to wildlife include the reduction of habitat as the result of increased development and agricultural activities on adjacent lands, poaching, road kills, trespass livestock, illegal off-road vehicles, and the invasion of nonnative plant species.



Mammals

Common mammal species using the area include black bear, elk, mountain lion, whitetail deer, mule deer, and moose. These larger species tend to move through the area in response to seasonal conditions. California bighorn sheep were recently transplanted nearby and have dispersed into the recreation area. Small mammals found in the area include beaver, river otter, muskrat, mink, badger, raccoon, skunk, bobcat, coyote, and red fox. In addition, porcupine, cottontail rabbits, ground squirrels, chipmunks, yellowbelly marmot, pika, shrew, voles, bats, gophers, rats, and deer and house mice are common (NPS 2000b:84).

Birds

Perennial and intermittent wetlands attract an abundance of birds. Lake Roosevelt is within the Pacific Flyway and serves as a resting area during migration periods. Other birds nest or are year-round residents.



Osprey nest at Hunter

Several species of raptors nest, roost, and forage in the area. Among these are the osprey, golden eagle, bald eagle, prairie falcon, red-tailed hawk, Northern harrier, and American kestrel. Snowy owls migrate through the area every few years, coinciding with cyclic fluctuations of available food sources farther north.

Other common owls include the great-horned owl, saw-whet owl, screech owl, and barn owl.

Many species of small perching birds use the area for forage and nesting. The most common of these include swallows, finches, jays, chickadees, kinglets, ravens, magpies, robins, sparrows, blackbirds, and juncos.

Common waterbirds migrating through the area include surface feeding ducks (mallards, pintails, teal, and goldeneyes), diving ducks (redhead and canvasback), western grebes, coots, lesser scaups, common mergansers, common loons, and Canada geese. Tundra and trumpeter swans also use the area occasionally. Wading and shorebirds in the area include plovers, great blue herons, spotted sandpipers, gulls, snipes, common egrets, and yellowlegs.

Upland native birds include western sage grouse, Columbia sharp-tailed grouse, mourning dove, blue grouse, and the band-tailed pigeon. Introduced species include the ring-necked pheasant, chukar, Hungarian partridge, and California quail. The elimination of natural sagebrush and bunchgrass communities on adjacent lands has severely reduced populations of native grouse. Agricultural practices and elimination of fencerows have also reduced habitat for native and introduced species (NPS 2000b:84).

Reptiles and Amphibians

A systematic inventory of reptile and amphibian species in the national recreation area has not been conducted. Very little is known about species occurrence, abundance, distribution, or critical habitat. Known common reptiles and amphibians include the sagebrush lizard, short-horned lizard, western rattlesnake, gopher or bull snake, western terrestrial garter snake, bullfrog, western toad, and various salamanders.

Invertebrates

Invertebrates are common throughout the national recreation area, but data on these, except for some special status butterflies (see below), is limited due to lack of studies.

Fisheries

Lake Roosevelt and its tributaries support a varied fish community that is considerably different from the native fish community of the early 1900s. Changes over time have been caused by the introduction of nonnative species, habitat alterations such as water pollution, the damming of rivers, and reservoir draw-downs. Today, there are possibly 28 native and 12 nonnative species that inhabit recreation area waters.

Native Fish Species

Before dams blocked fish passage, the Columbia River supported large numbers of anadromous sockeye and Chinook salmon and steelhead trout. Today, there are no anadromous runs of salmonids from the Pacific in Lake Roosevelt and its tributaries. Other salmonids native to the Columbia River system that occur in the national recreation area include kokanee (land-locked sockeye), rainbow trout, and bull trout. Other native fish include white sturgeon, burbot, and a variety of whitefish, minnow, sculpin, and sucker species. Native bull trout, burbot, and white sturgeon populations have declined substantially in the last 10 years, in part due to predation by competition with introduced species such as walleye.

Introduced Fish Species

Introduced game fish include brook trout, brown trout, walleye, yellow perch, largemouth bass, smallmouth bass, black crappie, white crappie, sunfish, and yellow bullhead. These nonnative species are important resources to recreational fishing; however, they have displaced the native fish populations.

H. Special Status Species

TABLE VI-1: FEDERALLY LISTED SPECIES

Common Name	Scientific Name	Status	Notes
Mammals			
Grizzly Bear	<i>Ursus arctos horribilis</i>	Federally Endangered State Endangered	No recent confirmed sightings
Gray Wolf	<i>Canis lupus</i>	Federally Endangered State Endangered	No confirmed sightings
Canada Lynx	<i>Lynx canadensis</i>	Federally Endangered State Threatened	Reported from northern end of Lake Roosevelt
Plants			
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	Federally Endangered	
Spalding's Silene	<i>Silene spaldingii</i>	Federally Endangered	

TABLE VI-2: STATE LISTED SPECIES

Common Name	Scientific Name	Status	Notes
Mammals			
California Wolverine	<i>Gulo gulo luteus</i>	Federal Candidate State Candidate	Not known from Lake Roosevelt
Woodland Caribou	<i>Rangifer tarandus caribou</i>	Federally Endangered State Endangered	No confirmed sightings
Pygmy Rabbit	<i>Brachylagus Idahoensis</i>	State Endangered	Extirpated from Lake Roosevelt
Birds			
Peregrine Falcon	<i>Falco peregrinus anatum</i>	Federally Endangered State Endangered	Nesting Reintroduced to Lake Roosevelt
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Federally Threatened State Threatened	Large overwintering population. As of 2000, more than 10 known nests.
Columbian Sharp-tailed Grouse	<i>Tympanuchus phasianellus columbiana</i>	State Threatened	

Table VI-1 and 2 above lists the threatened, endangered and candidate species potentially found in or near Lake Roosevelt National Recreation Area. No other proposed or candidate species for listing are known to occur in or near the national recreation area (FR 1997).

Federally Endangered Species



Grizzly bear

GRIZZLY BEAR

Although grizzly bears occur in the Selkirk ecosystem in northern Idaho and Washington, population levels are believed to be low (IGBC 1987). No grizzly bears have been recently reported within the national recreation area. Grizzly bears eat a variety of food, from grasses to large mammals. Ungulates are important to bears because they provide a high-quality food source during early spring before most vegetal foods are available to bears. Grizzly bears feed on ungulates primarily as winter-killed carrion from March through May. In areas where animal matter is less available, roots, bulbs, tubers, fungi, tree cambium, and succulent herbaceous plants are eaten (USFWS 1982). Additionally, salmonids spawning in Columbia River tributaries may also provide a food source for grizzlies.

GRAY WOLF

No confirmed gray wolf sightings have been documented in the national recreation area ; however, numerous unconfirmed sightings have been reported in some surrounding areas in recent years. If wolves were in the area, they would depend on ungulates for food year-round. Elk, moose, and deer are the principal prey species and usually account for more than 90% of the biomass consumed by wolves. Smaller mammals are an important alternative to ungulates in the snow-free months (USFWS 1994).

CANADA LYNX

Lynx have been seen near the northern end of Lake Roosevelt; however no evidence of resident populations has been documented (NPS 1997b in NPS 2000b:88). Lynx prefer the density of coniferous forests and swamp areas where its coloring allows it to be camouflaged from its prey. Snowshoe hares make up most of the lynx's diet, but lynx will also eat rodents, birds, and fish (WDFW 1991 in NPS 2000b:88).

Federal Species of Concern and State Listed Species

PYGMY RABBIT

The pygmy rabbit is always found in association with dense stands of sagebrush or rabbitbrush. It eats mainly sagebrush. Its population status within the recreation area is not known, but habitat is present.

PEREGRINE FALCON

Peregrine nests have been found in the area surrounding the Lake Roosevelt reservoir. Peregrine falcons migrate through the region seasonally. Peregrines have also been reintroduced in the Lake Roosevelt area in an effort to restore a breeding population to the area. Use of the area by peregrines normally occurs during spring and fall migrations. Peregrine falcon foraging and nesting habitats

are usually associated with tall cliffs near water. Their diet consists primarily of waterfowl, shorebirds, and passerine species commonly found on and around lakes and streams.

The National Park Service, in cooperation with other agencies, reintroduced peregrine falcons in the area from 1993 to 1997. More than two dozen captive-produced fledglings from the Peregrine Fund hatchery facility in Boise, Idaho, have been released on Lake Roosevelt since the program began in July 1993. Releases continued until at least one breeding pair was established in the area. The project addressed the Northwest Power Planning Council's wildlife mitigation goals for this species for the Upper Columbia Subbasin and coincided directly with other federal and state peregrine falcon recovery goals of the Inland Northwest.

BALD EAGLE

Bald eagles maintain a large overwintering population (200+) in the area surrounding the reservoir from November through March annually. More than 10 bald eagle nests are in the vicinity and appear to be becoming more productive each year. Bald eagle habitat is usually associated with large bodies of water that provide an abundant source of food. Eagles feed primarily on fish, waterfowl, and carrion. Bald eagles have been killed within the recreation area and surrounding areas by poachers and from collisions with powerlines. Annual bald eagle surveys are conducted, and foraging and roosting studies have been completed for several sections of the reservoir. Annual midwinter eagle surveys have been conducted since at least 1985. At least one survey is conducted in January of each year in coordination with the Washington Department of Fish Wildlife, the U.S. Forest Service, and the tribes.

COLUMBIAN SHARP-TAILED GROUSE

The Columbian sharp-tailed grouse is a Washington State threatened species that seasonally uses the shrub-steppe habitat at Lake Roosevelt. Of eight remaining populations in eastern Washington, one small population remains in Lincoln County. Historically, the critically endangered Washington pygmy rabbit may have also occupied the Keller Ferry vicinity of the park. Declines in these species appear linked to dramatic declines in the quantity and quality of native sagebrush-steppe habitat.

Canadian Listed Species

BEHR'S HAIRSTREAK

The Behr's (Columbia) hairstreak butterfly, which also relies on bitterbrush, can also be found at Lake Roosevelt. The butterfly lays its eggs on the plant, and the emerging caterpillar larvae feed exclusively on bitterbrush. The hairstreak butterfly is currently listed as threatened in Canada due to conversion of bitterbrush habitat to vineyards.

State Species of Concern

In addition to the above, another 24 animal species of concern to the state of Washington (WDNR 1998) may occur in or near the national recreation area. These include the threatened ferruginous hawk (*Buteo regalis*); the candidates California floater (*Anodonta californiensis*), Columbia sharp-tail grouse (*Tympanuchus phasianellus columbians*), loggerhead shrike (*Lanius ludovicianus*), northern goshawk (*Accipiter gentilis*), Pacific fisher (*Martes pennanti pacifica*), pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), and Washington ground squirrel (*Spermophilus washingtoni*). State monitor species include the black tern (*Chlidonias niger*), potholes meadow vole (*Microtus pennsylvanicus kincaidi*), and four species of Myotis bats.

Other species of concern identified by the U.S. Fish and Wildlife Service (1998) include the California bighorn sheep (*Ovis canadensis californiana*), Columbia pebblesnail (*Fluminicola (=Lithoglyphus) columbians*), olive-sided flycatcher (*Contopus borealis*), Pacific lamprey (*Lampetra tridentata*), western burrowing owl (*Athene cunicularia hypugea*), Westslope cutthroat trout (*Oncorhynchus clarki lewisi*), and Yuma myotis bat (*Myotis yumanensis*). These species of concern are known to occur or historically occurred in northeastern Washington. Limited information is available, however, on the occurrence and abundance of remnant populations, if any, in the Lake Roosevelt area.

TABLE VI-3: STATE AND FEDERAL SPECIES OF CONCERN

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
Columbia spotted frog	<i>Rana luteiventris</i>	Sp of Concern	Candidate
Reptiles			
Northern sagebrush lizard	<i>Sceloporus graciosus graciosus</i>	Sp of Concern	Candidate
Striped whipsnake	<i>Masticophis taeniatus</i>	None	Candidate
Birds			
Common Loon	<i>Gavia immer</i>	None	Sensitive
Western Grebe	<i>Aechmophorus occidentalis</i>	None	Candidate
Golden Eagle	<i>Aquila chrysaetos</i>	None	Candidate
Peregrine Falcon	<i>Falco peregrinus</i>	Sp of Concern	Sensitive
American White Pelican	<i>Pelecanus erythrorhynchos</i>	None	Endangered
Northern Goshawk	<i>Accipiter gentiles</i>	Sp. of Concern	Candidate
Ferruginous Hawk	<i>Buteo regalis</i>	Sp. of Concern	Threatened
Merlin	<i>Falco columbarius</i>	None	Candidate
Vaux's Swift	<i>Chaetura vauxi</i>	None	Candidate
Lewis' Woodpecker	<i>Melanerpes lewis</i>	None	Candidate
White-headed Woodpecker	<i>Picoides albolarvatus</i>	None	Candidate
Pileated Woodpecker	<i>Dryocopus pileatus</i>	None	Candidate
Sage Thrasher	<i>Oreoscoptes montanus</i>	None	Candidate
Mammals			
White-tailed Jack Rabbit	<i>Lepus townsendii</i>	None	Candidate

<http://wdfw.wa.gov/wlm/diversty/soc/soc.htm>

Plants

In addition to the federally listed endangered Ute ladies'-tresses and Spalding's silene, the following plant species of concern are known to occur in the area: black snake-root (*Sanicula marilandica*), Columbia crazyweed (*Oxytropis campestris* var. *columbiana*), crenulate moonwort (*Botrychium crenulatum*), giant hellborine (*Epipactis gigantea*), least bladderly milk-vetch (*Astragalus microcystis*), little grape-fern (*Botrychium simplex*), Nuttall's pussytoes (*Antennaria parvifolia*), palouse milk-vetch (*Astragalus arrectus*), and pygmy weed (*Crassula aquatica*) (WDNR 1998 in NPS 2000b:86). For the GMP, the U.S. Fish and Wildlife Service (1998) also identified several other rare plants that may occur in the area including the triangle-lobed moonwort (*Botrychium ascendens*), Two-spiked moonwort (*B. paradoxum*), Cusik's lupine (*Lupinus cusickii*), and Washington polemonium (*Polemonium pectinatum*). The list of special concern plants in the state is updated regularly by the Washington Natural Heritage Program.

I. Prehistoric and Historic Archeological Resources



Archeological information is derived from reports edited by Jerry Galm (1994) of Archaeological and Historical Services of Eastern Washington University in Cheney. J. Scott King and T. Webber Greiser of Historical Research Associates in Seattle (1995), give background information on the archeological resources in what is now the Lake Roosevelt basin (NPS 2000b:91).

Archeological resources abound in what are now recreation area lands. Because of the inundation of the valley floor following the construction of the Grand Coulee Dam, however, much has been lost. In preparation for the creation of Lake Roosevelt all surfaces expected to be submerged were cleared of trees and structures, though in most places stumps and foundations of entire townsites are all that remain to this day. Due to the fluctuating nature of the reservoir, even those elements that might have remained beneath the ground surface have been affected. The greatest density of cultural features was in proximity to the Columbia and Spokane rivers. As a result, a very high percentage of the cultural features contained in the Lake Roosevelt basin has been compromised, resulting in an irretrievable loss to the archaeological record of the Upper Columbia Region (NPS 2000b:91). Additional research, however, has resulted in identification of many new sites both below the full pool and above it.



"No digging" sign at the recreation area

Prehistorically and historically, habitation and fishing sites tended to cluster along the lower terraces of the Columbia and Spokane Rivers, which are now inundated by Lake Roosevelt. Many lower terraces in the upper reservoir become exposed during draw-downs. Other types of sites, such as those indicative of hunting and gathering, are more widely distributed and can occur in both the lower inundated terraces and the upper terraces, above the high-water line. Higher lake levels protect submerged archeological resources, which suffer potential exposure when draw-downs make them accessible, not only legally to archeologists undertaking excavation and data recovery, but also to looting and damage from vehicles illegally driven on the draw-down (NPS 2000b:93).



Shoreline at low lake levels

About 80 percent of the recreation area above the minimum operating pool of the lake (1,290 feet) has undergone initial archeological surveys. More than 200 archeological sites have been identified. The sites range from pictographs and petroglyphs to habitation and fishing sites and other evidences of human occupation. These include burial sites and cobble tools or modified core tools often found on upper terraces. Many sites are eroded surface scatters with little depth, although some sites do have considerable depth. Much is known, therefore, about the types of sites that occur and about their patterns of form and distribution, both prehistorically and historically (NPS 2000b:93).

The majority of cultural resources are inundated during peak use periods. During draw-downs, these cultural resources are exposed and vulnerable to damage from visitors or relic collectors. There are usually few visitors present during the annual spring flood draw-down. In recent years, however, draw-down has occurred in August for flow augmentation downriver for salmon recovery (NPS 2000b:93). With the additional 1.8 feet of draw-down, beyond the 1,280 foot level in summer, it is evident that more cultural resources will be exposed during periods of heavy visitation, making them more susceptible to discovery and loss.

J. Ethnography



Smoking salmon, circa 1939

The striking natural characteristics and resources of the Columbia and Spokane Rivers have defined the lengthy and complex history of the Lake Roosevelt area. The presence of these key water resources in an otherwise arid area attracted both Native Americans and later residents and visitors to the Lake Roosevelt area.

The Colville Indian Reservation and Spokane Indian Reservation border the recreation area. As a result, the desire for access to NPS areas is not so much for traditional use areas, which may be conveniently accessed on each reservation, but rather for land management concerns to further the conservation of their Indian heritage. In other words, the two Indian tribes seek to maintain an active role in resource management, especially cultural resource management (NPS 2000b:93).

Native American subsistence was based not only upon a rich fishery but also on gathering wild plants, manipulating plants by transplanting seedlings, and hunting small fauna as well as big game. This required a great deal of respect for and knowledge about different ecological/environmental zones and how their resources might be used. Fishing was important all along the Columbia River, but some areas had larger human populations, such as at Kettle Falls (NPS 2000b:90).



Native American fishing at Kettle Falls, 1901

The peoples now constituting the 12 Colville Confederated Tribes are the Colville, Lakes, San Poil-Nespelem, Southern Okanogan with a few Northern Okanogan, Moses/Columbia, Wenatchi, Entiat, Chelan, Methow, Palus, and the Chief Joseph band of the Nez Perce (Ackerman 1996, 19; Miller 1996, 130). In aboriginal times they occupied the tributaries of the upper Columbia River (see Confederated Tribes of the Colville Reservation map). Their way of life was compromised by ever-increasing European/American incursions in the form of fur traders, settlers, miners, the military, and the government bureaucracy associated with reservations (NPS 2000b:90-91).

In 1872 President Ulysses S. Grant established the Colville Reservation by executive order. On January 18, 1881, a reservation was also established for the Spokane Indians by President James A. Garfield. In 1892 President Benjamin Harrison approved of land being removed from reservation status to open it to settlement by non-Indians. And during President Franklin D. Roosevelt's time in office, 1933-45, the Grand Coulee Dam was authorized and built, with generators first running in 1941. The lake inundated some of the reservation lands, including those areas close to the river where the aboriginal culture was centered. The Grand Coulee Dam left no hope for salmon returning to their original grounds at such mighty fishing places as Kettle Falls, which was covered by Lake Roosevelt.

Colville shamans had long made a practice of transplanting certain plants (roots, herbs, willows, and so forth) to places where they would be most useful. Therefore, when fur traders introduced corn, potatoes, and other crops, chiefs and shamans took the lead in establishing communal tribal gardens on lakeshores (Miller 1996, 130 in NPS 2000b:91).

Ultimately, a way of life was lost, especially with no salmon-run provisions for the Grand Coulee Dam.

The Spokane Indian Reservation was created by an agreement in 1877 between the Lower Spokanes and the U.S. Later an executive order affirmed the boundary and the reservation. In 1887, another agreement included the Upper and Middle Spokanes. Later acts allowed taking back of the lands for mineral development, for electrical generation and for irrigation as well as for settlement by non-Indians. Use of both the Colville and Spokane reservation lands was granted in 1940 and modified in 1944 but also specified allowing an “Indian zone” on the reservoir. Subsequent acts transferred jurisdiction and management of these areas from the U.S. to Washington State and then to the tribes (Herron 1979).

Although ethnographic traditional cultural properties have been identified, none have undergone a determination of eligibility for nomination to the National Register. It is likely, however, that numerous sites are eligible, including traditional fishing areas near Kettle Falls and elsewhere.



Two Rivers Campground on the Spokane Reservation

Contemporary Native American Relations

Ongoing government-to-government relations with the Colville and Spokane Indian tribal governments is key to management of Lake Roosevelt. The NPS and the tribes meet with one another formally during the Five Party Agreement Meetings and informally, during day-to-day operations. Areas of mutual interest include effective communication and the sharing of information, knowledge and resources in planning and operations and in managing cultural and natural resources. Cooperative relationships with both the Colville and Spokane tribes has been essential to the development of the Shoreline Management Plan. Numerous ways to enhance information sharing and management strategies have been identified.

K. Historic Resources (National Register of Historic Places)



St. Paul's Mission

Saint Paul's Mission archeological site, included in the Kettle Falls Archeological District in Stevens County, was listed on the National Register of Historic Places on November 20, 1974. Fort Spokane Military Reserve in Lincoln County was listed on November 23, 1988 (NPS et al. 1994, 874 and 878 in NPS 2000b:95). These are currently the only properties in the national recreation area that are listed on the National Register of Historic Places.

An archeological site near Kettle Falls, which is primarily prehistoric with historic components, was found eligible for listing on the national register in February 1998 by the State Historic Preservation Officer. Eligible sites are required to be listed on the National Register.

The Fruitland irrigation canal, which is partially located in the national recreation area (near Rickey Point) has not been formally evaluated for eligibility for listing on the National Register of Historic Places. This is an archeological feature of the early 20th century focused on water withdrawal from the mouth of the Colville River. It extends south, parallel to what is now the lake for some 20 miles. Analysis by historical archeologists could include better understanding of its association with remaining habitations and agricultural operations, such as "ruins and foundations of homestead dwellings and outbuildings, and associated features. . . fences, dumps, and ditches" as part of the historic scene (Galm 1994, 11.14 in NPS 2000b:95).



Fort Spokane

L. Visitor Experience

The Five Party Agreement among the NPS, Bureau of Reclamation, the Confederated Tribes of the Colville Reservation, the Spokane Tribe of the Spokane Reservation, and the Bureau of Indian Affairs allows the Colville and Spokane tribes to manage their recreation lands in similar ways to the NPS, charging camping and boating fees and protecting large portions of shoreline. Currently, many tribal policies are different, such as the regulations that allow fires at campsites in the summer and the designation of certain campgrounds for tribal members only. Most of the discussion below focuses on NPS-managed areas, while the discussion developed in the Alternatives and Environmental Consequences section focuses on options for unifying some of these differences and thus includes more relationship to Colville- and Spokane-managed areas.



Highway near Kettle River

Visitor Access

The park can be reached via numerous state and U.S. highways, including State Route 55, State Route 17, State Route 174, U.S. Highway 2, U.S. Highway 395, and Interstate 90. State Route 2 is the primary east-west route for the southern part of the park, while State Route 20 is the primary east-west route in the northern part of the park. Gateway communities, include the towns of Coulee Dam, Grand Coulee and Electric City, near the Grand Coulee Dam. Colville and Kettle Falls are on the north end of the recreation area, while smaller towns and unincorporated county areas make up the rest of the developed areas near the park.

In a 1996 visitor use study, most visitors were from Washington State (74 percent), from Canada (13 percent) or from other Pacific Northwest areas (5 percent). Only about seven percent were from other parts of the U.S. and less than one percent were from a foreign country. About 46 percent of the respondents were repeat visitors (NPS 2000a:50).



Swim platform Fort Spokane

Visitor Use

Visitor use at Lake Roosevelt reached one million visitors in 1987 and has continued to top that since (Table VI-4: Lake Roosevelt National Recreation Area Visitation). Although the recreation area is open all year, similar to most areas in the National Park System, visitor use is not evenly distributed throughout the calendar year. Visitor use is relatively stable between November and March, but begins to rise in April, until it reaches a summertime peak in July or August, whereupon it falls until November.

Visitor use is also uneven over the many individual dispersed visitor access points within the recreation area. A 1997 study showed the highest levels of visitor use at Kettle Falls (304,080), followed by Fort Spokane (119,088 for the visitor center and 116,714 for the campground), Spring Canyon (103,251), Seven Bays Marina (100,949), Keller Ferry Campground (88,053), Hunters Campground (77,832), and 61,687 (Hawk Creek Campground). Six areas accounted for between 4-8 percent of total visitor use, while four recorded more than 100,000 visits in 1997. Nine



Fort Spokane group camp area

other areas accounted for one quarter of one percent to three percent of visitor use (NPS 2000a:47).

Recreational use in the North District (Kettle Falls area) varies widely, with most use at Kettle Falls, Hunters, Gifford and Evans campgrounds. In the South District (Fort Spokane to Spring Canyon), use is more evenly distributed, with most occurring at Fort Spokane, Spring Canyon, Seven Bays Marina, Keller Ferry, Hawk Creek and Porcupine Bay.

In general, if visitation to Lake Roosevelt National Recreation Area is unregulated, it will likely continue to increase over the long term. Visitor use experienced increases and declines from year to year (Table VI-4: Lake Roosevelt National Recreation Area Visitation).

TABLE VI-4: LAKE ROOSEVELT NATIONAL RECREATION AREA VISITATION

Fiscal Year	Recreational	Non-Recreational	Total Visits *	Percentage Change
2008	1,337,024	1,200	1,338,224	-7.81%
2007	1,450,438	1,200	1,451,638	13.16%
2006	1,281,586	1,200	1,282,786	0.74%
2005	1,272,119	1,200	1,273,319	0.57%
2004	1,264,923	1,200	1,266,123	-7.22%
2003	1,363,483	1,200	1,364,683	-5.07%
2002	1,436,309	1,200	1,437,509	12.08%
2001	1,277,183	5,400	1,282,583	-10.02%
2000	1,407,448	18,000	1,425,448	-0.95%
1999	1,421,124	18,000	1,439,124	-7.26%
1998	1,533,842	18,000	1,551,842	10.62%
1997	1,384,812	18,000	1,402,812	29.76%
1996	1,063,112	18,000	1,081,112	-21.32%
1995	1,356,092	18,000	1,374,092	-10.97%
1994	1,525,337	18,000	1,543,337	30.16%
1993	1,167,762	18,000	1,185,762	-3.89%
1992	1,215,802	18,000	1,233,802	-30.86%
1991	1,766,420	18,000	1,784,420	22.53%

Recreational visits are entry onto lands administered by the NPS for recreation (any part of a day). Non-recreational visits include commuters, inholding, trades/business, government personnel, and government business traffic.

(Source: www.nature.nps.gov/stats)

Visitor Opportunities/Selected Current Visitor Use Regulations

Table VI-5 Existing Facilities in the National Recreation Area below shows NPS facilities in Lake Roosevelt National Recreation Area. Visitors to Lake Roosevelt come for sightseeing, picnicking, motorized and non-motorized boating, fishing, camping, swimming and other water recreation activities. On the lake, these activities are managed by the NPS, the Colville and Spokane tribes.

A visitor use survey in 1996 found that although there are many things to see and do at Lake Roosevelt, the most popular activities with the visitors represented by the survey (n=3,869) were camping in a developed campground (16 percent), swimming (15 percent), motor boating (11 percent), and fishing (10 percent). Family gatherings (8 percent), picnicking (8 percent), sightseeing (7 percent), and water skiing (6 percent) were the next most frequent responses from those surveyed. Thirteen other activities had participation rates of less than 5 percent (NPS 2000b:72).

At the time of the GMP, there were 28 public campgrounds, including 18 drive-in and 10 boat-in campgrounds. Now there are 26 campgrounds, including 17 drive-in and 9 boat-in. There are currently 22 boat launch ramps.

DRIVE-IN CAMPING

Some campsites at the following designated campgrounds are reservable: Kettle Falls, Fort Spokane, Keller Ferry and Spring Canyon. Group camping requires a reservation at designated campgrounds. Other camping is available first-come, first-served.

CAMPING

Overnight camping is available at 17 designated vehicle campgrounds and at 10 designated boat-in campgrounds. Camping is limited to 14 days per campground/area per year, or a maximum of 30 days per calendar year within the recreation area (section 36 CFR 2.10 (b)(9) of the 2008 Superintendent's Compendium). While most campers set up camp close to the water's edge, some spread activities beyond that, inadvertently encroaching on private property. The recreation area demarcates the boundary with property markers, but these markers are not always evident and may have been moved or removed. Therefore, encroachments occur.

BOAT LAUNCHING/BOAT-IN CAMPING

Although there is a charge for boat launching from NPS launch ramps, boat camping is currently first-come, first-served and free of charge and can occur at both designated boat-in campsites and along other shoreline areas, provided that these are at least 0.5 mile from the nearest developed area.



Boat launch at Daisy

BOATING REGULATIONS

Boats are allowed on the lake up to a maximum of 30 days per year. Although there is no boating speed limit, decibel limits affect speed and engine noise. These limits, however, are difficult to enforce because training and equipment provision are currently insufficient. Cigarette boats, likely because of the recent ban on these craft at Lake Coeur d'Alene have recently started coming to Lake Roosevelt. As a result, problems with noise have increased.

WALK-IN SHORELINE CAMPING

This activity is currently not permitted.

OPEN BEACH FIRES

These are currently permitted on NPS lands only from November 1 to May 1 (not during the summer), when the fire danger rating for the recreation area is at or below Level 2.

CAMPFIRES

When the Washington Department of Natural Resources closes their campgrounds because of fire risk, recreation area campgrounds are also closed. Park regulations limit beach fires to winter months. In winter, fishermen are allowed a "warming fire." Unless there is a fire closure in effect, campfires are permitted year-round in designated fire pits (usually a metal fire ring) in designated boat-in campsites and other designated campgrounds. Similarly charcoal grills and stoves are permitted year-round if there is no fire closure and if charcoal ashes are packed out and disposed of when cool in trash receptacles.



Fishing at Hawk Creek

HUMAN WASTE DISPOSAL

Shoreline camping currently requires overnight boaters to have a Marine Sanitation Device (MSD) or portable toilet approved for landfill disposal. Where toilets are provided at designated boat-in campsites, possession of an MSD or portable toilet is not required. Waste must be disposed of at concessionaire marine pump-out facilities or at dump stations. Only solid waste bags approved for landfill disposal may be deposited into trash receptacles. Three floating toilets/dump stations and one floating toilet are currently provided on the lake. These are located at Spring Canyon, 10 Mile, and Hansen Harbor, with one just south of Kettle Falls. Land based toilets occur at most developed sites (see Table VI-5: Existing Facilities in the National Recreation Area below).

FISHING

Lake Roosevelt supports significant fish populations, especially in areas deeper than 10 feet. Fishermen pursue rainbow trout, walleye, kokanee, whitefish, smallmouth bass, and yellow perch. Sturgeon are also found in the lake, although they are not breeding. A net pen program was started in 1984. Fingerlings are put in the pens in October and released in May or June. The program has resulted in a dramatic increase in rainbow trout. By 1999, 45 net pens were raising both rainbow trout and kokanee salmon for release into the lake. The net pens lie just off shore, some adjacent to recreation facilities like the swim beach at Hunters. There is no fishery management plan for Lake Roosevelt due to the tribes' extensive programs funded by the Bonneville Power Administration (Jones & Jones 2008:13).

COMMUNITY ACCESS POINTS

Community Access Points (CAPs) currently consist of areas where community organizations can install NPS-approved boat docks if the public is able to use a portion of the boat slips and there is public road access to the launch. Three community access points have been approved: Eden Harbor, Rantz Marine Park, and Rickey Point. Many others, where communities would discourage the public coming through their land, are currently under review. Several communities, such as Cayuse Cove, Moccasin Bay and Sunset Point, have had applications under review by the NPS.

The NPS currently uses a draft evaluation criteria to analyze potential new CAPs: A revised set of criteria can be found on pages 63 and 64.

MOORING BUOYS

Mooring buoys are currently prohibited. Unattended buoys are removed by rangers because they can be a boating hazard if unseen.

Area Descriptions

In the summer along the shoreline between formal campgrounds every cove with a bit of beach and a shade tree will be occupied by shoreline campers or day use visitors. Most of these spots have unofficial names that have arisen over time due to need for rangers to communicate their locations to one another. The stretch of shoreline between Fort Spokane and Porcupine Bay has the most popular coves and requires additional staff on weekends. Proposed actions in Alternatives B-D could affect the following areas.

SOUTH ZONE (CRESCENT BAY TO SEVEN BAYS)

CRESCENT BAY (RIVER MILE 1): Crescent Bay is dominated by shrub-steppe and grasslands. Noxious weeds such as Spotted knapweed, Rush skeletonweed, Dalmation toadflax and Leafy spurge persist throughout this heavily disturbed site as do a number of non-native trees and shrubs.

Crescent Bay is the first recreation site encountered by visitors coming from the west, such as from Seattle. Existing facilities include a 60-foot boat ramp, information sign, informal swimming area and toilets. The boat ramp is crowded; over 100 boat trailers have been counted on a busy summer weekend. Crescent Bay often is an overflow area for nearby Spring Canyon facilities when they are full. There are wide expanses with dirt roads and informal parking areas. Visitors to Crescent Lake currently can swim (although there is no designated swim area, fish, boat and hike. A small boat launch for non-motorized boats is available on the east end of the lake and canoes, including for NPS interpretive programs are informally launched on the other side.



Panorama of Crescent Lake and Crescent Bay looking north-east



Spring Canyon

SPRING CANYON (RIVER MILE 3): This campground and day use area was constructed in the 1950s and 1960s. With its wide array of facilities and close proximity to nearby towns, it is the most popular beach on Lake Roosevelt. The campground contains 80 sites, including group sites. The boat launch can accommodate four vehicles at a time. Parking for 126 cars and 52 boat trailers is available. In addition, there are restrooms, a picnic area, boat dock, and seasonal visitor center and small amphitheater, where interpretive programs are staged.



Keller Ferry

NEAL CANYON (RIVER MILE 10): This undeveloped area has no public facilities but can be accessed by public roads which cross private property.

KELLER FERRY (RIVER MILE 16): This area, located approximately 15 miles from the town of Wilbur, contains a 55-site campground, including group sites; a boat launch that can accommodate two cars at a time; parking for 140 cars and 71 boat trailers; a boat dock, waste disposal facilities, picnic/day use area with a group picnic area gazebo; swim area; and a concessionaire marina (Roosevelt Recreational Enterprises) with a small store and houseboat rentals. Keller Ferry Marina has been in operation since the late 1960's, providing water-oriented recreational facilities to the public.

PENIX CANYON (RIVER MILE 22): Located within walking distance along the shoreline from Jones Bay (where there are nine boat-in campsites and a small parking area), Penix Canyon is currently minimally developed, with three boat-in campsites. Penix Canyon is located in an open area with scattered Ponderosa Pines.



Lincoln

LINCOLN (RIVER MILE 36): This area was a sawmill until the mid-1960s. This day use area contains a boat launch with a skid-dock and a small parking area. Up to 100 boat trailers have been observed in the parking area.

TABLE VI- 5: EXISTING FACILITIES IN LAKE ROOSEVELT NATIONAL RECREATION AREA

Developed Area	# Sites	Day Use Picnic Sites	Comfort Stations	Toilets Vault
Bradbury Beach Campground	n/a	3	No	Yes
China Bend	n/a		No	Yes
Cloverleaf Campground	9		No	Yes
Crescent Bay Lake	n/a		No	Yes
Crescent Bay	n/a	3	No	Yes
Crystal Cove Campground	3		No	Yes
Daisy	n/a		No	Yes
Detillion Campground	12		No	Yes
Enterprise Campground	13		No	Yes
Evans Campground	43		Yes	Yes
Fort Spokane Campground	67 campsites; 2 group sites (45 each)	64 picnic tables	Yes	Yes
French Rocks	n/a		No	Yes
Gifford Campground	43		No	Yes
Goldsmith Campground	3		No	Yes
Haag Cove Campground	16		No	Yes
Hanson Harbor	n/a	2	No	Yes
Hawk Creek Campground	21		No	Yes
Hunters	37 camp-sites; 3 group sites	10	No	Yes
Jones Bay Campground	9		No	Yes
Kamloops Island Campground	17		No	Yes
Keller Ferry Campground	55 campsites; 2 group sites (25 each)	15 picnic tables	Yes	Yes
Kettle Falls Campground	76	25 picnic tables	Yes	No
Kettle River Campground	13		No	Yes
Lincoln Mill	n/a		No	Yes
Locust Grove Group Campsite	2 group sites (50 each)		Yes	Yes
Marcus Island Campground	27		No	Yes
Napoleon Bridge	n/a		No	Yes
North Gorge Campground	12		No	Yes
Penix Campground	3		No	Yes
Plum Point Campground	4		No	Yes
Ponderosa Campground	8		No	Yes
Porcupine Bay Campground	31	15	Yes	Yes
Seven Bays	n/a		No	Yes
Snag Cove Campground	9		No	Yes
Spring Canyon Campground	87 campsites; 2 group sites of 25 each	60 picnic tables	Yes	Yes
Sterling Point	3		No	Yes
Summer Island Campground	6		No	Yes
Two Rivers (Spokane Tribe)			No	Yes

* No water is available if the lake is below 1,265 feet.
SD = skid dock; SR = snow removal

Fee Area	Drinking Water Yes/No	Launch Ramp	Launch Elevation (in feet)	Boat Dock	Trailer Dump Station	Remarks
Yes	No	Yes SR	1,251	Yes SD	No	
Yes	No	Yes	1,280	Yes SD	No	Boat launch only; no camping /picnicking.
Yes	Yes*	No	n/a	Yes	No	
No	No	Yes	n/a	Yes	No	Nonmotorized craft only.
Yes	No	Yes	1,265	Yes SD	No	
No	No	No	n/a	No	No	Boat-only campground. Pack in-pack out.
Yes	No	Yes SR	1,265	Yes SD	No	Launch ramp only.
No	Yes*	No	n/a	Yes	No	Boat-only campground. Pack in-pack out.
No	No	No	n/a	No	No	Boat-only campground. Pack in-pack out.
Yes	Yes	Yes	1,280	Yes	Yes	Comfort station open mid-April/mid-Oct. Weather permitting.
Yes	Yes	Yes	1,247	Yes SD	Yes	Comfort station open mid-April/mid-Oct. Weather permitting.
Yes	No	Yes	1,265	Yes SD	No	
Yes	Yes	Yes SR	1,249	Yes SD	Yes	
No	No	No	n/a	Yes	No	Boat-only campground. Pack in-pack out.
Yes	Yes*	No	n/a	No	No	
Yes	No	Yes	1,253	Yes SD	No	Boat launch only, no camping.
Yes	Yes*	Yes	1,281	Yes	No	
Yes	Yes	Yes SR	1,232	No	No	
Yes	No	Yes	1,268	Yes	No	
Yes	Yes*	No	n/a	Yes	No	
Yes	Yes	Yes SR	1,229	Yes SD	Yes	Comfort station open mid-April/mid-Oct. weather permitting.
Yes	Yes	Yes SR	1,234	Yes SD	Yes	Comfort station open mid-April/mid-Oct. weather permitting.
Yes	Yes*	No	n/a	Yes	No	
Yes	No	Yes	1,245	Yes SD	No	Picnic area.
Yes	Yes	No	n/a	No	No	\$10.00 minimum, \$1.00 per person.
Yes	Yes*	Yes	1,281	Yes	No	
Yes	No	Yes	1,280	No SD	No	
Yes	Yes*	Yes	1,280	Yes	No	
No	No	No	n/a	Yes	No	Boat-only campground; pack in-pack out.
No	No	No	n/a	Yes	No	Boat-only campground; pack in-pack out.
No	No	No	n/a	No	No	Boat-only campground, pack in-pack out.
Yes	Yes	Yes	1,243	Yes SD	Yes	Comfort station open mid-April/mid-Oct. weather permitting.
Yes	Yes	Yes SR	1,227	Yes SD	No	Restaurant and boat moorage.
Yes	Yes*	Yes	1,277	Yes SD	No	
Yes	Yes	Yes SR	1,222	Yes SD	Yes	Comfort station open mid-April/mid-Oct. weather permitting.
No	No	No	n/a	No	No	Boat-only campground; pack in-pack out.
No	No	No	n/a	Yes	No	Boat-only campground; pack in-pack out.
Yes	Yes	Yes SR	1280	No	Yes	



Fort Spokane

SPOKANE ARM (FORT SPOKANE TO LITTLE FALLS)

FORT SPOKANE (RIVER MILE 43): This highly developed area contains a drive-in campground with 67 sites and two group sites as well as an amphitheater. The boat launch accommodates two cars at a time. There is parking for 81 cars and 88 boat trailers. There is a visitor center and historic fort with interpretive trails. It also contains a large swim beach (imported sand), a fish-cleaning station, and a picnic area with a picnic shelter and play structures. NPS maintenance and other offices are also located here.

COUGAR COVE (RIVER MILE 49): This undeveloped area has no public facilities and no public road access.

DETILLION (RIVER MILE 50): This fairly large boat-in campground contains 12 sites, two fire pits and two primitive boat ramps but no public road access. The campground is expanding into the adjacent forested area.



Porcupine Bay

PORCUPINE BAY (RIVER MILE 55): This area is one of the most highly used and popular sites within the Lake Roosevelt. The campground was constructed in the late 1950's. Campsite density is high since 16 sites were split to form the present 31-site campground. In addition to the campground, there is a boat launch which accommodates three cars at a time; a large swim beach; picnic areas on the lawn and in the trees; a fish-cleaning station; and parking for 33 cars and 92 boat trailers. Because of crowded conditions impacts from overuse led to an EA to modify the campground and parking area configuration and to upgrade the restrooms (including ADA access) (see "Chapter II: Purpose and Need"). Sediment deposition has caused aquatic vegetation to spread within the last few years and testing of a benthic barrier is currently underway to protect the swim area. Neighboring homes have sewer/water easements over park property and permitted seawalls since many are on the edge of the lake.

LAUGHBON BAY/LANDING (RIVER MILE 55): This undeveloped area has no public facilities but can be accessed by public roads. There was formerly a boat launch at this site because of formerly developed areas (a highway river crossing) now beneath the lake.

CAYUSE COVE (RIVER MILE 60): This undeveloped area has no public facilities and no public road access. An illegal boat launch, however, has been constructed. Cayuse Cove is a 45 minute drive from Porcupine Bay or a 10 minute boat ride.

MOCCASIN BAY (RIVER MILE 60): This area has no public facilities but does have public road access. There are private, non-CAP compliant boat docks and a primitive non-compliant boat launch. Nearby communities include Moccasin Bay, Arrowhead and Sunset Point. .



Hunters

HUNTERS/RICE AREA (ENTERPRISE TO COLVILLE RIVER)

HUNTERS (RIVER MILE 64): This developed area contains a drive-in campground with 29 sites, a boat launch, picnic area, swim beach (imported sand), day use area, and parking for 55 cars and 56 boat trailers. The unique parking area has medians planted with kinnickinnick (*Arctostaphylos uva-ursi*) and Oregon grape (*Mahonia aquifolium*).

JEROME POINT (RIVER MILE 71): This undeveloped area has no public facilities but is accessible from public roads.

GIFFORD (RIVER MILE 79): This developed campground contains 43 sites and is accessible from public roads.

RICKEY POINT (RIVER MILE 98): This area has no public facilities but does have public road access and contains a special use area at the end of the road with 16 vacation cabins. There is a CAP (mooring buoys) near the vacation cabins. In part, because there are no formal recreational facilities trash, human waste and non-native species are found.

KETTLE FALLS NORTH (KETTLE FALLS TO CHINA BEND)

KETTLE FALLS (RIVER MILE 102): This is the site of a full-service marina with an office, convenience store, houseboat rentals and fuel and dump station. The large area also includes NPS offices and maintenance buildings, a boat launch and parking, a campground, picnic and day use areas, a swim beach and a softball field.

MARCUS ISLAND (RIVER MILE 110): This site contains a campground with 27 sites, a small boat launch with a skid dock, a picnic/day use area, and swim beach. Except at full pool, the swim area is not functional due to sedimentation and what are now seasonally inundated wetlands with emergent vegetation.

EVANS (RIVER MILE 112): This developed campground has 43 campsites, a boat launch, and a day use, picnic and swim area.



Evans

KAMLOOPS ISLAND (KETTLE RIVER—RIVER MILE 112): This moderately sized campground contains 17 campsites and a boat dock. There is also a primitive boat launch.

Visitor Safety

The Tread Lightly[®] program is used at Lake Roosevelt not only to limit impacts to natural and cultural resources but to manage visitor safety. The program is not comprised of a set of rules or regulations, rather, it seeks to create a cooperative attitude, ethic and way of living that respects wildlands.

By following the principles of the program, visitor safety is enhanced:

- **TRAVEL RESPONSIBLY** includes observing rules and regulations such as no wake zones and not drinking and driving, as well as staying on designated trails and waterways open to the type of transportation.
- **RESPECT THE ENVIRONMENT AND THE RIGHTS OF OTHERS** includes being cautious of surroundings and yielding the right of way to non-motorized craft and complying with signage.
- **EDUCATE YOURSELF, PLAN AND PREPARE BEFORE YOU GO** includes using available maps and other information from visitor centers, maintaining watercraft in good condition, checking weather forecasts, thinking safety first (wearing life jackets and carrying water, fuel and fire extinguishers when appropriate), and sharing plans with friends or park staff.
- **AVOID SENSITIVE AREAS** includes not disturbing wildlife and shoreline vegetation and slowing down in shallow water.
- **DO YOUR PART** includes pack it in, pack it out, not burning garbage, not leaving unattended campfires or creating illegal ones, properly disposing of human waste (not digging cat-holes or dumping irresponsibly, and cleaning vehicles and equipment of weed seed before transporting it).

In addition, the NPS and other agencies conduct periodic boat launch ramp safety inspections and on-water safety checks. Safety information for boating is posted at launch ramps, while campgrounds and other visitor use areas contain safety information pertinent to their use. Safety messages are also conveyed in visitor centers, in the park map and newspaper, on the park's web site (www.nps.gov/laro) and as part of interpretive programs. Launch ramp safe lake levels are also posted and available in handouts. Mileage between facilities is noted on the park map and in the newspaper.



NPS bulletin board and interpretive sign at Hanson Harbor

The following key safety messages are in the park map and guide:

- Regulations differ among areas managed by federal, state and tribal agencies.
- Read bulletin boards, ask rangers, and know the rules.
- Beware of navigational hazards like deadheads (protruding logs and snags), sandbars and floating debris.
- Always wear a life vest (PFD) when on the lake.
- Never ride on the bow of a boat.
- There are no lifeguards; swim at your own risk. Do not swim alone.
- Dispose of human waste in proper sanitation containers. Do not use plastic bags. Use dumpstations and floating pumpout stations. Marine sanitation devices (MSD) are required when shoreline camping.
- Pets are not allowed on developed swim beaches or in picnic areas.
- Protect yourself from the sun and drink plenty of water.
- Please watch your children.
- Collecting artifacts is strictly prohibited. All plants, animals, rocks, historic areas, and submerged townsites are protected by federal laws.
- Call 911 for emergencies.

Scenic Resources

Note: The following discussion is taken from the Site Analysis Report prepared by Jones & Jones, Inc. for the Interdisciplinary Planning Team Alternative Development Workshop (Jones & Jones 2008:15 et seq.).

The ecological context of the lake strongly influences the aesthetic character and scenic values of the national recreation area. The intrinsic qualities of place—the dry sagebrush landscape of rolling hills and basalt cliffs, the pine needle-covered floor beneath the Ponderosa pines, or the exposed, eroding bank affect visitors' perceptions of the shoreline and the quality of their experience. Those special or landmark places, such as the Hawk Creek waterfall, serve to orient people within the recreation area and provide a visual image that defines the lake environment.

Several factors influence the quality of the aesthetic character of the shoreline:

- **VIEWPOINT**—A visitor camping on the shore experiences different views than a boater in the middle of the lake. For the visitor on the shore, the foreground is dominated by the individual trees and campground development, the middle ground by the lake, and the background by the surrounding hills. For the visitor on the lake, the foreground is the lake water, individual trees blur into a forest canopy in the middle or background and the surrounding hills provide context.
- **VIEWSHED**—All the places a visitor can see from any one point is the viewshed. An approximate viewshed has been created for Lake Roosevelt from the centerline of the old river. Using contour data and a Geographic Information System (GIS), viewsheds were calculated from points every three miles along the lake. The viewsheds were added together to show the surrounding landscape as having High, Medium or Low visibility from the lake.
- **VIVIDNESS**—Vividness, along with intactness and unity, form a three part description of aesthetic quality used heavily by the U.S. Forest Service and state transportation agencies. Vividness describes the visual power or memorability of the landscape components as they combine in striking and distinctive visual patterns. The shoreline of Lake Roosevelt can be striking and distinctive in specific places, but compared to other National Parks with more dramatic scenery, is not as highly vivid as a whole. Topographic elements, such as Whitestone Rock or the cliffs above Lincoln Mill, however, form a necklace of vivid landscapes seen along the southern lake shoreline. Along the Spokane Arm, the lake itself provides the only vivid element. While in the north, the combination of sweeping grasslands, pine forests and eroding cliffs contributes to vivid scenery in the intersections of disparate ecosystems.



Example segment of scenic viewshed assessment (orange indicates visibility from lake)



NPS development that blends into the scenic landscape



Lake Roosevelt shoreline

- **INTACTNESS**—Intactness is the visual integrity of the landscape and its freedom from non-typical encroaching elements. If all of the various elements of a landscape seem to “belong” together, there will be a high level of intactness. For the most part, non-typical, encroaching elements consist of man-made elements, such as power lines, vacation homes and houseboats not built with local materials and which contain patterns and colors that distract from the natural landscape. NPS development, even where significant such as at Keller Ferry, tends to blend in to the landscape, due to familiarity of the elements to the typical visitor and the consistent nature of their design and use. A few NPS developments, however, encroach on scenic intactness; these include floating pump-out stations, larger parking lots at the entrance to facilities (i.e., Seven Bays), and even areas with denuded vegetation or invasive species (i.e., patches at Crescent Bay). Scale and distance affect visitors’ perception of intactness. Seen at a great distance, the floating pump stations are dwarfed by the surrounding basalt cliffs, for instance. Since the recreation area boundary is fairly close to the lake shore, most of the visible hills surrounding the lake that influence the lake’s intactness are outside the control of the NPS.
- **UNITY**—Similar to intactness, unity is the visual harmony of the landscape considered as a whole. Unity represents the degree to which the visual elements maintain a coherent visual pattern. From Enterprise to China Bend, the lake shore exhibits a high degree of unity at full pool given the significant forest cover and the lack of shoreline development. When lake levels drop in the winter and spring, the extended exposed sand banks create a visual “bathtub ring” around the lake that reveals the artificial hydrologic regime. This exposed beach detracts from the unity of the mostly natural landscape. From Crescent Bay to Fort Spokane, the lake shore exhibits a lower degree of unity at full pool due to the lack of trees, and the visibility of encroaching development and land use patterns. Fluctuating lake levels do not have as significant an impact on unity, as in the north, because the exposed sand appears similar to the shrub-steppe landscape and coloration.

In general overall scenic views are enhanced from Lincoln and Stevens County areas because the Colville Tribes do not allow homes within one mile of the lake shore, and because the Spokane Tribe has placed a moratorium on lake shore development outside of the Two Rivers area.

M. Socioeconomics

Lake Roosevelt lands encompass five counties (Okanogan, Ferry, Stevens, Lincoln and Grant) and are adjacent to two Indian Reservations (Colville and Spokane). Lake Roosevelt is but one recreational opportunity among many in this part of eastern Washington. Within 100 miles of the dam there are four national forests (Okanogan, Colville, Wenatchee and Kaniksu), six other major lakes or reservoirs (Lake Chelan, Lake Coeur d'Alene, Lake Pend Oreille, Priest Lake, Banks Lake, and Potholes Reservoir), several smaller reservoirs on the Columbia or Snake Rivers, as well as three other national park areas (North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area).

The national forests have a substantial complementary recreation potential, which consists of smaller lake and stream fishing, camping, hunting and winter sports. Similar boating and fishing opportunities are available on the lakes. The potholes country, to the south in the channeled scablands formed by the ancient Ice Age floods, also offers fish and game bird oriented activities as well as a new Ice Age Floods National Geologic Trail. The Grand Coulee Dam itself is a tourist destination that attracts more than 300,000 visitors a year to tour the dam and watch the laser light show.

Population

Spokane is the closest metropolitan area to the national recreation area. Spokane and Spokane County have a population of about 462,677, about double the aggregate population of the six-county area.

Gateway Community Visitor Services

The towns of Coulee Dam, Grand Coulee, Electric City on the southwest, Kettle Falls and Colville on the north and Davenport and other towns along the Highway 2 corridor on the south offer a variety of services, including motels, RV parks, gas stations, grocery stores and tourist information. A new regional visitor center in Kettle Falls will be jointly staffed by the NPS. Other smaller towns and rural areas surrounding the recreation area offer fewer choices for food, lodging, fuel and other services. In general, the majority of visitor services are strung out along the major highways, including U.S. 97 in the Okanogan Valley, U.S. 395 in Stevens County between Canada and Spokane, I-90 to the south, and State Route 17 between Moses Lake and Coulee City.



Town of Coulee Dam

**TABLE VI-6: WASHINGTON STATE GROWTH MANAGEMENT ACT
COUNTY POPULATION PROJECTIONS 2000-2030**

	Census		Estimate		Projections		
	2000	2005	2010	2015	2020	2025	2030
Douglas	32,603	34,700	43,321	48,042	52,461	56,920	61,216
Ferry	7,260	7,400	9,294	10,128	11,207	12,305	13,375
Grant	74,698	79,100	96,565	104,425	110,922	117,349	123,302
Lincoln	10,184	10,100	11,402	12,085	13,336	14,590	15,798
Okanogan	39,564	39,600	46,414	50,000	53,040	56,034	58,790
Stevens	40,066	41,200	46,616	52,053	58,098	63,997	69,527

TABLE VI-7: COUNTY POPULATION 2000-2008

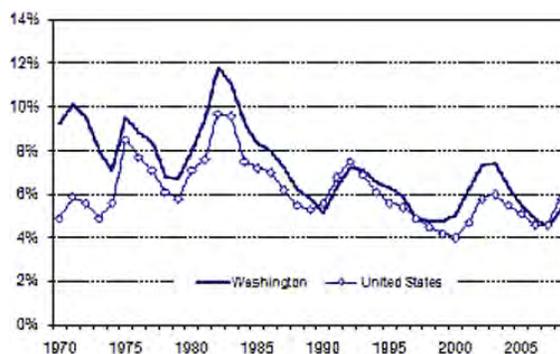
County	2000	2001	2002	2003	2004	2005	2006	2007	2008	Change 2000–2008	
										Number	Percent
Douglas	32,603	32,800	33,100	33,600	34,200	34,700	35,700	36,300	37,000	4,397	13.49
Ferry	7,260	7,300	7,300	7,300	7,300	7,400	7,500	7,550	7,700	440	6.06
Grant	74,698	75,900	76,400	77,100	78,300	79,100	80,600	82,500	84,600	9,902	13.26
Lincoln	10,184	10,200	10,200	10,100	10,200	10,100	10,200	10,300	10,400	216	2.12
Okanogan	39,564	39,700	39,800	39,600	39,600	39,600	39,800	39,800	40,100	536	1.35
Stevens	40,066	40,300	40,400	40,600	40,700	41,200	42,100	43,000	43,700	3,634	9.07

Source: <http://www.ofm.wa.gov/pop/april1/> (accessed 6/09)

TABLE VI- 8: SURROUNDING COUNTY INCOME

County	2007 Per Capita Personal Income (PCPI)	2006-2007 PCPI Growth	1997–2003 PCPI Growth
Douglas	\$27,260 66% state; 71% national	5.6%	3.6%
Ferry	\$21,520 52% state; 56% national	8.2%	2.9%
Grant	\$24,733 60% state; 66% national	5.2%	2.4%
Lincoln	\$27,108 66% state; 70% national	17.5%	2.2%
Okanogan	\$28,880 70% state; 77% national	5.8%	4.3%
Stevens	Unknown	Unknown	Unknown
	State Average: \$41,203 National Average: \$38,615	State: 6.6 % National: 4.9%	State: 4.5% Nation: 4.3%

WASHINGTON STATE UNEMPLOYMENT RATE 1970-2008



N. Park Operations

Budget and Staffing

Lake Roosevelt currently has 58 full-time equivalent employees who work in maintenance, visitor and resource protection, interpretation and education, natural and cultural resources management and administration. The park has an annual operating budget of over \$5,000,000. This is supplemented by additional money allocated for specific rehabilitation, construction, cyclic and other projects. Money to implement larger projects comes via congressional appropriations and concession fee funding.

Nine full-time rangers patrol the recreation area. The number of rangers decreased between 2006 and 2007. Two districts are used for park management, a north district centered at Kettle Falls and a south district centered at Spring Canyon/Fort Spokane. Rangers spend time, according to their own observations, either patrolling some or all of the 312 miles of shoreline or patrolling roads and developed areas on shore. Occasionally, an entire shift is spent managing traffic and other problems at a busy campground.

Ten to twelve youth are seasonally employed in the Youth Conservation Corps (YCC). These youth participate in a two month program where they are paid the Washington State minimum wage (\$8.07/hr during summer 2008). Their primary focus is on the campground/resource maintenance program but they are also exposed to other tasks experienced by park rangers, including patrolling the lake.



Boat launch at Seven Bays

Infrastructure

Where standardization has been applied, major launch ramps are 60-feet wide with a 10 to 12% slope and have a length as long as the site grade will allow. Depending on the grade, launches will continue to be operational after a draw down. Adjustable boat docks are 6 feet x 100 feet.

Potable Water Provision

If water is provided at an NPS facility, recreation area maintenance staff must sample water twice a month and sample chlorine every day to ensure adherence to potability standards. This activity requires a major investment of time and training for maintenance staff. The park also maintains four floating toilets. The park currently manages 72 vault toilets and 20 flush toilets or comfort stations. The comfort stations are winterized (closed in the winter).

Beach Cleanup/Monitoring

The park conducts a formal beach cleanup effort to monitor and assess whether signage or an increase in maintenance affects littering. Ongoing management problems stem from the construction of illegal fire rings, twine and driftwood houses and other structures, as well as from camping equipment, such as chairs, and trash left behind. For the cleanup, ten sites a year are monitored twice a week. Each year, after an initial cleanup, rangers break up structures or fire-rings but do not completely clean the area again until after monitoring is completed. A recent



Marcus Island facilities

visit to one of the sites, Cougar Cove, revealed a disturbed site with lots of trash and a fire ring even though it had been cleaned two weeks earlier. The recreation area is now experimenting with “Boat it in, Boat it out” signs used by Lake Mead National Recreation Area. Five of these signs have been put on beach cleanup sites on Lake Roosevelt to determine their effect on visitor behavior.

Special Management Provisions

Unlike some other national park areas, the recreation area allows hunting and the use of personal watercraft. It also has some special use management zones where the park encouraged the development of private cabins on public land in the 1950s.

Lake Patrols

Within the last twenty years, there has been an increase in the number of recreational boaters on Lake Roosevelt. Fishing seems to have remained steady. This increasing number of visitors has resulted in an increase in user conflicts and injuries. In the summer of 2007, there were two deaths and 19 medical evacuations for serious injuries on the water. Because many accidents and injuries go unreported these statistics do not provide an accurate depiction.

Emergency Response

Because there is no permit system for designated or informal boat-in campsites, it is very difficult to locate visitors when an outside emergency call is received by the park. Boating visitors could be anywhere along the more than 150 miles of shoreline. Because of the Colville and Spokane reservations, it is also difficult for visitors to determine in whose jurisdiction they are residing when placing emergency calls.

Encroachments

As of 2008, there were 272 documented trespasses/encroachments on the recreation area shoreline. Managing encroachments is a difficult and time consuming legal process.

Visitor Carrying Capacity Management

No comprehensive carrying capacity studies have been completed. The Concessions Management Plan examined houseboat carrying capacity. Physical carrying capacity is limited by facilities such as building or parking lot size. Although parking areas may fill, however, there may still be open beach areas nearby. Even at crowded, existing facilities, visitation can be facilitated through more intensive management, such as a one-in one-out strategy as has occurred recently at Porcupine Bay.

Interpretation and Education Programs

The recreation area’s interpretive and education programs are diverse, including both education for school and community groups and interpretive programming for the general public. The recreation area newspaper describes the availability of programs.