APPENDIX E

Detailed Recreation Assessment

UPPER COLUMBIA ALTERNATIVE FLOOD CONTROL AND FISH OPERATIONS EIS

RECREATION AFFECTED ENVIRONMENT
Appendix E: Part 1 of 2

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May 2005
Updated March 2006

UPPER COLUMBIA ALTERNATIVE FLOOD CONTROL AND FISH OPERATIONS EIS

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RECREATION AFFECTED ENVIRONMENT

1.0 Introduction

The Columbia River Basin hosts numerous Canadian and U.S. National parks, state/provincial parks, national forests, recreation areas, interpretive centers, wildlife refuges, hot springs, public beaches, and historic points of interest. The Basin's recreational opportunities attract both local residents and long distance visitors, drawing an estimated 18 million visitors to the basin each year and contributing substantially to local and regional economies (BPA *et al.* 1995).

The recreational features, facilities and activities that could be directly affected by changes in reservoir operations include boat ramps[1], fixed and floating boat docks, moorage, swimming beaches, and fishing. Additional land based features, facilities, and activities that could be indirectly affected are near-shore camping and campsites, sightseeing, and trails.

In this section, the affected environment regarding recreation is described by three sub-basins within the Columbia Basin, then by major river reach, lake and reservoir recreational areas, and finally by the affected recreation activity. The three regions within the Columbia Basin comprise the following areas:

- Area 1 - Kootenai River Basin from Lake Koocanusa in Montana (MT) and British Columbia (BC) through Idaho (ID) to the Columbia River in BC
- Area 2 - Flathead/Clark Fork/Pend Oreille Basin from Hungry Horse Reservoir in MT to the Columbia River in Washington (WA)
- Area 3 - Columbia River mainstem from the mouth of the Kootenai River in BC downstream to the Pacific Ocean in Oregon (OR) and WA

Area 1 – Kootenai River Basin recreational areas are:

- Lake Koocanusa in MT and BC (Extent of reservoir pool)

[1] Note that elevation data presented for boat ramps should be considered approximate as they are often not a precise measurement. These elevations do not account for all aspects of launching ability, such as the presence of mud or debris on the ramp, or exposed hazards that appear at lower water levels.

- Kootenai River[2] (Libby Dam in MT, through ID to Kootenay Lake in BC)
- Kootenay Lake in BC (Kootenay Lake to Corra Linn Dam)

Area 2 – Flathead/Clark Fork/Pend Oreille River Basin recreational areas are:

- Hungry Horse Reservoir in MT (Extent of reservoir pool)
- South Fork Flathead and Flathead River in MT (Hungry Horse Dam to confluence with Flathead Lake)
- Flathead Lake in MT (Confluence with Flathead River to Kerr Dam)
- Lower Flathead River in MT (Kerr Dam to confluence with Clark Fork)
- Lower Clark Fork (Confluence with lower Flathead River in MT to confluence with Lake Pend Oreille in ID)
- Lake Pend Oreille in ID (Confluence with lower Clark Fork to Albeni Falls Dam)
- Pend Oreille River (Albeni Falls Dam in ID to Columbia River in WA)
- Pend d'Oreille River and Pend d'Oreille Reservoir in BC

Area 3 – Columbia River mainstem recreational areas are:

- Primary Sub-basin (Kootenay River confluence in BC to Chief Joseph Dam in WA)
    - Upper Columbia River (Kootenay River in BC to Franklin D. Roosevelt Lake (Lake Roosevelt) confluence in WA)
    - Lake Roosevelt in WA (Lake Roosevelt confluence to Grand Coulee Dam)
    - Rufus Woods Lake in WA (Grand Coulee Dam to Chief Joseph Dam)
- Secondary Sub-basin in WA and OR (Chief Joseph Dam to Pacific Ocean)

[2] The Canadian spelling is Kootenay. The U.S. spelling is Kootenai.

2.0 Area 1 - Kootenai River Basin

From its headwaters to its confluence with the Columbia River, the Kootenai River Basin offers many recreational opportunities. The main recreational features of interest to this study include Lake Koocanusa, Kootenay Lake, and the Kootenai/Kootenay River itself.

2.1 Lake Koocanusa

General Information: Lake Koocanusa is an important regional recreational resource on both sides of the U.S./Canadian Border. The lake is relatively undeveloped compared to nearby reservoirs, with less transportation access, and fewer recreational facilities than those found in at Lake Pend Oreille or nearby Flathead Lake in Area 2. This is due, in part, to the large seasonal fluctuation in pool elevation that accompanies operation of the Libby Dam, which can result in a 160 foot fluctuation in water surface elevations through the year (BPA *et al.* 1995). Two provincial parks and two recreational areas are located along the lake in BC.

Recreation Management: The two primary U.S. recreational resource managers in the area are the U.S. Army Corps of Engineers (Corps) and the U.S. Forest Service (USFS). The Corps operates and maintains Libby Dam, the dam's visitor center, a campground, and a boat ramp at Lake Koocanusa. The USFS manages the Kootenai National Forest (KNF) and operates all other U.S. recreational facilities along the reservoir. Canadian recreation sites along the reservoir are managed by BC Provincial Parks and private owners.

Recreation Access: Lake Koocanusa is accessible by road. MT State Highway 37 runs along the east side of the reservoir for more than 20 miles, while the west side is accessible via USFS roads. On the Canadian side of the lake, BC Provincial Highway 3 crosses the reservoir near Wardner, BC (BPA *et al.* 1995).

Visitation: Approximately half of Lake Koocanusa recreational visitors are from MT and out of state visitors tend to come from WA, BC and Alberta. The peak recreation season is June through August (BPA *et al.* 1995). The estimated number of visitor days for the Corps' facilities at Libby Dam and Lake Koocanusa (the dam, Souse Gulch, and the Libby Dam Visitors Center) averaged 44,092 visitor days per year from 1988-1994. Over the last 10 years (fiscal years 1995-2004) visitation at these facilities increased to an average of 50,915 visitor days per year (D. Wernham, pers. comm. Dec 2004). These visitation statistics do not include visitation at USFS lake-oriented recreation sites in KNF. Visitor-day use data is not available for these sites. Visitation for the entire KNF in fiscal year 2002 was estimated at 1.1 million total visitors (USFS 2003). The most recent consolidated estimate of visitor days for water related recreation activities at Libby Dam and Lake Koocanusa was 175,400 visitor days per year (calculated over period 1987-1993). (BPA *et. al.* 1995 Appendix J).

Recreation Activities: A variety of developed and less well developed recreational sites are located on both sides of the U.S/Canadian border along Lake Koocanusa. Recreational activities at these sites include fishing, boating, camping, and swimming. Several businesses on Lake Koocanusa rent houseboats. A summary of Lake Koocanusa recreation sites is provided in **Table 1**.

Table 1: Lake Koocanusa Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Barron Creek	●	●		●
Canyon Creek	●			●
Englishman Creek	●			●
Gateway Boat Camp	●	●		●
Gold Creek Bay	●	●	●	●
Kikomun Creek Provincial Park	●	●		●
Koocanusa Lake Campsite and Resort	●	●		●
Lake Koocanusa Resort and Marina	●	●	●	●
Mariner's Haven	●	●		●
McGillivray	●	●	●	●
Newgate Sandy Shores Resort	●			●
Peck Gulch	●	●		●
Rexford Bench Complex	●	●	●	●
Rocky Gorge	●	●		●
Souse Gulch	●			
Tobacco Plains	●	●		●
Tobacco River		●		●
Wardner Provincial Park		●	●	
Warland Flats	●			●
Yarnell Islands				●
Lake Koocanusa Visitor Center				

Boating and Fishing: Fishing on Lake Koocanusa is reported to be the primary activity at the lake, with 45% of visitors reporting that fishing or related activities were the main reasons for visiting (BPA *et al.* 1995). Most fishing on the lake requires the use of a boat and most boating on the lake is associated with fishing (Shapiro 1985). The lake is available for fishing year round, including summer angling for game fish and winter ice-fishing. Game fish present include cutthroat trout, bull trout, rainbow

trout, kokanee, mountain whitefish, and burbot (BC Adventure 2004). Bull trout are currently listed as threatened with critical habitat areas requiring specialized management. Beginning in 2004, MT has allowed limited harvest of bull trout in Lake Koocanusa. The lake is stocked with rainbow trout (BPA *et al.* 1995).

There are 13 boat launches on the U.S. side of the lake, managed by the USFS and the Corps, and five improved boat launches on the Canadian side of the border, managed by the BC Provincial Parks and private owners. Additionally, there are two private campground/marinas (Lake Koocanusa Resort and Marina, on the east side of the lake 6 miles upstream from Libby Dam, and Mariner's Haven near Rexford, MT) on the U.S. side of the lake. Moorage slips, rental cabins, a care and convenience store, rental boats, and service shop are all available. In Canada, a commercial campground, boat launch, marina and store are located on the west shore of the reservoir, opposite Kikomun Creek. **Table 2** lists the minimum lake elevations for boat ramp operations at Lake Koocanusa.

Table 2: Lake Koocanusa Minimum Usable Boat Ramp Elevations

LAKE KOOCANUSA FULL POOL ELEVATION (FT):		**2459**
BOAT RAMP	**MINIMUM USABLE BOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT BELOW FULL POOL)**
U.S. Ramps		
Tobacco River	2449	10
Gateway Boat Camp	2445	14
Warland Flats	2444	15
Tobacco Plains	2433	26
Koocanusa Lake Campsite and Resort	2420	39
Mariner's Haven	2420	39
McGillivray	2385	74
Rocky Gorge	2370	89
Rexford Bench Complex	2341	118
Lake Koocanusa Resort and Marina	2334	125
Peck Gulch	2310	149
Souse Gulch	2310	149
Barron Creek	2282	177
Canadian Ramps		
Englishman Creek	2458	1
Newgate Sandy Shores Resort	2439	20
Koocanusa Marina	2430	29
Golden Ears (Gold Creek Bay)	2427	32
Kikomun Creek Provincial Park	2396	63

Swimming: Swimming and picnicking are popular activities on Lake Koocanusa, each accounting for 25% of recreation participation while at the lake (BPA *et al.* 1995). There are two swimming beaches on the U.S. side of the lake (McGillivray and Rexford Bench). The Souse Gulch boat dock also serves as a popular swimming destination for local residents. On the Canadian side of the lake, there are swimming beaches at both Kikomun Creek and Wardner provincial parks. Swimming is a popular activity with MT residents from Libby, Eureka and Rexford. Swimming is also a side activity for the recreational boaters who will stop at small secluded beach areas (BPA *et al.* 1995).

Camping: Camping along Lake Koocanusa is a popular activity that accompanies many boating, fishing, swimming and picnicking activities. Camping facilities typically include improved campsites, picnic tables, toilet facilities, and some locations have recreational vehicle (RV) hookups. The Corps and USFS operate and maintain eleven campgrounds on the U.S. side of the lake. There are six camping areas on the Canadian side of the lake, managed by BC Provincial Parks and private owner/operators.

Other Recreational Activities and Aesthetics: At Libby Dam, tourists can visit the visitor center that is managed by the Corps and offers a viewpoint tower. Several highways in the area are identified as scenic drives. MT State Highway 37 is a scenic by-way following the Kootenai River along Lake Koocanusa. Tourists frequently drive and hike throughout the Kootenai River Basin, enjoying views of natural landscapes and local wildlife. Many of these landscapes are enhanced by the regional water features of the Kootenai River, Kootenay Lake, and Lake Koocanusa (BPA *et al.* 1995).

Typical Reservoir Operation: Current dam operations are such that in low water years, boat ramp access can be problematic when the reservoir is drawn down. Commercial marinas along Lake Koocanusa are dependent on the reservoir filling to within 10 feet of the full pool elevation of 2459 feet.

2.2 Kootenai River

General Information: Downstream from Libby Dam the Kootenai River follows a meandering course, passing over Kootenai Falls nine miles west of the town of Libby, MT. The river flows northwesterly through Troy, MT and Bonners Ferry, ID, eventually turning north and crossing the border back into BC.

Recreation Management: The Corps operates three recreation sites downstream from Libby Dam; Alexander Creek, Dunn Creek, and Blackwell Flats. ID Department of Parks and Recreation provides boating facilities. Boundary County Parks and Recreation maintains two boat launches on the Kootenai River; Deep Creek and Copeland, which provide docks for fishing. In addition, the Corps manages 448 acres downstream from the dam as habitat for big game and waterfowl. Further downstream, the U.S. Fish and

Wildlife Service manages the Kootenai National Wildlife Refuge, providing outdoor recreational opportunities. In the U.S., The Kootenai River is bordered by both the Kootenai and Kaniksu National Forests which are managed by the USFS. In Canada, the Creston Valley Wildlife Management Area (CVWMA), a non-profit regional wildlife and recreational area, is a 17,000-acre wetland adjacent to the Kootenay River, offering bird and wildlife viewing, and non-motorized boating.

Recreation Access: The Kootenai River is accessible via U.S. Highway 2, which follows the river out of MT and up to Bonners Ferry, ID. As the river turns north, it runs through the Kootenai Indian Reservation, which is paralleled by ID State Highway 1.

Visitation: The estimated number of visitor days for the three Corps' facilities on the Kootenai River averaged 6,786 visitor days per year from 1988-1994. Over the last 10 years (fiscal years 1995-2004) visitation at these facilities increased to an average of 13,121 visitor days per year (D.Wernham, pers. comm. Dec 2004).

Recreation Activities: Recreational opportunities along the river are primarily fishing, boating, camping, sightseeing and wildlife viewing. The Kootenai Flats area, downstream from Bonners Ferry, is located in the scenic Purcell trench and includes the Kootenai National Wildlife Refuge area just downstream of Bonners Ferry. Recreation facilities on the river are summarized in **Table 3**.

Table 3: Kootenai River Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Alexander Creek				●
Blackwell Flats	●			●
Copeland	●			
Deep Creek	●			
Dunn Creek				●
Porthill	●			
Yaak River	●	●		●

Boating: Downstream from Libby Dam/Lake Koocanusa, boating opportunities on the Kootenai River are mostly related to float boating for fishing. The Kootenai is a big river and fly fishing from a boat is a popular method of fishing the river. Between Libby Dam and Kootenay Lake, there are a total of eight improved boat ramps and several unimproved boat ramp and fishing access points. Kayaking and rafting are popular activities at Kootenai Falls, MT and downstream between the Yaak River confluence in MT and the Hwy 2 bridge in Bonners Ferry, ID. (BSF 2004).

Fishing: Sportfishing opportunities primarily focus on rainbow and cutthroat trout. This reach of the river is a blue ribbon rainbow trout fishery and is a popular draw for anglers. Westslope cutthroat, bull trout and the occasional brown trout are found in this reach, but the primary sport fishery is for rainbow trout. In 1997, the freshwater world record rainbow trout was caught along this reach of the river. This stretch of the Kootenai also holds the MT state record for mountain whitefish (BSF 2004).

Other species found in this reach include the Kootenai River population of white sturgeon, which was listed as endangered in 1994 and burbot, which are also in decline, and kokanee. Fishing for white sturgeon, bulltrout and burbot is prohibited. Local guide services, outfitters, and gear shops are a growing part of the recreational economy (BPA *et al.* 1995). In 2004, there were more than five river outfitting services listed in Libby and Troy, MT. The river is primarily fished by floating, although there are some wadeable areas along the banks at certain times of the year (BSF 2004).

Camping: There are four maintained campgrounds located along the river from Libby Dam, downstream to the Canadian Border. These are shown in **Table 3**.

Other Recreational Activities and Aesthetics: Downstream of Libby Dam, the Kootenai River follows a free flowing meandering course. Nine miles west of Libby, MT the river passes over scenic Kootenai Falls. The landscape along this reach transforms from a narrow river valley near the reservoir (3 to 4 miles wide) to a wider valley through Kootenai Flats (5 miles wide or greater towards BC).Valley hillsides and nearby mountains are covered with stands of coniferous trees such as ponderosa pine, western larch, and Douglas fir. A variety of riparian plants can be found along the river. Most of the potential viewers of the reservoir and river are residents of nearby towns. Residents can view the reservoir and river from a number of locations including private property, local roads, and recreation facilities. Visitors from outside the immediate area can also view the river from roads and nearby recreation facilities. (BPA *et. al.* 1995 Appendix J)

2.3 Kootenay Lake

General Information: After crossing the border into BC, the Kootenay River flows into Kootenay Lake, which provides several river and lake-related recreational opportunities. Boating, sport fishing and camping abound in this region.

Recreation Management: Public recreation management at Kootenay Lake is provided by BC Parks of the Ministry of Water Land and Air Protection, and by the Ministry of Forests, Kootenay Lake Forest District. Some privately-operated resorts offer lake-oriented recreation activities. Kootenay Lake is bordered by several Provincial Parks, which are managed by BC Parks.

Recreation Access: Kootenay Lake is accessible from the east via Highway 3A. The Kootenay Lake Ferry offers free service across the lake, and the highway continues along the west arm of the lake to Nelson, B.C.

Visitation: In the period 1996 to 2001, annual average park visits for the BC Parks, Kootenay District was slightly less than 2.0 million visitors per year. Camping and day use continues to grow and boating use has increased substantially in the area (CRN 2004).

Recreation Activities: Many recreational activities take place on Kootenay Lake, including boating, fishing, swimming, camping, and sightseeing. Provincial and regional parks bordering the lake provide camping, hiking, and picnicking areas. Several privately-operated resorts and marinas also exist along the lake, primarily in the vicinities of Nelson, Balfour, Kaslo, and the eastern shore south of Kootenay Bay. Several marine parks, accessible only by boat, are located on the south arm of the lake. Recreation facilities on the lake are summarized in **Table 4**.

Table 4: Kootenay Lake Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Bayshore Resort	●	●		●
Davis Creek/Lost Ledge	●	●	●	●
Drewry Point	●	●	●	●
Garland Bay	●	●	●	●
Gray Creek Auto Camp	●		●	●
Kootenay Kampsites				●
Lockhart Beach	●	●	●	●
Lockhart Creek		●	●	●
Midge Creek	●	●	●	
Mountain Shores Resort and Marina	●	●	●	
Pebble Beach				●
Pilot Bay	●	●	●	●
Pilot Bay Resorts	●	●	●	
West Arm Provincial Park		●	●	
Downstream Vista				

Boating: Several types of boating take place on the lake, including houseboating, sailing, kayaking, cruising, sightseeing and fishing. Operators, businesses and marinas located around the lake provide charter services, rentals, and boat access on the lake. In addition, there are several smaller improved boat ramp access points and campground areas along the shoreline of the lake. Overall, there are eleven recreational facilities on Kootenay Lake that provide boat access, docking, and fueling for recreational boaters. Downstream from the lake, there are several reaches of river and rapids for kayaking. Brilliant Dam operators manage flows in coordination with the boating community (TekCominco 2001).

Fishing: At Kootenay Lake, fishing takes place for Gerrard rainbow trout (with some upwards of 20 pounds in weight), Yellowstone cutthroat trout, kokanee, and Dolly Varden. Fly fishing in the late summer with floating line is particularly productive. The Yellowstone cutthroat is more common in the southern end of the lake whereas the north end of the lake is good for kokanee. Sheltered Crawford Bay provides excellent fishery for Gerrard rainbows, bull trout and largemouth bass (FishBC 2004). Fishing boat charters recommend October through May for Gerrard rainbow angling (Split-Shot 2004). Duck Lake, a managed impoundment near the south end of Kootenay Lake in the Creston Valley Wildlife Management Area, provides boating and fishing opportunities unique to the area with its sheltered waters and fishery for bass and other warmwater fish species.

Swimming: Swimming is common at several of the campsites, resorts, marinas, beaches and pocket beaches along the shoreline of the lake.

Camping: The lake has twelve campgrounds and resorts that are owned and operated by BC Provincial Parks or private operators.

Other Recreational Activities and Aesthetics: Relatively undeveloped, the Kootenay Lake Valley exhibits thickly forested mountains and pristine waters. Kootenay Lake is fed by numerous creeks and its rocky shores encompass hundreds of tiny bays and beaches that can be explored by kayak or canoe. Approximately half of the lakeshore has roads, with the balance accessible only by boat. Settlements occupy a thin lakeside band where the roads follow the lakeshore. Opportunities for wildlife viewing exist with large populations of deer, elk, moose, bear, mountain goat, cougar, and coyote. Kootenay Lake remains ice-free in winter, and wetlands at both ends of the lake and at Crawford Bay, including the 7,000 hectare (17,298 acre) Creston Valley Wildlife Management Area, host over 260 species of migrating and nesting birds. Popular area sightseeing activities include a scenic drive down the lake to Creston or a ferry ride across the lake. A network of hiking trails of varying difficulty is offered providing scenic views of the lake and surrounding mountains. (Kootenay Lake Visitors Guide 2004).

3.0 Area 2 - Flathead/Clark Fork/Pend Oreille River Basin

Area 2 is dotted with recreational opportunities, offered in areas such as the Glacier National Park and Kootenai, Flathead, Lolo, Kanisku, Coeur d'Alene and Colville National Forests. Numerous developed and undeveloped recreation facilities are located along the rivers and reservoirs, which include state parks, privately owned campgrounds and resorts, picnic areas, public beaches, scenic viewpoints and byways, historic markers, and hot springs. Many wildlife refuges, natural scenic, hiking, and wilderness areas, and wildlife management areas are also present in this area.

The relatively pristine nature of the area is one of its primary recreation attractions. In addition to the area's high scenic quality, visitors have an opportunity to view an abundance of wildlife. Threatened or endangered species in the area include the gray wolf, grizzly bear, bald eagle, peregrine falcon, and bull trout. Big game species that draw hunters into the area throughout the year include deer, elk, and moose. Migratory waterfowl, fur bearers, and non-game species are also abundant in the area (BPA *et al.* 1995).

3.1 Hungry Horse Reservoir

General Information: Hungry Horse Reservoir is located 15 miles southwest of the west entrance to Glacier National Park, 20 miles northeast of Kalispell, MT (estimated population 15,463 in 2002), and 4 miles southeast of Hungry Horse, MT (population 934 in 2000). This
34-mile-long reservoir has 133 miles of shoreline and sits at an elevation of over 3500 feet. Hungry Horse Reservoir is located within 30 miles of the Continental Divide and is surrounded by high mountain peaks.

Recreation Management: The Flathead National Forest manages 6,729 acres of land around Hungry Horse Reservoir under a 1969 Memorandum of Agreement with Reclamation (BPA *et al.* 1995). Hungry Horse Reservoir is completely surrounded by national forest lands and there are no cabins or private lands located along the lake.

Recreation Access: Approximately 115 miles of road circle Hungry Horse Reservoir and provide good access for recreation around, and just beyond the head of the reservoir. Forest Road 895 on the west side of the reservoir passes over Hungry Horse Dam and is paved for the first 11 miles to Lid Creek Campground. Forest Road 38 is a rough dirt road and travels along the east side of the reservoir. The roads meet at the head of the reservoir and continue on 6 miles to Spotted Bear which has three guest ranches and no services. A trailhead at the south end of the road provides access to the Bob Marshall Wilderness, one of the largest wilderness areas in the lower 48 states.

Visitation: Visitation figures have not been collected at Hungry Horse Reservoir for over 10 years; however, according to USFS staff, visitation appears to be steadily increasing

(Burren 2004). Visitation at Hungry Horse Dam and Reservoir was estimated at 93,500 visitor days for 1993. From 1987 to 1993 the 7-year average visitation was 79,200 visitor days (BPA *et al.* 1995). Hungry Horse Reservoir is not considered a primary recreation destination spot in the basin. As pressure increases on surrounding recreation sites, overflow use goes to Hungry Horse Reservoir. Approximately 50 percent of the visitors to Hungry Horse Reservoir live within 50 miles of the reservoir (BPA *et al.* 1995).

Recreation Activities: Primary recreation activities at Hungry Horse Reservoir are camping, fishing, and boating. Also popular is sightseeing, and non-reservoir dependent activities such as huckleberry picking and hunting. Recreation facilities on the lake are summarized in **Table 5**.

Table 5: Hungry Horse Reservoir Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Doris	●	●		●
Lost Johnny Campground	●	●		●
Lost Johnny Point Campground	●	●		●
Wounded Bear Ob. Pt.				●
Lid Creek Campground	●	●		●
Lakeview				●
Abbot Bay	●	●		●
Emery Bay Campground	●	●		●
Riverside	●	●		●
Murray Bay Campground	●	●		●
Canyon	●	●		●
Devil's Corkscrew Campground	●	●		●
Fire Island				●
Elk Island				●

Camping: Fifteen campgrounds as well as dispersed recreation sites surround the reservoir. Facilities include approximately 174 single camp units, one group camp site with a 150 person capacity, and 27 picnic units (BPA *et al.* 1995). To some extent, the Hungry Horse campgrounds serve as overflow facilities when campgrounds at Glacier National Park are full (BPA *et al.* 1995).

Fishing: The reservoir receives relatively light angling pressure. The reservoir is low in nutrient input and primary productivity (Corps 2002). Unlike most MT reservoirs, the reservoir is not stocked with fish; however, native fish populations are currently considered good. Species present in the reservoir include bull trout, westslope cutthroat trout, and mountain whitefish. Beginning in 2004, Hungry Horse Reservoir and the South Fork Flathead River opened for a regulated and experimental bull trout angling season.[3] The reservoir is open year round to fishing; however, May through November receive the greatest fishing use.

Boating: There are 10 boat ramps along the reservoir (Burren 2004). Reservoir full pool is at elevation 3560 feet. Abbot Bay, on the east side, is the longest boat ramp providing access when the reservoir is down 130 feet below full pool. Lost Johnny Point is the longest boat ramp on the west side and provides access down to 45 feet from full through a series of several high water and low water boat ramps. Lake levels are important for boating access to the reservoir. As lake levels decrease throughout the summer months, there is a potential to strand certain boat ramps above the reservoir water levels. The minimum usable boat ramp elevations are presented in **Table 6**.

Table 6: Hungry Horse Reservoir Minimum Usable Boat Ramp Elevations

HUNGRY HORSE RESERVOIR FULL POOL ELEVATION (FT):		3560
BOAT RAMP	**MINIMUM USABLE BOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT below FULL POOL)**
Doris	3545	15
Canyon Creek	3542	18
Murray Bay Campground	3540	20
Lost Johnny Campground	3536	24
Lid Creek Campground	3529	31
Emery Bay Campground	3527	33
Devil's Corkscrew Campground	3517	43
Lost Johnny Point Campground	3515	45
Riverside	3507	53
Abbot Bay	3430	130

Other Recreational Activities and Aesthetics: The relatively pristine nature of the area is one of the primary recreational attractions, affording high scenic qualities and the opportunity to see an abundance of wildlife (Corps 2002). The primary destination for the area is Glacier National Park. The dam itself is also a major tourist draw in the area.

[3] This sentence was updated since release of the draft EIS. No other changes have been made.

Hungry Horse Reservoir is not visible from US Highway 2, the major access road to Glacier National Park. Views from the shores and pool of the reservoir are confined to the river valley and adjacent mountains. The mountainous terrain adjacent to the reservoir is steep with peaks ranging up to approximately 8000 feet in elevation. Coniferous forest surrounds the reservoir and views can extend 10 to 12 miles up and down the reservoir (BPA *et al.* 1995).

Typical Reservoir Operation: Since 1995 Hungry Horse Reservoir has been managed for flood control, minimum flows from the reservoir, minimum flows at Columbia Falls, salmon augmentation, and power production. The reservoir must refill by June 30, so except for extremely dry years where minimum flow requirements do not allow for refill, the reservoir is nearly full every summer. The reservoir is then drafted 20 feet from full by August 31 for salmon augmentation. The severe drawdowns that were common from 1987-1993 no longer occur. Since December 2000, the reservoir has been operated with ramping rates restrictions and minimum flows, so power-peaking fluctuations in water levels no longer occur.

3.2 Flathead River

General Information: The South Fork of the Flathead River flows for 5 miles below Hungry Horse Dam before joining the mainstem. Downstream from the confluence of its three forks, the Flathead River enters the Flathead Valley, and traverses predominantly cropland (Corps 2002). As the river approaches Columbia Falls, MT (estimated population 3827 in 2002) and Kalispell, MT (estimated population 15,463 in 2002), land use becomes increasingly developed and urban in character.

Recreation Management: The Flathead National Forest manages portions of federal lands below Hungry Horse Dam along the South Fork. On January 20, 2004, the USFS issued a Notice of Intent to prepare an Environmental Impact Statement to revise Forest Plans for the Bitterroot, Flathead, and Lolo National Forests. As part of this effort an *Assessment of the Management Situation* was done, and recreation was identified as one of six areas needing major changes. Release of the final revised forest plans is estimated for February 2006 (USFS 2004).

Recreation Access: The mainstem of the Flathead River runs adjacent to U.S. Highway 2, just below the confluence with the South Fork, and flows under the highway in the town of Columbia Falls, MT (BPA *et al.* 1995). Numerous day-use sites provide good river access to this 35-plus-mile reach of the river (**Table 7**).

Visitation: Although recreation use figures are not available along the Flathead River, the USFS indicates that use is steadily increasing (Burren 2004, BPA *et al.* 1995).

Recreation Activities: Primary recreation activities are fishing and boating. Other popular activities include sightseeing, camping, and picnicking. Recreation sites are present on all three forks of the river, including undeveloped boat ramps, sanitary

facilities, and parking areas. There are no developed campgrounds, although camping occurs on a dispersed basis along the South Fork below the dam. Fishing is a major recreational activity, and contributor to the local economy, that draws many thousands of visitors to the area. Recreation facilities on the river are summarized in **Table 7**.

Boating: This 35-mile stretch of the Flathead River is popular, but not crowded, for floating and boating. The current is generally fast, navigation is reasonably easy, and access is good. There are six boat ramps providing access to the river reach for fishing and boating. The boat ramps are not improved and do not have formal docks, marinas or structural access ramps. Boat access can become restricted when water levels drop.

Fishing: The South Fork and the mainstem of the Flathead River below Hungry Horse Dam are not considered great fisheries and receive low fishing pressure as compared to other MT rivers. The river itself is fed primarily by snowmelt resulting in clear, fast, cold water with fewer nutrients than many other MT rivers. The river fishery, primarily kokanee, has declined, reducing angler opportunities (BPA *et al.* 1995). The optimal discharge range for fishing along the river is 4,000 to 17,000 cfs (T.Tzeidt, pers. comm.). Cutthroat trout, whitefish, and bull trout are present in the river and northern pike can be found in the slower segments south of Kalispell.

Selective withdrawal facilities were added to Hungry Horse Dam in the mid 1990s to allow water to be drawn from any depth in the reservoir. Prior to this modification, all releases came from the bottom of the dam where the water was coldest. This very cold water had a negative affect on the fishery and aquatic hatches on the South Fork as well as the mainstem Flathead River, as well. With this modification, the dam now releases water that has the same temperature as the main stem of Flathead River. Insect hatches have improved and it is expected that fishing will also improve in time.

Table 7: Flathead River below Hungry Horse Dam Day Use Recreational Facilities

SITE NAME	BOATING	FISHING	RIVER MILE
Tea Kettle	●	●	143.6
Kokanee Bend	●	●	141.2
Pressentine Bend	●	●	136.2
Old Steel Bridge – in Kalispell, MT	●	●	128.5
Foys Bend Access Site[1]	●	●	122.0
Sportsman Bridge[1]	●	●	107.5
[1]site primarily used to access Flathead Lake			

Other Recreational Activities and Aesthetics: Between Hungry Horse Dam and Flathead Lake, the Flathead River valley is largely in agricultural production or developed and includes the communities of Hungry Horse, Columbia Falls, La Salle, and Kalispell. Within this reach, the three forks of the Flathead River join to the north of Columbia Falls. The river valley is bordered by the Flathead National Forest, offering scenic views of the Swan Range to the east and the Salish Mountains to the west. Surface roads in the area provide access to hiking, sightseeing, and wildlife viewing opportunities. The Stillwater State Game Preserve is just north of Kalispell in this reach.

3.3 Flathead Lake

General Information: Flathead Lake is the largest freshwater lake in the western United States. The lake has nearly 200 square miles of surface area and 185 miles of shoreline. Prominent communities bordering the lake include Polson (estimated population 4,308 in 2002) and Bigfork (population 1,421 in 2000). The Flathead Indian Reservation surrounds the southern half of the lake. Yellow Bay, Wild Horse Island, and Finely Point State Parks are within the reservation. Flathead National Forest lands are close, but not adjacent to the lake on both the east and west sides. Flathead Lake is ringed by summer and year-round homes; many increasingly upscale and elegant.

Recreation Management: MT Fish, Wildlife and Parks manages six areas as part of Flathead Lake State Park. The southern half of Flathead Lake is located on the Flathead Indian Reservation and is managed by The Confederated Salish Kootenai Tribes (CSKT). Flathead Lake does not have a comprehensive recreation management plan but the 2003-2007 Montana Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides some general direction for recreation management. Findings of the SCORP were that fishing and boating are near the top of the list of Montanans' favorite outdoor recreation activities, and also are a tourist draw (Montana SCORP 2003). It was determined that there is generally insufficient access to the lake for water-based recreation. One of 10 goals identified by the SCORP was to "enhance access for water-based recreation activities (fishing, boating)".

Recreation Access: Paved roads surround Flathead Lake. Six units of Flathead Lake State Park provide public access. Wildhorse Island, near Big Arm Bay, is the largest island in the lake at 2100 acres. It is managed by the MT Department of Fish, Wildlife and Parks as a wildlife refuge and is open for day-use only. Open space on the shoreline includes the National Wildlife Refuge on the north shore and state land managed by the Flathead Lake Biological Station as a refuge on the south shore (Polson Bay). The southern half of Flathead Lake is located on the Flathead Indian Reservation. Tribal fishing permits are required for fishing in this area.

Visitation: Consolidated visitation numbers are not available for Flathead Lake. Flathead County's population grew over 25 percent from 1990 to 2000, almost twice MT's state average growth of 12.9 percent during that period (U.S. Census 2004).

Recreation use across the Interior Columbia River Basin (which includes Flathead County) is increasing at 2.3 percent per year and is expected to double in 29 years (USFS 2004).

Recreation Activities: Popular activities on the lake are fishing and boating. Other activities include camping, swimming, hiking, biking, and horseback riding. Winter activities include ice fishing, ice skating, skiing, and snowmobiling. Recreation facilities on the lake are summarized in **Table 8.**

Table 8: Flathead Lake Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Bigfork	●	●		
Ducharme	●	●		
Elmo	●	●		
Woods Bay	●	●		
Walstad	●	●		
Somers	●	●		
Big Arm	●	●	●	●
Finley Point	●	●	●	●
Wayfarers	●	●	●	●
West Shore	●	●	●	●
Wild Horse Island		●	●	
Yellow Bay	●	●	●	●
Arrowhead Park and Marina	●	●	●	●
Marina Cay Resort and Conference	●	●	●	
Bayshore Resort	●	●	●	
Averills Ranch	●	●	●	

Boating: On Flathead Lake, eleven public sites have boating facilities. Additional private boat ramps and docks are located on the lake. Typically, facilities include access ramps, docks, marinas, fueling stations, mooring and camping areas. Boating on Flathead Lake is primarily for fishing. Sailing, cruising and waterskiing are also popular activities. Several commercial companies offer guided fishing trips, boat rental and scenic cruises on Flathead Lake. Minimum operable boat ramp elevations are presented in **Table 9**.

Table 9: Flathead Lake Minimum Usable Boat Ramp Elevations

	FLATHEAD LAKE FULL POOL ELEVATION (FT):	2893
BOAT RAMP	**MINIMUM USABLE BOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT below FULL POOL)**
Ducharme (MFWP)	2893	0
Averills Ranch	2892	1
Arrowhead Park and Marina	2891	2
Marina Cay Resort and Conference Center	2891	2
Bigfork (MFWP)	2890	3
Finley Point (MFWP)	2890	3
Bayshore Resort	2886	7
Walstad (MFWP)	2885	8
Woods Bay (MFWP)	2884	9
Note: Ramp elevations were provided by Jim Vashro of Montana Fish, Wildlife and Parks (MFWP) for the MFWP ramps through personal communications in 2004. The remaining ramps in Table 9 are privately operated and elevations were obtained through personal communications with facility managers in 2004.		

Fishing: Flathead Lake is considered one of the premiere fishing lakes in MT, attracting many thousands of anglers annually. Fishing is popular for cutthroat trout, yellow perch, lake trout, kokanee, and whitefish. The State of MT controls waters on the northern half of the lake, while CSKT control the southern end of the lake waters.

Swimming: The lake offers ten recreational facilities with swimming amenities. These sites include Big Arm, Finley Point, Wayfarers, West Shore, Wild Horse Island, Yellow Bay, Arrowhead Park and Marina, Marina Cay Resort and Conference Center, Bayshore Resort, and Averills Ranch.

Camping: Around the lake, there are seven state-run campground facilities, and many more private resorts offering lodging and camping facilities. Camping facilities offer a variety of campsites, picnic areas, boat access, RV hookups, swim beaches, toilets and showers.

Other Recreational Activities and Aesthetics: A 90-mile scenic paved loop road around the lake provides panoramic views and access to the campgrounds, picnic areas, hiking trails, and orchards. Narrated scenic cruises of the lake are also commercially available during the summer season. Visual quality is high, key observation points are numerous, and public sensitivity to changes is great. Mixtures of forest, rangeland, cropland, orchards, and pasture/meadow areas, as well as residential, commercial, and recreational development surround the lake (Corps 2002).

Typical Lake Operation: Regulation of outflow by Kerr Dam maintains the lake's level between 2883 and 2893 feet above sea level. The lake level is typically brought to 2890 feet by the end of May and to full pool (elevation 2892.75) by June 15. From 1951

through 2000, the average summer elevation was 2892.75 (Flathead Lakers 2004). During low water years parts of the lake shoreline can become exposed, making boat access difficult.

3.4 Lower Flathead River

General Information: The lower Flathead River flows out of Flathead Lake from Kerr Dam, downstream through Polson, MT to its confluence with the Clark Fork near Paradise, MT. Recreational opportunities on the lower Flathead are more limited than other sections of the river. This lower Flathead stretch has a low gradient and primarily warmwater fishery known for a variety of trout, northern pike and some largemouth bass.

Recreation Management: The majority of the lower Flathead River lies within the Flathead Indian Reservation, and is managed by CSKT.

Recreation Access: MT State Highway 200 parallels the lower Flathead River from Dixon, MT to the confluence with the Clark Fork in Paradise, MT.

Visitation: Recreation use statistics are not available along the lower Flathead River.

Recreation Activities: Recreational activities include boating and fishing. Fishing on the lower Flathead is less desirable for most anglers compared to sections of the Flathead upstream of the lake (FFC 2004). Another recreational opportunity along the lower Flathead is whitewater kayaking and rafting.

Boating: Downstream from Kerr Dam, kayaking is popular along the Buffalo Rapids reach. This section of the Flathead flows through lightly forested canyon and offers good whitewater and the big waves and holes of Buffalo Rapids. At flows above 20,000 cfs, many of the rapids wash out, though powerful currents and suctions can be hazardous. Also, this river stretch becomes more difficult at low to moderate flows when large waves and holes develop and some sharp drops and rocks appear (Allaboutrivers 2004).

Fishing: The lower Flathead River offers limited fishing opportunities. River navigation is difficult directly downstream from Kerr Dam through Buffalo Rapids. Fish species found in the lower Flathead include mountain whitefish, five species of trout including rainbow, bull, brown, cutthroat and brook, as well as non-native northern pike and largemouth bass. Expectations are that northern pike and largemouth bass fishing will become more popular in this reach as their availability becomes more generally known (BPA 1983).

Other Recreational Activities and Aesthetics: The lower mainstem Flathead River drains from the southwest corner of Flathead Lake and draws waters from an arid valley basin throughout its 75-mile course. The Flathead River empties into the Clark Fork at Paradise, MT. Most of this scenic reach of the river flows through a narrow valley bordered by scenic mountains within the Flathead Indian Reservation. A

diversity of fish and wildlife complement the land and water resources, and contribute to both the natural and cultural values of the lower Flathead river environment. (MFWP 2004a) Recreational boaters along the lower Flathead River have opportunity to view many birds of prey and waterfowl. (E-Raft 2004).

3.5 Lower Clark Fork

General Information: Three reservoirs on the lower Clark Fork provide recreation opportunities between Kerr Dam and Lake Pend Oreille. Thompson Falls, Noxon Rapids, and Cabinet Gorge are run-of-the-river reservoirs providing fishing, camping, picnicking, boating, water skiing, and other recreation activities.

Recreation Management: Recreation facilities are provided by MT Fish, Wildlife and Parks; Kanisku and Kootenai National Forests; and Avista Corporation. In 2001, Avista Corporation began a renewed 45-year license to operate Noxon Rapids Dam and Cabinet Gorge Dam collectively as the Clark Fork Project. The relicensing process led to new recreation resource management plans and improvements to numerous recreation sites along both reservoirs and the lower river.

Recreation Access: MT State Highway 200 parallels the Clark Fork from its confluence with the lower Flathead River in Paradise, MT to the ID border. The highway continues as ID State Highway 200 following the river to its confluence with Lake Pend Oreille, in ID.

Visitation: No visitation data is available for the lower Clark Fork.

Recreation Activities: Recreation opportunities include fishing, camping, boating, picnicking, swimming and sightseeing along the lower Clark Fork. This reach of the river is much different than the upper reaches of the upper and middle Clark Fork. Water flows more slowly and deeply along this reach, due in part to the backwater effects of the dams and reservoir areas. Dispersed recreation areas adjacent to the river and lake areas take advantage of the natural beauty provided by the water environment. These recreation areas have a range of facilities including unimproved and constructed boat ramps, parking, drinking water, flush and pit toilets, camping, RV hookups, picnic shelters, swimming beaches, including some with disabled access. A planned recreation element is the expansion of a trail system along the river and lake areas (Avista 2003). Recreation facilities on this reach are summarized in **Table 10**.

Table 10: Lower Clark Fork Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Thompson Falls State Park	●	●	●	●
Flatiron Ridge Boat ramp	●	●		
Finley Flats Recreational Area	●	●		●
Trout Creek Community Park	●	●	●	
North Shore Campground	●	●	●	●
Marten Creek Recreational Area	●	●		●
Pilgrim Creek Recreational Area		●		
Noxon Park	●	●		
Triangle Pond			●	
Bull River Campground	●	●	●	●
Heron Boat Launch	●			
Noxon Rapids Viewpoint				
Cabinet Gorge Dam Viewpoint				

Boating: There are nine boat ramp facilities along the lower Clark Fork. Most of these are unimproved ramps (access only), and a few have marina and docking facilities. Boat ramps are typically used for scenic float trips and float fishing (MFWP 2004).

Fishing: The lower Clark Fork reach flows through Noxon Rapids Reservoir and Dam, and the Cabinet Gorge Reservoir and Dam before entering Lake Pend Oreille. This reach is considered a big-water fishery with deeper, slower moving water. The fishery includes mountain whitefish, westslope cutthroat trout, rainbow trout, brook trout, brown trout, as well as northern pike, rainbow trout, smallmouth bass, and yellow perch.

The Cabinet Gorge Fish Hatchery is located on this reach between the Cabinet Gorge Dam and Lake Pend Oreille. The primary species production is kokanee salmon, which are released each June into Lake Pend Oreille. The hatchery also breeds rainbow trout, westslope cutthroat and fall Chinook salmon.

Camping: There are five campground areas along the lower Clark Fork. Many of these camping areas are located along the shoreline of Cabinet Gorge and Noxon Rapids Reservoirs.

Other Recreational Activities and Aesthetics: From the confluence with the Flathead River, the Clark Fork flows north and west 350 miles through broad, semi-arid valleys, high mountain ranges, and steep-sided valleys; and terminates in Lake Pend Oreille, Idaho. The lower Clark Fork flows through sedimentary formations and a landscape sculptured by the massive outflows of glacial Lake Missoula. The river valley is narrow; bordered by mountains within the Lolo National Forest in the Upper two thirds of the reach and the Kanisku National Forest in the lower third. Good up-close viewing of bighorn sheep is available at the U.S. Forest Service KooKooSint Sheep Viewing Area (up river about 8 miles from Thompson Falls), especially in the March-May and November-December time frames. Three dams/reservoirs exist in the reach; Thompson Falls Dam, Noxon Rapids Dam & Reservoir, and Cabinet Gorge Dam and Reservoir. (Travel Montana 2005).

The Thompson Falls Dam located in town on the Clark Fork is a popular attraction for visitors. The Thompson Falls area has outstanding access to millions of acres of national forest lands. These lands offer a wide range of recreational possibilities including hiking, mountain biking, fishing, camping, and hunting. Winter provides backcountry skiing and snowmobiling. Sightseeing adventures include trails in old growth timber, wild flowers, waterfalls, mountain lakes, creeks, rivers, and wildlife such as deer, elk, moose, big horn sheep, mountain goats, bears, and many varieties of birds. (Travel Montana 2005a). Noxon Rapids Dam is located in a heavily wooded area of Western Montana. This area is rich with natural beauty and wildlife. It is not uncommon to see bighorn sheep, elk, turkey, deer, and eagles while on the water. (Montana B.A.S.S. Federation 2005) Cabinet Gorge Dam is located outside of Clark Fork, Idaho. Scenic views of the reservoir can be found along the Pend Oreille Scenic Byway (ID Highway 200). (IDP 2005)

3.6 Lake Pend Oreille

General Information: The lower Clark Fork flows into Lake Pend Oreille, which is a major recreational resource for northern ID. It is the largest and deepest lake in ID, being 43-miles long and a maximum of 1200 feet deep, with 111 miles of shoreline. Lake Pend Oreille offers trophy fishing, as well as sailing, swimming, and water-skiing in summer. Winter sports include cross-country skiing on groomed trails, and nearby skiing and snowmobiling. The discussion of recreation in this section also includes recreation resources along the Pend Oreille River between Lake Pend Oreille, downstream to Albeni Falls Dam.

Recreation Management: There are 27 developed recreation sites around the shoreline (BPA *et al.* 1995). Camping and day use opportunities are provided by the Corps, USFS, City of Sandpoint, ID, IDFG, and ID Department of Parks and Recreation (IDPR). Farragut State Park, located at the southern tip of the lake, is one of the largest state parks in ID, covering 4000 acres with 184 campsites. Farragut State Park has hosted many large gatherings including several Boy Scout Jamborees and Girl Scout Roundups attended by thousands of people. There are also numerous private marinas and resorts

offering a full range of services around the lake. Along the Pend Oreille River between Lake Pend Oreille and Albeni Falls Dam, 8 recreation areas are operated by the Corps, including 4 developed campgrounds and day-use areas, 2 day-use only areas, and 2 primitive access areas (Corps 2004a).

Recreation Access: Lake Pend Oreille is easily accessible, located only 50 miles from Spokane, WA, and 48 miles from Coeur d'Alene, ID. U.S Route 2 runs from the dam to Spokane, while Interstate 90 and U.S. Route 95 provide access from Coeur d'Alene, ID. Jet service is available to the Spokane, WA Airport, and Amtrak serves Sandpoint, ID (BPA *et al.* 1995).

Visitation: Between 1987 and 1993, Lake Pend Oreille recreation visitation was estimated to average 175,400 visitor days per year (BPA *et al.* 1995). More current visitation statistics are not available. The estimated number of visitor days for the Corps' facilities at Lake Pend Oreille averaged 131,953 visitor days per year from 1987-1994. Over the last 10 years (fiscal years 1995-2004), visitation at these facilities decreased to an average of 118,460 visitor days per year (Brengle, pers comm. Dec 2004). Approximately 75 percent of the recreation use at the lake occurs during the months of May through September (BPA et al. 1995).

Recreation Activities: Swimming, boating, fishing, camping, sightseeing, picnicking, hiking, horseback riding, hunting, and snowmobiling are popular activities. Recreation facilities at the lake include numerous boat ramps; moorage slips at 11 separate marinas; over 100 picnic sites; and more than 300 camp sites (BPA *et al.* 1995). Recreation facilities on the lake are summarized in **Table 11**.

Table 11. Lake Pend Oreille Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Albeni Cove Recreation Area	●	●	●	●
Bayview Marina	●	●		
Beyond Hope Resort	●	●		●
Bottle Bay Marina	●	●		
Buttonhook	●	●		
Cedar Creek	●	●		
Evans Landing	●	●		
Farragut State Park	●	●	●	●
Floating Restaurant	●			
Garfield Bay	●	●	●	●

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Granite Creek	●	●		
Hudson Bay Resort	●	●		
Hope Boat Basin	●	●	●	
Idaho Country Resorts	●	●		●
Island View Resort	●	●	●	●
Johnson Creek	●	●		
Lakeview Landing	●	●		
McDonalds Hudson Bay Resort	●	●	●	●
Morton Slough Access Area	●	●		
Northbay Landing	●	●		
Pend Oreille Shores	●	●		
Priest River Recreation Area	●	●	●	●
Pringle Park	●	●		
Red Fir Resort	●	●	●	
Riley Creek Recreation Area	●	●	●	●
Sandpoint Marina and City Beach	●	●	●	
Sam Owen Park	●	●	●	●
Springy Point Recreation Area	●	●	●	●
Talache	●	●		
Trestle Creek Recreation Area	●	●	●	
Whiskey Rock	●	●		

Boating: There are more than twenty-eight boating related facilities on Lake Pend Oreille. These include federal, state and city owned parks and campground facilities, as well as private resorts and marinas. Typically, these facilities have access ramps, docks, marinas, fueling stations, mooring and camping areas (ISPR 2004). There are also several charter boat and fishing outfitters who provide boat access to the lake. Minimum operable boat ramp elevations are presented in **Table 12.**

Table 12: Lake Pend Oreille Minimum Usable Boat Ramp Elevations

	LAKE PEND OREILLE FULL POOL ELEVATION (FT):	2062.5
BOAT RAMP	**MINIMUM USABLE BOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT below FULL POOL)**
Beyond Hope Resort	2060	2.5
Island View Resort	2060	2.5
Springy Point Recreation Area	2059	3.5
Samowen Park	2056	6.5
Albeni Cove Recreation Area	2055	7.5
Buttonhook	2054	8.5
Farragut State Park	2054	8.5
MacDonald's Hudson Bay Resort	2054	8.5
Trestle Creek Recreation Area	2054	8.5
Idaho Country Resorts	2053	9.5
Bitter End Marina	2051.5	11
Garfield Bay	2051.5	11
East Hope	2048	14.5

Fishing: Over fourteen species of game fish inhabit Lake Pend Oreille, including Gerrard rainbow trout (kamloops), kokanee, whitefish, perch, crappie, bluegill, largemouth bass, rainbow, brown and brook trout (BPA *et al.* 1995). The world-record kamloops (37 pounds) was caught in the lake (IDPR website).

Camping: Lake Pend Oreille has nine campground areas that are owned and operated by both public and private entities. Two major camping areas are the Farragut State Park and Springy Point Recreation Area.

Swimming: Thirteen recreational sites with swimming beaches exist on Lake Pend Oreille.

Other Recreational Activities and Aesthetics: Lake Pend Oreille is situated at the foot of the Coeur d'Alene Mountains in the Bitterroot Range in a scenic forest setting of lodgepole pine, ponderosa pine, white pine, Douglas fir, poplar, western larch and grand fir. Most of Lake Pend Oreille is located adjacent to the Coeur d'Alene and Kaniksu National Forests and much of the shoreline is undeveloped. City Beach in downtown Sandpoint, ID offers hundreds of feet of sand beach with a sweeping view of the Cabinet Mountains east across the lake. Commercial sightseeing cruises are offered on the lake, and homes and businesses have been located to take advantage of lake views. Viewers of the reservoir include residents of local communities, recreationists and tourists, travelers on U.S. Routes 2 and 95 and ID State Highway 200, and Amtrak riders who can view the north and east sides of the reservoir.

Lake Pend Oreille provides a focal point for the current upward trend in recreational based tourism economy for the northern ID area. Additional recreational

opportunities near Lake Pend Oreille include sea kayaking, boat plane tours, and a drive around the Lake Pend Oreille scenic byway. The Corps of Engineers operates a visitor's facility at the Albeni Falls Dam (BPA *et al.* 1995).

Typical Reservoir Operation: Typical operations of Albeni Falls Dam regulate Lake Pend Oreille Lake levels for flood control and winter target elevations. Winter operations at Albeni Falls dam involve operating for three years at elevation 2055 feet and one year at elevation 2051 feet to aid in kokanee spawning.

3.7 Pend Oreille River - United States

General Information: The Pend Oreille River from Albeni Falls Dam to the Columbia River is impounded by a series of run-of-river dams. This has created a series of four long reservoirs along the reach, including two in the U.S., Box Canyon (55-miles long), and Boundary (17-miles long).

Recreation Management: Downstream from Albeni Falls Dam, the Pend Oreille River is a large flatwater river that travels from western ID, through the northeastern corner of WA, then briefly through BC to the confluence with the upper Columbia River, south of Trail, BC. Box Canyon Dam is owned and operated by Pend Oreille Utility District. Boundary Dam is owned and operated by Pend Oreille Utility District and Seattle City Light with some recreation lands manged by the Bureau of Land Management (BLM). The Colville National Forest operates 3 campgrounds along this reach of the Pend Oreille River in WA. Also, the WA Department of Fish and Wildlife manages the LeClerc Wildlife Area on the east side of the Pend Orielle River in this reach.

Recreation Access: U.S. Route 2 runs along the north side of the Pend Oreille River, from Sandpoint, ID to the WA border. As the river turns North, WA State Highway 20 follows along the western side to Tiger, WA. Then, WA State Highway 31 follows the western side of the river to Metaline Falls, where it crosses to the eastern side as the river flows into Canada.

Visitation: Visitation data is not available for recreation sites along the Pend Oreille River downstream of Albeni Falls Dam.

Recreation Activities: Recreation activities include fishing, boating, camping, picnicking, and sightseeing. Road access to both sides of the river is generally good, providing for numerous dispersed and some developed recreation opportunities. The Corps also operates a visitor center near Albeni Falls Dam. Recreation facilities on the river are summarized in **Table 13**.

Table 13: Pend Oreille River below Albeni Falls Dam Recreation Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Pioneer Park	●	●		●
Blueside Resort	●	●		●
Metaline Falls	●	●		●
Bonner Park West	●	●		
Dock-n-Shop	●	●		
Laclede	●	●		
LeClerc Creek	●	●		●
Thama	●	●		
Town of Ione	●	●		
Edgewater Campground	●	●		●
Willow Bay Marina	●			●

Boating: Downstream from Lake Pend Oreille, boating activities on the Pend Oreille River, Box Canyon reservoir and Boundary Dam reservoir are primarily related to fishing; but power boating, cruising, sightseeing as well as kayaking and camping are all popular activities along this reach. There are eleven sites documented as providing boat access, fuel, docks, marina and/or other boating related services.

Fishing: The Pend Oreille River offers a year-round fishery that includes brook trout, brown trout, rainbow trout, cutthroat trout, largemouth bass, walleye, whitefish, spiney ray, and panfish (WDFW 2004a). Most fishing is oriented toward warmwater species along this reach of river (WDFW 2004a). The Kalispel Tribe of Indians stocks the river with largemouth bass from its hatchery.

Camping: Downstream from Albeni Falls Dam, six campground facilities are located along the Pend Oreille River.

Other Recreational Activities and Aesthetics: The WA reach of the Pend Oreille River is bordered primarily by the Colville National Forest to the east and by the Coleville and Kaniksu National Forests on the west. The nearby WA towns of Newport, Ione, and Metaline Falls have resource-based economies. The towns continue to develop recreational opportunities, many of which are related to the scenic beauty of the river. The LeClerc Creek Wildlife area offers opportunities to view local flora and fauna in a natural setting. Scenic views can be enjoyed along the Selkirk Loop, a designated scenic route in WA, ID, and Canada (Selkirk 2005).

3.8 Pend d'Oreille River - Canada

General Information: The River is spelled "Pend Oreille" in the U.S. and "Pend d'Oreille" in Canada. There are two dams and reservoirs on the river in Canada; Seven Mile Reservoir (9-miles long) and Waneta Reservoir (less than 5 miles in length). The reservoir impounded by Seven Mile Dam includes the Pend d'Oreille Recreation Area, southeast of Trail, BC.

Recreation Management: BC Hydro Manages Seven Mile Dam and the Pend d'Oreille Reservoir Recreation Area. Tek Cominco manages Waneta Dam.

Recreation Access: Highways 3B and 22A are major highways that connect Trail and Waneta, BC; and provide access to the Pend d'Oreille Recreation Area.

Visitation: No visitation data is available for the Pend d'Oreille Reservoir and Recreation Area.

Recreation Activities: Recreational opportunities include camping, picnicking, swimming, boating, canoeing, wildlife viewing and fishing. There are two developed recreation opportunities, Buckley Campground and Seven Mile Dam Viewpoint (BC Hydro 2004). Buckley Campground provides boat access, fishing, swimming, and camping. Fishing is popular downstream of Waneta Dam near the confluence with the Columbia River.

Boating: Pend d'Oreille Reservoir has a gravel boat launch and parking area for day-use boating at Buckley Campground, which is open from May 1 through Sept. 30 (BC Hydro 2004).

Fishing: The fishery includes several freshwater species including rainbow trout, walleye, burbot, whitefish and bull trout. There are several outfitting guides in the area, and many locals frequent the reach of the Pend d'Oreille River just downstream from Waneta Dam to the confluence of the Pend d'Oreille and Columbia Rivers (TekCominco 2001).

Camping: There is one campground at the Buckley Recreational Area on Pend d'Oreille Reservoir behind Seven Mile Dam north of the U.S. border.

Other Recreational Activities and Aesthetics: The Canadian section of the Pend d'Oreille River basin is virtually uninhabited. The nearest major city is Trail, approximately 20 km to the northwest. There are two dams (Waneta and Seven Mile) in this reach. The Pend d'Oreille Recreation Area is situated on Pend d'Oreille Reservoir, near BC Hydro's Seven Mile Dam, southeast of Trail. Recreational opportunities include camping, picnicking, swimming, boating, canoeing, wildlife viewing and fishing. The tailrace viewpoint is open year round. An additional scenic

viewpoint is located on top of the dam. There are opportunities for viewing many species of wildlife, including deer, bears and cougars in the recreation area. (BCHydro, 2004; and Wipperman 1996).

4.0 Area 3 - Columbia River Mainstem

The area of the mainstem Columbia River that is likely to be most affected by variations in discharge volume and timing from Libby and Hungry Horse Dams is the reach from the mouth of the Kootenay River in BC to Grand Coulee Dam in WA. It is anticipated that the operation of the Grand Coulee Dam will re-regulate variations in volume from those two upstream dams, thus minimizing any potential effects on recreation opportunities on the mainstem Columbia River downstream of Grand Coulee Dam.

For this report the Columbia River mainstem was divided into two segments for evaluation. The upstream reach is referred to in this report as the "upper Columbia River," and corresponds to the river from the Kootenay River confluence to Chief Joseph Dam. Because it is possible that there may be the potential for minor or indirect effects on recreation opportunities to occur downstream of the upper Columbia River Reach, recreation below Chief Joseph Dam is also discussed. For this discussion this reach is referred to as the "middle and lower Columbia River Reach".

4.1 Upper Columbia River

The discussion of the upper Columbia River includes three river segments: (a) an "upper Columbia River in Canada" segment from the confluence of the Kootenay River in BC to the U.S. Border, (b) Lake Roosevelt in the U.S. (from the border to Grand Coulee Dam), and (c) Lake Rufus Woods (from Grand Coulee Dam to Chief Joseph Dam).

4.1.1 Upper Columbia River in Canada

General Information: The scenic and recreational resources of the upper Columbia reach are unique in the Columbia River Basin. The area provides a unique sport fishery, is part of a critical winter range for wildlife, includes several ancient Indian village sites along the shores, and is part of the longest navigable inland waterway in the western U.S. (BPA et. al. 1995).

Recreation Management: In Canada, groups responsible for management of recreational sites including the Castlegar Historical Society, the cities of Trail and Castlegar, BC, and the Ministry of Environment, Lands and Parks. Beaver Creek Provincial Park borders the upper Columbia River in BC. The Colville National Forest, managed by USFS, borders the upper Columbia River in the WA.

Recreation Access: In the U.S., WA State Route 25 runs along the eastern side of the upper Columbia River and Lake Roosevelt. River access in BC is good with roads close to the river and improved boat ramps at multiple locations.

Visitation: Although tourist traffic is low, the upper Columbia River is used extensively for recreation by local residents. Visitation at this segment of the river has been estimated at approximately 155,000 visitor days per year (BPA *et. al.* 1995).
Recreation Activities: The most popular forms of recreation in the area are sightseeing, picnicking, and fishing for a wide variety of species, including trophy sized rainbow trout. Other popular activities include hiking and swimming. Boating is popular for local residents and other boaters who travel up from Lake Roosevelt. Boat and drag-boat races are held annually during the summer festivals at Trail and Castlegar, BC (BPA *et. al.* 1995). Recreation facilities on the upper Columbia River reach are summarized in **Table 14**.

Fishing: The recreational fishery includes wild and stocked rainbow trout, walleye, kokanee, mountain and lake whitefish, burbot, brook trout, and brown trout. Primary use of the fishery is by local residents. (BPA *et. al.* 1995)

Swimming: Swimming is a popular recreation activity in this reach of the river. While swimming occurs throughout the area, concentrated swimming occurs at Gyro Park in Trail, BC and Pass Creek Park near Castlegar, BC.

Boating: River boating occurs throughout this reach of the river. Most boating is in conjunction with fishing. Access for boaters to the river is good with several improved boat ramps usable at low, medium and high water levels at Beaver Creek, Indian Eddy and Robson. While most boaters are local, some travel up from Lake Roosevelt. Canoeing, kayaking, waterskiing and rafting also take place in summer.

Table 14: Upper Columbia River Canadian Recreational Facilities

SITE NAME	BOATING	FISHING	CAMPING	SWIMMING
Beaver Creek Provincial Park	●	●	●	
Indian Eddy Boat Launch	●	●		
Waterloo Eddy	●	●		
Zuckerberg Island Historical Park	●	●		
Robson Boat Launch	●	●		
Gyro Park		●		●
Pass Creek Park		●	●	●

Other Recreational Activities and Aesthetics: The scenic and recreational resources of the upper Columbia River reach are unique within the Columbia River Basin. The reach offers the sight of one of the few accessible, big free-flowing rivers left in Western North America. In addition to the fishing swimming, and boating activities

described above, sightseeing and picnicking are also popular activities in this reach. Sightseeing is accomplished both from vehicles and by foot. The area is marked with many distinct natural and manmade vistas, including an excellent view of area mountains and high rock bluffs, old abandoned orchards and semi-rural landscapes, waterfalls, park land, and forested hills. Many people take advantage of the numerous opportunities to see wildlife in its natural habitat. Bird-watching is popular, with opportunities to view osprey, bald and golden eagles, turkey vultures, great blue herons, many species of ducks, as well as many other species o birds throughout the year. (BPA *et al.,* 1995, Appendix J)

4.1.2 Lake Roosevelt

General Information: Lake Roosevelt offers a wide variety of recreation opportunities on a 154-mile-long lake extending from Grand Coulee, WA, to the Canadian border. For most of its length, the lake is a deep gorge between ½- and 1-mile-wide, and is bordered by 513 miles of shoreline. Lake Roosevelt is one of the few large lakes in the region that has an extensive amount of shoreline and adjacent lands that are publicly owned and available for public recreation. Recreation activities include camping, sightseeing, fishing, hiking, boating and picnicking. The Colville National Forest, Colville Indian Reservation, and Fort Spokane are adjacent to the Columbia along Lake Roosevelt.

Recreation Management: The Lake Roosevelt National Recreation Area (LRNRA) was established in 1946, and management of Lake Roosevelt is shared by National Park Service (NPS), Bureau of Reclamation (Reclamation), Bureau of Indian Affairs (BIA), The Spokane Tribe of Indians (STI), and The Confederated Tribes of the Colville Reservation (CCT), as delineated in the Lake Roosevelt Cooperative Agreement (NPS 2002b). A management agreement was signed in 1990 confirming and establishing management authority of the CCT and STI for project lands within their respective reservations. The Tribes now administer approximately 45 percent of the project lands and waters (BPA et al. 1995). These lands are adjacent to the respective reservation boundaries on both sides of the reservoir. LRNRA is managed under the direction of the Lake Roosevelt National Recreation Area General Management Plan completed in January 2000.

LRNRA is the portion of Lake Roosevelt managed by the National Park Service (NPS). The LRNRA includes about 312 miles of shoreline, 47,438 acres of water surface (at full pool) and 12,936 acres of land (NPS 2002b). LRNRA also includes shoreline along about 29 miles of the Spokane River arm of the lake, and about 7 miles along the Kettle River arm (NPS 2002b).

The shorelands of LRNRA consist primarily of a narrow band of land above the maximum water surface elevation (1290 feet) that was originally purchased by Reclamation for construction of the reservoir. In most cases, the minimum amount of shorelands is determined by the 1310-foot contour, while the maximum ranges up to almost ½-mile from the water's edge in a few locations. The norm is a narrow strip of land that is just a few hundred feet wide (NPS 2002b).

Recreation Access: Most of the northern half of Lake Roosevelt is easily accessible by roads. WA State Route 25 parallels 70 miles of the east shore from Fort Spokane to Northport. The west shore has good road access from Inchelium north to Barstow via paved county roads, State Highway 20, and U.S. Highway 395. Two ferries operate on the lake; at Inchelium-Gifford, and Keller. Both ferries carry normal highway traffic, and are free. The ferry between Inchelium and Gifford is managed by the CCT, and provides access to the Colville Indian Reservation from WA State Route 25. This ferry cannot operate at lake elevations below 1225 feet (Corps 2002). The Keller Ferry, part of WA State Route 21, crosses the Columbia River at its confluence with the Sanpoil River, from Ferry County, WA and the Colville Indian Reservation on the north bank to Lincoln County, WA on the south. It can operate through the operating range of the lake, from elevation 1208 to 1290 feet, but when the normal terminal is affected by low water, the ferry must utilize an old road bed nearby to come ashore (Corps 2002).

Visitation: Annual visitation at LRNRA has been between 1.3 and 1.5 million people for the last several years (NPS 2002a). Visitation at LRNRA is affected by a variety of factors, including weather, fuel costs, and lake level fluctuations (NPS 2002a). The peak period of use is May to September. A 1996 visitor use survey found that WA residents made up 74 percent of the visitors, 13 percent were from Canada and 5 percent from other Pacific Northwest states (NPS 2002b).

A recent NPS study projected potential recreation use at LRNRA from 1998 to 2010. Projections based on a high rate of growth (7 percent compounded annually) predicted the visitor use of LRNRA would double in about 10 years. Projections based on a medium growth rate estimated that an additional 500,000 recreation visits would occur in about the same period of time. Annual visitor use is generally expected to increase to near the 2–million mark within the next 15-20 years from the year 2000's level of 1.4 million (NPS 2002b).

Recreation Activities: Of the approximately 1.4 million visitors that the park receives annually, over 70 percent participate in camping or fishing (NPS 2002a). The most popular activities include camping, swimming, motor boating, and fishing, followed by family gatherings, picnicking, sightseeing, and water skiing. These uses and other day-use recreational opportunities are primarily located in 28 developed areas easily reached by multiple access points (NPS 2002a). Recreation facilities on the lake are summarized in **Table 15**.

Table 15: Lake Roosevelt Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Abraham Cove	●	●		
Barnaby Island	●	●		
Barnaby Creek		●		

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Bradbury Beach	●	●	●	
Blackberry Cove				●
Blacomb's Landing				●
Chief 3 Mountain				●
China Bend	●	●		
Cloverleaf	●	●		●
Crescent Bay	●	●		
Crystal Cove	●			●
Daisy	●			
Detillion	●	●		●
Enterprise	●			●
Evans	●	●		●
Fort Spokane	●	●	●	●
French Rocks	●			
Gifford	●			●
Goldsmith	●			●
Haag Cove	●			●
Halverson Canyon	●			●
Hanson Harbor	●			
Hawk Creek	●			●
Hidden Beach			●	●
Hunters Camp	●			●
Inchelium Ferry	●			
Jones Bay	●			●
Kamloops	●			●
Keller Ferry Marina and Park	●	●	●	●

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Kettle Falls Marina and Campground	●	●		●
Kettle River				●
Lincoln Mill	●			
Locust Grove				●
Lower Columbia	●	●		●
Maggie Shoup				●
Marcus Island	●			●
McCoy's Marina	●			
McGuire's Place				●
No Name				●
Napolean Bridge	●			●
North Gorge	●			●
Penix Canyon	●			●
Plum Point	●			●
Ponderosa	●			●
Porcupine Bay	●	●	●	●
Reynold's Resort				●
Roger's Bar				●
Sand Creek				●
Seven Bays Marina	●			●
Snag Cove Camp	●			●
Spring Canyon Marina	●			●
Sterling Point	●			●
Summer Island	●			●
Two Rivers Marina	●			●
Upper Columbia	●			●

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Wilmont Creek				•
Raccoon Cove (picnic area)				
Grand Coulee Dam Visitors Center				

LRNRA facilities include 22 boat launch ramps with adjacent trailer and vehicle parking lots; 28 campgrounds (18 drive-in and 10 boat-in) containing 640 individual campsites as well as several group campsites, 10 developed swim areas, and three concessionaire-operated marinas (NPS 2002b). There is a visitor center at Fort Spokane, WA, and there are visitor contact stations at Kettle Falls and Coulee Dam, WA. Lakewide, there are over 40 campgrounds. More than half of the LRNRA's shoreline is maintained in a natural condition (NPS 2002b). STI maintains 11 campgrounds and 2 marinas (BPA *et al.* 1995). CCT maintains 7 campgrounds (BPA *et al.* 1995).

Boating: NPS estimates 112,498 boats visited LRNRA in 2002 (NPS 2002a). Park staff estimate personal watercraft (PWC) use is 4 percent of boating activity. PWC are banned from the Kettle River. Renting houseboats is growing in popularity at Lake Roosevelt and rental houseboats are available at several locations. The Concession Management Plan for Lake Roosevelt sets the maximum allowable number of rental houseboats on the lake at 200 (CODA 1998). Powerboating is a major recreation activity, while sailing is somewhat limited due to the lack of consistent wind during summer months. The popularity and growth of recreational boating on Lake Roosevelt is expected to continue (NPS 2002a). The STI operates the Two Rivers Marina, which is operable down to lake elevation 1280 feet. **Table 16** summarizes mimimum elevations for boat ramp operations at Lake Roosevelt.

Table 16: Lake Roosevelt Minimum Usable Boat Ramp Elevations

	LAKE ROOSEVELT FULL POOL ELEVATION (FT):	1290
BOAT RAMP	**MINIMUM USABLEBOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT below FULL POOL)**
Jones Bay	1282	8
Hawk Creek	1281	9
Marcus Island	1281	9
Evans	1280	10
North Gorge	1280	10
Two Rivers (marina)	1280	10
Napoleon Bridge	1280	10
Snag Cove Camp	1277	13
China Bend	1277	13
Crescent Bay	1265	25
Daisy	1265	25
French Rocks	1265	25

	LAKE ROOSEVELT FULL POOL ELEVATION (FT):	1290
BOAT RAMP	**MINIMUM USABLEBOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT below FULL POOL)**
Hansen Harbor	1253	37
Barnaby Island	1251	39
Bradbury Beach	1251	39
Gifford	1249	41
Fort Spokane	1247	43
Lincoln Mill	1245	45
Porcupine Bay	1243	47
Kettle Falls (marina)	1234	56
Hunters Camp	1230	60
Keller Ferry (marina)	1229	61
Seven Bays (marina)	1227	63
Spring Canyon	1222	68

Fishing: The primary sport fishery on Lake Roosevelt include walleye, rainbow trout, kokanee, smallmouth bass and perch. The Spokane Tribal Hatchery and cooperative net-pen culture operations located throughout the reservoir raise trout to yearling catchable size then release them to the reservoir in May through June (Corps 2002). Annually, over 500,000 rainbow trout and 500,000 kokanee are stocked in the lake. Other common sport fish include large and smallmouth bass, walleye, and perch. Several fishing tournaments are held at the lake each year. (LRF 2004c).

Swimming: Swimming at Lake Roosevelt accounts for a major portion of visitor day use. The NPS maintains six swimming areas with lifeguards in the more popular areas. Picnicking is frequently a companion activity to swimming with picnic areas located adjacent to the swim beaches. Swimming is highly affected by changes in reservoir levels. As reservoir levels are reduced, the access to the lake from swimming beaches becomes difficult due to unsafe topography and bottom composition (BPA *et al.* 1995).

Camping: The NPS operates over 17 campgrounds accessible by car and 10 campgrounds accessible by boat (LRF 2004b). Shoreline camping is permitted within a distance of ¼ mile from NPS campsites. STI maintains 11 campgrounds and CCT maintain 7 campgrounds. In addition some camping opportunities are provided by private operators and resorts. A 1996 visitor survey found camping in developed campgrounds to be the most popular visitor activity at Lake Roosevelt accounting for 16% of the total use-days. The use of recreational vehicles is the most popular form of camping. Tents are commonly used at developed and undeveloped areas along the lakeshore. Houseboats are popular for overnight stays on the reservoir (NPS 2002b).

Other Recreational Activities and Aesthetics: Sightseeing is a popular recreational activity at Lake Roosevelt. Many visitors come to the Grand Coulee Dam visitor center to view the largest dam in the U.S. Recreationists visiting the lake are principal viewers of the lake, and much of the viewing is done from boats on the lake. Views of

the lake are possible from a few small communities, including Grand Coulee and Seven Bays, WA in the southern section of the reservoir and Kettle Falls and Marcus, WA to the north (BPA *et al.* 1995). A popular laser light show plays nightly across the face of the dam during the tourist season and is visible from several points below the dam.

The visual amenities at Lake Roosevelt are one of the primary attractions for most visitors. The landscape adjacent to Lake Roosevelt is relatively natural and undeveloped except for occasional farms and small communities. In the northern section of the reservoir, the river valley is shallow and visitors to the reservoir are afforded views of both the valley and the mountains beyond. Coniferous forests cover the hills and line the shores. In the southern section of the reservoir (Fort Spokane, WA to the dam) the forested areas thin out and the predominant vegetation changes to sagebrush, bitterbrush, and other arid species. In this portion of the reservoir, the canyon walls rise from the shoreline and views from the reservoir are frequently restricted to basalt cliffs and narrow terraces within the canyon rim.

Reservoir Operation: Lake Roosevelt is drawn down 30 to 80 feet by May 1 to make room for high spring flows and prevent downstream flooding. During years when high spring run-off is expected, recreational access to the lake is limited from January through May due to low lake elevations. Since 1995, the lake levels have been lower in August due to efforts to increase downstream flow for salmon. All facilities are operable from full pool (1290 feet) to five feet of drawdown. If the reservoir is drawn down more than 5 feet, some swimming areas and boat launch ramps become inoperable (BPA *et al.* 1995). The lake is drafted 10 to 12 feet between August 1 and August 31. These summer adjustments in lake level reduce recreation access and use during the primary season (NPS 2002).

4.1.3 Lake Rufus Woods

General Information: Downstream from Grand Coulee Dam, Chief Joseph is the next dam on the Columbia River System. Chief Joseph Dam is a run of the river facility, and has much less developed recreational facilities. Facilities include Bridgeport State Park, Brandt's Landing, Rocky Flats and viewpoints at the dam.

Recreation Management: The Corps is the primary federal agency responsible for managing recreation lands at Lake Rufus Woods. Corps-managed facilities include the visitor center, viewpoints, and fishing access sites. The Corps cooperates with the WA State Parks Department in the operation of Bridgeport State park, the only major recreation site on the lake. This state park includes a campground, day-use park, and golf course on the lake. Other local entities such as Douglas County, WA and the town of Bridgeport, WA cooperate in managing other recreation facilities including boat ramps, swimming beaches, campgrounds, picnic areas, golf course, and interpretive sites.

Recreation Access: Road access is available to Bridgeport State Park, the Visitor Center, viewpoints, and the Brandt's Landing Recreation Site. The state park offers an improved boat launch.

Visitation: Available visitation data shows an average annual visitation at Corps recreation facilities at Lake Rufus Woods of 30,800 visitor days over the period 1987-1993, and 47,900 at Bridgeport State Park over the period 1989-2003 (BPA *et al.* 1995).

Recreation Activities: Boating, sightseeing and fishing are the primary recreational activities, with less participation in swimming and camping activities (BPA *et al.* 1995). Recreation facilities on the river are summarized in **Table 17**.

Table 17: Lake Rufus Woods Recreational Facilities

SITE NAME	BOATING	FISHING	SWIMMING	CAMPING
Rocky Flats	●			●
Brandt's Landing	●	●		●
Bridgeport State park	●	●	●	●
Upstream Boat Ramp	●			
Seaton's Grove Boat Ramp	●			
River Mile 581	●			
Chief Joe Dam Visitors Center				

Boating: Most of the boating on Rufus Woods Lake is for fishing and water skiing. Most boaters remain close to the vicinity of the put-in, whereas in other areas along the mainstem Columbia, boaters will travel further up and downstream from their entry/exit point. Four boat ramps were identified on Lake Rufus Woods. Two of the ramps (Bridgeport State Park on the north shore and the Upstream Boat Ramp on the south shore) are near Chief Joseph Dam. The other two ramps are the Seatons Grove Boat Ramp and the River Mile 581 Boat Ramp (Corps 2004c). The River Mile 581 ramp is a gravel launch; the other listed ramps are paved. Minimum usable boat ramp elevations at the lake are listed in **Table 18**.

Table 18: Lake Rufus Woods Minimum Usable Boat Ramp Elevations

LAKE RUFUS WOODS FULL POOL ELEVATION (FT):		956
BOAT RAMP	**MINIMUM USABLE BOAT RAMP ELEVATION (FT)**	**MINIMUM USABLE BOAT RAMP ELEVATION (FT below FULL POOL)**
River Mile 581	952	4
Seatons Grove Boat Ramp	950	6
Bridgeport State Park	937	19
Upstream Boat Ramp	930	26

Fishing: At Lake Rufus Woods, people fish primarily for walleye, rainbow trout, and kokanee, and some other small populations of sportfish (WDFW 2004a).

Swimming: Swimming at Rufus Woods Lake takes place at Bridgeport State Park and at Marina Park in Bridgeport, WA. All of the swim beaches along Lake Rufus Woods are sensitive to changes in flow operations or conditions with respect to the swimming facilities. The swimming beach at Bridgeport State Park is accessible down to elevation 945 feet (BPA *et al.*, App. J, 1995).

Camping: At Rufus Woods Lake, there is camping at Bridgeport State Park, Marina Park, upstream shorelines areas and a newly opened boat-in campsite named Rocky Flats (WA Parks 2004).

Other Recreational Activities and Aesthetics: Chief Joseph Dam and Lake Rufus Woods are located in a relatively remote portion of central WA. The north side of the valley rises sharply to the Okanogan Highlands, 1,000 feet or more above the Columbia River. The south side of the valley rises in a series of terraces and benches climbing to the Columbia Plateau surface. The majority of the shoreline is treeless with a dry land shrub-steppe cover. Numerous canyons and deep draws support isolated stands of pine and deciduous trees and shrubs. Irrigated orchards on upland benches and 6 irrigated wildlife mitigation sites along the lakeshore provide islands of greenery.

Many visitors are attracted to the impressive engineering features of the dam, which is the second largest power producing dam in the United States. The dam includes visitor facilities and viewpoints. Hiking and sightseeing are popular activities at Lake Rufus Woods. The project includes multiple trails. The North Shore Trail extends two miles from the Orientation Area, through the Tower Trailhead to the Dunes Trailhead on the boundary of Bridgeport State Park. A spur trail connects to the Spillway Viewpoint at the north end of Chief Joseph Dam. The trail is fully paved and has many rest areas. The South Shore Trail is a gravel trail that goes around the Debris Basin, connecting to the Upstream Boat Ramp. Hunting is also a popular recreational activity in the vicinity of Rufus Woods Lake. Animals sought include Canada goose, ducks, chukar, gray partridge, ring-necked pheasant, California quail, mourning dove, coyote, and mule deer. (Corps 2002a)

4.2 Middle and Lower Columbia River

General Information: Downstream from Chief Joseph Dam, the Columbia River passes through the flatlands of central Washington, also called the channeled scablands. The area is hot and dry in the summer, making it an excellent area for rock climbing, boating, sunbathing, and cultural, geological, and historic interpretation. As the river passes through the Columbia River Gorge, the surrounding areas become more heavily urbanized, and a greater number of year-round recreational opportunities are available. In the Columbia River Gorge, climatic conditions create an excellent location for windsurfing, and Hood River, OR has become a choice windsurfing destination (WTHR 2004).

Recreation Access: U.S. Route 97 parallels the river from Brewster to just north of Wenatchee, WA. Downstream of Wenatchee, WA State Route 28 follows the river to Trinidad, WA. There is intermittent local access downstream to the Interstate 90 crossing just south of Vantage. Downstream of the I-90 crossing, WA State Route 243 follows the river to the WA State Highway 24 crossing at Vernita Bridge. Downstream of this crossing, the River is surrounded by the United States Department of Energy Hanford Site to the south, and the Saddle Mountain National Wildlife Refuge and the Wahluke Wildlife Refuge to the north. Multiple access points are offered in the vicinity of Richland/Pasco/Kennewick WA Tri-Cities Area, just downstream of the Hanford site. U.S. Route 12 follows the river from Tri-Cities to Wallula Junction, WA. U.S. Route 12 follows the river from Wallula Junction to Interstate 84. Both Interstate 84 and Highway 14 parallel the Columbia River and provide direct access to many developed recreation recreational areas along the river.

Recreation Activities: Rocky Reach Dam and Rock Island Dam are operated by the Chelan Public Utility District (PUD). Grant County PUD operates Wanapum Dam and Priest Rapids Dam (Grant PUD 2004). Camping, picnicking, swimming, boating and fishing are common recreation activities associated with the Chelan and Grant County, WA PUD projects (Chelan PUD 1999). Further downstream the Corps and BPA facilities include McNary Dam, John Day Dam, The Dalles Dam, and Bonneville Dam. There are many recreational facilities and areas including boat ramps, camping areas, picnic areas, and hiking trails associated with these dams and reservoirs (Corps 2004c). Overall this vast region has a wide variety of recreational opportunities at several hundred recreation-related facilities. This is especially true within the Columbia River Gorge National Scenic Area (CRGNSA). Congress created the Columbia River Gorge National Scenic Area (CRGNSA) in 1986.

The Portland, OR/Vancouver, WA tourist industry is largely based on the Columbia and Willamette Rivers. Steamboat tours, kayaking trips, fishing, boating, hot spring use, and hiking are all popular year-round activities. During the summer, sailing, boating, swimming and camping are common along this reach of the Columbia River.

Boating: Boating along the mainstem Columbia includes powerboating, waterskiing, cruising, navigating the lock and dam systems, and fishing.

Fishing: The lower and middle Columbia River have historically had some of the world's largest runs of salmon and steelhead. The middle Columbia fishery includes walleye, salmon, sturgeon, bass, perch and whitefish. Sturgeon caught upstream of Priest Rapids Dam are required to be released. Summer Chinook and steelhead angling may be allowed, depending upon the size and composition of the runs. The lower Columbia fishery includes sturgeon, shad, winter and summer steelhead, sea-run cutthroat trout, bass, crappie and walleye, plus salmon during open seasons. All chum, wild cutthroat, wild steelhead, and wild coho must be released (WDFW 2004a). In recent years, bounty programs for northern pikeminnow have encouraged fisherman to target this species during the spring and summer.

Swimming: Swimming is a popular activity along the mainstem Columbia. There are numerous swim beaches at recreational areas and campsites and swimming is also done in conjunction with boating along the shores of the river (BPA *et al.* 1995).

Camping: Downstream from Chief Joseph Dam numerous locations provide campsites along the banks, overlooking scenic sections of the Columbia River. Camping areas are found along the shores of the river behind many of the dams. The reach includes several designated state parks with camping, RV hookup, and trail facilities.

Other Recreational Activities and Aesthetics: The upper part of this reach includes Wells, Rocky Reach, and Rock Island reservoirs operated by WA Public Utility District (PUD). Here scenic driving is popular, with highways providing access to vistas of natural features, such as the east Cascade Mountains, cliffs paralleling the river canyon, tributary rivers and streams, and WA fruit orchards. The numerous fish hatcheries and fish ladders at the PUD projects are also popular visitor attractions.

Below Rock Island Dam, the river moves east away from the mountains, the climate is dryer, and the river canyon becomes wider. Land uses bordering the river include hydroelectric dams, suburban residential areas, resorts, wildlife areas, an Indian village, an Army base, agricultural acreage, and a variety of recreational developments. The Wanapum Indian village at Priest Rapids Dam and the Army's Yakima Firing Center occupies much of the west shore of the river between Priest Rapids Dam and Sentinel Gap

The Hanford Reach, located between Priest Rapids Dam on the north and the upper end of Lake Wallula (McNary Dam pool) on the south, is unique in being the last undammed reach of the Columbia River in the U.S. The Hanford Reach and adjacent wildlife refuge/recreation areas provide year round recreational opportunities, including nature viewing and hunting. Public use and access is restricted in the Hanford Reservation and in the Saddle Mountain National Wildlife Refuge located to the north of the river.

The lower Columbia River reach encompasses the four Corps run of the river reservoir projects McNary Dam (Lake Wallula), John Day Dam (Lake Umatilla), The Dalles (Lake Celio), and Bonneville Dam (Lake Bonneville). The scenic and recreational amenities of the lower Columbia River have gained national and international renown. In recognition of those amenities, Congress created the CRGNSA. Scenic driving is a popular form of sightseeing in the reach. Area highways provide access to majestic vistas of natural features including forests, mountains, cliffs, rivers, streams, and waterfalls.

In the CRGNSA, there are a variety of recreational related tourist activities. Windsurfing is identified as an extremely popular recreational activity and the Hood River area is known as the windsurfing capital of the U.S. The Gorge offers thousands of maintained forest service hiking and backpacking trails, including the Pacific Crest Trail, which crosses the Columbia River at the Bridge of the Gods near the Cascade Locks. Wineries and fruit orchards are also present along the river. Many visitors to the region are attracted to the engineered dams, navigation locks, hatcheries, and fish ladders of the lower Columbia River. The region is also rich in history and pre-history. Features such as Native American petroglyphs, the route of the Lewis and Clarke Expedition and the Oregon Trail, and historic navigation locks can be viewed and interpreted. (BPA et. al. 1995, Appendix J)

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RECREATION IMPACT ANALYSIS
Appendix E: Part 2 of 2

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May 2005

UPPER COLUMBIA ALTERNATIVE FLOOD CONTROL AND FISH OPERATIONS EIS

RECREATION IMPACT ANALYSIS

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RECREATION IMPACT ANALYSIS

1.0 Introduction

This document presents the findings of an assessment of potential recreational impacts associated with different alternatives for Libby and Hungry Horse Dams as described in Section 2. The potential impacts were examined for each of three study areas.

- Area 1 - Kootenai River Basin from Lake Koocanusa in Montana (MT) and British Columbia (BC) through Idaho (ID) to the Columbia River in BC
- Area 2 - Flathead/Clark Fork/Pend Oreille Basin from Hungry Horse Reservoir in MT to the Columbia River in Washington (WA)
- Area 3 - Columbia River mainstem from the mouth of the Kootenai River in BC downstream to the Pacific Ocean in Oregon (OR) and WA

Water-related recreation resources in the three study areas are associated with either reservoir/lake recreation or river recreation. The recreation activities potentially most affected in the three areas include boating, fishing, swimming, camping, and aesthetics. The primary recreation use season for all study areas is the summer (May through September). Winter recreation appears to be less affected by water levels.

For reservoir/lake-based recreation, pool elevation during the summer season is one of the most influential factors on recreation and aesthetics. Full pool is ideal for most forms of reservoir recreation, and water levels are particularly important for the function of boat ramps. For river-based recreation, river flows below flood stage and above minimum flows are generally best for recreation. Extreme high and low flows are generally not good for river-based fishing and boating.

A discussion of potential recreation impacts for each area is presented below, preceded by a brief description of the general methodologies used to assess and evaluate these impacts.

2.0 Recreation Impact Analysis Methodology

Potential recreation impacts associated with alternative flood control and fish flow operations were evaluated. Two operations without fish flows, referred to as "benchmark operations[4]," were evaluated:

- Standard Flood Control Operations *without* Fish Flows (LS)
- VARQ Flood Control Operations *without* Fish Flows (LV)

The two benchmark operations were evaluated to facilitate assessment of the potential recreational impacts of fish flows that have been implemented in response to the 2000 U.S Fish and Wildlife Service and National Marine Fisheries Service Biological Opinion.

In addition to the two benchmark operations, four other operational alternatives were evaluated in Area 1 that include fish flows.

- Standard Flood Control Operations *with* Fish Flows up to Powerhouse Capacity at Libby Dam (LS1)
- VARQ Flood Control Operations *with* Fish Flows up to Powerhouse Capacity at Libby Dam (LV1)
- Standard Flood Control Operations *with* Fish Flows up to 10,000 cfs above Powerhouse Capacity at Libby Dam (LS2)
- VARQ Flood Control Operations *with* Fish Flows up to 10,000 cfs above Powerhouse Capacity at Libby Dam (LV2)

In Area 2, two operational alternatives were evaluated.

- Standard Flood Control Operations (HS)
- VARQ Flood Control Operations (HV)

To evaluate the effects that the Area 1 and Area 2 operational alternatives and benchmarks have in Area 3, the following combinations were addressed:

- HS + LS1 (no-action)
- HV + LV1
- HS + LS2
- HV + LV2
- HS + LS (benchmark combination)
- HV + LV (benchmark combination)

[4] A "benchmark operation" does not meet the purpose and need of the action and provides a basis for comparison of the incremental impacts of the fish flows at Libby.

The methodology used to evaluate the recreational impacts of the different alternatives and benchmarks involved the following approach:

1) River-related recreation resources were identified and documented in the Recreation Affected Environment report.

2) "Threshold" water surface elevations or recreation resource characteristics were identified for different recreational activities in each subarea. These thresholds are the data points at which the recreation activity becomes affected by changes in water levels or discharge volumes.

3) To identify impacts, the identified thresholds were compared with hydrologic model outputs for all alternatives and benchmarks in each study area. In Areas 1 and 2, daily stages for the two lakes and daily discharges for the river reach were simulated. In Area 3, average monthly stages and discharges were simulated. Area 1 and Area 3 simulations were over a 53-year period for all four alternatives and two benchmarks. Area 2 simulations were over a 74-year period for the two alternatives evaluated in Area 2. The data from these simulations were used to calculate average end-of-month stages, average monthly discharges, and average number of days per month above or below identified threshold elevations. Impacts were quantified where possible, and in cases where available data was insufficient for quantification, a qualitative evaluation of potential impacts was performed. Quantification of impacts typically involved documenting the number of days in the respective recreation season that the recreational activity would be available with each alternative/benchmark.

3.0 Area 1 – Kootenai River Basin Recreation Impacts

Three subareas in Area 1 were evaluated: Lake Koocanusa, the Kootenai River, and Kootenay Lake. The analysis for Lake Koocanusa is further divided between the U.S. and Canadian portions of the lake.

3.1 Lake Koocanusa – U.S.

The primary recreational activities at Lake Koocanusa that could be affected by changes in lake levels include boating, fishing, swimming, and camping. Average end-of-month stages at the lake during the high use summer recreation months of May-September are presented in **Table 1** for each of the four alternatives and two benchmarks.

Table 1. Lake Koocanusa Month-End Average Stage (feet)

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	2393	2406	2391	2404		2400	2410
June	2431	2440	2429	2439		2449	2450
July	2443	2448	2442	2447		2459	2459
August	2438	2439	2437	2439		2459	2459
September	2435	2436	2434	2436		2438	2438

For each of the standard flood control alternatives and benchmark modeled (LS, LS1, and LS2), the change to VARQ (LV, LV1, and LV2; respectively) results in an increase in average end-of-month stage at Lake Koocanusa during May, June, and July. The higher stages result in more recreational opportunities by increasing the number of days that boat ramps and swimming beaches are functional. Additionally, the higher stages can benefit the quality of recreation activities through improved aesthetics. In August and September, there is little to no change between standard flood control operations and VARQ. Average end-of-month stages are higher in all months for the benchmarks without fish flows (LS and LV) compared to the alternatives with fish flows (LS1, ALT 2, LS2, and LV2).

3.1.1 Lake Koocanusa Fishing and Boating – U.S.

Fishing was identified as the prime recreational activity on Lake Koocanusa. Since most fishing on Lake Koocanusa is done by boat and most boating on the lake is associated with fishing, impacts to these two linked recreational activities were evaluated together. The most important limiting factor for lake fishing/boating is boat access to the lake, which can be affected by lake drawdown. Thirteen boat ramps were identified and evaluated.

The total number of days that each ramp was functional over the 53-year period of simulation was calculated and converted to an average annual value. The average annual days of availability were then summed across all ramps at the lake to calculate the average number of usable boat "ramp days" per month. **Table 2** shows the average number of ramp days per month at Lake Koocanusa. Reference the **Exhibits** at the end of this report for results of average end-of-month and average daily elevation analysis for each ramp.

Table 2. Lake Koocanusa Average Usable Boat Ramp Days/Month – U.S.

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	171	199	171	198		174	201
June	244	269	239	265		290	300
July	327	360	321	355		398	399
August	323	337	321	333		403	403
September	274	303	298	303		362	362
Total:	1,340	1,467	1,351	1,454		1,627	1,665

3.1.2 Lake Koocanusa Swimming – U.S.

The primary swimming season at Lake Koocanusa is June through August. Two improved swimming beaches were identified on the U.S. side of the lake: the McGillivray and Rexford Bench recreation areas. In addition, the Souse Gulch boat dock serves as a popular swimming location during high water levels. Low water elevations result in disconnection of the improved beaches or dock from the water. Swimming at McGillivray is possible down to lake elevation 2444 feet; at Rexford Bench to elevation 2439 feet. Swimming from the dock at Souse Gulch is possible down to elevation 2441 feet. **Table 3** presents the sum of usable swimming days at the three swimming sites on the U.S. side of the lake.

Table 3. Lake Koocanusa Average Swimming Days/Month – United States

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
June	10	19	9	18		32	36
July	52	69	41	65		91	92
August	45	62	43	59		93	93
Total:	107	150	92	141		216	221

3.1.3 Lake Koocanusa Camping - U.S.

Camping use becomes affected when the lake elevation drops below 2439 feet (20 feet below full pool). At lake levels between 2439 feet and 2409 feet, camping is expected to become more concentrated at the recreation sites with longer boat ramps that provide access to the lake at lower pools. Increased demand on these facilities could result in reduced quality of the camping experience for campers at those sites. At elevations below 2409 feet, more extensive impacts on camping could result as a result of increased concentration of campers and potential camping on the dry lake bed that could result in poor sanitation, lack of privacy, and increased litter. **Tables 4 and 5** show the number of days per month in the recreation season that pool levels would be at or above these two threshold elevations (2439 feet and 2409 feet).

Table 4. Lake Koocanusa Average Days/Month with Lake Level ≥ 2439 feet – U.S.

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	0	0	0	0		0	0
June	4	8	4	7		12	14
July	17	25	16	24		31	31
August	22	29	21	28		31	31
September	2	3	1	2		28	28
Total:	45	65	42	61		102	104

Table 5. Lake Koocanusa Average Days/Month with Lake Level ≥ 2409 feet – U.S.

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	3	9	3	9		4	11
June	18	25	16	23		25	27
July	31	31	31	31		31	31
August	31	31	31	31		31	31
September	31	31	30	31		31	31
Total:	113	126	112	124		122	130

3.1.5 Summary of Lake Koocanusa Recreation Impacts – U.S.

Quantified recreation evaluation criteria for Lake Koocanusa included boat ramp days, swimming days, camping days above the initial impact threshold of 2439 feet, and camping days above the more extensive impact threshold of 2409 feet. The total number of days for each criterion and each alternative/benchmark are summarized in **Table 6**.

Table 6. Summary of Quantified Recreation Impacts at Lake Koocanusa – U.S.

Recreation Evaluation Criteria	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
Total Boat Ramp Days (May-Sep)	1,340	1,467	1,351	1,454		1,627	1,665
Swimming Days (Jun-Aug)	107	150	92	142		217	221
Camping Days above 2439 feet (May-Sep)	45	65	42	61		102	104
Camping Days above 2409 feet (May to Sep)	113	126	112	124		122	130

Additional non-quantified effects included impacts on aesthetics. Higher pool elevations are more aesthetically pleasing for viewing and sightseeing than low pool elevations due to the presence of exposed stumps, banks, and flats with drawdown. As presented in **Table 1**, the two benchmark operations (LS and LV) maintain the highest water surface elevations. VARQ flood control operations (LS, LS1, and LS2) provide higher pool elevations than do standard flood control operations (LV, LV1, and LV2) in all months. Additionally, the Libby Dam Visitor center could receive higher visitation with VARQ flood control due to the increased general lake visitation associated with increased days of availability for boating, swimming, and camping resulting from the higher pool levels.

3.2 Lake Koocanusa – Canada

Table 1 includes the average end-of-month stage for each month in the summer recreation season for Lake Koocanusa. As with the U.S. side of the lake, for each standard flood control operations modeled (LS, LS1, and LS2), the change to VARQ flood control operations (LV, LV1, and LV2, respectively) results in an increase in average end-of-month stage at Lake Koocanusa during May, June, and July. The higher stages benefit recreational activities at the lake by increasing the number of days that boat ramps and swimming beaches are functional and by improving aesthetics. In August and September, there is little to no change between VARQ and standard flood control operations. From June through September, there is no change in end-of-month stage between benchmarks LS and LV. Average end-of-month stages are higher in all months for the benchmarks without fish flows compared to the alternatives with fish flows. Expected effects for each primary recreational activity in Canada are presented below.

3.2.1 Lake Koocanusa Boating and Fishing - Canada

The most influential limiting factor for Lake Koocanusa fishing and boating is access to the lake. Five boat ramps were identified on the Canadian side of the lake for evaluation of their functionality under conditions with each of the four alternatives and two

benchmarks. The methodology applied to identify average annual usable boat ramp days was the same as described for the U.S. portion of the lake. **Table 7** shows the average number of ramp days per month at Lake Koocanusa for the Canadian side of the lake. Reference the **Exhibits** at the end of this report for results of average end-of-month and average daily elevation analysis for each ramp.

Table 7. Lake Koocanusa Average Usable Boat Ramp Days/Month – Canada

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	8	19	8	18		10	20
June	44	65	41	61		76	83
July	99	116	96	114		141	142
August	112	122	110	121		154	154
September	89	92	88	91		122	122
Total:	352	414	343	404		503	522

3.2.2 Lake Koocanusa Swimming - Canada

The primary swimming season at Lake Koocanusa is June through August. Two improved public swimming beaches were identified on the Canadian side of the lake. The sites are Kikomun Creek Provincial Park and Wardner Provincial Park. An additional private swim beach is provided at the Newgate Sandy Shores Resort. Swimming at Kikomun Creek is possible down to lake elevation 2452 feet; at Wardner to elevation 2444 feet. Newgate Sandy Shores Resort indicated that the facility's gradually sloping beach was not affected by drawdown. **Table 8** presents the sum of usable swimming days at the two public improved swimming sites at the lake.

Table 8. Lake Koocanusa Average Swimming Days/Month – Canada

Month	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
June	4	7	3	6		13	14
July	17	30	14	27		56	57
August	9	14	8	12		62	62
Total	29	51	25	45		131	133

3.2.3 Lake Koocanusa Camping - Canada

With lower pools, the quality of the recreation experience at Canadian campsites on the lake could be diminished due to loss of swimming opportunities and diminished aesthetics. Generally, the highest pool levels are associated with the benchmark operations. Fish flows result in lower pools during the camping season which can be

partially offset by moving from standard flood control operations (LS, LS1, and LS2) to VARQ flood control operations (LV, LV1, and LV2).

3.2.5 Summary of Lake Koocanusa Recreation Impacts - Canada

Quantified recreation evaluation criteria for Lake Koocanusa included boat ramp days and swimming days. The total number of days for each criterion and each alternative/benchmark are summarized in **Table 9**.

Table 9. Summary of Quantified Recreation Impacts at Lake Koocanusa – Canada

Recreation Evaluation Criteria	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
Total Boat Ramp Days (May-Sep)	352	414	343	404		503	522
Swimming Days (Jun-Aug)	29	51	24	45		131	133

Additional non-quantified effects included impacts on camping and aesthetics. Higher stages are generally preferable for camping and aesthetics at the lake. As the pool is lowered, more mudflat in the Canadian portion of the lake becomes exposed resulting in diminished quality of the scenic resources. As identified in **Table 1**, the highest stages during the summer recreation season are associated with LS and LV, the benchmark operations without fish flows. Once fish flows are added, stages go down. This is partially although not completely offset by implementing VARQ flood control operations (LV, LV1, and LV2) as compared to standard flood control operations (LS, LS1, and LS2).

3.3 Kootenai River

The primary recreational activities associated with the Kootenai River that are potentially affected by changes in discharge from Libby Dam include boating, fishing, and camping. The average monthly discharge rates for all months from Libby Dam in cubic feet per second (cfs) are presented in **Table 10** for each alternative/benchmark modeled.

Table 10. Libby Dam Monthly Average Discharge (cfs)

Month	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
January	20,405	12,562	20,402	12,562		20,596	12,663
February	13,795	9,728	13,795	9,728		13,795	9,728
March	7,529	6,721	7,529	6,721		7,529	6,721
April	5,684	6,425	5,684	6,425		5,685	6,425
May	9,776	14,344	10,862	15,337		5,965	12,071

Month	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
June	18,016	18,346	17,946	18,338		9,222	13,832
July	14,095	16,958	13,664	16,461		14,918	15,429
August	13,619	16,111	13,202	15,738		9,670	9,764
September	8,606	8,982	8,581	8,909		22,272	22,279
October	6,852	7,005	6,790	6,998		7,394	7,421
November	6,350	6,426	6,334	6,426		6,657	6,639
December	16,885	17,104	16,841	17,081		17,699	17,742

Compared to standard flood control operations (LS, LS1, and LS2), VARQ flood control operations (LV, LV1, and LV2) result in an increase in discharge from Libby Dam during the summer recreation season (May-September). Fish flows result in higher discharges in May, June and August and lower discharges in September and October when compared to the non-fish-flow benchmarks. Discharges in other months (November through April) are similar or the same.

3.3.1 Kootenai River Fishing and Boating

Discharge ranges accommodating recreational fishing were identified for both shoreline and boat fishing on the river. The optimal range for shoreline fishing was identified as 4,000 to 10,000 cfs. **Table 11** shows the days per month of the summer recreation season with optimal flows for shore fishing for each of the alternatives/benchmarks.

Table 11. Kootenai River Average Shore Fishing Days

Month	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
May	21	10	21	10		26	11
June	10	10	13	12		20	10
July	10	3	10	4		9	9
August	11	4	11	5		19	19
September	24	23	24	23		0	0
Totals	77	50	80	54		74	48

The optimal range for boat fishing was identified as 8,000 to 25,000 cfs, which also corresponds to the optimal discharge rate for use of boat launches along the Kootenai River. From 5,000 to 7,000 cfs, only small drift boats, canoes, and kayaks can be launched. At flows below 5,000 cfs, the boat launches are not usable. **Table 12** shows the days per month that river flows are between 8,000 and 25,000 cfs for each alternative/benchmark.

Table 12. Kootenai River Average Boating and Boat Fishing Days

Month	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
May	8	18	7	19		6	23
June	12	12	13	14		10	22
July	28	29	28	30		22	23
August	28	30	28	30		21	21
September	12	13	11	13		27	27
Totals	88	101	88	105		85	115

3.3.3 Kootenai River Camping

No impacts from the modeled discharges were identified for campsites along the Kootenai River.

3.3.4 Summary of Kootenai River Recreation Impacts

Quantified recreation evaluation criteria for the Kootenai River included shore fishing days and boating/boat fishing days. The total number of days for each criterion and each alternative/benchmark are summarized in **Table 13**.

Table 13. Summary of Quantified Recreation Impacts at the Kootenai River

Recreation Evaluation Criteria	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
Shore Fishing Days (May-Sep)	77	50	80	54		74	48
Boating and Boat Fishing Days (May-Sep)	88	101	88	105		85	115

No impacts to camping along the river were identified. Higher flow rates are generally more aesthetically pleasing than lower flow rates. Generally, the VARQ flood control operations (LS, LS1, and LS2) result in higher flow rates during the summer recreation season. From May through August, the increase in flows with LV1 is large enough to be perceptible to recreation users.

3.4 Kootenay Lake

Boating, fishing, swimming and camping were identified as the primary recreational activities at Kootenay Lake that could potentially be affected by changes in lake levels.

Table 14 presents average end-of-month water surface elevations for Kootenay Lake for all twelve months.

Table 14. Kootenay Lake Month-End Average Stage (feet)

Month	LS1 (No-Action)	LV1	LS2	LV2		LS Benchmark	LV benchmark
January	1744	1744	1744	1744		1744	1744
February	1742	1742	1742	1742		1742	1742
March	1739	1739	1739	1739		1739	1739
April	1741	1741	1741	1741		1741	1741
May	1747	1748	1747	1748		1746	1747
June	1747	1747	1747	1747		1746	1747
July	1744	1744	1744	1744		1744	1744
August	1743	1743	1743	1743		1743	1743
September	1745	1745	1745	1745		1745	1745
October	1745	1745	1745	1745		1745	1745
November	1745	1745	1745	1745		1745	1745
December	1745	1745	1745	1745		1745	1745

Average end-of-month stage at Kootenay Lake is similar with all alternatives and benchmarks in all summer recreation season months (May-September). Average end-of-month stages are one foot higher with VARQ flood control operations (LV, LV1, and LV2) during May as compared to standard flood control operations (LS, LS1, and LS2).

3.4.1 Kootenay Lake Recreation

Canadian stakeholders identified lake elevations of between 1740 and 1754 feet as non-detrimental for most recreational resources at the lake. Average end-of-month stages are within the non-detrimental range for all months in the main summer recreation season (May to September) with all alternatives and benchmarks. Average end-of-month stages are also within the non-detrimental range for all non-summer months excluding March; where all alternatives and benchmarks have average end-of-month stages of 1739 feet, one foot below the lower threshold of 1740 feet. No average end-of month elevations in any months of the year exceeded the upper threshold of 1754 feet.

Additional daily analysis of pool elevations in the 53 years of simulation for all alternatives and benchmarks found that there was no difference in the number of days in the detrimental recreational range during the summer recreation season. In the period of May-September, the only month with days in the detrimental range was May with a monthly average of two days under the lower threshold elevation of 1740 feet for all alternatives and benchmarks. Non-summer months with days below 1740 feet include February, March, and April. In these months there is little to no difference in lake level across all alternatives and benchmarks. No days in any months of the year exceeded the upper threshold of 1754 feet.

Table 15 shows the number of days within the non-detrimental range of lake elevations for recreation at Kootenay Lake.

Table 15. Kootenay Lake Average Days/Month between Elevations 1740 and 1754 Feet

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	28	27	28	27		28	27
June	18	17	17	16		25	22
July	28	28	29	28		28	28
August	31	31	31	31		31	31
September	30	30	30	30		30	30
Total	135	132	134	132		142	139

3.4.2 Kootenay Lake Boat Moorage (Pilot Bay Resorts)

In addition to the non-detrimental recreational range evaluated in section 3.4.1, Pilot Bay Resorts, a private recreation facility, indicated detrimental impacts to boat moorage at lake elevations below 1744 feet. Problems were cited during the low water season (January-May). **Table 16** shows the average number of days per month that the lake was at or above elevation 1744 feet over these months. The total number of days at or above the threshold is within one day across all alternatives/benchmarks.

Table 16. Kootenay Lake Average Days/Month at or above Elevation 1744 Feet

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
January	30	30	30	30		30	30
February	5	2	5	2		5	2
March	0	0	0	0		0	0
April	1	1	1	1		1	1
May	16	19	17	19		15	19
Total	52	52	52	52		51	52

3.4.3 Kootenay Lake Fishing (Kootenay Kampsites)

In addition to the non-detrimental recreational range evaluated in section 3.4.1, Kootenay Kampsites, a private recreation facility, indicated fishing impacts at lake levels below 1744 feet. **Table 17** shows the number of days at or above the threshold elevation of 1744 feet for each alternative/benchmark. VARQ flood control operations (LV, LV1,

and LV2) result in more days above 1744 feet than do standard flood control operations (LV, LV1, and LV2).

Table 17. Kootenay Lake Average Days/Month at or above Elevation 1744 Feet

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
May	16	19	17	19		15	19
June	27	27	27	27		25	27
July	18	19	17	19		17	18
August	6	7	5	7		4	4
September	16	17	16	17		18	18
Total	83	90	82	89		79	86

3.4.4 Kootenay Lake Swimming

The main recreational swimming season at Kootenay Lake is June to August. Impacts to the lake's swimming beaches can occur at high water elevations ($\geq$ 1749 feet) that cause improved beaches to be inundated. **Table 18** shows the average number of days per month that the lake beaches were accessible (i.e., the pool was lower than elevation 1749 feet) during the swimming season.

Table 18. Kootenay Lake Average Days/Month < Elevation 1749 Feet

Month	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
June	18	17	17	16		25	22
July	28	28	29	28		28	28
August	31	31	31	31		31	31
Total	77	76	76	75		84	82

3.4.5 Kootenay Lake Camping

No additional evaluation criteria for Kootenay Lake camping beyond the non-detrimental range of lake elevations presented in Section 3.4.1 were identified. No impacts were identified to Kootenay Lake campgrounds during the primary May-September recreation season.

3.4.6 Summary of Kootenay Lake Recreation Impacts

The main recreation evaluation criterion for Kootenay Lake was the number of days in the non-detrimental range of lake levels for lake recreation identified by lake stakeholders. In addition to this range, several specific threshold impact elevations were identified for specific activities and/or locations. These additional thresholds included boat moorage days at Pilot Bay Resorts, fishing days at Kootenay Kampsites, and swimming days. The total number of days for each criterion and each alternative/benchmark are summarized in **Table 19**.

Table 19. Summary of Quantified Recreation Impacts at Kootenay Lake

Recreation Evaluation Criteria	LS1 (No-Action)	LV1	LS2	LV2		LS benchmark	LV benchmark
Days in the General Recreation Non-Detrimental Range (May-Sep)	135	132	134	132		142	139
Pilot Bay Resorts Boat Moorage Days (Jan-May)	52	52	52	52		51	52
Kootenay Kampsites Fishing Days above elevation 1744 feet (May-Sep)	83	90	82	89		79	86
Swimming Days below elevation 1749 feet (Jun-Aug)	77	76	76	75		84	82

No impacts were identified to Kootenay Lake campgrounds during the primary May-September recreation season. The small changes in summer stage between standard flood control operations (LS, LS1, and LS2) and VARQ flood control operations (LV, LV1, and LV2) should not have any noticeable effect on lake aesthetics.

4.0 Area 2 – Flathead/Clark Fork/Pend Oreille River Basin Recreation Impacts

Seven subareas in Area 1 were evaluated: Hungry Horse Reservoir, the Flathead River upstream of Flathead Lake, Flathead Lake, the South Fork Flathead River and Clark Fork upstream of Lake Pend Oreille, Lake Pend Oreille, the Pend Oreille River in the U.S., and the Pend d'Oreille River in Canada including Pend d'Oreille Reservoir. As described in Section 2.0, only two alternatives (HS and HV) were evaluated in Area 2.

4.1 Hungry Horse Reservoir

Primary recreation activities at Hungry Horse Reservoir that could potentially be affected by changes in water surface levels include camping, fishing, and boating. **Table 20** presents average end-of-month water surface elevations for Hungry Horse Reservoir for all 12 months with both alternatives.

Table 20. Hungry Horse Reservoir Month-End Average Stage (feet)

Month	HS (No-Action)	HV
January	3522	3523
February	3510	3515
March	3505	3509
April	3501	3512
May	3529	3533
June	3555	3556
July	3552	3552
August	3540	3540
September	3538	3538
October	3536	3536
November	3535	3535
December	3533	3532

During the summer recreation season of May to September, VARQ flood control operations (HV) result in higher average end-of-month stage in May. There is little to no change in average end-of-month stage between VARQ flood control operations (HV) and standard flood control operations (HS) in the remaining summer season months. During the remaining lower demand months, average end-of-month stage is similar for both alternatives from October to December and higher with HV from January to April.

4.1.2 Hungry Horse Camping

Campsites at Hungry Horse Reservoir are all above full pool elevation of 3560 feet; therefore, there are no impacts expected from inundation with the modeled alternatives. During the summer recreation season, higher average pool levels in May associated with HV could provide a slight benefit from improved aesthetics. HV will result in no perceptible changes to elevations from HS during the rest of the summer.

4.1.2 Hungry Horse Fishing

Refill probabilities are slightly higher at Hungry Horse Reservoir with HV. This is expected to benefit bull trout in Hungry Horse Reservoir and anadromous fish downstream in the Columbia River. Recreational fishermen may eventually benefit from the improved fishery effect of HV at Hungry Horse and in the Columbia River system.

4.1.1 Hungry Horse Boating

The main concern for boating on Hungry Horse reservoir is access to the lake. Ten boat ramps were identified and compared with water surface elevations to determine the impact of each alternative on ramp functionality. Average end-of-month water surface elevations for HS and HV were compared to minimum usable boat ramp elevations. The end-of-month analysis found no change in the number of usable ramps at the end of each month in the summer recreation season.

Analysis of daily stage data was performed to identify the number of days that boat ramps at the reservoir were functional. **Table 21** shows the sum of the average number of days per month that each ramp was usable (boat ramp days) over the summer recreation season (May to September). The analysis shows increased usable boat ramp days in May with HV. In other summer months there is little to no change in boat ramp days between the alternatives. Reference the **Exhibits** at the end of this report for results of average end-of-month and average daily elevation analysis for each ramp.

Table 21. Hungry Horse Reservoir Average Usable Boat Ramp Days/Month

Month	HS (No-Action)	HV
May	103	145
June	257	262
July	309	309
August	293	293
September	213	209
Total	1,175	1,218

4.1.3 Summary of Hungry Horse Reservoir Recreation Impacts

Quantified recreation evaluation criteria for Hungry Horse Reservoir included boat ramp days at the lake. The results of the evaluation were:

- HS (No-Action) Total Boat Ramp Days (May-September) = 1,175
- HV Total Boat Ramp Days (May-September) = 1,218

Non-quantified potential recreation impacts included effects on camping and fishing. Slight benefits may be expected to camping at the lake as a result of improved aesthetics with the slightly higher pools associated with HV and the resultant slight increase in boat ramp functionality. The additional flows with HV are expected to benefit bull trout in Hungry Horse Reservoir and anadromous fish downstream in the Columbia River which may result in recreation benefits associated with the improved fisheries.

4.2 Flathead River

Hungry Horse Dam discharges to the South Fork Flathead River which joins the mainstem Flathead River and flows on to Flathead Lake approximately 35 miles downstream of the dam. Primary recreation activities on the Flathead River that could be affected by changes in discharge from Hungry Horse Dam include boating and fishing. **Table 22** shows the average monthly discharge from Hungry Horse Dam for both alternatives in all months.

Table 22. Hungry Horse Dam Monthly Average Discharge (cfs)

Month	HS (No-Action)	HV
January	4,789	4,068
February	5,129	3,956
March	2,732	2,862
April	5,418	3,466
May	3,667	5,659
June	2,978	4,238
July	5,146	5,246
August	5,469	5,433
September	1,828	1,829
October	1,634	1,635
November	1,655	1,654
December	1,937	2,103

During the main recreation season of May to September, flows increase with HV from May to July. HV results in a minor decrease in flow in August. Flows are basically the same with either alternative in September. In the off season months, HV flows are lower

in January, February, and April and relatively close in March, September, October, November, and December compared to HS flows.

Flow is also measured at Columbia Falls, downstream of the confluence of the north, middle, and south Forks of the Flathead River. **Table 23** shows the average monthly flow at Columbia Falls for both alternatives and all months.

Table 23. Flathead River at Columbia Falls Monthly Average Discharge (cfs)

Month	HS (No-Action)	HV
January	6,594	5,751
February	6,499	5,465
March	4,558	4,688
April	12,681	10,592
May	23,874	26,088
June	23,650	24,839
July	13,323	13,451
August	8,571	8,573
September	3,871	3,871
October	3,916	3,916
November	4,143	4,143
December	3,887	4,054

During the main recreation season of May to September, downstream flows as measured at Columbia Falls are increased in May and June with HV. There is little to no difference in flows in the remaining summer months. In the winter months, HV flows are lower in January, February, and April and relatively close in March and from September-December.

4.2.1 Flathead River Boating

There are several unimproved boat ramps along the Flathead River. These ramps are operable down to flows of 4,000 cfs. There is no change between HS and HV in the number of days with flows at or above 4,000 cfs during the summer recreation season **(Table 24)**.

Table 24: Average Days ≥ 4,000 cfs, Flathead River at Columbia Falls

Month	HS (No-Action)	HV
May	31	31
June	30	30
July	30	30
Aug	30	30
Sep	6	6
Total	127	127

Additionally, there is no increase in the occurrence of flooding on the Flathead River at Columbia Falls, MT with HV that would affect boating or the day use recreation areas. Below flood stage, flows are slightly higher for HV compared to HS. This small increase would be imperceptible to recreation users.

4.2.2 Flathead River Mainstem Fishing

The optimal discharge range for recreational fishing was identified as 4,000 to 17,000 cfs. During the summer months, HV results in slightly fewer fishing days in May, June, and July. August and September resulted in the same number of fishing days as the no action alternative. **Table 25** shows the average days per month with optimal fishing flows as modeled at Columbia Falls for the two alternatives.

Table 25. Flathead River at Columbia Falls Average Days between 4,000 & 17,000 cfs

Month	HS (No-Action)	HV
May	8	6
June	9	8
July	23	22
August	30	30
September	6	6
Total	76	72

4.2.3 Summary of Flathead River Recreation Impacts

The recreation evaluation criteria for the Flathead River included boating days and fishing days. The total number of days for each criterion and each alternative are summarized in **Table 26**.

Table 26. Summary of Quantified Recreation Impacts at the Flathead River

Recreation Evaluation Criteria	HS (No-Action)	HV
Boating Days with flows at or above 4,000 cfs at Columbia Falls Gage	127	127
Fishing Days with flows at 4,000 to 17,000 cfs at Columbia Falls Gage	76	72

The higher flows in May and June with HV are an increase of 9% and 5%, respectively from the flows with HS. This level of increase is not likely to result in perceptible changes to aesthetics in the area.

4.3 Flathead Lake

Recreation activities at Flathead Lake that could be affected by changes in lake levels include boating, fishing, swimming, and camping. **Table 27** shows the average end-of-month stage for Flathead Lake for both alternatives in all months.

Table 27. Flathead Lake Month-End Average Stage (feet)

Month	HS (No-Action)	HV
January	2887	2887
February	2885	2885
March	2884	2884
April	2887	2886
May	2890	2890
June	2893	2893
July	2893	2893
August	2893	2893
September	2892	2892
October	2891	2891
November	2890	2890
December	2888	2888

There is no difference in the average end-of-month stage at Flathead Lake with either alternative in the summer recreation season of May-September.

4.3.1 Flathead Lake Boating

The most important factor for boating on Flathead Lake is access to the lake. Full pool at Flathead Lake is at elevation 2062.5. Average end-of-month water elevations with HS and HV were compared to minimum usable boat ramp elevations. No changes in ramp

usability were identified across the alternatives during the summer months (May-September) based on average end-of-month elevations. Additional analysis of average daily stages showed a slight increase in usable boat ramp days at Flathead Lake during the summer with HV. Based on usable pool elevation for each boat ramp and the number of days it is above that elevation each month, **Table 28** shows the total number of usable boat ramp days per month. Reference the **Exhibits** at the end of this report for results of average end-of-month and average daily elevation analysis for each ramp.

Table 28. Flathead Lake Average Usable Boat Ramp Days/Month

Month	HS (No-Action)	HV
May	130	132
June	267	269
July	295	298
August	302	303
September	271	271
Total	1,265	1,273

Note: Ramp elevations were provided by Jim Vashro of Montana Fish, Wildlife and Parks (MFWP) for the MFWP ramps through personal communications in 2004. The remaining ramps in Table 9 are privately operated and elevations were obtained through personal communications with facility managers in 2004.

4.3.2 Flathead Lake Swimming

On Flathead Lake, swimming would be affected at pool elevations below 2890 feet because the beach is separated from the water. As shown in **Table 29**, there is no difference in the number of days at or above elevation 2890 feet during the swimming season (June to August).

Table 29: Average Days/Month with Beach Access on Flathead Lake

Average Days with Water Elevation ≥ 2890 ft		
Month	**HS (No-Action)**	**HV**
June	29	29
July	29	29
August	30	30
Total	88	88

4.3.3 Flathead Lake Fishing and Camping

No impacts were identified for fishing or camping facilities on Flathead Lake with implementation of VARQ flood control operations (HV).

4.3.4 Summary of Flathead Lake Recreation Impacts

Quantified recreation evaluation criteria for Flathead Lake included boating days and fishing days. The total number of days for each criterion and each alternative are summarized in **Table 30**.

Table 30. Summary of Quantified Recreation Impacts at Flathead Lake

Recreation Evaluation Criteria	HS (No-Action)	HV
Total Boat Ramp Days (May-Sep)	1,265	1,273
Swimming Days (Jun-Aug)	88	88

The higher Hungry Horse discharges in May and June under HV can be stored in Flathead Lake during the refill period. This results in Flathead Lake having a slightly better probability of filling to full pool. Flathead Lake can also stay full a little longer in the summer under HV. This provides a slight beneficial effect for lake recreation by extending the quantity and quality of recreation opportunities and is desirable for boat ramp function, shoreline activities, and aesthetic values.

4.4 Lower Flathead River and Clark Fork River

Recreational activities on the lower Flathead River between Kerr Dam and the confluence with the Clark Fork that could be affected by changes in discharge from Kerr Dam include boating and fishing. Activities on the lower Clark Fork that could be affected include boating, fishing, swimming, and camping. **Table 31** shows the average end-of-month discharge in cubic feet per second from Kerr Dam for both alternatives in all months.

Table 31. Kerr Dam Monthly Average Discharge (cfs)

Month	HS (No-Action)	HV
January	10,331	9,657
February	10,595	9,412
March	8,206	8,246
April	9,913	9,058
May	21,592	22,312
June	24,222	25,675
July	15,652	15,793
August	8,741	8,821
September	6,062	6,075
October	6,363	6,366
November	7,012	7,012
December	8,624	8,789

Flows are slightly higher with HV in May and June and approximately the same in the remainder of the summer (July-September).

No modeling of flows on the lower Clark Fork was performed downstream of the confluence with the Flathead River. Examination of USGS gage data (1990-2000) identified that flows on the lower Flathead (as measured at the Polson, MT gage) are approximately 55% of flows downstream of the confluence with the Clark Fork (as measured at the Noxon, MT gage). This suggests that relative changes in discharge at Kerr Dam would be reduced by nearly half in the lower Clark Fork reach from the Flathead River confluence to Lake Pend Oreille. This is because of the nearly doubling of flows below the Flathead confluence.

4.4.1 Lower Flathead River and Lower Clark Fork Boating

Non-motorized recreational boating is popular on the lower Flathead River below Kerr Dam. The optimal range of flows for kayaking on the Flathead River below Kerr Dam is 10,000 to 20,000 cfs. **Table 32** shows the number of days per month with optimal flows on this reach of the river for kayaking activities.

Table 32. Lower Flathead River Average Kayaking Days/Month

Average Days per Month with Flows between 10,000 and 20,000 cfs		
Month	**HS (No-Action)**	**HV**
May	13	11
June	14	13
July	17	16
August	10	10
September	1	1
Total	55	51

No impacts to boating on the lower Clark Fork were identified with implementation of VARQ flood control operations (HV).

4.4.2 Lower Flathead River and Lower Clark Fork Fishing

The optimal discharge range for recreational fishing on the Flathead River was identified as 4,000 to 17,000 cfs. **Table 33** shows the number of days per month of the fishing season with optimal flows for fishing for both alternatives.

Table 33. Lower Flathead River Average Days between 4,000 and 17,000 cfs

Month	**HS (No-Action)**	**HV**
May	13	13
June	12	11
July	20	19
August	27	28
September	26	27
Total	99	97

No impacts to fishing on the lower Clark Fork were identified with implementation of VARQ flood control operations (HV).

4.4.3 Summary of Lower Flathead River and Lower Clark Fork Recreation Impacts

Quantified recreation evaluation criteria for lower Flathead River and lower Clark Fork included kayaking days and fishing days. The total number of days for each criterion and each alternative are summarized in **Table 34**.

Table 34. Summary of Quantified Recreation Impacts at Lower Flathead River and Lower Clark Fork

Recreation Evaluation Criteria	HS (No-Action)	HV
Lower Flathead River Kayaking Days (May-Sep)	55	51
Lower Flathead River Fishing Days (May-Sep)	99	97

No impacts were identified to boating or fishing on the lower Clark Fork with VARQ flood control operations (HV). HV results in higher flows in May and June; increases of 3% and 6%, respectively from the flows with HS. This level of increase in flow is not likely to result in perceptible changes to aesthetics in the area.

4.5 Lake Pend Oreille

Recreation activities at Lake Pend Oreille that could be affected by changes in lake levels include boating, fishing, camping, and swimming. Average end-of-month water surface elevations at the lake with the two alternatives are shown in **Table 35**.

Table 35. Lake Pend Oreille Month-End Average Stage (feet)

Month	HS (No-Action)	HV
January	2054	2054
February	2054	2054
March	2054	2054
April	2055	2055
May	2059	2059
June	2062	2062
July	2062	2062
August	2062	2062
September	2061	2061
October	2057	2057
November	2054	2054
December	2054	2054

Both summer and winter lake elevations remain the same with both alternatives. No effects are expected for recreation or visual resources. Additional average daily stage analysis found that HV resulted in a slight increase of 3 boat ramp days at Lake Pend Oreille (from 1,896 to 1,899 ramp-days, a change of one tenth of one percent). Reference the **Exhibits** at the end of this report for results of average end-of-month and average daily elevation boat ramp analysis for Lake Pend Oreille.

4.5.1 Summary of Lake Pend Oreille Recreation Impacts

The recreational effects of both alternatives at Lake Pend Oreille would be similar. No impacts to recreational resources or aesthetics are expected from VARQ flood control operations (HV) at the lake.

4.6 Pend Oreille River – U.S.

Primary recreation activities on the Pend Oreille River that could be affected by changes in discharge from Albeni Falls Dam include camping, fishing, and boating. **Table 37** shows the average monthly discharge from Albeni Falls Dam for both alternatives.

Table 37. Albeni Falls Dam Monthly Average Discharge (cfs)

Month	HS (No-Action)	HV
January	17,296	16,956
February	19,448	17,948
March	19,521	19,516
April	28,016	27,513
May	52,961	52,625
June	55,277	57,402
July	29,700	29,885
August	14,526	14,602
September	13,363	13,405
October	18,380	18,364
November	19,464	19,387
December	16,393	16,477

Discharge from the dam is slightly lower in February (-8%), slightly higher in June (+4%), and approximately the same (within 2%) in all other months with VARQ flood control operations relative to standard flood control operations.

4.6.1 Summary of Pend Oreille River Recreation Impacts

Due to the relatively minor changes in discharge from Albeni Falls Dam during the summer recreation season with HV, no impacts to recreational resources and activities or aesthetics are expected on the Pend Oreille River.

4.7 Pend d'Oreille River – Canada

The primary location for recreational activities on the Pend d'Oreille River in Canada is BC Hydro's Pend d'Oreille Recreation Area. Activities at the recreation area that could be affected by changes in discharge from Albeni Falls Dam include camping, swimming, boating, and fishing. Based upon the minimal changes to discharge from Albeni Falls Dam with HV, no impacts to recreational resources or aesthetics are expected at Pend d'Oreille Reservoir.

5.0 Area 3 – Columbia River Mainstem Recreation Impacts

Evaluation of recreation impacts was performed for four subareas; the upper Columbia River from the Kootenay River confluence to its inflow point to Lake Franklin Delano Roosevelt (Lake Roosevelt), Lake Roosevelt itself, Lake Rufus Woods, and the middle and lower Columbia River (downstream of Chief Joseph Dam). The upper Columbia River reach is in Canada, the other subareas are in the U.S.

5.1 Upper Columbia River

This reach includes the Columbia River from the confluence with Kootenai River in Canada to the U.S. Border. Popular river recreation activities identified in the upper Columbia River reach include fishing, swimming, and boating. No flow data were modeled for the different combinations downstream of Libby Dam. Examination of USGS and Environment Canada gage data (1991-2000) identified that flows just downstream of Libby Dam are approximately 15% of the volume of flows downstream of the Kootenai/Columbia confluence (as measured at the Birchbank, BC gage). This suggests that changes in discharge from Libby Dam would be reduced in terms of their relative magnitude by a factor of about five times downstream of the confluence with the Columbia. Regulation of Kootenay Lake would also likely provide additional reduction of the changes. No impacts to recreational resources or aesthetics on the upper Columbia River reach are expected with any of the combinations.

5.2 Lake Roosevelt

The Lake Roosevelt reach extends from Grand Coulee Dam upriver to the Canadian border. Popular recreation activities at Lake Roosevelt that could be affected by changes in lake levels include boating, fishing, swimming, and camping. **Table 39** shows the average end-of-month stages at the lake for all combinations.

Table 39. Lake Roosevelt Month-End Average Stage (feet)

Month	LS1+HS (No-Action)	LV1+HV	LS2+HS	LV2+HV		LS+HS benchmark	LV+HV benchmark
January	1268	1268	1268	1268		1268	1268
February	1264	1264	1264	1264		1264	1263
March	1261	1260	1261	1260		1261	1259
April	1244	1242	1244	1242		1244	1242
May	1254	1253	1254	1253		1254	1253
June	1287	1287	1287	1287		1287	1287
July	1288	1288	1288	1288		1288	1288
August	1280	1280	1280	1280		1280	1280
September	1290	1290	1290	1290		1290	1290
October	1290	1290	1290	1290		1290	1290
November	1286	1286	1286	1286		1286	1286
December	1287	1287	1287	1287		1287	1287

All average end-of-month stages at Lake Roosevelt for all combinations are similar. The month of April exhibits the largest change in average end-of-month stage; -2 feet with VARQ combinations (LV+HV, LV1+HV, and LV2+HV) as compared to standard flood control combinations (LS+HS, LS1+HS, and LS2+HS). VARQ combinations also result in an average 1 foot reduction in stage at the end of May. Average end-of-month stages are basically the same for combinations in all other months.

5.2.1 Lake Roosevelt Boating

Average end-of-month water elevations with all combinations were compared to minimum boat ramp elevations. No changes in ramp usability were identified across the combinations during the summer months (May- September) based on average end-of-month elevations. Additional analysis of average daily stages showed very little change in usable boat ramp days at Lake Roosevelt during the summer. **Table 40** shows the number of usable boat ramp days per month. The ramp days with all combinations are within .5% of each other. Reference the **Exhibits** at the end of this report for results of average end-of-month and average daily elevation analysis for each ramp.

Table 40. Lake Roosevelt Average Usable Boat Ramp Days/Month

Month	LS1+HS (No-Action)	LV1+HV	LS2+HS	LV2+HV		LS+HS benchmark	LV+HV benchmark
May	349	336	349	336		349	337
June	695	694	695	694		695	694
July	744	744	744	744		744	744
August	650	650	650	650		647	647
September	720	720	720	720		720	720
Total	3,158	3,144	3,157	3,144		3,155	3,142

5.2.2 Lake Roosevelt Fishing, Swimming, and Camping

No impacts to Lake Roosevelt fishing, swimming, or camping recreation are expected with any of the combinations.

5.2.5 Summary of Lake Roosevelt Recreation Impacts

No impacts to Lake Roosevelt recreational resources or aesthetics are expected with any of the combinations.

5.3 Lake Rufus Woods

Recreation activities at Lake Rufus Woods include boating, fishing, swimming, and camping. Water surface elevations were not modeled for the combinations at Lake Rufus Woods, which is a run-of-river reservoir rather than a storage reservoir. Its relatively narrow range of pool levels is governed by power requirements; it does not operate for flood control. Average monthly discharges from Grand Coulee with each combination were modeled and are presented in **Table 42**.

Table 42. Grand Coulee Dam Monthly Average Discharge

Month	LS1+HS (No-Action)	LV1+HV	LS2+HS	LV2+HV		LS+HS benchmark	LV+HV benchmark
January	161,507	152,491	161,492	152,492		161,824	152,792
February	93,219	89,154	93,221	89,156		93,232	89,445
March	88,705	88,567	88,703	88,552		88,712	88,455
April	117,940	118,038	117,939	118,038		117,981	117,832
May	161,380	164,241	161,928	164,734		159,490	163,146
June	149,242	153,132	149,696	153,537		142,543	149,566
July	142,841	144,822	142,613	144,592		139,211	141,149
August	111,443	114,127	110,948	113,673		108,619	108,761
September	59,887	60,179	59,820	60,068		72,969	72,985
October	73,262	73,476	73,197	73,465		73,862	73,859
November	82,568	83,018	82,519	82,997		82,913	83,084
December	96,385	96,838	96,335	96,818		97,196	97,381

During the summer recreation season of May to September, VARQ flood control combinations (LV+HV, LV1+HV, and LV2+HV) result in slight increases in discharge from Grand Coulee from May – August relative to standard flood control combinations (LS+HS, LS1+HS, and LS2+HS). These relatively minor changes are not expected to affect recreational resources or aesthetics at Lake Rufus Woods.

5.4 Middle and Lower Columbia River

The lower Columbia River reach includes the river downstream of Chief Joseph Dam. No modeling of flows or water surface elevations for the combinations was performed downstream of Chief Joseph Dam. Modeled average monthly discharge from Grand Coulee Dam was presented in **Table 42**. The relative effect of changes in discharge from Grand Coulee is reduced as the volume of flows increases downstream. Examination of mean annual flows (1990-2000) at Grand Coulee, Priest Rapids, and The Dalles indicates that flows at Grand Coulee are approximately 88% of the volume at Priest Rapids and 58% of the volume at The Dalles. As was found to be the case with Lake Rufus Woods, the relatively minor changes in discharge from Grand Coulee dam during the summer recreation season with VARQ flood control operations are not expected to affect recreational resources or aesthetics on the Columbia River downstream of Chief Joseph Dam.

UPPER COLUMBIA ALTERNATIVE FLOOD CONTROL AND FISH OPERATIONS EIS

RECREATION APPENDIX IMPACT ANALYSIS EXHIBITS

List of Exhibits

Exhibit 1: Lake Koocanusa Average End of Month Boat Ramp In/Out Analysis

Boat Ramp Name	End of Ramp Elevation (feet)	May						June						July						August						September					
		LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2
Month End Average Stage (feet)		2400	2409	2393	2406	2391	2404	2449	2449	2430	2440	2429	2438	2458	2458	2442	2447	2441	2447	2458	2458	2437	2438	2437	2438	2437	2438	2434	2435	2434	2435
US Boat Ramps																															
Tobacco River	2449	out[2]	out	out	out	out	out	in[1]	in	out	out	out	out	in	in	out	out	out	out	in	in	out	out	out	out	out	out	out	out	out	out
Gateway Boat Camp[3]	2445	out	out	out	out	out	out	in	in	out	out	out	out	in	in	out	in	out	in	in	in	out	out	out	out	out	out	out	out	out	out
Warland Flats	2444	out	out	out	out	out	out	in	in	out	out	out	out	in	in	out	in	out	in	in	in	out	out	out	out	out	out	out	out	out	out
Tobacco Plains	2435	out	out	out	out	out	out	in	in	out	in	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	out	in	out	in
Rexford Bench Complex	2431	out	out	out	out	out	out	in	in	out	in	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Koocanusa Lake Campsite and Resort	2420	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Mariner's Haven	2420	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
McGillvary	2385	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Rocky Gorge	2370	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Lake Koocanusa Resort and Marina	2334	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Peck Gulch	2310	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Souse Gulch	2310	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Barron Creek	2282	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Canadian Boat Ramps																															
Englishman Creek	2458	out	out	out	out	out	out	out	out	out	out	out	out	in	in	out	out	out	out	in	in	out	out	out	out	out	out	out	out	out	out
Newgate Sandy Shores Resort	2439	out	out	out	out	out	out	in	in	out	in	out	out	in	in	in	in	in	in	in	in	out	out	out	out	out	out	out	out	out	out
Koocanusa Marina	2430	out	out	out	out	out	out	in	in	in	in	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Golden Ears (Gold Creek Bay)	2427	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Kikomun Creek Provincial Park[4]	2396	in	in	out	in	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Full pool = 2459 ft.																															

Notes:
1-in = end of the boat ramp would be in the water so ramp would most likely be useable.
2-out = end of the boat ramp would be out of the water so ramp would probably not be useable.
3- No boat ramp, this level is the lowest operating level for the site.
4-This data from BC Hydro, Sept 2004.

Exhibit 2: Lake Koocanusa Average Boat Ramp Days per Month

Boat Ramp Name	End of Ramp Elevation (feet)	May						June						July						August						September					
		LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2	LS	LV	LS1	LV1	LS2	LV2
US Boat Ramps																															
Tobacco River	2449	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.5	1.8	2.8	1.5	2.5	28.1	28.5	7.5	14.4	5.9	13.5	31.0	31.0	2.2	4.2	1.6	3.5	14.5	14.5	0.0	0.0	0.0	0.0
Gateway Boat Camp	2445	0.0	0.0	0.0	0.0	0.0	0.0	8.3	9.2	2.4	4.5	2.3	4.3	29.9	30.0	10.6	18.1	9.4	17.1	31.0	31.0	6.8	10.2	6.0	9.5	20.4	20.4	0.0	0.0	0.0	0.0
Warland Flats	2444	0.1	0.0	0.0	0.0	0.0	0.0	9.0	9.9	2.6	5.0	2.5	4.8	30.1	30.2	11.8	20.3	10.6	18.0	31.0	31.0	8.3	12.4	7.3	11.1	21.4	21.4	0.0	0.0	0.0	0.0
Tobacco Plains	2433	1.0	0.9	0.3	0.4	0.3	0.3	15.3	17.9	6.1	11.5	5.5	10.4	31.0	31.0	21.7	28.3	20.8	27.7	31.0	31.0	27.1	30.8	26.8	30.4	30.4	30.5	0.0	28.3	24.3	28.1
Koocanusa Lake Campsite and Resort	2420	2.3	4.8	2.1	4.0	2.1	3.7	21.3	23.9	12.0	18.5	10.9	17.6	31.0	31.0	29.2	30.8	28.9	30.6	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.1	30.2	30.0	30.2
Mariner's Haven	2420	2.3	4.8	2.1	4.0	2.1	3.7	21.3	23.9	12.0	18.5	10.9	17.6	31.0	31.0	29.2	30.8	28.9	30.6	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.1	30.2	30.0	30.2
McGillvary	2385	10.9	19.4	9.9	19.3	9.5	19.3	28.9	29.2	27.6	28.9	26.5	28.8	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Rocky Gorge	2370	16.4	23.1	16.0	23.1	16.0	23.1	29.6	29.7	29.4	29.6	29.1	29.5	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Rexford Bench Complex	2341	24.3	27.8	24.2	27.7	24.2	27.7	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Lake Koocanusa Resort and Marina	2334	26.1	28.7	26.1	28.7	26.1	28.7	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Souse Gulch Dock	2310	30.0	30.3	29.8	30.3	29.8	30.3	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Peck Gulch	2310	30.0	30.3	29.8	30.3	29.8	30.3	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Barron Creek	2282	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Number of Useable Days		**174.4**	**201.0**	**171.4**	**198.8**	**170.9**	**198.0**	**289.7**	**300.2**	**243.8**	**269.4**	**239.2**	**265.4**	**398.0**	**398.8**	**327.0**	**359.7**	**321.4**	**354.6**	**403.0**	**403.0**	**323.3**	**336.5**	**320.7**	**333.4**	**361.8**	**362.1**	**274.2**	**302.8**	**298.4**	**302.6**
Canadian Boat Ramps																															
Englishman Creek	2458	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9	0.2	0.3	0.2	0.2	17.3	18.2	1.0	1.2	1.1	0.8	29.6	30.2	0.0	0.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	0.0
Newgate Sandy Shores Resort	2439	0.3	0.1	0.0	0.0	0.0	0.0	12.1	13.8	4.1	7.8	3.5	7.2	30.8	30.9	17.1	25.2	16.0	24.2	31.0	31.0	21.9	28.7	21.4	28.0	28.1	28.2	1.7	3.1	1.5	2.0
Koocanusa Marina	2430	1.2	1.5	0.7	0.9	0.5	0.6	16.9	19.4	7.1	13.6	6.6	12.0	31.0	31.0	23.9	29.1	23.0	28.6	31.0	31.0	28.3	31.0	27.7	30.9	30.5	30.6	27.2	28.9	26.6	28.9
Golden Ears (Gold Creek Bay)	2427	1.5	2.1	1.2	1.6	1.0	1.3	18.3	20.9	8.3	15.3	7.7	13.8	31.0	31.0	26.2	29.9	25.4	29.4	31.0	31.0	30.8	31.0	30.2	31.0	30.6	30.6	29.3	29.5	28.9	29.5
Kikomun Creek Provincial Park	2396	7.4	16.3	6.4	16.2	6.0	16.0	27.7	28.5	24.1	27.9	22.8	27.4	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.6	30.6	30.6	30.6	30.6	30.6
Number of Useable Days		**10.4**	**20.0**	**8.3**	**18.8**	**7.6**	**17.9**	**75.9**	**83.5**	**43.9**	**64.8**	**40.8**	**60.6**	**141.0**	**142.1**	**99.3**	**116.4**	**96.5**	**113.9**	**153.6**	**154.2**	**112.0**	**121.7**	**110.4**	**120.9**	**122.3**	**122.5**	**88.7**	**92.1**	**87.6**	**91.0**

Exhibit 3: Hungry Horse Reservoir Average End of Month Boat Ramp In/Out Analysis

Boat Ramp Name	End of Ramp Elevation	May		June		July		August		September	
		HS	HV	HS	HV	HS	HV	HS	HV	HS	HV
Month End Average Stage (feet)		3529.2	3533.1	3555.3	3555.7	3552.3	3552.3	3540.3	3540.3	3537.6	3537.6
Doris Creek	3545	out	out	in	in	in	in	out	out	out	out
Canyon Creek	3542	out	out	in	in	in	in	out	out	out	out
Murray Bay CG	3540	out	out	in	in	in	in	out	out	out	out
Lost Johnny Camp	3536	out	out	in	in	in	in	in	in	in	in
Lid Creek CG	3529	in	in	in	in	in	in	in	in	in	in
Emery Bay CG	3527	in	in	in	in	in	in	in	in	in	in
Devil's Corkscrew CG	3517	in	in	in	in	in	in	in	in	in	in
Lost Johnny Point CG	3515	in	in	in	in	in	in	in	in	in	in
Riverside	3507	in	in	in	in	in	in	in	in	in	in
Abbot Bay	3430	in	in	in	in	in	in	in	in	in	in
Full Pool = 3560 ft.											

Notes:
1-in = end of the boat ramp would be in the water so ramp would most likely be useable.
2-out = end of the boat ramp would be out of the water so ramp would probably not be useable.

Exhibit 4: Hungry Horse Reservoir Average Boat Ramp Days per Month

Boat Ramp Name	End of Ramp Elevation	May		June		July		August		September	
		HS	HV	HS	HV	HS	HV	HS	HV	HS	HV
Doris Creek	3545	0.7	3.0	18.9	19.9	30.5	30.6	18.7	18.7	0.0	0.0
Canyon Creek	3542	1.5	4.3	20.9	22.0	30.6	30.6	26.6	26.6	0.4	0.1
Murray Bay CG	3540	2.0	5.2	22.2	23.1	30.6	30.6	30.6	30.6	3.6	0.3
Lost Johnny Camp	3536	3.1	7.6	24.3	24.9	31.0	31.0	30.7	30.6	28.8	28.8
Lid Creek CG	3529	6.3	13.4	26.8	27.1	31.0	31.0	31.0	31.0	30.0	30.0
Emery Bay CG	3527	7.4	14.4	27.3	27.6	31.0	31.0	31.0	31.0	30.0	30.0
Devil's Corkscrew CG	3517	14.2	20.1	28.7	28.9	31.0	31.0	31.0	31.0	30.0	30.0
Lost Johnny Point CG	3515	15.7	21.4	28.9	29.0	31.0	31.0	31.0	31.0	30.0	30.0
Riverside	3507	20.8	24.4	29.4	29.4	31.0	31.0	31.0	31.0	30.0	30.0
Abbot Bay	3430	31.0	31.0	30.0	30.0	31.0	31.0	31.0	31.0	30.0	30.0
Number of Useable Days		**102.7**	**144.8**	**257.4**	**261.7**	**308.7**	**308.7**	**292.6**	**292.5**	**212.8**	**209.3**

Exhibit 5: Flathead Lake Average End of Month Boat Ramp In/Out Analysis

Boat Ramp Name	End of Ramp Elevation (feet)	May		June		July		August		September	
		HS	HV	HS	HV	HS	HV	HS	HV	HS	HV
Month End Average Stage (feet)		2890	2890	2893	2893	2893	2893	2893	2893	2892	2892
Ducharme	2893	out[2]	out	out	out	out	out	out	out	out	out
Arrowhead Park and Marina	2891	out	out	in[1]	in	in	in	in	in	in	in
Marina Cay Resort and Conference Center	2891	out	out	in	in	in	in	in	in	in	in
Averills Ranch	2891	out	out	in	in	in	in	in	in	in	in
Bigfork	2890	in	in	in	in	in	in	in	in	in	in
Finley Point	2890	in	in	in	in	in	in	in	in	in	in
Bayshore Resort	2887	in	in	in	in	in	in	in	in	in	in
Walstead	2885	in	in	in	in	in	in	in	in	in	in
Woods Bay	2884	in	in	in	in	in	in	in	in	in	in
Elmo	2883	in	in	in	in	in	in	in	in	in	in
Full Pool = 2893 ft.											

Notes:
1-out = end of the boat ramp would be out of the water so ramp would probably not be useable.
2-in = end of the boat ramp woulb be in the water so ramp would most likely be useable.

Exhibit 6: Flathead Lake Average Boat Ramp Days per Month

Boat Ramp Name	Ramp Elevation (feet)	May		June		July		August		September	
		HS	HV	HS	HV	HS	HV	HS	HV	HS	HV
Ducharme	2893	0.0	0.0	11.7	12.3	25.2	25.6	27.8	28.2	0.9	0.9
Arrowhead Park and Marina	2891	1.2	1.6	24.9	25.2	28.5	29.2	29.5	29.7	29.5	29.5
Marina Cay Resort and Conference Center	2891	1.2	1.6	24.9	25.2	28.5	29.2	29.5	29.7	29.5	29.5
Averills Ranch	2891	1.2	1.6	24.9	25.2	28.5	29.2	29.5	29.7	29.5	29.5
Bigfork	2890	4.1	5.2	29.5	29.7	29.6	29.8	30.3	30.3	30.0	30.0
Finley Point	2890	4.1	5.2	29.5	29.7	29.6	29.8	30.3	30.3	30.0	30.0
Bayshore Resort	2887	25.0	24.4	30.3	30.3	31.0	31.0	31.0	31.0	30.0	30.0
Walstead	2885	30.6	30.2	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Woods Bay	2884	31.2	31.1	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Elmo	2883	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Number of Useable Days		**130.0**	**132.2**	**267.0**	**268.9**	**295.3**	**297.9**	**302.2**	**303.4**	**270.8**	**270.8**

Exhibit 7: Lake Pend d'Oreille Average End of Month Boat Ramp In/Out Analysis

Boat Ramp Name	End of Ramp Elevation (feet)	May		June		July		August		September	
		HS	HV	HS	HV	HS	HV	HS	HV	HS	HV
Month End Average Stage (feet)		2059	2059	2062	2062	2062	2062	2062	2062	2061	2061
Beyond Hope Resort	2060	out[1]	out	in[2]	in	in	in	in	in	in	in
Island View Resort	2060	out	out	in	in	in	in	in	in	in	in
Springy Point Recreation Area	2059	in	in	in	in	in	in	in	in	in	in
Samowen Park	2056	in	in	in	in	in	in	in	in	in	in
Albeni Cove Recreation Area	2055	in	in	in	in	in	in	in	in	in	in
Garfield Bay	2055	in	in	in	in	in	in	in	in	in	in
Buttonhook	2055	in	in	in	in	in	in	in	in	in	in
Farragut State Park	2055	in	in	in	in	in	in	in	in	in	in
MacDonalds Hudson Bay Resort	2054	in	in	in	in	in	in	in	in	in	in
Trestle Creek Recreation Area	2054	in	in	in	in	in	in	in	in	in	in
Idaho Country Resorts	2053	in	in	in	in	in	in	in	in	in	in
Bitter End Marina	2052	in	in	in	in	in	in	in	in	in	in
East Hope	2049	in	in	in	in	in	in	in	in	in	in
Full pool = 2063.5 ft.											

Notes:
1-out = end of the boat ramp would be out of the water so ramp would probably not be useable.
2-in = end of the boat ramp woulb be in the water so ramp would most likely be useable.

Exhibit 8: Lake Pend d'Oreille Average Boat Ramp Days per Month

Boat Ramp Name	Boat Ramp Elevation (feet)	May		June		July		August		September	
		HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Beyond Hope Resort	2060	2.9	3.1	18.9	19.5	31.4	31.4	31.4	31.4	30.4	30.4
Island View Resort	2060	2.9	3.1	18.9	19.5	31.4	31.4	31.4	31.4	30.4	30.4
Springy Point Recreation Area	2059	4.6	4.9	25.4	26.0	31.4	31.4	31.4	31.4	30.4	30.4
Samowen Park	2056	23.9	23.2	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Albeni Cove Recreation Area	2055	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Garfield Bay	2055	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Buttonhook	2055	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Farragut State Park	2055	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
MacDonalds Hudson Bay Resort	2054	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Trestle Creek Recreation Area	2054	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Idaho Country Resorts	2053	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
Bitter End Marina	2052	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	30.4
East Hope	2049	31.4	31.4	30.4	30.4	31.4	31.4	31.4	31.4	30.4	31.4
Number of Useable Days		**316.9**	**316.9**	**367.2**	**369.0**	**408.2**	**408.2**	**408.2**	**408.2**	**395.2**	**396.2**

Exhibit 9: Lake Roosevelt Average End of Month Boat Ramp In/Out Analysis

Boat Ramp Name	End of Ramp Elevation	May						June						July						August						September					
		LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV
		1254	1253	1254	1253	1254	1253	1287	1287	1287	1287	1287	1287	1288	1288	1288	1288	1288	1288	1280	1280	1280	1280	1280	1280	1290	1290	1290	1290	1290	1290
Jones Bay	1282	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	out	out	out	out	out	out	in	in	in	in	in	in
Hawk Creek	1281	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	out	out	out	out	out	out	in	in	in	in	in	in
Marcus Island	1281	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	out	out	out	out	out	out	in	in	in	in	in	in
Evans	1280	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
North Gorge	1280	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Napoleon Bridge	1280	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Snag Cove Camp	1277	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
China Bend	1277	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Crescent Bay	1265	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Daisy	1265	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
French Rocks	1265	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Two Rivers (marina)	1260	out	out	out	out	out	out	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Hansen Harbor	1253	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Bradbury Beach	1251	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Barnaby Island	1251	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Gifford	1249	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Fort Spokane	1247	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Lincoln Mill	1245	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Porcupine Bay	1243	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Kettle Falls (marina)	1234	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Hunters Camp	1230	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Keller Ferry (marina)	1229	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Seven Bays (marina)	1227	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Spring Canyon (marina)	1222	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
Full Pool = 1290 ft.																															

Notes:
1-out = end of the boat ramp would be out of the water so ramp would probably not be useable.
2-in = end of the boat ramp would be in the water so ramp would most likely be useable.

Exhibit 10: Lake Roosevelt Average Boat Ramp Days per Month

Boat Ramp Name	End of Ramp Elevation (feet)	May						June						July						August						September					
		LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV	LS+HS	LV+HV	LS1+HS	LV1+HV	LS2+HS	LV2+HV
Jones Bay	1282	4	4	4	4	4	4	26.5	26.0	26.5	26.0	26.5	26.0	31.0	31.0	31.0	31.0	31.0	31.0	5	5	6	6	6	5	30.0	30.0	30.0	30.0	30.0	30.0
Hawk Creek	1281	4	4	4	4	4	4	26.5	26.5	26.5	26.5	26.5	26.5	31.0	31.0	31.0	31.0	31.0	31.0	5	5	6	6	6	6	30.0	30.0	30.0	30.0	30.0	30.0
Marcus Island	1281	4	4	4	4	4	4	26.5	26.5	26.5	26.5	26.5	26.5	31.0	31.0	31.0	31.0	31.0	31.0	5	5	6	6	6	6	30.0	30.0	30.0	30.0	30.0	30.0
Evans	1280	7	6	7	6	7	6	27.7	27.7	27.7	27.7	27.7	27.7	31.0	31.0	31.0	31.0	31.0	31.0	25	25	25	25	25	25	30.0	30.0	30.0	30.0	30.0	30.0
North Gorge	1280	7	6	7	6	7	6	27.7	27.7	27.7	27.7	27.7	27.7	31.0	31.0	31.0	31.0	31.0	31.0	24.7	24.7	24.7	24.7	24.7	24.7	30.0	30.0	30.0	30.0	30.0	30.0
Napoleon Bridge	1280	7	6	7	6	7	6	27.7	27.7	27.7	27.7	27.7	27.7	31.0	31.0	31.0	31.0	31.0	31.0	24.7	24.7	24.7	24.7	24.7	24.7	30.0	30.0	30.0	30.0	30.0	30.0
Snag Cove Camp	1277	8	8	8	8	8	8	27.7	27.7	27.7	27.7	27.7	27.7	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
China Bend	1277	8	8	8	8	8	8	27.7	27.7	27.7	27.7	27.7	27.7	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Crescent Bay	1265	11	11	11	11	11	11	28.8	28.8	28.8	28.8	28.8	28.8	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Daisy	1265	11	11	11	11	11	11	28.8	28.8	28.8	28.8	28.8	28.8	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
French Rocks	1265	11	11	11	11	11	11	28.8	28.8	28.8	28.8	28.8	28.8	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Two Rivers (marina)	1260	14	12	14	12	14	12	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Hansen Harbor	1253	16	16	16	15	16	15	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Bradbury Beach	1251	16	16	16	16	16	16	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Barnaby Island	1251	16	16	16	16	16	16	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Gifford	1249	17	17	17	17	17	17	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Fort Spokane	1247	18	17	18	17	18	17	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Lincoln Mill	1245	18	18	18	18	18	18	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Porcupine Bay	1243	18	18	18	18	18	18	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Kettle Falls (marina)	1234	25	24	25	24	25	24	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Hunters Camp	1230	25	25	25	25	25	25	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Keller Ferry (marina)	1229	27	27	27	27	27	27	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Seven Bays	1227	27	27	27	27	27	27	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Spring Canyon (marina)	1222	27	27	27	27	27	27	30.0	30.0	30.0	30.0	30.0	30.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	30.0	30.0	30.0	30.0	30.0	30.0
Number of useable days		**349**	**337**	**349**	**336**	**349**	**336**	**695**	**694**	**695**	**694**	**695**	**694**	**744**	**744**	**744**	**744**	**744**	**744**	**647**	**647**	**650**	**650**	**650**	**650**	**720**	**720**	**720**	**720**	**720**	**720**